STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0094	1	21

REFERENCE: BR-0094

PROJECT: 67094

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	15+50-26+00	4	N/A
-RPA-	15+25-16+29	4	N/A
-RPB-	10+00-11+25	4	N/A
-RPC-	10+00-12+00	4	N/A
-RPD-	12+08-14+07	4	N/A

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	18+00-25+00	5-9
-RPA-	15+50	10
-RPB-	10+50	11
-RPC-	11+00	12
-RPD-	13+00	13

APPENDICES

APPENDIX	TITLE	SHEETS
A	LAB RESULTS	14-17
B	BORE LOG	18-19

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *ROCKINGHAM*

PROJECT DESCRIPTION *BRIDGE 780069 ON NC 770 OVER US 220*

INVENTORY

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE 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

BRECCIA

R. WESSINGER

D. HARRIS

INVESTIGATED BY *F&ME CONSULTANTS*

DRAWN BY *R. LAWRENCE, P.E.*

CHECKED BY *A. SHANNON, P.E.*

SUBMITTED BY *A. SHANNON, P.E.*

DATE *MAY 2022*

Prepared in the Office of:

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DocuSigned by:

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06/13/2022

SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
BR-0094	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 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 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 PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
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 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	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 SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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, DPT, 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
- [X] CME-550X
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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:

ELEVATION: FEET

NOTES:

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DATE: 8-15-14

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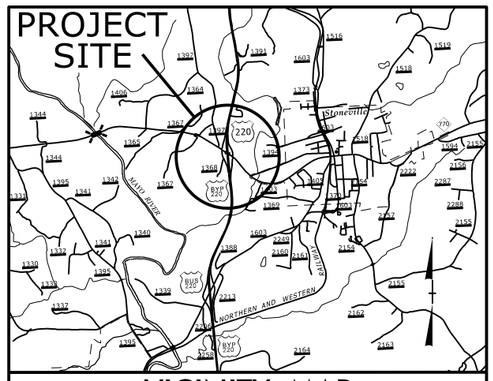
TIP PROJECT: BR–0094

CONTRACT:

See Sheet 1A For Index of Sheets
See Sheet 1B For Symbology Sheet



VICINITY MAP

DESIGN RECOMMENDATION PLAN SET

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

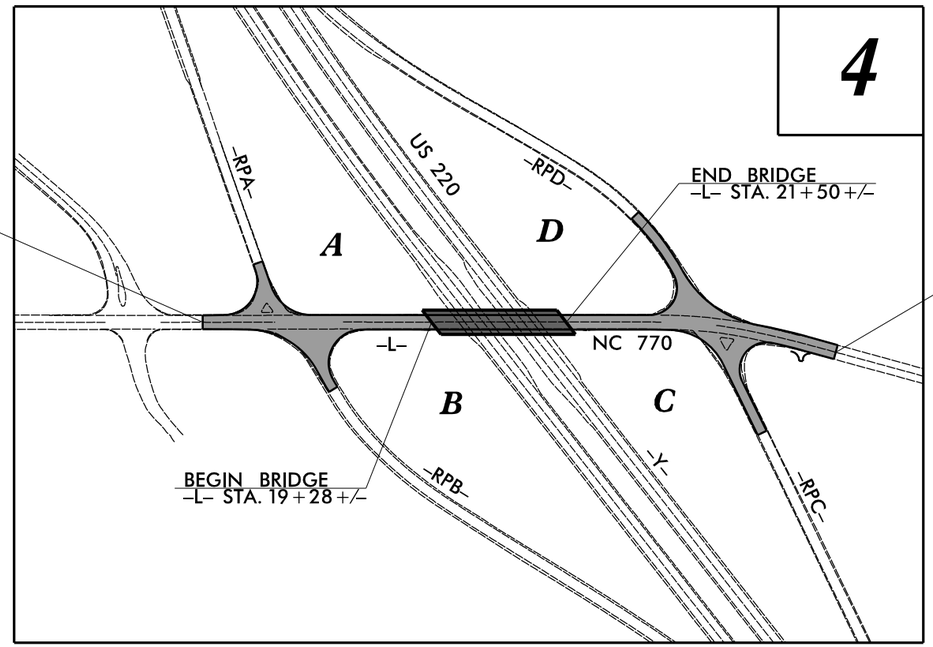
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR–0094	3	21

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67094.1.1		PE
67094.2.1		RW/UTIL
67094.3.1		CONST

LOCATION: BRIDGE 780069 ON NC 770 OVER US 220

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURE

NAD 83 - NA 2011



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES
THIS IS NOT A CONTROL OF ACCESS FACILITY
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

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2023 = 3,554
ADT 2045 = 4,400
K = 9%
D = 75%
T = 10% *
V = 50 MPH
* TTST = 4% DUAL = 6%
FUNC CLASS = MAJOR COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR–0094 = 0.157 MILES

LENGTH STRUCTURES TIP PROJECT BR–0094 = 0.042 MILES

TOTAL LENGTH TIP PROJECT BR–0094 = 0.199 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MAY 13, 2022

LETTING DATE: JANUARY 17, 2023

KRISTY W. ALFORD, PE
PROJECT MANAGER

DAVID J. CLODGO, PE, PMP
ROADWAY GROUP LEAD

SHERRI E. CALHOUN, PE
ROADWAY TEAM LEAD

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

June 10, 2022

Mr. John L. Pilipchuk, L.G., P.E.
Geotechnical Engineering Unit (GEU)
1589 Mail Service Center
Raleigh, NC. 27699 -1589

Re.: WBS ELEMENT: 67094.1.1
T.I.P. NO.: BR-0094
PROJECT ID: 39074
COUNTY: Rockingham
DESCRIPTION: Replace Bridge 78069 on NC 770 over US 220
FME Project No.: G6300.001

SUBJECT: Roadway Inventory Report

Dear Mr. Pilipchuk:

F&ME Consultants, Inc (FME) has completed the roadway investigation and submit the following recommendations for the above referenced project.

Project Description

The project is located in Rockingham County just west of the city of Stoneville, North Carolina. The project is identified by the NCDOT as TIP Project No. BR-0094 and will consist of replacing the existing four-span steel girder bridge with a new two-span precast/prestressed (PC/PC) concrete AASHTO girder bridge and raise profile approximately six (6) to eight (8) feet along centerline. The project will also realign the two existing at-grade intersections on either end of the bridge.

The preliminary project plans show that fills will all be associated with a raising of the mainline (-L-) profile and maximum fill heights will be on the order of ten (10) to fifteen (15) feet. Cuts are associated with creating new roadside drainage ditches and will have a maximum cut height of ten (10) feet approximately fifty (50) feet long near Station 10+25.00 on the -RPB- line.

A geotechnical investigation consisting of soil test borings was performed by F&ME Consultants, Inc. (FME) between April 13 and April 19, 2022. During this time, a total of fourteen (14) soil borings were advanced with an ATV-mounted CME-550 drill rig equipped with an automatic hammer. Six of the borings were drilled for the proposed bridge replacement and ten (10) borings were drilled for the associated roadway work (-L-). The remaining four borings were drilled at the intersections on each side of the bridge. Disturbed representative soil samples were recovered from the borings as they were advanced, visually classified in the field, and brought to FME's soil laboratory for laboratory testing.

As part of this study, the following alignments were investigated as part of this study:

LINE	STATIONS (±)	OFFSETS
-L-	15+50.00 to 26+00.00	LT to RT
-RPA-	15+25.00 to 16+79.78	LT to RT
-RPB-	10+00.00 to 11+25.00	LT to RT
-RPC-	10+00.11 to 12+00.00	LT to RT
-RPD-	12+00.00 to 14+07.24	LT to RT

Physiography and Geography

The project site lies within the region known as the Piedmont Physiographic Providence. Based upon the Geologic Map of North Carolina, 1985, the project site is mapped as at/near the contact of Late Proterzoic Metamorphosed Granitic Rock and Meta-Graywacke and Muscovite-Biotite Schist. The virgin site soils are residual soil (saprolite) derived from weathering in place of the parent bedrock.

The project corridor is a rural portion of the county with thick vegetation and few commercial businesses outside the project limits. The existing topography is gently rolling hills with the majority of the site relief being the bridge approach embankments. The preliminary project plans show that fills will all be associated with a raising of the mainline (-L-) profile and maximum fill heights will be on the order of ten (10) to fifteen (15) feet. Cuts are associated with creating new roadside drainage ditches and will have a maximum cut height of ten (10) feet approximately fifty (50) feet long near Station 10+25.00 on the -RPB- line.

Soil Properties

The subsurface conditions discussed below are based upon the soils identified in the borings, observations made of the surficial soils, where exposed, and using normally excepted geotechnical engineering judgements. The transitions between soil strata are generally less defined than those presented on the Bore Logs. As soil sampling only obtains a small representation of the actual soil conditions, at times it may not be sufficient to accurately determine the origins of the soil strata. Even though individual soil test borings are representative of the overall subsurface conditions at the location of the test boring, it should be noted that there may be differences in the soils at other locations.

Soils within the overall area of this project have been divided into three categories: roadway embankment, residual soil, and weathered bedrock.

Roadway Embankment:

Roadway Embankment (RE) soils embankment soils were encountered along the following alignments at the approximate stationing:

LINE	STATIONS (±)	OFFSETS
-L-	17+50.00 to 18+75.00	LT to RT

The RE materials identified in the test borings generally consisted of loose to very dense,

brownish- yellow/brown/red/yellowish-red, moist silty fine sand (A-2-4), stiff, yellowish-red, moist fine sandy clay (A-7-5/A-7-6), and firm to stiff, red to brown, moist fine sandy silt (A-4).). Laboratory testing of the indicates the PI's range from 18 to 38 for the A-7-5/A-7-6 soils and 9 for the A-4 materials.

Residual Soils:
Residual Soils (RS) throughout the project limits were derived from the in-place weathering of the parent bedrock. The majority of the of the RS materials identified in the test borings consisted of loose to very dense, brownish- yellow/brown/red/yellowish-red, moist silty fine sand (A-2-4), stiff, yellowish-red, moist fine sandy clay (A-7-5/A-7-6), and firm to stiff, red to brown, moist fine sandy silt (A-4). Laboratory testing of the indicates the PI's range from 18 to 38 for the A-7-5/A-7-6 soils and 9 for the A-4 materials.

LINE	STATIONS (±)	OFFSETS
-L-	15+50.00 to 26+00.00	LT to RT
-RPA-	15+25.00 to 16+79.78	LT to RT
-RPB-	10+00.00 to 11+25.00	LT to RT
-RPC-	10+00.11 to 12+00.00	LT to RT
-RPD-	12+00.00 to 14+07.24	LT to RT

Weathered Rock:
Weathered Rock (WR) was identified in the bridge test borings along the -L- alignments indicated below. WR is defined as residual geomaterials with a Standard Penetration Test (SPT) blow count (N-value) of greater than 100 blows per foot of drive. WR was identified within the project limits between Elevations 763 feet and 782 feet (msl) between the following stations.

LINE	STATIONS (±)	OFFSETS
-L-	24+60.00 to 25+60.00	LT to RT

Groundwater:
Groundwater levels were measured in the test boring immediately after completion of the test boring and, where the bore hole remained open, 24 hours after completion. At the time of drilling, groundwater was not observed in any of the borings performed for this study. It should be noted that perched or transient groundwater can be encountered after recent precipitation at or upgradient of the project site and in the wetter months of the year.

Areas of Special Geotechnical Interest

High Plastic Soils:
The following areas were identified to have potentially high plastic soils with Plastic Indices (PI) of greater than 25 but less than 35, and high plastic soils with a PI greater than 35 within the project limits. High plasticity soils have the potential to cause subgrade issues during construction and can lead to embankment stabilities especially if exposed to free water and can require undercutting to provide a stable subgrade:

LINE	STATIONS (±)	OFFSETS
-L-	18+50.00 to 25+50.00	LT to RT

Soil/Very Loose Soils:
The following areas were identified to have soils which are in a soft or very loose state. Soft/very loose soils have the potential to cause subgrade stability problems, embankment stability issues, and long-term settlement problems. The borings for the new bridge will not impact the roadway construction but are still identified as an area of special geotechnical interest for this study.

LINE	STATIONS (±)	OFFSETS
-L-	16+40.00 to 22+30.00	LT to RT
-RPA-	15+25.00 to 16+79.78	LT to RT
-RPB-	10+00.00 to 11+25.00	LT to RT
-RPC-	10+00.11 to 12+00.00	LT to RT
-RPD-	12+00.00 to 14+07.24	LT to RT

We thank you for the opportunity to prepare this study for this project and look forward to providing continued support of this and future projects.

Sincerely,

F&ME Consultants, Inc.

DocuSigned by:
1A41AB989658497...

Adam Shannon, PE
Senior Vice President

DocuSigned by:
Robert Lawrence, PE GE
6FC3554635DF436...

Robert Lawrence, PE GE
Senior Geotechnical Engineer

PROJECT REFERENCE NO.	SHEET NO.
BR-0094	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 8/17/99

-L-
PI Sta 24+17.60
Δ = 15° 22' 59.8" (RT)
D = 5° 59' 58.4"
L = 256.41'
T = 128.98'
R = 955.00'
SE = 0.06
RO = 150'
INC. = 25'

-RPD-
PI Sta 11+35.20
Δ = 15° 19' 28.1" (RT)
D = 10° 23' 41.0"
L = 147.43'
T = 74.16'
R = 551.20'

-RPD-
PI Sta 13+10.00
Δ = 28° 45' 31.8" (RT)
D = 14° 28' 07.1"
L = 198.77'
T = 101.52'
R = 396.00'

NAD 83 NA 2011

-RPB-
PI Sta 12+51.85
Δ = 28° 28' 44.2" (LT)
D = 10° 00' 00.0"
L = 284.79'
T = 145.40'
R = 572.96'

SEE SHEET 5 FOR PROFILE OF LINES -L-, -RPA- AND -RPB-.
SEE SHEET 6 FOR PROFILE OF LINES -RPC- AND -RPD-.

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P:\Vec\technical\G6300's\G6300.000 - NCDOT Geotechnical On-Call\G6300.001 - NC 770 Over US 220\From CG2\BR-0094\CADD_GEOTECH\PlanProf\BR0094_Rdy_psh04.dgn
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PROJ. REFERENCE NO.	SHEET NO.
BR-0094	5

0 2.5 5

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

825 820 815 810 805 800 795

Ⓐ -ROADWAY EMBANKMENT- LOOSE, MOIST, REDDISH YELLOW, SILTY FINE SAND (A-2-4)

2:1

-ROADWAY EMBANKMENT- Ⓐ

-RESIDUAL-

MEDIUM STIFF, MOIST, RED TO BROWNISH YELLOW, FINE SANDY SILT (A-4), WITH GRAVEL SIZED ROCK FRAGMENTS

2:1

18+50.00

Ⓐ -ROADWAY EMBANKMENT- LOOSE, MOIST, REDDISH YELLOW, SILTY FINE SAND (A-2-4)

L-1800
18+14
31' RT

2:1

-ROADWAY EMBANKMENT- Ⓐ

-RESIDUAL-

VERY LOOSE TO MEDIUM DENSE, MOIST, REDDISH YELLOW TO BROWN YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE ORGANICS

6 4 5 8 15

BT
DRY
FIAD
04/22

18+00.00

-L-

820 815 810 805 800 795 790 785

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

PROJ. REFERENCE NO.	SHEET NO.
BR-0094	6

0 2.5 5

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

830 825 820 815 810 805 800 795 790 785 780 775 770 765 760 755 750

Ⓐ -RESIDUAL- SOFT TO STIFF, MOIST, RED TO REDDISH YELLOW, FINE SANDY SILT AND SILT (A-4)

EBI-A
18+97
9' LT

EBI-B
19+12
22' RT

PAVEMENT

2:1

-RESIDUAL-
Ⓐ

2:1

5 9 5 6 10 15 53 69 34 18 29

9 4 3 4 4 8 16 14 39 100 29

LOOSE TO VERY DENSE, MOIST, REDDISH YELLOW, BROWNISH YELLOW, AND LIGHT BROWN, SILTY FINE SAND (A-2-4)

LIGHT BROWN, (GRANITIC ROCK) 100/.8

-WEATHERED ROCK-

60/0.1

BT
DRY
FIAD
04/22

BT
DRY
04/22

-CRYSTALLINE ROCK-
GRANITIC ROCK

19+00.00

-L-

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

6/23/16

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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	BR-0094	7

EB2-A
21+59
21' LT

EB2-B
21+87
23' RT

2:1

2:1

-RESIDUAL-

VERY LOOSE TO BROWN, SILTY FINE

DENSE, MOIST, YELLOWISH RED, BROWN, SAND (A-2-4), WITH MICA

GRAYISH BROWN AND LIGHT

-WEATHERED ROCK-
LIGHT BROWN, (GRANITIC ROCK)

	EB2-A	EB2-B
	4	7
	7	5
	15	8
	20	12
	28	15
	44	49
	41	46
	100/.8	100/.8
	100/.8	100/.9
		100/.6

BT
DRY
04/22

BT
DRY
04/22

22+00.00

-L-

10-JUN-2022 13:52
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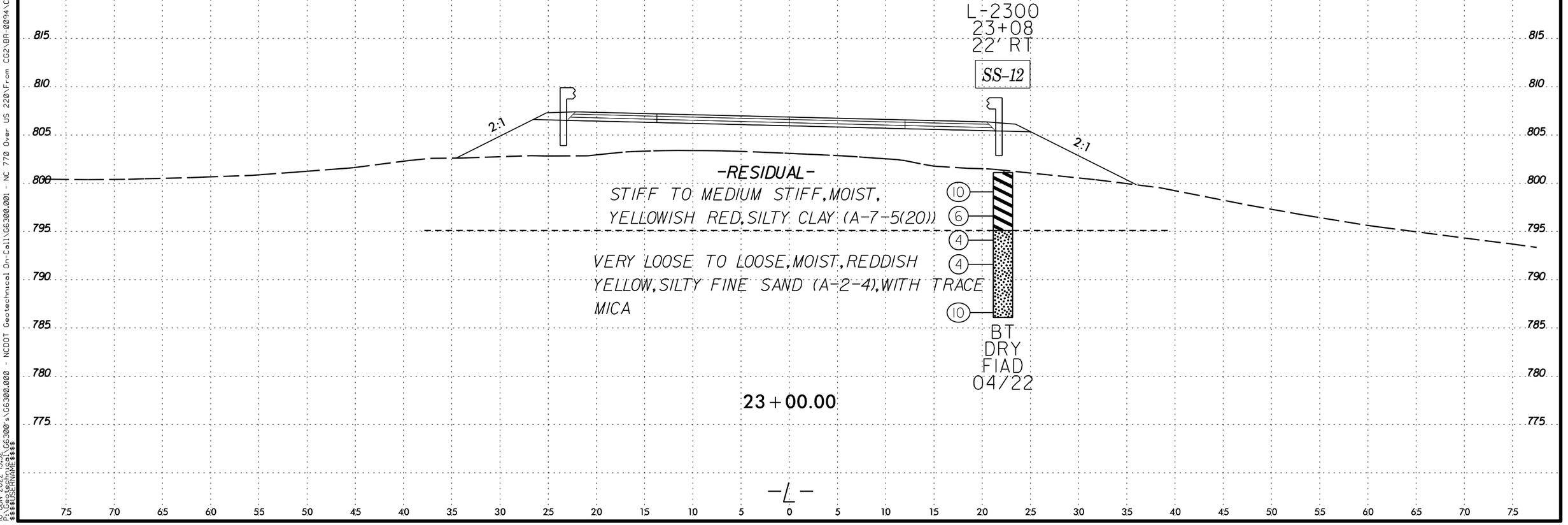
$$$$USERNAME$$$$

6/23/16

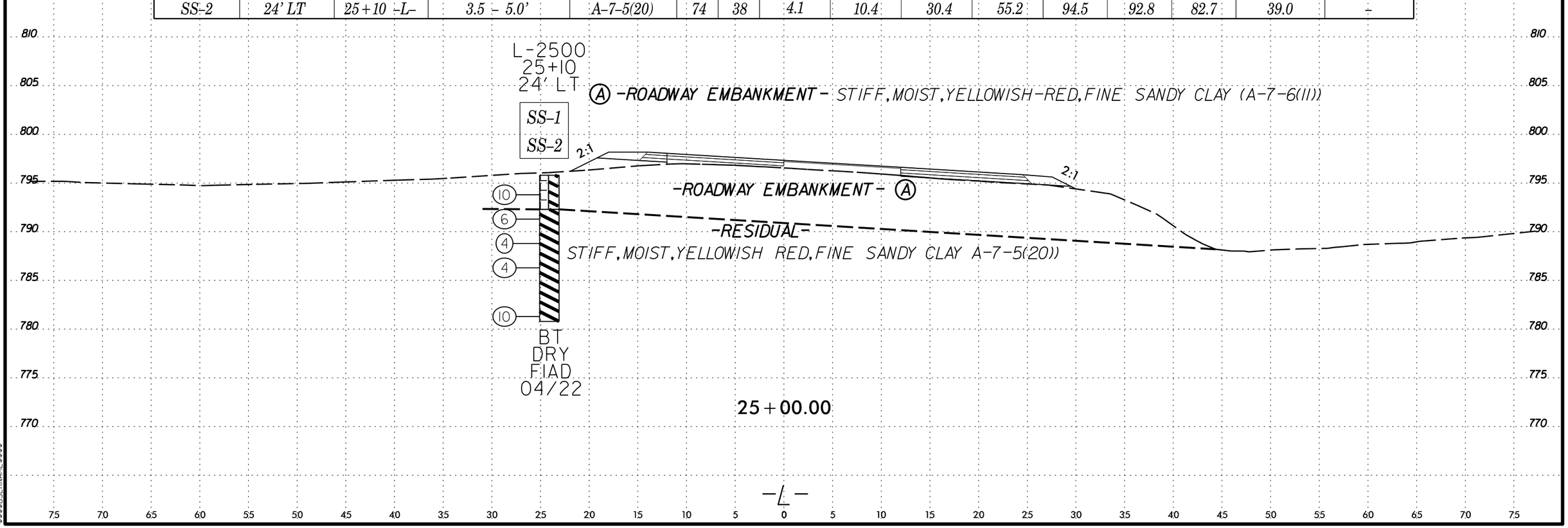
SOIL TEST RESULTS

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-12	22' RT	23+08 -L-	1.0 - 2.5'	A-7-5(20)	62	26	10.3	18.8	29.5	41.3	96.6	91.5	71.5	71.5	-



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-1	24' LT	25+10 -L-	1.0 - 2.5'	A-7-6(11)	43	18	12.3	21.8	22.7	43.2	95.9	89.9	67.0	26.7	-
SS-2	24' LT	25+10 -L-	3.5 - 5.0'	A-7-5(20)	74	38	4.1	10.4	30.4	55.2	94.5	92.8	82.7	39.0	-



0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	BR-0094	10

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

840
835
830
825
820
815
810
805
800
795
790

Ⓐ -RESIDUAL- MEDIUM STIFF, MOIST, YELLOWISH RED, FINE SANDY SILT (A-4), WITH MICA

RPA-1550
15+61
25' RT

4:1

4:1

Ⓐ -RESIDUAL-

7
4
4
4
6

VERY LOOSE TO LOOSE, MOIST, YELLOWISH RED TO BROWNISH YELLOW, SILTY FINE SAND (A-2-4)

BT
DRY
04/22

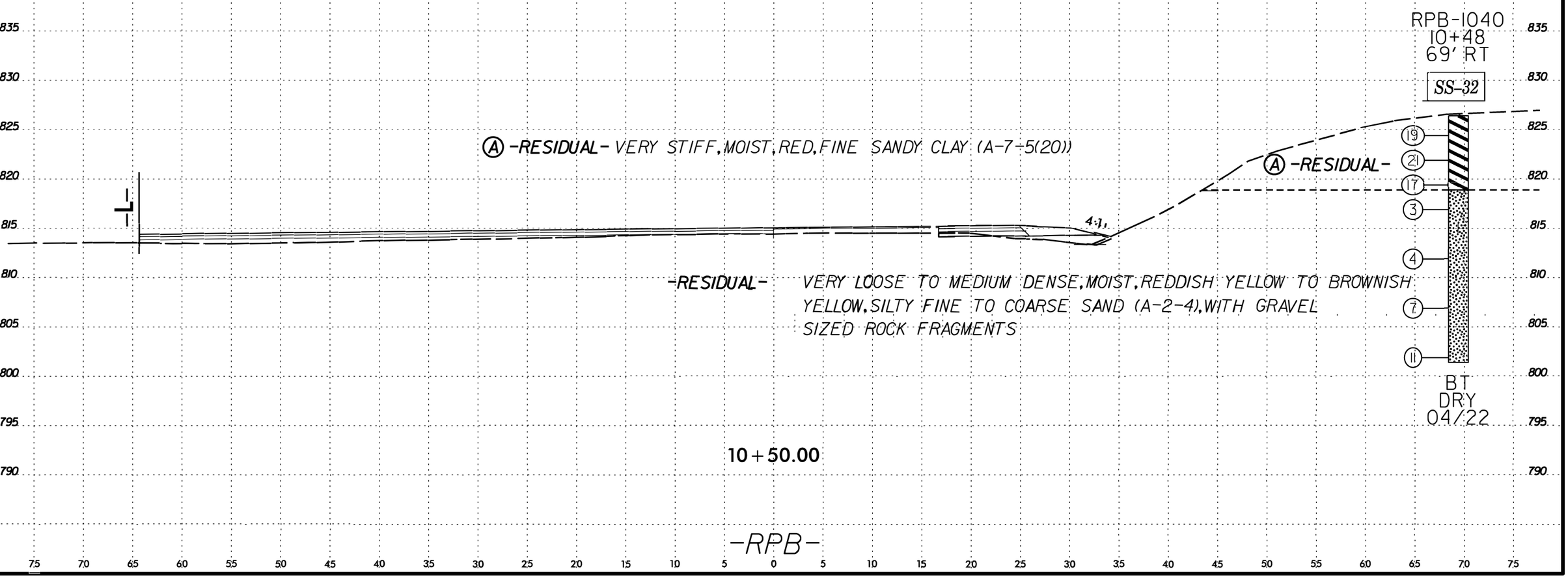
15+50.00

-RPA-

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

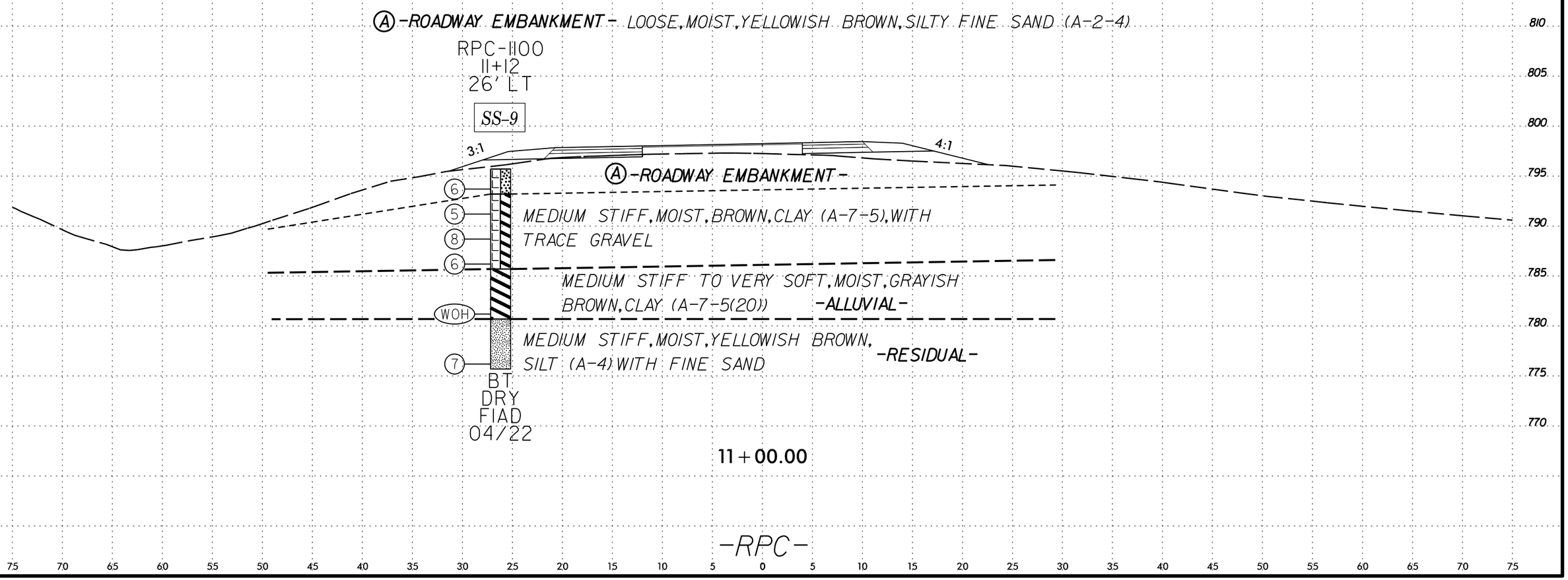
SOIL TEST RESULTS

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-32	69' RT	10+48 -RPA-	1.0 - 2.5'	A-7-5(20)	71	31	7.5	18.1	19.2	55.3	99.7	97.3	76.9	26.5	-



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-9	26' LT	11+12 -RPC-	8.5 - 10.0'	A-7-5(20)	68	23	14.3	16.4	23.3	46.0	98.0	89.6	71.0	34.4	-



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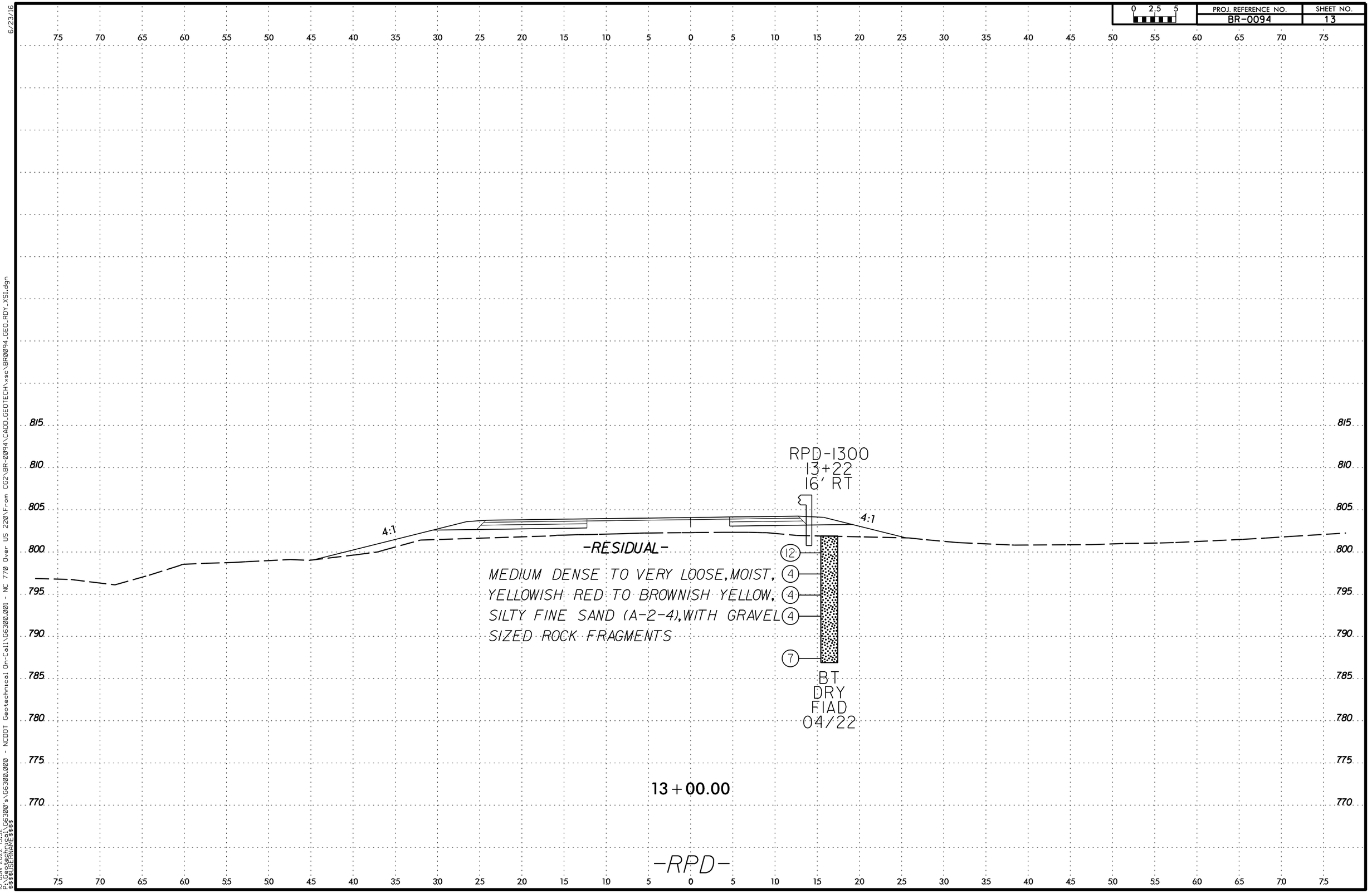
	BR-0094	13



PROJECT REFERENCE NO.	SHEET NO.
BR–0094	14

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A
LAB RESULTS

REFERENCE: BR–0094

PROJECT: 67094

Prepared in the Office of:

F&ME CONSULTANTS, INC.
1613 PARIS AVE, STE A
PORT ROYAL, SC 29935

F&ME CONSULTANTS, INC.
3112 DEVINE STREET, COLUMBIA SC 29205
(CERT No.: 130-0212)

Project Replace Bridge 78069 on NC 770 over US 220 **T.I.P. No.** BR-0094 **County** Rockingham **F&ME Job No.** G6300.01

Date Received 4/25/2022 **Date Reported** 5/2/2022 **Tested By** J. Hiers **CERT No.:** 130-04-0212

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL (ft.)	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	24 ft LT	25+10	1.0 - 2.5	A-7-6(11)	43	18	12.3%	21.8%	22.7%	43.2%	95.9%	89.9%	67.0%	26.7%	ND
SS-2	24 ft LT	25+10	3.5 - 5.0	A-7-5(20)	74	38	4.1%	10.4%	30.4%	55.2%	94.5%	92.8%	82.7%	39.0%	ND
SS-9	26 ft LT	11+12	8.5 - 10.0	A-7-5(20)	68	23	14.3%	16.4%	23.3%	46.0%	98.0%	89.6%	71.0%	34.4%	ND
SS-12	22 ft RT	23+08	1.5 - 3.0	A-7-5(20)	62	26	10.3%	18.8%	29.5%	41.3%	96.6%	91.5%	71.5%	26.1%	ND
SS-32	69 ft RT	10+48	1.5 - 3.0	A-7-5(20)	71	31	7.5%	18.1%	19.2%	55.3%	99.7%	97.3%	76.9%	26.5%	ND
SS-40	106 ft LT	18+64	3.5 - 5.0	A-4(4)	36	9	20.2%	26.4%	31.0%	22.4%	98.8%	89.0%	57.3%	18.1%	ND

REV 05/2022

M & T Form 503

F&ME CONSULTANTS, INC.
3112 DEVINE STREET, COLUMBIA SC 29205
(CERT No.: 130-0212)

Project	Replace Bridge 78069 on NC 770 over US 220	**T.I.P. No.**	BR-0094
County	Rockingham	**F&ME Job No.**	G6300.01
Date Received	4/25/2022	**Date Reported**	5/2/2022
Tested By	J. Hiers	**CERT No.:**	130-04-0212

TEST RESULTS

Proj. Sample No.		**Bulk-1**					
Lab. Sample No.		**22-1286**					
Retained #4 Sieve	%	**0%**					
Passing #10 Sieve	%	**99%**					
Passing #40 Sieve	%	**93%**					
Passing #200 Sieve	%	**63.1%**					

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	**14.5%**					
Fine Sand Ret - #270	%	**27.2%**					
Silt 0.05 - 0.005 mm	%	**34.0%**					
Clay < 0.005 mm	%	**24.3%**					
Passing #40 Sieve	%	**93.8%**					
Passing #200 Sieve	%	**63.7%**					

L. L.		**41**					
P. I.		**8**					
AASHTO Classification		**A-5(5)**					
Natural Moisture Content	%	**25.7%**					
Organic Impurities	%	**ND**					
Boring No.		**Bulk-1**					
Depth (ft.)		**1.0**					
	to	**3.0**					

Laboratory Manager

PROJECT REFERENCE NO.	SHEET NO.
BR-0094	17

LAB RESULTS

REV 08/2021

CALIFORNIA BEARING RATIO (CBR)
AASHTO T193

SAMPLE INFORMATION

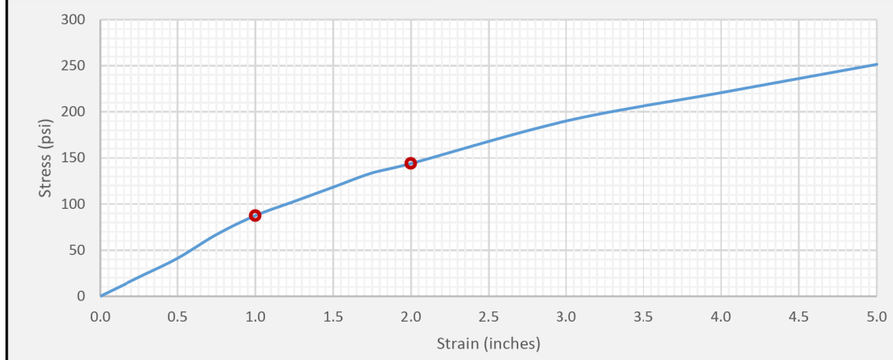
Project Name	Replace Bridge 78069 on NC 770 over US 200			Project No.	BR-0094
Sample Location	Bulk-1 (Specimen B)			FME Lab ID	22-0430
Soil Description	A-5(5)			Depth/Elev.	1.0 - 3.0 ft.
Date Sampled	--	Sampled By:	FME	Date Received	4/25/22
Date Test Began	4/28/22	Date Completed	5/2/22	Tested By	JWW

MOLDING CHARACTERISTICS

Method	AASHTO T99 - Method A	% Retained on 3/4" Sieve	0%
Max Dry Density (lb/ft^3)	100.2	Optimum Moisture Content (%)	21.4
Soak Time (hr)	96	Surcharge Weight (lb)	10.0

TESTING RESULTS

CBR at 0.10-inch penetration	CBR at 0.20-inch penetration
8.7	**9.6**



Before Soaking	
Dry Density (lb/ft^3)	100.4
Moisture Content	21.1%
Percent Compaction	100.2%
Percent Shrink/Swell	--

After Soaking	
Dry Density (lb/ft^3)	97.0
Moisture Content (Top 1")	26.5%
Percent Compaction	96.8%
Percent Shrink/Swell	0.8%

ADDITIONAL COMMENTS

Desired Percent Compaction = 100%

F&ME CONSULTANTS

F&ME Consultants, Inc.
3112 Devine Street, Columbia, SC 29205

Reviewed By

5/3/22
Date

REV 08/2021

CALIFORNIA BEARING RATIO (CBR)
AASHTO T193

SAMPLE INFORMATION

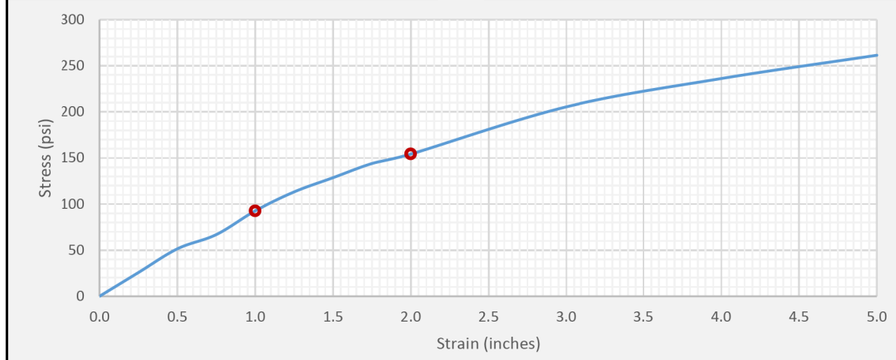
Project Name	Replace Bridge 78069 on NC 770 over US 200			Project No.	BR-0094
Sample Location	Bulk-1 (Specimen A)			FME Lab ID	22-1286
Soil Description	A-5(5)			Depth/Elev.	1.0 - 3.0 ft.
Date Sampled	--	Sampled By:	FME	Date Received	4/25/22
Date Test Began	4/28/22	Date Completed	5/2/22	Tested By	JWW

MOLDING CHARACTERISTICS

Method	AASHTO T99 - Method A	% Retained on 3/4" Sieve	0%
Max Dry Density (lb/ft^3)	100.2	Optimum Moisture Content (%)	21.4
Soak Time (hr)	96	Surcharge Weight (lb)	10.0

TESTING RESULTS

CBR at 0.10-inch penetration	CBR at 0.20-inch penetration
9.3	**10.3**



Before Soaking	
Dry Density (lb/ft^3)	99.6
Moisture Content	20.9%
Percent Compaction	99.4%
Percent Shrink/Swell	--

After Soaking	
Dry Density (lb/ft^3)	95.3
Moisture Content (Top 1")	28.1%
Percent Compaction	95.1%
Percent Shrink/Swell	0.8%

ADDITIONAL COMMENTS

Desired Percent Compaction = 100%

F&ME CONSULTANTS

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3112 Devine Street, Columbia, SC 29205

Reviewed By

5/3/22
Date

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PROJECT REFERENCE NO.	SHEET NO.
BR–0094	18

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX B
BORE LOG

REFERENCE: BR–0094

PROJECT: 67094

Prepared in the Office of:

F&ME CONSULTANTS, INC.
1613 PARIS AVE, STE A
PORT ROYAL, SC 29935

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67094.1.1	**TIP** BR-0094	**COUNTY** ROCKINGHAM	**GEOLOGIST** R. Wessinger	
SITE DESCRIPTION Bridge 780069 on NC 770 over US 220				**GROUND WTR (ft)**
BORING NO. L-1900	**STATION** 18+64	**OFFSET** 106 ft LT	**ALIGNMENT** L	**0 HR.** Dry
COLLAR ELEV. 791.2 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 990,527	**EASTING** 1,727,412	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRE9553 CME-550X 85% 03/11/2022		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D. Harris	**START DATE** 04/13/22	**COMP. DATE** 04/13/22	**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)
795										
										791.2 GROUND SURFACE 0.0
790	790.2	1.0	3	4	3	7		M		**RESIDUAL** Medium Stiff, Red, Sandy SILT (A-4(4))
	787.7	3.5	2	2	3	5	SS-40	18%		=> Yellowish Red
785	785.2	6.0	1	2	4	6		M		=> Brownish Yellow
	782.7	8.5	2	3	3	6		M		781.2 => with Gravel Sized Rock Fragments 10.0
										Boring Terminated at Elevation 781.2 ft In Residual Sandy Silt (A-4)