STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP6.R005	1	12

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *ROBESON*

PROJECT DESCRIPTION *BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP*

REFERENCE: *BP6.R005*

PROJECT: *N/A*

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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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

T. MILLER

M. HARTMAN

A. RODRIGUEZ

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *J. SWARTLEY*

CHECKED BY *S. MITCHELL*

SUBMITTED BY *J. DAILY*

DATE *OCTOBER 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 10/24/2022
F29CA6BB83F449F...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BP6.R005	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 / 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [X] D-50

ADVANCING TOOLS:
- [X] 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: BL-3 N: 378689 E: 1938695

ELEVATION: 183.76 FEET

NOTES: FIAD: FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
BP6.R005	3

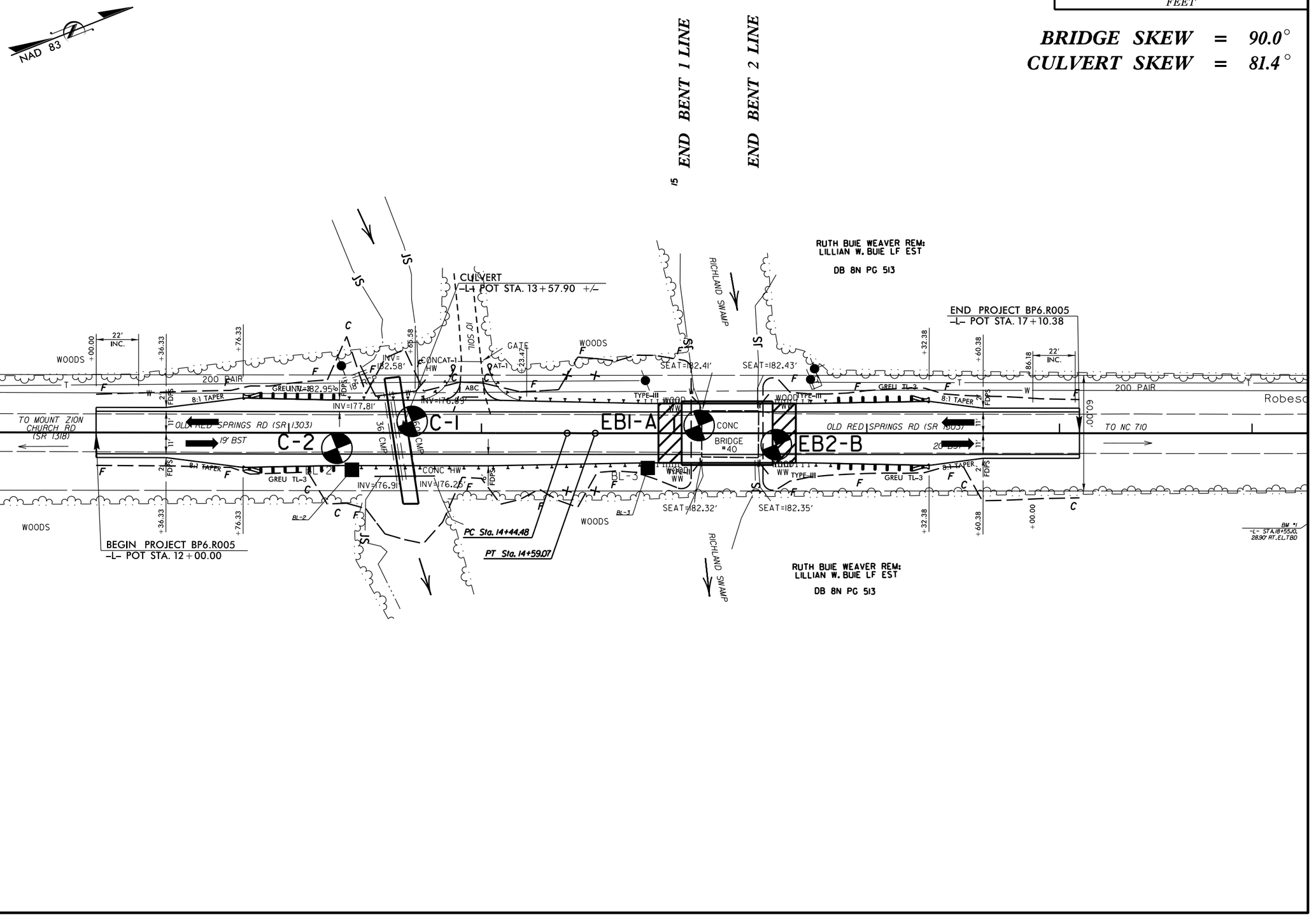
SITE PLAN

0 50 100

FEET

BRIDGE SKEW = 90.0°

CULVERT SKEW = 81.4°



5/14/99

PROJECT REFERENCE NO.	SHEET NO.
BP6.R005	4

PROFILE PROJECTED ALONG CENTERLINE OF –L–

0 50 100
FEET
VE = 5

BEGIN GRADE
–L– STA. 12+00.00
EL. 189.97'

PROPOSED GRADE

EXISTING GROUND

C-2
13+25
8' RT
-L-

C-1
13+64
6' LT
-L-

PAVEMENT

BEGIN BRIDGE
–L– STA 15+03.88
EL. 184.73'

EBI-A
15+13
4' LT
-L-
SS-29
SS-34
SS-37

EB2-B
15+53
6' RT
-L-
SS-13
SS-15
SS-18
SS-23

END BRIDGE
–L– STA 15+51.13
EL. 184.34'

BRIDGE NO. 40

PROPOSED GRADE

PAVEMENT

END GRADE
–L– STA. 17+10.38
EL. 183.02'

EXISTING GROUND

04/22

BT 04/22

BT 04/22

ROADWAY EMBANKMENT. V. LOOSE TO MED. DENSE, TAN, BROWN, AND ORANGE, SILTY AND CLAYEY FINE SAND, A-2-4 AND A-2-6, MOIST TO WET

ALLUVIAL.
VERY SOFT, GRAY AND DARK BROWN TO BLACK, SILTY CLAY, A-7-6, TRACE TO SOME WOOD, WET

LOOSE TO MED. DENSE, RED, BROWN, TAN, ORANGE, AND GRAY, FINE TO COARSE SAND, SILTY SAND, AND CLAYEY SAND, A-3, A-2-4, AND A-2-6, AND SOFT, GRAYISH BLACK, SANDY SILT, A-4, TRACE WOOD, WET

COASTAL PLAIN.
VERY SOFT TO STIFF, LIGHT BROWN AND GRAY TO DARK GRAY AND BLUEISH GRAY, SANDY AND SILTY CLAY, A-6 AND A-7-6, WET (BLACK CREEK FORMATION)

V. SOFT TO STIFF, BROWN AND GRAY, SANDY AND SILTY CLAY, A-6 AND A-7-6

V. LOOSE TO MED. DENSE, TAN AND GRAY, FINE TO COARSE SAND AND SILTY FINE TO COARSE SAND, A-3, A-1-b AND A-2-4, WET

V. LOOSE, GRAY, CLAYEY FINE TO MED. SAND, A-2-6, WET

MED. DENSE TO VERY DENSE, GRAY AND TAN, FINE TO COARSE SAND, SILTY SAND, AND CLAYEY SAND, A-3, A-1-b, A-2-4 AND A-2-6, WET (BLACK CREEK FORMATION)

Ⓐ **ROADWAY EMBANKMENT.**
V. LOOSE TO MED. DENSE, TAN, BROWN, AND ORANGE, SILTY AND CLAYEY FINE SAND, A-2-4 AND A-2-6, MOIST TO WET

Ⓑ **ALLUVIAL.**
V. LOOSE TO LOOSE, GRAY AND BROWN, SILTY AND CLAYEY FINE SAND, A-2-4 AND A-2-6, TRACE ROOTLETS, WET

Ⓒ **COASTAL PLAIN.**
MED. DENSE TO DENSE, GRAY AND TAN, SILTY SAND, A-2-4, WET (BLACK CREEK FORMATION)

MATCHLINE
48 29
Ⓒ
49 30
BT 04/22
BT 04/22

MATCHLINE

NOTE: EXISTING GROUND SURFACE PROFILE OF –L– CENTERLINE TAKEN FROM ELECTRONIC TIN FILE 770040_ls_tin.tin' DATED 2/15/22. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

190 180 170 160 150 140 130 120 110 100

12+00 13+00 14+00 15+00 16+00 17+00 18+00

5/14/99

0 20 40 FEET VE = 2	PROJECT REFERENCE NO.	SHEET NO.
	BP6.R005	5
	PROFILE PROJECTED ALONG C.L. OF CULVERT	

℄ -L- STA 13+58
SKEW = 81 DEGREES
PROPOSED 16ft7"X79' ALUMINUM PIPE ARCH CULVERT
GRADE POINT ELEV. = 186.64'

PROPOSED ALUMINUM PIPE ARCH CULVERT

EXISTING GROUND ALONG C.L. OF CULVERT

C-1 13+64 6' LT -L-

C-2 13+25 8' RT -L-

PAVEMENT

NWS = 181.5'

PROP. INV.=176.9'

PROP. INV.=176.0

BT 04/22

BT FIAD 04/22

Ⓐ ROADWAY EMBANKMENT, VERY LOOSE TO MED. DENSE, TAN, ORANGE AND BROWN, SILTY SAND AND CLAYEY SAND, A-2-4 & A-2-6, MOIST TO WET

Ⓑ ALLUVIAL, MED. DENSE, ORANGE AND BROWN, CLAYEY SAND, A-2-6, WET

Ⓒ ALLUVIAL, SOFT, GRAY, SILTY CLAY, A-7-6, WET

Ⓓ ALLUVIAL, LOOSE TO MED. DENSE, GRAY AND BROWN, SAND AND SILTY SAND, A-3 & A-2-4, WET

Ⓔ COASTAL PLAIN, MED. STIFF, BROWN AND GRAY, SANDY AND SILTY CLAY, A-6 & A-7-6, WET (BLACK CREEK FM.)

Ⓕ COASTAL PLAIN, LOOSE, TAN AND GRAY, SILTY SAND, A-2-4, WET (BLACK CREEK FM.)

VERY SOFT TO STIFF, BROWN AND GRAY, SILTY CLAY, A-7-5/A-7-6, WET

LOOSE, GRAY AND TAN, SAND AND SILTY SAND, A-3 & A-2-4, WET

NOTE: EXISTING GROUND SURFACE PROFILE OF CULVERT CENTERLINE TAKEN FROM ELECTRONIC TIN FILE 770040_ls_tin.tin' DATED 2/15/22. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

190 180 170 160 150 140

–50 00 50 100

6/23/16

0 5 10 UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
	BP6.R005	6

BRIDGE NO. 40

CROSS SECTION ALONG END BENT 1

℄

Ⓐ ROADWAY EMBANKMENT,
LOOSE, BROWN, CLAYEY FINE TO COARSE SAND, A-2-6, MOIST TO WET

Ⓑ ALLUVIAL,
LOOSE, GRAY, CLAYEY FINE TO COARSE SAND, TRACE ROOTLETS, A-2-6, WET

EB1-A
15+13
4' LT
-L-
SS-29
SS-34
SS-37

PAVEMENT

EXISTING GROUND

04/22

ALLUVIAL,
V. SOFT, BLACK, SILTY CLAY, SOME WOOD, A-7-6, WET

SOFT, GRAYISH BLACK, SANDY SILT, TRACE WOOD, A-4, WET

COASTAL PLAIN,
V. SOFT TO SOFT, GRAY, SILTY CLAY, A-7-6, WET
(BLACK CREEK FORMATION)

MED. DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4, WET

MED. STIFF, GRAY, SANDY CLAY, A-6, WET

MED. DENSE TO DENSE, GRAY,
SILTY FINE TO COARSE SAND, A-2-4, WET

MED. DENSE TO DENSE, GRAY,
CLAYEY FINE TO COARSE SAND, A-2-6, WET

DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4, WET

BT
04/22

15+00.00

—℄—

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED NEAR BENT LINE WITH SKEW OF 90.0 DEGREES USING TIN FILE '770040_ls_tin.tin' DATED 2/5/22. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

0 5 10 UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
	BP6.R005	7

BRIDGE NO. 40

CROSS SECTION ALONG END BENT 2

℄

Ⓐ ROADWAY EMBANKMENT.
LOOSE, BROWN, CLAYEY FINE SAND, A-2-6, MOIST TO WET

Ⓑ ALLUVIAL.
V. LOOSE, BROWN, SILTY FINE SAND, A-2-4, WET

Ⓒ COASTAL PLAIN.
V. LOOSE, GRAY, CLAYEY FINE TO MED. SAND, A-2-6, WET
(BLACK CREEK FORMATION)

EB2-B
15+53
6' RT
-L-
SS-13
SS-15
SS-18
SS-23

BRIDGE NO. 40
(CORED SLAB)

PAVEMENT

EXISTING GROUND

8	Ⓐ
4	
WOH	ALLUVIAL. V. SOFT, DARK BROWN, SILTY CLAY, A-7-5/A-7-6, TRACE WOOD FRAGMENTS, WET
13	MED. DENSE, BROWN, SILTY FINE SAND, TRACE WOOD FRAGMENTS, A-2-4
WOH	
WOH	COASTAL PLAIN. V. SOFT TO SOFT, LIGHT BROWN AND DARK TO BLUEISH GRAY, HIGHLY PLASTIC, A-7-5/A-7-6, WET (BLACK CREEK FORMATION)
4	
2	V. LOOSE, GRAY, FINE TO COARSE SAND AND SILTY SAND, A-3, A-1-b AND A-2-4, WITH CLAY LENSES, WET
3	Ⓒ
56	MED. DENSE TO V. DENSE, GRAY AND TAN, FINE TO COARSE SAND AND SILTY SAND, A-3, A-1-b AND A-2-4, TRACE WOOD FRAGMENTS, WET
24	
31	
10	
72	
34	
36	
29	
30	

BT
04/22

190 180 170 160 150 140 130 120 110 100 90

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

15+50.00

—℄—

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED NEAR BENT LINE WITH SKEW OF 90.0 DEGREES USING TIN FILE '770040_ls_tin.tin' DATED 2/5/22. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+13	**OFFSET** 4 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 184.1 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 378,722	**EASTING** 1,938,685	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME8245 CME-55 90% 07/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 04/20/22	**COMP. DATE** 04/21/22	**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)
185											
	183.1	1.0	9	5	4	9		M		184.1 GROUND SURFACE 183.5 **ROADWAY EMBANKMENT** PAVEMENT LOOSE, BROWN, CLAYEY FINE TO COARSE SAND, A-2-6	0.0 0.6
180	180.6	3.5	4	5	4	9					
	178.1	6.0	3	4	3	7		W		178.6 **ALLUVIAL** LOOSE, GRAY, CLAYE FINE TO COARSE SAND, TRACE ROOTLETS, A-2-6	5.5
175	175.6	8.5	WOH	WOH	WOH	0		W		176.1 VERY SOFT, BLACK, SILTY CLAY, SOME WOOD PIECES, A-7-6	8.0
170	170.6	13.5	WOH	1	1	2	SS-29	40%		172.1 SOFT, GRAYISH BLACK, SILTY SAND, TRACE WOOD, A-2-4	12.0
165	165.6	18.5	WOH	WOH	WOH	0		W		167.1 **COASTAL PLAIN** VERY SOFT TO SOFT, GRAY, SILTY CLAY, A-7-6 (BLACK CREEK FORMATION)	17.0
160	160.6	23.5	1	1	2	3		W			
155	155.6	28.5	1	7	8	15		W		157.1 MEDIUM DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4	27.0
150	150.6	33.5	1	3	4	7		W		152.1 MEDIUM STIFF, GRAY, SANDY CLAY, A-6	32.0
145	145.6	38.5	4	2	3	5	SS-34	22%		147.1 MEDIUM DENSE TO DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4	37.0
140	140.6	43.5	11	13	22	35		W			
135	135.6	48.5	11	12	15	27		W			
130	130.6	53.5	10	17	10	27	SS-37	20%			
125	125.6	58.5	12	21	24	45		W			
120	120.6	63.5	9	11	5	16		W		122.1 MEDIUM DENSE TO DENSE, GRAY, CLAYEY FINE TO COARSE SAND, A-2-6	62.0
115	115.6	68.5	10	21	19	40		W			
110	110.6	73.5	13	22	24	46		W		112.1 DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4	72.0
105	105.6	78.5									

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+13	**OFFSET** 4 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 184.1 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 378,722	**EASTING** 1,938,685	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME8245 CME-55 90% 07/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 04/20/22	**COMP. DATE** 04/21/22	**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
105			12	23	25	Match Line 48 49		W		DENSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4 *(continued)*
100	100.6	83.5	20	23	26			W		99.1 Boring Terminated at Elevation 99.1 ft IN DENSE SILTY SAND (COASTAL PLAIN) 85.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 15+53	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 184.1 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 378,756	**EASTING** 1,938,709	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE SME8245 CME-55 90% 07/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 02/24/22	**COMP. DATE** 04/21/22	**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)
185										
	183.1	1.0	6	6	4	10		M		184.1 GROUND SURFACE 0.0 183.3 **ROADWAY EMBANKMENT** 0.8 PAVEMENT LOOSE, BROWN, CLAYEY FINE SAND, A-2-6
180	180.6	3.5	9	5	3	8		W		
	178.1	6.0	2	3	1	4		W		178.6 5.5 177.1 **ALLUVIAL** 7.0 VERY LOOSE, BROWN, SILTY FINE SAND, A-2-4
175	175.6	8.5	WOH	WOH	WOH	0	SS-13	28%		VERY SOFT, DARK BROWN, SILTY CLAY, WOOD FRAGMENTS, A-7-6
170	170.6	13.5	2	4	9	13		W		172.1 12.0 MEDIUM DENSE, BROWN, SILTY FINE SAND, TRACE WOOD FRAGMENTS, A-2-4
165	165.6	18.5	WOH	WOH	WOH	0	SS-15	42%		167.1 17.0 **COASTAL PLAIN** VERY SOFT, LIGHT BROWN AND GRAY, HIGHLY PLASTIC, SILTY CLAY, A-7-6 (BLACK CREEK FORMATION)
160	160.6	23.5	WOH	WOH	WOH	0		W		
155	155.6	28.5	2	1	3	4		W		154.9 29.2 VERY LOOSE TO LOOSE, GRAY, SILTY FINE SAND AND FINE TO COARSE SAND, A-2-4 AND A-1-b
150	150.6	33.5	2	1	1	2	SS-18	23%		152.1 32.0 WITH CLAY LENSES
145	145.6	38.5	1	1	2	3		W		145.3 38.8 VERY LOOSE, GRAY, CLAYEY FINE TO MEDIUM SAND, A-2-6
140	140.6	43.5	29	32	24	56		W		142.1 42.0 DENSE TO VERY DENSE, GRAY TO GRAYISH TAN, FINE TO MEDIUM SAND, A-3
135	135.6	48.5	6	7	17	24		W		
130	130.6	53.5	17	15	16	31		W		132.1 52.0 DENSE, TAN GRAY, SILTY FINE SAND, WITH MOD. INDURATED LENSES, A-2-4
125	125.6	58.5	7	6	4	10	SS-23	31%		127.1 57.0 LOOSE TO VERY DENSE, TAN GRAY TO GRAY, COARSE SAND, TRACE WOOD, A-1-b
120	120.6	63.5	13	28	44	72		W		
115	115.6	68.5	10	12	22	34		W		119.1 65.0 MEDIUM DENSE TO DENSE, GRAY, SILTY FINE TO COARSE SAND, TRACE WOOD, A-2-4
110	110.6	73.5	10	15	21	36		W		
105	105.6	78.5								

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 15+53	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 184.1 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 378,756	**EASTING** 1,938,709	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE SME8245 CME-55 90% 07/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 02/24/22	**COMP. DATE** 04/21/22	**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
105						Match Line				
			7	13	16	29		W		MEDIUM DENSE TO DENSE, GRAY, SILTY FINE TO COARSE SAND, TRACE WOOD, A-2-4 *(continued)*
100	100.6	83.5	9	13	17	30		W		99.1 85.0 Boring Terminated at Elevation 99.1 ft IN MED. DENSE SILTY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Rodriguez, A.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. C-1	**STATION** 13+64	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 185.8 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 378,584	**EASTING** 1,938,628	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SME0382 DIEDRICH D-50 96% 05/07/2020		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 04/20/22	**COMP. DATE** 04/20/22	**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)
190											
185	184.8	1.0	7	6	6	12 14		M		185.8 GROUND SURFACE	0.0
										185.4 **ROADWAY EMBANKMENT** (PAVEMENT)	0.4
	182.3	3.5	4	8	6					MEDIUM DENSE, TAN BROWN, SILTY FINE TO COARSE SAND, SOME WOOD PIECES, A-2-4	
180	179.8	6.0	WOH	1	1	2		W		180.3	5.5
										ALLUVIAL SOFT, GRAY, CLAYEY SILT, TRACE ORGANIC MATTER, A-7-5	
	177.3	8.5	WOH	3	6	9		W		177.8	8.0
175										LOOSE, GRAY, POORLY GRADED FINE TO COARSE SAND, A-3	
	172.3	13.5	9	13	12	25		W		173.8	12.0
170										MEDIUM DENSE, BROWN, SILTY FINE TO COARSE SAND, A-2-4	
	167.3	18.5	6	4	2	6		W		168.8	17.0
165										**COASTAL PLAIN** MEDIUM STIFF, GRAY, SANDY CLAY, A-6 (BLACK CREEK FORMATION)	
	162.3	23.5	5	5	2	7		W		163.8	22.0
160										LOOSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4	
	157.3	28.5	WOH	WOH	WOH	0		W		158.8	27.0
155										VERY SOFT, GRAY, SILTY CLAY, A-7-6	
	152.3	33.5	3	5	5	10		W		153.8	32.0
										LOOSE, GRAY, SILTY FINE TO COARSE SAND, A-2-4	
								W		150.8	35.0
										Boring Terminated at Elevation 150.8 ft IN MED. DENSE SILTY SAND (COASTAL PLAIN)	

Other Samples:
ST-2 (18.0 - 20.0)

WBS BP6.R005	**TIP** N/A	**COUNTY** ROBESON	**GEOLOGIST** Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 40 ON OLD RED SPRINGS ROAD (SR 1303) OVER RICHLAND SWAMP				**GROUND WTR (ft)**
BORING NO. C-2	**STATION** 13+25	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.6 N/A
COLLAR ELEV. 186.2 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 378,543	**EASTING** 1,938,626	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME8245 CME-55 90% 07/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 02/23/22	**COMP. DATE** 02/23/22	**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	
190											
185	185.8	1.0	2	2	2	4		M		186.8 GROUND SURFACE	0.0
										186.0 **ROADWAY EMBANKMENT** (PAVEMENT)	0.8
	183.3	3.5	1	1	1	2		W		VERY LOOSE, ORANGE-BROWN AND TAN, CLAYEY FINE SAND, A-2-6	
180	180.8	6.0	4	5	8	13		W		181.3	5.5
										ALLUVIAL MEDIUM DENSE, ORANGE-BROWN AND TAN, CLAYEY FINE SAND, A-2-6	
	178.3	8.5	5	7	8	15		W		174.8	12.0
175										MEDIUM DENSE, RED, BROWN, AND TAN, FINE SAND, A-3	
	173.3	13.5	3	5	10	15		W		169.8	17.0
170										**COASTAL PLAIN** STIFF, BROWN, SILTY CLAY, TRACE TO SOME WOOD, A-7-5/A-7-6 (BLACK CREEK FORMATION)	
	168.3	18.5	1	6	4	10		W		167.3	19.5
165										LOOSE, TAN, SILTY FINE SAND, TRACE TO SOME WOOD, A-2-4	
	163.3	23.5	4	3	6	9		W		164.8	22.0
160										SOFT TO STIFF, BROWN, SILTY CLAY, SOME SAND, TRACE WOOD, A-7-5/A-7-6	
	158.3	28.5	WOH	2	1	3		W		SWITCH TO MUD ROTARY DRILLING AT 30.0'	
155										154.8	32.0
	153.3	33.5	1	1	3	4		W		VERY LOOSE, TAN, FINE TO COARSE SAND, A-3	
										151.8	35.0
										Boring Terminated at Elevation 151.8 ft IN LOOSE SAND (COASTAL PLAIN)	

PROPOSED LOCATION HAD AUGER REFUSAL ON CONCRETE AT 5.7', OFFSET ~ 24' SOUTH

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

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

S&ME Project #:	213634A			Date Report:	6/5/2022
State Project No.:		County:	Robeson	Date Tested:	4/25/22-5/4/22
Federal ID No.:	NA	TIP No.:	BP6.R005		
Project Name:	Bridge No. 40 on Old Red Springs Rd over Richland Swamp				
Client Name:	CDM Smith	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-13	EB2-B	15+53	6' RT	-L-	8.5-10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
SS-15	EB2-B	15+53	6' RT	-L-	18.5-20.0	A-7-6	(25)	100	99	98	71	2	32	12	54	57	20	37	-	41.8
SS-18	EB2-B	15+53	6' RT	-L-	33.5-35.0	A-1-b	(0)	98	30	19	12	80	9	2	9	20	15	5	-	23.3
SS-23	EB2-B	15+53	6' RT	-L-	58.5-60.0	A-1-b	(0)	95	27	15	8	84	7	1	8	NP	NP	NP	-	30.6
SS-29	EB1-A	15+13	4' LT	-L-	13.5-15.0	A-2-4	(0)	100	90	70	28	30	49	13	8	NP	NP	NP	-	39.7
SS-34	EB1-A	15+13	4' LT	-L-	38.5-40.0	A-2-4	(0)	98	75	60	30	39	35	6	20	28	20	8	-	22.1
SS-37	EB1-A	15+13	4' LT	-L-	53.5-55.0	A-2-4	(0)	98	24	18	11	82	8	1	9	21	14	7	-	20.2

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. 40 on –L– (SR 1303) over Richland Swamp

Looking North