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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2303E	1	13

REFERENCE: R-2303E

PROJECT: 34416

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *SAMPSON*

PROJECT DESCRIPTION *NC 24 AT SR 1296 (SUNSET AVE.) AND NC 24 FROM US 701 TO EAST OF SR 1935 (CECIL-ODIE RD.)*

SITE DESCRIPTION *DUAL BRIDGES 39 AND 40 OVER NC 24 AT -L- STA. 33+45.45*

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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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A. BADEY

TERRACON PERSONNEL

INVESTIGATED BY *RK&K, LLP*

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DATE *JULY 2019*

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4725B2704A8F4D7... SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
R-2303E	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	- 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] ACKER RENEGADE
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] 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: N/A

ELEVATION: N/A FEET

NOTES:

FIAD = FILLED IMMEDIATELY AFTER DRILLING

BORING COLLAR ELEVATIONS DETERMINED USING SURVEY-GRADE GPS

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	3

SITE PLAN

0 50 100

FEET

TO US 701

31+00

-L-

EBI-A LL

BI-A LL

B2-A LL

EB2-A LL

END BENT 1

BENT 1

BRIDGE No. 40

BENT 2

END BENT 2

25+00

35+00

TO SR 1214

92°4'15" (TO TANGENT)

92°5'13" (TO TANGENT)

93°53'50" (TO TANGENT)

95°13'22" (TO TANGENT)

96°3'57" (TO TANGENT)

BRIDGE No. 39

EBI-B RL

BI-B RL

B2-B RL

EB2-B RL

27+00

-Y1-

(NC 24)

SS

F

C

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	4

0 100 200
FEET
VE = 5

PROFILE THROUGH LEFT LANE
BORINGS PROJECTED ALONG -L-

(A) 0.9'-1.0' Asphalt
(B) ROADWAY EMBANKMENT: Orange-brown to orange, medium dense, silty clayey and clayey silty fine to coarse SAND, moist
(C) ROADWAY EMBANKMENT: Brown, stiff, clayey fine sandy SILT, moist
(D) ROADWAY EMBANKMENT: Brown to orange to brown-black, soft to stiff, silty fine to coarse sandy CLAY, trace gravel, moist to saturated
(E) UNDIVIDED COASTAL PLAIN: Orange-brown to grey-brown, very soft to stiff, sandy silty and silty sandy CLAY, moist to wet
(F) UNDIVIDED COASTAL PLAIN: Orange-brown-red, very loose, clayey fine SAND, moist to saturated
(G) COASTAL PLAIN: Grey-black to black to dark grey, medium stiff to hard, silty to fine sandy CLAY, trace organics, lenses of peat (Black Creek Formation), moist to saturated
(H) COASTAL PLAIN: Grey to dark grey to grey-black, medium dense to very dense, silty and clayey fine to coarse SAND, lenses of silty CLAY, trace organics, trace mica (Black Creek Formation), wet
(I) COASTAL PLAIN: Dark grey, hard, clayey fine sandy SILT, trace organics (Black Creek Formation), wet

EB1-A LL 32+62 46' LT
B1-A LL 33+25 53' LT
B2-A LL 33+73 55' LT
EB2-A LL 34+37 55' LT

PROPOSED GRADE
EXISTING GROUND

CAVED 06/19
FIAD 06/19
CAVED 06/19
FIAD 06/19

NOTE: GROUNDLINE PROFILE DRAWN FROM PROVIDED TIN FILE ALONG CENTERLINE.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ONTO THE PROFILE.

200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40

27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	5

0 100 200
FEET
VE = 5

PROFILE THROUGH RIGHT LANE
BORINGS PROJECTED ALONG -L-

(A) 0.8"-1.1" Asphalt
(B) ROADWAY EMBANKMENT Orange to brown-orange-gray, medium stiff to stiff, fine to medium sandy to silty CLAY, moist to saturated
(C) ROADWAY EMBANKMENT: Brown, medium dense, clayey fine to coarse SAND, wet to saturated
(D) ROADWAY EMBANKMENT: Brown-orange, stiff, fine sandy clayey SILT, moist to wet
(E) UNDIVIDED COASTAL PLAIN: Brown-orange, very soft to very stiff, fine to coarse sandy to silty CLAY, wet to saturated
(F) COASTAL PLAIN: Orange-grey, light grey, dark grey, grey-black, black, very soft to hard, fine to coarse sandy to silty CLAY, trace mica, trace organics to highly organic, lenses of sand (Black Creek Formation), wet
(G) COASTAL PLAIN: Dark grey, dark grey-green, light grey, grey-black, very loose to very dense, silty to clayey fine to coarse SAND, trace organics, trace shell fragments (Black Creek Formation), wet

EBI-B RL 32+57 36' RT
BI-B RL 33+18 59' RT
B2-B RL 33+65 53' RT
EB2-B RL 34+19 42' RT

PROPOSED GRADE
EXISTING GROUND
06/19
FIAD 06/19
FIAD 06/19
FIAD 06/19

NOTE: GROUNDLINE PROFILE DRAWN FROM PROVIDED TIN FILE ALONG CENTERLINE.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ONTO THE PROFILE.

200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40

26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** P. Cary	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB1-A LL	**STATION** 32+62	**OFFSET** 46 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 161.5 ft	**TOTAL DEPTH** 90.0 ft	**NORTHING** 453,919	**EASTING** 2,198,419	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/28/19	**COMP. DATE** 06/28/19	**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)
165										
	161.5	0.0	4	7	5	12		M		161.5 — 0.0 GROUND SURFACE **ROADWAY EMBANKMENT** Orange-brown, silty clayey fine to medium SAND
160	158.0	3.5	5	6	7	13		M		158.5 — 3.0 Brown, clayey fine sandy SILT
155	153.0	8.5	2	3	4	7		M		155.5 — 6.0 Orange, sandy silty CLAY
150	148.0	13.5	1	2	4	6		M		150.5 — 11.0 Orange, silty fine sandy CLAY
145	143.0	18.5	8	10	13	23		M		145.5 — 16.0 Orange, clayey silty fine SAND
140	138.0	23.5	2	2	3	5		W		139.5 — 22.0 **UNDIVIDED COASTAL PLAIN** Orange-brown, sandy silty CLAY
135	133.0	28.5	WOH	1	3	4		Sat		132.5 — 29.0 **COASTAL PLAIN** Grey-black, fine sandy silty CLAY (Black Creek Formation)
130	128.0	33.5	3	4	6	10		W		
125	123.0	38.5	3	5	7	12		W		125.5 — 36.0 Dark grey, silty CLAY, trace organics, lens of little organic peat
120	118.0	43.5	4	5	9	14		M		
115	113.0	48.5	3	4	6	10		M		
110	108.0	53.5	10	11	11	22		W		109.5 — 52.0 Grey, silty fine SAND with lenses of silty CLAY at 53.5' to 55'
105	103.0	58.5	6	6	17	23		W		
100	98.0	63.5	4	10	23	33		W		
95	93.0	68.5	3	4	7	11		M		95.5 — 66.0 Dark grey-black, fine sandy silty CLAY
90	88.0	73.5	4	5	10	15		M		85.5 — 76.0
85										Match Line
85	83.0	78.5	5	6	9	15		M		Grey-black, fine sandy silty CLAY *(continued)*
80	78.0	83.5	4	7	12	19		W		
75	73.0	88.5	8	9	14	23		W		71.5 — 90.0 Boring Terminated at Elevation 71.5 ft in Coastal Plain: silty sandy CLAY Caved at 27.3 ft

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB1-B RL	**STATION** 32+57	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 164.7 ft	**TOTAL DEPTH** 115.0 ft	**NORTHING** 453,883	**EASTING** 2,198,345	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/24/19	**COMP. DATE** 06/24/19	**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)
165											
	163.6	1.1	2	5	5	10		M		164.7 GROUND SURFACE	0.0
	161.2	3.5								163.6 1.1' Asphalt	1.1
160			3	4	5	9		M		**ROADWAY EMBANKMENT** Orange, silty CLAY	
	156.2	8.5								157.7	7.0
155			3	2	3	5		M		Brown-orange, fine sandy silty CLAY	
	151.2	13.5									
150			1	2	3	5		M			
	146.2	18.5								147.7	17.0
145			2	3	5	8		M		Brown-orange-grey, fine sandy silty CLAY	
	141.2	23.5								142.7	22.0
140			3	6	10	16		M		**UNDIVIDED COASTAL PLAIN** Orange-red-white, silty CLAY	
	136.2	28.5	WOH	WOH	WOH	0		W		137.7	27.0
135										**COASTAL PLAIN** Orange-grey-brown, very soft, fine sandy CLAY, trace shell fragments (Black Creek Formation)	
130	131.2	33.5	WOH	WOH	1	1		Sat			
	126.2	38.5								127.7	37.0
125			2	4	6	10		Sat		Grey-black, fine sandy silty CLAY	
	121.2	43.5									
120			8	5	5	10		W			
	116.2	48.5									
115			4	5	6	11		W			
	111.2	53.5									
110			3	4	6	10		W			
	106.2	58.5									
105			5	7	7	14		W			
	101.2	63.5									
100			2	14	17	31		W		100.7	64.0
	96.2	68.5								Dark grey, silty fine to coarse SAND	
95			2	4	5	9		W		97.7	67.0
	91.2	73.5								Black, silty CLAY	
90			2	6	7	13		W			
	86.2	78.5									
85			3	6	6	12		W			

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB1-B RL	**STATION** 32+57	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 164.7 ft	**TOTAL DEPTH** 115.0 ft	**NORTHING** 453,883	**EASTING** 2,198,345	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/24/19	**COMP. DATE** 06/24/19	**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
85						Match Line				Black, silty CLAY *(continued)*
80	81.2	83.5	3	6	7	13		W		
75	76.2	88.5	5	8	8	16		W		
70	71.2	93.5	5	7	9	16		W		72.7 92.0 Dark grey, silty CLAY
65	66.2	98.5	15	31	40	71		W		67.7 97.0 Dark grey-green, silty clayey fine SAND
60	61.2	103.5	10	16	26	42		W		
55	56.2	108.5	27	31	39	70		W		52.7 112.0 Dark grey-green, silty fine SAND
50	51.2	113.5	17	31	35	66		W		49.7 115.0 Boring Terminated at Elevation 49.7 ft in Coastal Plain: silty SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B1-A LL	**STATION** 33+25	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 143.4 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,869	**EASTING** 2,198,456	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/26/19	**COMP. DATE** 06/26/19	**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))
145										
	142.4	1.0								143.4 GROUND SURFACE 0.0 142.4 1.0' Asphalt 1.0
			3	5	6	11		M		**ROADWAY EMBANKMENT** Brown-orange-black, silty fine sandy CLAY
140	139.9	3.5	3	4	4	8		M		
135	134.9	8.5	WOH	WOH	WOH	0		Sat		136.4 7.0 **UNDIVIDED COASTAL PLAIN** Brown-orange, fine sandy silty CLAY
130	129.9	13.5	2	5	5	10		W		131.4 12.0 **COASTAL PLAIN** Grey-black, silty CLAY (Black Creek Formation)
125	124.9	18.5	2	5	5	10		W		126.4 17.0 Black, silty CLAY, trace organics
120	119.9	23.5	3	4	5	9		W		
115	114.9	28.5	3	5	7	12		W		
110	109.9	33.5	6	11	19	30		W		111.4 32.0 Dark grey, silty fine SAND, trace organics
105	104.9	38.5	8	11	15	26		W		
100	99.9	43.5	5	7	11	18		W		
95	94.9	48.5	2	5	5	10		W		96.4 47.0 Grey-black, fine sandy silty CLAY, trace organics
90	89.9	53.5	3	6	7	13		W		
85	84.9	58.5	4	6	7	13		W		
80	79.9	63.5	4	7	8	15		W		
75	74.9	68.5	5	7	8	15		W		76.4 67.0 Dark grey, silty fine SAND
70	69.9	73.5	15	22	40	62		W		
65										

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B1-A LL	**STATION** 33+25	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 143.4 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,869	**EASTING** 2,198,456	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/26/19	**COMP. DATE** 06/26/19	**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
65						Match Line				
	64.9	78.5	12	25	24	49		W		Dark grey, silty fine SAND *(continued)*
60	59.9	83.5	16	16	24	40		W		
55	54.9	88.5	23	33	37	70		W		
50	49.9	93.5	10	19	27	46		W		48.4 95.0 Boring Terminated at Elevation 48.4 ft in Coastal Plain: silty SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B1-B RL	**STATION** 33+18	**OFFSET** 59 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 145.6 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 453,817	**EASTING** 2,198,356	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/26/19	**COMP. DATE** 06/26/19	**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)
150										
145	144.8	0.8								145.6 GROUND SURFACE 0.0 144.8 0.8' Asphalt 0.8
	142.1	3.5	7	8	5	13		M		**ROADWAY EMBANKMENT** Orange-brown, fine sandy silty CLAY
140			1	4	4	8		W		
	137.1	8.5	WOH	WOH	WOH	0		Sat		138.6 7.0 **UNDIVIDED COASTAL PLAIN** Brown-orange, fine sandy CLAY
135	132.1	13.5	WOH	1	1	2		Sat		133.6 12.0 **COASTAL PLAIN** Light grey, clayey coarse SAND, trace shell fragments (Black Creek Formation)
130	127.1	18.5	3	5	6	11		W		128.6 17.0 Dark grey-black, fine to coarse sandy silty CLAY, trace organics
125	122.1	23.5	4	4	7	11		W		
120	117.1	28.5	8	9	11	20		W		
115	112.1	33.5	3	5	5	10		W		
110	107.1	38.5	8	17	22	39		W		108.6 37.0 Grey-black, silty clayey coarse SAND
105	102.1	43.5	11	10	15	25		W		101.6 44.0 Dark grey, silty CLAY, trace organics
100	97.1	48.5	4	7	8	15		W		98.6 47.0 Dark grey, silty fine to coarse sandy CLAY, lens of highly organic peat at 53.5'-55'
95	92.1	53.5	8	23	27	50		W		
90	87.1	58.5	3	4	7	11		W		
85	82.1	63.5	4	5	7	12		W		
80	77.1	68.5	3	6	7	13		W		
75	72.1	73.5	7	13	18	31		W		70.6 75.0

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B1-B RL	**STATION** 33+18	**OFFSET** 59 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 145.6 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 453,817	**EASTING** 2,198,356	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/26/19	**COMP. DATE** 06/26/19	**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
70						Match Line				Boring Terminated at Elevation 70.6 ft in Coastal Plain: silty sandy CLAY

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B2-A LL	**STATION** 33+73	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 143.2 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 453,830	**EASTING** 2,198,482	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/25/19	**COMP. DATE** 06/25/19	**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)
145										
	142.3	0.9	7	7	6	13		M		143.2 — GROUND SURFACE — 0.0 142.3 — 0.9' Asphalt — 0.9 **ROADWAY EMBANKMENT** 140.2 — Brown-black, fine to coarse sandy CLAY — 3.0
140	139.7	3.5	2	3	5	8		M		**UNDIVIDED COASTAL PLAIN** Orange-brown, silty fine to coarse sandy CLAY 136.2 — 7.0
135	134.7	8.5	1	1	0	1		Sat		Orange-brown-red, clayey fine SAND 131.2 — 12.0
130	129.7	13.5	3	4	6	10		W		**COASTAL PLAIN** Dark grey, silty CLAY, trace organics (Black Creek Formation)
125	124.7	18.5	3	5	6	11		W		
120	119.7	23.5	2	4	5	9		W		
115	114.7	28.5	2	3	7	10		W		
110	109.7	33.5	4	9	13	22		W		111.2 — 32.0 Dark grey, silty clayey fine to coarse SAND
105	104.7	38.5	7	12	15	27		W		106.2 — 37.0 Grey-black, silty coarse SAND, trace organics, trace mica
100	99.7	43.5	6	12	13	25		W		
95	94.7	48.5	6	14	14	28		W		
90	89.7	53.5	3	5	8	13		W		91.2 — 52.0 Grey-black, silty CLAY
85	84.7	58.5	4	6	9	15		W		
80	79.7	63.5	4	5	8	13		W		
75	74.7	68.5	1	1	8	9		W		
70	69.7	73.5	6	7	18	25		W		
65										66.2 — 77.0 Grey-black, silty clayey fine SAND

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B2-A LL	**STATION** 33+73	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 143.2 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 453,830	**EASTING** 2,198,482	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/25/19	**COMP. DATE** 06/25/19	**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
65						Match Line				
	64.7	78.5	18	26	34	60		W		Grey-black, silty clayey fine SAND *(continued)*
60	59.7	83.5	7	7	15	22		W		58.2 — 85.0 Boring Terminated at Elevation 58.2 ft in Coastal Plain: silty clayey SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B2-B RL	**STATION** 33+65	**OFFSET** 53 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 145.5 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,779	**EASTING** 2,198,386	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/25/19	**COMP. DATE** 06/25/19	**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)
150										
145	144.6	0.9	4	5	5	10		M		145.5 0.0 GROUND SURFACE 144.6 0.9 0.9' Asphalt
	142.0	3.5	2	3	6	9		M		**ROADWAY EMBANKMENT** 142.5 3.0 Brown, clayey fine to coarse SAND Orange-brown, silty CLAY
140										
	137.0	8.5	3	2	3	5		W		138.5 7.0 **UNDIVIDED COASTAL PLAIN** Orange-brown, fine to coarse sandy CLAY
135										
	132.0	13.5	WOH	1	3	4		M		133.5 12.0 **COASTAL PLAIN** Dark grey, silty CLAY (Black Creek Formation)
130										
	127.0	18.5	2	5	5	10		M		
125										
	122.0	23.5	3	4	5	9		M		123.5 22.0 Dark grey, silty CLAY
120										
	117.0	28.5	5	9	15	24		W		116.0 29.5 Dark grey,silty fine to coarse SAND
115										113.5 32.0 Dark grey, silty CLAY
	112.0	33.5	2	5	6	11		W		
110										
	107.0	38.5	3	9	15	24		W		106.0 39.5 Black, silty coarse SAND
105										
	102.0	43.5	7	13	10	23		W		98.5 47.0 Dark grey, silty CLAY
100										
	97.0	48.5	2	4	6	10		W		
95										
	92.0	53.5	2	4	6	10		W		89.5 56.0 Dark grey, silty coarse SAND
90										
	87.0	58.5	5	8	8	16		W		86.0 59.5 Dark grey, silty CLAY
85										
	82.0	63.5	3	4	7	11		W		
80										
	77.0	68.5	4	8	12	20		W		78.5 67.0 Dark grey, sandy CLAY
75										73.5 72.0 Dark grey, silty clayey fine to coarse SAND
	72.0	73.5	9	20	16	36		W		
70										

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. B2-B RL	**STATION** 33+65	**OFFSET** 53 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 145.5 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,779	**EASTING** 2,198,386	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/25/19	**COMP. DATE** 06/25/19	**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
70						Match Line				
	67.0	78.5	7	10	22	32		W		Dark grey, silty clayey fine to coarse SAND *(continued)*
65										
	62.0	83.5	15	20	28	48		W		
60										
	57.0	88.5	16	23	31	54		W		
55										
	52.0	93.5	28	37	52	89		W		50.5 95.0 Boring Terminated at Elevation 50.5 ft in Coastal Plain: silty SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB2-A LL	**STATION** 34+37	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 161.6 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 453,777	**EASTING** 2,198,516	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/27/19	**COMP. DATE** 06/27/19	**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)
165										
	161.6	0.0	2	6	4	10		M		161.6 0.0 GROUND SURFACE **ROADWAY EMBANKMENT** Orange-brown, silty clayey fine to coarse SAND
160	158.1	3.5	1	2	1	3		M		158.6 3.0 Orange-brown-red, silty fine sandy CLAY, trace gravel
155	153.1	8.5	2	5	8	13		M		
150	148.1	13.5	2	4	6	10		M		
145	143.1	18.5	2	4	6	10		M		
140	138.1	23.5	1	1	1	2		M		139.6 22.0 **UNDIVIDED COASTAL PLAIN** Grey-brown, fine to medium sandy CLAY
135	133.1	28.5	WOH	WOH	WOH	0		Sat		
130	128.1	33.5	3	10	8	18		W		129.6 32.0 **COASTAL PLAIN** Grey-black, fine sandy silty CLAY (Black Creek Formation)
125	123.1	38.5	2	5	6	11		W		124.6 37.0 Grey-black, fine sandy silty CLAY, trace organics
120	118.1	43.5	2	5	5	10		W		
115	113.1	48.5	2	3	4	7		W		
110	108.1	53.5	6	5	7	12		W		109.6 52.0 Dark grey, fine sandy silty CLAY
105	103.1	58.5	4	9	11	20		W		104.6 57.0 Grey-black, clayey silty fine to coarse SAND, trace organics
100	98.1	63.5	4	4	8	12		W		99.6 62.0 Dark grey, sandy silty CLAY, lens of highly organic peat at 68.5'-70.0'
95	93.1	68.5	8	18	22	40		W		
90	88.1	73.5	3	6	6	12		W		89.6 72.0 Dark grey, fine sandy silty CLAY
85										

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB2-A LL	**STATION** 34+37	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 161.6 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 453,777	**EASTING** 2,198,516	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/27/19	**COMP. DATE** 06/27/19	**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
85						Match Line				
	83.1	78.5	5	7	10	17		W		Dark grey, fine sandy silty CLAY *(continued)*
80	78.1	83.5	4	7	10	17		W		
75	73.1	88.5	12	11	9	20		W		
70	68.1	93.5	5	12	28	40		W		69.6 92.0 Dark grey, clayey fine sandy SILT, trace organics
65	63.1	98.5	15	15	15	30		W		61.6 100.0 Boring Terminated at Elevation 61.6 ft in Coastal Plain: clayey sandy SILT Caved at 27.4 ft

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB2-B RL	**STATION** 34+19	**OFFSET** 42 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.0 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,739	**EASTING** 2,198,425	**24 HR.** 24.1
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/27/19	**COMP. DATE** 06/27/19	**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))
170										
	166.0	0.0	3	4	5	9		M		166.0 / 0.0 GROUND SURFACE
165										**ROADWAY EMBANKMENT** Brown-orange, fine sandy clayey SILT
	162.5	3.5	3	3	4	7		M		163.0 / 3.0 Brown-orange, silty fine to medium sandy CLAY
160										
	157.5	8.5	3	4	5	9		M		
155										
	152.5	13.5	2	6	5	11		M		
150										
	147.5	18.5	2	4	2	6		W		
145										
	142.5	23.5	2	3	2	5		W		
140										
	137.5	28.5	2	4	9	13		W		139.0 / 27.0 **UNDIVIDED COASTAL PLAIN** Brown-grey, silty fine sandy CLAY
135										
	132.5	33.5	1	2	3	5		W		134.0 / 32.0 **COASTAL PLAIN** Grey, fine sandy CLAY (Black Creek Formation)
130										
	127.5	38.5	3	6	10	16		W		129.0 / 37.0 Grey-black, silty CLAY
125										
	122.5	43.5	2	3	6	9		W		124.0 / 42.0 Dark grey, silty CLAY, lenses of coarse sand, trace organics
120										
	117.5	48.5	5	6	8	14		W		
115										
	112.5	53.5	2	3	5	8		W		
110										
	107.5	58.5	3	11	10	21		W		109.0 / 57.0 Grey-black, clayey silty fine to coarse SAND, trace organics
105										
	102.5	63.5	11	14	17	31		W		104.0 / 62.0 Light grey, silty clayey fine to coarse SAND, trace organics, trace mica
100										
	97.5	68.5	9	17	12	29		W		
95										94.0 / 72.0 Dark grey, silty CLAY, lenses of sand, trace organics
	92.5	73.5	3	7	10	17		W		
90										

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** A. Badey	
SITE DESCRIPTION Dual Bridges 39 and 40 over NC 24 at -L- Sta. 33+45.45				**GROUND WTR (ft)**
BORING NO. EB2-B RL	**STATION** 34+19	**OFFSET** 42 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.0 ft	**TOTAL DEPTH** 95.0 ft	**NORTHING** 453,739	**EASTING** 2,198,425	**24 HR.** 24.1
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 02/15/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER W. Duggins	**START DATE** 06/27/19	**COMP. DATE** 06/27/19	**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
90						Match Line				
	87.5	78.5	4	6	9	15		W		Dark grey, silty CLAY, lenses of sand, trace organics *(continued)*
85										
	82.5	83.5	2	5	6	11		W		
80										
	77.5	88.5	8	11	11	22		W		
75										74.0 / 92.0 Grey, silty fine sandy CLAY
	72.5	93.5	16	16	17	33		W		71.0 / 95.0 Boring Terminated at Elevation 71.0 ft in Coastal Plain: silty sandy CLAY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2303E	1	7

REFERENCE: R-2303E

PROJECT: 34416

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *SAMPSON*

PROJECT DESCRIPTION *NC 24 AT SR 1296 (SUNSET AVE.) AND NC 24 FROM US 701 TO EAST OF SR 1935 (CECIL-ODIE RD.)*

SITE DESCRIPTION *BRIDGE OVER US 421 ON SR 1934 (BYRD YANCEY BASS RD.) BETWEEN SR 1116 (PEARSON RD.) AND SR 1932*

CONTENTS

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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

M. METRY

P. NEUMANN

SUMMIT PERSONNEL

INVESTIGATED BY *RK&K, LLP*

DRAWN BY *P. CARY*

CHECKED BY *G. GOINS*

SUBMITTED BY *RK&K, LLP*

DATE *JULY 2019*

Prepared in the Office of:

RK&K

RUMMEL, KLEPPER & KAHL, LLP
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RALEIGH, NORTH CAROLINA 27609
NC LICENSE NO. F-0112

NORTH CAROLINA PROFESSIONAL SEAL 041709 ENGINEER GREGORY K. GOINS

DocuSigned by:
Gregory K. Goins 8/22/2019
4725B2704A9E4D7... SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	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

	GRANULAR SOILS	SILT - CLAY SOILS
ORGANIC MATERIAL		
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	> 10%	> 20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- AF — 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-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " 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: N/A

ELEVATION: N/A FEET

NOTES:

FIAD = FILLED IMMEDIATELY AFTER DRILLING

BORING COLLAR ELEVATIONS DETERMINED USING SURVEY-GRADE GPS

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	3

SITE PLAN

0 50 100

FEET

BRIDGE I.D. STA.
STA. 31+16.90 -Y2- POT
STA. 71+23.47 -L1- POC

EB2-A

EBI-C

END BENT 1

BENT 1

BENT 2

END BENT 2

BI-B

83°58'03"
(TYP.)

TO SR 1116

TO SR 1932

29+00

35+00

-Y2-

-L1-

73+00

70+00

C

F

0	100	200

FEET

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
R-2303E	4

PROFILE THROUGH BORINGS PROJECTED ALONG -Y2-

(A) UNDIVIDED COASTAL PLAIN: Tan to grey, very loose to medium dense, clayey to silty fine to coarse SAND, trace rock fragments, moist to saturated
(B) COASTAL PLAIN: Black-brown to grey-green, stiff to very stiff, fine sandy to silty CLAY, trace mica (Black Creek Formation), moist to wet
(C) COASTAL PLAIN: Black-grey-brown, dense, clayey to silty fine SAND, trace to little organics (Black Creek Formation), wet
(D) COASTAL PLAIN: Brown-black to grey-green, medium dense to very dense, silty to clayey fine SAND, trace mica (Black Creek Formation), moist to wet
(E) COASTAL PLAIN: Brown-black to grey-green, very stiff, silty fine sandy CLAY, trace mica, trace organics (Black Creek Formation), moist to wet
(F) COASTAL PLAIN: Black-brown to dark grey-green, medium dense to very dense, silty clayey fine SAND, trace mica (Black Creek Formation), wet

PROPOSED GRADE

EXISTING GROUND

EB1-C
30+37
CL

B1-B
31+18
46' RT

EB2-A
31+98
28' LT

07/19

07/19

CAVED
07/19

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40

25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** P. Neumann	
SITE DESCRIPTION Bridge over US 421 on SR 1934 (Byrd Yancey Bass Rd.) between SR 1116 (Pearson Rd.) and SR 1932				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 30+37	**OFFSET** CL	**ALIGNMENT** -Y2-	**0 HR.** N/A
COLLAR ELEV. 133.6 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 440,098	**EASTING** 2,211,958	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 81% 04/23/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Mosely	**START DATE** 07/12/19	**COMP. DATE** 07/11/19	**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)
135											
	133.6	0.0	1	2	1	3		M		133.6 GROUND SURFACE	0.0
										UNDIVIDED COASTAL PLAIN	
130	130.1	3.5	3	6	5	11		W		131.6 Tan-brown, silty fine SAND	2.0
										White-tan, silty clayey fine SAND	
125	125.1	8.5	3	5	7	12		M		124.6	9.0
										COASTAL PLAIN	
120	120.1	13.5	4	6	9	15		M		Dark grey, silty CLAY, trace mica, some organics (Black Creek Formation)	
115	115.1	18.5	5	6	7	13		M		116.6 Dark grey, silty CLAY, trace mica	17.0
110	110.1	23.5	5	6	7	13		M			
105	105.1	28.5	12	18	18	36		W		106.6 Dark grey, clayey silty fine SAND, trace mica	27.0
100	100.1	33.5	7	10	12	22		M		101.6 Dark grey, silty fine sandy CLAY, trace mica	32.0
95	95.1	38.5	5	8	9	17		M		94.6 Dark grey, fine sandy CLAY	39.0
90	90.1	43.5	5	6	9	15		M			
85	85.1	48.5	11	18	24	42		M		84.6 Dark grey to green, clayey fine SAND, trace to little organics	49.0
80	80.1	53.5	10	20	23	43		M			
75	75.1	58.5	8	10	27	37		M			
70	70.1	63.5	6	7	10	17		M		71.6 Dark grey, silty fine sandy CLAY, trace organics	62.0
65	65.1	68.5	5	8	10	18		M		63.6	70.0
										Boring Terminated at Elevation 63.6 ft in Coastal Plain: silty fine sandy CLAY Caved at 2.6 ft	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** M. Metry	
SITE DESCRIPTION Bridge over US 421 on SR 1934 (Byrd Yancey Bass Rd.) between SR 1116 (Pearson Rd.) and SR 1932				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 31+18	**OFFSET** 46 ft RT	**ALIGNMENT** -Y2-	**0 HR.** N/A
COLLAR ELEV. 135.9 ft	**TOTAL DEPTH** 74.4 ft	**NORTHING** 440,048	**EASTING** 2,211,879	**24 HR.** 10.2
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 81% 04/23/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Mosely	**START DATE** 07/10/19	**COMP. DATE** 07/10/19	**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)
140										
	135.9	0.0	2	1	2	3		M		135.9 GROUND SURFACE 0.0 **UNDIVIDED COASTAL PLAIN** Tan, silty fine SAND
135	132.4	3.5	4	7	7	14		M		
130	127.4	8.5	2	1	2	3		W		127.9 8.0 Tan-grey, clayey silty fine SAND
125	122.4	13.5	3	4	12	16		W		123.9 12.0 **COASTAL PLAIN** Black-grey-brown, fine sandy silty CLAY (Black Creek Formation)
120	117.4	18.5	3	5	6	11		W		119.9 16.0 Grey-black, silty CLAY
115	112.4	23.5	4	4	9	13		W		113.9 22.0 Grey-black, silty fine sandy CLAY
110	107.4	28.5	14	9	21	30		W		109.9 26.0 Black-grey-brown, silty fine SAND
105	102.4	33.5	4	5	9	14		W		101.9 34.0 Black-grey-blue, fine sandy silty CLAY
100	97.4	38.5	6	6	10	16		W		
95	92.4	43.5	4	6	9	15		W		
90	87.4	48.5	4	6	9	15		W		
85	82.4	53.5	19	31	30	61		W		83.9 52.0 Grey-brown-black, silty clayey fine SAND, trace mica
80	77.4	58.5	14	11	15	26		W		77.9 58.0 Grey-brown-black, silty fine sandy CLAY, trace mica
75	72.4	63.5	6	8	10	18		W		
70	67.4	68.5	10	14	15	29		W		68.9 67.0 Grey-black, fine sandy silty CLAY
65	62.4	73.5	48	52/0.4		100/0.9		W		63.9 72.0 Grey-black-brown, silty clayey fine SAND 61.5 74.4 Boring Terminated at Elevation 61.5 ft in

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** M. Metry	
SITE DESCRIPTION Bridge over US 421 on SR 1934 (Byrd Yancey Bass Rd.) between SR 1116 (Pearson Rd.) and SR 1932				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 31+18	**OFFSET** 46 ft RT	**ALIGNMENT** -Y2-	**0 HR.** N/A
COLLAR ELEV. 135.9 ft	**TOTAL DEPTH** 74.4 ft	**NORTHING** 440,048	**EASTING** 2,211,879	**24 HR.** 10.2
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 81% 04/23/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Mosely	**START DATE** 07/10/19	**COMP. DATE** 07/10/19	**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
60						Match Line				Coastal Plain: silty clayey fine SAND

NCDOT BORE DOUBLE R_2303E SITE 2.GPJ NC_DOT.GDT 7/25/19

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** P. Neumann	
SITE DESCRIPTION Bridge over US 421 on SR 1934 (Byrd Yancey Bass Rd.) between SR 1116 (Pearson Rd.) and SR 1932				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 31+98	**OFFSET** 28 ft LT	**ALIGNMENT** -Y2-	**0 HR.** N/A
COLLAR ELEV. 135.9 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 439,943	**EASTING** 2,211,906	**24 HR.** 5.9
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 81% 04/23/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Mosely	**START DATE** 07/11/19	**COMP. DATE** 07/11/19	**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))
140										
	135.9	0.0	4	4	4	8		M		135.9 / 0.0 GROUND SURFACE **UNDIVIDED COASTAL PLAIN** Tan, silty fine SAND
135	132.4	3.5	3	3	2	5		W		132.9 / 3.0 Grey-tan, clayey fine to coarse SAND, trace rock fragments
130	127.4	8.5	2	1	1	2		Sat		
125	122.4	13.5	4	8	7	15		W		123.9 / 12.0 **COASTAL PLAIN** Dark grey to orange, fine sandy silty CLAY, trace mica (Black Creek Formation)
120	117.4	18.5	3	5	6	11		M		
115	112.4	23.5	3	5	7	12		M		
110	107.4	28.5	5	8	9	17		M		
105	102.4	33.5	7	8	11	19		M		
100	97.4	38.5	5	6	8	14		M		
95	92.4	43.5	18	26	21	47		W		93.9 / 42.0 Dark grey to green, clayey silty fine SAND, trace mica
90	87.4	48.5	9	12	20	32		W		
85	82.4	53.5	5	5	8	13		W		
80	77.4	58.5	9	28	25	53		W		
75	72.4	63.5	6	8	12	20		M		71.4 / 64.5 Dark grey to green, fine sandy silty CLAY, trace mica
70	67.4	68.5	6	9	8	17		M		67.4 / 68.5 Dark grey-green, silty clayey fine SAND, trace mica
65	62.4	73.5	31	27	34	61		W		60.9 / 75.0

WBS 34416.1.S1	**TIP** R-2303E	**COUNTY** SAMPSON	**GEOLOGIST** P. Neumann	
SITE DESCRIPTION Bridge over US 421 on SR 1934 (Byrd Yancey Bass Rd.) between SR 1116 (Pearson Rd.) and SR 1932				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 31+98	**OFFSET** 28 ft LT	**ALIGNMENT** -Y2-	**0 HR.** N/A
COLLAR ELEV. 135.9 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 439,943	**EASTING** 2,211,906	**24 HR.** 5.9
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 81% 04/23/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Mosely	**START DATE** 07/11/19	**COMP. DATE** 07/11/19	**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
60						Match Line				Boring Terminated at Elevation 60.9 ft in Coastal Plain: silty clayey fine SAND

NCDOT BORE DOUBLE R_2303E SITE 2.GPJ NC_DOT.GDT 7/25/19