STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	41099.1.2 (P-4900)	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 41099.1.2 (P-4900) F.A. PROJ. TCSP-0635(5)

COUNTY ROBESON

PROJECT DESCRIPTION RAILROAD BYPASS OF PEMBROKE TO ALLOW NORTH TO SOUTH SHIPMENTS TO TURN EAST

SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER -EY2- (UNION CHAPEL RD.)

ID: P-4900

PROJECT: 41099.1.2

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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. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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PERSONNEL

CATLIN

TERRACON

J.R. SWARTLEY

INVESTIGATED BY J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE MAY 2014

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST JARETT R. SWARTLEY

DocuSigned by: Jarett Swartley 7E355C29E75A413...

10/10/2014

DRAWN BY: T.T. WALKER, J.R. SWARTLEY

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT REFERENCE NO.	SHEET NO.
41099.1.2 (P-4900)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
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
- 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 W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

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:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-45B
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 3/8 " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [■] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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: BY2-12, N: 341486.6412 E: 1945040.0808

ELEVATION: 165.99 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
41099.1.2 (P-4900)	3

SITE PLAN

0 50 100

FEET

EB1-A

EB1-B

B1-B

B2-A

EB2-A

EB2-B

25+00

20+00

40+00

ROBESON COUNTY WATER

SR 1563

UNION CHAPEL RD

(AATUR)

NO ASSOCIATED PIPING FOUND

WM

ISBLKBUS

MTL CAN

GR

20' GR

EIP

DI

SS

HUT OFF VALVE

ISFBUS

WD RAMP

PA BST

TOWN OF PEMBROKE

ISBKBUS

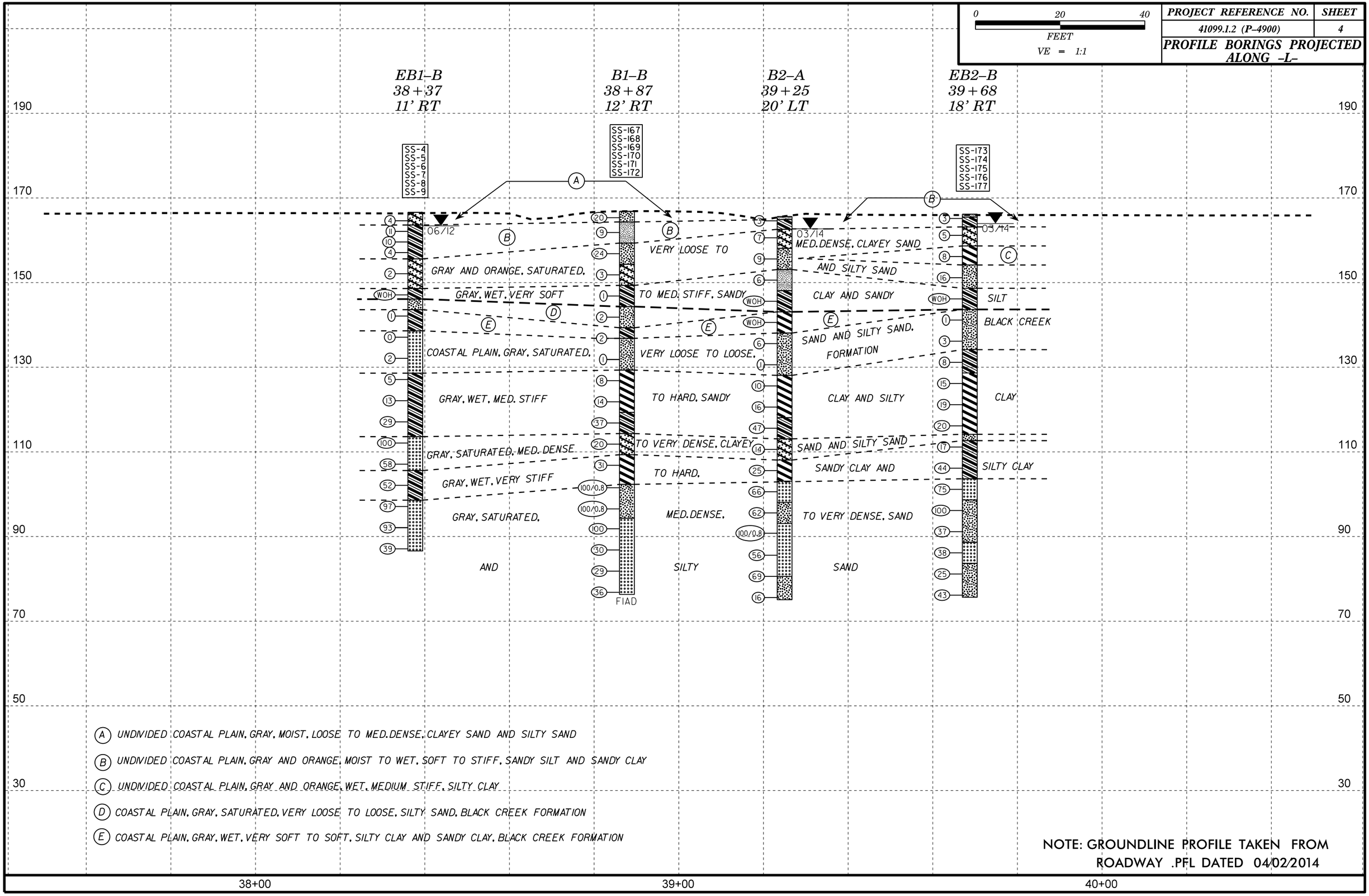
-L- STA 38+93.31 =
-W- STA 22+01.70

SKEW = 114°

PROJECT REFERENCE NO.	SHEET
41099.1.2 (P–4900)	4

PROFILE BORINGS PROJECTED ALONG –L–

0 20 40
FEET
VE = 1:1



(A) UNDIVIDED COASTAL PLAIN, GRAY, MOIST, LOOSE TO MED.DENSE, CLAYEY SAND AND SILTY SAND

(B) UNDIVIDED COASTAL PLAIN, GRAY AND ORANGE, MOIST TO WET, SOFT TO STIFF, SANDY SILT AND SANDY CLAY

(C) UNDIVIDED COASTAL PLAIN, GRAY AND ORANGE, WET, MEDIUM STIFF, SILTY CLAY

(D) COASTAL PLAIN, GRAY, SATURATED, VERY LOOSE TO LOOSE, SILTY SAND, BLACK CREEK FORMATION

(E) COASTAL PLAIN, GRAY, WET, VERY SOFT TO SOFT, SILTY CLAY AND SANDY CLAY, BLACK CREEK FORMATION

NOTE: GROUNDLINE PROFILE TAKEN FROM ROADWAY .PFL DATED 04/02/2014

38+00 39+00 40+00

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 38+17	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 165.9 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,692	**EASTING** 1,945,208	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/13/14	**COMP. DATE** 03/14/14	**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											
	165.9	0.0								165.9 GROUND SURFACE	0.0
165			1	1	2	3		M-W		165.2 **UNDIVIDED COASTAL PLAIN** BROWN AND ORANGE, SANDY SILT AND SANDY CLAY	0.7
	161.9	4.0								162.9 GRAY, CLAYEY SAND	3.0
160			4	5	6	11		Sat.			
	156.9	9.0									
155			2	2	3	5		Sat.		155.4 GRAY, SANDY CLAY	10.5
	151.9	14.0									
150			1	3	4	7		W			
	146.9	19.0									
145			WOH	1	1	2		W			
	141.9	24.0								141.4 **COASTAL PLAIN** GRAY, SILTY SAND (BLACK CREEK FORMATION)	24.5
140			WOH	2	2	4		Sat.		138.9 GRAY, SANDY SILT	27.0
	136.9	29.0									
135			WOH	1	2	3		W		135.9 GRAY, CLAYEY SAND	30.0
	131.9	34.0									
130			WOH	WOH	WOH	0		Sat.			
	126.9	39.0								128.4 GRAY, SANDY CLAY AND SILTY CLAY	37.5
125			WOH	4	6	10		W			
	121.9	44.0								123.4	42.5
120			3	7	10	17		W			
	116.9	49.0									
115			6	8	16	24		W			
	111.9	54.0								113.4 GRAY SAND	52.5
110			49	44	31	75		Sat.			
	106.9	59.0									
105			6	5	11	16		Sat.		105.9 GRAY, SANDY CLAY	60.0
	101.9	64.0									
100			10	25	37	62		W			
	96.9	69.0								98.4 GRAY, SILTY SAND	67.5
95			23	43	57	100/1.0		Sat.			
	91.9	74.0									
90			52	48/0.5		100/1.0		Sat.			

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 38+17	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 165.9 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,692	**EASTING** 1,945,208	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/13/14	**COMP. DATE** 03/14/14	**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				GRAY, SILTY SAND *(continued)*
	86.9	79.0	12	10	17	27		Sat.		
85										
	81.9	84.0	8	12	19	31		Sat.		
80										
	76.9	89.0	29	42	58	100/1.0		Sat.		75.4 Boring Terminated at Elevation 75.4 ft IN VERY DENSE SAND 90.5

Other Samples:
ST-58 (20.5 - 22.5)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 38+37	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.6 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 341,671	**EASTING** 1,945,181	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 06/19/12	**COMP. DATE** 06/19/12	**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										166.6 GROUND SURFACE	0.0
165	165.6	1.0	2	2	2	4		M		**UNDIVIDED COASTAL PLAIN** GRAY AND TAN, CLAYEY SAND	
	163.1	3.5	6	5	6	11	SS-178	15% W		163.6 GRAY, SANDY CLAY	3.0
160	160.6	6.0	4	5	5	10	SS-179	19% W			
	158.1	8.5	2	2	2	4	SS-180	18% W			
155										155.6 GRAY, CLAYEY SAND	11.0
	153.1	13.5	1	1	1	2		Sat.			
150										148.6 GRAY, SANDY CLAY	18.0
	148.1	18.5	WOH	WOH	WOH	0	SS-181	30% W		146.1	20.5
145										**COASTAL PLAIN** GRAY, SILTY SAND (BLACK CREEK FORMATION)	
	143.1	23.5	WOH	WOH	1	1	SS-182	53% W		143.6 GRAY, SANDY CLAY	23.0
140											
	138.1	28.5	1	0	0	0		Sat.		138.6 GRAY SAND	28.0
135											
	133.1	33.5	1	1	1	2		Sat.			
130											
	128.1	38.5	WOH	1	4	5	SS-183	24% W		128.6 GRAY, SANDY CLAY	38.0
125											
	123.1	43.5	3	5	8	13		W			
120											
	118.1	48.5	12	13	16	29		W			
115											
	113.1	53.5	53	47/0.5		100/1.0		Sat.		113.6 GRAY SAND	53.0
110											
	108.1	58.5	14	30	28	58		Sat.			
105										105.6 GRAY, SANDY CLAY	61.0
	103.1	63.5	12	22	30	52		W			
100											
	98.1	68.5	38	45	52	97		Sat.		98.6 GRAY SAND	68.0
95											
	93.1	73.5	33	45	48	93		Sat.			
90											

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 38+37	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.6 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 341,671	**EASTING** 1,945,181	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 06/19/12	**COMP. DATE** 06/19/12	**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				GRAY SAND *(continued)*
	88.1	78.5	16	18	21	39		Sat.		86.6 80.0
										Boring Terminated at Elevation 86.6 ft IN DENSE SAND
										Other Samples: ST-1A (20.5 - 22.5)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 38+87	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.8 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,620	**EASTING** 1,945,186	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/12/14	**COMP. DATE** 03/12/14	**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										
	166.3	0.5								166.8 — GROUND SURFACE — 0.0 166.3 — (PAVEMENT) — 0.5
165			12	10	10	20				**ROADWAY EMBANKMENT**
	162.8	4.0								164.3 — **UNDIVIDED COASTAL PLAIN** — 2.5 ORANGE AND TAN, SANDY SILT
160			2	4	5	9	SS-167			
	157.8	9.0								159.3 — GRAY, SILTY SAND AND CLAYEY SAND — 7.5
155			6	11	13	24				
	152.8	14.0								154.3 — 12.5
150			1	2	1	3	SS-168			
	147.8	19.0								149.3 — GRAY, SANDY CLAY — 17.5
145			WOH	WOH	1	1	SS-169			
	142.8	24.0								144.3 — **COASTAL PLAIN** — 22.5 GRAY, SILTY SAND (BLACK CREEK FORMATION)
140			WOR	1	1	2	SS-170			
	137.8	29.0								139.3 — GRAY, SANDY CLAY — 27.5
135			WOH	WOH	2	2				136.8 — GRAY, SILTY SAND — 30.0
	132.8	34.0								
130			WOR	WOH	1	1	SS-171			
	127.8	39.0								129.3 — GRAY, SILTY CLAY AND SANDY CLAY — 37.5
125			WOR	2	6	8				
	122.8	44.0								
120			3	6	8	14				119.3 — 47.5
	117.8	49.0								
115			6	12	25	37				
	112.8	54.0								114.3 — GRAY, CLAYEY SAND — 52.5
110			6	8	12	20	SS-172			
	107.8	59.0								109.3 — GRAY, SILTY CLAY — 57.5
105			8	12	19	31				
	102.8	64.0								102.3 — GRAY, SAND AND SILTY SAND — 64.5
100			24	50	50/0.3	100/0.8				
	97.8	69.0								
95			26	51	49/0.3	100/0.8				
	92.8	74.0								94.3 — 72.5
90			30	45	55	100/1.0				

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 38+87	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.8 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,620	**EASTING** 1,945,186	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/12/14	**COMP. DATE** 03/12/14	**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				
	87.8	79.0	12	13	17	30				
85										
	82.8	84.0	10	12	17	29				
80										
	77.8	89.0	12	15	21	36				76.3 — 90.5 Boring Terminated at Elevation 76.3 ft IN DENSE SAND

Other Samples:
ST-55 (20.5 - 22.5)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 39+25	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.6 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,587	**EASTING** 1,945,223	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/13/14	**COMP. DATE** 03/13/14	**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											
	166.6	0.0								166.6 GROUND SURFACE	0.0
165			2	2	1	3		M		165.9 **UNDIVIDED COASTAL PLAIN** BROWN, SILT AND SANDY CLAY	0.7
	162.6	4.0								163.6 ORANGE AND TAN, CLAYEY SAND AND SILTY SAND	3.0
160			3	3	4	7		Sat.			
	157.6	9.0								159.1	7.5
155			6	5	4	9		Sat.			
	152.6	14.0								154.1 ORANGE, GRAY AND BROWN, SANDY SILT AND SANDY CLAY	12.5
150			2	3	3	6		W			
	147.6	19.0								149.1	17.5
145			WOH	WOH	WOH	0		W			
	142.6	24.0								144.1 **COASTAL PLAIN** GRAY, SILTY CLAY (BLACK CREEK FORMATION)	22.5
140			WOH	WOH	WOH	0		W			
	137.6	29.0								139.1 GRAY, SILTY SAND	27.5
135			1	4	2	6		Sat.			
	132.6	34.0									
130			WOR	WOH	1	1		Sat.			
	127.6	39.0								129.1 GRAY SILTY CLAY AND SANDY CLAY	37.5
125			2	4	6	10		W			
	122.6	44.0									
120			4	6	10	16		W			
	117.6	49.0								119.1	47.5
115			7	14	33	47		W			
	112.6	54.0								114.1 GRAY, CLAYEY SAND	52.5
110			4	6	8	14		Sat.			
	107.6	59.0								109.1 GRAY, SILTY CLAY	57.5
105			8	11	14	25		W			
	102.6	64.0								104.1 GRAY, SAND AND SILTY SAND	62.5
100			29	29	37	66		Sat.			
	97.6	69.0								99.1	67.5
95			21	30	32	62		Sat.			
	92.6	74.0								94.1	72.5
90			51	49/0.3		100/0.8		Sat.			

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 39+25	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.6 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,587	**EASTING** 1,945,223	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/13/14	**COMP. DATE** 03/13/14	**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				
	87.6	79.0	34	29	27	56		Sat.		
85										81.6 85.0
	82.6	84.0	10	22	47	69		Sat.		
80										
	77.6	89.0	9	7	9	16		Sat.		76.1 90.5
										Boring Terminated at Elevation 76.1 ft IN MED. DENSE SAND

NCDOT BORE DOUBLE P4900_GEO_RDWY_SPT_BORINGS.GPJ NC_DOT.GDT 10/7/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 39+42	**OFFSET** 6 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 166.3 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 341,568	**EASTING** 1,945,211 — **24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 06/18/12	**COMP. DATE** 06/18/12	**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											
										166.3	0.0
										GROUND SURFACE	
165	165.3	1.0								**UNDIVIDED COASTAL PLAIN**	
			1	1	1	2	SS-10	15% M		GRAY, SANDY CLAY	
	162.8	3.5								163.3	3.0
			2	3	8	11		M		GRAY AND TAN, CLAYEY SAND	
160	160.3	6.0									
			11	15	8	23		Sat.			
	157.8	8.5									
			2	3	4	7		Sat.			
155											
	152.8	13.5									
			1	2	2	4		Sat.			
150											
	147.8	18.5								149.3	17.0
			WOH	WOH	WOH	0	SS-11	34% W		**COASTAL PLAIN** GRAY, SANDY CLAY (BLACK CREEK FORMATION)	
145											
	142.8	23.5								GRAY, SAND AND CLAYEY SAND	
			WOH	WOH	1	1	SS-12	W			
140											
	137.8	28.5								139.3	27.0
			2	2	0	2		Sat.			
135											
	132.8	33.5									
			WOH	1	0	1		Sat.			
130											
	127.8	38.5								129.3	37.0
			3	5	6	11	SS-13	29% W		GRAY, SANDY CLAY AND SILTY CLAY	
125										124.3	42.0
	122.8	43.5									
			4	7	11	18		W			
120											
	117.8	48.5									
			7	13	18	31		W			
115											
	112.8	53.5								114.3	52.0
			5	6	6	12		Sat.		GRAY, CLAYEY SAND	
110											
	107.8	58.5								109.3	57.0
			6	11	15	26		W		GRAY, SANDY CLAY	
105											
	102.8	63.5								104.3	62.0
			30	70/0.4		100/0.9		Sat.		GRAY SAND	
100											
	97.8	68.5									
			20	32	68/0.4	100/0.9		Sat.			
95											
	92.8	73.5									
			54	46/0.3		100/0.8		Sat.			
90											

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 39+42	**OFFSET** 6 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 166.3 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 341,568	**EASTING** 1,945,211 — **24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 06/18/12	**COMP. DATE** 06/18/12	**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				
	87.8	78.5								GRAY SAND *(continued)*
			14	18	23	41		Sat.		86.3 80.0
										Boring Terminated at Elevation 86.3 ft IN DENSE SAND

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 39+68	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.2 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,539	**EASTING** 1,945,192	**24 HR.** 2.2
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/12/14	**COMP. DATE** 03/13/14	**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											
	166.2	0.0								166.2 GROUND SURFACE	0.0
165			1	1	2	3	SS-173	M		165.5 **UNDIVIDED COASTAL PLAIN** BROWN AND ORANGE, SANDY SILT AND SANDY CLAY	0.7
	162.2	4.0								163.2 ORANGE, CLAYEY SAND	3.0
160			2	2	3	5	SS-174	Sat.			
	157.2	9.0								158.7 GRAY, SILTY CLAY	7.5
155			3	4	4	8	SS-175	W			
	152.2	14.0								154.2 GRAY, SILTY SAND	12.0
150			3	6	10	16		Sat.			
	147.2	19.0								148.7 GRAY, SANDY CLAY	17.5
145			WOH	WOH	WOH	0	SS-176	W			
	142.2	24.0								143.7 **COASTAL PLAIN** GRAY, SILTY SAND (BLACK CREEK FORMATION)	22.5
140			1	0	1	1	SS-177	Sat.			
	137.2	29.0									
135			1	1	2	3		Sat.			
	132.2	34.0								134.2 GRAY, SANDY CLAY AND SILTY CLAY	32.0
130			1	4	4	8		W		128.7	37.5
	127.2	39.0									
125			3	7	8	15		W			
	122.2	44.0									
120			4	7	12	19		W			
	117.2	49.0									
115			5	8	12	20		W		114.2 GRAY, SILTY SAND	52.0
	112.2	54.0								112.7 GRAY, SANDY CLAY	53.5
110			3	8	9	17		W			
	107.2	59.0									
105			6	13	31	44		W			
	102.2	64.0								103.7 GRAY, SAND AND SILTY SAND	62.5
100			40	40	35	75		Sat.			
	97.2	69.0								98.7	67.5
95			26	35	65	100		Sat.			
	92.2	74.0									
90			9	15	22	37		Sat.			

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION RAILROAD BRIDGE ON -L- @ STA. 38+90 OVER SR 1563 (UNION CHAPEL RD.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 39+68	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 166.2 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 341,539	**EASTING** 1,945,192	**24 HR.** 2.2
DRILL RIG/HAMMER EFF./DATE CAT6394 CME-45B 91% 02/19/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/12/14	**COMP. DATE** 03/13/14	**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				
	87.2	79.0	11	17	21	38		Sat.		88.7 GRAY, SAND AND SILTY SAND (cont.) 77.5
85										83.7 82.5
	82.2	84.0	10	11	14	25		Sat.		
80										
	77.2	89.0	11	18	25	43		Sat.		75.7 90.5

Boring Terminated at Elevation 75.7 ft IN DENSE SAND

Other Samples:
ST-56 (20.5 - 22.5)
ST-57 (35.5 - 37.5)

NCDOT BORE DOUBLE P4900_GEO_RDWY_SPT_BORINGS.GPJ NC_DOT.GDT 10/7/14

PROJ. NO. - 41099.1.2
ID NO. - P-4900
COUNTY - ROBESON

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-178	11'RT	38+37	3.5-5.0	A-6(4)	37	23	39.1	24.7	7.5	28.7	100	39	15.2	-	-
SS-179	11'RT	38+37	6.0-7.5	A-6(5)	39	25	31.1	31.2	6.3	31.4	100	83	41	18.6	-
SS-180	11'RT	38+37	8.5-10.0	A-6(6)	38	24	33.0	24.1	8.3	34.6	100	80	46	17.8	-
SS-181	11'RT	38+37	18.5-20.0	A-6(9)	32	16	4.5	35.5	29.4	30.6	100	97	70	30	2.07
SS-182	11'RT	38+37	23.5-25.0	A-6(1)	31	13	3.7	62.3	13.7	20.3	100	97	39	52.6	0.48
SS-183	11'RT	38+37	38.5-40.0	A-6(13)	40	23	13.2	22.1	13.2	51.5	96	87	66	23.8	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-167	12'RT	38+87	4.0-5.5	A-4(0)	17	4	38.9	25.9	16.2	19.1	100	76	40	-	-
SS-168	12'RT	38+87	14.0-15.5	A-2-6(1)	30	17	48.0	22.1	5.8	24.1	100	70	31	-	-
SS-169	12'RT	38+87	19.0-20.5	A-6(5)	34	13	7.0	48.6	18.3	26.1	100	95	56	-	-
SS-170	12'RT	38+87	24.0-25.5	A-2-4(0)	25	NP	1.8	74.4	14.8	9.0	100	99	30	-	-
SS-171	12'RT	38+87	34.0-35.5	A-2-4(0)	25	NP	46.7	41.7	5.6	6.0	95	60	13	-	-
SS-172	12'RT	38+87	54.0-55.5	A-2-6(1)	32	16	47.6	18.9	2.4	31.1	100	82	34	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	6'LT	39+42	1.0-2.5	A-6(2)	25	15	37.7	23.5	13.5	25.3	99	75	42	15.2	-
SS-11	6'LT	39+42	18.5-20.0	A-6(16)	43	29	2.3	42.1	26.7	28.9	100	99	66	34	1.82
SS-12	6'LT	39+42	23.5-25.0	A-1-b(0)	24	NP	0.2	82.4	2.2	15.2	100	100	23	-	0.24
SS-13	6'LT	39+42	38.5-40.0	A-7-6(40)	59	36	0.6	1.7	4.3	93.4	100	100	98	29.3	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-173	18' RT	39+68	0.7-1.5	A-6(6)	35	21	34.9	19.7	15.3	30.1	100	77	48	-	-
SS-174	18' RT	39+68	4.0-5.5	A-2-6(2)	40	23	48.5	19.2	8.2	24.1	100	68	34	-	-
SS-175	18' RT	39+68	9.0-10.5	A-7-6(9)	55	37	39.0	20.7	9.2	31.1	99	71	42	-	-
SS-176	18' RT	39+68	19.0-20.5	A-6(10)	39	19	1.0	47.0	19.9	32.1	100	99	65	-	-
SS-177	18' RT	39+68	24.0-25.5	A-2-4(0)	23	NP	4.1	74.5	12.3	9.0	100	98	25	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	41099.1.2 (P-4900)	1	7

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *41099.1.2 (P-4900)* F.A. PROJ. *TCSP-0635(5)*

COUNTY *ROBESON*

PROJECT DESCRIPTION *RAILROAD BYPASS OF PEMBROKE TO ALLOW NORTH TO SOUTH SHIPMENTS TO TURN EAST*

SITE DESCRIPTION *BRIDGE ON PROPOSED CONNECTING TRACK OVER BEAR SWAMP BETWEEN ST. ANNA RD. AND UNION CHAPEL RD.*

ID: P-4900

PROJECT: 41099.1.2

CONTENTS

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PERSONNEL

CATLIN

TERRACON

J.R. SWARTLEY

INVESTIGATED BY *J.R. SWARTLEY*

CHECKED BY *N.T. ROBERSON*

SUBMITTED BY *N.T. ROBERSON*

DATE *SEPTEMBER 2014*

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST JARETT R. SWARTLEY

DocuSigned by: Jarett Swartley 1/7/2015

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DRAWN BY: *T.T. WALKER, J.R. SWARTLEY*

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PROJECT REFERENCE NO.	SHEET NO.
41099.1.2 (P-4900)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
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
- 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 W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

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:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-45B
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 3/8 " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [■] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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: BY2-12, N: 341486.6412 E: 1945040.0808

ELEVATION: 165.99 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET NO.
41099.1.2 (P-4900)	3

SITE PLAN

0 50 100

FEET

N

EB1–A

EB2–A

20+00

25+00

–L–

12675+00

CSX RR

2 - BARRELL BOX CULVERT

4'x6'

4'x6'

T FO

(FO) VERIZON BUS. (MCI)

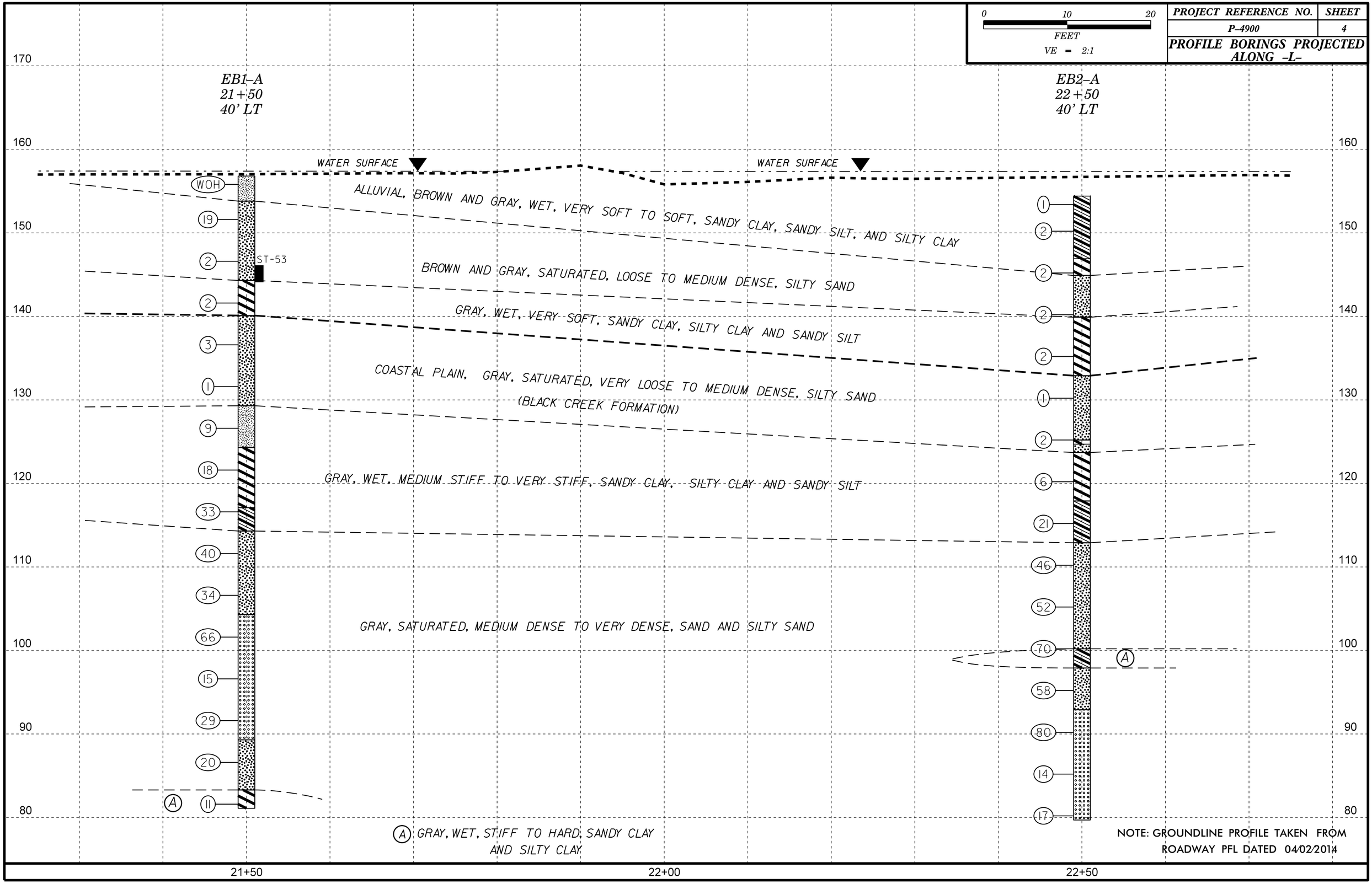
0	10	20

FEET

VE = 2:1

PROJECT REFERENCE NO.	SHEET
P–4900	4

PROFILE BORINGS PROJECTED ALONG –L–



(A) GRAY, WET, STIFF TO HARD, SANDY CLAY AND SILTY CLAY

NOTE: GROUNDLINE PROFILE TAKEN FROM ROADWAY PFL DATED 04/02/2014

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BR. ON PROP. CONNECTING TRACK OVER BEAR SWAMP BETWEEN ST. ANNA RD. AND UNION CHAPEL RD.			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 21+50	**OFFSET** 40 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 156.8 ft	**TOTAL DEPTH** 75.7 ft	**NORTHING** 343,131	**EASTING** 1,945,901	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/11/14	**COMP. DATE** 03/11/14	**SURFACE WATER DEPTH** 0.6ft	

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)
										WATER SURFACE (03/11/14)	
	156.8	0.0								156.8 GROUND SURFACE	0.0
			WOH	WOH	WOH	0	SS-162A	Sat.		**ALLUVIAL** GRAY, SANDY SILT	
	153.8	3.0								153.8 GRAY, SILTY SAND	3.0
			6	9	10	19		Sat.			
	147.6	9.2									
			1	1	1	2	SS-163	40%			
	144.3	12.5						Sat.		GRAY, SILTY CLAY	12.5
			WOH	WOH	2	2					
	140.1	16.7						Sat.		**COASTAL PLAIN** GRAY, SILTY SAND (BLACK CREEK FORMATION)	16.7
			1	1	2	3					
	132.6	24.2						Sat.			
			1	0	1	1		W			
	129.3	27.5								GRAY, SANDY SILT, SILTY CLAY AND SANDY CLAY	27.5
			6	6	3	9	SS-164	W			
	124.3	32.5									
			4	7	11	18		W			
	117.1	39.7									
			4	11	22	33	SS-165	W			
	114.3	42.5								GRAY, SAND AND SILTY SAND	42.5
			7	16	24	40		Sat.			
			9	16	18	34		Sat.			
	104.3	52.5									
			27	31	35	66		Sat.			
			5	6	9	15		Sat.			
			5	9	20	29		Sat.			
	89.3	67.5									
			9	13	7	20		Sat.			
	83.3	73.5								GRAY, SILTY CLAY	73.5
			2	3	8	11		Sat.			
	81.1	75.7								Boring Terminated at Elevation 81.1 ft	

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BR. ON PROP. CONNECTING TRACK OVER BEAR SWAMP BETWEEN ST. ANNA RD. AND UNION CHAPEL RD.			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 21+50	**OFFSET** 40 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 156.8 ft	**TOTAL DEPTH** 75.7 ft	**NORTHING** 343,131	**EASTING** 1,945,901	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 03/11/14	**COMP. DATE** 03/11/14	**SURFACE WATER DEPTH** 0.6ft	

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
80						Match Line				STIFF SILTY CLAY
										Other Samples: ST-53 (10.7 - 12.7)

NCDOT BORE DOUBLE P4900_GEO_RDWY_SPT_BORINGS.GPJ NC_DOT.GDT 1/5/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 41099.1.2	**TIP** P-4900	**COUNTY** ROBESON	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BR. ON PROP. CONNECTING TRACK OVER BEAR SWAMP BETWEEN ST. ANNA RD. AND UNION CHAPEL RD.				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 22+50	**OFFSET** 40 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 154.4 ft	**TOTAL DEPTH** 74.7 ft	**NORTHING** 343,053	**EASTING** 1,945,837	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 03/10/14	**COMP. DATE** 03/10/14	**SURFACE WATER DEPTH** 0.3ft	

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)
155											
	154.4	0.0	1	0	1	1	SS-159	M		154.4 WATER SURFACE (03/10/14)	0.0
	151.2	3.2								**ALLUVIAL** GRAY, SANDY CLAY AND SILTY CLAY WITH TRACE ORGANIC MATTER	
150			WOR	1	1	2	SS-160	W			
	146.2	8.2								146.9	7.5
145			1	1	1	2		W		144.9 GRAY, SILTY SAND	9.5
	141.2	13.2									
140			1	1	1	2	SS-161	Sat.		139.9 GRAY, SILTY CLAY	14.5
	136.2	18.2									
135			1	1	1	2		W		132.9 **COASTAL PLAIN** GRAY, SILTY SAND (BLACK CREEK FORMATION)	21.5
	131.2	23.2									
130			1	0	1	1		Sat.			
	126.2	28.2									
125			1	1	1	2		Sat.		125.2 GRAY, SILTY CLAY 124.7 GRAY, SILTY SAND 123.7 GRAY, SILTY CLAY AND SANDY CLAY	29.2 29.7 30.7
	121.2	33.2									
120			2	2	4	6		W		117.9	36.5
	116.2	38.2									
115			3	9	12	21	SS-162	Sat.		112.9 GRAY, SILTY SAND	41.5
	111.2	43.2									
110			9	19	27	46		W			
	106.2	48.2									
105			12	22	30	52		W			
	101.2	53.2									
100			16	20	50	70		Sat.		100.2 GRAY, SANDY CLAY	54.2
	96.2	58.2						W		97.9 GRAY, SILTY SAND AND SAND	56.5
95			11	26	32	58		Sat.		92.9	61.5
	91.2	63.2									
90			28	40	40	80		Sat.			
	86.2	68.2									
85			4	7	7	14		Sat.			
	81.2	73.2									
80			4	6	11	17		Sat.		79.7 Boring Terminated at Elevation 79.7 ft MED. DENSE SILTY SAND	74.7

NCDOT BORE DOUBLE P4900_GEO_RDWY_SPT_BORINGS.GPJ NC_DOT.GDT 1/5/15

PROJECT REFERENCE NO.	SHEET NO.
P-4900	7

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-162A	40' LT	21+50	0.0-1.5	A-4(0)	15	NP	23.0	39.9	19.0	18.1	100	92	42	-	-
SS-163	40' LT	21+50	9.2-10.7	A-2-4(0)	25	NP	4.2	73.3	14.4	8.1	100	98	30	39.9	-
SS-164	40' LT	21+50	29.2-30.7	A-4(0)	17	2	16.7	35.6	27.5	20.1	100	90	57	-	-
SS-165	40' LT	21+50	39.7-40.7	A-6(9)	32	15	0.8	30.4	26.5	42.3	100	100	75	-	-
SS-159	40' LT	22+50	0.5-1.5	A-6(6)	28	15	19.3	26.2	22.3	32.2	100	92	59	-	-
SS-160	40' LT	22+50	3.2-4.7	A-6(4)	26	13	19.1	27.8	22.9	30.2	100	91	58	-	-
SS-161	40' LT	22+50	13.2-14.7	A-2-4(0)	27	NP	6.4	73.7	14.8	5.0	100	96	26	-	-
SS-162	40' LT	22+50	38.2-39.7	A-6(10)	35	15	1.6	33.2	26.9	38.3	100	99	76	-	-