STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5986B	1	7

REFERENCE: I-5986B

PROJECT: 47532

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *I-95 WIDENING FROM SR 1811 (BUD HAWKINS ROAD) (EXIT 70) TO I-40 (EXIT 81) – WIDEN TO EIGHT LANES*

SITE DESCRIPTION *SECTION 3 OF 4; I-5883 PORTION, REPLACE CULVERT BENEATH I-95 @ -L- STA. 1220+34 ALONG MINGO SWAMP TRIBUTARY #1*

CONTENTS

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

M. HARTMAN

J. WHITE

S. HARDEE

INVESTIGATED BY *S&ME, INC.*

DRAWN BY *J. SWARTLEY*

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DATE *APRIL 2019*

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DocuSigned by: Stacie Mitchell BBC611B64F19458... 4/26/2019

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [X] 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
- [X] 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: • SEE NOTE

ELEVATION: FEET

NOTES:

• Elevations derived from geopak and the .tin file I5896B_2_ls_tin.tin dated 06/18/18

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	3

SITE PLAN

0 50 100
FEET

NAD 83

S 75°00'08"E
137.30'

POND

WOODS

-L- POT Sta. 12
-Y17RPA-

△=3°53'20.0"

SKEW = 87°

PA- TS Sta. 13+13.79

BILLBOARD

EXISTING R/W

60" WW

27'
TYP

36" CMP

.04 .03 .025

13+00

-Y17RPA-

CONC HW

CULV-1

+74.42 -L-

TO FAYETTEVILLE

I-95 SBL

1220+00

1223+00

18" RCP

15" RCP

-L-

DI

I-95 NBL

TO BENSON

48" RCP

48" RCP

18" RCP

18" RCP

2@7'X6' RCBC
BURY INVERT 1'

CONC

60" WW

205

CULV-2

ROBIN HOOD RD.

.04 .03 .025

.00 .01 .02 .03 .04

TYP

R/W MON

35+00

-SR17-

WOODS

B SOIL

WOODS

CULV-4

MINGO SWAMP TRIB. 1

-SR17- PT

Sta. 1217+86.78 =
ST Sta. 10+00.00

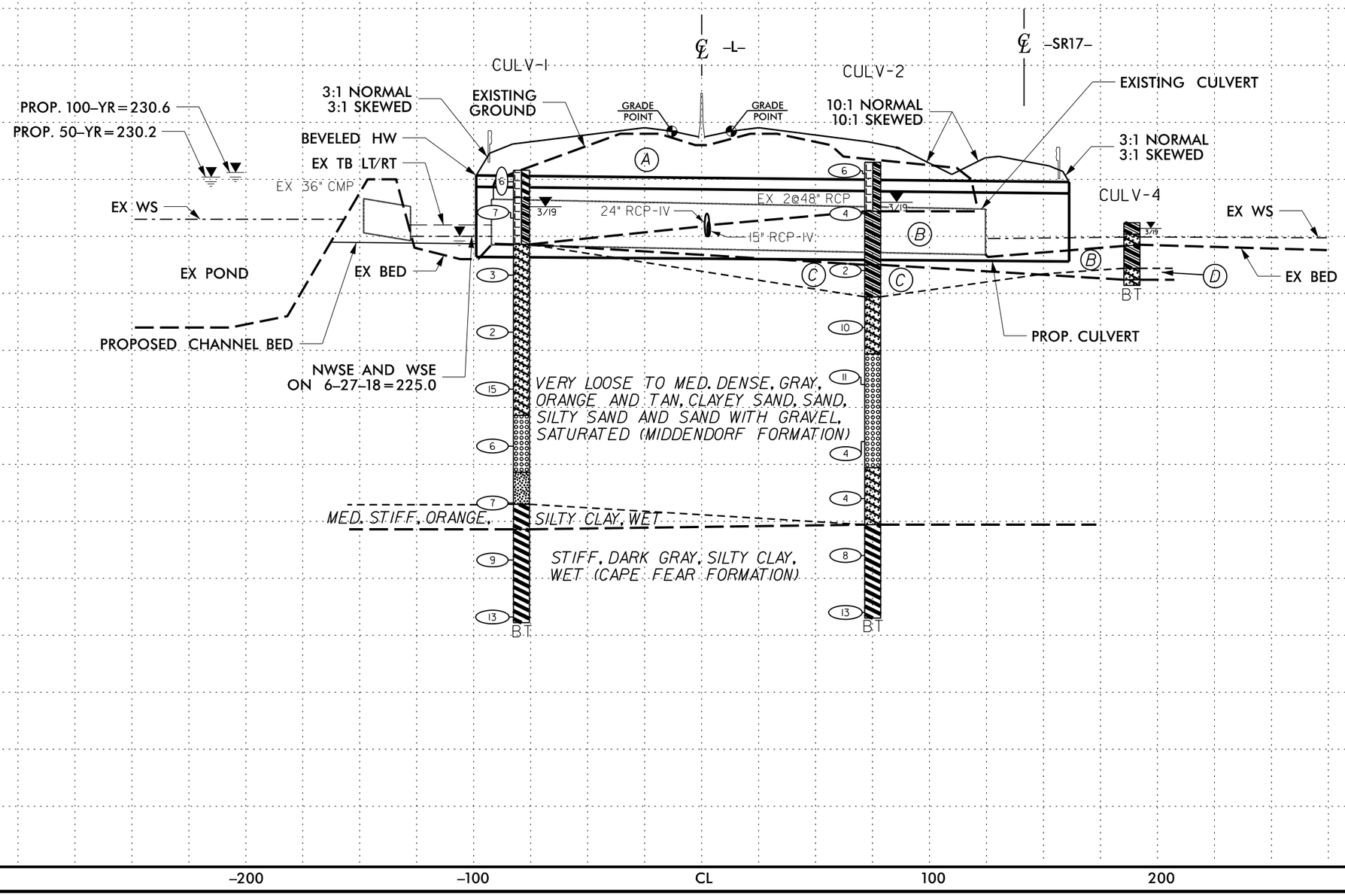
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	4

PROFILE PROJECTED ALONG CL OF CULVERT

0 50 100
FEET
VE = 5:1

(A) MED. STIFF TO STIFF, BROWN, ORANGE AND RED, SILTY CLAY AND SANDY CLAY, MOIST (ROADWAY EMBANKMENT)
(B) SOFT, BROWN, SANDY CLAY, WET (ALLUVIAL)
(C) VERY SOFT, GRAY, SANDY CLAY, WET (MIDDENDORF FORMATION)
(D) LOOSE, BROWN AND TAN, CLAYEY SAND, SATURATED (ALLUVIAL)



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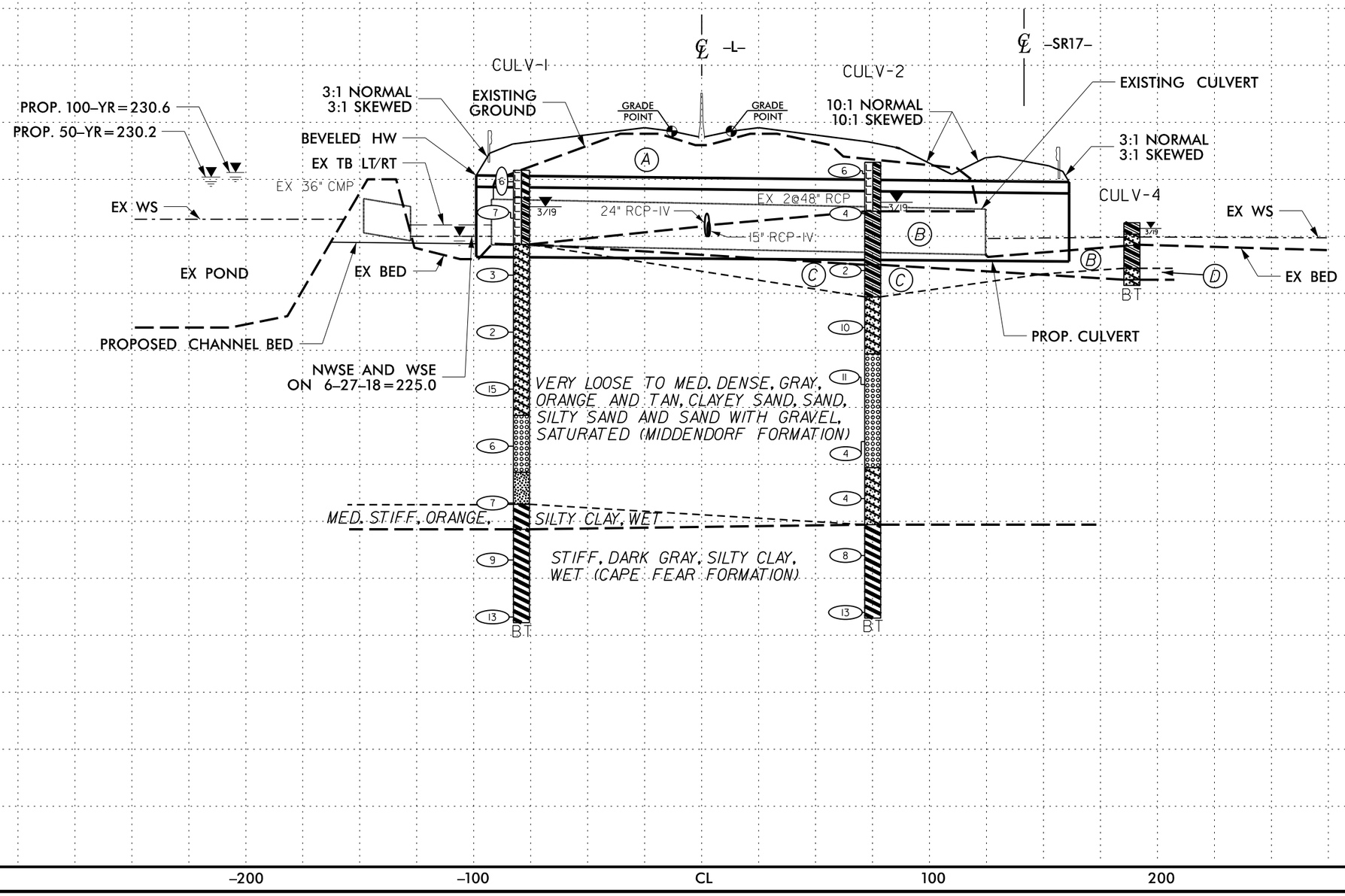

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532.1.3	**TIP** I-5986B (I-5833)	**COUNTY** HARNETT	**GEOLOGIST** Hartman, Matt
SITE DESCRIPTION REPLACE CULVERT BENEATH I-95 @ -L- STA. 1220+34 ALONG MINGO SWAMP TRIBUTARY #1			**GROUND WTR (ft)**
BORING NO. CULV-1	**STATION** 1220+50	**OFFSET** 80 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 230.8 ft	**TOTAL DEPTH** 39.7 ft	**NORTHING** 581,304	**EASTING** 2,132,137	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 93% 11/08/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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)
235											
230	230.8	0.0	3	3	3	6		M		230.8 GROUND SURFACE	0.0
	227.6	3.2								**ROADWAY EMBANKMENT**	
			4	3	4	7				228.4 BROWN, ORANGE AND RED, SILTY CLAY AND SANDY CLAY	2.4
225										224.3 **COASTAL PLAIN**	6.5
	222.6	8.2	5	2	1	3		Sat.		GRAY, ORANGE AND TAN, CLAYEY SAND (MIDDENDORF FORMATION)	
220											
	217.6	13.2	2	1	1	2		Sat.			
215											
	212.6	18.2	6	4	11	15		Sat.			
210										209.3 ORANGE, SAND WITH GRAVEL AND SILTY SAND	21.5
	207.6	23.2	3	3	3	6		Sat.			
205										204.3	26.5
	202.6	28.2	4	5	2	7		W		201.5 ORANGE, SILTY CLAY	29.3
200										199.3 **COASTAL PLAIN**	31.5
	197.6	33.2	3	4	5	9		W		DARK GRAY, SILTY CLAY (CAPE FEAR FORMATION)	
195											
	192.6	38.2	5	5	8	13		W		191.1 Boring Terminated at Elevation 191.1 ft IN STIFF SILTY CLAY (COASTAL PLAIN)	39.7

WBS 47532.1.3	**TIP** I-5986B (I-5833)	**COUNTY** HARNETT	**GEOLOGIST** Hartman, Matt
SITE DESCRIPTION REPLACE CULVERT BENEATH I-95 @ -L- STA. 1220+34 ALONG MINGO SWAMP TRIBUTARY #1			**GROUND WTR (ft)**
BORING NO. CULV-2	**STATION** 1220+00	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 231.5 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 581,206	**EASTING** 2,132,270	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 93% 11/08/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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
235										
230	231.5	0.0	3	3	3	6		M		231.5 GROUND SURFACE 0.0
	228.0	3.5								**ROADWAY EMBANKMENT** BROWN, SANDY CLAY
			3	2	2	4		M		227.2 4.3
225										**ALLUVIAL** BROWN, SANDY CLAY
	223.0	8.5	1	1	1	2		W		222.5 9.0
220										**COASTAL PLAIN** GRAY, SANDY CLAY (MIDDENDORF FORMATION)
	218.0	13.5	3	5	5	10		Sat.		219.7 11.8 ORANGE, CLAYEY SAND
215										
	213.0	18.5	3	6	5	11		Sat.		214.7 16.8 ORANGE SAND WITH GRAVEL
210										
	208.0	23.5	4	3	1	4		Sat.		
205										204.7 26.8 ORANGE, CLAYEY SAND
	203.0	28.5	3	1	3	4		Sat.		
200										199.7 31.8 **COASTAL PLAIN**
	198.0	33.5	3	3	5	8		W		DARK GRAY, SILTY CLAY (CAPE FEAR FORMATION)
195										
	193.0	38.5	4	5	8	13		W		191.5 40.0 Boring Terminated at Elevation 191.5 ft IN STIFF SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532.1.3	**TIP** I-5986B (I-5833)	**COUNTY** HARNETT	**GEOLOGIST** Hartman, Matt	
SITE DESCRIPTION REPLACE CULVERT BENEATH I-95 @ -L- STA. 1220+34 ALONG MINGO SWAMP TRIBUTARY #1				**GROUND WTR (ft)**
BORING NO. CULV-4	**STATION** 1220+35	**OFFSET** 189 ft RT	**ALIGNMENT** -L-	**0 HR.** 0.5
COLLAR ELEV. 225.9 ft	**TOTAL DEPTH** 5.5 ft	**NORTHING** 581,204	**EASTING** 2,132,388	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Hand Auger	**HAMMER TYPE** N/A	
DRILLER Hartman, Matt	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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)
230											
225										225.9 GROUND SURFACE	0.0
										224.9 **ALLUVIAL** BROWN, SOFT, SANDY CLAY, MOIST	1.0
										223.9 BROWN AND TAN, LOOSE, CLAYEY SAND, SAT.	2.0
										221.9 BROWN, SOFT, SANDY CLAY, WET	4.0
										220.9 TAN AND GRAY, LOOSE, CLAYEY SAND, SAT.	5.0
										220.4 **COASTAL PLAIN** GRAY, DENSE, CLAYEY SAND, SAT. (MIDDENDORF FORMATION)	5.5
										Boring Terminated at Elevation 220.4 ft IN MED. DENSE CLAYEY SAND (COASTAL PLAIN)	

NCDOT BORE DOUBLE I5883_CULVERTS.GPJ NC_DOT.GDT 4/5/19

SITE PHOTOGRAPH (S)

Culvert Beneath I-95 (-L-) Along Mingo Swamp Tributary #1

Looking North

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5878	1	15

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *IMPROVE I-95 INTERCHANGES AT US 421 AND SR 1793 (SPRING BRANCH /POPE RD)*

SITE DESCRIPTION *BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)*

REFERENCE: I-5878

PROJECT: 53078

CONTENTS

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
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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

E.G. BLONSHINE

M.S. HAYES

T.J. WHITE

K.S. HARDEE

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *S.S. LANEY*

SUBMITTED BY *S.S. LANEY*

DATE *NOVEMBER 2019*

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST JARETT SWARTLEY

DocuSigned by:
919459487BA3471...
SIGNATURE

11/21/2019
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I–5878	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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
- [X] BWJ RODS

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

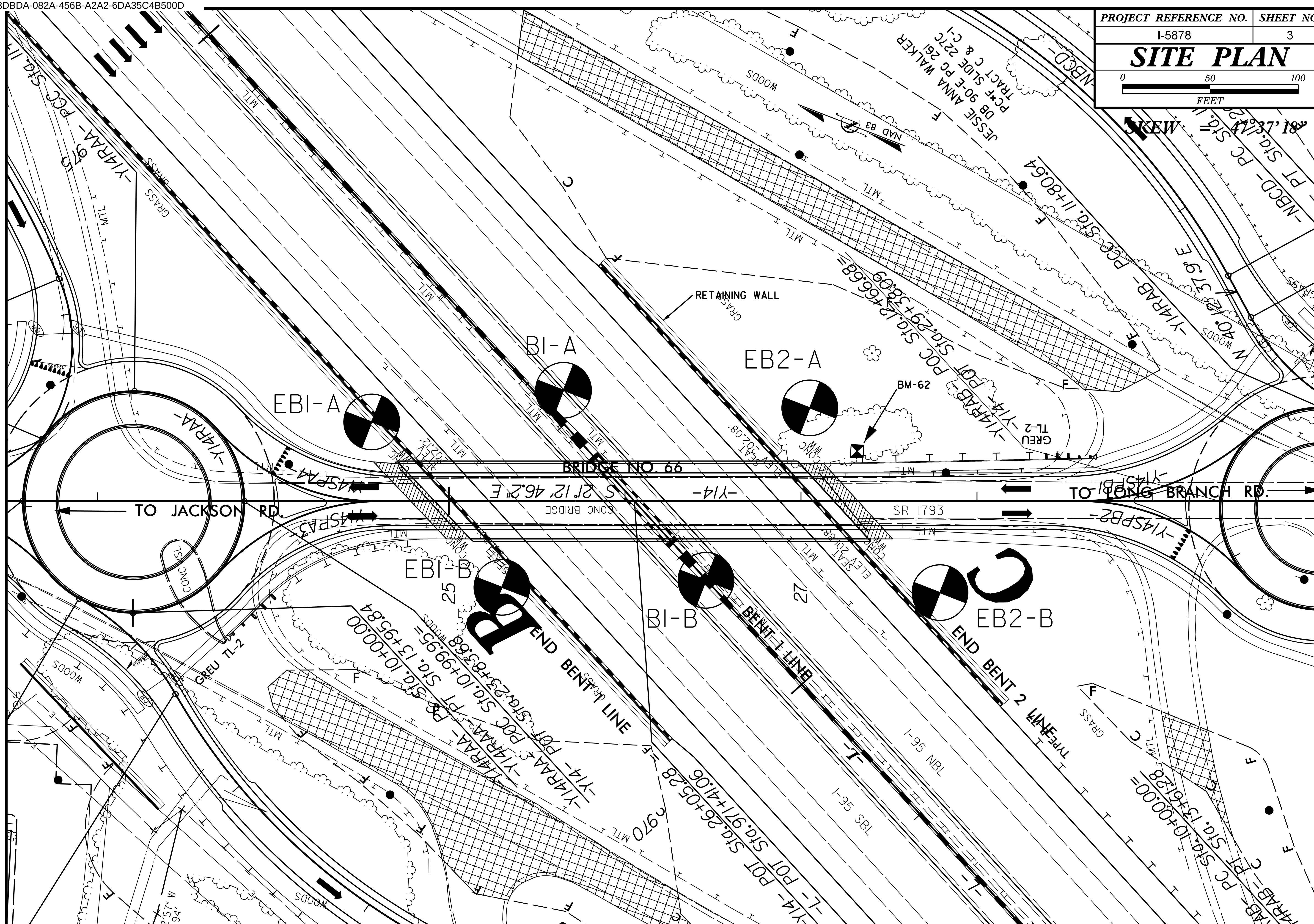
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM-62
NORTHING: 561213 EASTING: 2118159
ELEVATION: 198.28 FEET

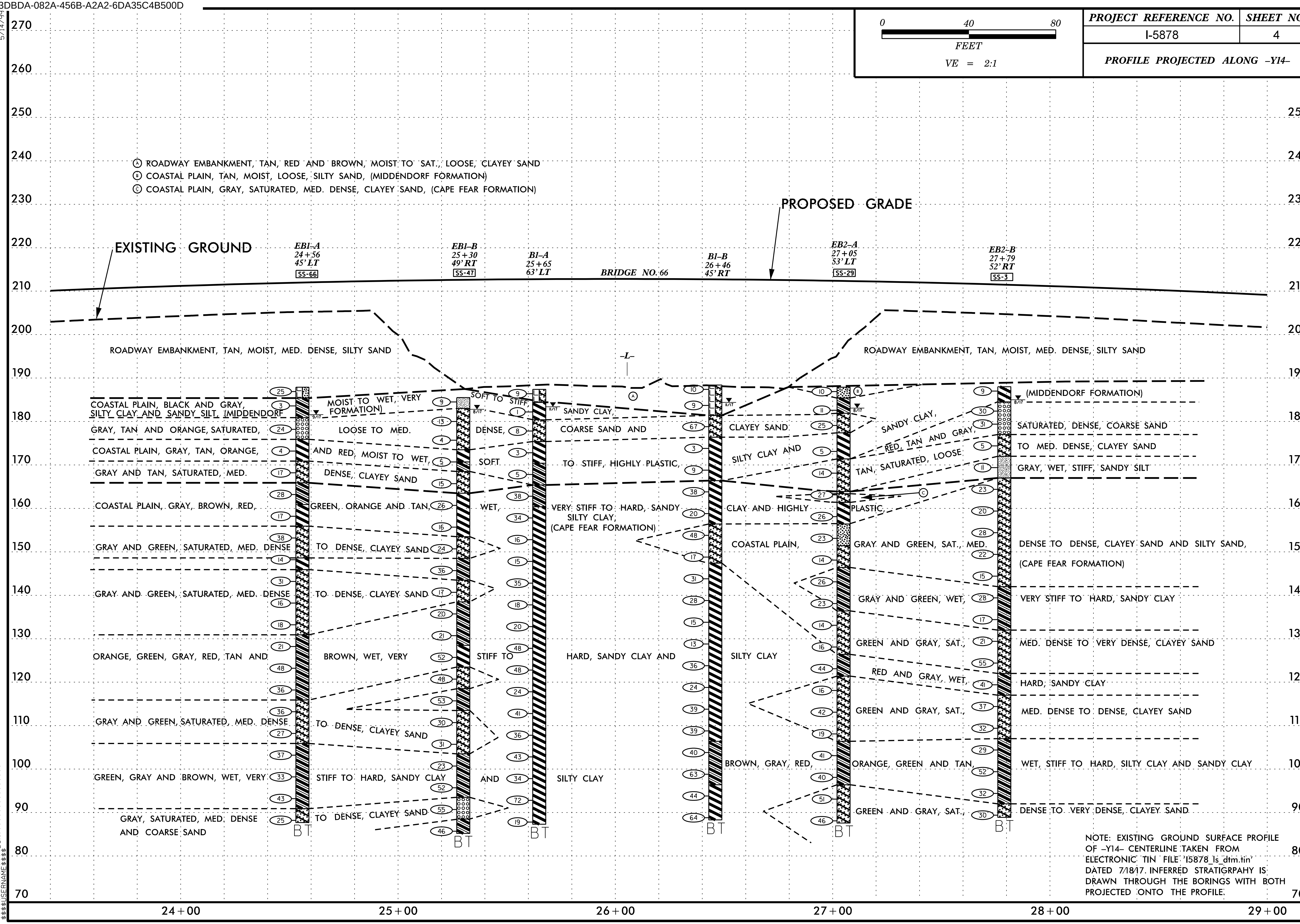
NOTES:

DATE: 8-15-14



PROJECT REFERENCE NO.	SHEET NO.
I-5878	4

PROFILE PROJECTED ALONG –Y14–

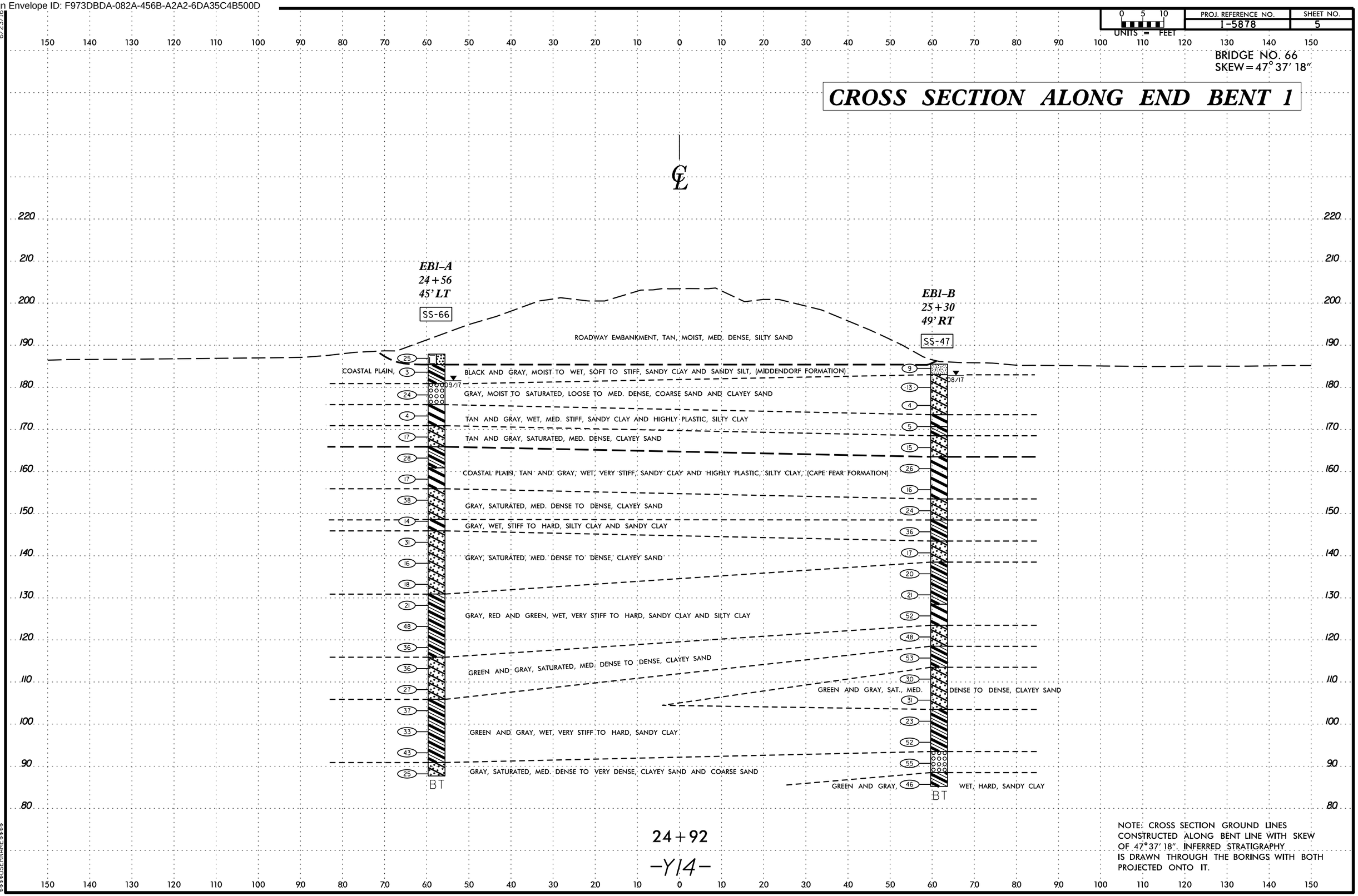


6/23/16

0 5 10 UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
	I-5878	5

BRIDGE NO. 66
SKEW = 47° 37′ 18″

CROSS SECTION ALONG END BENT 1



24+92

–Y14–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 47°37′18″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

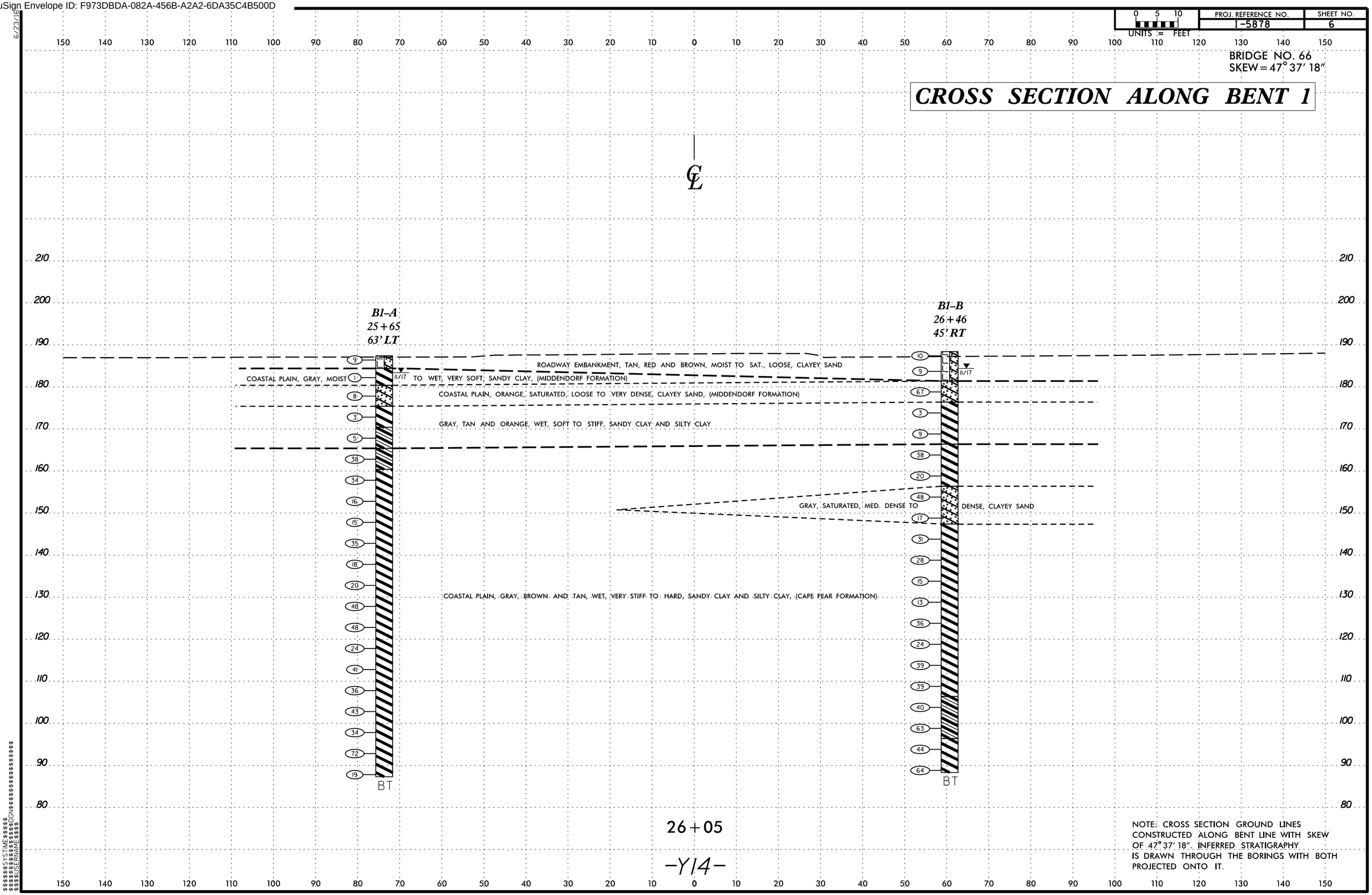
$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$

6/23/16

0 5 10 UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
	I-5878	6

BRIDGE NO. 66
SKEW = 47° 37′ 18″

CROSS SECTION ALONG BENT 1

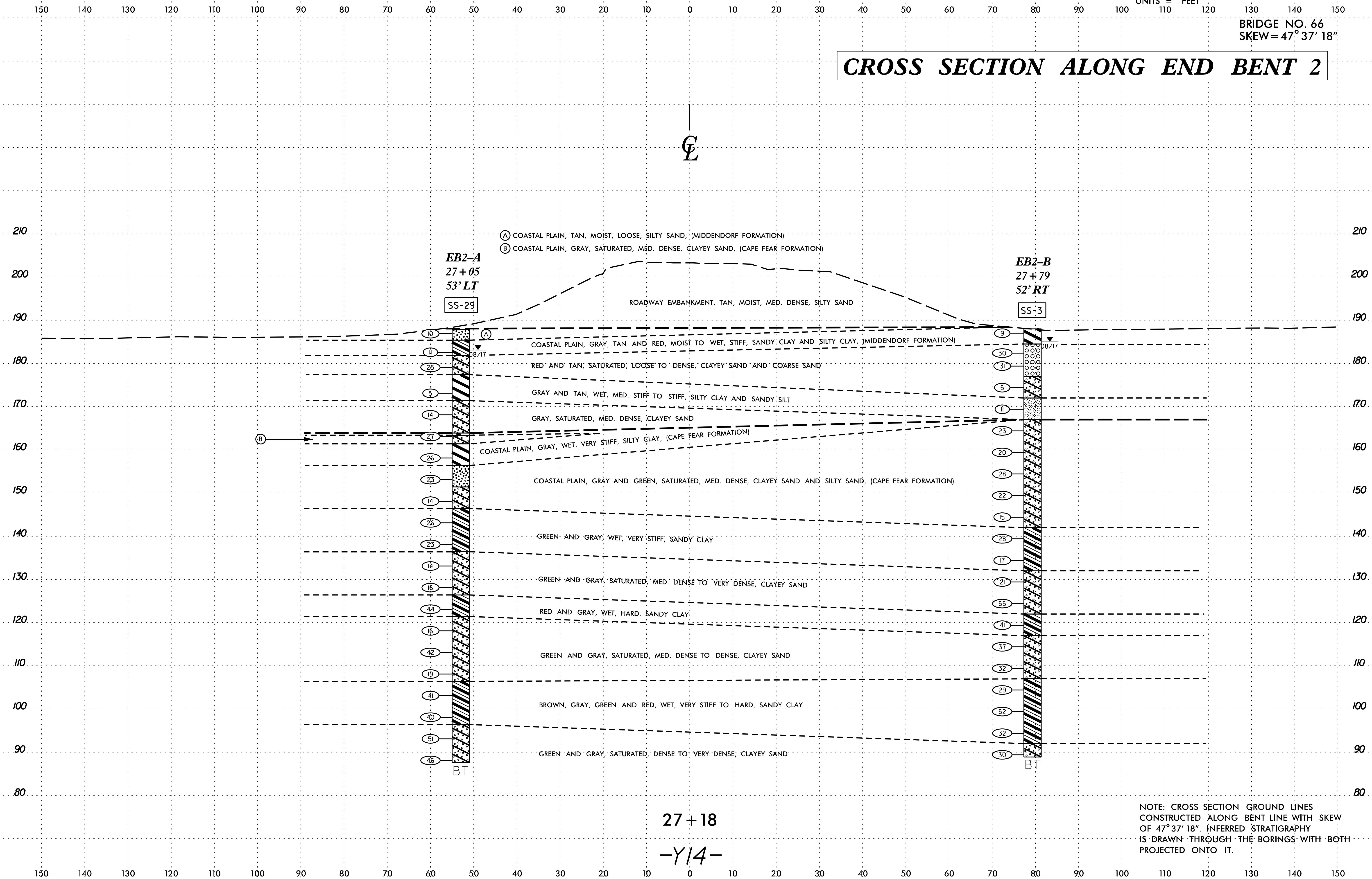


NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 47° 37′ 18″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

BRIDGE NO. 66
SKEW = 47° 37' 18"

CROSS SECTION ALONG END BENT 2



27 + 18

-Y14-

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 47° 37' 18". INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 24+56	**OFFSET** 45 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 561,476	**EASTING** 2,118,075	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/31/17	**COMP. DATE** 08/31/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
190												
	187.9	0.0	5	10	15	25		M		GROUND SURFACE	187.9	0.0
185	184.6	3.3								**ROADWAY EMBANKMENT** TAN, SILTY SAND	185.4	2.5
			2	2	1	3		M		**COASTAL PLAIN** BLACK, SANDY CLAY (MIDDENDORF FORMATION)		
180	179.2	8.7								GRAY, COARSE SAND	180.9	7.0
			9	12	12	24		Sat.				
175	174.2	13.7								TAN, HIGHLY PLASTIC, SILTY CLAY	175.9	12.0
			1	2	2	4	SS-66	W				
170	169.2	18.7								TAN, CLAYEY SAND	170.9	17.0
			4	5	12	17		Sat.				
165	164.2	23.7								**COASTAL PLAIN** GRAY, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	165.9	22.0
			7	11	17	28		W				
160	159.2	28.7									160.9	27.0
			5	8	9	17		W				
155	154.2	33.7								GRAY, CLAYEY SAND	155.9	32.0
			13	18	20	38		Sat.				
150	149.2	38.7									148.6	39.3
			4	6	8	14		W		GRAY, SILTY CLAY		
145	144.2	43.7								GRAY, CLAYEY SAND	145.9	42.0
			9	14	17	31		Sat.				
140	139.2	48.7										
			5	7	9	16		Sat.				
135	134.2	53.7										
			7	8	10	18		Sat.				
130	129.2	58.7								GRAY, SANDY CLAY	130.9	57.0
			8	9	12	21		W				
125	124.2	63.7										
			15	23	25	48		W				
120	119.2	68.7										
			8	15	21	36		W				
115	114.2	73.7								GRAY, CLAYEY SAND	115.9	72.0
			10	18	18	36		Sat.				
110												

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 24+56	**OFFSET** 45 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 561,476	**EASTING** 2,118,075	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/31/17	**COMP. DATE** 08/31/17	**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
110						Match Line				
	109.2	78.7	12	13	14	27		Sat.		GRAY, CLAYEY SAND *(continued)*
105	104.2	83.7								105.9 82.0 GRAY AND GREEN, SANDY CLAY
			12	14	23	37		W		
100	99.2	88.7								
			11	13	20	33		W		
95	94.2	93.7								
			13	18	25	43		W		
90	89.2	98.7								90.9 97.0 GRAY, CLAYEY SAND
			12	13	12	25		Sat.		87.7 100.2
										Boring Terminated at Elevation 87.7 ft IN MED. DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 25+30	**OFFSET** 49 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 185.5 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,373	**EASTING** 2,118,014	**24 HR.** 2.7
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/30/17	**COMP. DATE** 08/30/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
185	185.5	0.0	4	5	4	9		M		185.5 GROUND SURFACE	0.0
										COASTAL PLAIN BLACK AND GRAY, SANDY SILT WITH TRACE ORGANICS (MIDDENDORF FORMATION)	
	181.0	4.5								183.0	2.5
180			4	5	8	13				GRAY, CLAYEY SAND	
	176.7	8.8									
175			6	2	2	4		Sat.		173.5 GRAY AND TAN, SILTY CLAY AND SANDY CLAY	12.0
	171.7	13.8									
170			2	2	3	5		W		170.7	14.8
	166.7	18.8								168.5 GRAY, CLAYEY SAND	17.0
165			5	7	8	15		Sat.			
	161.7	23.8								163.5 **COASTAL PLAIN** GRAY, HIGHLY PLASTIC, SILTY CLAY (CAPE FEAR FORMATION)	22.0
160			8	10	16	26	SS-47	25%			
	156.7	28.8									
155			5	6	10	16		W			
	151.7	33.8								153.5 GRAY AND GREEN, CLAYEY SAND	32.0
150			8	11	13	24		Sat.			
	146.7	38.8								148.5 GRAY, SANDY CLAY	37.0
145			12	17	19	36		W			
	141.7	43.8								143.5 GRAY, CLAYEY SAND	42.0
140			6	7	10	17		Sat.			
	136.7	48.8								138.5 GRAY AND RED, SANDY CLAY AND SILTY CLAY	47.0
135			6	8	12	20		W			
130	131.7	53.8	5	8	13	21		W			
	126.7	58.8								128.5	57.0
125			15	22	30	52		W			
	121.7	63.8								123.5 GRAY, CLAYEY SAND	62.0
120			13	21	27	48		Sat.			
	116.7	68.8								118.5 GRAY, SANDY CLAY	67.0
115			17	25	28	53		W			
	111.7	73.8								113.5 GRAY, CLAYEY SAND	72.0
110			13	13	17	30		Sat.			

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 25+30	**OFFSET** 49 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 185.5 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,373	**EASTING** 2,118,014	**24 HR.** 2.7
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/30/17	**COMP. DATE** 08/30/17	**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
110						Match Line				
	106.7	78.8	15	15	16	31		Sat.		GRAY, CLAYEY SAND *(continued)*
105										103.5 GREEN AND GRAY, SANDY CLAY 82.0
	101.7	83.8	9	11	12	23		W		
100										
	96.7	88.8	20	24	28	52		W		93.5 GRAY, COARSE SAND 92.0
95										
	91.7	93.8	23	27	28	55		Sat.		
90										88.5 GRAY AND GREEN, SANDY CLAY 97.0
	86.7	98.8	17	21	25	46		W		85.2 100.3
										Boring Terminated at Elevation 85.2 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 25+65	**OFFSET** 63 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.4 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 561,381	**EASTING** 2,118,131	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 11/08/17	**COMP. DATE** 11/09/17	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
190												
	187.4	0.0								GROUND SURFACE	187.4	0.0
185			2	4	5	9		M		**ROADWAY EMBANKMENT** TAN AND RED, CLAYEY SAND		
	183.2	4.2								**COASTAL PLAIN** GRAY, SILTY CLAY (MIDDENDORF FORMATION)	184.4	3.0
180			WOH	WOH	1	1		M				
	178.8	8.6								ORANGE, CLAYEY SAND	180.4	7.0
175			5	4	4	8		Sat.				
	173.8	13.6								ORANGE, GRAY AND TAN, SILTY CLAY AND SANDY CLAY	175.4	12.0
170			1	1	2	3		W				
	168.8	18.6									170.4	17.0
165			2	2	3	5		W				
	163.8	23.6								**COASTAL PLAIN** GRAY AND BROWN, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	165.4	22.0
160			9	20	18	38		W				
	158.8	28.6									160.4	27.0
155			8	14	20	34		W				
	153.8	33.6										
150			3	6	10	16		W				
	148.8	38.6										
145			5	5	10	15		W				
	143.8	43.6										
140			11	16	19	35		W				
	138.8	48.6										
135			5	7	11	18		W				
	133.8	53.6										
130			5	7	13	20		W				
	128.8	58.6										
125			12	21	27	48		W				
	123.8	63.6										
120			14	22	26	48		W				
	118.8	68.6										
115			6	10	14	24		W				
	113.8	73.6										
110			9	18	23	41		W				

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 25+65	**OFFSET** 63 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.4 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 561,381	**EASTING** 2,118,131	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 11/08/17	**COMP. DATE** 11/09/17	**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)
110						Match Line						
	108.8	78.6	12	17	19	36		W				
105												
	103.8	83.6	17	17	26	43		W				
100												
	98.8	88.6	12	15	19	34		W				
95												
	93.8	93.6	24	35	37	72		W				
90												
	88.8	98.6	7	7	12	19		W			87.3	100.1

Boring Terminated at Elevation 87.3 ft IN VERY STIFF SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 26+46	**OFFSET** 45 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 188.4 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 561,266	**EASTING** 2,118,060	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 11/09/17	**COMP. DATE** 11/10/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) — DEPTH (ft)
190										
	188.4	0.0	3	4	6	10		M		188.4 — 0.0 GROUND SURFACE **ROADWAY EMBANKMENT** TAN AND BROWN, CLAYEY SAND
185	184.7	3.7	3	2	7	9				
180	179.8	8.6	17	31	36	67		Sat.		181.4 — 7.0 **COASTAL PLAIN** ORANGE, CLAYEY SAND (MIDDENDORF FORMATION)
175	174.8	13.6	1	1	2	3		W		176.4 — 12.0 ORANGE AND GRAY, SILTY CLAY
170	169.8	18.6	3	4	5	9		W		
165	164.8	23.6	5	17	21	38		W		166.4 — 22.0 **COASTAL PLAIN** ORANGE AND GRAY, SILTY CLAY (CAPE FEAR FORMATION)
160	159.8	28.6	4	8	12	20		W		
155	154.8	33.6	4	9	39	48		W		156.4 — 32.0 GRAY AND ORANGE, CLAYEY SAND
150	149.8	38.6	5	7	10	17		W		
145	144.8	43.6	8	13	18	31		W		147.4 — 41.0 GRAY AND ORANGE, SILTY CLAY AND SANDY CLAY
140	139.8	48.6	8	12	16	28		W		
135	134.8	53.6	6	6	9	15		W		
130	129.8	58.6	4	5	8	13		W		
125	124.8	63.6	11	15	21	36		W		
120	119.8	68.6	8	9	15	24		W		
115	114.8	73.6	9	15	24	39		W		
110										

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 26+46	**OFFSET** 45 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 188.4 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 561,266	**EASTING** 2,118,060	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 11/09/17	**COMP. DATE** 11/10/17	**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
110						Match Line				
	109.8	78.6	15	18	21	39		W		GRAY AND ORANGE, SILTY CLAY AND SANDY CLAY *(continued)*
105	104.8	83.6	16	18	22	40		W		106.4 — 82.0
100	99.8	88.6	19	28	35	63		W		
95	94.8	93.6	12	17	27	44		W		96.4 — 92.0
90	89.8	98.6	19	30	34	64		W		88.3 — 100.1 Boring Terminated at Elevation 88.3 ft IN HARD SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 27+05	**OFFSET** 53 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,247	**EASTING** 2,118,172	**24 HR.** 4.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/29/17	**COMP. DATE** 08/29/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) — DEPTH (ft)
190										
	187.9	0.0	4	6	4	10		M		187.9 — GROUND SURFACE — 0.0 **COASTAL PLAIN** TAN, SILTY SAND (MIDDENDORF FORMATION)
185	183.6	4.3	3	4	7	11				185.4 — 2.5 GRAY AND TAN, SANDY CLAY
180	180.1	7.8	6	14	11	25		Sat.		181.9 — 6.0 TAN, CLAYEY SAND
175	174.1	13.8	2	2	3	5		W		177.4 — 10.5 GRAY AND TAN, SILTY CLAY
170	169.1	18.8	4	6	8	14		Sat.		171.4 — 16.5 GRAY, CLAYEY SAND
165	164.1	23.8	8	13	14	27		Sat.		163.9 — 24.0 163.4 — 24.5 **COASTAL PLAIN** GRAY SILTY CLAY (CAPE FEAR FORMATION)
160	159.1	28.8	7	10	16	26		W		161.4 — 26.5 GRAY, CLAYEY SAND GRAY, SILTY CLAY
155	154.1	33.8	6	10	13	23	SS-29	17%		156.4 — 31.5 GRAY, SILTY SAND
150	149.1	38.8	6	6	8	14		Sat.		151.4 — 36.5 GRAY, CLAYEY SAND
145	144.1	43.8	9	11	15	26		W		146.4 — 41.5 GRAY, SANDY CLAY
140	139.1	48.8	7	10	13	23		W		
135	134.1	53.8	5	6	8	14		Sat.		136.4 — 51.5 GRAY AND GREEN, CLAYEY SAND
130	129.1	58.8	5	7	9	16		Sat.		
125	124.1	63.8	15	20	24	44		W		126.4 — 61.5 GRAY AND RED, SANDY CLAY
120	119.1	68.8	8	8	8	16		Sat.		121.4 — 66.5 GRAY AND GREEN, CLAYEY SAND
115	114.1	73.8	17	16	26	42		Sat.		
110										

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 27+05	**OFFSET** 53 ft LT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,247	**EASTING** 2,118,172	**24 HR.** 4.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/29/17	**COMP. DATE** 08/29/17	**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
110						Match Line				
	109.1	78.8	9	9	10	19		Sat.		GRAY AND GREEN, CLAYEY SAND *(continued)*
105	104.1	83.8	14	20	21	41		W		106.4 — 81.5 BROWN, GRAY AND GREEN, SANDY CLAY
100	99.1	88.8	15	17	23	40		W		96.4 — 91.5 GRAY AND GREEN, CLAYEY SAND
95	94.1	93.8	17	21	30	51		Sat.		
90	89.1	98.8	19	23	23	46		Sat.		87.6 — 100.3 Boring Terminated at Elevation 87.6 ft IN DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 27+79	**OFFSET** 52 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 188.0 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 561,140	**EASTING** 2,118,101	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 08/28/17	**COMP. DATE** 08/28/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
190											
	188.0	0.0	2	4	5	9		M		188.0 GROUND SURFACE	0.0
185										**COASTAL PLAIN** RED AND TAN, SILTY CLAY (MIDDENDORF FORMATION)	
	183.4	4.6	11	14	16	30		W		184.5 RED AND TAN, COARSE SAND	3.5
180	180.4	7.6	10	16	15	31	SS-3	Sat.			
175	175.4	12.6	2	1	4	5		Sat.		177.0 TAN, CLAYEY SAND	11.0
170	170.4	17.6	4	5	6	11		W		172.0 **COASTAL PLAIN** GRAY, SANDY SILT (CAPE FEAR FORMATION)	16.0
165	165.4	22.6	6	9	14	23		Sat.		167.0 GRAY AND GREEN, CLAYEY SAND	21.0
160	160.4	27.6	6	8	12	20		Sat.			
155	155.4	32.6	7	10	18	28		Sat.			
150	150.4	37.6	8	11	11	22		Sat.			
145	145.4	42.6	6	6	9	15		Sat.			
140	140.4	47.6	9	13	15	28		W		142.0 GRAY AND GREEN, SANDY CLAY	46.0
135	135.4	52.6	7	7	10	17		W			
130	130.4	57.6	6	10	11	21		Sat.		132.0 GRAY AND GREEN, CLAYEY SAND	56.0
125	125.4	62.6	14	24	31	55		Sat.			
120	120.4	67.6	17	21	20	41		W		122.0 GRAY, SANDY CLAY	66.0
115	115.4	72.6	16	16	21	37		Sat.		117.0 GRAY AND GREEN, CLAYEY SAND	71.0
110	110.4	77.6									

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 ON -Y14- (SR 1793) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 27+79	**OFFSET** 52 ft RT	**ALIGNMENT** -Y14-	**0 HR.** N/A
COLLAR ELEV. 188.0 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 561,140	**EASTING** 2,118,101	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 08/28/17	**COMP. DATE** 08/28/17	**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
110						Match Line				
105	105.4	82.6	12	11	21	32		Sat.		GRAY AND GREEN, CLAYEY SAND *(continued)*
100	100.4	87.6	9	12	17	29		W		107.0 BROWN, GRAY AND RED, SANDY CLAY 81.0
95	95.4	92.6	17	25	27	52		W		
90	90.4	97.6	14	15	17	32		W		92.0 GRAY, CLAYEY SAND 96.0
			14	15	15	30		Sat.		88.9 Boring Terminated at Elevation 88.9 ft IN DENSE CLAYEY SAND (COASTAL PLAIN) 99.1

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

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

S&ME Project #: 6235-16-013 — Date Report: 12/1/2017

State Project No.: 53078.1.1 — County: Harnett — Date Tested: 11/1/17-11/30/17

Federal ID No.: N/A — TIP No.: I-5878

Project Name: Bridge No. 66 on -Y14- (SR 1793) over -L- (I-95)

Client Name: Michael Baker International

Sample No.	Station #:	Offset (ft)	Boring #:	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
								10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay				
SS-3	27+79	52 RT	EB2-B	-Y14-	7.6-9.1	A-1-b	(0)	86	44	19	10.9	9.5	78	11	2	9	20	0	N.P.	ND
SS-29	27+05	53 LT	EB2-A	-Y14-	33.8-35.3	A-2-4	(0)	97	62	44	23.7	17.6	55	27	13	5	37	28	9	17.3
SS-47	25+30	49 RT	EB1-B	-Y14-	23.8-25.3	A-7-6	(21)	100	94	89	78.9	72.2	11	17	37	35	51	25	26	24.5
SS-66	24+56	45 LT	EB1-A	-Y14-	13.7-15.2	A-7-6	(19)	99	96	92	72.1	67.4	8	25	24	43	51	24	27	ND

References / Comments / Deviations: ND=Not Detemined.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

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

Mal Krajan, ET		104-01-0703	Stewart Laney, P.E.	Project Manager
Technician Name:	*Signature*	*Certification #*	*Technical Responsibility:*	*Position*

SITE PHOTOGRAPH

Bridge No. 66 on -Y14- (Spring Branch\Pope Rd.) over -L- (I-95)

Looking West towards End Bent 1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5878	1	19

REFERENCE: I-5878

PROJECT: 53078

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *IMPROVE I-95 INTERCHANGES AT US 421 AND SR 1793 (SPRING BRANCH /POPE RD)*

SITE DESCRIPTION *BRIDGE NO 73 ON -LREV- (I-95) OVER -Y15- (US 421)*

CONTENTS

CAUTION NOTICE

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

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

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NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

E.G. BLONSHINE

T.J. HILL

T.J. WHITE

K.S. HARDEE

INVESTIGATED BY *J.R. SWARTLEY*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *S.S. LANEY*

SUBMITTED BY *S.S. LANEY*

DATE *NOVEMBER 2019*

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

NORTH CAROLINA LICENSED SEAL 2296 GEOLOGIST JARETT SWARTLEY

DocuSigned by:
919459487BA3471...
SIGNATURE

11/21/2019
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I–5878	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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
- [X] BWJ RODS

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM-63
NORTHING: 561213 EASTING: 2118159
ELEVATION: 198.28 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5878	3

SITE PLAN

0 40 80
FEET

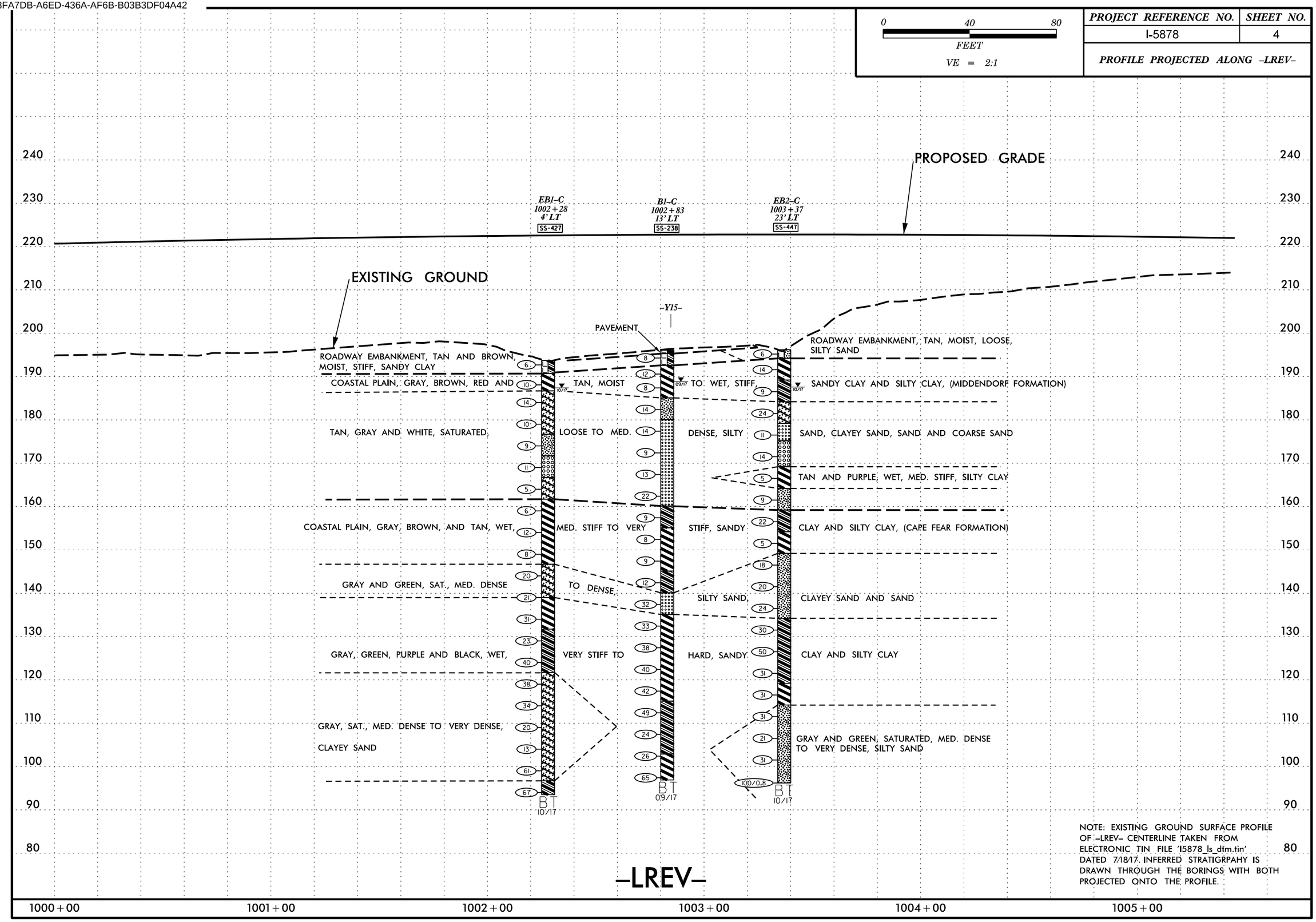
SKEW = 105°01'31"

ELEV. = 199.61'
105.42' RIGHT
BM 63
GREU TL-3
PROP. GUARDRAIL
REMOVE EXIST. GUARDRAIL
BEGIN CONC. BARRIER
-Y15- +70.96
42.00' RT.
BL-109
SEAT ELEV 210.62'
MTL
F
-EL-
SEAT ELEV 210.56'
SEAT ELEV 210.49'
CAT-1
I-95 NBL
24' PAVED ROADWAY
BEGIN RETAINING WALL
-LREV- +97.00
77.63' LT.
TO FAYETTEVILLE
-L-
-LREV-
SEAT ELEV 210.47'
N 43°07'06.5" E
1000
1000
TYPE B-77
EB1-A
BL-A
EB2-A
US 421 SBL
US 421 NBL
4'
24'
32'
45.00'
8:1
PS
BRIDGE NO. 77
BRIDGE NO. 73
EB1-C
BL-C
EB2-C
+50.00
8'
24'
45.00'
TO DUNN
SEAT ELEV 211.55'
END CONC. BARRIER
-Y15- +49.09
42.00' LT.
SEAT ELEV 211.56'
SEAT ELEV 211.52'
END RETAINING WALL
-LREV- +16.78
77.63' LT.
SEAT ELEV 211.51'
N 43°59'06.7" E
1005
1005
REMOVE EXIST GUARDRAIL
TO BENSON
END RETAINING WALL
-LREV- +55.39
77.62' RT.
WOODS
PROP. GUARDRAIL
NAD 83
END CONC. BARRIER
-Y15- +33.22
42.00' RT.
30" RCP END UNKNOWN
END BENT 1 LINE
8:1
4'
PS
-Y15-
+50.00
BENT 1 LINE
24'
4'
TO SPIVEY'S CORNER
EB1-B
BL-B
EB2-B
END BENT 1 LINE
BEGIN CONC. BARRIER
-Y15- +08.36
42.00' LT.
-Y15- POC Sta. 28+40.13 =
-LREV- POT Sta. 1002+79.68
WOODS
30

0 40 80
FEET
VE = 2:1

PROJECT REFERENCE NO.	SHEET NO.
I-5878	4

PROFILE PROJECTED ALONG –LREV–

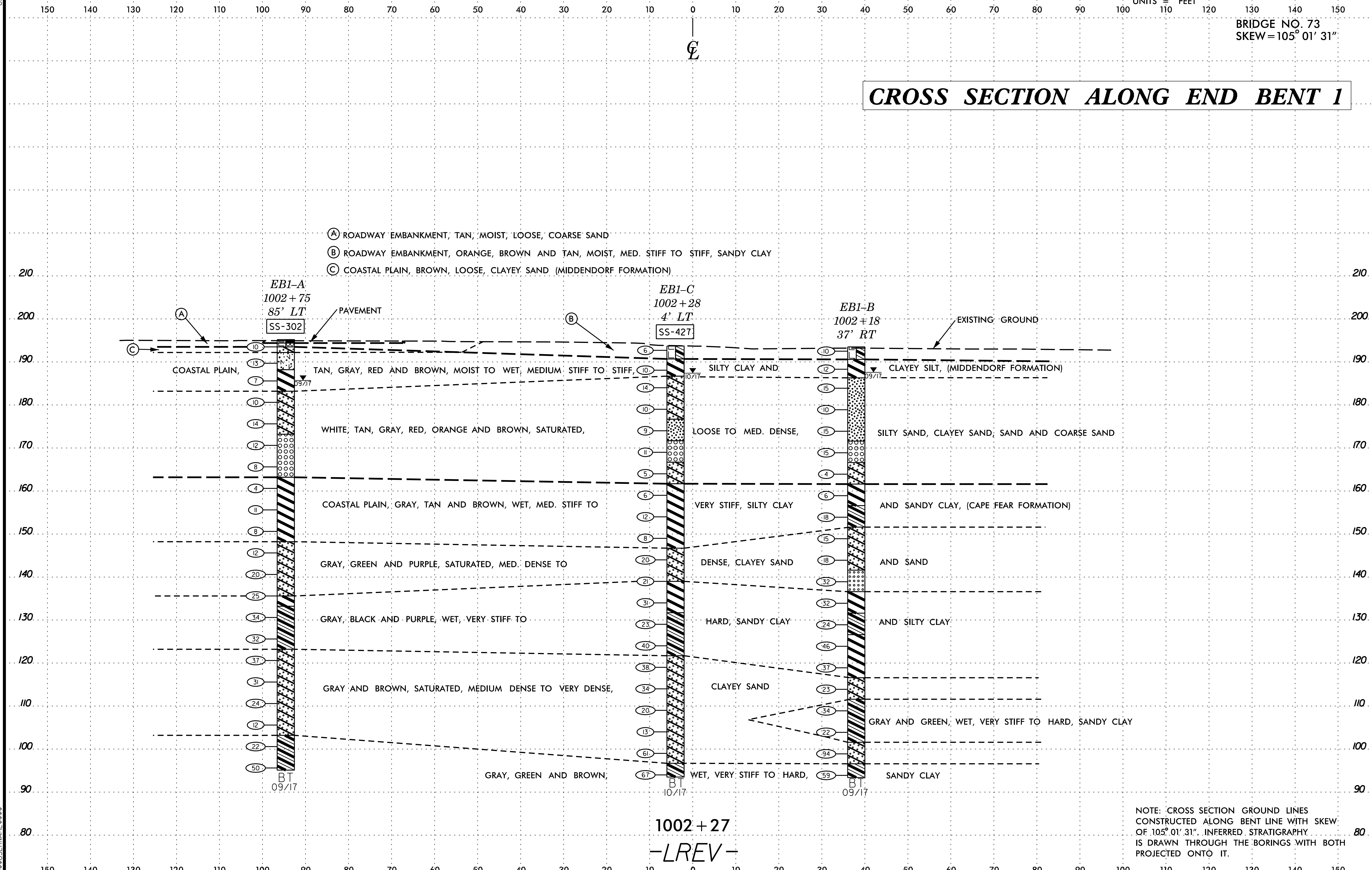


–LREV–

NOTE: EXISTING GROUND SURFACE PROFILE OF –LREV– CENTERLINE TAKEN FROM ELECTRONIC TIN FILE '15878_ls_dtm.tin' DATED 7/18/17. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG END BENT 1



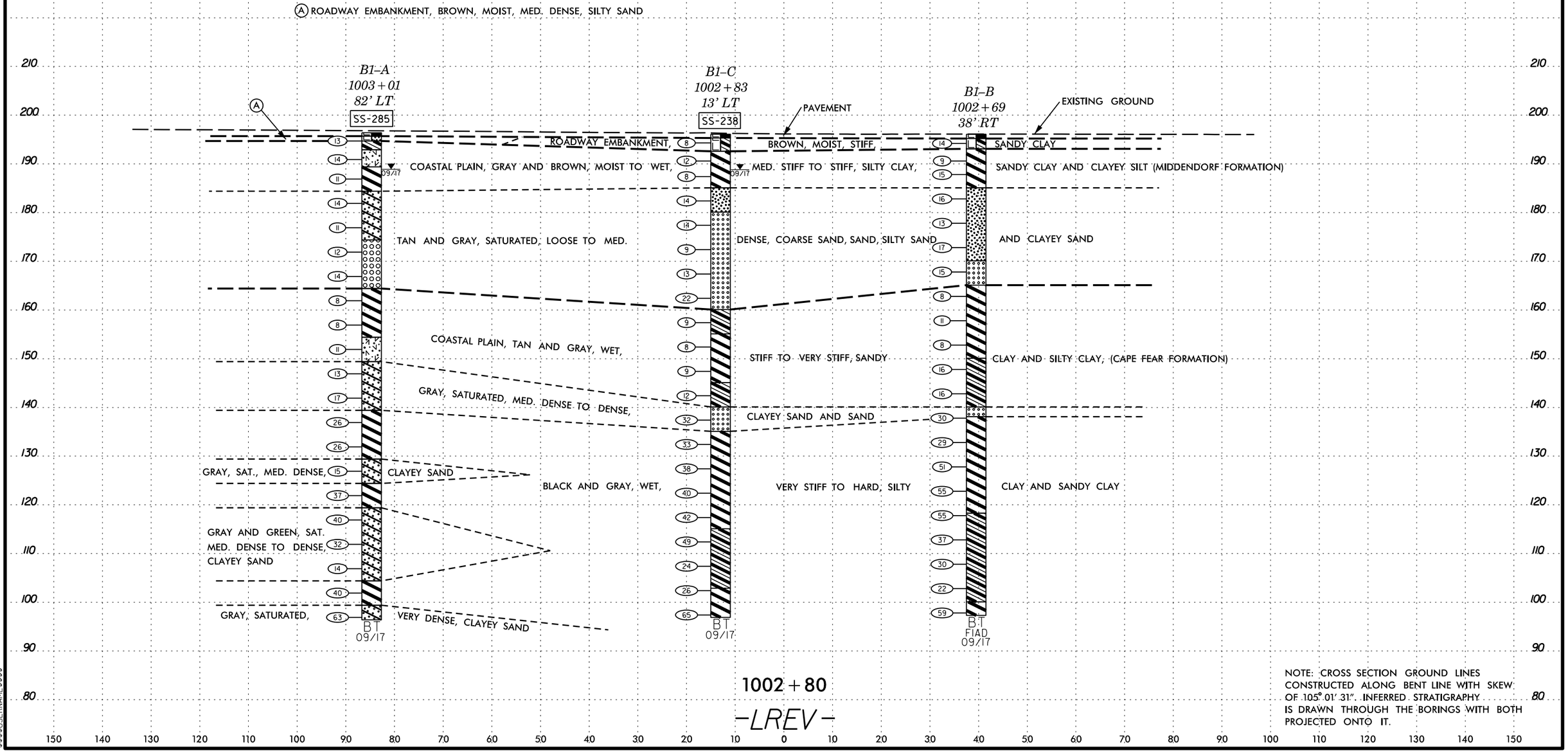
NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

6/23/16

UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
0 5 10	I-5878	6

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG BENT 1



NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG END BENT 2

EB2–A
1003 + 31
80′ LT
SS-324

EB2–C
1003 + 37
23′ LT
SS-447

EB2–B
1003 + 24
53′ RT

EXISTING GROUND

ROADWAY EMBANKMENT, TAN, MOIST, LOOSE, SILTY SAND AND CLAYEY SAND COASTAL PLAIN, BROWN, MOIST, MED. DENSE, SILTY SAND, (MIDDENDORF FORMATION)

COASTAL PLAIN, GRAY, TAN AND RED, MOIST TO WET, STIFF, SILTY CLAY AND SANDY CLAY, (MIDDENDORF FORMATION)

ST-1

TAN, WHITE, RED AND GRAY, SATURATED, MEDIUM DENSE, SILTY SAND, SAND AND COARSE SAND

GRAY, TAN AND PURPLE, WET, MED. STIFF, HIGHLY PLASTIC, SILTY CLAY

COASTAL PLAIN, SILTY CLAY AND TAN AND GRAY, WET, MED. STIFF TO SANDY CLAY (CAPE FEAR FORMATION) VERY STIFF,

COASTAL PLAIN, GRAY, GREEN AND BLACK, SATURATED, MED. DENSE TO DENSE, SILTY SAND AND CLAYEY SAND, (CAPE FEAR FORMATION)

GRAY, SAT., DENSE, CLAYEY SAND GRAY AND BLACK, WET, VERY STIFF TO HARD, SANDY CLAY AND SILTY CLAY

GRAY AND GREEN, SATURATED, MED. DENSE TO VERY DENSE, SILTY SAND AND CLAYEY SAND

GRAY, WET, HARD, SILTY CLAY

BT 09/17

BT 10/17

BT 10/17

1003 + 32

–LREV–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 1002+75	**OFFSET** 85 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.2 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,975	**EASTING** 2,119,735	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
200										
195	194.5	0.7	7	5	5	10		M		195.2 / 0.0 GROUND SURFACE 194.4 / 0.8 **ROADWAY EMBANKMENT** (PAVEMENT) 193.5 / 1.7 BROWN, COARSE SAND
190	190.7	4.5	2	5	8	13		M		192.2 / 3.0 **COASTAL PLAIN** BROWN, CLAYEY SAND (MIDDENDORF FORMATION) 188.2 / 7.0 GRAY, BROWN AND PURPLE, CLAYEY SILT GRAY AND TAN, SILTY CLAY
185	186.6	8.6	2	3	4	7				
180	181.6	13.6	5	4	6	10		Sat.		183.2 / 12.0 BROWN, RED AND TAN, CLAYEY SAND
175	176.6	18.6	4	4	10	14		Sat.		
170	171.6	23.6	4	5	7	12	SS-302	Sat.		173.2 / 22.0 TAN, COARSE SAND
165	166.6	28.6	3	3	5	8		Sat.		
160	161.6	33.6	1	1	3	4		W		163.2 / 32.0 **COASTAL PLAIN** GRAY, SILTY CLAY (CAPE FEAR FORMATION)
155	156.6	38.6	3	5	6	11		W		
150	151.6	43.6	3	4	4	8		W		
145	146.6	48.6	4	5	7	12		Sat.		148.2 / 47.0 GRAY, CLAYEY SAND
140	141.6	53.6	8	9	11	20		Sat.		
135	136.6	58.6	11	11	14	25		W		135.6 / 59.6 GRAY, SILTY CLAY AND SANDY CLAY
130	131.6	63.6	12	14	20	34		W		133.2 / 62.0
125	126.6	68.6	9	11	21	32		W		
120	121.6	73.6	13	15	22	37		Sat.		123.2 / 72.0 GRAY, CLAYEY SAND

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 1002+75	**OFFSET** 85 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.2 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,975	**EASTING** 2,119,735	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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
120						Match Line				GRAY, CLAYEY SAND *(continued)*
115	116.6	78.6	11	13	18	31		Sat.		
110	111.6	83.6	9	11	13	24		Sat.		
105	106.6	88.6	11	7	5	12		Sat.		
100	101.6	93.6	6	9	13	22		W		103.2 / 92.0 GRAY, SANDY CLAY
	96.6	98.6	14	20	30	50				95.1 / 100.1 Boring Terminated at Elevation 95.1 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 1002+18	**OFFSET** 37 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.5 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,849	**EASTING** 2,119,783	**24 HR.** 5.9
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 09/27/17	**COMP. DATE** 09/27/17	**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)
195											
	193.5	0.0	4	4	6	10		M		193.5 GROUND SURFACE	0.0
190										**ROADWAY EMBANKMENT** ORANGE AND BROWN, SANDY CLAY 190.6	2.9
	189.3	4.2	3	4	8	12				**COASTAL PLAIN** RED, BROWN AND GRAY, SILTY CLAY (MIDDENDORF FORMATION)	
185										186.3	7.2
	184.9	8.6	6	7	8	15		Sat.		RED, ORANGE, BROWN AND GRAY, SILTY SAND AND COARSE SAND	
180	179.9	13.6	4	5	5	10		Sat.			
175	174.9	18.6	6	6	9	15		Sat.		171.6	21.9
170	169.9	23.6	5	9	6	15		Sat.		166.6 GRAY, CLAYEY SAND	26.9
165	164.9	28.6	2	2	2	4		Sat.		161.6	31.9
160	159.9	33.6	2	3	3	6		W		**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY AND SANDY CLAY (CAPE FEAR FORMATION)	
155	154.9	38.6	5	8	10	18		W		156.6	36.9
150	149.9	43.6	5	7	8	15		Sat.		151.6 GRAY AND GREEN, CLAYEY SAND	41.9
145	144.9	48.6	6	8	10	18		Sat.			
140	139.9	53.6	7	14	18	32		Sat.		141.6 GRAY AND PURPLE, SAND	51.9
135	134.9	58.6	7	14	18	32		W		136.6 GRAY AND PURPLE, SILTY CLAY AND SANDY CLAY	56.9
130	129.9	63.6	6	11	13	24		W		131.6	61.9
125	124.9	68.6	11	19	27	46		W		126.6	66.9
120	119.9	73.6	12	16	21	37		W			
115										116.6 GRAY, CLAYEY SAND	76.9

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
115						Match Line				
	114.9	78.6	6	10	13	23		Sat.		GRAY, CLAYEY SAND *(continued)*
110	109.9	83.6	8	12	22	34		W		111.6 GRAY AND GREEN, SANDY CLAY
105	104.9	88.6	7	10	12	22		W		101.6 BROWN AND GRAY, CLAYEY SAND
100	99.9	93.6	12	41	53	94		Sat.		96.6 GRAY AND GREEN, SANDY CLAY
95	94.9	98.6	17	27	32	59		W		93.4 Boring Terminated at Elevation 93.4 ft IN HARD SANDY CLAY (COASTAL PLAIN)

81.9 · 91.9 · 100.1

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 1002+28	**OFFSET** 4 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 563,885	**EASTING** 2,119,760	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/02/17	**COMP. DATE** 10/02/17	**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)
195											
	193.7	0.0	3	3	3	6		M		193.7 GROUND SURFACE	0.0
190										**ROADWAY EMBANKMENT** TAN, SANDY CLAY	
	189.1	4.6	1	4	6	10				190.7 **COASTAL PLAIN** TAN AND GRAY, SILTY CLAY (MIDDENDORF FORMATION)	3.0
185	185.0	8.7								186.7 TAN, CLAYEY SAND	7.0
			5	7	7	14		Sat.			
180	180.0	13.7									
			4	4	6	10		Sat.			
175	175.0	18.7								176.7 WHITE AND TAN, SILTY SAND AND COARSE SAND	17.0
			4	4	5	9		Sat.			
170	170.0	23.7								171.7	22.0
			9	5	6	11	SS-427	Sat.			
165	165.0	28.7								166.7 TAN AND GRAY, CLAYEY SAND	27.0
			1	2	3	5		Sat.			
160	160.0	33.7								161.7 **COASTAL PLAIN** GRAY AND TAN, SILTY CLAY (CAPE FEAR FORMATION)	32.0
			3	3	3	6		W			
155	155.0	38.7									
			3	5	7	12		W			
150	150.0	43.7									
			3	3	5	8		W			
145	145.0	48.7								146.7 GREEN AND GRAY, CLAYEY SAND	47.0
			8	8	12	20		Sat.			
140	140.0	53.7									
			9	7	14	21		Sat.		139.0 GRAY AND BLACK, SILTY CLAY AND SANDY CLAY	54.7
135	135.0	58.7									
			9	14	17	31		W			
130	130.0	63.7								131.7	62.0
			7	10	13	23		W			
125	125.0	68.7									
			13	17	23	40		W			
120	120.0	73.7								121.7 GRAY, CLAYEY SAND	72.0
			17	19	19	38		Sat.			
115	115.0	78.7									

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 1002+28	**OFFSET** 4 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 563,885	**EASTING** 2,119,760	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/02/17	**COMP. DATE** 10/02/17	**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
115						Match Line				
	110.0	83.7	15	16	18	34		Sat.		GRAY, CLAYEY SAND *(continued)*
110										
	105.0	88.7	8	9	11	20		Sat.		
105										
	100.0	93.7	7	6	7	13		Sat.		
100										
	95.0	98.7	13	25	36	61		Sat.		96.7 GRAY AND BROWN, SANDY CLAY 97.0
95			29	33	34	67		W		93.5 100.2
										Boring Terminated at Elevation 93.5 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 1003+01	**OFFSET** 82 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.4 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,992	**EASTING** 2,119,755	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/19/17	**COMP. DATE** 09/19/17	**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)
200										
										196.4 — 0.0 GROUND SURFACE
195	195.7	0.7	8	6	7	13		M		195.7 — 0.7 **ROADWAY EMBANKMENT** (PAVEMENET)
										194.7 — 1.7 BROWN, SILTY SAND
	191.9	4.5	2	6	8	14		M		192.9 — 3.5 **COASTAL PLAIN** BROWN, SANDY CLAY (MIDDENDORF FORMATION)
190										
	187.9	8.5	4	5	6	11				189.4 — 7.0 GRAY, RED AND BROWN, CLAYEY SILT GRAY, RED AND BROWN, SILTY CLAY
185										
	182.9	13.5	7	7	7	14		Sat.		184.4 — 12.0 TAN, CLAYEY SAND
180										
	177.9	18.5	4	5	6	11		Sat.		
175										
	172.9	23.5	5	5	7	12		Sat.		174.4 — 22.0 TAN AND GRAY, COARSE SAND
170										
	167.9	28.5	5	6	8	14		Sat.		
165										
	162.9	33.5	2	3	5	8		W		164.4 — 32.0 **COASTAL PLAIN** TAN AND GRAY, SILTY CLAY (CAPE FEAR FORMATION)
160										
	157.9	38.5	3	4	4	8		W		
155										
	152.9	43.5	4	4	7	11	SS-285	29% W		154.4 — 42.0 GRAY, CLAYEY SILT
150										149.4 — 47.0 GRAY, CLAYEY SAND
	147.9	48.5	4	6	7	13		Sat.		
145										
	142.9	53.5	4	6	11	17		Sat.		
140										
	137.9	58.5	12	13	13	26		W		139.4 — 57.0 BLACK, SILTY CLAY
135										
	132.9	63.5	9	11	15	26		W		
130										
	127.9	68.5	7	7	8	15		Sat.		129.4 — 67.0 GRAY, CLAYEY SAND
125										
	122.9	73.5	11	16	21	37		W		124.4 — 72.0 GRAY, SILTY CLAY
120										

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 1003+01	**OFFSET** 82 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.4 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,992	**EASTING** 2,119,755	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/19/17	**COMP. DATE** 09/19/17	**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
120						Match Line				
	117.9	78.5	11	17	23	40		Sat.		119.4 — 77.0 GRAY AND GREEN, CLAYEY SAND
115										
	112.9	83.5	9	14	18	32		Sat.		
110										
	107.9	88.5	7	6	8	14		Sat.		104.4 — 92.0 BLACK, SILTY CLAY
105										
	102.9	93.5	12	17	23	40		W		99.4 — 97.0 GRAY, CLAYEY SAND
100										
	97.9	98.5	20	28	35	63		Sat.		96.4 — 100.0 Boring Terminated at Elevation 96.4 ft IN VERY DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 1002+69	**OFFSET** 38 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 98.8 ft	**NORTHING** 563,885	**EASTING** 2,119,819	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/15/17	**COMP. DATE** 09/15/17	**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)
200											
										196.1	GROUND SURFACE 0.0
195	195.2	0.9	7	8	6	14		M		195.2	**ROADWAY EMBANKMENT** (PAVEMENT) 0.9
	191.6	4.5								193.1	BROWN, SANDY CLAY 3.0
190			1	4	5	9		M			**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY (MIDDENDORF FORMATION)
	188.8	7.3									
185			4	6	9	15		W			
	183.8	12.3								185.1	11.0
			4	6	10	16		Sat.			TAN AND GRAY, SILTY SAND AND SAND
180	178.8	17.3									
			5	6	7	13		Sat.			
175	173.8	22.3									
			7	8	9	17		Sat.			
170	168.8	27.3								170.1	26.0
			7	8	7	15		Sat.			
165	163.8	32.3								165.1	31.0
			1	3	5	8		W			**COASTAL PLAIN** TAN AND GRAY, SILTY CLAY AND SANDY CLAY (CAPE FEAR FORMATION)
160	158.8	37.3									
			3	5	6	11		W			
155	153.8	42.3									
			5	3	5	8		W			
150	148.8	47.3								150.1	46.0
			7	7	9	16		W			
145	143.8	52.3									
			7	8	8	16		W			
140	138.8	57.3								140.1	56.0
			10	13	17	30		Sat.			GRAY SAND
135	133.8	62.3								138.1	58.0
			9	12	17	29		W			GRAY, SILTY CLAY AND SANDY CLAY
130	128.8	67.3									
			14	22	29	51		W			
125	123.8	72.3									
			14	23	32	55		W			
120											

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 1002+69	**OFFSET** 38 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 98.8 ft	**NORTHING** 563,885	**EASTING** 2,119,819	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/15/17	**COMP. DATE** 09/15/17	**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
120						Match Line				
	118.8	77.3	12	27	28	55		W		GRAY, SILTY CLAY AND SANDY CLAY *(continued)* 118.3 77.8
115	113.8	82.3	12	15	22	37		W		
110	108.8	87.3	11	12	18	30		W		
105	103.8	92.3	9	9	13	22		W		
100	98.8	97.3	28	29	30	59		W		100.1 96.0
										97.3 98.8
										Boring Terminated at Elevation 97.3 ft IN HARD SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 1002+83	**OFFSET** 13 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 563,931	**EASTING** 2,119,792	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/14/17	**COMP. DATE** 09/14/17	**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)
200											
										196.1 GROUND SURFACE	0.0
195	195.3	0.8	3	3	5	8		M		195.3 **ROADWAY EMBANKMENT** (PAVEMENT)	0.8
	191.6	4.5	2	4	8	12		M		192.6 BROWN, SANDY CLAY	3.5
190	188.4	7.7	2	3	5	8				**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY (MIDDENDORF FORMATION)	
185	183.4	12.7	2	6	8	14		Sat.		185.1 TAN AND GRAY, SILTY SAND AND SAND	11.0
180	178.4	17.7	6	7	7	14	SS-238	Sat.		180.1	16.0
175	173.4	22.7	4	4	5	9		Sat.			
170	168.4	27.7	5	3	10	13		Sat.			
165	163.4	32.7	7	12	10	22		Sat.			
160	158.4	37.7	3	3	6	9		W		160.1 **COASTAL PLAIN** TAN AND GRAY, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	36.0
155	153.4	42.7	3	3	5	8		W		155.1	41.0
150	148.4	47.7	3	4	5	9		W			
145	143.4	52.7	4	5	7	12		W		145.1	51.0
140	138.4	57.7	9	13	19	32		Sat.		140.1 GRAY SAND	56.0
135	133.4	62.7	10	14	19	33		W		135.1 GRAY, SILTY CLAY AND SANDY CLAY	61.0
130	128.4	67.7	11	16	22	38		W			
125	123.4	72.7	13	17	23	40		W			
120											

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 1002+83	**OFFSET** 13 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 563,931	**EASTING** 2,119,792	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/14/17	**COMP. DATE** 09/14/17	**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
120						Match Line				
	118.4	77.7	14	18	24	42		W		GRAY, SILTY CLAY AND SANDY CLAY *(continued)*
115	113.4	82.7	20	22	27	49		W		115.1 81.0
110	108.4	87.7	11	12	12	24		W		
105	103.4	92.7	7	11	15	26		W		102.9 93.2
100	98.4	97.7	15	23	42	65		W		96.9 99.2
										Boring Terminated at Elevation 96.9 ft IN HARD SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 1003+31	**OFFSET** 80 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 197.3 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 564,012	**EASTING** 2,119,777	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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)
200											
	197.3	0.0								197.3 GROUND SURFACE	0.0
195			5	10	6	16		M		**ROADWAY EMBANKMENT** BROWN, CLAYEY SAND	
	192.8	4.5								194.3	3.0
190			5	6	9	15		M		**COASTAL PLAIN** GRAY, TAN AND RED, SILTY CLAY (MIDDENDORF FORMATION)	
	188.7	8.6									
185			3	5	7	12				185.3	12.0
	183.7	13.6								TAN, CLAYEY SAND	
180			8	7	9	16		Sat.			
	178.7	18.6									
175			5	4	5	9		Sat.			
	173.7	23.6								175.3	22.0
170			6	6	7	13		Sat.		TAN AND GRAY, COARSE SAND	
	168.7	28.6								170.3	27.0
165			4	2	2	4	SS-324	63%		GRAY AND PURPLE, HIGHLY PLASTIC, SILTY CLAY	
	163.7	33.6									
160			1	2	3	5		W			
	158.7	38.6								160.3	37.0
155			3	4	5	9		W		**COASTAL PLAIN** GRAY AND TAN, SILTY CLAY (CAPE FEAR FORMATION)	
	153.7	43.6									
150			3	3	4	7		W			
	148.7	48.6								150.3	47.0
145			7	12	13	25		Sat.		GRAY AND GREEN, CLAYEY SAND	
	143.7	53.6									
140			9	13	16	29		Sat.			
	138.7	58.6									
135			7	13	16	29		Sat.			
	133.7	63.6								135.3	62.0
130			14	15	20	35		W		BLACK, SANDY CLAY	
	128.7	68.6								130.3	67.0
125			11	16	19	35		Sat.		GRAY, CLAYEY SAND	
	123.7	73.6								125.3	72.0
120			15	21	25	46		W		BLACK, SANDY CLAY	

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 1003+31	**OFFSET** 80 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 197.3 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 564,012	**EASTING** 2,119,777	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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
120						Match Line				
	118.7	78.6	13	15	20	35		W		BLACK, SANDY CLAY *(continued)*
115	113.7	83.6	14	17	21	38		Sat.		115.3 82.0 GRAY AND GREEN, CLAYEY SAND
110	108.7	88.6	11	12	17	29		Sat.		
105	103.7	93.6	10	13	14	27		Sat.		
100	98.7	98.6	13	16	22	38		Sat.		97.2 100.1 Boring Terminated at Elevation 97.2 ft IN DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 1003+24	**OFFSET** 53 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,914	**EASTING** 2,119,868	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/04/17	**COMP. DATE** 10/04/17	**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)
200										
195	195.5	0.0	5	9	5	14		M		195.5 — GROUND SURFACE — 0.0 **COASTAL PLAIN** BROWN, SILTY SAND (MIDDENDORF FORMATION)
190	191.0	4.5	2	4	6	10		M		193.0 — 2.5 RED, GRAY AND TAN, SILTY CLAY
185	187.0	8.5	3	4	6	10				
180	182.0	13.5	6	8	10	18		Sat.		183.5 — 12.0 RED AND TAN, CLAYEY SAND
175	177.0	18.5	4	5	5	10		Sat.		
170	172.0	23.5	9	9	14	23		Sat.		173.5 — 22.0 GRAY AND TAN, COARSE SAND AND SILTY SAND
165	167.0	28.5	7	8	17	25		Sat.		168.5 — 27.0
160	162.0	33.5	4	6	9	15		Sat.		161.0 — 34.5 **COASTAL PLAIN** BLACK, SILTY SAND
155	157.0	38.5	3	5	9	14		Sat.		158.5 — 37.0 (CAPE FEAR FORMATION) GRAY AND BLACK, CLAYEY SAND
150	152.0	43.5	3	6	14	20		Sat.		
145	147.0	48.5	8	8	10	18		Sat.		
140	142.0	53.5	10	18	22	40		Sat.		
135	137.0	58.5	10	11	14	25		W		138.5 — 57.0 GRAY, SANDY CLAY
130	132.0	63.5	7	12	13	25		W		
125	127.0	68.5	11	16	22	38		W		
120	122.0	73.5	14	17	23	40		W		

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 1003+24	**OFFSET** 53 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,914	**EASTING** 2,119,868	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/04/17	**COMP. DATE** 10/04/17	**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
120						Match Line				
115	117.0	78.5	10	11	12	23		Sat.		118.5 — GRAY, SANDY CLAY *(continued)* — 77.0 GRAY AND GREEN, CLAYEY SAND
110	112.0	83.5	10	12	16	28		Sat.		
105	107.0	88.5	10	14	15	29		Sat.		
100	102.0	93.5	15	17	23	40		W		103.5 — GRAY, SILTY CLAY — 92.0
	97.0	98.5	28	46	45	91		W		95.5 — 100.0 Boring Terminated at Elevation 95.5 ft IN HARD SILTY CLAY (COASTAL PLAIN) ST-1 pushed 5' upstation Other Samples: ST-1 (6.0 - 8.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 1003+37	**OFFSET** 23 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.2 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,977	**EASTING** 2,119,822	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/03/17	**COMP. DATE** 10/03/17	**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)
										196.2 GROUND SURFACE	0.0
	196.2	0.0	3	3	3	6		M		**ROADWAY EMBANKMENT** TAN, SILTY SAND	
	194.2	2.0								194.2	2.0
	192.6	3.6	5	6	8	14		M		**COASTAL PLAIN** GRAY, TAN AND RED, SILTY CLAY AND SANDY CLAY (MIDDENDORF FORMATION)	
	189.2	7.0								189.2	7.0
	187.5	8.7	3	4	5	9					
	184.2	12.0								184.2 TAN, CLAYEY SAND	12.0
	182.5	13.7	5	12	12	24		W			
	179.2	17.0								179.2 TAN AND WHITE, SAND AND COARSE SAND	17.0
	177.5	18.7	4	4	7	11	SS-447	Sat.			
	175.2	21.0								175.2	21.0
	172.5	23.7	6	8	6	14		Sat.			
	169.2	27.0								169.2 TAN AND PURPLE, SILTY CLAY	27.0
	167.5	28.7	3	2	3	5		W			
	164.2	32.0								164.2 TAN, SILTY SAND	32.0
	162.5	33.7	3	4	5	9		Sat.			
	159.2	37.0								**COASTAL PLAIN** TAN AND GRAY, SANDY CLAY (CAPE FEAR FORMATION)	37.0
	157.5	38.7	5	10	12	22		W			
	154.2	42.0									42.0
	152.5	43.7	2	2	3	5		W			
	149.2	47.0								149.2 GRAY AND GREEN, CLAYEY SAND	47.0
	147.5	48.7	6	7	11	18		Sat.			
	142.5	53.7	8	10	10	20		Sat.			
	137.5	58.7	10	11	13	24		Sat.			
	134.2	62.0								134.2 GRAY AND BLACK, SANDY CLAY AND SILTY CLAY	62.0
	132.5	63.7	10	13	17	30		W			
	127.5	68.7	13	23	27	50		W			
	122.5	73.7	9	13	18	31		W			

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 1003+37	**OFFSET** 23 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.2 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,977	**EASTING** 2,119,822	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/03/17	**COMP. DATE** 10/03/17	**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
120						Match Line				
	117.5	78.7	12	14	17	31		W		119.2 77.0
115										114.2 GRAY AND GREEN, CLAYEY SAND 82.0
	112.5	83.7	12	14	17	31		Sat.		
110										
	107.5	88.7	9	10	11	21		Sat.		
105										
	102.5	93.7	9	13	18	31		Sat.		
100										
	97.5	98.7	20	44	56/0.3	100/0.8		Sat.		96.2 Boring Terminated at Elevation 96.2 ft IN VERY DENSE SILTY SAND (COASTAL PLAIN) 100.0

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

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

S&ME Project #:	6235-16-013			Date Report:	12/1/2017
State Project No.:	53078.1.1	County:	Harnett	Date Tested:	11/1/17-11/30/17
Federal ID No.:	N/A	TIP No.:	I-5878		
Project Name:	Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)				
Client Name:	Michael Baker International	Client Address:	Raleigh, NC		

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
							10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay				
SS-238	1002+83	13' LT	-LREV-	17.7-19.2	A-3	(0)	100	56	15	6.4	85	10	1	4	22	0	NP	ND
SS-285	1003+01	82' LT	-LREV-	43.5-45.0	A-5	(10)	100	95	92	81.2	8	20	64	8	44	35	9	29.2
SS-302	1002+75	85' LT	-LREV-	23.6-25.1	A-1-a	(0)	48	17	12	5.4	36	7	2	3	24	NP	NP	ND
SS-324	1003+31	80' LT	-LREV-	28.6-30.1	A-7-5	(75)	100	99	99	98.2	1	1	16	82	95	31	64	62.5
SS-427	1002+28	4' LT	-LREV-	23.7-25.2	A-1-a	(0)	42	21	11	5.0	31	7	2	2	41	0	NP	ND
SS-447	1003+37	23' LT	-LREV-	18.7-20.2	A-3	(0)	100	54	12	5.6	88	7	1	4	20	0	NP	ND
ST-1	1003+19	53' RT	-LREV-	6.0-8.0	A-7-6	(41)	100	96	93	89.4	7	6	28	59	69	29	40	27.6

References / Comments / Deviations: ND=Not Detemined. NP=Non-Plastic.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

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

Mal Krajan, ET		104-01-0703	Stewart Laney, P.E.	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

SITE PHOTOGRAPH

Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)

Looking Southwest towards End Bent 1

SITE PHOTOGRAPH

Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)

Looking South towards End Bent 1

REFERENCE: I-5986B

PROJECT: 47532

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5986B	1	5

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *I-95 WIDENING FROM SR 1811 (BUD HAWKINS ROAD) (EXIT 70) TO I-40 (EXIT 81) – WIDEN TO EIGHT LANES*

SITE DESCRIPTION *SECTION 2 OF 4; I-5878 PORTION, CULVERT BENEATH PROPOSED –NBCD– ALIGNMENT*

CONTENTS

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PERSONNEL

M. HARTMAN

R. NORWOOD

INVESTIGATED BY *S&ME, INC.*

DRAWN BY *C. CHANDLER*

CHECKED BY *K. HILL*

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DATE *FEBRUARY 2020*

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NORTH CAROLINA PROFESSIONAL SEAL 032125 ENGINEER STACIE E. MITCHELL

DocuSigned by:
Stacie Mitchell 2/5/2020
BBC611B64F19458...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-750
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: • SEE NOTE

ELEVATION: FEET

NOTES:

• Elevations derived from geopak and the .tin file 15986b_Merged_ls_tin.tin dated 01/09/19

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	3

SITE PLAN

0 20 40

FEET

SKEW = 87° 37'52"

NAD 83

TO DUNN

-NBCD-

16

15

NBCD_I547_C1

NBCD_I547_C2

54" RCP

WOODS

TO POPE RD

C

F

SS

E

PUE

TDE

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	4

PROFILE PROJECTED ALONG CENTERLINE OF PROPOSED CULVERT

0 30 60
FEET
VE = 2:1

Ⓐ ALLUVIAL
BROWN,TAN VERY LOOSE TO DENSE,SILTY SAND W/ TRACE GRAVEL,MOIST TO WET

Ⓑ COASTAL PLAIN
GRAY,BROWN,TAN VERY SOFT TO STIFF HIGHLY PLASTIC SILTY CLAY,SANDY CLAY AND SANDY SILT,WET [MIDDENDORF FORMATIC

Ⓒ COASTAL PLAIN
GRAY VERY DENSE SILTY SAND AND CLAYEY SAND W/ TRACE QUARTZ GRAVEL,WET

℄ –NBCD–

NBCD_1547_C1
15+35
34' LT

NBCD_1547_C2
15+33
30' RT

PROP 100–yr
WSEL=184.4'

OBS WS ON
2–27–19=
NWS=180.6'

3
40
5
7
84
BT
12/19

12/19

6
2
1
11
83
BT
12/19

12/19

250 240 230 220 210 200 190 180 170 160 150 140 130 120 110

200 100 0 100 200

CULVERT UNDER –NBCD–
STA. 15+47.41

NOTE: EXISTING GROUND SURFACE PROFILE TAKEN FROM ELECTRONIC TIN FILE 'i5986b_Merged_ls_tin.tin' DATED 01/9/19. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** M. Hartman	
SITE DESCRIPTION CULVERT BENEATH PROPOSED -NBCD-				**GROUND WTR (ft)**
BORING NO. NBCD_1547_C1	**STATION** 15+35	**OFFSET** 34 ft LT	**ALIGNMENT** -NBCD-	**0 HR.** 3.4
COLLAR ELEV. 182.7 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 561,414	**EASTING** 2,118,402	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE SME9978 CME-750 74% 12/19/2018		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 12/11/19	**COMP. DATE** 12/11/19	**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)
185											
	182.7	0.0						M		182.7 GROUND SURFACE	0.0
			2	1	2	3				**ALLUVIAL** BROWN, TAN, VERY LOOSE TO DENSE, SILTY SAND (A-2-4) TRACE GRAVEL	
180	178.7	4.0	12	20	20	40		W			
175	173.7	9.0	2	1	2	3		W		173.0	9.7
										COASTAL PLAIN GRAY AND BROWN, SOFT SILTY CLAY, HIGHLY PLASTIC (A-7) [MIDDENDORF FORMATION]	
170	168.7	14.0	3	3	4	7		W		170.4	12.3
										BROWN, MEDIUM STIFF SANDY CLAY (A-6), HIGHLY PLASTIC	
165	163.7	19.0	19	28	56	84		W		165.4 GRAY VERY DENSE SILTY SAND (A-2-4)	17.3
										162.2 Boring Terminated at Elevation 162.2 ft IN VERY DENSE SILTY SAND	20.5

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** M. Hartman	
SITE DESCRIPTION CULVERT BENEATH PROPOSED -NBCD-				**GROUND WTR (ft)**
BORING NO. NBCD_1547_C2	**STATION** 15+33	**OFFSET** 30 ft RT	**ALIGNMENT** -NBCD-	**0 HR.** 4.3
COLLAR ELEV. 182.9 ft	**TOTAL DEPTH** 20.3 ft	**NORTHING** 561,405	**EASTING** 2,118,465	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE SME9978 CME-750 74% 12/19/2018		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 12/11/19	**COMP. DATE** 12/11/19	**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
185										
	182.9	0.0						M		182.9 GROUND SURFACE 0.0
			3	3	3	6				**ALLUVIAL** BROWN, LOOSE TO VERY LOOSE, SILTY SAND (A-2-4) TRACE GRAVEL
180	179.1	3.8	1	1	1	2		M		
175	174.1	8.8	1	0	1	1		W		175.8 7.1
										COASTAL PLAIN GRAY AND BROWN, VERY SOFT SILTY CLAY, HIGHLY PLASTIC (A-7) [MIDDENDORF FORMATION]
170	169.1	13.8	5	5	6	11		W		170.8 12.1
										TAN BROWN, STIFF SANDY SILT (A-4)
165	164.1	18.8	12	24	59	83		W		165.8 17.1
										GRAY VERY DENSE CLAYEY SAND (A-2-6)
										163.5 19.4
										162.6 GRAY VERY DENSE SILTY SAND (A-2-4), TRACE QUARTZ GRAVEL 20.3
										Boring Terminated at Elevation 162.6 ft IN VERY DENSE SILTY SAND

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5986B	1	8

REFERENCE: I-5986B

PROJECT: 47532

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *I-95 WIDENING FROM SR 1811 (BUD HAWKINS ROAD) (EXIT 70) TO I-40 (EXIT 81) – WIDEN TO EIGHT LANES*

SITE DESCRIPTION *SECTION 2 OF 4; I-5878 PORTION, REPLACE CULVERT BENEATH I-95 @ -L- STA. 1042+09 ALONG STONY RUN*

CONTENTS

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

H. CAMP

T. WILLIAMS

INVESTIGATED BY *S&ME, INC.*

DRAWN BY *C.CHANDLER*

CHECKED BY *K. HILL*

SUBMITTED BY *S. MITCHELL*

DATE *FEBRUARY 2020*

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

NORTH CAROLINA PROFESSIONAL SEAL 032125 ENGINEER STACIE E. MITCHELL

DocuSigned by:
Stacie Mitchell 2/7/2020
BBC611B64F19458...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

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
- [X] HAND AUGER
- [X] 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: • SEE NOTE

ELEVATION: FEET

NOTES:

• Elevations derived from geopak and the .tin file 15896B_2_ls_tin.tin dated 10/22/18

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	3

SITE PLAN

0 50 100
FEET

SKEW = 29° 24'07"

POND

NAD 83

1040+00

1045+00

EXISTING R/W

L_104200_LT

L_104200

L_104200_RT

HA-1
RS-1

HA-2
RS-2

MTL

TO FAYETTEVILLE

I-95 SBL

TO BENSON

I-95 NBL

WLB

F

JS

Sf

TB

WOODS

20' UTILITY EASEMENT

A/G SS

MANGO SW AMP TRIB. 1

5/14/99

0	40	80

FEET

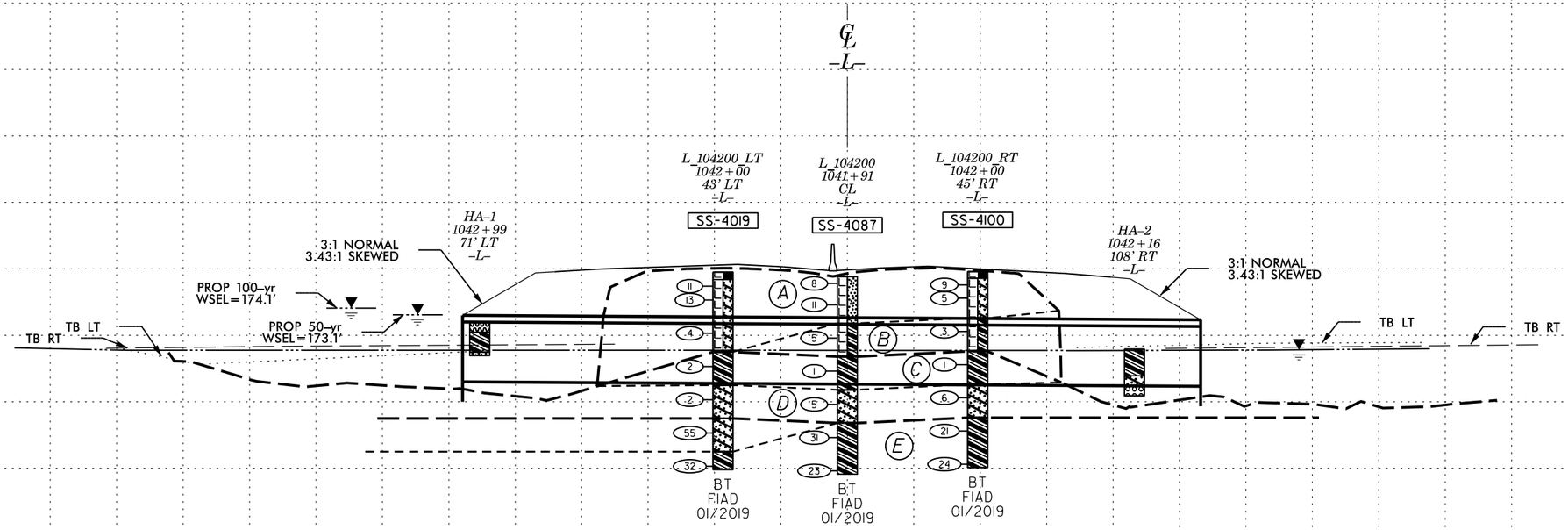
VE = 2:1

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	4

PROFILE PROJECTED ALONG –L–

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-4019	43' LT	1042+00	3.2 - 4.7	A-2-6(0)	37	18	46	22	7	25	89	67	30.1	20.2	ND
SS-4087	CL	1041+91	3.4 - 4.9	A-7-6(8)	44	24	1	53	8	38	100	100	50.3	25.8	ND
SS-4100	45' RT	1042+00	8.0 - 9.5	A-6(6)	40	24	27	30	10	34	98	87	45.0	23.1	ND



(A) LOOSE TO MEDIUM DENSE, BROWN, ORANGE AND RED, SILTY CLAY AND SANDY CLAY, MOIST (ROADWAY EMBANKMENT)

(B) MED. STIFF TO STIFF, BROWN, ORANGE AND RED, SILTY CLAY AND SANDY CLAY, MOIST (ROADWAY EMBANKMENT)

(C) SOFT, BROWN, SANDY CLAY, WET (ALLUVIAL)

(D) LOOSE, BROWN AND TAN, CLAYEY SAND, SATURATED (ALLUVIAL)

(E) VERY SOFT, GRAY, SANDY CLAY, WET (MIDDENDORF FORMATION)

CULVERT UNDER –L–
STA. 1042+09

NOTE: EXISTING GROUND SURFACE PROFILE TAKEN FROM ELECTRONIC TIN FILE 'i5986b_Merged_ls_tin.tin' DATED 01/9/19. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp	
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run				**GROUND WTR (ft)**
BORING NO. HA-1	**STATION** 1042+99	**OFFSET** 71 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 172.0 ft	**TOTAL DEPTH** 5.0 ft	**NORTHING** 566,721	**EASTING** 2,122,680	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Hand Auger		**HAMMER TYPE** N/A
DRILLER N/A	**START DATE** 12/03/19	**COMP. DATE** 12/03/19	**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)
175											
										172.0 GROUND SURFACE	0.0
										ALLUVIAL BROWN MUCK WITH SAND	
										170.5	1.5
170										TAN BLACK SANDY CLAY, TRACE ORGANICS, TRACE GRAVEL	
										167.5	4.5
										167.0 GRAY SILTY FINE TO MEDIUM SAND, TRACE ORGANICS	5.0
										Boring Terminated at Elevation 167.0 ft In Silty Sand	

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp	
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run				**GROUND WTR (ft)**
BORING NO. RS-1	**STATION** 1042+99	**OFFSET** 71 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 172.0 ft	**TOTAL DEPTH** 12.0 ft	**NORTHING** 566,721	**EASTING** 2,122,680	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Rod Sounding		**HAMMER TYPE** N/A
DRILLER N/A	**START DATE** 12/03/19	**COMP. DATE** 12/03/19	**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
175										
	172.0	0.0	N/A	2	1	3				172.0 GROUND SURFACE 0.0
	171.0	1.0	N/A	0	1	1				
170	170.0	2.0	N/A	0	1	1				
	169.0	3.0	N/A	1	1	2				
	168.0	4.0	N/A	1	4	5				
	167.0	5.0	N/A	7	7	14				
	166.0	6.0	N/A	11	20	31				
165	165.0	7.0	N/A	24	21	45				
	164.0	8.0	N/A	27	4	31				
	163.0	9.0	N/A	6	10	16				
	162.0	10.0	N/A	19	29	48				
	161.0	11.0	N/A	45	88					
160										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run			**GROUND WTR (ft)**
BORING NO. L_104200_LT	**STATION** 1042+00	**OFFSET** 43 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 179.5 ft	**TOTAL DEPTH** 29.7 ft	**NORTHING** 566,634	**EASTING** 2,122,625	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 90% 11/08/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 01/17/19	**COMP. DATE** 01/17/19	**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)
180											
	178.4	1.1	2	4	7	11		M		179.5 GROUND SURFACE	0.0
	176.3	3.2				13				178.4 PAVEMENT (8 INCHES OF ASPHALT AND 5 INCHES OF STONE)	1.1
175			5	7	6		SS-4019	M		**ROADWAY EMBANKMENT** LOOSE TO MEDIUM DENSE, RED, ORANGE, AND TAN, CLAYEY FINE TO COARSE SAND (A-2-6)	
	171.3	8.2									
170			2	2	2	4		M			
	166.3	13.2								167.5 **ALLUVIAL**	12.0
165			2	2	0	2		M		VERY SOFT, BROWN AND GRAY, SANDY CLAY (A-6)	
	161.3	18.2								162.5	17.0
160			3	1	1	2		Sat.		VERY LOOSE, GRAY AND BROWN, CLAYEY FINE TO COARSE SAND (A-2-6)	
	156.3	23.2								157.5 **COASTAL PLAIN**	22.0
155			26	35	20	55		M		VERY DENSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6) [MIDDENDORF FORMATION]	
	151.3	28.2								152.5	27.0
150			9	15	17	32		M		HARD, GRAY, SANDY CLAY (A-6)	
										149.8	29.7
										Boring Terminated at Elevation 149.8 ft IN HARD SANDY CLAY	

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run			**GROUND WTR (ft)**
BORING NO. L_104200	**STATION** 1042+00	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 178.8 ft	**TOTAL DEPTH** 29.7 ft	**NORTHING** 566,602	**EASTING** 2,122,654	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 90% 11/08/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 01/20/19	**COMP. DATE** 01/20/19	**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
180										
	178.8	0.0	2	4	4	8		M		178.8 GROUND SURFACE 0.0
	175.6	3.2								**ROADWAY EMBANKMENT** LOOSE TO MEDIUM DENSE, RED AND BROWN, SILTY FINE SAND (A-2-4), TRACE MICA
175			5	6	5	11		M		
	170.6	8.2								171.8 MEDIUM STIFF, RED AND TAN, SANDY CLAY (A-6) 7.0
170			2	3	2	5		M		
	165.6	13.2								166.8 **ALLUVIAL** 12.0
165			1	0	1	1		W		VERY LOOSE, GRAY, SANDY CLAY (A-6)
	160.6	18.2								161.8 17.0
160			4	4	1	5		W		LOOSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6), TRACE GRAVEL
	155.6	23.2								156.8 **COASTAL PLAIN** 22.0
155			7	11	20	31		M		VERY STIFF TO HARD, BLUE AND GRAY, SANDY CLAY (A-6) [MIDDENDORF FORMATION]
	150.6	28.2								149.1 29.7
150			8	9	14	23		M		Boring Terminated at Elevation 149.1 ft IN VERY STIFF SANDY CLAY

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp	
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run				**GROUND WTR (ft)**
BORING NO. L_104200_RT	**STATION** 1042+00	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 179.6 ft	**TOTAL DEPTH** 29.5 ft	**NORTHING** 566,568	**EASTING** 2,122,684	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 90% 11/08/2018		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 01/16/19	**COMP. DATE** 01/16/19	**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)
180										179.6 GROUND SURFACE	0.0
	178.6	1.0								178.6 PAVEMENT (8 INCHES OF ASPHALT AND 4 INCHES OF STONE)	1.0
	176.6	3.0	3	4	5	9		M		**ROADWAY EMBANKMENT** LOOSE, GRAY, RED, AND ORANGE, CLAYEY FINE TO COARSE SAND (A-2-6)	
175			4	3	2	5		M			
	171.6	8.0								172.6 SOFT, RED, ORANGE, AND GRAY, SANDY CLAY (A-6)	7.0
170			1	2	1	3	SS-4010	M			
	166.6	13.0								167.6 **ALLUVIAL** VERY SOFT, BLACK, SANDY CLAY (A-6)	12.0
165			1	1	0	1		W			
	161.6	18.0								162.6 LOOSE, GRAY AND BLACK, CLAYEY FINE TO COARSE SAND (A-2-6)	17.0
160			2	1	5	6		Sat.			
	156.6	23.0								157.6 **UNDIVIDED COASTAL PLAIN** MEDIUM DENSE, BLUE AND GRAY, SANDY CLAY (A-6)	22.0
155			5	9	12	21		M			
	151.6	28.0									
			3	8	16	24		M		150.1	29.5
										Boring Terminated at Elevation 150.1 ft IN MEDIUM DENSE SANDY CLAY	

NCDOT BORE DOUBLE CULVERT_L_104209 LOGS.GPJ NC_DOT.GDT 2/6/20

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp	
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run				**GROUND WTR (ft)**
BORING NO. HA-2	**STATION** 1042+16	**OFFSET** 108 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 167.9 ft	**TOTAL DEPTH** 7.0 ft	**NORTHING** 566,532	**EASTING** 2,122,738	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Hand Auger	**HAMMER TYPE** N/A	
DRILLER N/A	**START DATE** 12/03/19	**COMP. DATE** 12/03/19	**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										
										167.9 0.0 GROUND SURFACE
										ALLUVIAL GRAY TAN BLACK SANDY CLAY, TRACE ORGANICS
165										163.9 4.0 BLACK CLAYEY SAND, TRACE ORGANICS, TRACE GRAVEL
										162.4 5.5 BROWN SANDY GRAVEL, TRACE ORGANICS
										160.9 7.0 Boring Terminated at Elevation 160.9 ft In Sandy Gravel

WBS 47532	**TIP** I-5878	**COUNTY** Harnett	**GEOLOGIST** H. Camp	
SITE DESCRIPTION Replace Culvert Beneath I-95 at -L- Station 1042+09 Along Stony Run				**GROUND WTR (ft)**
BORING NO. RS-2	**STATION** 1042+16	**OFFSET** 108 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 167.9 ft	**TOTAL DEPTH** 11.5 ft	**NORTHING** 566,532	**EASTING** 2,122,738	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Rod Sounding	**HAMMER TYPE** N/A	
DRILLER N/A	**START DATE** 12/03/19	**COMP. DATE** 12/03/19	**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
170										
	167.9	0.0	N/A	woh	woh					167.9 GROUND SURFACE 0.0
	166.9	1.0	N/A	woh	woh	0				
	165.9	2.0	N/A	woh	woh	0				
165	164.9	3.0	N/A	woh	1	0				
	163.9	4.0	N/A	0	2	1				
	162.9	5.0	N/A	2	5	2				
	161.9	6.0	N/A	2	18	7				
	160.9	7.0	N/A	14	7	20				
160	159.9	8.0	N/A	6	14	21				
	158.9	9.0	N/A	26	31	20				
	157.9	10.0	N/A	49	68	57				

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5986B	1	15

REFERENCE: I-5986B

PROJECT: 47532

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *CUMBERLAND, HARNETT AND JOHNSTON*

PROJECT DESCRIPTION *I-95 FROM NORTH OF SR 1002 (LONG BRANCH ROAD) (EXIT 71) TO I-40 (EXIT 81)*

SITE DESCRIPTION *BRIDGE 66 WALLS - 76.50' RT OF -L- STA 969+40*
76.42' LT OF -L- STA 970+77

INVENTORY

CONTENTS

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J. MARLOWE

P. GUNNELL

E. BLONESHINE

M. HAYES

T. WHITE

K. HARDEE

INVESTIGATED BY *S&ME, INC.*

DRAWN BY *C. CHANDLER*

CHECKED BY *K. HILL*

SUBMITTED BY *S. MITCHELL*

DATE *APRIL 2020*

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

NORTH CAROLINA PROFESSIONAL SEAL 032125 ENGINEER STACIE E. MITCHELL

DocuSigned by:
Stacie Mitchell 4/29/2020
BBC611B64F19458...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
I-5986B	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10	50 MX													
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [X] CME-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
- [X] BWJ RODS

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.

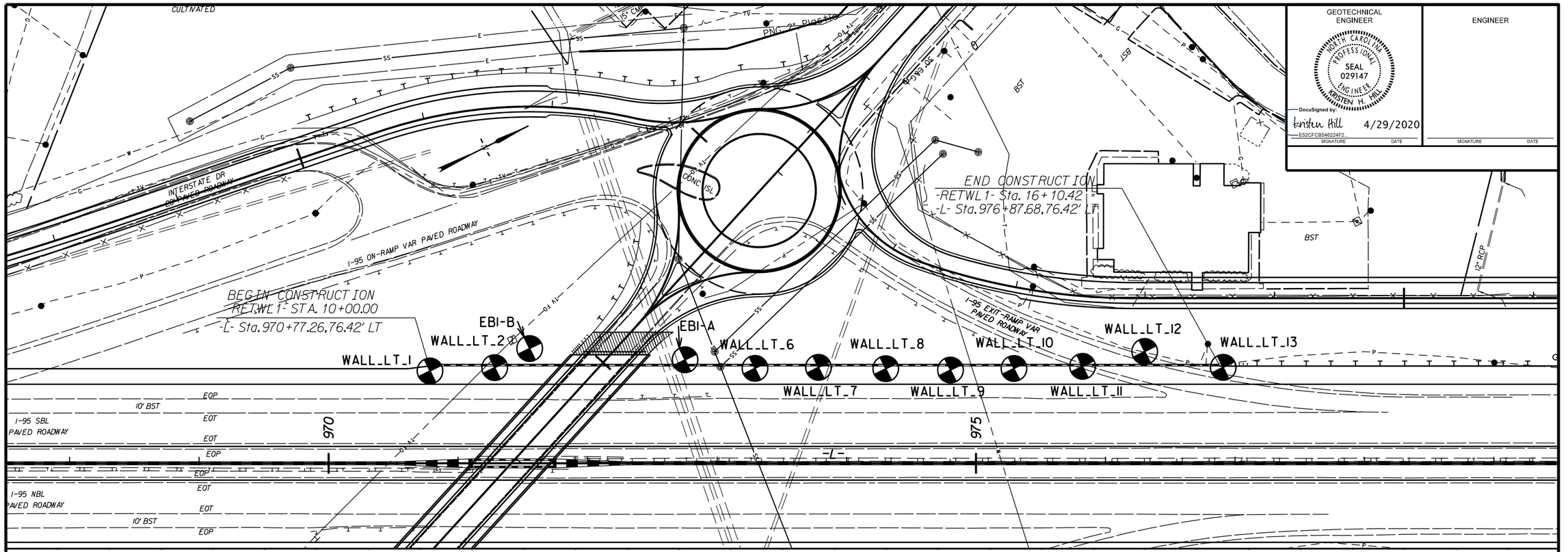
BENCH MARK: • SEE NOTE

ELEVATION: FEET

NOTES:

• Elevations derived from geopak and the .tin file i5896b_2_ls_tin.tin dated 06/18/18

DATE: 8-15-14



GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 029147 ENGINEER KRISTEN H. HILL

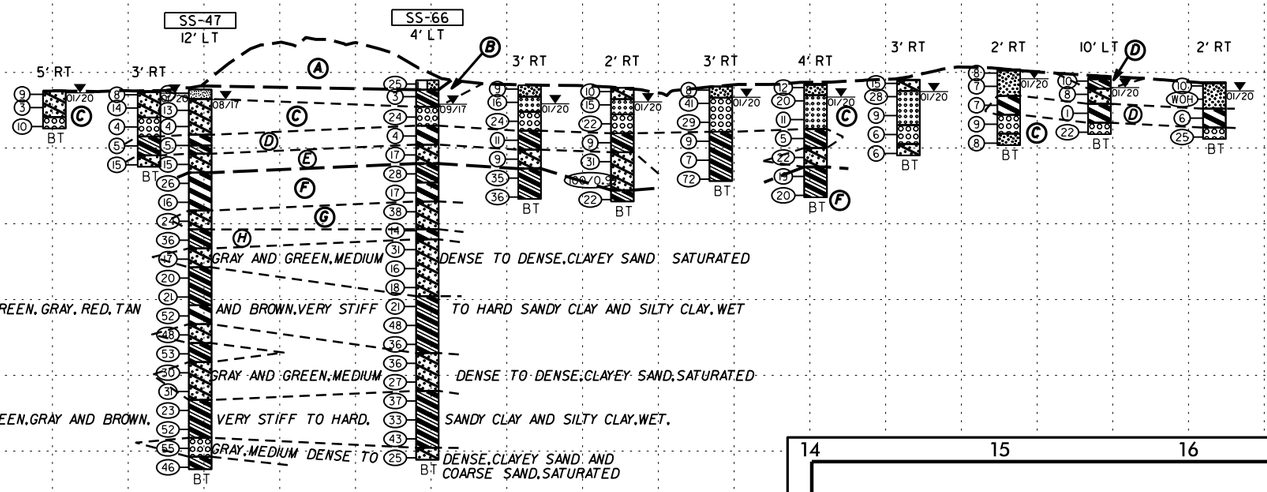
DocuSigned by: kristen hill 4/29/2020
E52CFCB546224F2...
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-47	12' LT	10+78	23.8 - 25.3	A-7-6(21)	51	26	11	17	37	35	100	94	78.9	24.5	ND
SS-66	4' LT	11+98	13.7 - 15.2	A-7-6(19)	51	27	8	25	24	43	99	96	72.1	ND	ND



230 210 190 170 150 130 110 90 70

(A) ROADWAY EMBANKMENT
TAN, MEDIUM DENSE, SILTY SAND, MOIST

(B) COASTAL PLAIN
BLACK AND GRAY, VERY SOFT TO STIFF SANDY CLAY, SILTY CLAY AND SANDY SILT, MOIST TO WET [MIDDENDORF FORMATION]

(C) COASTAL PLAIN
GRAY, TAN, WHITE, BROWN AND ORANGE, VERY LOOSE TO DENSE, SAND, SILTY SAND AND CLAYEY SAND, TRACE ROOTLETS, TRACE GRAVEL SATURATED

(D) COASTAL PLAIN
GRAY, TAN, ORANGE, AND RED, VERY SOFT TO HARD, HIGHLY PLASTIC, SILTY CLAY AND SANDY CLAY, MOIST TO WET. [MIDDENDORF FORMATION]

(E) COASTAL PLAIN
GRAY AND TAN, LOOSE TO VERY DENSE, CLAYEY SAND, SATURATED

(F) COASTAL PLAIN
GRAY, BROWN, RED, GREEN, ORANGE AND TAN, VERY STIFF TO HARD, SANDY CLAY AND HIGHLY PLASTIC, SILTY CLAY, WET [CAPE FEAR FORMATION]

(G) COASTAL PLAIN
GRAY AND GREEN, MED. DENSE TO DENSE, CLAYEY SAND, SATURATED

(H) COASTAL PLAIN
GRAY, BROWN, RED, GREEN, ORANGE AND TAN, VERY STIFF TO HARD, SANDY CLAY AND HIGHLY PLASTIC, SILTY CLAY, WET. [CAPE FEAR FORMATION]

14 15 16

10 11 12 13

PROJECT NO.: I-5986B (I-5878 SECTION)
HARNETT COUNTY
STATION: BRIDGE 66 WALL - 76.42' LT OF -L- STA 970+77

PREPARED BY: KHH	DATE: 4/17/20
REVIEWED BY: SEM	DATE: 4/17/20

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

MSE RETAINING WALL BRIDGE 66 WALL ENVELOPE

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. 3

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 029147 ENGINEER KRISTEN H. HILL

DocuSigned by: kristen Hill 4/29/2020
E52CFCB546224F2...
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

970

975

-L-

BEGIN CONSTRUCTION
-RETWL1- STA. 10+00.00 =
-L- STA. 969+40.19 -L- 76.50' RT

END CONSTRUCTION
-RETWL1- STA. 12+71.91 =
-L- Sta. 972+12.10, 76.50' LT

WALL_RT_1

EB2-B

WALL_RT_5

WALL_RT_6

EB2-A

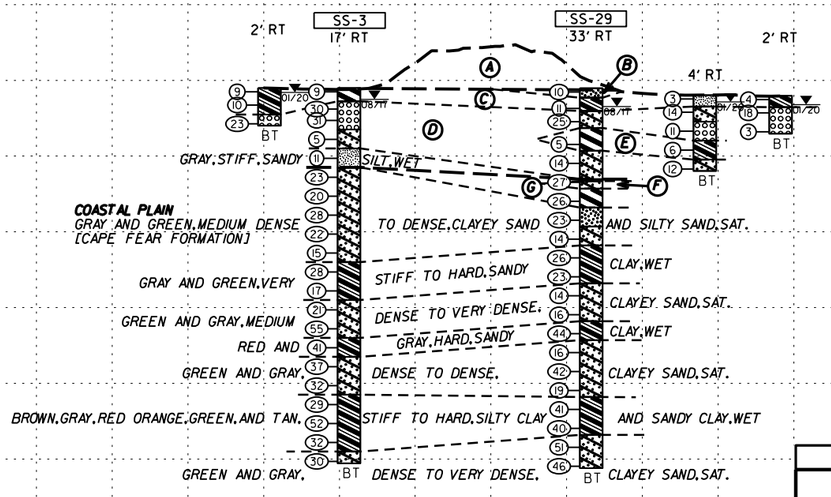
GREU TL 3

PNG, 2", Plastic

CONC

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-3	17' RT	10+45	7.6 - 9.1	A-1-b(0)	20	0	78	11	2	9	86	44	10.9	ND	ND
SS-29	33' RT	11+73	33.8 - 35.3	A-2-4(0)	37	9	55	27	13	5	97	62	23.7	17.3	ND



(A) **ROADWAY EMBANKMENT**
TAN, MEDIUM DENSE, SILTY SAND, MOIST

(B) **COASTAL PLAIN**
TAN, LOOSE, SILTY SAND, MOIST
[MIDDENDORF FORMATION]

(C) **COASTAL PLAIN**
GRAY, TAN, RED, ORANGE, BROWN, BLACK SOFT TO STIFF, SANDY CLAY, SANDY SILT AND SILTY CLAY, MOIST TO WET
[MIDDENDORF FORMATION]

(D) **COASTAL PLAIN**
ORANGE, RED, TAN, WHITE, GRAY VERY LOOSE TO DENSE, CLAYEY SAND AND SAND, SATURATED

(E) **COASTAL PLAIN**
ORANGE, TAN, GRAY MEDIUM STIFF, SILTY CLAY AND SANDY CLAY, MOIST TO WET

(F) **COASTAL PLAIN**
GRAY, MEDIUM DENSE, CLAYEY SAND, SATURATED
[CAPE FEAR FORMATION]

(G) **COASTAL PLAIN**
GRAY STIFF SILTY CLAY, WET
(CAPE FEAR FORMATION)

PROJECT NO.: I-5986B (I-5878 SECTION)
HARNETT COUNTY
STATION: BRIDGE 66 WALL - 76.50' RT OF -L- STA 969+40

PREPARED BY: KHH	DATE: 03/27/20
REVIEWED BY: SEM	DATE: 03/27/20

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

MSE RETAINING WALL -WL6- WALL ENVELOPES

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. 4

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_1	**STATION** 10+01	**OFFSET** 5 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.2 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 561,296	**EASTING** 2,117,995	**24 HR.** 0.6
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/24/20	**COMP. DATE** 01/24/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
185	185.2	0.0	3	4	5	9		M		185.2 GROUND SURFACE	0.0
	181.7	3.5	2	1	2	3		W		**COASTAL PLAIN** LOOSE, ORANGE AND TAN, CLAYEY FINE SAND (A-2-6), TRACE ROOTLETS [MIDDENDORF FORMATION]	
180	176.7	8.5	9	7	3	10		W		178.2 LOOSE, TAN, ORANGE AND WHITE, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL	7.0
										175.2 Boring Terminated at Elevation 175.2 ft IN LOOSE SAND (COASTAL PLAIN)	10.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_2	**STATION** 10+51	**OFFSET** 3 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 561,342	**EASTING** 2,118,015	**24 HR.** 0.6
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/24/20	**COMP. DATE** 01/24/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
185	185.1	0.0	3	4	4	8		W		185.1 GROUND SURFACE 0.0
	181.6	3.5	5	8	6	14		W		**COASTAL PLAIN** MEDIUM DENSE TO LOOSE, TAN, ORANGE AND BROWN, CLAYEY FINE TO COARSE SAND (A-2-6) [MIDDENDORF FORMATION]
180	176.6	8.5	4	3	1	4		W		178.1 VERY LOOSE, TAN AND WHITE, COARSE SAND (A-1-A), TRACE GRAVEL 7.0
175	171.6	13.5	3	2	3	5		W		173.1 MEDIUM STIFF, ORANGE AND TAN, SANDY CLAY (A-6) 12.0
170	166.6	18.5	5	6	9	15		W		168.1 MEDIUM DENSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6) 17.0
										165.1 Boring Terminated at Elevation 165.1 ft IN MEDIUM DENSE CLAYEY SAND (COASTAL PLAIN) 20.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 10+78	**OFFSET** 12 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.5 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,373	**EASTING** 2,118,014	**24 HR.** 2.7
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 08/30/17	**COMP. DATE** 08/30/17	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
185	185.5	0.0	4	5	4	9		M		GROUND SURFACE	0.0
										COASTAL PLAIN BLACK AND GRAY, SANDY SILT WITH TRACE ORGANICS (MIDDENDORF FORMATION)	183.0 / 2.5
180	181.0	4.5	4	5	8	13				GRAY, CLAYEY SAND	
175	176.7	8.8	6	2	2	4		Sat.		GRAY AND TAN, SILTY CLAY AND SANDY CLAY	173.5 / 12.0
170	171.7	13.8	2	2	3	5		W			170.7 / 14.8
165	166.7	18.8	5	7	8	15		Sat.		GRAY, CLAYEY SAND	168.5 / 17.0
160	161.7	23.8	8	10	16	26	SS-47	25%		COASTAL PLAIN GRAY, HIGHLY PLASTIC, SILTY CLAY (CAPE FEAR FORMATION)	163.5 / 22.0
155	156.7	28.8	5	6	10	16		W			
150	151.7	33.8	8	11	13	24		Sat.		GRAY AND GREEN, CLAYEY SAND	153.5 / 32.0
145	146.7	38.8	12	17	19	36		W		GRAY, SANDY CLAY	148.5 / 37.0
140	141.7	43.8	6	7	10	17		Sat.		GRAY, CLAYEY SAND	143.5 / 42.0
135	136.7	48.8	6	8	12	20		W		GRAY AND RED, SANDY CLAY AND SILTY CLAY	138.5 / 47.0
130	131.7	53.8	5	8	13	21		W			
125	126.7	58.8	15	22	30	52		W			128.5 / 57.0
120	121.7	63.8	13	21	27	48		Sat.		GRAY, CLAYEY SAND	123.5 / 62.0
115	116.7	68.8	17	25	28	53		W		GRAY, SANDY CLAY	118.5 / 67.0
110	111.7	73.8	13	13	17	30		Sat.		GRAY, CLAYEY SAND	113.5 / 72.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 10+78	**OFFSET** 12 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.5 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,373	**EASTING** 2,118,014	**24 HR.** 2.7
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 08/30/17	**COMP. DATE** 08/30/17	**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
110						Match Line				
105	106.7	78.8	15	15	16	31		Sat.		GRAY, CLAYEY SAND *(continued)*
										103.5 / 82.0 GREEN AND GRAY, SANDY CLAY
100	101.7	83.8	9	11	12	23		W		
95	96.7	88.8	20	24	28	52		W		93.5 / 92.0 GRAY, COARSE SAND
90	91.7	93.8	23	27	28	55		Sat.		
	86.7	98.8	17	21	25	46		W		88.5 / 97.0 GRAY AND GREEN, SANDY CLAY
										85.2 / 100.3 Boring Terminated at Elevation 85.2 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 11+98	**OFFSET** 4 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 561,476	**EASTING** 2,118,075	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/31/17	**COMP. DATE** 08/31/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
190												
	187.9	0.0	5	10	15	25		M		GROUND SURFACE	187.9	0.0
185	184.6	3.3	2	2	1	3		M		**ROADWAY EMBANKMENT** TAN, SILTY SAND	185.4	2.5
180	179.2	8.7	9	12	12	24		Sat.		**COASTAL PLAIN** BLACK, SANDY CLAY (MIDDENDORF FORMATION)	180.9	7.0
175	174.2	13.7	1	2	2	4	SS-66	W		GRAY, COARSE SAND	175.9	12.0
170	169.2	18.7	4	5	12	17		Sat.		TAN, HIGHLY PLASTIC, SILTY CLAY	170.9	17.0
165	164.2	23.7	7	11	17	28		W		TAN, CLAYEY SAND	165.9	22.0
160	159.2	28.7	5	8	9	17		W		**COASTAL PLAIN** GRAY, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	160.9	27.0
155	154.2	33.7	13	18	20	38		Sat.		GRAY, CLAYEY SAND	155.9	32.0
150	149.2	38.7	4	6	8	14		W		GRAY, SILTY CLAY	148.6	39.3
145	144.2	43.7	9	14	17	31		Sat.		GRAY, CLAYEY SAND	145.9	42.0
140	139.2	48.7	5	7	9	16		Sat.				
135	134.2	53.7	7	8	10	18		Sat.				
130	129.2	58.7	8	9	12	21		W		GRAY, SANDY CLAY	130.9	57.0
125	124.2	63.7	15	23	25	48		W				
120	119.2	68.7	8	15	21	36		W				
115	114.2	73.7	10	18	18	36		Sat.		GRAY, CLAYEY SAND	115.9	72.0
110												

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 11+98	**OFFSET** 4 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 561,476	**EASTING** 2,118,075	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/31/17	**COMP. DATE** 08/31/17	**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
110						Match Line				
	109.2	78.7	12	13	14	27		Sat.		GRAY, CLAYEY SAND *(continued)*
105	104.2	83.7	12	14	23	37		W		GRAY AND GREEN, SANDY CLAY (105.9 / 82.0)
100	99.2	88.7	11	13	20	33		W		
95	94.2	93.7	13	18	25	43		W		
90	89.2	98.7	12	13	12	25		Sat.		GRAY, CLAYEY SAND (90.9 / 97.0)
										87.7 / 100.2 — Boring Terminated at Elevation 87.7 ft IN MED. DENSE CLAYEY SAND (COASTAL PLAIN)

NCDOT BORE DOUBLE WALL 66 BORING LOGS.GPJ NC_DOT.GDT 4/17/20

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_6	**STATION** 12+52	**OFFSET** 3 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 186.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 561,522	**EASTING** 2,118,105	**24 HR.** 4.9
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/24/20	**COMP. DATE** 01/24/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
190											
	186.6	0.0	3	5	4	9 16 24		M		186.6 GROUND SURFACE	0.0
185										**COASTAL PLAIN** LOOSE, TAN AND ORANGE, SILTY FINE TO COARSE SAND (A-2-4) [MIDDENDORF FORMATION]	
	183.1	3.5	10	9	7			W		183.6 MEDIUM DENSE, TAN AND BROWN, FINE TO COARSE SAND (A-3)	3.0
180										179.6 MEDIUM DENSE, ORANGE AND TAN, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL	7.0
	178.1	8.5	11	13	11			W		174.6 STIFF, ORANGE AND TAN, SANDY CLAY (A-6)	12.0
175											
	173.1	13.5	3	5	6	11		W			
170										169.6 LOOSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6)	17.0
	168.1	18.5	3	4	5	9		W			
165										164.6 HARD, BROWN, SANDY CLAY (A-6)	22.0
	163.1	23.5	10	15	20	35		W			
160											
	158.1	28.5	5	11	25	36		W		156.6 Boring Terminated at Elevation 156.6 ft IN HARD SANDY CLAY (COASTAL PLAIN)	30.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_7	**STATION** 13+01	**OFFSET** 2 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.9 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 561,566	**EASTING** 2,118,126	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/24/20	**COMP. DATE** 01/24/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
190											
	185.9	0.0	2	5	5	10 15 22		W		185.9 GROUND SURFACE	0.0
185										**COASTAL PLAIN** LOOSE, TAN, CLAYEY FINE TO COARSE SAND (A-2-6)	
	182.4	3.5	6	7	8			W		182.9 [MIDDENDORF FORMATION] MEDIUM DENSE, TAN AND WHITE, FINE SAND (A-3)	3.0
180										178.9 MEDIUM DENSE, ORANGE AND TAN, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL	7.0
	177.4	8.5	12	14	8			W			
175										173.9 STIFF, ORANGE, TAN AND GRAY, SANDY CLAY (A-6)	12.0
	172.4	13.5	3	4	5	9 31		W			
170										168.9 DENSE TO VERY DENSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6)	17.0
	167.4	18.5	15	16	15			W			
165											
	162.4	23.5	28	72/0.4		100/0.9		W		158.9 VERY STIFF, BROWN, SANDY CLAY (A-6)	27.0
160											
	157.4	28.5	6	10	12	22		W		155.9 Boring Terminated at Elevation 155.9 ft IN VERY STIFF SANDY CLAY (COASTAL PLAIN)	30.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_8	**STATION** 13+53	**OFFSET** 3 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 186.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 561,612	**EASTING** 2,118,150	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
	186.3	0.0	2	2	6	8 41		W		186.3 GROUND SURFACE	0.0
185										**COASTAL PLAIN** LOOSE, TAN AND GRAY, SILTY FINE SAND (A-2-4), TRACE ROOTLETS [MIDDENDORF FORMATION]	
	182.8	3.5	21	21	20			W		183.3 DENSE, ORANGE, GRAY AND TAN, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL	3.0
180											
	177.8	8.5	3	10	19	29		W			
175										174.3 MEDIUM STIFF TO HARD, ORANGE, TAN, AND GRAY, SANDY CLAY (A-6)	12.0
	172.8	13.5	3	4	5	9		W			
170											
	167.8	18.5	4	3	4	7		W			
165											
	162.8	23.5	14	30	42	72		W		161.3 Boring Terminated at Elevation 161.3 ft IN HARD SANDY CLAY (COASTAL PLAIN)	25.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_9	**STATION** 14+03	**OFFSET** 4 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 561,656	**EASTING** 2,118,173	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
	187.0	0.0	3	5	7	12 20		M		187.0 GROUND SURFACE 0.0
185										**COASTAL PLAIN** MEDIUM DENSE, TAN, SILTY FINE TO COARSE SAND (A-2-4) [MIDDENDORF FORMATION]
	183.5	3.5	9	9	11			W		184.0 MEDIUM DENSE, TAN AND ORANGE, FINE TO COARSE SAND (A-3) 3.0
180										
	178.5	8.5	4	6	5	11		W		
175										175.0 MEDIUM STIFF, ORANGE AND TAN, SANDY CLAY (A-6) 12.0
	173.5	13.5	2	2	3	5		W		
170										170.0 MEDIUM DENSE, GRAY AND TAN, CLAYEY FINE TO COARSE SAND (A-2-6) 17.0
	168.5	18.5	11	11	11	22		M		
165										165.0 **COASTAL PLAIN** VERY STIFF, GRAY AND BROWN, SANDY CLAY (A-6) [CAPE FEAR FORMATION] 22.0
	163.5	23.5	16	11	8	19		W		
160										
	158.5	28.5	7	8	12	20		W		157.0 Boring Terminated at Elevation 157.0 ft IN VERY STIFF SANDY CLAY (COASTAL PLAIN) 30.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_10	**STATION** 14+52	**OFFSET** 3 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 188.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 561,701	**EASTING** 2,118,194	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190	188.1	0.0	3	4	11	15		M		188.1 GROUND SURFACE	0.0
										COASTAL PLAIN	
185	184.6	3.5	13	15	13	28		W		MEDIUM DENSE, ORANGE AND TAN, CLAYEY FINE SAND (A-2-6) [MIDDENDORF FORMATION]	
										185.1	3.0
180	179.6	8.5	1	5	4	9		W		MEDIUM DENSE TO LOOSE, TAN AND ORANGE, FINE TO COARSE SAND (A-3)	
175	174.6	13.5	14	4	2	6		W		176.1 LOOSE, TAN, GRAY AND WHITE, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL	12.0
170	169.6	18.5	2	2	4	6		W		171.1 LOOSE, ORANGE AND TAN, CLAYEY FINE SAND (A-2-6)	17.0
										168.1 Boring Terminated at Elevation 168.1 ft IN LOOSE CLAYEY SAND (COASTAL PLAIN)	20.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_11	**STATION** 15+05	**OFFSET** 2 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 190.8 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 561,749	**EASTING** 2,118,216	**24 HR.** 2.5
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**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
195										
190	190.8	0.0	2	2	6	8		M		190.8 GROUND SURFACE 0.0
										COASTAL PLAIN
185	187.3	3.5	8	4	3	7		M		LOOSE, TAN AND ORANGE, SILTY FINE SAND (A-2-4) [MIDDENDORF FORMATION]
	182.3	8.5	1	4	3	7		M		183.8 MEDIUM STIFF, RED AND ORANGE, SILTY CLAY (A-7-5) 7.0
180										178.8 LOOSE, TAN AND ORANGE, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL 12.0
175	177.3	13.5	11	8	1	9		W		173.8 LOOSE, ORANGE AND TAN, SILTY FINE TO COARSE SAND (A-2-4) 17.0
	172.3	18.5	2	4	4	8		W		170.8 Boring Terminated at Elevation 170.8 ft IN LOOSE SILTY SAND (COASTAL PLAIN) 20.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_12	**STATION** 15+53	**OFFSET** 10 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 188.7 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 561,797	**EASTING** 2,118,227	**24 HR.** 2.7
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
190										
	188.7	0.0	2	4	6	10		M		188.7 GROUND SURFACE 0.0
185	185.2	3.5	5	4	4	8		M		**COASTAL PLAIN** STIFF, TAN AND ORANGE, SANDY CLAY (A-6) 185.7 3.0 [MIDDENDORF FORMATION] LOOSE, TAN, CLAYEY FINE TO COARSE SAND (A-2-6) 181.7 7.0
180	180.2	8.5	WOH	WOH	1	1		M		VERY SOFT, TAN, RED, AND ORANGE, SILTY CLAY (A-7-5) 176.7 12.0
175	175.2	13.5	12	11	11	22		W		MEDIUM DENSE, ORANGE, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL 173.7 15.0 Boring Terminated at Elevation 173.7 ft IN MEDIUM DENSE SAND (COASTAL PLAIN)

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.42' LT OF -L- STA 970+77				**GROUND WTR (ft)**
BORING NO. WALL_LT_13	**STATION** 16+14	**OFFSET** 2 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.4 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 561,846	**EASTING** 2,118,265	**24 HR.** 2.3
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/23/20	**COMP. DATE** 01/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
	187.4	0.0	2	5	5	10		M		187.4 GROUND SURFACE 0.0
185	183.9	3.5	WOH	WOH	WOH	0		W		**COASTAL PLAIN** LOOSE TO VERY LOOSE, TAN AND ORANGE, SILTY FINE SAND (A-2-4) [MIDDENDORF FORMATION] 180.4 7.0
180	178.9	8.5	1	3	3	6		W		MEDIUM STIFF, ORANGE AND RED, SILTY CLAY (A-7-5) 175.4 12.0
175	173.9	13.5	14	14	11	25		W		MEDIUM DENSE, ORANGE, WHITE AND GRAY, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL 172.4 15.0 Boring Terminated at Elevation 172.4 ft IN MEDIUM DENSE SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. WALL_RT_1	**STATION** 10+03	**OFFSET** 2 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 188.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 561,108	**EASTING** 2,118,069	**24 HR.** 1.2
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/22/20	**COMP. DATE** 01/22/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
	188.0	0.0	2	4	5	9		M		188.0 GROUND SURFACE	0.0
185										**COASTAL PLAIN** STIFF, TAN ORANGE, RED AND GRAY, SANDY CLAY (A-6), TRACE ROOTLETS [MIDDENDORT FORMATION]	
	184.5	3.5	3	4	6	10		M			
180										181.0 MEDIUM DENSE, ORANGE, TAN AND WHITE FINE TO COARSE SAND (A-1-A), LITTLE GRAVEL	7.0
	179.5	8.5	9	9	14	23		W		178.0 Boring Terminated at Elevation 178.0 ft IN MEDIUM DENSE SAND (COASTAL PLAIN)	10.0

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. WALL_RT_5	**STATION** 12+33	**OFFSET** 4 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 186.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 561,314	**EASTING** 2,118,173	**24 HR.** 1.8
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/22/20	**COMP. DATE** 01/22/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
	186.1	0.0	2	2	1	3		M		186.1 GROUND SURFACE 0.0
185										**COASTAL PLAIN** SOFT, BLACK, SANDY SILT (A-4), TRACE ROOTLETS [MIDDENDORF FORMATION] 183.1 3.0
	182.6	3.5	2	6	8	14		W		MEDIUM DENSE, TAN AND ORANGE, CLAYEY FINE TO COARSE SAND (A-2-6), TRACE GRAVEL 179.1 7.0
180										MEDIUM DENSE, ORANGE, FINE TO COARSE SAND (A-1-A), TRACE GRAVEL
	177.6	8.5	3	4	7	11		W		
175										174.1 MEDIUM STIFF, ORANGE AND TAN, SANDY CLAY (A-6) 12.0
	172.6	13.5	2	3	3	6		W		
170										169.1 MEDIUM DENSE, GRAY, CLAYEY FINE TO COARSE SAND (A-2-6) 17.0
	167.6	18.5	5	6	6	12		W		166.1 Boring Terminated at Elevation 166.1 ft IN MEDIUM DENSE CLAYEY SAND (COASTAL PLAIN) 20.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 10+45	**OFFSET** 17 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 188.0 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 561,140	**EASTING** 2,118,101	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/28/17	**COMP. DATE** 08/28/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
190											
	188.0	0.0	2	4	5	9		M		188.0 GROUND SURFACE	0.0
185										**COASTAL PLAIN** RED AND TAN, SILTY CLAY (MIDDENDORF FORMATION)	
	183.4	4.6	11	14	16	30		W		184.5 RED AND TAN, COARSE SAND	3.5
180	180.4	7.6	10	16	15	31	SS-3	Sat.			
										177.0 TAN, CLAYEY SAND	11.0
175	175.4	12.6	2	1	4	5		Sat.			
										172.0 **COASTAL PLAIN** GRAY, SANDY SILT (CAPE FEAR FORMATION)	16.0
170	170.4	17.6	4	5	6	11		W			
										167.0 GRAY AND GREEN, CLAYEY SAND	21.0
165	165.4	22.6	6	9	14	23		Sat.			
160	160.4	27.6	6	8	12	20		Sat.			
155	155.4	32.6	7	10	18	28		Sat.			
150	150.4	37.6	8	11	11	22		Sat.			
145	145.4	42.6	6	6	9	15		Sat.			
										142.0 GRAY AND GREEN, SANDY CLAY	46.0
140	140.4	47.6	9	13	15	28		W			
135	135.4	52.6	7	7	10	17		W			
										132.0 GRAY AND GREEN, CLAYEY SAND	56.0
130	130.4	57.6	6	10	11	21		Sat.			
125	125.4	62.6	14	24	31	55		Sat.			
										122.0 GRAY, SANDY CLAY	66.0
120	120.4	67.6	17	21	20	41		W			
115	115.4	72.6	16	16	21	37		Sat.		117.0 GRAY AND GREEN, CLAYEY SAND	71.0
110	110.4	77.6									

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 10+45	**OFFSET** 17 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 188.0 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 561,140	**EASTING** 2,118,101	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/28/17	**COMP. DATE** 08/28/17	**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
110						Match Line				
	105.4	82.6	12	11	21	32		Sat.		GRAY AND GREEN, CLAYEY SAND *(continued)*
105										107.0 BROWN, GRAY AND RED, SANDY CLAY 81.0
	100.4	87.6	9	12	17	29		W		
100			17	25	27	52		W		
	95.4	92.6	14	15	17	32		W		
95										92.0 GRAY, CLAYEY SAND 96.0
90	90.4	97.6	14	15	15	30		Sat.		88.9 Boring Terminated at Elevation 88.9 ft IN DENSE CLAYEY SAND (COASTAL PLAIN) 99.1

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 11+73	**OFFSET** 33 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,247	**EASTING** 2,118,172	**24 HR.** 4.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/29/17	**COMP. DATE** 08/29/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) — DEPTH (ft)
190										
	187.9	0.0	4	6	4	10		M		187.9 — GROUND SURFACE — 0.0 **COASTAL PLAIN** TAN, SILTY SAND (MIDDENDORF FORMATION)
185										185.4 — 2.5 GRAY AND TAN, SANDY CLAY
	183.6	4.3	3	4	7	11				181.9 — 6.0 TAN, CLAYEY SAND
180	180.1	7.8	6	14	11	25		Sat.		177.4 — 10.5 GRAY AND TAN, SILTY CLAY
175										
	174.1	13.8	2	2	3	5		W		171.4 — 16.5 GRAY, CLAYEY SAND
170	169.1	18.8	4	6	8	14		Sat.		
165										163.9 — 24.0
	164.1	23.8	8	13	14	27		Sat.		163.4 — 24.5 **COASTAL PLAIN** GRAY SILTY CLAY (CAPE FEAR FORMATION)
160	159.1	28.8	7	10	16	26				161.4 — 26.5 GRAY, CLAYEY SAND GRAY, SILTY CLAY
155								W		156.4 — 31.5 GRAY, SILTY SAND
	154.1	33.8	6	10	13	23	SS-29	17%		151.4 — 36.5 GRAY, CLAYEY SAND
150	149.1	38.8	6	6	8	14		Sat.		
145										146.4 — 41.5 GRAY, SANDY CLAY
	144.1	43.8	9	11	15	26		W		
140	139.1	48.8	7	10	13	23		W		136.4 — 51.5 GRAY AND GREEN, CLAYEY SAND
135	134.1	53.8	5	6	8	14		Sat.		
130	129.1	58.8	5	7	9	16		Sat.		126.4 — 61.5 GRAY AND RED, SANDY CLAY
125	124.1	63.8	15	20	24	44		W		121.4 — 66.5 GRAY AND GREEN, CLAYEY SAND
120	119.1	68.8	8	8	8	16		Sat.		
115	114.1	73.8	17	16	26	42		Sat.		
110										

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 11+73	**OFFSET** 33 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 187.9 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 561,247	**EASTING** 2,118,172	**24 HR.** 4.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 08/29/17	**COMP. DATE** 08/29/17	**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
110						Match Line				
	109.1	78.8	9	9	10	19		Sat.		GRAY AND GREEN, CLAYEY SAND *(continued)*
105	104.1	83.8	14	20	21	41		W		106.4 — 81.5 BROWN, GRAY AND GREEN, SANDY CLAY
100	99.1	88.8	15	17	23	40		W		96.4 — 91.5 GRAY AND GREEN, CLAYEY SAND
95	94.1	93.8	17	21	30	51		Sat.		
90	89.1	98.8	19	23	23	46		Sat.		87.6 — 100.3 Boring Terminated at Elevation 87.6 ft IN DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 47532	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** P. Gunnell	
SITE DESCRIPTION BRIDGE NO. 66 WALL - 76.5' RT OF -L- STA 969+40				**GROUND WTR (ft)**
BORING NO. WALL_RT_6	**STATION** 12+73	**OFFSET** 2 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 185.9 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 561,350	**EASTING** 2,118,189	**24 HR.** 2.3
DRILL RIG/HAMMER EFF./DATE SME6573 CME-550X 89% 05/03/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Marlowe	**START DATE** 01/22/20	**COMP. DATE** 01/22/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
190										
	185.9	0.0								185.9 GROUND SURFACE 0.0
185			3	2	2	4		M		**COASTAL PLAIN** SOFT, BROWN AND ORANGE, SANDY CLAY (A-6) [MIDDENDORF FORMATION]
	182.4	3.5								182.9 3.0
			2	9	9	18		M		MEDIUM DENSE TO VERY LOOSE, ORANGE AND WHITE, FINE TO MEDIUM SAND (A-1-A), TRACE GRAVEL
180										
	177.4	8.5								175.9 10.0
			3	1	2	3		W		Boring Terminated at Elevation 175.9 ft IN VERY LOOSE SAND (COASTAL PLAIN)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5878	1	19

REFERENCE: I-5878

PROJECT: 53078

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *IMPROVE I-95 INTERCHANGES AT US 421 AND SR 1793 (SPRING BRANCH /POPE RD)*

SITE DESCRIPTION *BRIDGE NO 73 ON -LREV- (I-95) OVER -Y15- (US 421)*

CONTENTS

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NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

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T.J. WHITE

K.S. HARDEE

INVESTIGATED BY *J.R. SWARTLEY*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *S.S. LANEY*

SUBMITTED BY *S.S. LANEY*

DATE *NOVEMBER 2019*

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DocuSigned by:
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SIGNATURE

11/21/2019
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I–5878	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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
- [X] BWJ RODS

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM-63
NORTHING: 561213 EASTING: 2118159
ELEVATION: 198.28 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5878	3

SITE PLAN

0 40 80
FEET

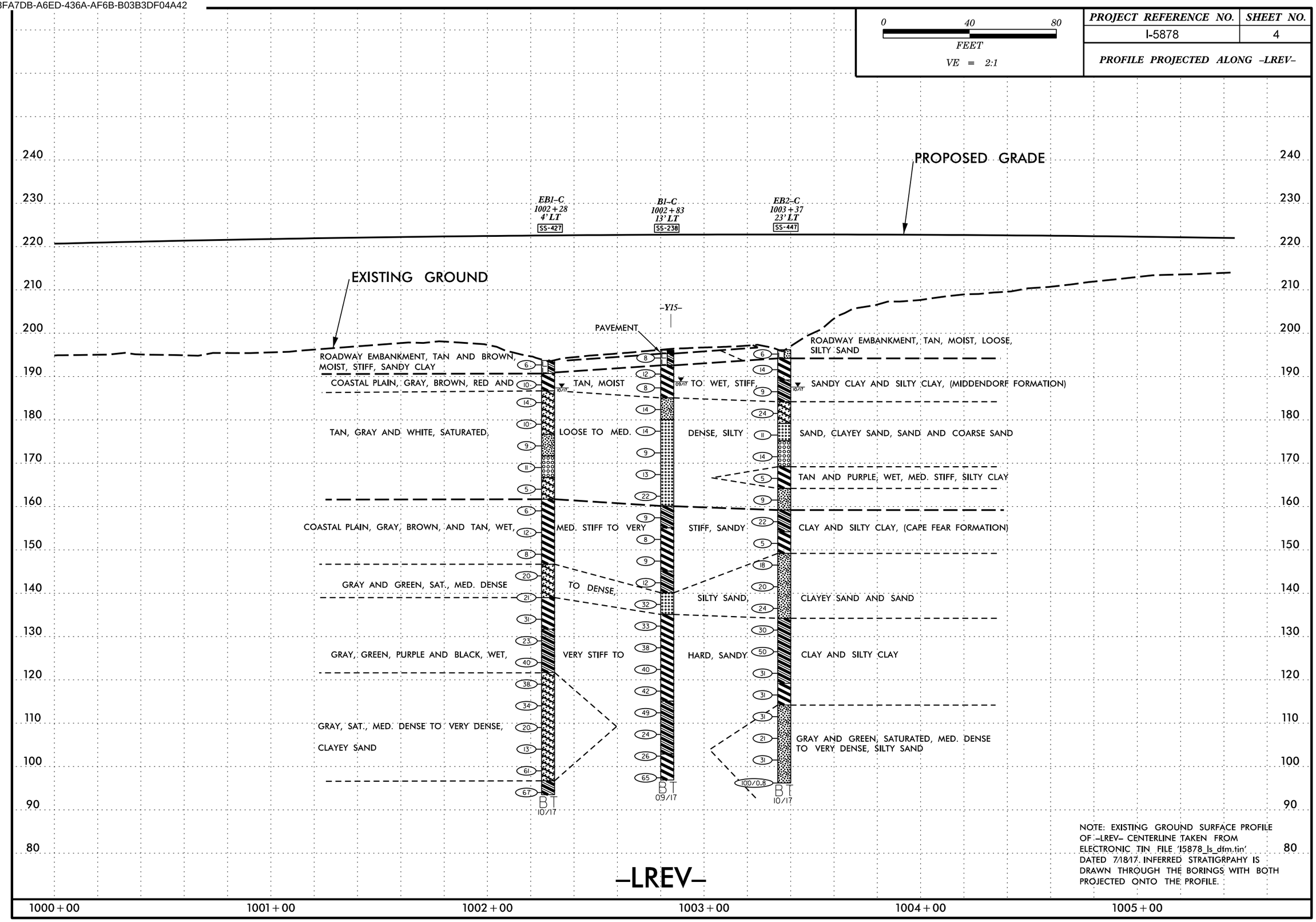
SKEW = 105°01'31"

ELEV. = 199.61'
105.42' RIGHT
BM 63
GREU TL-3
PROP. GUARDRAIL
REMOVE EXIST. GUARDRAIL
BEGIN CONC. BARRIER
-Y15- +70.96
42.00' RT.
BL-109
SEAT ELEV 210.62'
MTL
F
-EL-
SEAT ELEV 210.56'
SEAT ELEV 210.49'
CAT-1
I-95 NBL
24' PAVED ROADWAY
BEGIN RETAINING WALL
-LREV- +97.00
77.63' LT.
TO FAYETTEVILLE
-L-
-LREV-
SEAT ELEV 210.47'
N 43°07'06.5" E
1000
1000
TYPE B-77
EB1-A
BL-A
EB2-A
US 421 SBL
US 421 NBL
4'
24'
32'
45.00'
8:1
PS
BRIDGE NO. 77
BRIDGE NO. 73
EB1-C
BL-C
EB2-C
+50.00
8'
24'
45.00'
TO DUNN
SEAT ELEV 211.55'
END CONC. BARRIER
-Y15- +49.09
42.00' LT.
SEAT ELEV 211.56'
SEAT ELEV 211.52'
END RETAINING WALL
-LREV- +16.78
77.63' LT.
SEAT ELEV 211.51'
N 43°59'06.7" E
1005
1005
REMOVE EXIST GUARDRAIL
TO BENSON
END RETAINING WALL
-LREV- +55.39
77.62' RT.
WOODS
PROP. GUARDRAIL
NAD 83
END CONC. BARRIER
-Y15- +33.22
42.00' RT.
30" RCP END UNKNOWN
END BENT 1 LINE
8:1
4'
PS
-Y15-
+50.00
BENT 1 LINE
24'
4'
TO SPIVEY'S CORNER
EB1-B
BL-B
EB2-B
END BENT 1 LINE
BEGIN CONC. BARRIER
-Y15- +08.36
42.00' LT.
-Y15- POC Sta. 28+40.13 =
-LREV- POT Sta. 1002+79.68
WOODS
30

0 40 80
FEET
VE = 2:1

PROJECT REFERENCE NO.	SHEET NO.
I-5878	4

PROFILE PROJECTED ALONG –LREV–



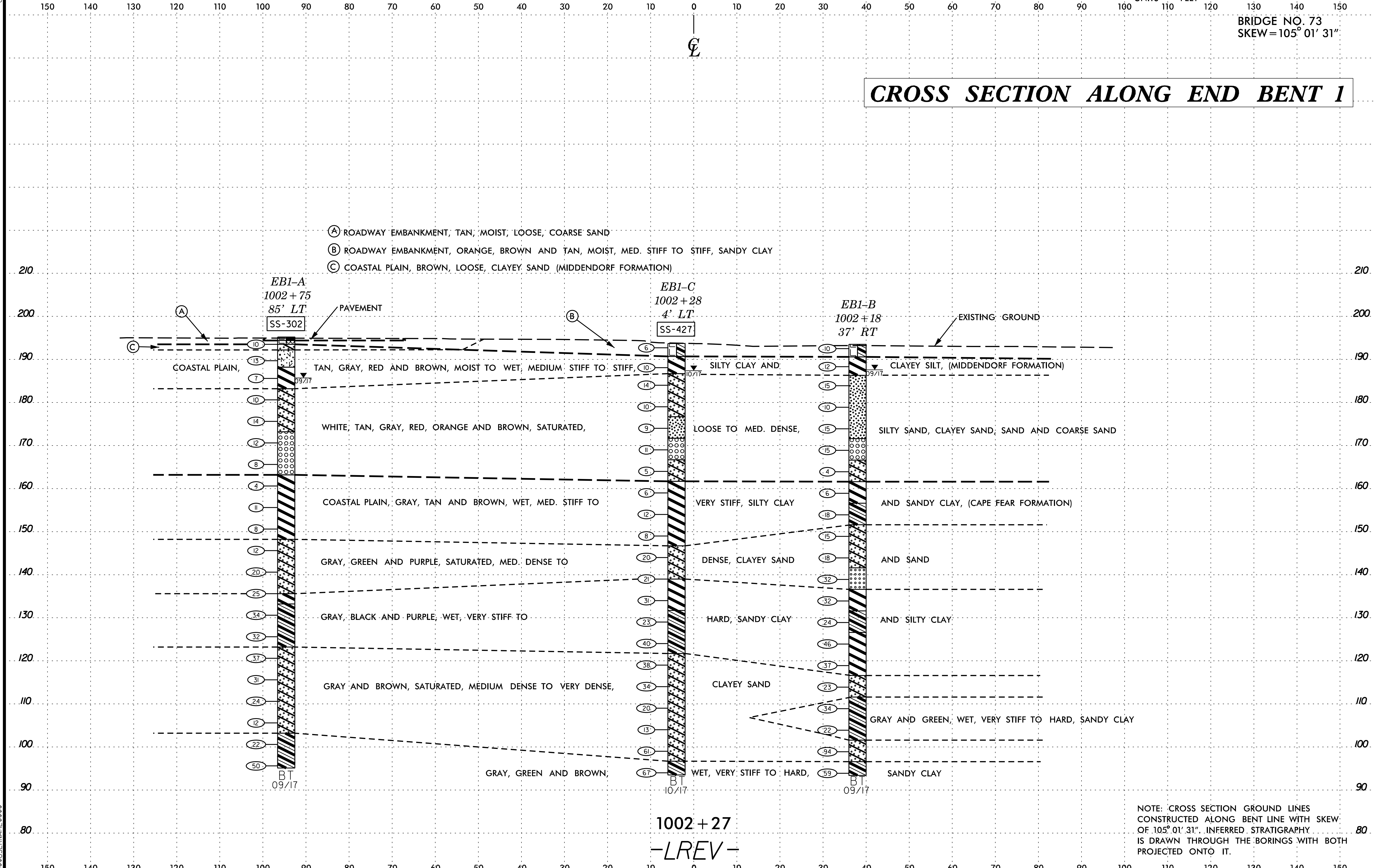
–LREV–

NOTE: EXISTING GROUND SURFACE PROFILE OF –LREV– CENTERLINE TAKEN FROM ELECTRONIC TIN FILE '15878_ls_dtm.tin' DATED 7/18/17. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

PROJ. REFERENCE NO.	SHEET NO.
I-5878	5

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG END BENT 1



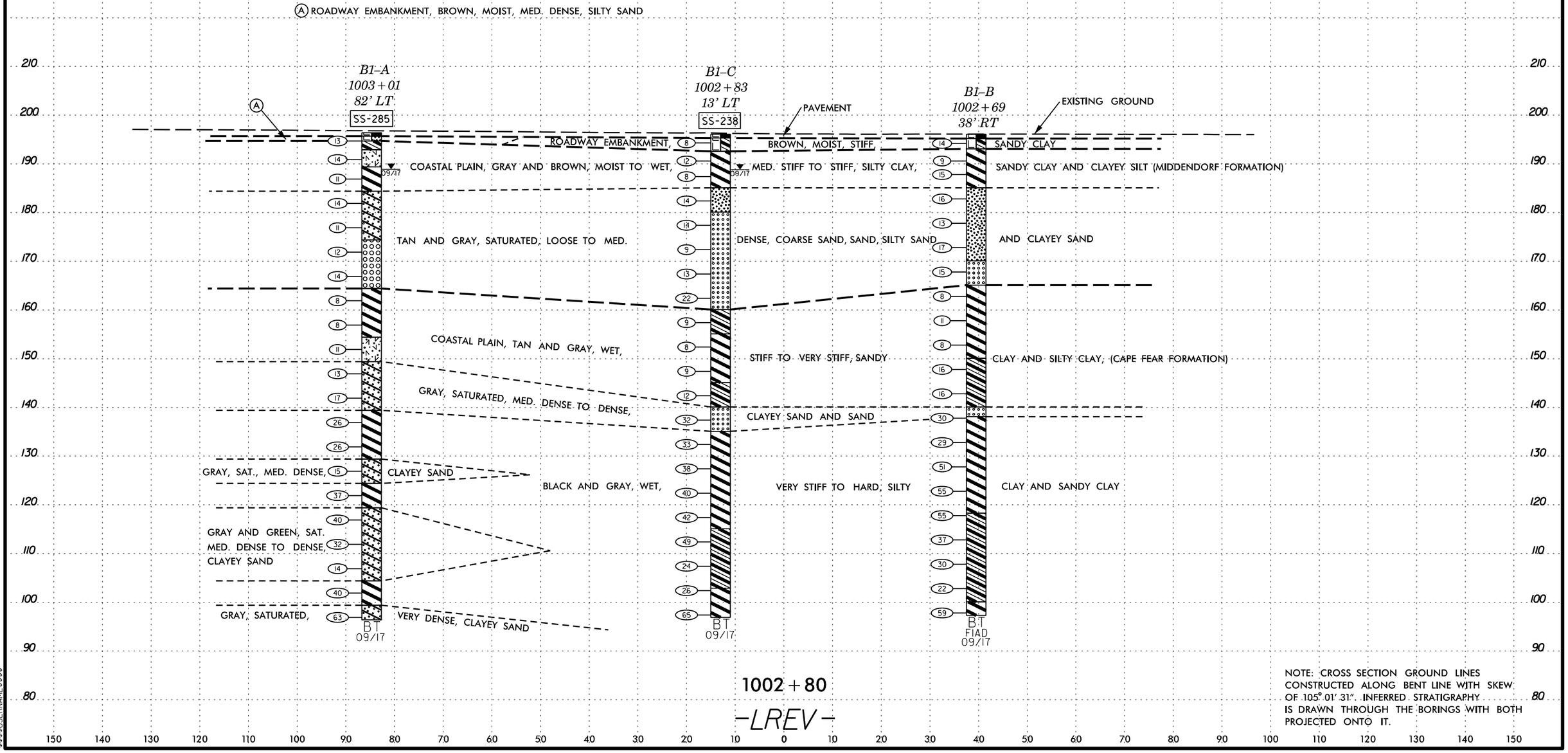
NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

6/23/16

UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
0 5 10	I-5878	6

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG BENT 1



NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

BRIDGE NO. 73
SKEW = 105° 01′ 31″

CROSS SECTION ALONG END BENT 2

EB2–A
1003 + 31
80′ LT
SS-324

EB2–C
1003 + 37
23′ LT
SS-447

EB2–B
1003 + 24
53′ RT

EXISTING GROUND

ROADWAY EMBANKMENT, TAN, MOIST, LOOSE, SILTY SAND AND CLAYEY SAND COASTAL PLAIN, BROWN, MOIST, MED. DENSE, SILTY SAND, (MIDDENDORF FORMATION)

COASTAL PLAIN, GRAY, TAN AND RED, MOIST TO WET, STIFF, SILTY CLAY AND SANDY CLAY, (MIDDENDORF FORMATION)

ST-1

TAN, WHITE, RED AND GRAY, SATURATED, MEDIUM DENSE, SILTY SAND, SAND AND COARSE SAND

GRAY, TAN AND PURPLE, WET, MED. STIFF, HIGHLY PLASTIC, SILTY CLAY

COASTAL PLAIN, SILTY CLAY AND TAN AND GRAY, WET, MED. STIFF TO SANDY CLAY (CAPE FEAR FORMATION) VERY STIFF,

COASTAL PLAIN, GRAY, GREEN AND BLACK, SATURATED, MED. DENSE TO DENSE, SILTY SAND AND CLAYEY SAND, (CAPE FEAR FORMATION)

GRAY, SAT., DENSE, CLAYEY SAND GRAY AND BLACK, WET, VERY STIFF TO HARD, SANDY CLAY AND SILTY CLAY

GRAY AND GREEN, SATURATED, MED. DENSE TO VERY DENSE, SILTY SAND AND CLAYEY SAND

GRAY, WET, HARD, SILTY CLAY

BT 09/17

BT 10/17

BT 10/17

1003 + 32

–LREV–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 105° 01′ 31″. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 1002+75	**OFFSET** 85 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.2 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,975	**EASTING** 2,119,735	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
200										
195	194.5	0.7	7	5	5	10		M		195.2 / 0.0 GROUND SURFACE 194.4 / 0.8 **ROADWAY EMBANKMENT** (PAVEMENT) 193.5 / 1.7 BROWN, COARSE SAND
190	190.7	4.5	2	5	8	13		M		192.2 / 3.0 **COASTAL PLAIN** BROWN, CLAYEY SAND (MIDDENDORF FORMATION) 188.2 / 7.0 GRAY, BROWN AND PURPLE, CLAYEY SILT GRAY AND TAN, SILTY CLAY
185	186.6	8.6	2	3	4	7				
180	181.6	13.6	5	4	6	10		Sat.		183.2 / 12.0 BROWN, RED AND TAN, CLAYEY SAND
175	176.6	18.6	4	4	10	14		Sat.		
170	171.6	23.6	4	5	7	12	SS-302	Sat.		173.2 / 22.0 TAN, COARSE SAND
165	166.6	28.6	3	3	5	8		Sat.		
160	161.6	33.6	1	1	3	4		W		163.2 / 32.0 **COASTAL PLAIN** GRAY, SILTY CLAY (CAPE FEAR FORMATION)
155	156.6	38.6	3	5	6	11		W		
150	151.6	43.6	3	4	4	8		W		
145	146.6	48.6	4	5	7	12		Sat.		148.2 / 47.0 GRAY, CLAYEY SAND
140	141.6	53.6	8	9	11	20		Sat.		
135	136.6	58.6	11	11	14	25		W		135.6 / 59.6 GRAY, SILTY CLAY AND SANDY CLAY
130	131.6	63.6	12	14	20	34		W		133.2 / 62.0
125	126.6	68.6	9	11	21	32		W		
120	121.6	73.6	13	15	22	37		Sat.		123.2 / 72.0 GRAY, CLAYEY SAND

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 1002+75	**OFFSET** 85 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.2 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,975	**EASTING** 2,119,735	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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
120						Match Line				GRAY, CLAYEY SAND *(continued)*
115	116.6	78.6	11	13	18	31		Sat.		
110	111.6	83.6	9	11	13	24		Sat.		
105	106.6	88.6	11	7	5	12		Sat.		
100	101.6	93.6	6	9	13	22		W		103.2 / 92.0 GRAY, SANDY CLAY
	96.6	98.6	14	20	30	50				95.1 / 100.1 Boring Terminated at Elevation 95.1 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 1002+18	**OFFSET** 37 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.5 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 563,849	**EASTING** 2,119,783	**24 HR.** 5.9
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 09/27/17	**COMP. DATE** 09/27/17	**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)
195											
	193.5	0.0	4	4	6	10		M		193.5 GROUND SURFACE	0.0
190										**ROADWAY EMBANKMENT** ORANGE AND BROWN, SANDY CLAY 190.6	2.9
	189.3	4.2	3	4	8	12				**COASTAL PLAIN** RED, BROWN AND GRAY, SILTY CLAY (MIDDENDORF FORMATION)	
185										186.3	7.2
	184.9	8.6	6	7	8	15		Sat.		RED, ORANGE, BROWN AND GRAY, SILTY SAND AND COARSE SAND	
180	179.9	13.6	4	5	5	10		Sat.			
175	174.9	18.6	6	6	9	15		Sat.		171.6	21.9
170	169.9	23.6	5	9	6	15		Sat.		166.6 GRAY, CLAYEY SAND	26.9
165	164.9	28.6	2	2	2	4		Sat.		161.6	31.9
160	159.9	33.6	2	3	3	6		W		**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY AND SANDY CLAY (CAPE FEAR FORMATION)	
155	154.9	38.6	5	8	10	18		W		156.6	36.9
150	149.9	43.6	5	7	8	15		Sat.		151.6 GRAY AND GREEN, CLAYEY SAND	41.9
145	144.9	48.6	6	8	10	18		Sat.			
140	139.9	53.6	7	14	18	32		Sat.		141.6 GRAY AND PURPLE, SAND	51.9
135	134.9	58.6	7	14	18	32		W		136.6 GRAY AND PURPLE, SILTY CLAY AND SANDY CLAY	56.9
130	129.9	63.6	6	11	13	24		W		131.6	61.9
125	124.9	68.6	11	19	27	46		W		126.6	66.9
120	119.9	73.6	12	16	21	37		W			
115										116.6 GRAY, CLAYEY SAND	76.9

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
115						Match Line				
	114.9	78.6	6	10	13	23		Sat.		GRAY, CLAYEY SAND *(continued)*
110	109.9	83.6	8	12	22	34		W		111.6 GRAY AND GREEN, SANDY CLAY
105	104.9	88.6	7	10	12	22		W		101.6 BROWN AND GRAY, CLAYEY SAND
100	99.9	93.6	12	41	53	94		Sat.		96.6 GRAY AND GREEN, SANDY CLAY
95	94.9	98.6	17	27	32	59		W		93.4 Boring Terminated at Elevation 93.4 ft IN HARD SANDY CLAY (COASTAL PLAIN)

81.9 · 91.9 · 100.1

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 1002+28	**OFFSET** 4 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 563,885	**EASTING** 2,119,760	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/02/17	**COMP. DATE** 10/02/17	**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)
195											
	193.7	0.0	3	3	3	6		M		193.7 GROUND SURFACE	0.0
190										**ROADWAY EMBANKMENT** TAN, SANDY CLAY	
	189.1	4.6	1	4	6	10				190.7 **COASTAL PLAIN** TAN AND GRAY, SILTY CLAY (MIDDENDORF FORMATION)	3.0
185	185.0	8.7								186.7 TAN, CLAYEY SAND	7.0
			5	7	7	14		Sat.			
180	180.0	13.7									
			4	4	6	10		Sat.			
175	175.0	18.7								176.7 WHITE AND TAN, SILTY SAND AND COARSE SAND	17.0
			4	4	5	9		Sat.			
170	170.0	23.7								171.7	22.0
			9	5	6	11	SS-427	Sat.			
165	165.0	28.7								166.7 TAN AND GRAY, CLAYEY SAND	27.0
			1	2	3	5		Sat.			
160	160.0	33.7								161.7 **COASTAL PLAIN** GRAY AND TAN, SILTY CLAY (CAPE FEAR FORMATION)	32.0
			3	3	3	6		W			
155	155.0	38.7									
			3	5	7	12		W			
150	150.0	43.7									
			3	3	5	8		W			
145	145.0	48.7								146.7 GREEN AND GRAY, CLAYEY SAND	47.0
			8	8	12	20		Sat.			
140	140.0	53.7									
			9	7	14	21		Sat.		139.0 GRAY AND BLACK, SILTY CLAY AND SANDY CLAY	54.7
135	135.0	58.7									
			9	14	17	31		W			
130	130.0	63.7								131.7	62.0
			7	10	13	23		W			
125	125.0	68.7									
			13	17	23	40		W			
120	120.0	73.7								121.7 GRAY, CLAYEY SAND	72.0
			17	19	19	38		Sat.			
115	115.0	78.7									

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 1002+28	**OFFSET** 4 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 193.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 563,885	**EASTING** 2,119,760	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/02/17	**COMP. DATE** 10/02/17	**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
115						Match Line				
	110.0	83.7	15	16	18	34		Sat.		GRAY, CLAYEY SAND *(continued)*
110										
	105.0	88.7	8	9	11	20		Sat.		
105										
	100.0	93.7	7	6	7	13		Sat.		
100										
	95.0	98.7	13	25	36	61		Sat.		96.7 GRAY AND BROWN, SANDY CLAY 97.0
95			29	33	34	67		W		93.5 100.2
										Boring Terminated at Elevation 93.5 ft IN HARD SANDY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 1003+01	**OFFSET** 82 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.4 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,992	**EASTING** 2,119,755	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/19/17	**COMP. DATE** 09/19/17	**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)
200										
										196.4 — 0.0 GROUND SURFACE
195	195.7	0.7	8	6	7	13		M		195.7 — 0.7 **ROADWAY EMBANKMENT** (PAVEMENET)
										194.7 — 1.7 BROWN, SILTY SAND
	191.9	4.5	2	6	8	14		M		192.9 — 3.5 **COASTAL PLAIN** BROWN, SANDY CLAY (MIDDENDORF FORMATION)
190										
	187.9	8.5	4	5	6	11				189.4 — 7.0 GRAY, RED AND BROWN, CLAYEY SILT GRAY, RED AND BROWN, SILTY CLAY
185										
	182.9	13.5	7	7	7	14		Sat.		184.4 — 12.0 TAN, CLAYEY SAND
180										
	177.9	18.5	4	5	6	11		Sat.		
175										
	172.9	23.5	5	5	7	12		Sat.		174.4 — 22.0 TAN AND GRAY, COARSE SAND
170										
	167.9	28.5	5	6	8	14		Sat.		
165										
	162.9	33.5	2	3	5	8		W		164.4 — 32.0 **COASTAL PLAIN** TAN AND GRAY, SILTY CLAY (CAPE FEAR FORMATION)
160										
	157.9	38.5	3	4	4	8		W		
155										
	152.9	43.5	4	4	7	11	SS-285	29% W		154.4 — 42.0 GRAY, CLAYEY SILT
150										149.4 — 47.0 GRAY, CLAYEY SAND
	147.9	48.5	4	6	7	13		Sat.		
145										
	142.9	53.5	4	6	11	17		Sat.		
140										
	137.9	58.5	12	13	13	26		W		139.4 — 57.0 BLACK, SILTY CLAY
135										
	132.9	63.5	9	11	15	26		W		
130										
	127.9	68.5	7	7	8	15		Sat.		129.4 — 67.0 GRAY, CLAYEY SAND
125										
	122.9	73.5	11	16	21	37		W		124.4 — 72.0 GRAY, SILTY CLAY
120										

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 1003+01	**OFFSET** 82 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.4 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,992	**EASTING** 2,119,755	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/19/17	**COMP. DATE** 09/19/17	**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
120						Match Line				
	117.9	78.5	11	17	23	40		Sat.		119.4 — 77.0 GRAY AND GREEN, CLAYEY SAND
115										
	112.9	83.5	9	14	18	32		Sat.		
110										
	107.9	88.5	7	6	8	14		Sat.		104.4 — 92.0 BLACK, SILTY CLAY
105										
	102.9	93.5	12	17	23	40		W		99.4 — 97.0 GRAY, CLAYEY SAND
100										
	97.9	98.5	20	28	35	63		Sat.		96.4 — 100.0 Boring Terminated at Elevation 96.4 ft IN VERY DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 1002+69	**OFFSET** 38 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 98.8 ft	**NORTHING** 563,885	**EASTING** 2,119,819	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/15/17	**COMP. DATE** 09/15/17	**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)
200											
										196.1	GROUND SURFACE 0.0
195	195.2	0.9	7	8	6	14		M		195.2	**ROADWAY EMBANKMENT** (PAVEMENT) 0.9
	191.6	4.5								193.1	BROWN, SANDY CLAY 3.0
190			1	4	5	9		M			**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY (MIDDENDORF FORMATION)
	188.8	7.3									
185			4	6	9	15		W			
	183.8	12.3								185.1	11.0
			4	6	10	16		Sat.			TAN AND GRAY, SILTY SAND AND SAND
180	178.8	17.3									
			5	6	7	13		Sat.			
175	173.8	22.3									
			7	8	9	17		Sat.			
170	168.8	27.3								170.1	26.0
			7	8	7	15		Sat.			
165	163.8	32.3								165.1	31.0
			1	3	5	8		W			**COASTAL PLAIN** TAN AND GRAY, SILTY CLAY AND SANDY CLAY (CAPE FEAR FORMATION)
160	158.8	37.3									
			3	5	6	11		W			
155	153.8	42.3									
			5	3	5	8		W			
150	148.8	47.3								150.1	46.0
			7	7	9	16		W			
145	143.8	52.3									
			7	8	8	16		W			
140	138.8	57.3								140.1	56.0
			10	13	17	30		Sat.			GRAY SAND
135	133.8	62.3								138.1	58.0
			9	12	17	29		W			GRAY, SILTY CLAY AND SANDY CLAY
130	128.8	67.3									
			14	22	29	51		W			
125	123.8	72.3									
			14	23	32	55		W			
120											

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 1002+69	**OFFSET** 38 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 98.8 ft	**NORTHING** 563,885	**EASTING** 2,119,819	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/15/17	**COMP. DATE** 09/15/17	**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
120						Match Line				
	118.8	77.3	12	27	28	55		W		GRAY, SILTY CLAY AND SANDY CLAY *(continued)* 118.3 77.8
115	113.8	82.3	12	15	22	37		W		
110	108.8	87.3	11	12	18	30		W		
105	103.8	92.3	9	9	13	22		W		
100	98.8	97.3	28	29	30	59		W		100.1 96.0
										97.3 98.8
										Boring Terminated at Elevation 97.3 ft IN HARD SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 1002+83	**OFFSET** 13 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 563,931	**EASTING** 2,119,792	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/14/17	**COMP. DATE** 09/14/17	**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)
200											
										196.1 GROUND SURFACE	0.0
195	195.3	0.8	3	3	5	8		M		195.3 **ROADWAY EMBANKMENT** (PAVEMENT)	0.8
	191.6	4.5	2	4	8	12		M		192.6 BROWN, SANDY CLAY	3.5
190	188.4	7.7	2	3	5	8				**COASTAL PLAIN** GRAY AND BROWN, SILTY CLAY (MIDDENDORF FORMATION)	
185	183.4	12.7	2	6	8	14		Sat.		185.1 TAN AND GRAY, SILTY SAND AND SAND	11.0
180	178.4	17.7	6	7	7	14	SS-238	Sat.		180.1	16.0
175	173.4	22.7	4	4	5	9		Sat.			
170	168.4	27.7	5	3	10	13		Sat.			
165	163.4	32.7	7	12	10	22		Sat.			
160	158.4	37.7	3	3	6	9		W		160.1 **COASTAL PLAIN** TAN AND GRAY, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	36.0
155	153.4	42.7	3	3	5	8		W		155.1	41.0
150	148.4	47.7	3	4	5	9		W			
145	143.4	52.7	4	5	7	12		W		145.1	51.0
140	138.4	57.7	9	13	19	32		Sat.		140.1 GRAY SAND	56.0
135	133.4	62.7	10	14	19	33		W		135.1 GRAY, SILTY CLAY AND SANDY CLAY	61.0
130	128.4	67.7	11	16	22	38		W			
125	123.4	72.7	13	17	23	40		W			
120											

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Hill, T.J.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 1002+83	**OFFSET** 13 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 563,931	**EASTING** 2,119,792	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/14/17	**COMP. DATE** 09/14/17	**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
120						Match Line				
	118.4	77.7	14	18	24	42		W		GRAY, SILTY CLAY AND SANDY CLAY *(continued)*
115	113.4	82.7	20	22	27	49		W		115.1 81.0
110	108.4	87.7	11	12	12	24		W		
105	103.4	92.7	7	11	15	26		W		102.9 93.2
100	98.4	97.7	15	23	42	65		W		96.9 99.2
										Boring Terminated at Elevation 96.9 ft IN HARD SILTY CLAY (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 1003+31	**OFFSET** 80 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 197.3 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 564,012	**EASTING** 2,119,777	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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)
200											
	197.3	0.0								197.3 GROUND SURFACE	0.0
195			5	10	6	16		M		**ROADWAY EMBANKMENT** BROWN, CLAYEY SAND	
	192.8	4.5								194.3	3.0
190			5	6	9	15		M		**COASTAL PLAIN** GRAY, TAN AND RED, SILTY CLAY (MIDDENDORF FORMATION)	
	188.7	8.6									
185			3	5	7	12				185.3	12.0
	183.7	13.6								TAN, CLAYEY SAND	
180			8	7	9	16		Sat.			
	178.7	18.6									
175			5	4	5	9		Sat.			
	173.7	23.6								175.3	22.0
170			6	6	7	13		Sat.		TAN AND GRAY, COARSE SAND	
	168.7	28.6								170.3	27.0
165			4	2	2	4	SS-324	63%		GRAY AND PURPLE, HIGHLY PLASTIC, SILTY CLAY	
	163.7	33.6									
160			1	2	3	5		W			
	158.7	38.6								160.3	37.0
155			3	4	5	9		W		**COASTAL PLAIN** GRAY AND TAN, SILTY CLAY (CAPE FEAR FORMATION)	
	153.7	43.6									
150			3	3	4	7		W			
	148.7	48.6								150.3	47.0
145			7	12	13	25		Sat.		GRAY AND GREEN, CLAYEY SAND	
	143.7	53.6									
140			9	13	16	29		Sat.			
	138.7	58.6									
135			7	13	16	29		Sat.			
	133.7	63.6								135.3	62.0
130			14	15	20	35		W		BLACK, SANDY CLAY	
	128.7	68.6								130.3	67.0
125			11	16	19	35		Sat.		GRAY, CLAYEY SAND	
	123.7	73.6								125.3	72.0
120			15	21	25	46		W		BLACK, SANDY CLAY	

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 1003+31	**OFFSET** 80 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 197.3 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 564,012	**EASTING** 2,119,777	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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
120						Match Line				
	118.7	78.6	13	15	20	35		W		BLACK, SANDY CLAY *(continued)*
115	113.7	83.6	14	17	21	38		Sat.		115.3 82.0 GRAY AND GREEN, CLAYEY SAND
110	108.7	88.6	11	12	17	29		Sat.		
105	103.7	93.6	10	13	14	27		Sat.		
100	98.7	98.6	13	16	22	38		Sat.		97.2 100.1 Boring Terminated at Elevation 97.2 ft IN DENSE CLAYEY SAND (COASTAL PLAIN)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 1003+24	**OFFSET** 53 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,914	**EASTING** 2,119,868	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/04/17	**COMP. DATE** 10/04/17	**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)
200										
195	195.5	0.0	5	9	5	14		M		195.5 — GROUND SURFACE — 0.0 **COASTAL PLAIN** BROWN, SILTY SAND (MIDDENDORF FORMATION)
190	191.0	4.5	2	4	6	10		M		193.0 — 2.5 RED, GRAY AND TAN, SILTY CLAY
185	187.0	8.5	3	4	6	10				
180	182.0	13.5	6	8	10	18		Sat.		183.5 — 12.0 RED AND TAN, CLAYEY SAND
175	177.0	18.5	4	5	5	10		Sat.		
170	172.0	23.5	9	9	14	23		Sat.		173.5 — 22.0 GRAY AND TAN, COARSE SAND AND SILTY SAND
165	167.0	28.5	7	8	17	25		Sat.		168.5 — 27.0
160	162.0	33.5	4	6	9	15		Sat.		161.0 — 34.5 **COASTAL PLAIN** BLACK, SILTY SAND
155	157.0	38.5	3	5	9	14		Sat.		158.5 — 37.0 (CAPE FEAR FORMATION) GRAY AND BLACK, CLAYEY SAND
150	152.0	43.5	3	6	14	20		Sat.		
145	147.0	48.5	8	8	10	18		Sat.		
140	142.0	53.5	10	18	22	40		Sat.		
135	137.0	58.5	10	11	14	25		W		138.5 — 57.0 GRAY, SANDY CLAY
130	132.0	63.5	7	12	13	25		W		
125	127.0	68.5	11	16	22	38		W		
120	122.0	73.5	14	17	23	40		W		

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 1003+24	**OFFSET** 53 ft RT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 195.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,914	**EASTING** 2,119,868	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/04/17	**COMP. DATE** 10/04/17	**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
120						Match Line				
115	117.0	78.5	10	11	12	23		Sat.		118.5 — GRAY, SANDY CLAY *(continued)* — 77.0 GRAY AND GREEN, CLAYEY SAND
110	112.0	83.5	10	12	16	28		Sat.		
105	107.0	88.5	10	14	15	29		Sat.		
100	102.0	93.5	15	17	23	40		W		103.5 — GRAY, SILTY CLAY — 92.0
	97.0	98.5	28	46	45	91		W		95.5 — 100.0 Boring Terminated at Elevation 95.5 ft IN HARD SILTY CLAY (COASTAL PLAIN) ST-1 pushed 5' upstation Other Samples: ST-1 (6.0 - 8.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 1003+37	**OFFSET** 23 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.2 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,977	**EASTING** 2,119,822	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/03/17	**COMP. DATE** 10/03/17	**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)
										196.2 GROUND SURFACE	0.0
	196.2	0.0	3	3	3	6		M		**ROADWAY EMBANKMENT** TAN, SILTY SAND	
	194.2	2.0								194.2	2.0
	192.6	3.6	5	6	8	14		M		**COASTAL PLAIN** GRAY, TAN AND RED, SILTY CLAY AND SANDY CLAY (MIDDENDORF FORMATION)	
	189.2	7.0								189.2	7.0
	187.5	8.7	3	4	5	9					
	184.2	12.0								184.2 TAN, CLAYEY SAND	12.0
	182.5	13.7	5	12	12	24		W			
	179.2	17.0								179.2 TAN AND WHITE, SAND AND COARSE SAND	17.0
	177.5	18.7	4	4	7	11	SS-447	Sat.			
	175.2	21.0								175.2	21.0
	172.5	23.7	6	8	6	14		Sat.			
	169.2	27.0								169.2 TAN AND PURPLE, SILTY CLAY	27.0
	167.5	28.7	3	2	3	5		W			
	164.2	32.0								164.2 TAN, SILTY SAND	32.0
	162.5	33.7	3	4	5	9		Sat.			
	159.2	37.0								**COASTAL PLAIN** TAN AND GRAY, SANDY CLAY (CAPE FEAR FORMATION)	37.0
	157.5	38.7	5	10	12	22		W			
	154.2	42.0									42.0
	152.5	43.7	2	2	3	5		W			
	149.2	47.0								149.2 GRAY AND GREEN, CLAYEY SAND	47.0
	147.5	48.7	6	7	11	18		Sat.			
	142.5	53.7	8	10	10	20		Sat.			
	137.5	58.7	10	11	13	24		Sat.			
	134.2	62.0								134.2 GRAY AND BLACK, SANDY CLAY AND SILTY CLAY	62.0
	132.5	63.7	10	13	17	30		W			
	127.5	68.7	13	23	27	50		W			
	122.5	73.7	9	13	18	31		W			

WBS 53078.1.1	**TIP** I-5878	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 73 ON -LREV- (I-95) OVER -Y15- (US 421)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 1003+37	**OFFSET** 23 ft LT	**ALIGNMENT** -LREV-	**0 HR.** N/A
COLLAR ELEV. 196.2 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 563,977	**EASTING** 2,119,822	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/03/17	**COMP. DATE** 10/03/17	**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
120						Match Line				
	117.5	78.7	12	14	17	31		W		119.2 77.0
115										114.2 GRAY AND GREEN, CLAYEY SAND 82.0
	112.5	83.7	12	14	17	31		Sat.		
110										
	107.5	88.7	9	10	11	21		Sat.		
105										
	102.5	93.7	9	13	18	31		Sat.		
100										
	97.5	98.7	20	44	56/0.3	100/0.8		Sat.		96.2 Boring Terminated at Elevation 96.2 ft IN VERY DENSE SILTY SAND (COASTAL PLAIN) 100.0

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

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

S&ME Project #:	6235-16-013			Date Report:	12/1/2017
State Project No.:	53078.1.1	County:	Harnett	Date Tested:	11/1/17-11/30/17
Federal ID No.:	N/A	TIP No.:	I-5878		
Project Name:	Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)				
Client Name:	Michael Baker International	Client Address:	Raleigh, NC		

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
							10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay				
SS-238	1002+83	13' LT	-LREV-	17.7-19.2	A-3	(0)	100	56	15	6.4	85	10	1	4	22	0	NP	ND
SS-285	1003+01	82' LT	-LREV-	43.5-45.0	A-5	(10)	100	95	92	81.2	8	20	64	8	44	35	9	29.2
SS-302	1002+75	85' LT	-LREV-	23.6-25.1	A-1-a	(0)	48	17	12	5.4	36	7	2	3	24	NP	NP	ND
SS-324	1003+31	80' LT	-LREV-	28.6-30.1	A-7-5	(75)	100	99	99	98.2	1	1	16	82	95	31	64	62.5
SS-427	1002+28	4' LT	-LREV-	23.7-25.2	A-1-a	(0)	42	21	11	5.0	31	7	2	2	41	0	NP	ND
SS-447	1003+37	23' LT	-LREV-	18.7-20.2	A-3	(0)	100	54	12	5.6	88	7	1	4	20	0	NP	ND
ST-1	1003+19	53' RT	-LREV-	6.0-8.0	A-7-6	(41)	100	96	93	89.4	7	6	28	59	69	29	40	27.6

References / Comments / Deviations: ND=Not Detemined. NP=Non-Plastic.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

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

Mal Krajan, ET		104-01-0703	Stewart Laney, P.E.	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

SITE PHOTOGRAPH

Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)

Looking Southwest towards End Bent 1

SITE PHOTOGRAPH

Bridge No. 73 on -LREV- (I-95) over -Y15- (US 421)

Looking South towards End Bent 1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5883	1	15

REFERENCE: I-5883

PROJECT: 53083

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HARNETT*

PROJECT DESCRIPTION *IMPROVE I-95 INTERCHANGES AT SR 1808 (JONESBORO RD.) AND SR 1709 (HODGES CHAPEL RD.)*

SITE DESCRIPTION *BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)*

CONTENTS

CAUTION NOTICE

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

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

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NOTES:
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DATE *FEBRUARY 2018*

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DocuSigned by:
Jarett R. Swartley
919459487BA3471...
SIGNATURE

7/23/2018
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5883	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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
- [X] BWJ RODS

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: BY75-153
NORTHING: 570733 EASTING: 2127213
ELEVATION: 230.26 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5833	3

SITE PLAN

0 50 100

FEET

SKEW = 120° 34' 30"

END MSE WALL

END BENT 1 LINE

INTERIOR BENT 1 LINE

END BENT 2 LINE

END MSE

CONCRETE BRIDGE

BRIDGE NO. 80

EB1-A

B1-A

EB2-A

EB1-B

B1-B

EB2-B

BEGIN MSE WALL

OFFSET 74.50' LT.

OFFSET 74.50' RT.

BEGIN MSE WALL

-YIRPC- PT Sta. 31+66.03

-YI- POT

TO LANE RD.

TO SADDLEBRED RD.

JONESBORO RD

NAD 83

CONC

GRAVEL

18" RCP

24" RCP

36" MTL

60" WW

60" CONC

BY75-53

328

325

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
I-5883	4

PROFILE ALONG –Y1–

0 40 80
FEET
VE = 2:1

Ⓐ ROADWAY EMBANKMENT, TAN AND GRAY, MOIST, STIFF, SANDY CLAY
Ⓑ ROADWAY EMBANKMENT, BLACK, MOIST, LOOSE, SILTY SAND
Ⓒ COASTAL PLAIN, TAN AND GRAY, WET, SOFT, SANDY CLAY, (MIDDENDORF FORMATION)

PROPOSED GRADE

EXISTING GROUND

EB1–B
26+00
29' RT
SS-II

B1–B
27+00
25' RT
SS-328

BRIDGE NO. 80

EB2–B
28+00
25' RT

–L–

ROADWAY EMBANKMENT, BROWN, MOIST, TO LOOSE, SILTY SAND AND CLAYEY

VERY LOOSE TO LOOSE SAND

COASTAL PLAIN, GRAY, RED, BROWN, YELLOW, TAN AND RED, MOIST TO SAT., VERY LOOSE TO LOOSE, CLAYEY SAND AND SILTY SAND, (MIDDENDORF FORMATION)

GRAY, BROWN, RED, YELLOW, TAN AND PINK, WET, SOFT TO MED. STIFF, HIGHLY PLASTIC, SILTY CLAY

TAN, RED AND PINK, VERY LOOSE TO MED. DENSE, SAND, SILTY SAND AND CLAYEY SAND

COASTAL PLAIN, GRAY AND BROWN, PLASTIC, SILTY CLAY, (CAPE FEAR FORMATION) WET, VERY STIFF, HIGHLY

COASTAL PLAIN, GRAY AND TAN, SAT., MED. DENSE TO DENSE, CLAYEY SAND, (CAPE FEAR FORMATION)

COASTAL PLAIN, GRAY, GREEN AND TAN, WET, STIFF TO HARD, SILTY CLAY AND SANDY CLAY, (CAPE FEAR FORMATION)

GRAY AND GREEN, SAT., DENSE, CLAYEY SAND

GRAY, SATURATED, MEDIUM DENSE TO DENSE, CLAYEY SAND

GRAY, GREEN, RED, TAN AND PURPLE, WET, STIFF TO HARD, SANDY CLAY AND SILTY CLAY

B.T

B.T

B.T

NOTE: EXISTING GROUND SURFACE PROFILE OF –Y1– CENTERLINE TAKEN FROM ELECTRONIC TIN FILE '15883_ls_dtm.tin' DATED 5/8/17. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80

24+00 25+00 26+00 27+00 28+00 29+00

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5833	5

℄

Ⓐ COASTAL PLAIN, GRAY AND GREEN, SATURATED, DENSE, CLAYEY SAND, (CAPE FEAR FORMATION)

EB1–A
26+31
30' LT

EB1–B
26+00
29' RT

SS-II

ROADWAY EMBANKMENT,

BROWN, MOIST, VERY LOOSE TO LOOSE, SILTY SAND AND CLAYEY SAND

COASTAL PLAIN, GRAY, BROWN, RED, YELLOW AND PINK, MOIST TO SATURATED, CLAYEY SAND, (MIDDENDORF FORMATION)

GRAY, RED, BROWN AND YELLOW, SOFT TO MED. STIFF,

ST-2 HIGHLY PLASTIC, SILTY CLAY

GRAY, TAN, BROWN, YELLOW AND PINK, SATURATED, LOOSE TO MED. DENSE, SILTY SAND AND SAND

YELLOW AND BROWN, WET, MED. STIFF TO VERY STIFF, SANDY CLAY

VERY STIFF TO HARD,

COASTAL PLAIN, YELLOW, BROWN, GRAY, GREEN AND BLUE, WET,

SANDY CLAY AND HIGHLY PLASTIC, SILTY CLAY, (CAPE FEAR FORMATION)

GRAY AND BROWN, SATURATED, MED. DENSE TO DENSE, SILTY SAND AND CLAYEY SAND

GRAY, BROWN AND GREEN, WET, VERY STIFF TO HARD, SILTY CLAY

GRAY AND BLUE, SAT., MED. DENSE, CLAYEY SAND

BT

BT

26+16.44

–Y/–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 120° 34' 30". INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

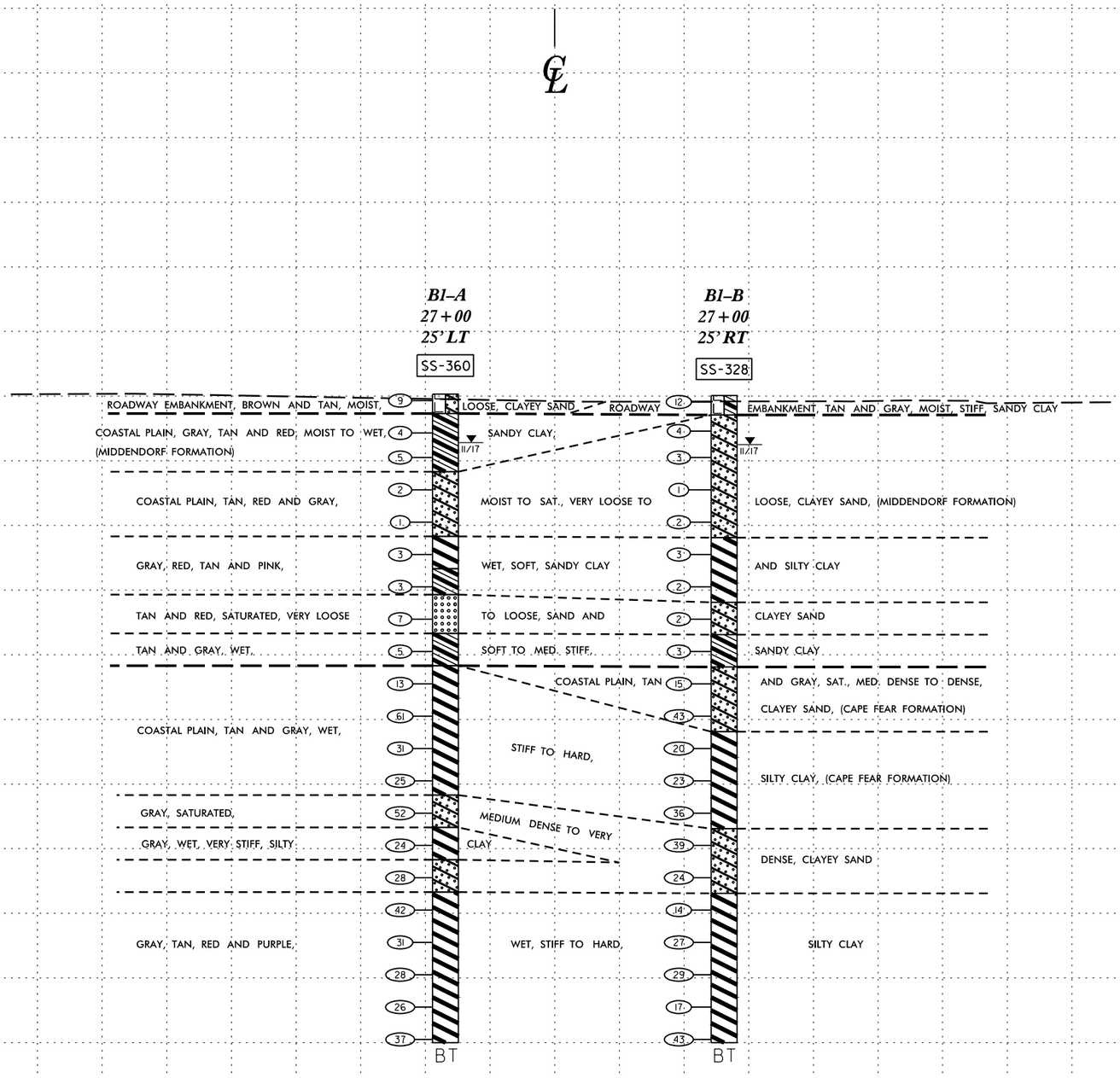
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5833	6

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

240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90



27 + 09.21

–Y/–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 120° 34' 30". INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5833	7

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

240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90

℄

Ⓐ COASTAL PLAIN, GRAY AND TAN, MOIST TO WET, SOFT, SANDY CLAY, (MIDDENDORF FORMATION)
Ⓑ COASTAL PLAIN, GRAY, WET, STIFF, SILTY CLAY, (CAPE FEAR FORMATION)

EB2–A
28 + 00
25' LT
SS-64

EB2–B
28 + 00
25' RT

ROADWAY EMBANKMENT,
MOIST, LOOSE, SILTY SAND
10/17
10/17
COASTAL PLAIN, GRAY, TAN, AND RED, MOIST TO SAT., VERY LOOSE TO LOOSE, CLAYEY SAND AND SILTY SAND, (MIDDENDORF FORMATION)
GRAY, PURPLE AND RED, WET, VERY SOFT TO SOFT, HIGHLY PLASTIC, SILTY CLAY
ST-1
TAN AND GRAY, SAT., LOOSE, CLAYEY SAND AND SILTY SAND
COASTAL PLAIN, GRAY AND TAN, WET, STIFF, SILTY CLAY, (CAPE FEAR FORMATION)
GRAY AND GREEN, SAT., MED. DENSE TO DENSE, CLAYEY SAND
GRAY, WET, VERY STIFF, SANDY SILT
GRAY AND GREEN, SAT., MED. DENSE TO DENSE, CLAYEY SAND
GRAY, RED AND GREEN, WET, VERY STIFF TO HARD, SANDY CLAY

BT
BT

28 + 01.47
–Y/–

NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 120° 34' 30". INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 26+31	**OFFSET** 30 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 570,707	**EASTING** 2,126,942	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/12/17	**COMP. DATE** 10/13/17	**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)
210											
	209.7	0.0	2	2	2	4		M		209.7 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT BROWN, SILTY SAND	
205	205.3	4.4	3	2	3	5		M		206.7	3.0
										COASTAL PLAIN GRAY, BROWN, RED, YELLOW AND PINK, CLAYEY SAND (MIDDENDORF FORMATION)	
200	201.0	8.7	2	2	2	4		Sat.			
195	196.0	13.7	1	0	1	1		Sat.			
190	191.0	18.7	WOH	WOH	1	1		Sat.			
185	186.0	23.7	WOH	1	2	3		W		187.7 GRAY, RED AND BROWN, SILTY CLAY	22.0
180	181.0	28.7	WOH	5	6	11		Sat.		182.7 GRAY, TAN, BROWN AND YELLOW, SAND AND SILTY SAND	27.0
175	176.0	33.7	3	3	4	7		Sat.		177.7	32.0
170	171.0	38.7	3	3	4	7		W		172.7 YELLOW AND BROWN, SANDY CLAY	37.0
165	166.0	43.7	9	9	16	25		W			
160	161.0	48.7	6	14	28	42		W		162.7 **COASTAL PLAIN** YELLOW, BROWN, GRAY, GREEN AND BLUE, SANDY CLAY AND SILTY CLAY (CAPE FEAR FORMATION)	47.0
155	156.0	53.7	6	7	8	15		W		157.7	52.0
150	151.0	58.7	9	12	15	27		W			
145	146.0	63.7	9	13	17	30		W			
140	141.0	68.7	15	17	27	44		W			
135	136.0	73.7	14	19	23	42		Sat.		137.7 GRAY AND BROWN, SILTY SAND	72.0
130	131.0	78.7	9	14	12						

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 26+31	**OFFSET** 30 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.7 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 570,707	**EASTING** 2,126,942	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/12/17	**COMP. DATE** 10/13/17	**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
130						Match Line				
125	126.0	83.7	11	17	28	45		Sat.		GRAY AND BROWN, SILTY SAND *(continued)*
										127.7 GRAY AND BROWN, SILTY CLAY 82.0
120	121.0	88.7	5	10	13	23		W		
										122.7 GRAY AND BLUE, CLAYEY SAND 87.0
115	116.0	93.7	8	9	12	21		Sat.		
										117.7 GRAY AND GREEN, SILTY CLAY 92.0
110	111.0	98.7	12	20	27	47		W		
										109.5 Boring Terminated at Elevation 109.5 ft IN HARD SILTY CLAY (COASTAL PLAIN) 100.2

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 26+00	**OFFSET** 29 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.8 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 570,654	**EASTING** 2,126,901	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/11/17	**COMP. DATE** 10/12/17	**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)
210												
	209.8	0.0	1	2	4	6		M		GROUND SURFACE	209.8	0.0
										ROADWAY EMBANKMENT BROWN, SILTY SAND		
	206.2	3.6								BROWN, CLAYEY SAND	207.3	2.5
205			2	2	1	3		M				
											203.1	6.7
	201.2	8.6								**COASTAL PLAIN** RED, BROWN, YELLOW AND GRAY, CLAYEY SAND (MIDDENDORF FORMATION)		
200			2	3	2	5		Sat.				
	196.2	13.6										
195			1	1	2	3		Sat.				
	191.2	18.6										
190			1	2	2	4		Sat.				
											187.8	22.0
	186.2	23.6								BROWN, RED AND YELLOW, HIGHLY PLASTIC, SILTY CLAY		
185			1	1	1	2		W				
	181.2	28.6										
180			7	3	4	7		W				
											178.1	31.7
	176.2	33.6								PINK SAND		
175			3	3	4	7		Sat.				
	171.2	38.6										
170			4	5	8	13		Sat.				
											168.1	41.7
	166.2	43.6								**COASTAL PLAIN** GRAY AND BROWN, HIGHLY PLASTIC, SILTY CLAY (CAPE FEAR FORMATION)		
165			10	13	12	25		W				
	161.2	48.6										
160			7	9	11	20	SS-11	23%				
	156.2	53.6									158.1	51.7
										GRAY, CLAYEY SAND		
155			10	14	27	41		Sat.				
											153.1	56.7
	151.2	58.6								GRAY, SILTY CLAY		
150			11	14	18	32		W				
											148.1	61.7
	146.2	63.6								GRAY AND GREEN, CLAYEY SAND		
145			6	15	32	47		Sat.				
											143.1	66.7
	141.2	68.6								GRAY AND GREEN, SANDY CLAY		
140			6	9	13	22		W				
											138.1	71.7
	136.2	73.6								GRAY, CLAYEY SAND		
135			15	17	20	37		Sat.				
											133.1	76.7
	131.2	78.6								GRAY AND GREEN, SILTY CLAY		
130			6	12	13	25		W				

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Goslin, G.H.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 26+00	**OFFSET** 29 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.8 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 570,654	**EASTING** 2,126,901	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/11/17	**COMP. DATE** 10/12/17	**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
130						Match Line				GRAY AND GREEN, SILTY CLAY *(continued)*
	126.2	83.6	11	15	21	36		W		
125										
	121.2	88.6	10	16	19	35		W		
120										
	116.2	93.6	9	13	18	31		W		
115										
	111.2	98.6	12	21	31	52		W		
110										
										109.7 100.1
										Boring Terminated at Elevation 109.7 ft IN HARD SILTY CLAY (COASTAL PLAIN)
										ST-2 Pushed at Sta. 26+00, 31 RT, -Y1-
										Other Samples: ST-2 (23.5 - 25.5)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 27+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 210.3 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 570,690	**EASTING** 2,127,009	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 11/01/17	**COMP. DATE** 11/02/17	**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)
215												
210	210.3	0.0	3	4	5	9		M		GROUND SURFACE **ROADWAY EMBANKMENT** BROWN AND TAN, CLAYEY SAND	210.3	0.0
205	205.3	5.0	2	2	2	4				**COASTAL PLAIN** GRAY, TAN AND RED, SANDY CLAY (MIDDENDORF FORMATION)	207.3	3.0
200	201.5	8.8	1	2	3	5		W				
195	196.5	13.8	WOH	1	1	2		Sat.		TAN AND RED, CLAYEY SAND	198.3	12.0
190	191.5	18.8	1	0	1	1		Sat.				
185	186.5	23.8	WOH	1	2	3		W		GRAY, RED AND TAN, SILTY CLAY AND SANDY CLAY	188.3	22.0
180	181.5	28.8	2	1	2	3		W			183.3	27.0
175	176.5	33.8	3	3	4	7		Sat.		TAN AND RED, SAND	179.3	31.0
170	171.5	38.8	3	2	3	5		W		TAN AND GRAY, SANDY CLAY	173.3	37.0
165	166.5	43.8	3	6	7	13		W		**COASTAL PLAIN** TAN AND GRAY, SILTY CLAY (CAPE FEAR FORMATION)	168.3	42.0
160	161.5	48.8	12	23	38	61		W				
155	156.5	53.8	9	12	19	31		W				
150	151.5	58.8	9	11	14	25		W				
145	146.5	63.8	16	21	31	52	SS-360	18%		GRAY, CLAYEY SAND	148.3	62.0
140	141.5	68.8	11	11	13	24		W		GRAY, SILTY CLAY	143.3	67.0
135	136.5	73.8	16	16	12	28		Sat.		GRAY, CLAYEY SAND	138.3	72.0

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 27+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 210.3 ft	**TOTAL DEPTH** 100.3 ft	**NORTHING** 570,690	**EASTING** 2,127,009	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 11/01/17	**COMP. DATE** 11/02/17	**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						Match Line						
130	131.5	78.8	11	18	24	42		W		GRAY, CLAYEY SAND *(continued)*	133.3	77.0
125	126.5	83.8	12	14	17	31		W		GRAY, SILTY CLAY		
120	121.5	88.8	9	12	16	28		W				
115	116.5	93.8	8	12	14	26		W				
110	111.5	98.8	12	14	23	37		W		Boring Terminated at Elevation 110.0 ft IN HARD SILTY CLAY (COASTAL PLAIN)	110.0	100.3

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 27+00	**OFFSET** 25 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 210.1 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 570,641	**EASTING** 2,127,000	**24 HR.** 7.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 11/02/17	**COMP. DATE** 11/03/17	**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)
215												
210	210.1	0.0	2	5	7	12		M		GROUND SURFACE	210.1	0.0
										ROADWAY EMBANKMENT TAN AND GRAY, SANDY CLAY	207.1	3.0
205	205.6	4.5	1	2	2	4		M		**COASTAL PLAIN** GRAY, TAN AND RED, CLAYEY SAND (MIDDENDORF FORMATION)		
	201.5	8.6										
200			1	1	2	3	SS-328	20%				
	196.5	13.6										
195			1	0	1	1		Sat.				
	191.5	18.6										
190			1	1	1	2		Sat.				
	186.5	23.6									188.1	22.0
185			WOH	1	2	3		W		GRAY, TAN AND PINK, SILTY CLAY		
	181.5	28.6										
180			WOH	1	1	2		W				
	176.5	33.6									178.1	32.0
175			1	1	1	2		Sat.		TAN AND RED, CLAYEY SAND		
	171.5	38.6									173.1	37.0
170			4	1	2	3		W		TAN AND GRAY, SANDY CLAY		
	166.5	43.6									168.1	42.0
165			4	6	9	15		Sat.		**COASTAL PLAIN** TAN AND GRAY, CLAYEY SAND (CAPE FEAR FORMATION)		
	161.5	48.6										
160			5	16	27	43		Sat.				
	156.5	53.6									158.1	52.0
155			4	7	13	20		W		GRAY AND TAN, SILTY CLAY		
	151.5	58.6										
150			4	7	16	23		W				
	146.5	63.6										
145			2	16	20	36		W				
	141.5	68.6									143.1	67.0
140			10	16	23	39		Sat.		GRAY, CLAYEY SAND		
	136.5	73.6										
135			7	8	16	24		Sat.				

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Hayes, M.S.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 27+00	**OFFSET** 25 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 210.1 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 570,641	**EASTING** 2,127,000	**24 HR.** 7.6
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 11/02/17	**COMP. DATE** 11/03/17	**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						Match Line						
	131.5	78.6	4	5	9	14		W		GRAY, CLAYEY SAND *(continued)*	133.1	77.0
130										GRAY, TAN, RED AND PURPLE, SILTY CLAY		
	126.5	83.6	10	11	16	27		W				
125												
	121.5	88.6	10	12	17	29		W				
120												
	116.5	93.6	6	7	10	17		W				
115												
	111.5	98.6	12	18	25	43		W			110.0	100.1
110										Boring Terminated at Elevation 110.0 ft IN HARD SILTY CLAY (COASTAL PLAIN)		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 28+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.2 ft	**TOTAL DEPTH** 105.4 ft	**NORTHING** 570,672	**EASTING** 2,127,108	**24 HR.** 6.2
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/16/17	**COMP. DATE** 10/17/17	**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)
210											
	209.2	0.0	4	4	3	7		M		209.2 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT BROWN, SILTY SAND	
205	204.9	4.3	WOH	2	2	4				206.2 **COASTAL PLAIN** GRAY AND TAN, SANDY CLAY (MIDDENDORF FORMATION	3.0
200	200.3	8.9	1	2	2	4		Sat.		201.7 TAN AND RED, CLAYEY SAND	7.5
195	195.3	13.9	2	1	2	3		Sat.			
190	190.3	18.9	1	0	1	1		Sat.		189.3 GRAY, PURPLE AND RED, SILTY CLAY	19.9
185	185.3	23.9	1	1	0	1		W			
180	180.3	28.9	3	2	2	4		Sat.		181.7 TAN, SILTY SAND	27.5
175	175.3	33.9	4	4	3	7		Sat.			
170	170.3	38.9	3	3	4	7		Sat.		172.2 TAN, CLAYEY SAND	37.0
165	165.3	43.9	3	4	4	8		Sat.		164.3 **COASTAL PLAIN** GRAY, SILTY CLAY (CAPE FEAR FORMATION)	44.9
160	160.3	48.9	3	5	7	12		W			
155	155.3	53.9	4	7	9	16		Sat.		157.2 GRAY, CLAYEY SAND	52.0
150	150.3	58.9	4	6	9	15		Sat.		149.1 GRAY, SILTY CLAY	60.1
145	145.3	63.9	14	13	16	29		Sat.		147.2 GRAY, CLAYEY SAND	62.0
140	140.3	68.9	9	7	11	18	SS-64	20%		142.2 GRAY, SANDY SILT	67.0
135	135.3	73.9	8	10	12	22		Sat.		137.2 GRAY AND GREEN, CLAYEY SAND	72.0
130	130.3	78.9									

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 28+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 209.2 ft	**TOTAL DEPTH** 105.4 ft	**NORTHING** 570,672	**EASTING** 2,127,108	**24 HR.** 6.2
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, T.J.	**START DATE** 10/16/17	**COMP. DATE** 10/17/17	**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
130						Match Line				
	125.3	83.9	6	10	12	22		Sat.		GRAY AND GREEN, CLAYEY SAND *(continued)*
125			7	11	21	32		Sat.		
120	120.3	88.9	8	9	10	19		Sat.		117.2 GRAY AND RED, SANDY CLAY 92.0
115	115.3	93.9	10	12	15	27		W		
110	110.3	98.9	19	24	30	54		W		
105	105.3	103.9	13	16	22	38		W		103.8 Boring Terminated at Elevation 103.8 ft IN HARD SANDY CLAY (COASTAL PLAIN) 105.4

NCDOT BORE DOUBLE I5833_GEO_BRDG0080_SPT_BORINGS.GPJ NC_DOT.GDT 7/23/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 28+00	**OFFSET** 25 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 207.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 570,623	**EASTING** 2,127,099	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/17/17	**COMP. DATE** 10/17/17	**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)
210											
	207.5	0.0						M		207.5 GROUND SURFACE	0.0
			1	3	3	6				**ROADWAY EMBANKMENT** BLACK, SILTY SAND	
205										204.5	3.0
	203.0	4.5	2	3	3	6		Sat.		**COASTAL PLAIN** GRAY, TAN AND RED, CLAYEY SAND (MIDDENDORF FORMATION)	
200											
	199.0	8.5	2	2	3	5		Sat.			
195										195.5	12.0
	194.0	13.5	2	2	1	3		Sat.		TAN AND RED, SILTY SAND	
190										190.5	17.0
	189.0	18.5	1	1	2	3		W		GRAY AND RED, HIGHLY PLASTIC, SILTY CLAY	
185											
	184.0	23.5	WOH	1	1	2		W			
180										180.5	27.0
	179.0	28.5	4	2	3	5		Sat.		TAN, SILTY SAND	
175											
	174.0	33.5	3	2	2	4		Sat.			
170										170.5	37.0
	169.0	38.5	3	2	3	5		Sat.		GRAY AND TAN, CLAYEY SAND	
165										165.5	42.0
	164.0	43.5	3	6	6	12		W		**COASTAL PLAIN** GRAY AND TAN, SILTY CLAY (CAPE FEAR FORMATION)	
160										160.5	47.0
	159.0	48.5	6	10	15	25		Sat.		GRAY, CLAYEY SAND	
155											
	154.0	53.5	4	7	8	15		Sat.			
150											
	149.0	58.5	7	7	15	22		Sat.			
145											
	144.0	63.5	11	15	14	29		Sat.			
140											
	139.0	68.5	16	20	18	38		Sat.			
135											
	134.0	73.5	8	9	10	19		Sat.			
130											

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
130						Match Line				
	129.0	78.5	8	12	19	31		Sat.		GRAY, CLAYEY SAND *(continued)*
125										125.5 82.0
	124.0	83.5	9	13	16	29		W		GRAY, RED AND GREEN, SANDY CLAY
120										
	119.0	88.5	7	9	12	21		W		
115										
	114.0	93.5	12	13	19	32		W		
110										
	109.0	98.5	11	22	18	40		W		107.5 100.0
										Boring Terminated at Elevation 107.5 ft IN HARD SANDY CLAY (COASTAL PLAIN)
										ST-1 Pushed at Sta. 28+05, 25 RT, -Y1-
										Other Samples: ST-1 (18.8 - 20.7)

WBS 53083.1.1	**TIP** I-5883	**COUNTY** HARNETT	**GEOLOGIST** Blonshine, E.G.
SITE DESCRIPTION BRIDGE NO. 80 ON -Y1- (SR 1808) OVER -L- (I-95)			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 28+00	**OFFSET** 25 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 207.5 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 570,623	**EASTING** 2,127,099	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 8/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER White, T.J.	**START DATE** 10/17/17	**COMP. DATE** 10/17/17	**SURFACE WATER DEPTH** N/A

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

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

S&ME Project #:	6235-16-015			Date Report	12/1/2017
State Project No.:	53083.1.1	County:	Harnett	Date Tested	11/1/17-11/30/17
Federal ID No.:	N/A	TIP No.:	I-5883		
Project Name:	Bridge No. 80 on -Y1- (SR 1808) over -L- (I-95)				
Client Name:	Michael Baker International				

Sample No.	Station #:	Offset	Boring #:	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve # 10	40	60	200	270	Total Mortar Fraction (%) Coarse Sand	Fine Sand	Silt	Clay	LL	PL	PI	Moist. %
SS-11	26+00	29 RT	EB1-B	Y1	48.6-50.1	A-7-6	(8)	100	97	95	48.1	42.4	5	53	8	34	43	17	26	23.3
SS-64	28+00	25 LT	EB2-A	Y1	68.9-70.4	A-4	(1)	100	97	95	55.8	36.1	5	59	30	6	30	26	4	19.8
SS-328	27+00	25 RT	B1-B	Y1	8.6-10.1	A-2-6	(0)	100	61	43	26.7	25.4	57	18	7	18	37	22	15	20.2
SS-360	27+00	25 LT	B1-A	Y1	63.8-65.3	A-2-7	(0)	100	48	30	18.6	15.2	70	15	10	5	41	22	19	18.4
ST-1	28+05	25 RT	EB2-B	Y1	18.8-20.7	A-7-6	(45)	100	100	99	98.7	96.5	1	3	36	60	64	25	39	41.0
ST-2	26+00	31 RT	EB1-B	Y1	23.5-25.5	A-7-6	(46)	100	99	98	97.0	94.3	2	4	34	60	65	23	42	37.8

References / Comments / Deviations: ND=Not Detemined.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

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

Mal Krajan, ET		104-01-0703	Stewart Laney, P.E.	Project Manager
Technician Name:	*Signature*	*Certification #*	*Technical Responsibility:*	*Position*

SITE PHOTOGRAPH

Bridge No. 80 on -Y1- (SR 1808) over -L- (I-95)

Looking West towards End Bent 1