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PROJECT: 34360 REFERENCE: R-1015

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CRAVEN  
 PROJECT DESCRIPTION US 70 (HAVELOCK BYPASS)  
FROM NORTH OF CARTERET/CRAVEN COUNTY  
LINE TO NORTH OF PINE GROVE ROAD  
 SITE DESCRIPTION SITE 1 RETAINING WALLS 1 & 2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-1015	1	8

**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:
- 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.
  - 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

P. GRAINGER

GET SOLUTIONS

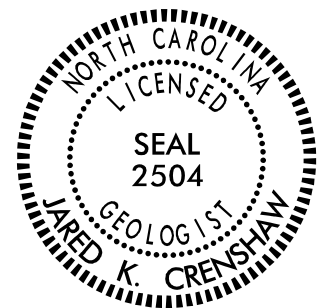
INVESTIGATED BY J.K. CRENSHAW

DRAWN BY W. SHUECRAFT

CHECKED BY E.C. HOWEY

SUBMITTED BY B.D. KEANEY

DATE JULY 2018

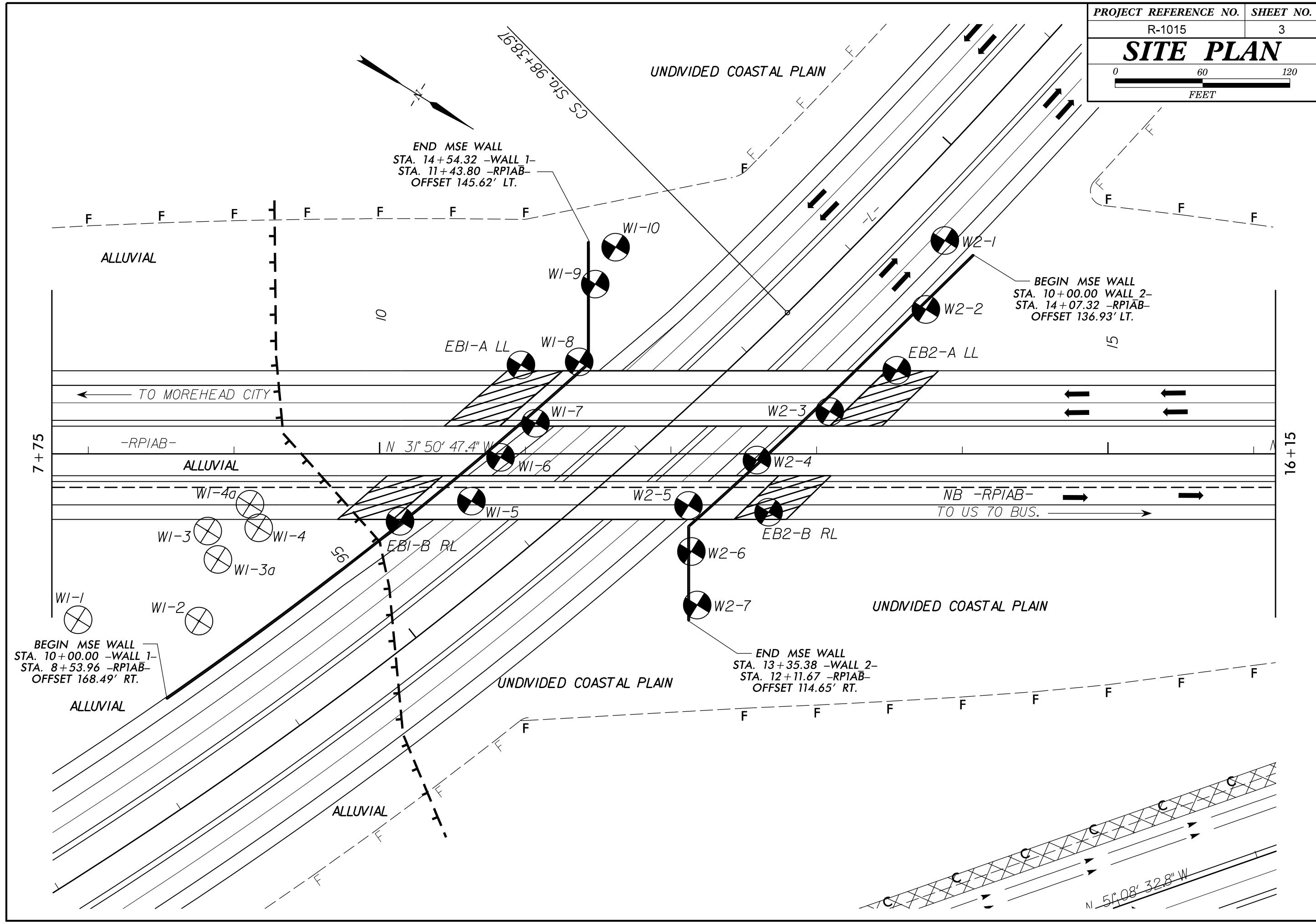


DocuSigned by:  
Jared K. Crenshaw 8/28/2018  
 3AB1C06A82E681A SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
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, GRAV, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	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.  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50  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 ▽ 24 STATIC WATER LEVEL AFTER 24 HOURS ▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP  ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY  DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE  UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK  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 HL - HIGHLY  MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLL. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY  VST - VANE SHEAR TEST WEA. - WEATHERED γ <sub>s</sub> - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT  SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO	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 (INCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD 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 CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. HARD CAN BE GROOVED 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. SOFT CAN BE GROOVED 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.	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 DISLOGGED 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 IMPERVIUS 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 (SCRC) - 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.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> 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 SYMBOL % PASSING #10 #40 #200 MATERIAL PASSING #40 LL PI GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS SUBGRADE PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<b>CONSISTENCY OR DENSENESS</b> PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) GENERALLY GRANULAR MATERIAL (NON-COHESIVE) GENERALLY SILT-CLAY MATERIAL (COHESIVE)	<b>RECOMMENDATION SYMBOLS</b> <b>ABBREVIATIONS</b> <b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>TEXTURE OR GRAIN SIZE</b> U.S. STD. SIEVE SIZE BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM IN. <b>SOIL MOISTURE - CORRELATION OF TERMS</b> SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL PLASTIC RANGE (PI) LIQUID LIMIT PLASTIC LIMIT OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT <b>PLASTICITY</b> NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC <b>COLOR</b> 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.

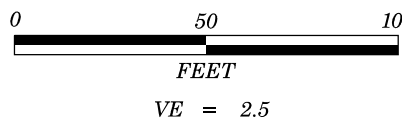




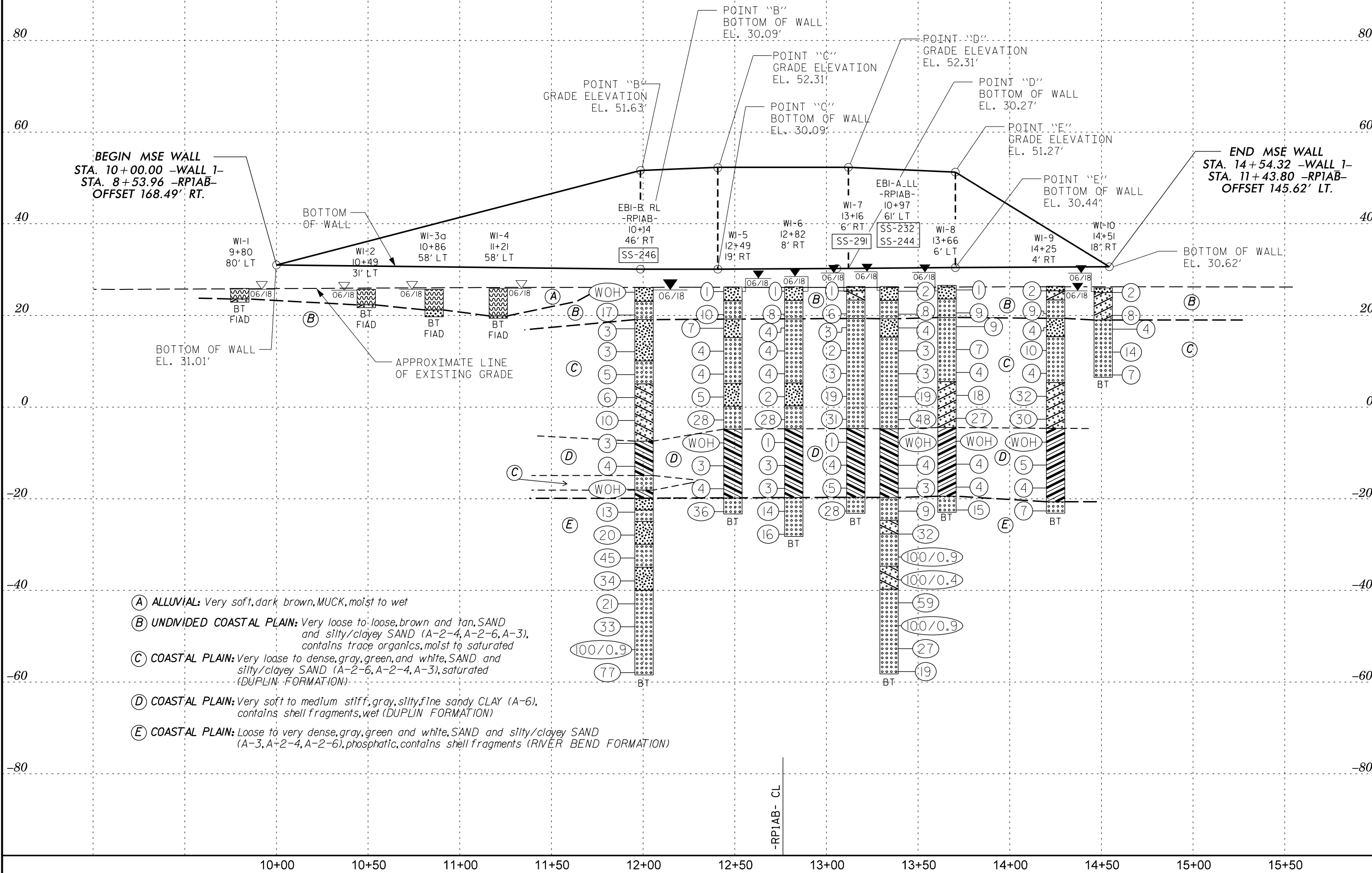
7/12/99

GROUNDLINE PROFILE CREATED FROM r1015\_ls\_fin.tin FILE

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE FRONT FACE OF THE WALL ENVELOPE - LOOKING DOWNSTATION



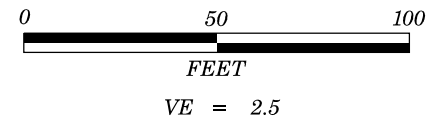
PROJECT REFERENCE NO.	SHEET NO.
R-1015	4
MSE WALL AT END BENT 1	



7/2/99

GROUNDLINE PROFILE CREATED FROM r1015\_ls tin.tin FILE

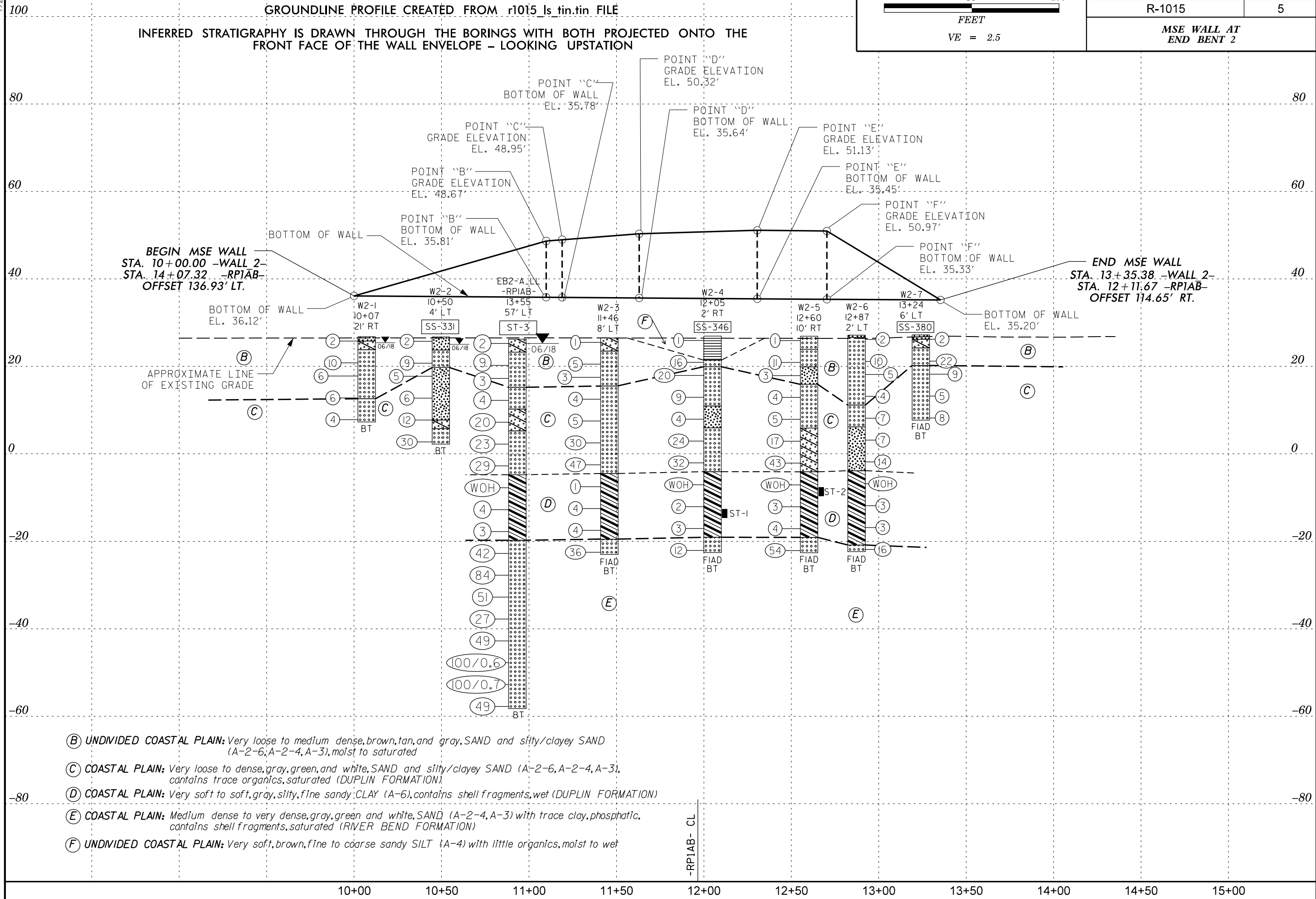
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PROJECT REFERENCE NO. SHEET NO.

R-1015 5

MSE WALL AT  
END BENT 2



- (B) UNDIVIDED COASTAL PLAIN: Very loose to medium dense, brown, tan, and gray, SAND and silty/clayey SAND (A-2-6, A-2-4, A-3), moist to saturated
- (C) COASTAL PLAIN: Very loose to dense, gray, green, and white, SAND and silty/clayey SAND (A-2-6, A-2-4, A-3), contains trace organics, saturated (DUPLIN FORMATION).
- (D) COASTAL PLAIN: Very soft to soft, gray, silty, fine sandy, CLAY (A-6), contains shell fragments, wet (DUPLIN FORMATION)
- (E) COASTAL PLAIN: Medium dense to very dense, gray, green and white, SAND (A-2-4, A-3) with trace clay, phosphatic, contains shell fragments, saturated (RIVER BEND FORMATION)
- (F) UNDIVIDED COASTAL PLAIN: Very soft, brown, fine to coarse sandy SILT (A-4) with little organics, moist to wet

-RPIAB- CL

# GEOTECHNICAL BORING REPORT

## BORE LOG

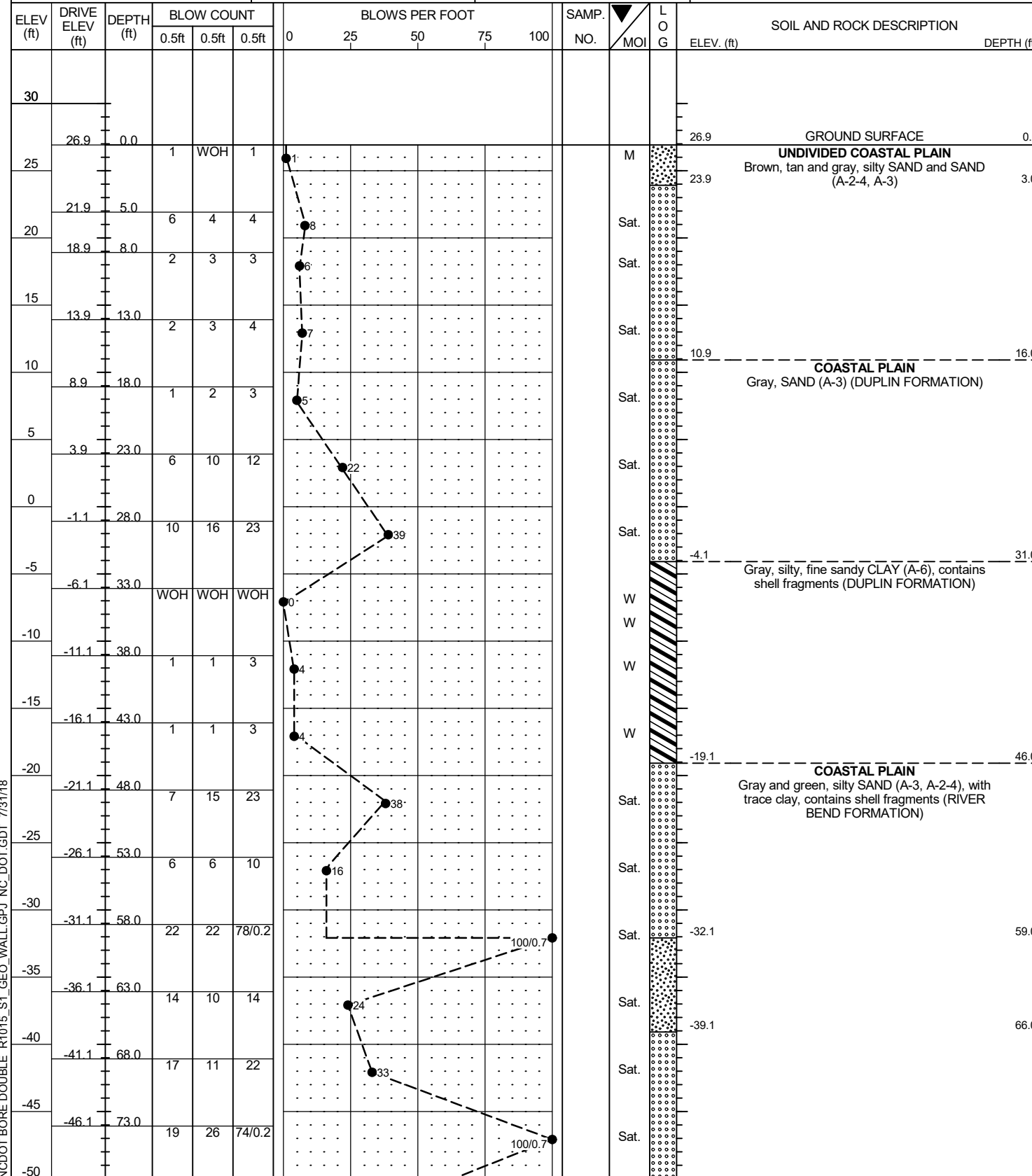
WBS 34360.1.2		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 1: Retaining Wall 1							GROUND WTR (ft)								
BORING NO. W1-3		STATION 10+92		OFFSET 77 ft LT		ALIGNMENT -WALL 1-									
COLLAR ELEV. 25.7 ft		TOTAL DEPTH 6.0 ft		NORTHING 407,418		EASTING 2,632,782									
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD Hand Auger		HAMMER TYPE Automatic											
DRILLER Crenshaw, J.		START DATE 06/29/18		COMP. DATE 06/29/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
30															
25													▽	25.7	0.0
													▽	20.7	5.0
20													▽	19.7	6.0

WBS 34360.1.2		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 1: Retaining Wall 1							GROUND WTR (ft)								
BORING NO. W1-4a		STATION 11+27		OFFSET 74 ft LT		ALIGNMENT -WALL 1-									
COLLAR ELEV. 25.6 ft		TOTAL DEPTH 6.5 ft		NORTHING 407,433		EASTING 2,632,751									
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD Hand Auger		HAMMER TYPE Automatic											
DRILLER Crenshaw, J.		START DATE 06/29/18		COMP. DATE 06/29/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
30															
25													▽	25.6	0.0
													▽	19.6	6.0
20													▽	19.1	6.5

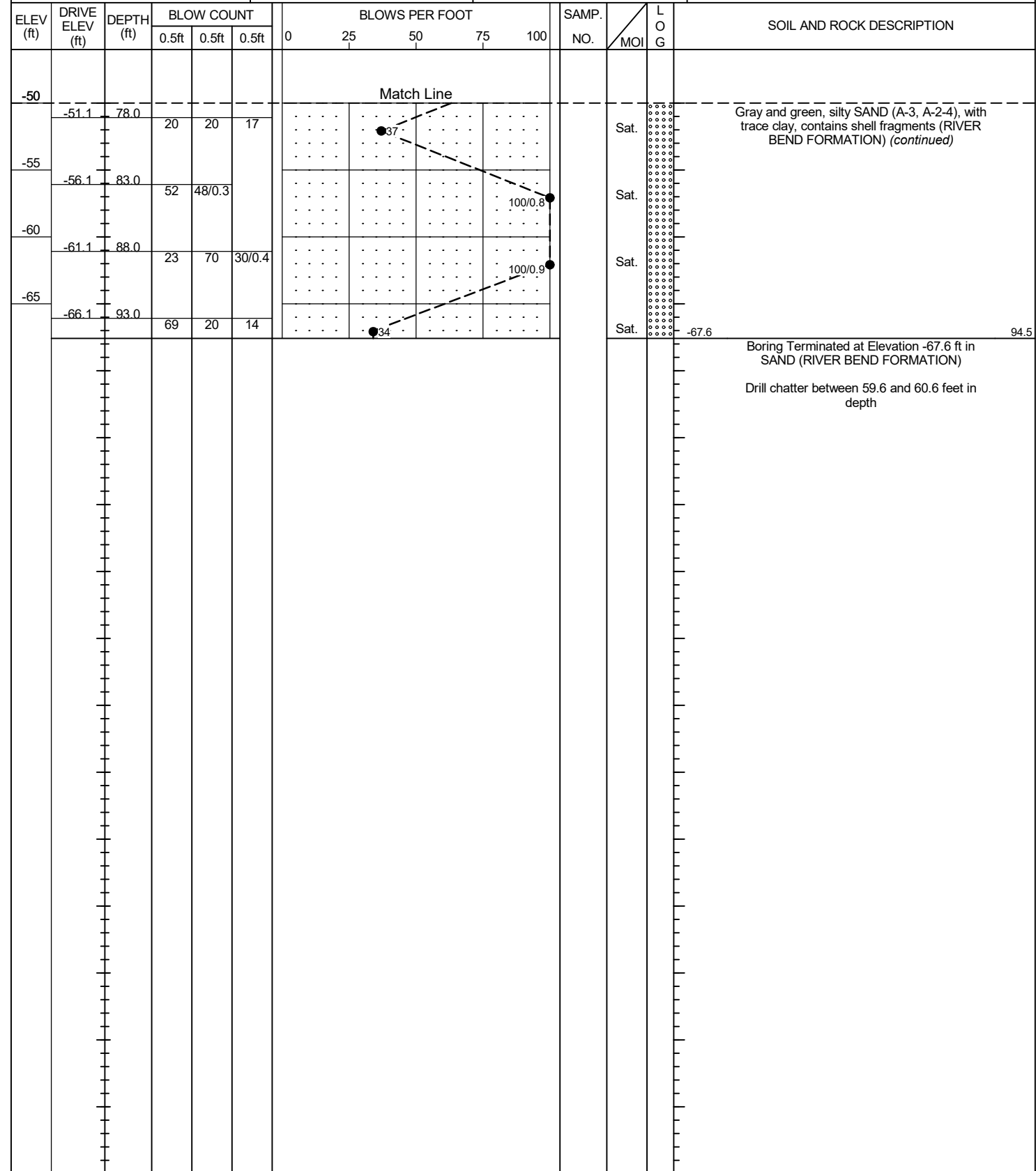
NCDOT BORE DOUBLE R1015\_S1\_GEO\_WALL.GPJ NC\_DOT.GDT 7/31/18

# GEOTECHNICAL BORING REPORT BORE LOG

<b>WBS</b> 34360.1.2	<b>TIP</b> R-1015	<b>COUNTY</b> CRAVEN	<b>GEOLOGIST</b> Grainger, P.
<b>SITE DESCRIPTION</b> Bridge No. 273 on -RP1AB- (US 70 Bus.) Over US 70 Bypass Between US 70 and SR 1824			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> EB2-B RL	<b>STATION</b> 12+67	<b>OFFSET</b> 40 ft RT	<b>ALIGNMENT</b> -RP1AB-
<b>COLLAR ELEV.</b> 26.9 ft	<b>TOTAL DEPTH</b> 94.5 ft	<b>NORTHING</b> 407,738	<b>EASTING</b> 2,632,568
<b>DRILL RIG/HAMMER EFF./DATE</b> GET0674 CME-45C 93% 03/22/2018		<b>DRILL METHOD</b> Mud Rotary	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Donahue, T.	<b>START DATE</b> 05/24/18	<b>COMP. DATE</b> 05/24/18	<b>SURFACE WATER DEPTH</b> N/A



<b>WBS</b> 34360.1.2	<b>TIP</b> R-1015	<b>COUNTY</b> CRAVEN	<b>GEOLOGIST</b> Grainger, P.
<b>SITE DESCRIPTION</b> Bridge No. 273 on -RP1AB- (US 70 Bus.) Over US 70 Bypass Between US 70 and SR 1824			<b>GROUND WTR (ft)</b>
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<b>COLLAR ELEV.</b> 26.9 ft	<b>TOTAL DEPTH</b> 94.5 ft	<b>NORTHING</b> 407,738	<b>EASTING</b> 2,632,568
<b>DRILL RIG/HAMMER EFF./DATE</b> GET0674 CME-45C 93% 03/22/2018		<b>DRILL METHOD</b> Mud Rotary	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Donahue, T.	<b>START DATE</b> 05/24/18	<b>COMP. DATE</b> 05/24/18	<b>SURFACE WATER DEPTH</b> N/A



NCDOT BORE DOUBLE R1015\_S1\_GEO\_WALL.GPJ NC\_DOT.GDT 7/31/18

### SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	ALIGNMENT	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS- 246	46' RT	10+14	- RP 1AB-	5.0-6.5	A-3(0)	NP	NP	19.4	73.6	1.9	5.1	100	100	8	27.8	-
SS- 232	61' LT	10+97	- RP 1AB-	23.0-24.5	A-3(0)	NP	NP	6.4	85.1	3.6	4.9	100	100	10	26.7	-
SS- 244	61' LT	10+97	- RP 1AB-	83.0-84.5	A-3(0)	NP	NP	9.5	82.9	2.9	4.7	100	98	8	31.5	-
SS- 291	6' RT	13+16	- WALL 1-	23.0-24.5	A-3(0)	NP	NP	4.6	90.3	2.5	2.6	100	99	6	24.0	-
SS- 331	4' LT	10+50	- WALL 2-	8.0-9.5	A-2-4(0)	NP	NP	36.4	51.2	3.4	8.9	96	87	12	37.6	-
SS- 346	2' RT	12+05	- WALL 2-	0.0-1.5	A-4(0)	37	9	32.7	31.7	16.6	19.0	100	88	37	32.9	6.1
SS- 380	6' LT	13+24	- WALL 2-	5.0-6.5	A-3(0)	NP	NP	18.3	77.7	1.3	2.6	100	93	5	23.0	-
ST- 1	2' RT	12+05	- WALL 2-	39.5-41.5	A-6(1)	31	11	19.8	42.0	20.7	17.5	87	73	40	35.2	-
ST- 2	10' RT	12+60	- WALL 2-	34.5-36.5	A-6(2)	29	12	3.7	56.6	22.7	17.1	100	99	47	29.3	-
ST- 3	52' LT	13+54	- RP 1AB-	33.0-35.0	A-6(2)	30	11	3.2	59.2	19.1	18.4	100	99	46	31.0	-



PROJECT: 34360 REFERENCE: R-1015

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-5	PROFILES
6-7	CROSS SECTIONS
8-13	BORE LOGS
14	SOIL TEST RESULTS
15	SITE PHOTOGRAPHS

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY CRAVEN  
 PROJECT DESCRIPTION US 70 (HAVELOCK BYPASS)  
FROM NORTH OF CARTERET/CRAVEN COUNTY  
LINE TO NORTH OF PINE GROVE ROAD  
 SITE DESCRIPTION SITE 1 - DUAL BRIDGES NO.  
272 AND NO. 273 ON -RPIAB- (US 70 BUS.) OVER  
US 70 BYPASS BETWEEN US 70 & SR 1824  
-L- STATION 96+97.07

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-1015	1	15

**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

P. GRAINGER

GET SOLUTIONS

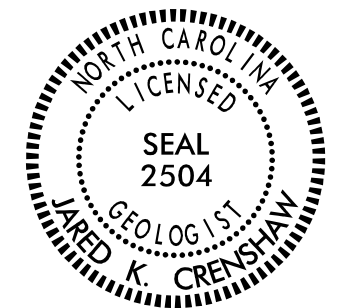
INVESTIGATED BY J. K. CRENSHAW

DRAWN BY W. SHUECRAFT

CHECKED BY B. HOWEY

SUBMITTED BY B. D. KEANEY

DATE JULY, 2018






























DocuSigned by:  
Jared K. Crenshaw 8/15/2018  
 3AB1C06A823647 SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

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

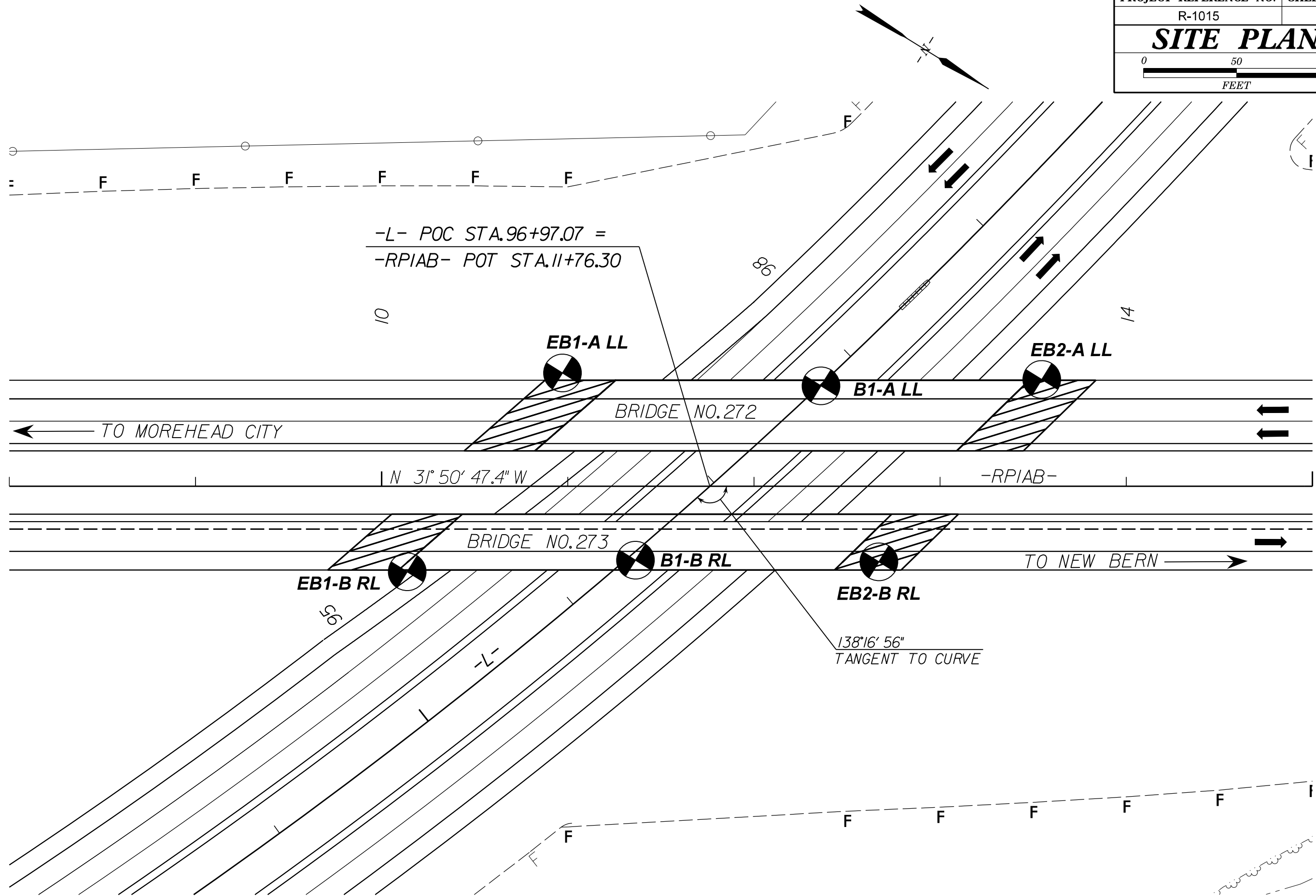
## SUBSURFACE INVESTIGATION

### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

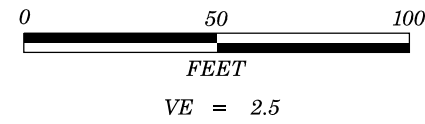
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																										
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 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										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.										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:										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 DISLOGGED 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 IN 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 (SRC) - 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.																																										
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										WEATHERED ROCK (WR) 										<b>CRYSTALLINE ROCK (CR)</b> FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																																										
<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										<b>NON-CRYSTALLINE ROCK (NCR)</b> FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b> COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																																																				
<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL > 31 - 50 HIGHLY COMPRESSIBLE LL > 50										<b>PERCENTAGE OF MATERIAL</b> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt; 10%</td> <td>&gt; 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										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	<b>WEATHERING</b> 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.																																
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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																																																																					
<b>TEXTURE OR GRAIN SIZE</b> <table border="1"> <tr> <th>U.S. STD. SIEVE SIZE</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <th>OPENING (MM)</th> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table>										U.S. STD. SIEVE SIZE	4	10	40	60	200	270	OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053	<b>GROUND WATER</b>  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING  STATIC WATER LEVEL AFTER 24 HOURS  PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  SPRING OR SEEP										<b>MISCELLANEOUS SYMBOLS</b>  ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION  SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  INFERRED ROCK LINE  ALLUVIAL SOIL BOUNDARY  DIP & DIP DIRECTION OF ROCK STRUCTURES  SPT TEST BORING  AUGER BORING  CORE BORING  MONITORING WELL  PIEZOMETER INSTALLATION  SLOPE INDICATOR INSTALLATION  CONE PENETROMETER TEST  SOUNDING ROD  TEST BORING WITH CORE  SPT N-VALUE																																						
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<b>COLOR</b> 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.										<b>INDURATION</b> 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.										<b>BENCH MARK: N/A</b>  <b>ELEVATION: N/A FEET</b>  <b>NOTES:</b> BORING LOCATIONS AND ELEVATIONS OBTAINED FROM MCKIM & CREED INC. SURVEY DATED - 7/3/2018 UCP - UNDIVIDED COASTAL PLAIN FIAD - FILLED IMMEDIATELY AFTER DRILLING																																																				

7/2/99

PROJECT REFERENCE NO.	SHEET NO.
R-1015	3
<b>SITE PLAN</b>	
 0 50 100 FEET	



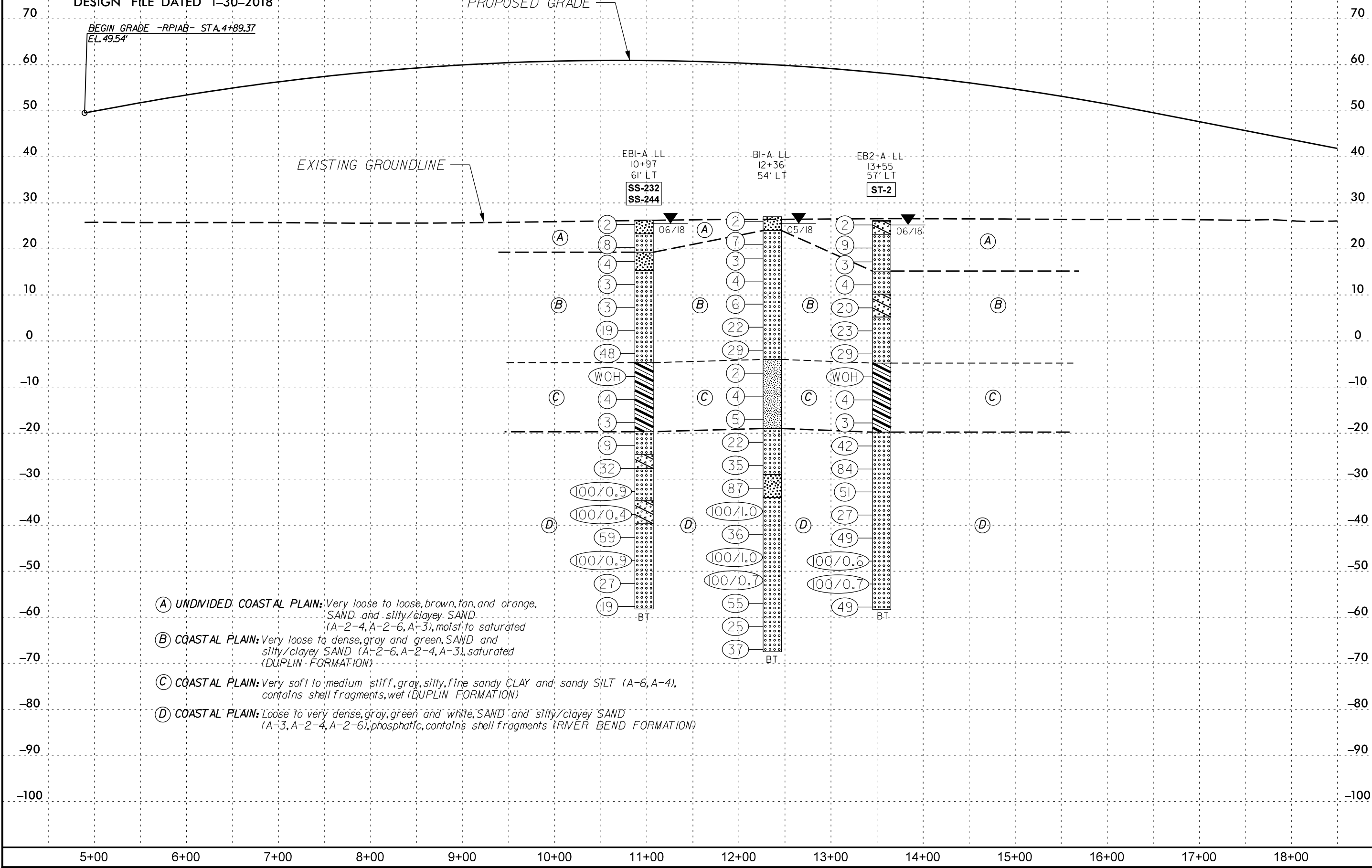
7/2/99



PROJECT REFERENCE NO.	SHEET NO.
R-1015	4
PROFILE - BRIDGE NO. 272 BORINGS PROJECTED ONTO -RPIAB-	

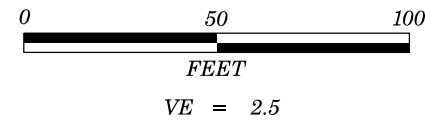
NOTES:

- BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO -RPIAB-
- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILE DATED 1-30-2018



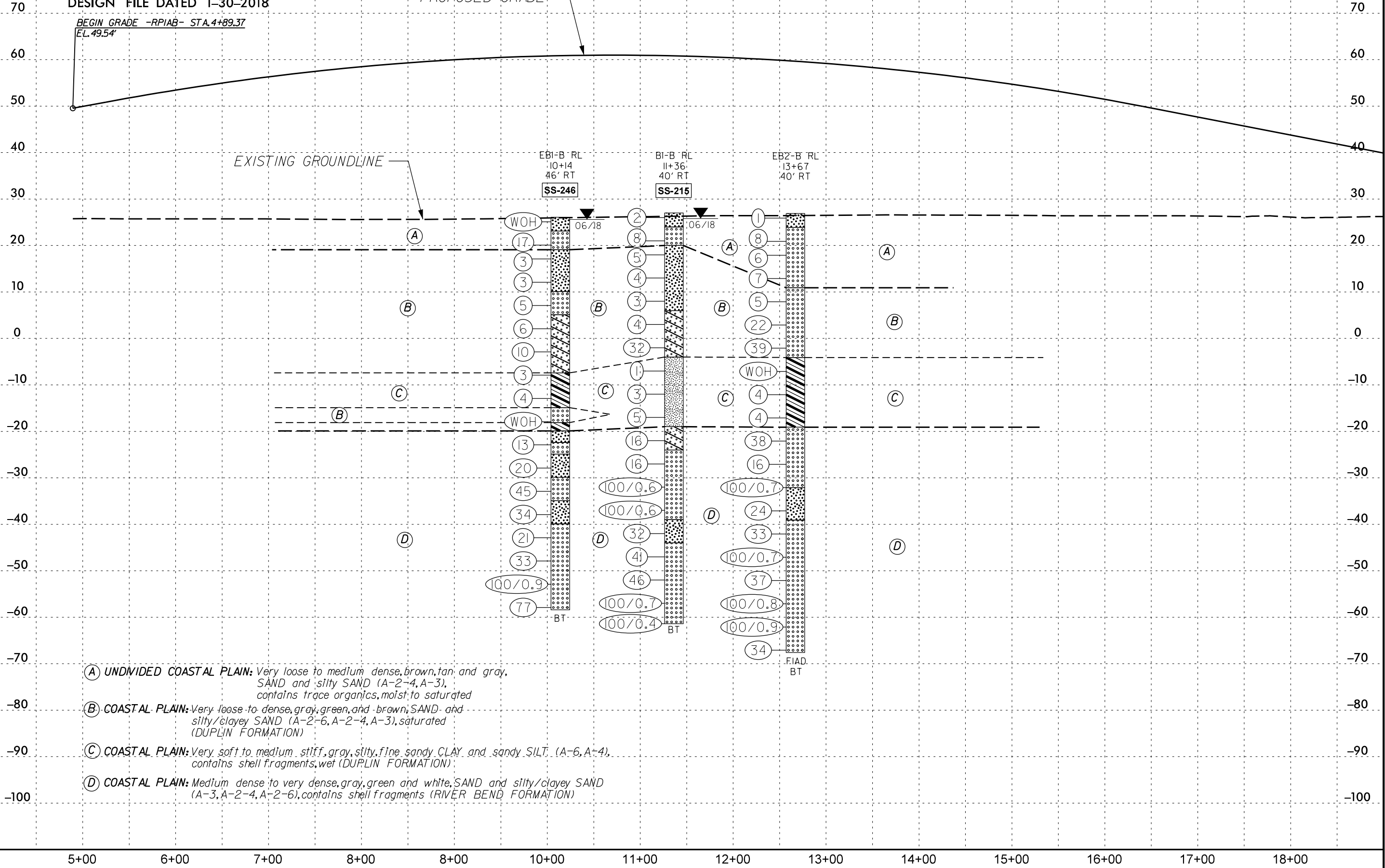
- (A) **UNDIVIDED COASTAL PLAIN:** Very loose to loose, brown, tan, and orange, SAND and silty/clayey SAND (A-2-4, A-2-6, A-3), moist to saturated
- (B) **COASTAL PLAIN:** Very loose to dense, gray and green, SAND and silty/clayey SAND (A-2-6, A-2-4, A-3), saturated (DUPLIN FORMATION)
- (C) **COASTAL PLAIN:** Very soft to medium stiff, gray, silty, fine sandy CLAY and sandy SILT (A-6, A-4), contains shell fragments, wet (DUPLIN FORMATION)
- (D) **COASTAL PLAIN:** Loose to very dense, gray, green and white, SAND and silty/clayey SAND (A-3, A-2-4, A-2-6), phosphatic, contains shell fragments (RIVER BEND FORMATION)

7/2/99



PROJECT REFERENCE NO.	SHEET NO.
R-1015	5
PROFILE - BRIDGE NO. 273 BORINGS PROJECTED ONTO -RPIAB-	

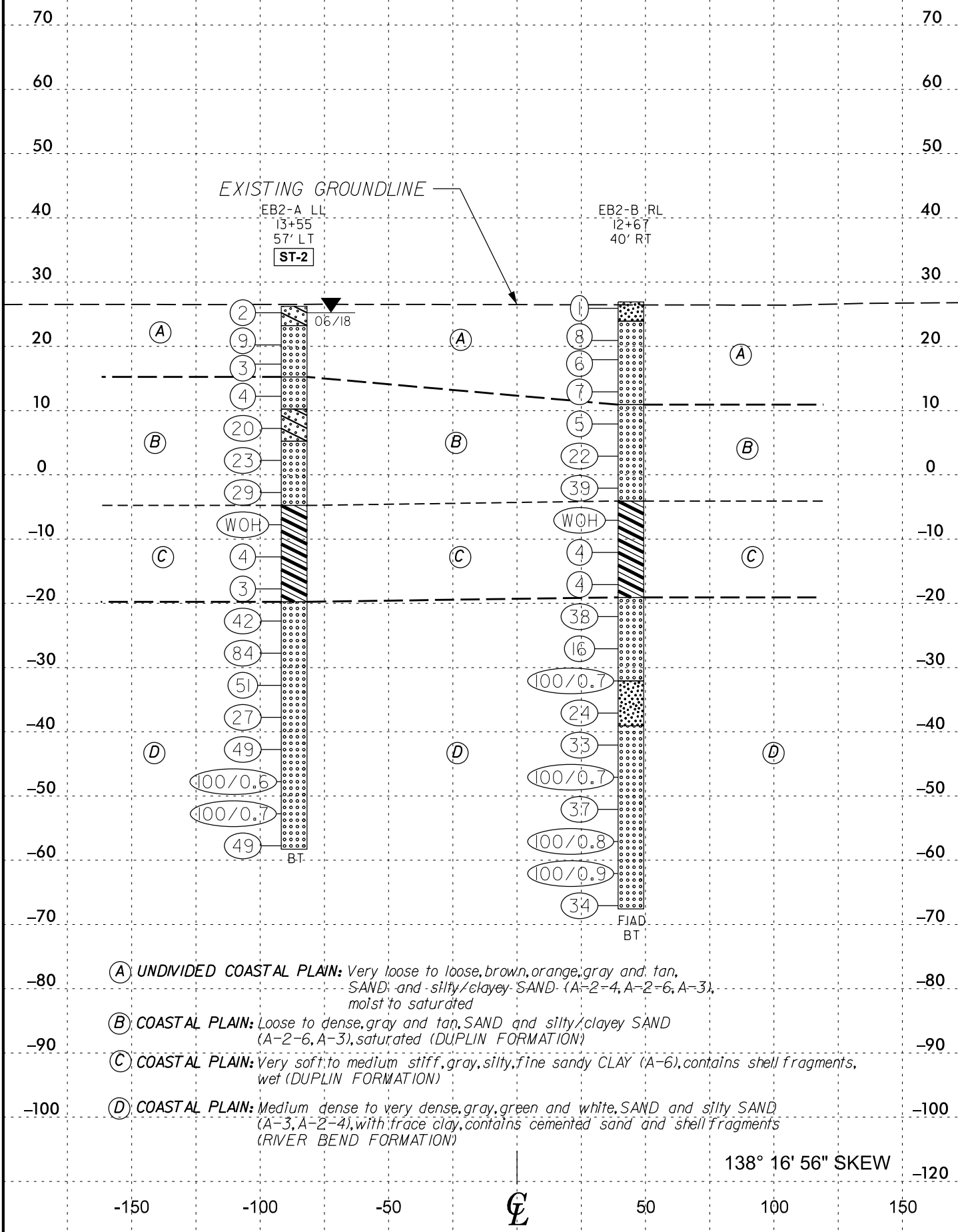
- NOTES:  
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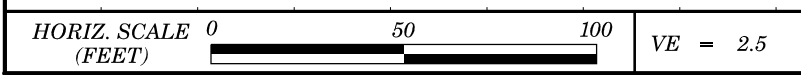


7/2/99



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- (C) **COASTAL PLAIN:** Very soft to medium stiff, gray, silty, fine sandy CLAY (A-6), contains shell fragments, wet (DUPLIN FORMATION)
- (D) **COASTAL PLAIN:** Medium dense to very dense, gray, green and white, SAND and silty SAND (A-3, A-2-4), with trace clay, contains cemented sand and shell fragments (RIVER BEND FORMATION)

**NOTE: CROSS SECTIONS  
CREATED FROM  
r1015\_ls\_fin.tin FILE  
DATED 1-30-2018**



**CROSS SECTION - END BENT 2  
-RPIAB- STA 12+89.40**

138° 16' 56" SKEW





# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.	
SITE DESCRIPTION Bridge No. 272 on -RP1AB- (US 70 Bus.) Over US 70 Bypass Between US 70 and SR 1824							GROUND WTR (ft)
BORING NO. B1-A LL		STATION 12+36		OFFSET 54 ft LT		ALIGNMENT -RP1AB-	
COLLAR ELEV. 27.0 ft		TOTAL DEPTH 94.5 ft		NORTHING 407,662		EASTING 2,632,504	
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER Donahue, T.		START DATE 05/24/18		COMP. DATE 05/24/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
30															
27.0	27.0	0.0	WOH	1	1										27.0
25															
22.0		5.0		3	3	4									24.0
20															
19.0		8.0		1	2	1									
15															
14.0		13.0		2	2	2									
10															
9.0		18.0		2	3	3									
5															
4.0		23.0		11	9	13									
0															
-1.0		28.0		12	13	16									
-5															
-6.0		33.0	WOH	1	1										
-10															
-11.0		38.0		1	2	2									
-15															
-16.0		43.0		3	2	3									
-20															
-21.0		48.0		12	10	12									
-25															
-26.0		53.0		17	16	19									
-30															
-31.0		58.0		23	42	45									
-35															
-36.0		63.0		9	51	49/0.5									
-40															
-41.0		68.0		11	21	15									
-45															
-46.0		73.0		21	30	70/0.5									
-50															

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DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER Donahue, T.		START DATE 05/24/18		COMP. DATE 05/24/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-50															
-51.0		78.0		52	48/0.2										
-55															
-56.0		83.0		31	31	24									
-60															
-61.0		88.0		11	12	13									
-65															
-66.0		93.0		13	15	22									
-67.5															

NCDOT BORE DOUBLE R-1015\_S1\_GEO\_BRDG.GPJ NC\_DOT.GDT 7/24/18









### SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-246	46' RT	10+14	5.0-6.5	A-3(0)	NP	NP	19.4	73.6	1.9	5.1	100	100	8	27.8	-
SS-232	61' LT	10+97	23.0-24.5	A-3(0)	NP	NP	6.4	85.1	3.6	4.9	100	100	10	26.7	-
SS-244	61' LT	10+97	83.0-84.5	A-3(0)	NP	NP	9.5	82.9	2.9	4.7	100	98	8	31.5	-
SS-215	40' RT	11+36	33.0-34.5	A-4(0)	26	7	4.3	60.4	18.7	16.7	100	99	42	30.8	-
ST-3	52' LT	13+54	33.0-35.0	A-6(2)	30	11	3.2	59.2	19.1	18.4	100	99	46	31.0	-



Photo 1: Looking towards End Bent 2 and up station of -RP1AB-

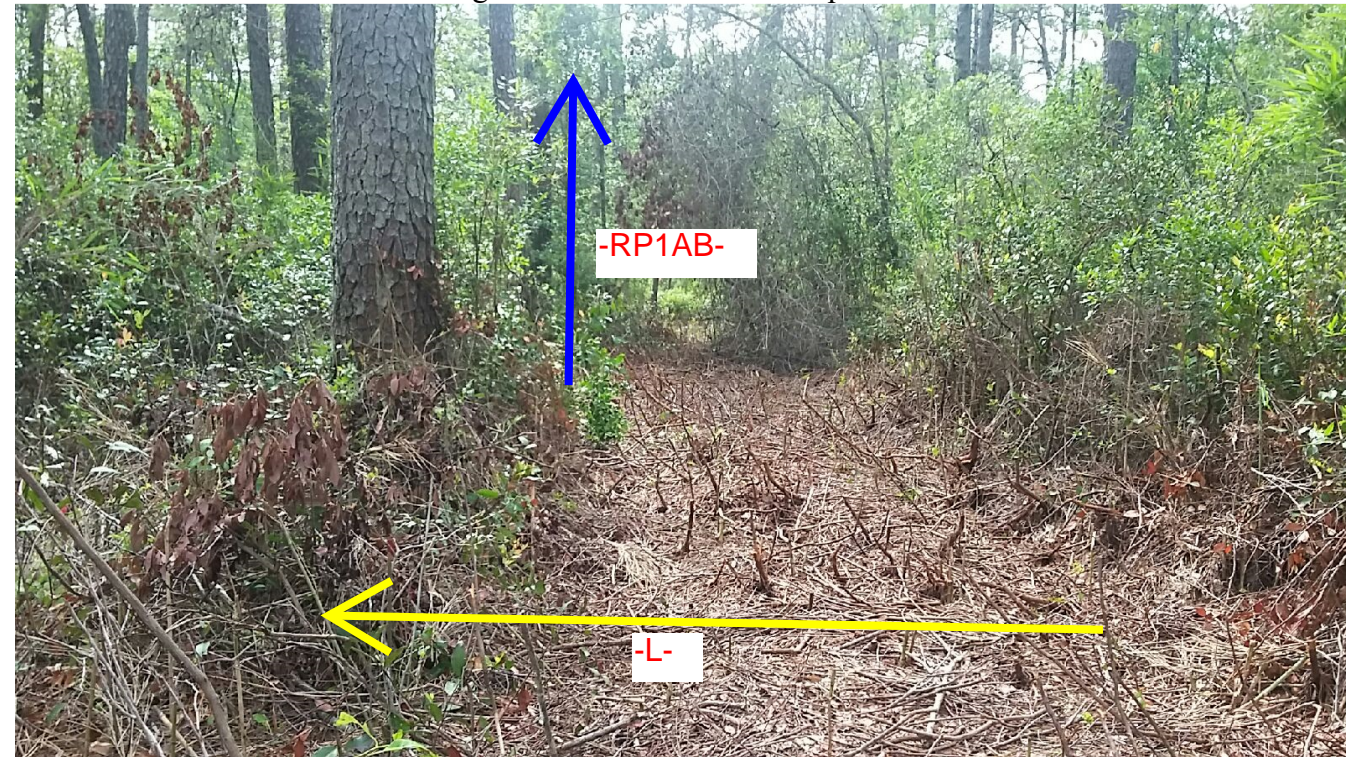
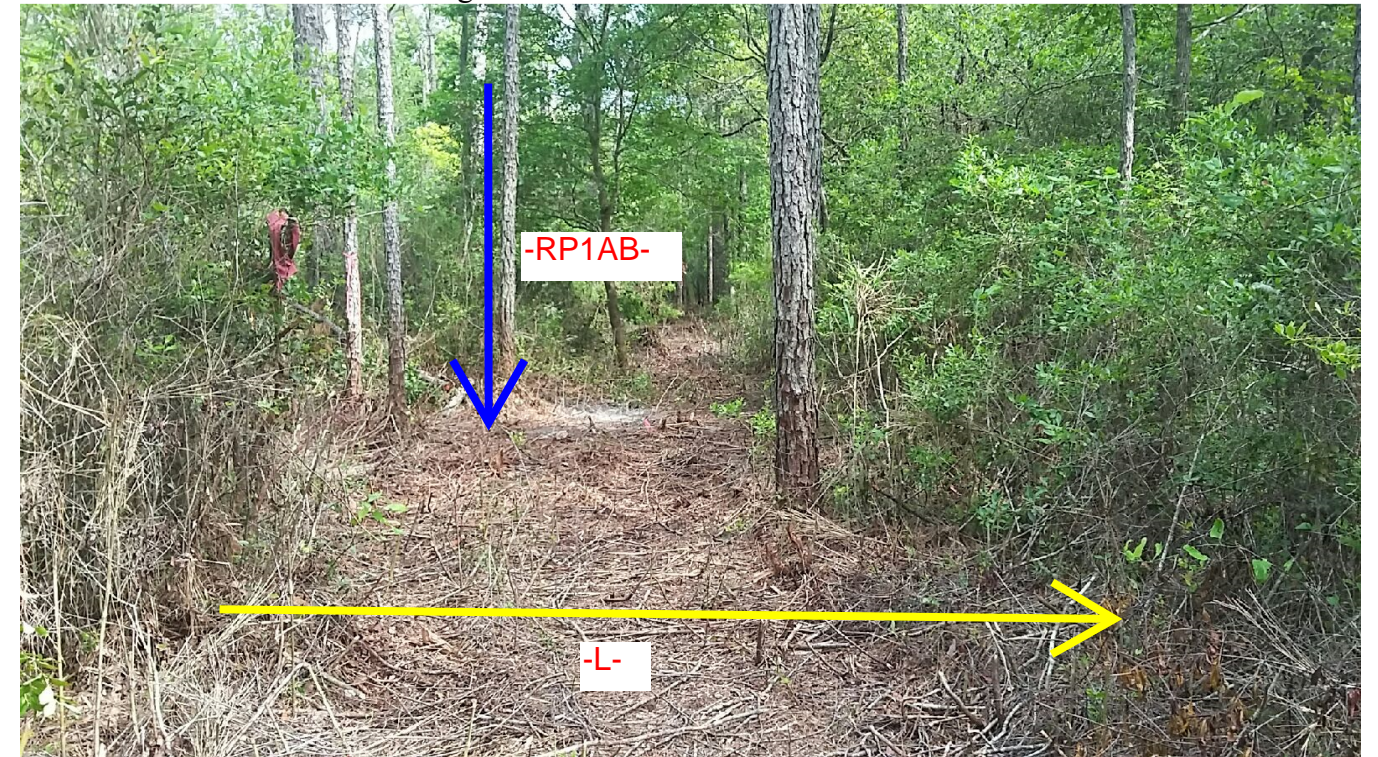


Photo 2: Looking towards End Bent 1 and down station of -RP1AB-





REFERENCE: R-1015

PROJECT: 34360

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

STRUCTURE  
SUBSURFACE INVESTIGATION

COUNTY CRAVEN  
PROJECT DESCRIPTION US 70 (HAVELOCK BYPASS)  
FROM NORTH OF CARTERET/CRAVEN COUNTY  
LINE TO NORTH OF PINE GROVE ROAD  
SITE DESCRIPTION SITE 2 - DUAL BRIDGES NO. 274  
AND NO. 275 ON -L- (US 70 - HAVELOCK  
BYPASS) OVER NCRR BETWEEN US 70 AND SR  
1756 -L- STATION 138 + 31.09

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-5	PROFILES
6-8	CROSS SECTIONS
9-18	BORE LOGS
19	SOIL TEST RESULTS
20	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-1015	1	20

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:

- 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.
- 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

P. GRAINGER

J.K. CRENSHAW

T. DONAHUE

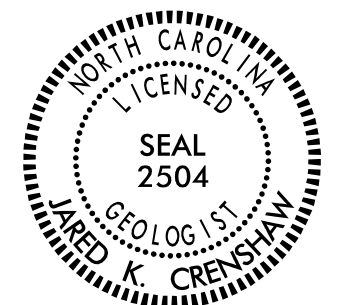
INVESTIGATED BY J.K. CRENSHAW

DRAWN BY T. LYNN

CHECKED BY B. HOWEY

SUBMITTED BY B. D. KEANEY

DATE JULY, 2018



DocuSigned by:

Jared Crenshaw

7/31/2018

3AB1C06A82EE4F1...

SIGNATURE

DATE

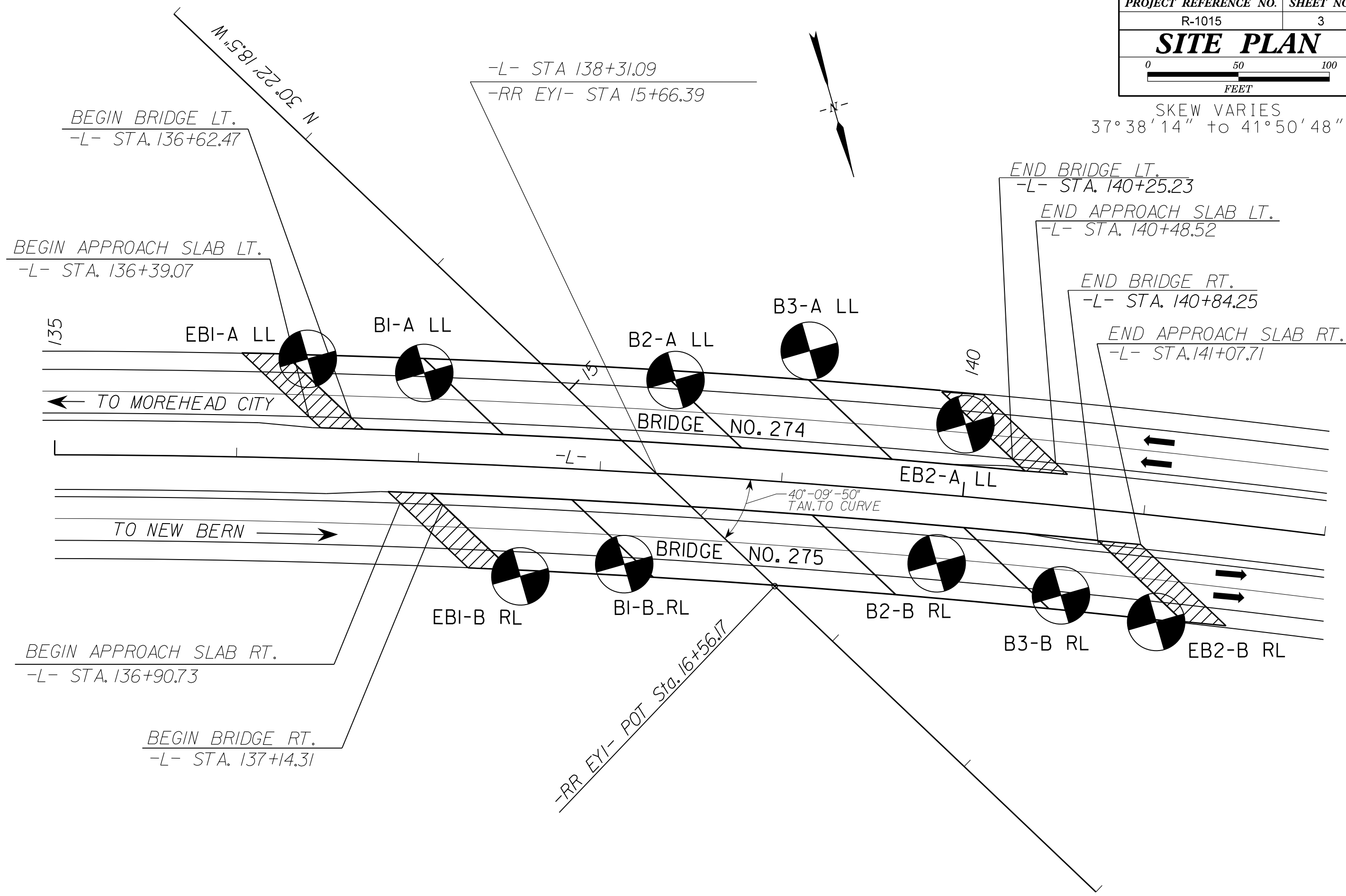
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

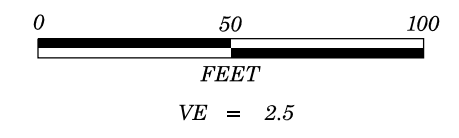


7/12/99

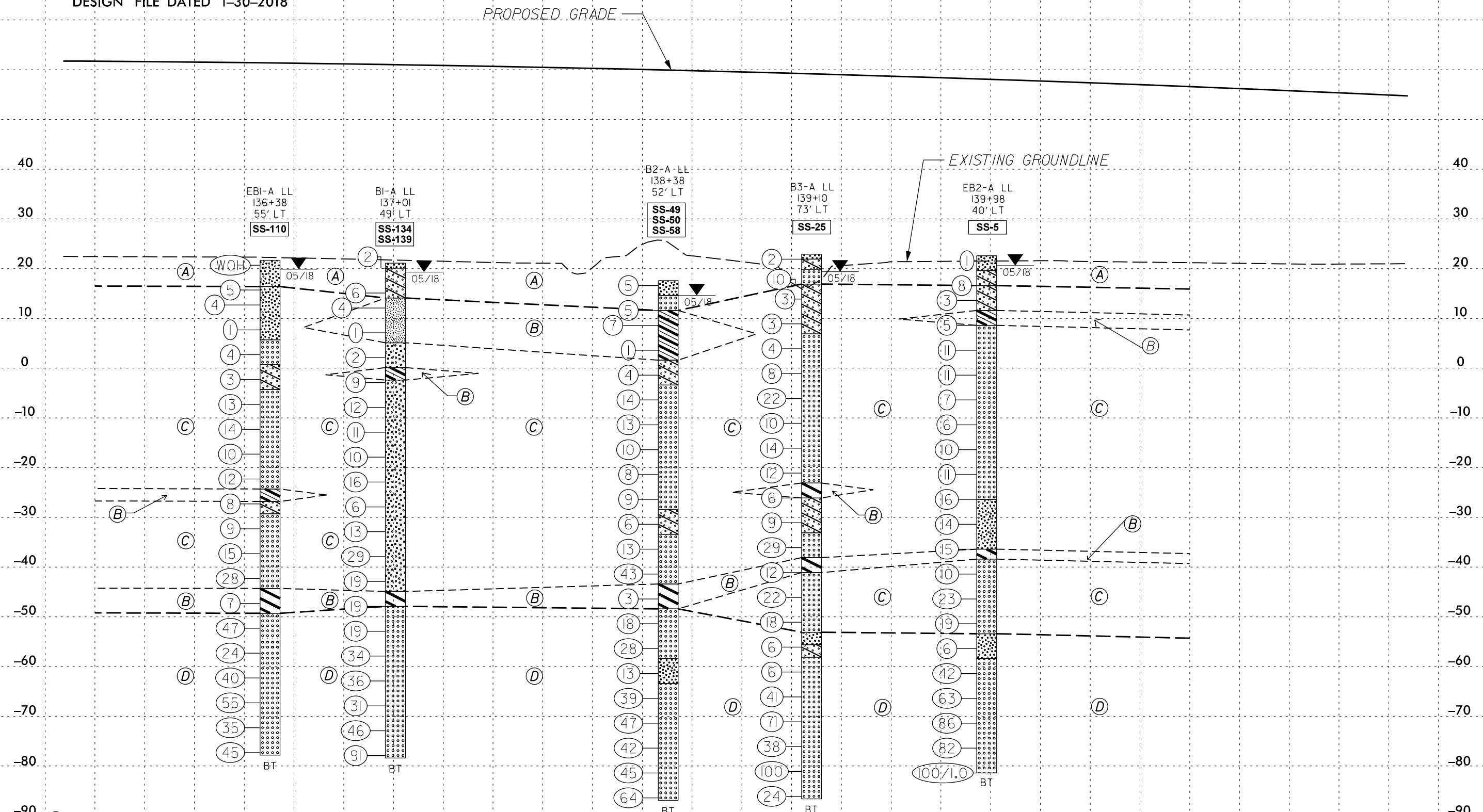
PROJECT REFERENCE NO.	SHEET NO.
R-1015	3
<b>SITE PLAN</b>	
 0 50 100 FEET	

SKEW VARIES  
37°38'14" to 41°50'48"



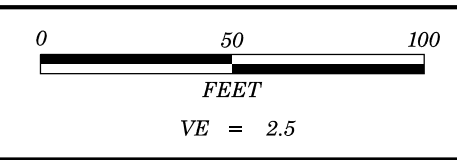


- NOTES:  
 1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO -L-  
 2. GROUNDLINE TAKEN FROM ROADWAY DESIGN FILE DATED 1-30-2018



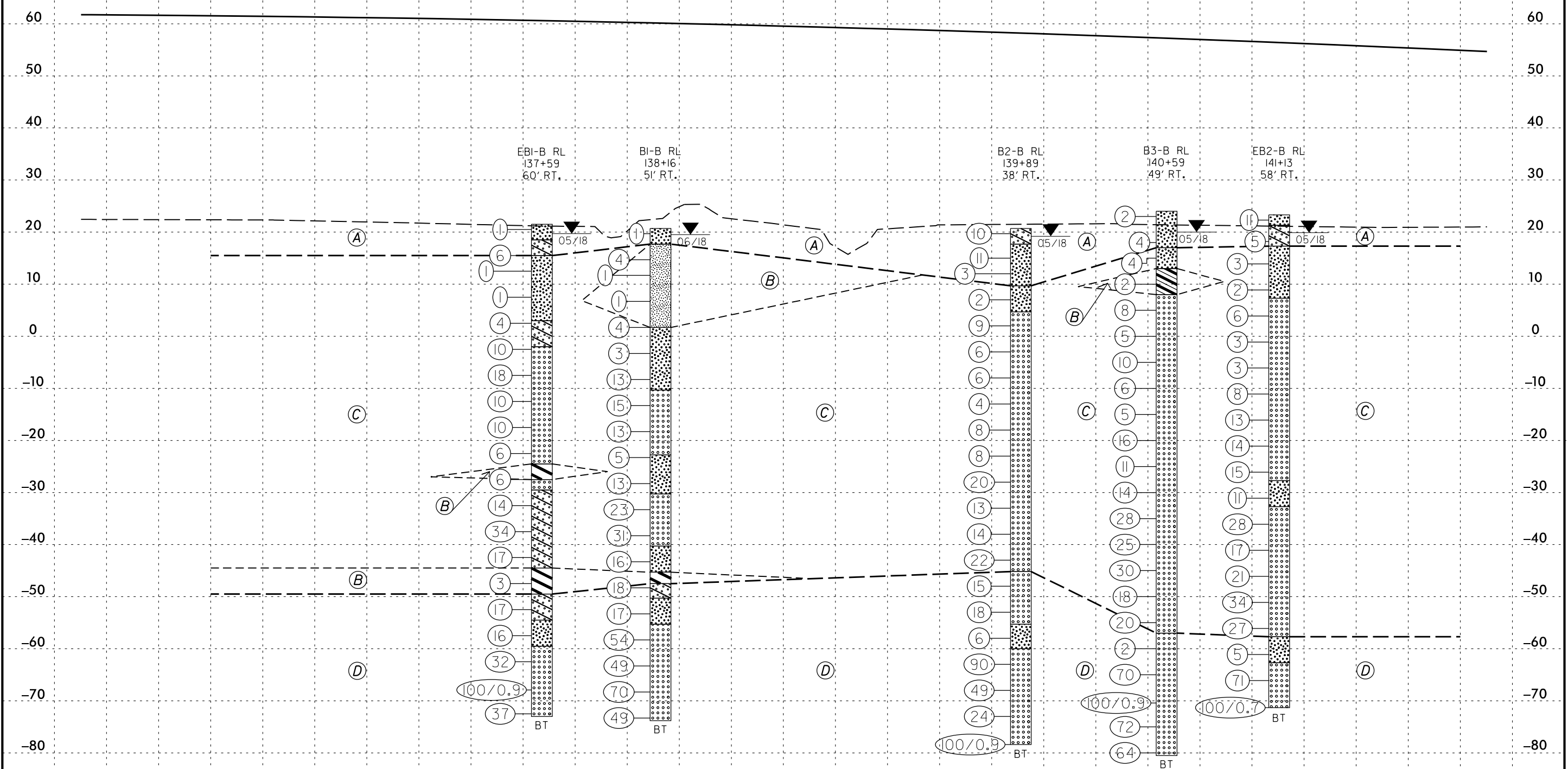
- (A) UCP: Very loose to loose, brown and tan, silty and clayey SAND and SAND (A-2-4, A-2-6, A-3), contains trace organics, moist to saturated
- (B) COASTAL PLAIN: Very soft to medium stiff, gray, sandy silt SILT and sandy/silty CLAY (A-4, A-6, A-7-6), contains shell fragments, wet (DUPLIN FORMATION)
- (C) COASTAL PLAIN: Very loose to dense, gray, green, and white, SAND and CLAYEY SAND (A-2-6, A-2-4, A-3), with trace silt, phosphatic, contains shell fragments, saturated (DUPLIN FORMATION)
- (D) COASTAL PLAIN: Loose to very dense, gray, green, and white, clayey SAND and SAND (A-2-6, A-2-4, A-3), with silt, contains cemented sand and shell fragments, saturated (RIVER BEND FORMATION)

136+00                      137+00                      138+00                      139+00                      140+00                      141+00                      142+00



<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
R-1015	5
<b>PROFILE THROUGH BRIDGE NO. 275 BORINGS PROJECTED ONTO -L-</b>	

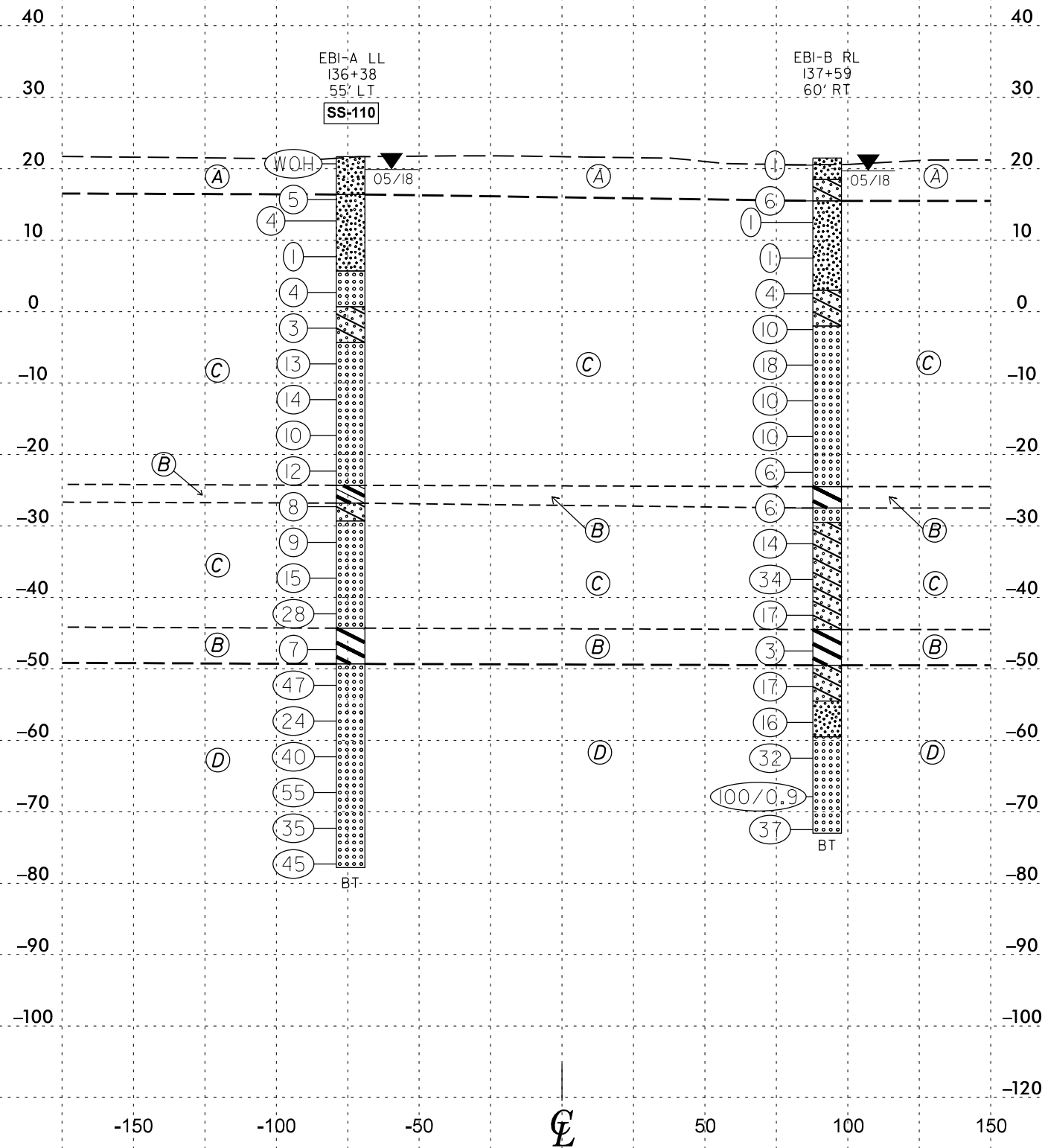
**NOTES:**  
 1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO -L-  
 2. GROUNDLINE TAKEN FROM ROADWAY DESIGN FILE DATED 1-30-2018



- (A) UCP: Very loose to medium dense, brown and tan, silty and clayey SAND (A-2-4, A-2-6), contains trace organics, moist to saturated
- (B) COASTAL PLAIN: Very soft to medium stiff, gray, sandy SILT, and sandy/silty CLAY (A-4, A-6, A-7-6), with silt, wet (DUPLIN FORMATION)
- (C) COASTAL PLAIN: Very loose to dense, gray, clayey SAND and SAND (A-2-6, A-2-4, A-3), phosphatic, with thin clay interbeds, contains shell fragments, saturated (DUPLIN FORMATION)
- (D) COASTAL PLAIN: Very loose to very dense, gray and green, clayey SAND and SAND (A-2-6, A-2-4, A-3), with silt, phosphatic, contains shell fragments, saturated (RIVER BEND FORMATION)

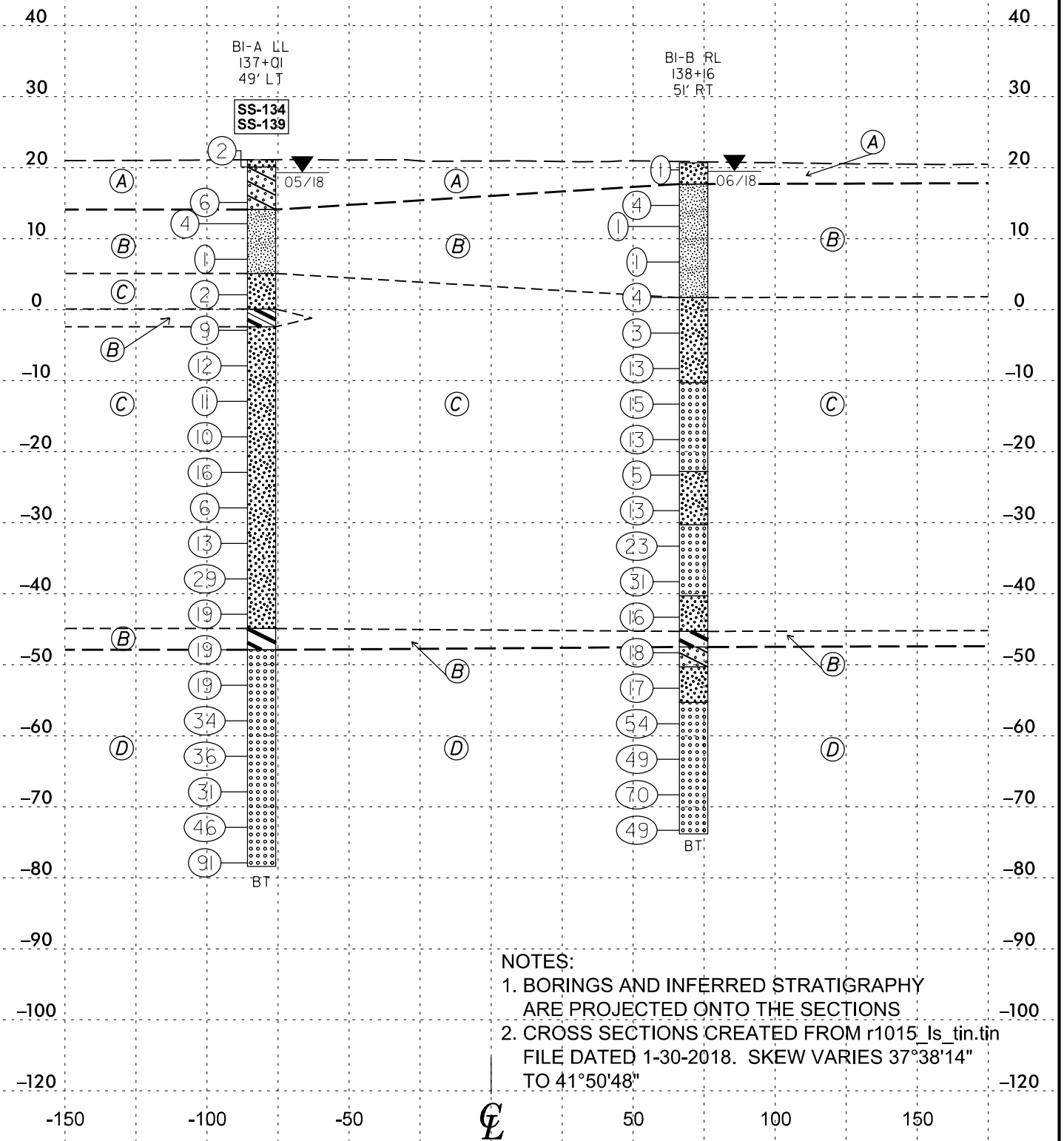
136+00                      137+00                      138+00                      139+00                      140+00                      141+00                      142+00

- (A) **UCP:** Very loose to loose, brown, gray and tan, silty and clayey SAND (A-2-4, A-2-6), contains trace organics, moist to saturated
- (B) **COASTAL PLAIN:** Very soft to medium stiff, gray, sandy/silty CLAY (A-6, A-7-6), wet (DUPLIN FORMATION)
- (C) **COASTAL PLAIN:** Very loose to dense, gray, SAND and clayey SAND (A-3, A-2-4, A-2-6), contains shell fragments, saturated (DUPLIN FORMATION)
- (D) **COASTAL PLAIN:** Medium dense to very dense, gray, and green, SAND and clayey SAND (A-2-6, A-2-4, A-3), contains shell fragments, saturated (RIVER BEND FORMATION)



**CROSS SECTION - END BENT 1**  
-L- STA 136+88.22

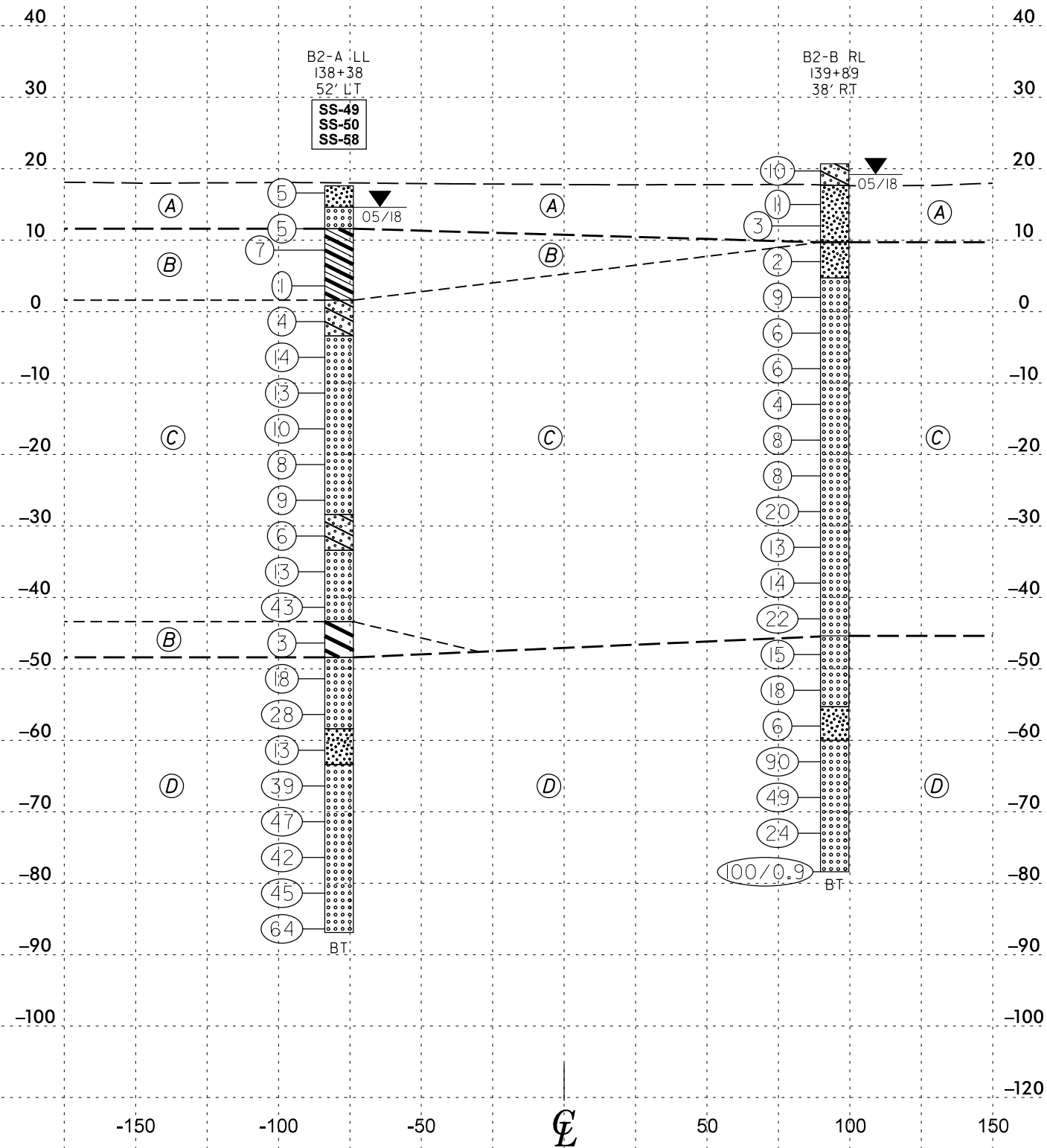
- (A) **UCP:** Very loose to loose, brown and tan, silty and clayey SAND (A-2-4, A-2-6), contains trace organics, moist to saturated
- (B) **COASTAL PLAIN:** Very soft to medium stiff, gray, sandy SILT and sandy/silty CLAY (A-4, A-6, A-7-6), wet (DUPLIN FORMATION)
- (C) **COASTAL PLAIN:** Very loose to dense, gray, SAND (A-2-4, A-3), contains shell fragments, saturated (DUPLIN FORMATION)
- (D) **COASTAL PLAIN:** Medium dense to very dense, gray, and green, SAND and clayey SAND (A-2-6, A-2-4, A-3), contains cemented sand and shell fragments, saturated (RIVER BEND FORMATION)



**NOTES:**  
 1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTIONS  
 2. CROSS SECTIONS CREATED FROM r1015\_Is\_tin.tin FILE DATED 1-30-2018. SKEW VARIES 37°38'14" TO 41°50'48"

**CROSS SECTION - BENT 1**  
-L- STA 137+65.64

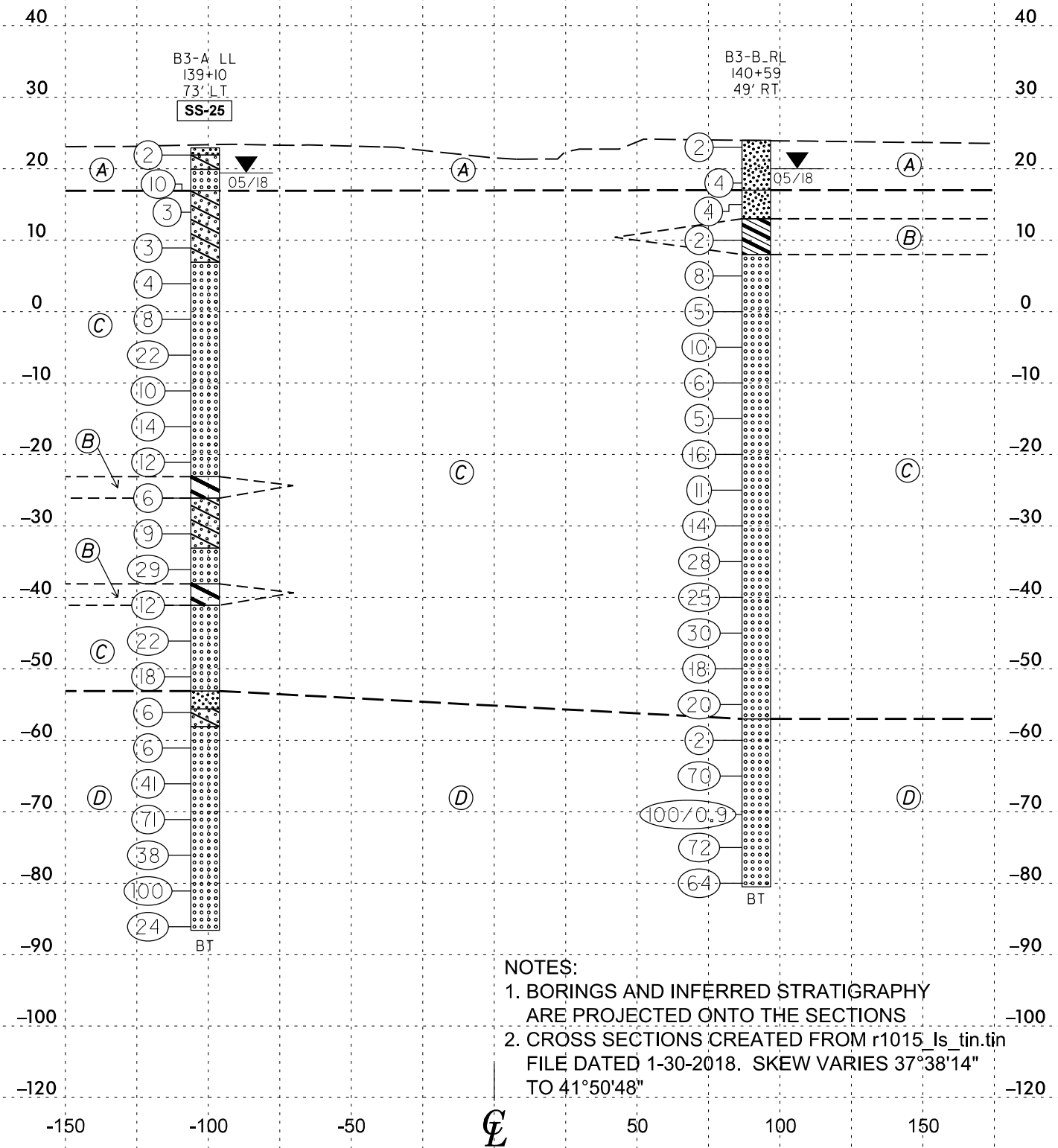
- (A) UCP: Very loose to medium dense, brown, tan and gray, silty and clayey SAND and SAND (A-2-6, A-2-4, A-3), with thin clay interbeds, moist to saturated
- (B) COASTAL PLAIN: Very soft to medium stiff, gray, CLAY and sandy CLAY (A-6, A-7-6), wet (DUPLIN FORMATION)
- (C) COASTAL PLAIN: Very loose to dense, gray, SAND and clayey SAND (A-2-6, A-2-4, A-3), contains shell fragments, saturated (DUPLIN FORMATION)
- (D) COASTAL PLAIN: Loose to very dense, gray and green, SAND (A-2-4, A-3), phosphatic, with trace clay, contains shell fragments, saturated (RIVER BEND FORMATION)



HORIZ. SCALE 0 50 100 (FEET) VE = 2.5

**CROSS SECTION - BENT 2**  
-L- STA 138+97.45

- (A) UCP: Very loose, brown and tan, silty and clayey SAND and SAND (A-2-6, A-2-4, A-3), moist to saturated
- (B) COASTAL PLAIN: Soft, gray, CLAY and sandy CLAY (A-6, A-7-6), wet (DUPLIN FORMATION)
- (C) COASTAL PLAIN: Very loose to dense, gray, SAND and clayey SAND (A-2-6, A-2-4, A-3), phosphatic, contains shell fragments, saturated (DUPLIN FORMATION)
- (D) COASTAL PLAIN: Very loose to very dense, gray, white, and green, SAND and clayey SAND (A-2-6, A-2-4, A-3), with thin clay interbeds, contains shell fragments, saturated (RIVER BEND FORMATION)

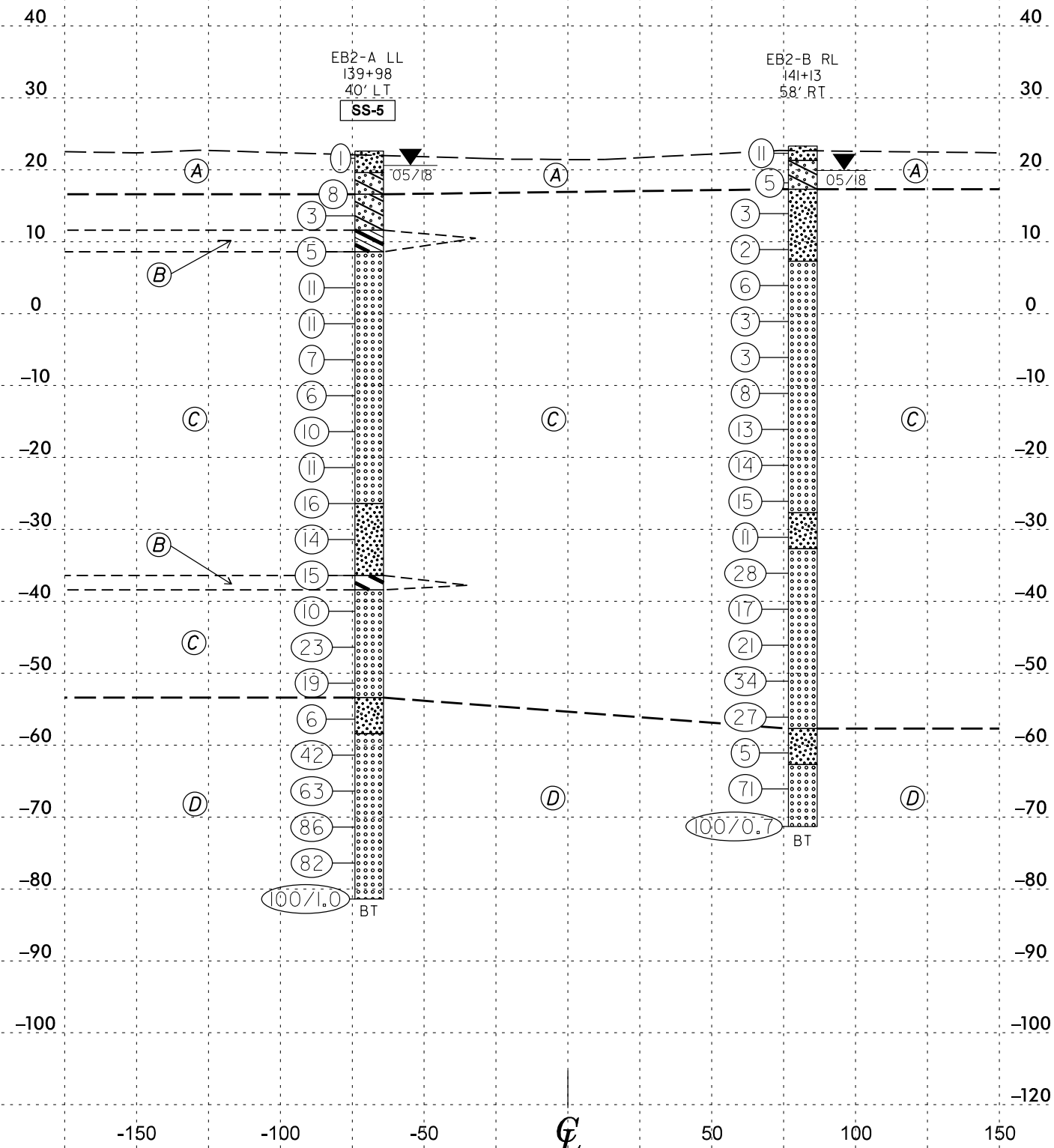


HORIZ. SCALE 0 50 100 (FEET) VE = 2.5

**CROSS SECTION - BENT 3**  
-L- STA 139+80.71

NOTES:  
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTIONS  
2. CROSS SECTIONS CREATED FROM r1015\_Is\_tin.tin FILE DATED 1-30-2018. SKEW VARIES 37°38'14" TO 41°50'48"

- (A) UCP: Very loose to medium dense, brown, silty and clayey SAND (A-2-4, A-2-6), contains trace organics, moist to saturated
- (B) COASTAL PLAIN: Medium stiff to stiff, gray, CLAY and sandy CLAY (A-7-6, A-6), wet (DUPLIN FORMATION)
- (C) COASTAL PLAIN: Very loose to dense, gray, SAND and clayey SAND (A-2-4, A-3, A-2-6), with thin clay interbeds, contains shell fragments, saturated (DUPLIN FORMATION)
- (D) COASTAL PLAIN: Loose to very dense, gray and green, SAND (A-3), saturated (RIVER BEND FORMATION)



- NOTES:
- BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTIONS
  - CROSS SECTIONS CREATED FROM r1015\_Is\_tin.tin FILE DATED 1-30-2018. SKEW VARIES 37°38'14" TO 41°50'48"

HORIZ. SCALE 0 50 100 (FEET)

VE = 2.5

**CROSS SECTION - END BENT 2**  
**-L- STA 140+54.52**



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. EB1-A LL		STATION 136+38		OFFSET 55 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 21.7 ft		TOTAL DEPTH 99.5 ft		NORTHING 408,344		EASTING 2,628,700									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Donahue, T.		START DATE 05/30/18		COMP. DATE 05/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
40															
35															
30															
25															
20	21.7	0.0													
15	16.7	5.0	4	2	3										
10	13.7	8.0	3	2	2										
5	8.7	13.0	2	0	1										
0	3.7	18.0	2	2	2										
-5	-1.3	23.0	1	1	2										
-10	-6.3	28.0	5	6	7										
-15	-11.3	33.0	3	7	7										
-20	-16.3	38.0	3	5	5										
-25	-21.3	43.0	5	5	7										
-30	-26.3	48.0	2	4	4										
-35	-31.3	53.0	6	5	4										
-40	-36.3	58.0	6	6	9										

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. EB1-A LL		STATION 136+38		OFFSET 55 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 21.7 ft		TOTAL DEPTH 99.5 ft		NORTHING 408,344		EASTING 2,628,700									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Donahue, T.		START DATE 05/30/18		COMP. DATE 05/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-40															
-45	-41.3	63.0	11	15	13										
-50	-46.3	68.0	4	4	3										
-55	-51.3	73.0	10	21	26										
-60	-56.3	78.0	5	9	15										
-65	-61.3	83.0	15	18	22										
-70	-66.3	88.0	22	29	26										
-75	-71.3	93.0	13	17	18										
	-76.3	98.0	15	22	23										

NCDOT BORE DOUBLE R-1015\_S2\_GEO\_BRDG.GPJ NC\_DOT.GDT 7/19/18

Match Line

**COASTAL PLAIN**

Boring Terminated at Elevation -77.8 ft in SAND (River Bend Formation)

Strata change in split spoon at depths of 5.3 feet and 48.5 feet.  
ST-4 acquired in offset boring at -L- STA 136+42.58' LT

Other Samples:  
ST-4 (8.0 - 10.0)

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 275 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. EB1-B RL		STATION 137+59		OFFSET 60 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 21.5 ft		TOTAL DEPTH 94.5 ft		NORTHING 408,491		EASTING 2,628,621									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Donahue, T.		START DATE 05/30/18		COMP. DATE 05/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
25															
20	21.5	0.0	WOH	1	0										
15	16.5	5.0		3	3										
10	13.5	8.0		1	0										
5	8.5	13.0	WOH	WOH	1										
0	3.5	18.0		2	2										
-5	-1.5	23.0		3	4										
-10	-6.5	28.0		7	9										
-15	-11.5	33.0		4	4										
-20	-16.5	38.0		5	5										
-25	-21.5	43.0		5	4										
-30	-26.5	48.0		1	3										
-35	-31.5	53.0		4	6										
-40	-36.5	58.0		10	15										
-45	-41.5	63.0		5	6										
-50	-46.5	68.0		2	2										
-55	-51.5	73.0		6	7										

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 275 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. EB1-B RL		STATION 137+59		OFFSET 60 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 21.5 ft		TOTAL DEPTH 94.5 ft		NORTHING 408,491		EASTING 2,628,621									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Donahue, T.		START DATE 05/30/18		COMP. DATE 05/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-55															
-60	-56.5	78.0		6	6										
-65	-61.5	83.0		11	14										
-70	-66.5	88.0		38	56										
	-71.5	93.0		16	16										

NCDOT BORE DOUBLE R-1015\_S2\_GEO\_BRDG.GPJ NC\_DOT.GDT 7/19/18





# GEOTECHNICAL BORING REPORT

## BORE LOG

<b>WBS</b> 34360.1.1	<b>TIP</b> R-1015	<b>COUNTY</b> CRAVEN	<b>GEOLOGIST</b> Grainger, P.
<b>SITE DESCRIPTION</b> Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> B2-A LL	<b>STATION</b> 138+38	<b>OFFSET</b> 52 ft LT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 17.6 ft	<b>TOTAL DEPTH</b> 104.5 ft	<b>NORTHING</b> 408,411	<b>EASTING</b> 2,628,509
<b>DRILL RIG/HAMMER EFF./DATE</b> GET0674 CME-45C 93% 03/22/2018		<b>DRILL METHOD</b> Mud Rotary	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Donahue, T.	<b>START DATE</b> 05/15/18	<b>COMP. DATE</b> 05/15/18	<b>SURFACE WATER DEPTH</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
20	17.6	0.0											GROUND SURFACE	0.0
15	12.6	5.0	1	2	3							M	<b>UNDIVIDED COASTAL PLAIN</b> Tan, and gray, SAND and silty SAND (A-2-4, A-3), with thin clay interbeds	3.0
10	9.6	8.0	3	3	2							Sat.	<b>COASTAL PLAIN</b> Gray, sandy CLAY (A-6(5)) (DUPLIN FORMATION)	6.0
5	4.6	13.0	2	2	5							W		
0	-0.4	18.0	1	0	1							SS-49	33%	
-5	-5.4	23.0	3	1	3							SS-50	23%	Gray, SAND and clayey SAND (A-2-6(0), A-3(0)), contains shell fragments, with trace silt (DUPLIN FORMATION)
-10	-10.4	28.0	6	7	7							Sat.		
-15	-15.4	33.0	5	6	7							Sat.		
-20	-20.4	38.0	2	5	5							Sat.		
-25	-25.4	43.0	4	4	4							Sat.		
-30	-30.4	48.0	3	4	5							Sat.		
-35	-35.4	53.0	3	3	3							Sat.		
-40	-40.4	58.0	7	7	6							Sat.		
-45	-45.4	63.0	10	23	20							SS-58	17%	
-50	-50.4	68.0	1	2	1							W		Gray, silty CLAY (A-7-6) (DUPLIN FORMATION)
-55	-55.4	73.0	7	7	11							Sat.		<b>COASTAL PLAIN</b> Gray, green and dark gray, SAND and silty SAND (A-3, A-2-4), with trace clay, contains shell fragments (RIVER BEND FORMATION)
-60	-58.4	76.0	13	12	16							Sat.		

NCDOT BORE DOUBLE R-1015\_S2\_GEO\_BRDG.GPJ NC\_DOT.GDT 7/19/18

<b>WBS</b> 34360.1.1	<b>TIP</b> R-1015	<b>COUNTY</b> CRAVEN	<b>GEOLOGIST</b> Grainger, P.
<b>SITE DESCRIPTION</b> Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> B2-A LL	<b>STATION</b> 138+38	<b>OFFSET</b> 52 ft LT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 17.6 ft	<b>TOTAL DEPTH</b> 104.5 ft	<b>NORTHING</b> 408,411	<b>EASTING</b> 2,628,509
<b>DRILL RIG/HAMMER EFF./DATE</b> GET0674 CME-45C 93% 03/22/2018		<b>DRILL METHOD</b> Mud Rotary	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Donahue, T.	<b>START DATE</b> 05/15/18	<b>COMP. DATE</b> 05/15/18	<b>SURFACE WATER DEPTH</b> N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-60	-60.4	78.0	4	5	8								Match Line	
-65	-65.4	83.0	13	17	22							Sat.		<b>COASTAL PLAIN</b> Gray, green and dark gray, SAND and silty SAND (A-3, A-2-4), with trace clay, contains shell fragments (RIVER BEND FORMATION) (continued)
-70	-70.4	88.0	15	20	27							Sat.		
-75	-75.4	93.0	10	20	22							Sat.		
-80	-80.4	98.0	13	19	26							Sat.		
-85	-85.4	103.0	22	29	35							Sat.		
														Boring Terminated at Elevation -86.9 ft in SAND (River Bend Formation)



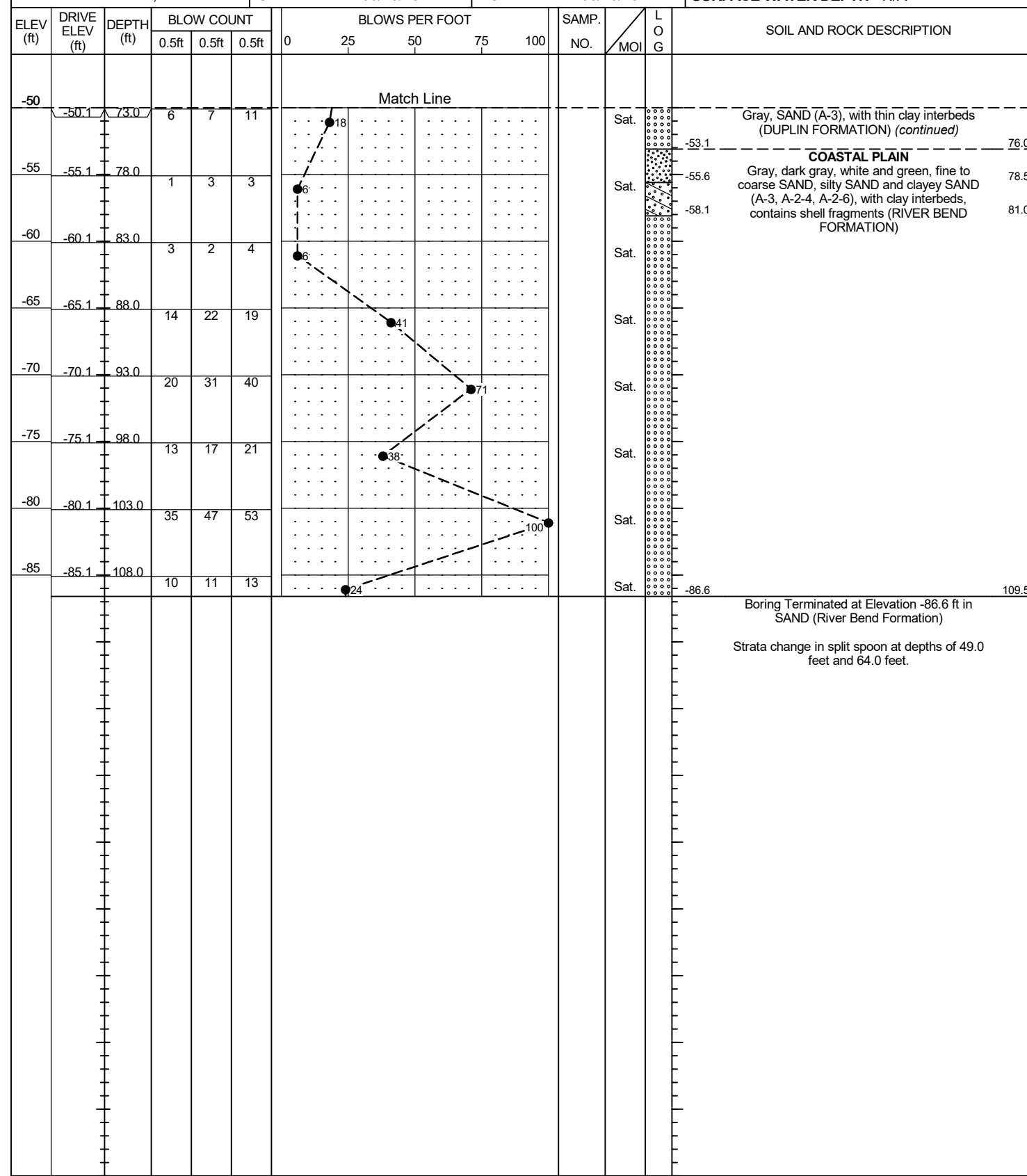
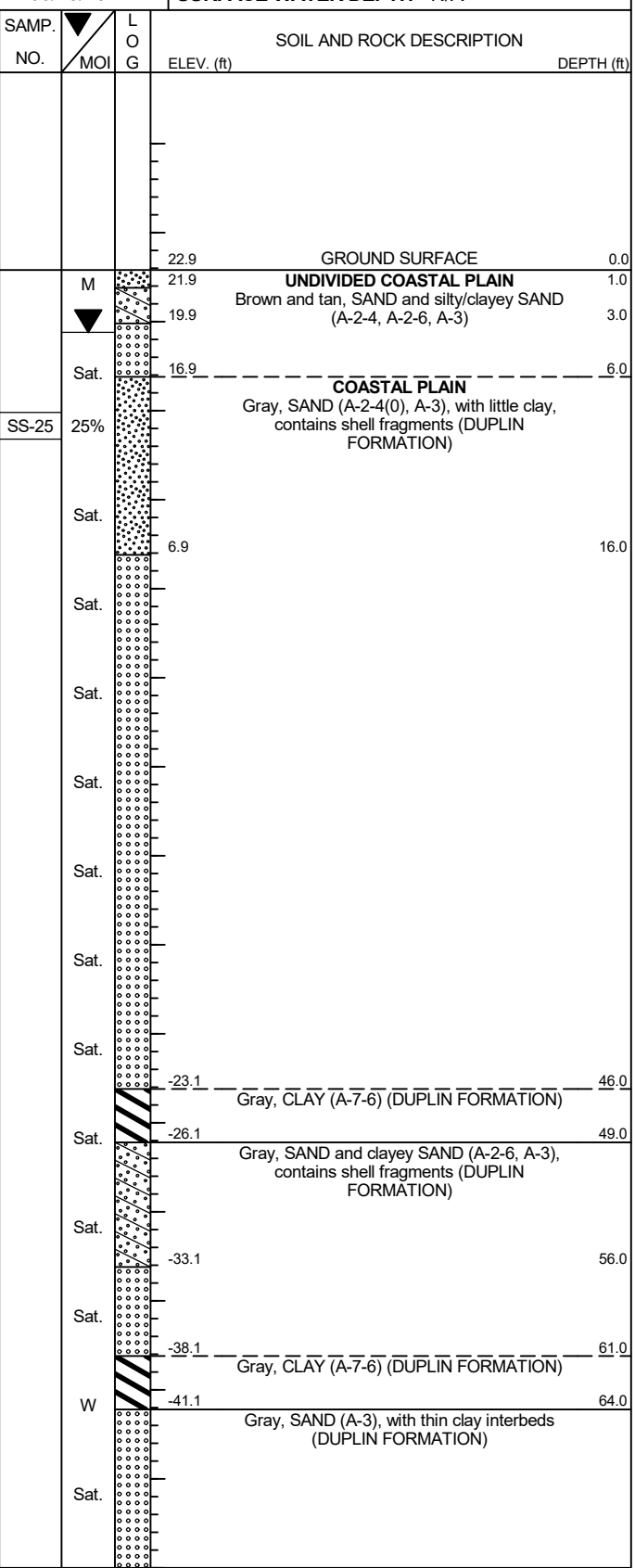
# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. B3-A LL		STATION 139+10		OFFSET 73 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 22.9 ft		TOTAL DEPTH 109.5 ft		NORTHING 408,416		EASTING 2,628,434									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Donahue, T.		START DATE 05/15/18		COMP. DATE 05/15/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
30															
25	22.9	0.0	1	1	1	2									
20	17.9	5.0	3	6	4										
15	14.9	8.0	3	2	1										
10	9.9	13.0	1	2	1										
5	4.9	18.0	1	2	2										
0	-0.1	23.0	5	5	3										
-5	-5.1	28.0	10	10	12										
-10	-10.1	33.0	5	5	5										
-15	-15.1	38.0	7	7	7										
-20	-20.1	43.0	4	5	7										
-25	-25.1	48.0	4	2	4										
-30	-30.1	53.0	6	4	5										
-35	-35.1	58.0	9	12	17										
-40	-40.1	63.0	WOH	6	6										
-45	-45.1	68.0		9	10										
-50															

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.									
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)								
BORING NO. B3-A LL		STATION 139+10		OFFSET 73 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 22.9 ft		TOTAL DEPTH 109.5 ft		NORTHING 408,416		EASTING 2,628,434									
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Donahue, T.		START DATE 05/15/18		COMP. DATE 05/15/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-50	-50.1	73.0	6	7	11										
-55	-55.1	78.0	1	3	3										
-60	-60.1	83.0	3	2	4										
-65	-65.1	88.0	14	22	19										
-70	-70.1	93.0	20	31	40										
-75	-75.1	98.0	13	17	21										
-80	-80.1	103.0	35	47	53										
-85	-85.1	108.0	10	11	13										

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1			TIP R-1015		COUNTY CRAVEN			GEOLOGIST Crenshaw, J. K.							
<b>SITE DESCRIPTION</b> Site 2 - Bridge No. 275 On US 70 Bypass Over NCRB Between US 70 and SR 1756							<b>GROUND WTR (ft)</b>								
BORING NO. B3-B RL			STATION 140+59		OFFSET 49 ft RT		ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEV. 24.0 ft			TOTAL DEPTH 104.5 ft		NORTHING 408,583		EASTING 2,628,338		24 HR. 4.0						
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018						DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DRILLER Donahue, T.			START DATE 05/11/18		COMP. DATE 05/11/18		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
25	24.0	0.0	WOH	1	1								24.0	GROUND SURFACE	0.0
20	19.0	5.0		2	2								UNDIVIDED COASTAL PLAIN		
15	16.0	8.0		2	2								COASTAL PLAIN		
10	11.0	13.0		1	1								Gray, SAND (A-2-4) (DUPLIN FORMATION)		
5	6.0	18.0		2	4								Gray, sandy CLAY (A-6) (DUPLIN FORMATION)		
0	1.0	23.0		2	3								Gray, SAND (A-3), phosphatic, contains shell fragments (DUPLIN FORMATION)		
-5	-4.0	28.0		4	4										
-10	-9.0	33.0		2	3										
-15	-14.0	38.0		2	3										
-20	-19.0	43.0		6	9										
-25	-24.0	48.0		4	5										
-30	-29.0	53.0		5	8										
-35	-34.0	58.0		9	10										
-40	-39.0	63.0		13	10										
-45	-44.0	68.0		13	13										
-50	-49.0	73.0		14	10										
-55	-54.0	78.0		12	11										

WBS 34360.1.1			TIP R-1015		COUNTY CRAVEN			GEOLOGIST Crenshaw, J. K.						
<b>SITE DESCRIPTION</b> Site 2 - Bridge No. 275 On US 70 Bypass Over NCRB Between US 70 and SR 1756							<b>GROUND WTR (ft)</b>							
BORING NO. B3-B RL			STATION 140+59		OFFSET 49 ft RT		ALIGNMENT -L-		0 HR. N/A					
COLLAR ELEV. 24.0 ft			TOTAL DEPTH 104.5 ft		NORTHING 408,583		EASTING 2,628,338		24 HR. 4.0					
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018						DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER Donahue, T.			START DATE 05/11/18		COMP. DATE 05/11/18		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-55	-55.0	83.0		2	0								Match Line	
-60	-59.0	88.0		33	40								Gray, phosphatic SAND (A-3), with shell fragments (DUPLIN FORMATION)	
-65	-64.0	93.0		32	49	51/0.4							COASTAL PLAIN	
-70	-69.0	98.0		14	30								Gray and green, SAND (A-3) (RIVER BEND FORMATION)	
-75	-74.0	103.0		31	29									
-80	-79.0	103.0												

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.										
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)									
BORING NO. EB2-A LL		STATION 139+98		OFFSET 40 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 22.6 ft		TOTAL DEPTH 104.0 ft		NORTHING 408,478		EASTING 2,628,362										
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Donahue, T.		START DATE 05/14/18		COMP. DATE 05/14/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
30																
25	22.6	0.0	1	0	1											
20	17.6	5.0	3	5	3											
15	14.6	8.0	2	1	2											
10	9.6	13.0	1	3	2											
5	4.6	18.0	4	5	6											
0	-0.4	23.0	4	5	6											
-5	-5.4	28.0	3	3	4											
-10	-10.4	33.0	4	3	3											
-15	-15.4	38.0	2	6	4											
-20	-20.4	43.0	4	5	6											
-25	-25.4	48.0	12	11	5											
-30	-30.4	53.0	4	6	8											
-35	-35.4	58.0	11	9	6											
-40	-40.4	63.0	9	5	5											
-45	-45.4	68.0	12	11	12											
-50																

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Grainger, P.										
SITE DESCRIPTION Site 2 - Bridge No. 274 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)									
BORING NO. EB2-A LL		STATION 139+98		OFFSET 40 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 22.6 ft		TOTAL DEPTH 104.0 ft		NORTHING 408,478		EASTING 2,628,362										
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Donahue, T.		START DATE 05/14/18		COMP. DATE 05/14/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-50	-50.4	73.0	8	10	9											
-55	-55.4	78.0	3	2	4											
-60	-60.4	83.0	9	20	22											
-65	-65.4	88.0	21	29	34											
-70	-70.4	93.0	27	37	49											
-75	-75.4	98.0	15	35	47											
-80	-80.4	103.0	39	61/0.5												

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Crenshaw, J. K.								
SITE DESCRIPTION Site 2 - Bridge No. 275 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)							
BORING NO. EB2-B RL		STATION 141+13		OFFSET 58 ft RT		ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEV. 23.3 ft		TOTAL DEPTH 94.6 ft		NORTHING 408,611		EASTING 2,628,292		24 HR. 3.4						
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Donahue, T.		START DATE 05/10/18		COMP. DATE 05/10/18		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
25	23.3	0.0	1	6	5								GROUND SURFACE	0.0
20	19.2	4.1	2	2	3							M	UNDIVIDED COASTAL PLAIN Brown and tan, SAND and clayey SAND (A-2-6, A-2-4), contains trace organics	2.0
15	14.9	8.4	3	1	2							Sat.	COASTAL PLAIN Gray, SAND (A-3, A-2-4), contains shell fragments, with thin clay interbeds (DUPLIN FORMATION)	6.0
10	9.9	13.4	1	1	1							Sat.		7.3
5	4.9	18.4	1	2	4							Sat.		
0	-0.1	23.4	1	1	2							Sat.		
-5	-5.1	28.4	1	2	1							Sat.		
-10	-10.1	33.4	3	4	4							Sat.		
-15	-15.1	38.4	5	5	8							Sat.		
-20	-20.1	43.4	6	7	7							Sat.		
-25	-25.1	48.4	8	10	5							Sat.		
-30	-30.1	53.4	5	4	7							Sat.		
-35	-35.1	58.4	7	14	14							Sat.	Gray, dark gray and tan, phosphatic SAND (A-3), with trace clay, contains shell fragments (DUPLIN FORMATION)	56.0
-40	-40.1	63.4	6	8	9							Sat.		
-45	-45.1	68.4	10	10	11							Sat.		
-50	-50.1	73.4	11	17	17							Sat.		
-55												Sat.		

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WBS 34360.1.1		TIP R-1015		COUNTY CRAVEN		GEOLOGIST Crenshaw, J. K.								
SITE DESCRIPTION Site 2 - Bridge No. 275 On US 70 Bypass Over NCRR Between US 70 and SR 1756							GROUND WTR (ft)							
BORING NO. EB2-B RL		STATION 141+13		OFFSET 58 ft RT		ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEV. 23.3 ft		TOTAL DEPTH 94.6 ft		NORTHING 408,611		EASTING 2,628,292		24 HR. 3.4						
DRILL RIG/HAMMER EFF./DATE GET0674 CME-45C 93% 03/22/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Donahue, T.		START DATE 05/10/18		COMP. DATE 05/10/18		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-55	-55.1	78.4	15	14	13								Match Line	
-60	-60.1	83.4	WOH	2	3							Sat.	Gray, dark gray and tan, phosphatic SAND (A-3), with trace clay, contains shell fragments (DUPLIN FORMATION) <i>(continued)</i>	81.0
-65	-65.1	88.4	23	28	43							Sat.	COASTAL PLAIN Gray, dark gray and tan, phosphatic SAND (A-3, A-2-4), with trace clay, contains shell fragments (RIVER BEND FORMATION)	86.0
-70	-70.1	93.4	55	75	25/0.2							Sat.		100/0.7
												Sat.	Boring Terminated at Elevation -71.3 ft in SAND (River Bend Formation)	94.6

## SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS- 110	55' LT	136+38	8.0-9.5	A-2-4(0)	NP	NP	0.4	80.9	5.0	13.7	100	100	31	46.2	-
SS- 134	49' LT	137+01	23.5-24.5	A-2-4(0)	NP	NP	50.9	32.5	3.3	13.3	100	73	18	35.6	-
SS- 139	49' LT	137+01	48.0-49.5	A-2-4(0)	21	1	7.7	63.0	9.7	19.6	100	97	33	53.3	-
SS- 49	52' LT	138+38	13.0-14.5	A-6(5)	32	14	12.6	33.4	20.8	33.2	100	98	58	32.6	-
SS- 50	52' LT	138+38	18.0-19.5	A-2-6(0)	31	12	35.1	33.9	3.6	27.4	99	81	31	22.8	-
SS- 58	52' LT	138+38	58.0-59.5	A-3(0)	NP	NP	77.6	16.0	0.7	5.7	100	78	7	17.0	-
SS- 25	73' LT	139+10	8.0-9.5	A-2-4(0)	NP	NP	1.9	85.3	1.7	11.7	100	100	15	25.4	-
SS- 5	40' LT	139+98	18.0-19.5	A-3(0)	NP	NP	76.1	19.7	0.6	4.6	96	59	5	19.1	-
ST- 4	58' LT	136+42	8.0-10.0	A-2-4(0)	NP	NP	0.1	86.1	1.9	11.9	100	100	15	30.5	-



Photo 1: Looking towards End Bent 2 and up station of -L-

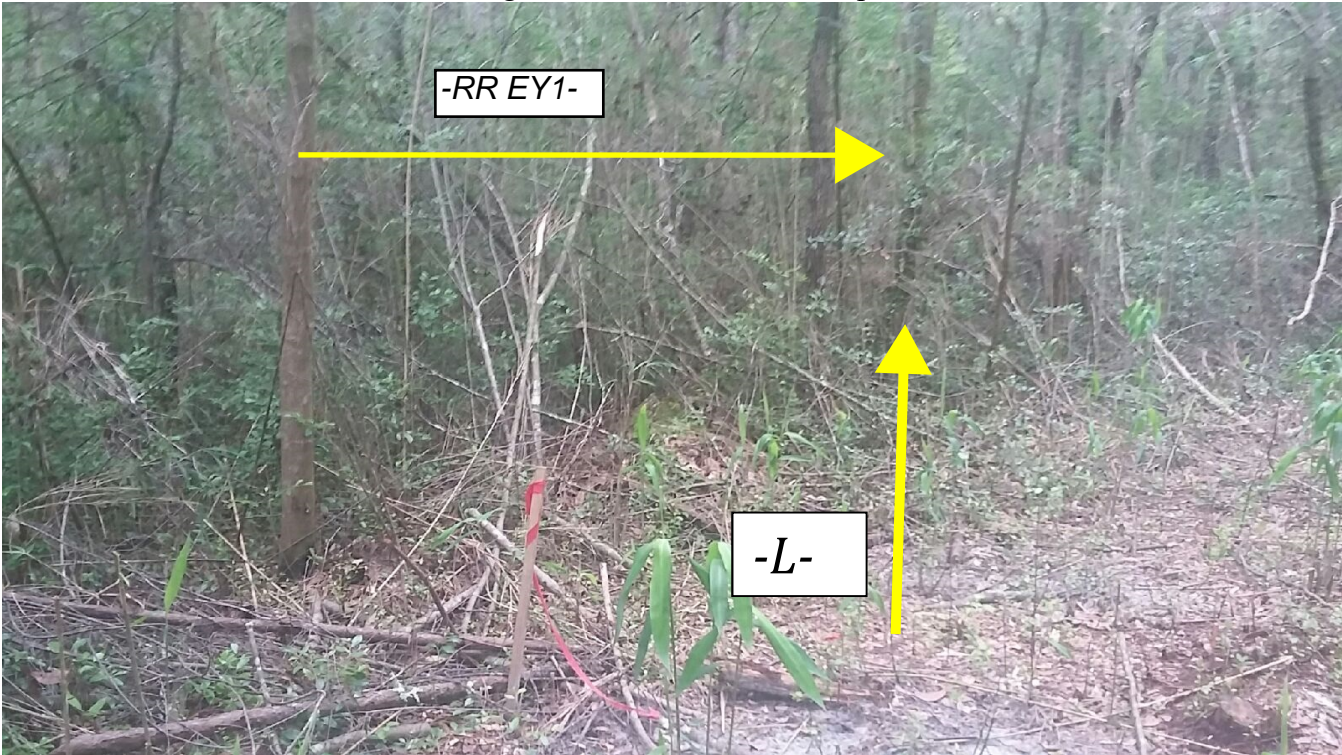


Photo 2: Looking towards End Bent 1 and down station of -L-

