

REFERENCE: SF-660013

PROJECT: 17BP.3.R.55

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ONslow
PROJECT DESCRIPTION BRIDGE NO.13 ON -L- (SR 1434)
OVER GRANTS CREEK

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-7	BORE LOGS & CORE REPORT
8	CORE PHOTOGRAPH
9	LAB TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-660013	1	9

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

C.J. CORNETTE

R.E. SMITH

D.E. PINTER

J.M. EDMONDSON

INVESTIGATED BY T.C. BOTTOMS

DRAWN BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE AUGUST 2017



DocuSigned by:

Tyler Bottoms

9/25/2017

48A2D3BD08CF4A6
SIGNATURE

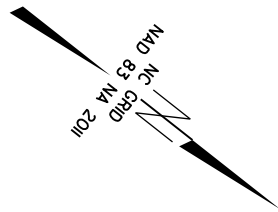
DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

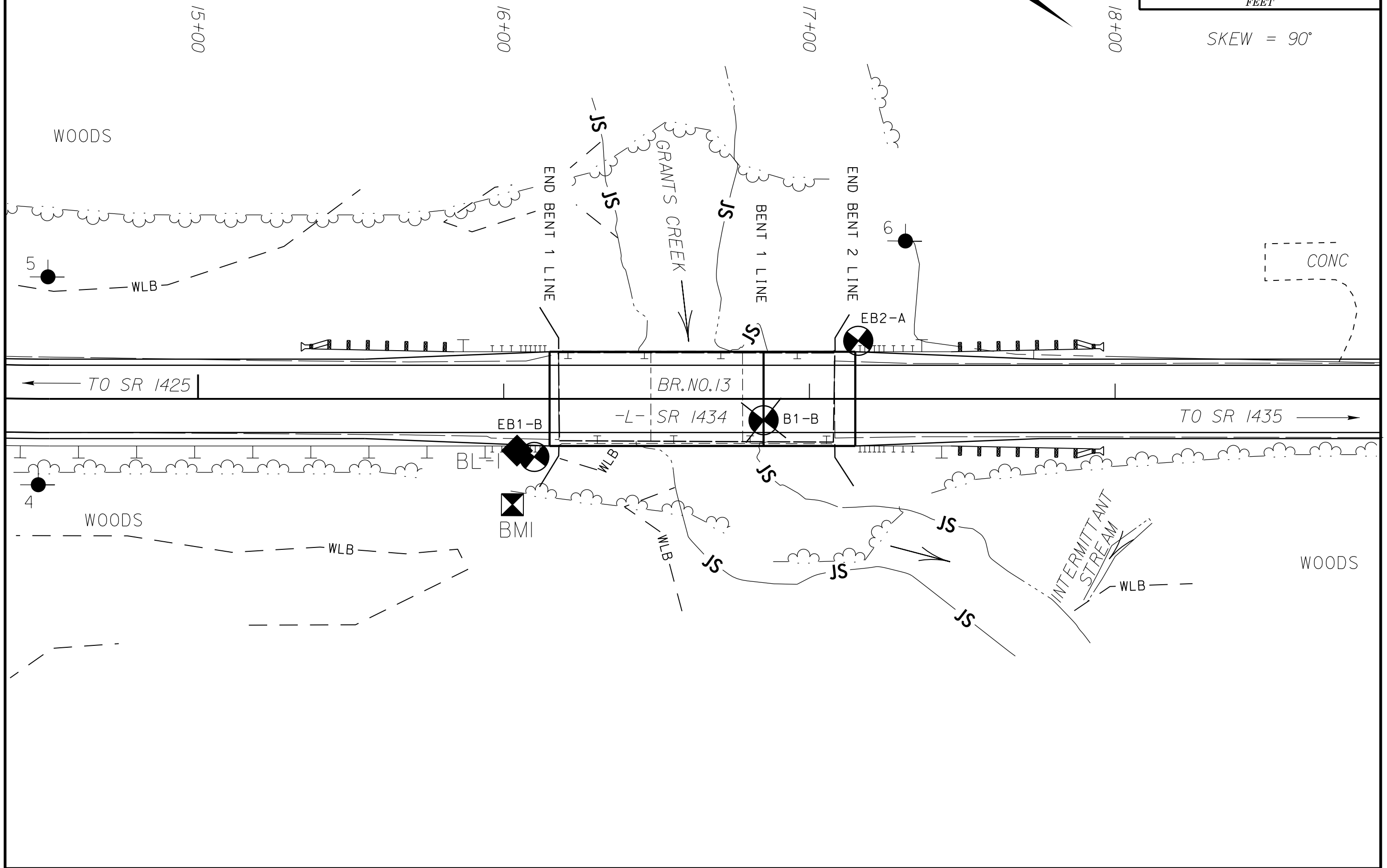
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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 (ASTM 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)										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 (ROD) - 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 (SROD) - 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.																																																																																																																																																															
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																																																																																																																																																																									
<table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-1-b</th> <th>A-3</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> </tr> <tr> <th>SYMBOL</th> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td></td> </tr> <tr> <th>% PASSING #10 #200</th> <td>50 MX</td> <td>30 MX</td> <td>15 MX</td> <td>25 MX</td> <td>10 MN</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MN</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td></td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="2">-</td> <td colspan="2">-</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td></td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="2">0</td> <td colspan="2">0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="5">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">POOR</td> <td colspan="5">UNSATURABLE</td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL	[Pattern]					[Pattern]					[Pattern]						% PASSING #10 #200	50 MX	30 MX	15 MX	25 MX	10 MN	35 MX	35 MX	35 MX	35 MX	35 MX	35 MN	36 MN	36 MN	36 MN	36 MN		MATERIAL PASSING #40 LL PI	-		-		40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN		GROUP INDEX	0		0		0	4 MX	8 MX	12 MX	16 MX	NO MX								USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC SOILS					GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR					POOR					UNSATURABLE					<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>PERCENTAGE OF MATERIAL</p> <p>GROUND WATER</p> <p>MISCELLANEOUS SYMBOLS</p> <p>RECOMMENDATION SYMBOLS</p> <p>ABBREVIATIONS</p> <p>EQUIPMENT USED ON SUBJECT PROJECT</p>										<p>FRESH</p> <p>VERY SLIGHT (V SLI.)</p> <p>SLIGHT (SLI.)</p> <p>MODERATE (MOD.)</p> <p>MODERATELY SEVERE (MOD. SEV.)</p> <p>SEVERE (SEV.)</p> <p>VERY SEVERE (V SEV.)</p> <p>COMPLETE</p> <p>ROCK HARDNESS</p> <p>FRACTURE SPACING</p> <p>BEDDING</p> <p>INDURATION</p>										<p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p> <p>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</p> <p>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</p> <p>U.S. STD. SIEVE SIZE OPENING (MM)</p> <p>BOULDER (BLDR.)</p> <p>COBBLE (COB.)</p> <p>GRAVEL (GR.)</p> <p>COARSE SAND (CSE. SD.)</p> <p>FINE SAND (F SD.)</p> <p>SILT (SL.)</p> <p>CLAY (CL.)</p> <p>GRAIN SIZE</p> <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <p>PLASTICITY</p> <p>PLASTICITY INDEX (PI)</p> <p>DRY STRENGTH</p> <p>COLOR</p>									
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																																																																																																		
GROUP CLASS.	A-1	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																																																																																														
SYMBOL	[Pattern]					[Pattern]					[Pattern]																																																																																																																																																																																		
% PASSING #10 #200	50 MX	30 MX	15 MX	25 MX	10 MN	35 MX	35 MX	35 MX	35 MX	35 MX	35 MN	36 MN	36 MN	36 MN	36 MN																																																																																																																																																																														
MATERIAL PASSING #40 LL PI	-		-		40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN																																																																																																																																																																													
GROUP INDEX	0		0		0	4 MX	8 MX	12 MX	16 MX	NO MX																																																																																																																																																																																			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC SOILS																																																																																																																																																																													
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR					POOR					UNSATURABLE																																																																																																																																																																								
<p>COMPACTNESS OR CONSISTENCY</p> <p>VERY LOOSE</p> <p>LOOSE</p> <p>MEDIUM DENSE</p> <p>DENSE</p> <p>VERY DENSE</p> <p>VERY SOFT</p> <p>SOFT</p> <p>MEDIUM STIFF</p> <p>STIFF</p> <p>VERY STIFF</p> <p>HARD</p>										<p>ORGANIC MATERIAL</p> <p>TRACE OF ORGANIC MATTER</p> <p>LITTLE ORGANIC MATTER</p> <p>MODERATELY ORGANIC</p> <p>HIGHLY ORGANIC</p>										<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i></p> <p>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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i></p> <p>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.</p>										<p>EXCELLENT TO GOOD</p> <p>FAIR TO POOR</p> <p>FAIR TO POOR</p> <p>POOR</p> <p>UNSATURABLE</p>																																																																																																																																																															
<p>TEXTURE OR GRAIN SIZE</p> <p>U.S. STD. SIEVE SIZE OPENING (MM)</p> <p>BOULDER (BLDR.)</p> <p>COBBLE (COB.)</p> <p>GRAVEL (GR.)</p> <p>COARSE SAND (CSE. SD.)</p> <p>FINE SAND (F SD.)</p> <p>SILT (SL.)</p> <p>CLAY (CL.)</p> <p>GRAIN SIZE</p>										<p>UNDERCUT</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>VERY HARD</p> <p>HARD</p> <p>MODERATELY HARD</p> <p>MEDIUM HARD</p> <p>SOFT</p> <p>VERY SOFT</p>										<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</p> <p>FIELD MOISTURE DESCRIPTION</p> <p>GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LIQUID LIMIT</p> <p>WET - (W)</p> <p>PLASTIC LIMIT</p> <p>OPTIMUM MOISTURE SHRINKAGE LIMIT</p> <p>MOIST - (M)</p> <p>DRY - (D)</p>																																																																																																																																																															
<p>PLASTICITY</p> <p>NON PLASTIC</p> <p>SLIGHTLY PLASTIC</p> <p>MODERATELY PLASTIC</p> <p>HIGHLY PLASTIC</p>										<p>ADVANCING TOOLS</p> <p>CLAY BITS</p> <p>6" CONTINUOUS FLIGHT AUGER</p> <p>8" HOLLOW AUGERS</p> <p>HARD FACED FINGER BITS</p> <p>TUNG-CARBIDE INSERTS</p> <p>CASING</p> <p>TRICONE</p> <p>TRICONE</p> <p>CORE BIT</p>										<p>HAMMER TYPE:</p> <p>AUTOMATIC</p> <p>MANUAL</p> <p>CORE SIZE:</p> <p>B</p> <p>H</p> <p>N</p> <p>HAND TOOLS:</p> <p>POST HOLE DIGGER</p> <p>HAND AUGER</p> <p>SOUNDING ROD</p> <p>VANE SHEAR TEST</p>										<p>FRAGILE</p> <p>MODERATELY INDURATED</p> <p>INDURATED</p> <p>EXTREMELY INDURATED</p>																																																																																																																																																															
<p>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.</p>										<p>DRILL UNITS:</p> <p>CME-45C</p> <p>CME-55</p> <p>CME-550</p> <p>VANE SHEAR TEST</p> <p>PORTABLE HOIST</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>BENCH MARK: BL-1</p> <p>N=386455.4573 E=2536361.0833</p> <p>ELEVATION: 9.12 FEET</p> <p>NOTES:</p> <p>FIAD: FILLED IMMEDIATELY AFTER DRILLING</p>																																																																																																																																																															

PROJECT REFERENCE NO.	SHEET NO.
SF-660013	3
SITE PLAN	
 0 30 60 FEET	



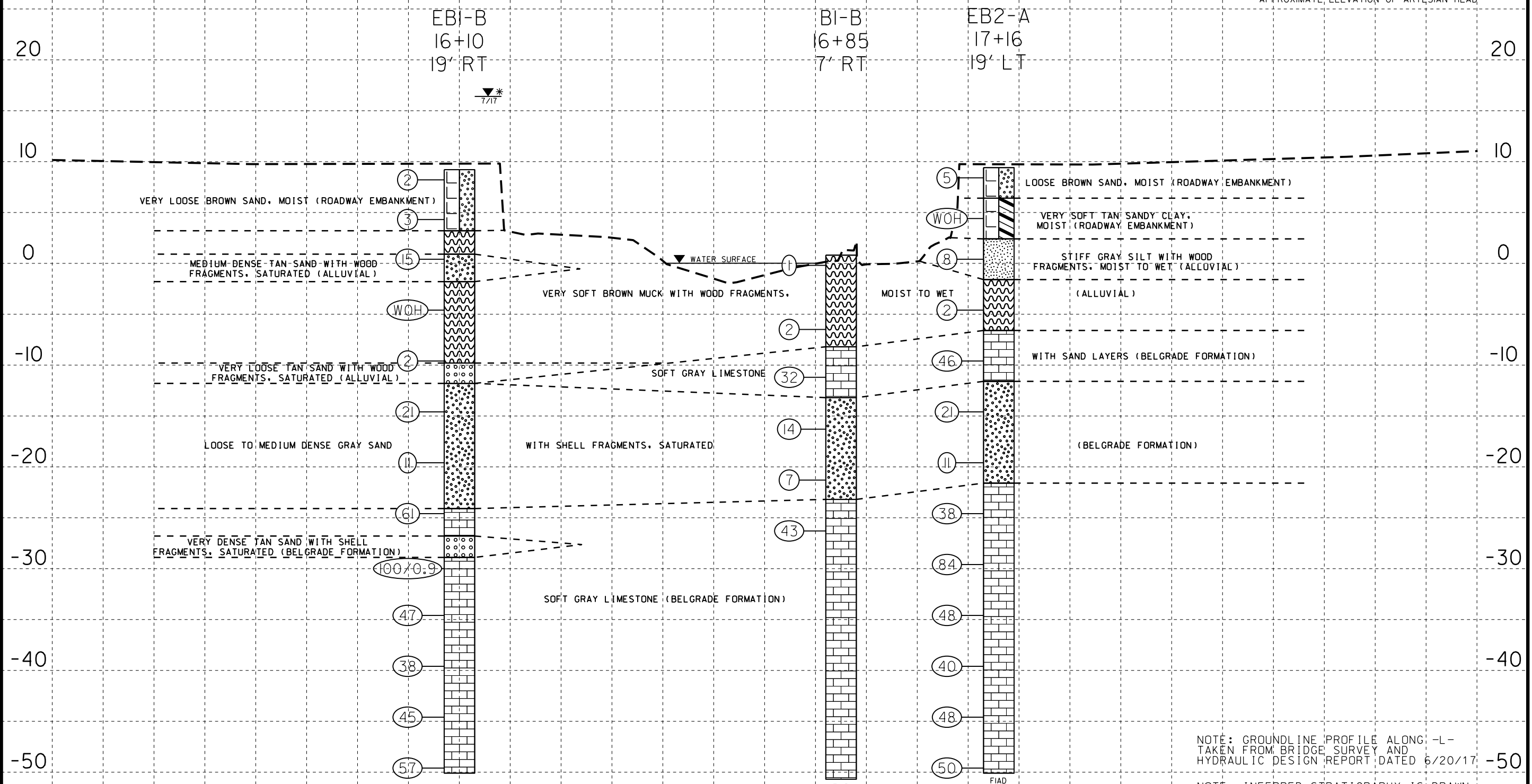
SKEW = 90°



PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE=2

▼* APPROXIMATE ELEVATION OF ARTESIAN HEAD



NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 6/20/17

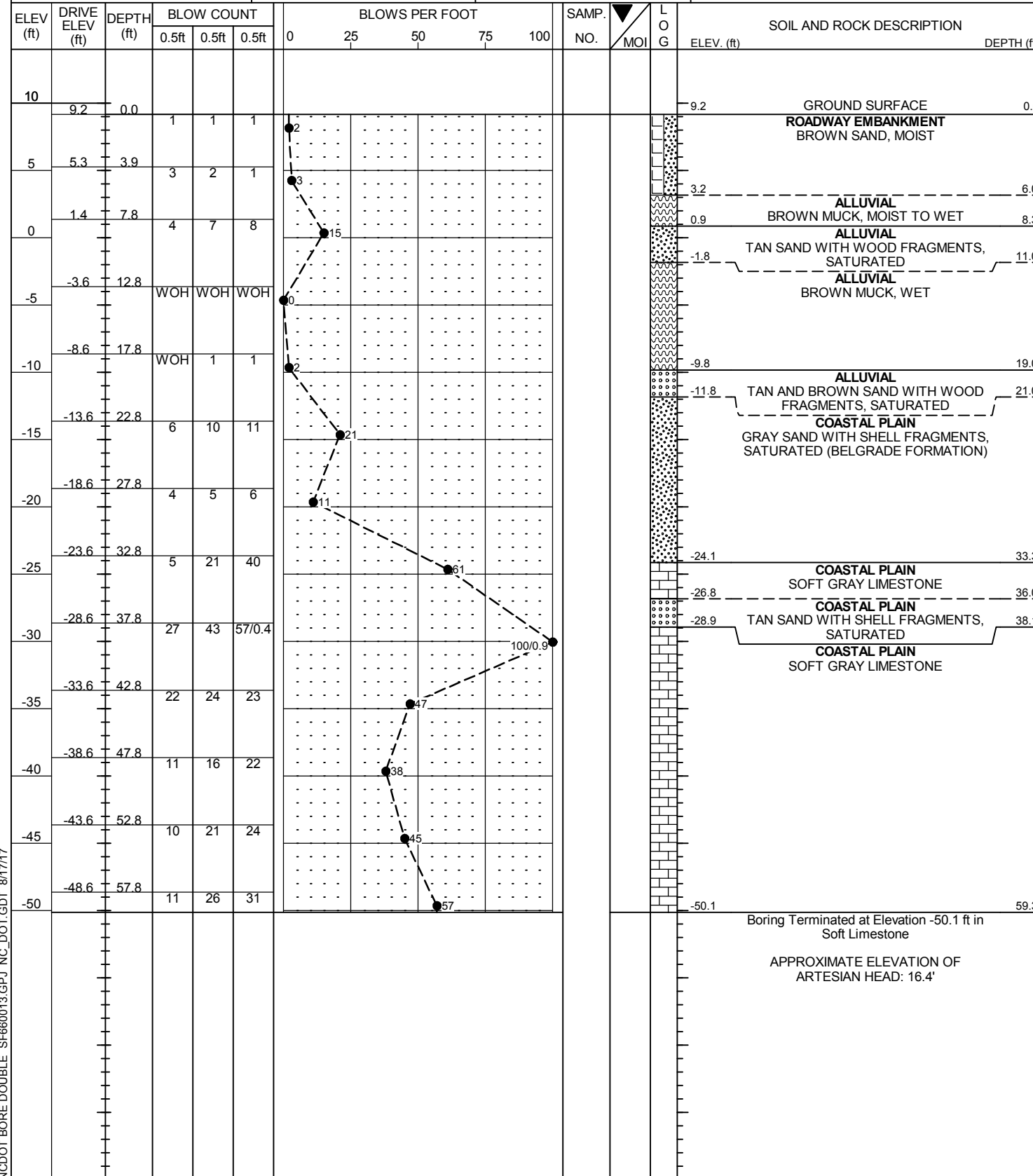
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

5/14/99
 0:\AUG-2017 13:32
 S:\ERDC\greenville_investigation\TIP_SF660013_GEO_BRD00013\CADD_GEO\TECHN\Plan\Prof\660013_Rdy.plt.dgn
 \$\$\$\$

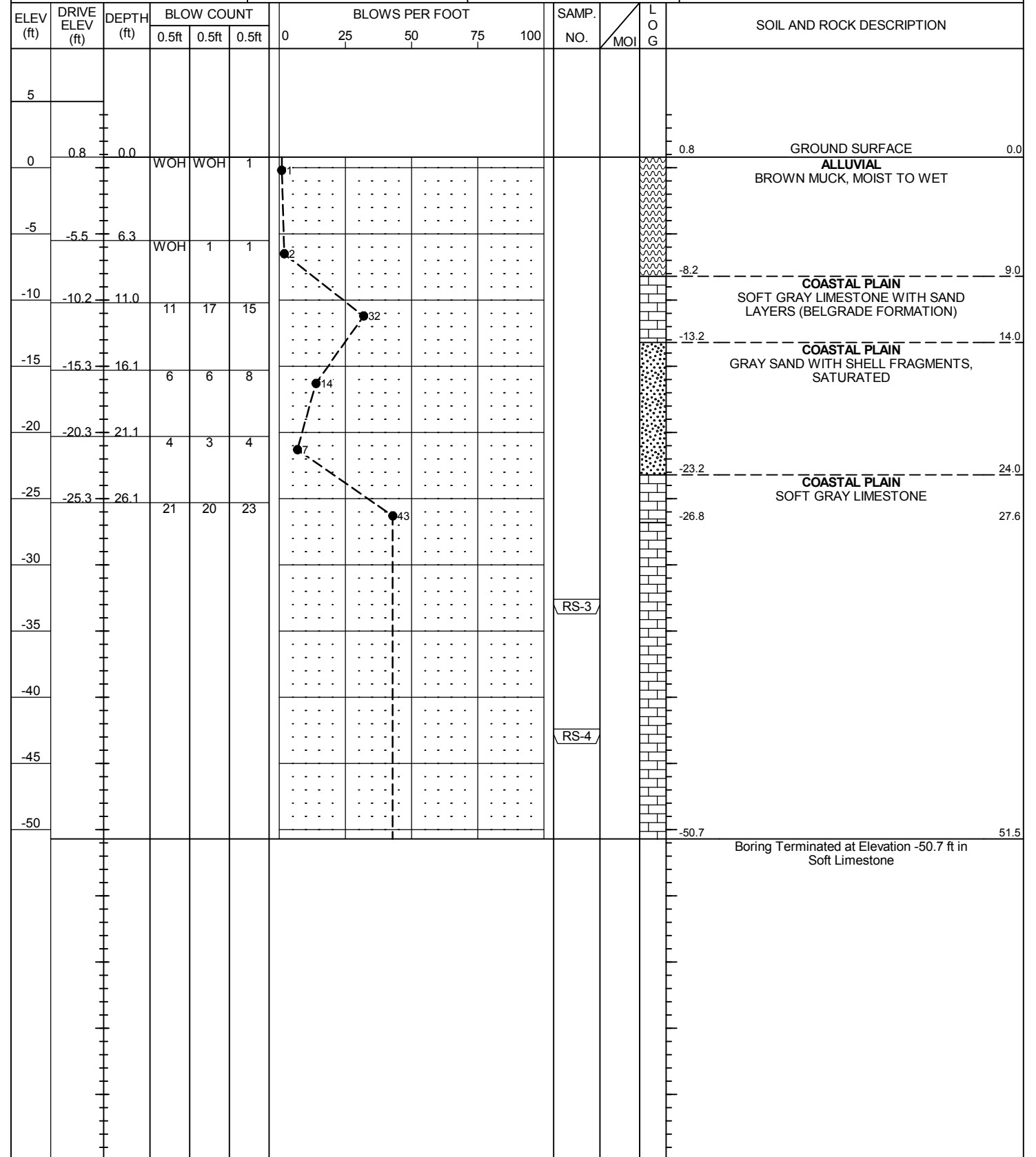
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.3.R.55	TIP SF-660013	COUNTY ONSLOW	GEOLOGIST Cornette, C.J.
SITE DESCRIPTION BRIDGE NO. 13 ON -L- (SR 1434) OVER GRANTS CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+10	OFFSET 19 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.2 ft	TOTAL DEPTH 59.3 ft	NORTHING 386,461	EASTING 2,536,359
DRILL RIG/HAMMER EFF./DATE GFO0057 CME-550X 76% 06/13/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Smith, R. E.	START DATE 07/19/17	COMP. DATE 07/19/17	SURFACE WATER DEPTH N/A



WBS 17BP.3.R.55	TIP SF-660013	COUNTY ONSLOW	GEOLOGIST Cornette, C.J.
SITE DESCRIPTION BRIDGE NO. 13 ON -L- (SR 1434) OVER GRANTS CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 16+85	OFFSET 7 ft RT	ALIGNMENT -L-
COLLAR ELEV. 0.8 ft	TOTAL DEPTH 51.5 ft	NORTHING 386,513	EASTING 2,536,303
DRILL RIG/HAMMER EFF./DATE GFO0057 CME-550X 76% 06/13/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 07/26/17	COMP. DATE 07/26/17	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE SF660013.GPJ NC_DOT.GDT 8/17/17

Boring Terminated at Elevation -50.1 ft in
Soft Limestone

APPROXIMATE ELEVATION OF
ARTESIAN HEAD: 16.4'

Boring Terminated at Elevation -50.7 ft in
Soft Limestone

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 17BP.3.R.55		TIP SF-660013		COUNTY ONSLOW		GEOLOGIST Cornette, C.J.					
SITE DESCRIPTION BRIDGE NO. 13 ON -L- (SR 1434) OVER GRANTS CREEK							GROUND WTR (ft)				
BORING NO. B1-B		STATION 16+85		OFFSET 7 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 0.8 ft		TOTAL DEPTH 51.5 ft		NORTHING 386,513		EASTING 2,536,303					
DRILL RIG/HAMMER EFF./DATE GFO0057 CME-550X 76% 06/13/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER Pinter, D. G.		START DATE 07/26/17		COMP. DATE 07/26/17		SURFACE WATER DEPTH N/A					
CORE SIZE N		TOTAL RUN 23.9 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
-26.78	-26.8	27.6	4.5	0:35/1.0 0:12/1.0 0:13/1.0 0:10/1.0 0:13/0.5	(2.5) 56%	(0.3) 7%	(8.7) 36%	(1.5) 6%		Begin Coring @ 27.6 ft SOFT GRAY LIMESTONE	27.6
-30	-31.3	32.1	5.0	0:09/1.0 0:17/1.0 1:37/1.0 1:22/1.0 1:30/1.0	(2.1) 42%	(0.5) 10%				RS-3	
-35	-36.3	37.1	5.0	1:36/1.0 0:34/1.0 2:02/1.0 1:22/1.0 0:35/1.0	(0.7) 14%	(0.0) 0%					
-40	-41.3	42.1	5.0	2:05/1.0 0:27/1.0	(2.2) 44%	(0.7) 14%					
-45	-46.3	47.1	4.4	0:47/1.0 1:00/1.0 1:07/1.0	(1.2) 27%	(0.0) 0%					
-50	-50.7	51.5	3.09/0.4	1:02/1.0 0:54/1.0 0:36/1.0 0:40/1.0							Boring Terminated at Elevation -50.7 ft in Soft Limestone

NCDOT CORE DOUBLE SF660013.GPJ NC_DOT.GDT 8/17/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.3.R.55	TIP SF-660013	COUNTY ONSLOW	GEOLOGIST Cornette, C.J.
SITE DESCRIPTION BRIDGE NO. 13 ON -L- (SR 1434) OVER GRANTS CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 17+16	OFFSET 19 ft LT	ALIGNMENT -L-
COLLAR ELEV. 9.4 ft	TOTAL DEPTH 59.5 ft	NORTHING 386,524	EASTING 2,536,263
DRILL RIG/HAMMER EFF./DATE GFO0057 CME-550X 76% 06/13/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Smith, R. E.	START DATE 07/19/17	COMP. DATE 07/20/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
10	9.4	0.0												9.4	0.0	GROUND SURFACE	
			WOH	2	3									6.4	3.0	ROADWAY EMBANKMENT BROWN SAND, MOIST	
5	5.4	4.0	WOH	WOH	WOH									2.4	7.0	ROADWAY EMBANKMENT TAN SANDY CLAY, MOIST	
0	1.4	8.0		2	2	6								-1.7	11.0	ALLUVIAL GRAY SILT WITH WOOD FRAGMENTS, MOIST TO WET	
-5	-3.7	13.0		2	1	1								-6.7	16.0	ALLUVIAL BROWN MUCK, WET	
-10	-8.7	18.0		13	25	21								-11.7	21.0	COASTAL PLAIN SOFT GRAY LIMESTONE WITH SAND LAYERS (BELGRADE FORMATION)	
-15	-13.7	23.0		7	9	12								-21.7	31.0	COASTAL PLAIN GRAY SAND WITH SHELL FRAGMENTS, SATURATED	
-20	-18.7	28.0		5	5	6										COASTAL PLAIN SOFT GRAY LIMESTONE	
-25	-23.7	33.0		15	18	20											
-30	-28.7	38.0		15	36	48											
-35	-33.7	43.0		15	26	22											
-40	-38.7	48.0		17	21	19											
-45	-43.7	53.0		15	18	30											
-50	-48.7	58.0		18	21	29											
																	Boring Terminated at Elevation -50.2 ft in Soft Limestone

NCDOT BORE DOUBLE SF660013.GPJ NC_DOT.GDT 8/17/17

CORE PHOTOGRAPH
B1-B
27.6' TO 51.5'



LAB TEST RESULTS

<i>SAMPLE NO.</i>	<i>OFFSET</i>	<i>STATION</i>	<i>DEPTH INTERVAL</i>	<i>ROCK TYPE</i>	<i>UNCONFINED STRENGTH (psi)</i>	<i>UNDRAINED SHEAR STRENGTH (psi)</i>	<i>RATE OF STRAIN (in/min)</i>	<i>STRAIN AT FAILURE (%)</i>
<i>RS-3</i>	<i>7' RT</i>	<i>16 + 85</i>	<i>33.4-33.8</i>	<i>LIMESTONE</i>	<i>675.250</i>	<i>337.625</i>	<i>0.03</i>	<i>0.5</i>
<i>RS-4</i>	<i>7' RT</i>	<i>16 + 85</i>	<i>43.2-43.6</i>	<i>LIMESTONE</i>	<i>80.722</i>	<i>40.361</i>	<i>0.03</i>	<i>0.2</i>