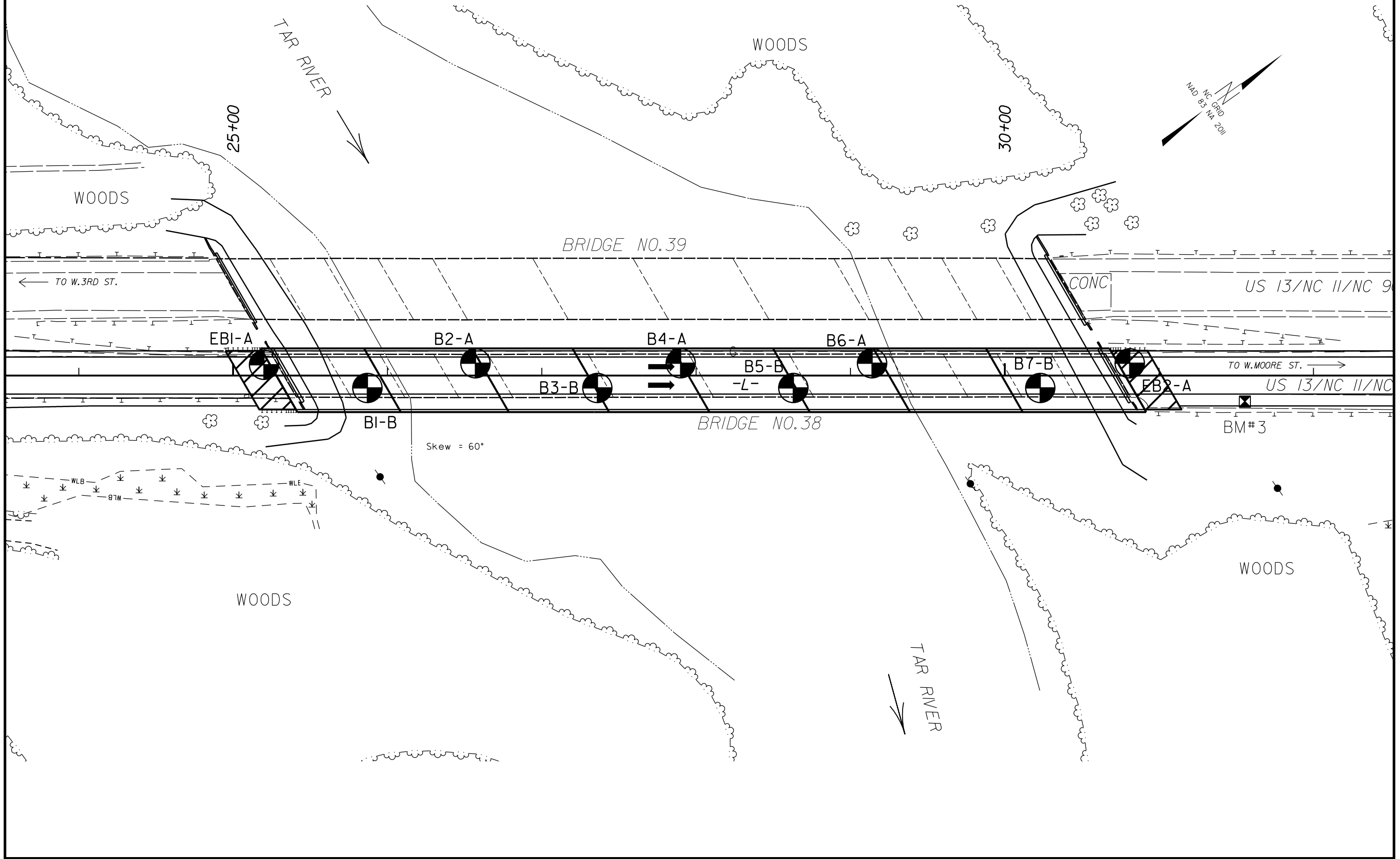
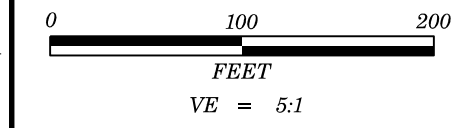


**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																																																																																																																																																																																															
<p>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, <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>				<p>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.</p>				<p>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:</p>				<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS 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 O.D. 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.</p>																																																																																																																																																																																																																																																															
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1-a</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> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>SYMBOL</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>% PASSING</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>*10</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>*40</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>*200</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>MATERIAL PASSING #40</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>LL</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>PI</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="7"></td> <td colspan="7"></td> <td colspan="3"></td> </tr> </table>				GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			A-1-a	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				GROUP CLASS.																		SYMBOL																		% PASSING																		*10																		*40																		*200																		MATERIAL PASSING #40																		LL																		PI																		GROUP INDEX																		USUAL TYPES OF MAJOR MATERIALS																		GEN. RATING AS SUBGRADE																		<p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p>WEATHERING</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.</p>			
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS																																																																																																																																																																																																																																																												
	A-1-a	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																																																																																																																																																																																																																																																												
GROUP CLASS.																																																																																																																																																																																																																																																																											
SYMBOL																																																																																																																																																																																																																																																																											
% PASSING																																																																																																																																																																																																																																																																											
*10																																																																																																																																																																																																																																																																											
*40																																																																																																																																																																																																																																																																											
*200																																																																																																																																																																																																																																																																											
MATERIAL PASSING #40																																																																																																																																																																																																																																																																											
LL																																																																																																																																																																																																																																																																											
PI																																																																																																																																																																																																																																																																											
GROUP INDEX																																																																																																																																																																																																																																																																											
USUAL TYPES OF MAJOR MATERIALS																																																																																																																																																																																																																																																																											
GEN. RATING AS SUBGRADE																																																																																																																																																																																																																																																																											
<p>CONSISTENCY OR DENSENESS</p> <table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </table>				PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	<p>GROUND WATER</p> <p>▽ 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</p>				<p>WEATHERING</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.</p>																																																																																																																																																																																																																																																							
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																																																																																																																																																																								
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A																																																																																																																																																																																																																																																																								
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4																																																																																																																																																																																																																																																																								
<p>TEXTURE OR GRAIN SIZE</p> <table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CSE. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>395</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>SIZE</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)							COBBLE (COB.)							GRAVEL (GR.)							COARSE SAND (CSE. SD.)							FINE SAND (F. SD.)							SILT (SL.)							CLAY (CL.)							GRAIN SIZE	395	75	2.0	0.25	0.05	0.005	SIZE	12	3					<p>MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES 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</p>																																																																																																																																																																																										
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																																																																																																																																																																																					
	4.76	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																																																																																																																					
BOULDER (BLDR.)																																																																																																																																																																																																																																																																											
COBBLE (COB.)																																																																																																																																																																																																																																																																											
GRAVEL (GR.)																																																																																																																																																																																																																																																																											
COARSE SAND (CSE. SD.)																																																																																																																																																																																																																																																																											
FINE SAND (F. SD.)																																																																																																																																																																																																																																																																											
SILT (SL.)																																																																																																																																																																																																																																																																											
CLAY (CL.)																																																																																																																																																																																																																																																																											
GRAIN SIZE	395	75	2.0	0.25	0.05	0.005																																																																																																																																																																																																																																																																					
SIZE	12	3																																																																																																																																																																																																																																																																									
<p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td rowspan="2">LL - LIQUID LIMIT PL - PLASTIC LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td rowspan="2">OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>				SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT PL - PLASTIC LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<p>RECOMMENDATION SYMBOLS</p> <p>UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>																																																																																																																																																																																																																																																										
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																																																																																																																									
LL - LIQUID LIMIT PL - PLASTIC LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																																																																																																																									
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																									
OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																																																																																																									
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																									
<p>PLASTICITY</p> <table border="1"> <tr> <th>NON PLASTIC</th> <th>SLIGHTLY PLASTIC</th> <th>MODERATELY PLASTIC</th> <th>HIGHLY PLASTIC</th> </tr> <tr> <td>0-5</td> <td>6-15</td> <td>16-25</td> <td>26 OR MORE</td> </tr> <tr> <td>VERY LOW</td> <td>SLIGHT</td> <td>MEDIUM</td> <td>HIGH</td> </tr> </table>				NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC	0-5	6-15	16-25	26 OR MORE	VERY LOW	SLIGHT	MEDIUM	HIGH	<p>ABBREVIATIONS</p> <p>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</p> <p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W_g - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>																																																																																																																																																																																																																																																											
NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC																																																																																																																																																																																																																																																																								
0-5	6-15	16-25	26 OR MORE																																																																																																																																																																																																																																																																								
VERY LOW	SLIGHT	MEDIUM	HIGH																																																																																																																																																																																																																																																																								
<p>EQUIPMENT USED ON SUBJECT PROJECT</p> <p>DRILL UNITS: <input checked="" type="checkbox"/> CME-450 <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 2.25" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE STEEL TEETH <input checked="" type="checkbox"/> TRICONE 2(15/16)" TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>				<p>ROCK HARDNESS</p> <p>VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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.</p>																																																																																																																																																																																																																																																																							
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>				<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																																								
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																																																																																																																																																																																																																																																																										
<p>COLOR</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>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																																								
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																																																																																																																																																																																																																																																																										
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>				<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>																																																																																																																																																																																																																																																																							
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>				<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>																																																																																																																																																																																																																																																																							
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>				<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>																																																																																																																																																																																																																																																																							
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>				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																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
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																																																																																																																																																																																																																																																																										
<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>				<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>																																																																																																																																																																																																																																																																							
<p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>				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	<p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 -</td></tr></table>				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 -																																																																																																																																																																																																																																												
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																																																																																																																																																																																																																																																																										
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 -																																																																																																																																																																																																																																																																										

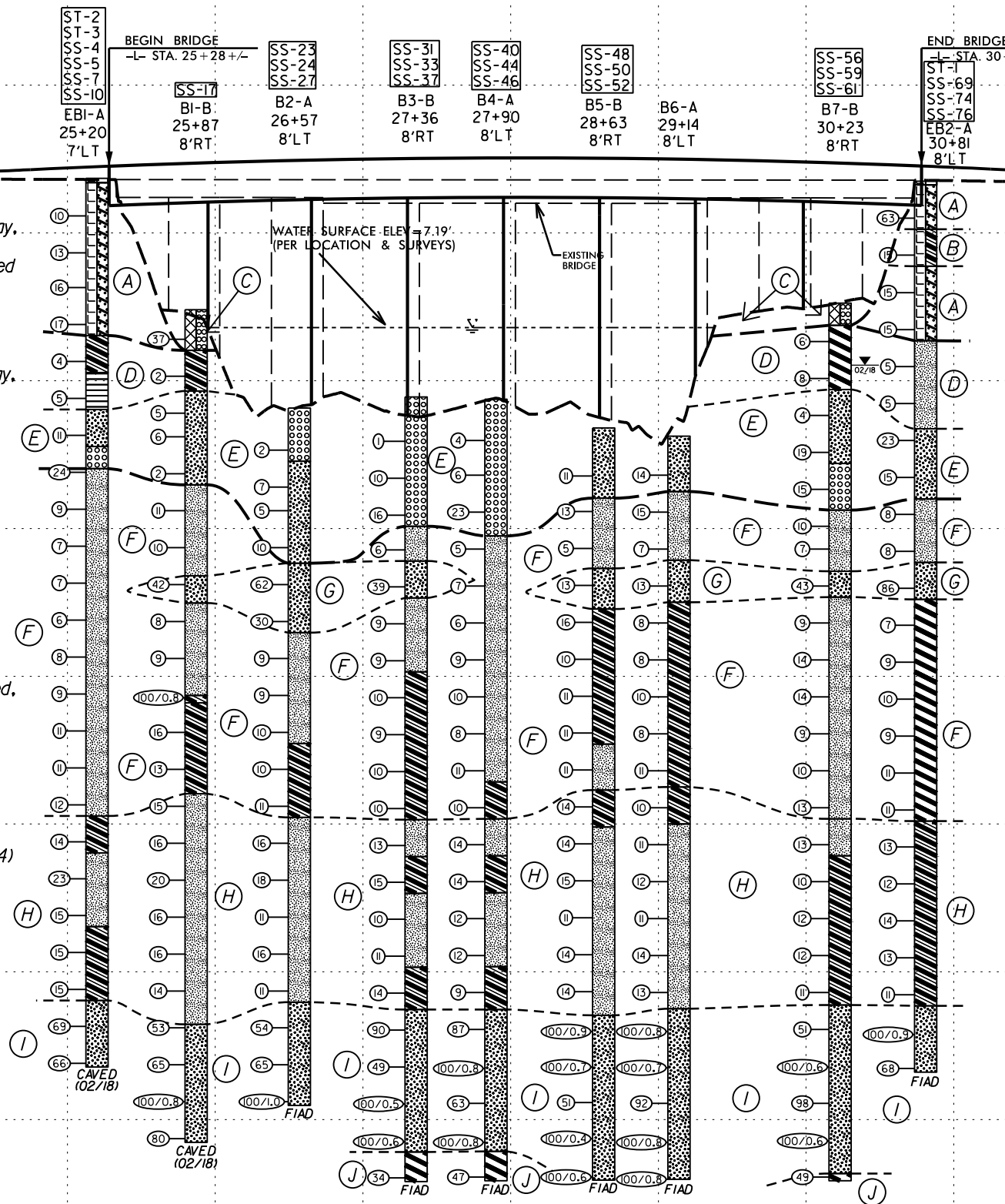




BEGIN GRADE
-L- STA. 22+00.00
ELEV=27.86'

END GRADE
-L- STA. 34+50.00
ELEV=25.91'

- (A) **ROADWAY EMBANKMENT:** orange-brown and gray, moist to wet, medium dense to very dense, clayey SAND (A-2-6) with trace organics and fossilized shell fragments
- (B) **ROADWAY EMBANKMENT:** gray, moist, stiff, sandy CLAY (A-6)
- (C) **ARTIFICIAL FILL (ENGINEERED):** brown and gray, moist to saturated, dense, GRAVEL (A-1-a) with some sand, cobbles and boulders (rip rap)
- (D) **ALLUVIAL:** brown, gray to dark gray, mottled yellow-brown and orange-brown, moist to saturated, soft to stiff, fine sandy CLAY (A-6) with some silt, clayey SILT (A-5) with some fine sand, highly sandy, silty CLAY (A-7-6), and highly clayey, sandy SILT (A-4) with moderate to trace organics and wood fragments
- (E) **ALLUVIAL:** gray, brown, and orange-brown, saturated, very loose to medium dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b) with some to trace gravel and wood fragments
- (F) **COASTAL PLAIN (YORKTOWN FORMATION):** blue-gray, dark gray, and dark green-gray, moist to wet, medium stiff to hard, sandy SILT (A-4) with some to little clay, fine sandy CLAY (A-6), and highly sandy, silty CLAY (A-7-6), some to trace fossilized shell fragments with locally highly fossiliferous zones, slightly calcareous, some to trace mica
- (G) **COASTAL PLAIN (YORKTOWN FORMATION):** blue-gray and dark green-gray, moist to saturated, medium dense to very dense, silty fine SAND (A-2-4) with little to trace clay, some mica, and trace fossilized shell fragments
- (H) **COASTAL PLAIN (PEEDEE FORMATION):** dark green-gray, dark gray, and blue-gray, moist to saturated, stiff to very stiff, fine sandy SILT (A-4) with little clay, and fine sandy CLAY (A-6) with some to trace mica and trace fossilized shell fragments, glauconitic
- (I) **COASTAL PLAIN (BLACK CREEK FORMATION):** light to dark gray, and green-gray, moist to saturated, dense to very dense, silty SAND (A-2-4) with little clay (v. thin seams), some mica, and little to trace lignite
- (J) **COASTAL PLAIN (CAPE FEAR FORMATION):** pale gray to gray, and mottled yellow-brown, moist, hard, highly sandy, silty CLAY (A-7-6)



Note: Existing ground-line generated along -L- profile from B4786.ls_fin.fin. Stratigraphy shown is drawn through offset borings with both projected onto the -L- profile.

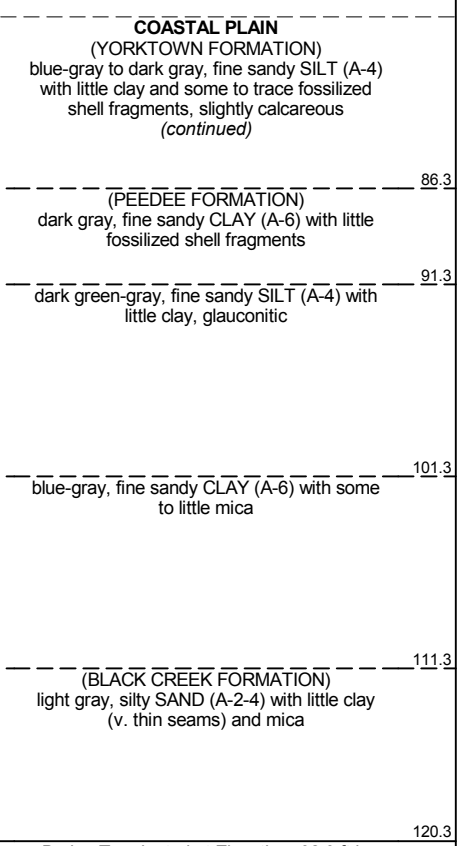
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.									
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 25+20		OFFSET 7 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 27.4 ft		TOTAL DEPTH 120.3 ft		NORTHING 683,600		EASTING 2,478,308									
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.G.		START DATE 01/31/18		COMP. DATE 01/31/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
30															
25	23.3	4.1	5	4	6										
20	18.3	9.1	4	5	8										
15	13.6	13.8	2	8	8										
10	8.6	18.8	4	9	8										
5	3.6	23.8	2	2	2										
0	-1.4	28.8	1	2	3										
-5	-6.4	33.8	2	5	6										
-10	-11.4	38.8	18	16	8										
-15	-16.4	43.8	3	3	6										
-20	-21.4	48.8	2	3	4										
-25	-26.4	53.8	6	3	4										
-30	-31.4	58.8	3	3	3										
-35	-36.4	63.8	3	3	5										
-40	-41.4	68.8	3	4	5										
-45	-46.4	73.8	4	5	6										
-50															

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.									
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 25+20		OFFSET 7 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 27.4 ft		TOTAL DEPTH 120.3 ft		NORTHING 683,600		EASTING 2,478,308									
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.G.		START DATE 01/31/18		COMP. DATE 01/31/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-50	-51.4	78.8	3	5	6										
-55	-56.4	83.8	4	6	6										
-60	-61.4	88.8	5	6	8										
-65	-66.4	93.8	7	10	13										
-70	-71.4	98.8	5	7	8										
-75	-76.4	103.8	5	6	9										
-80	-81.4	108.8	5	7	8										
-85	-86.4	113.8	10	27	42										
-90	-91.4	118.8	18	34	32										

NCDOT BORE DOUBLE B4786_GEO_BRDG0038_GINT_SUMMIT.GPJ_NC_DOT.GDT 4/11/18

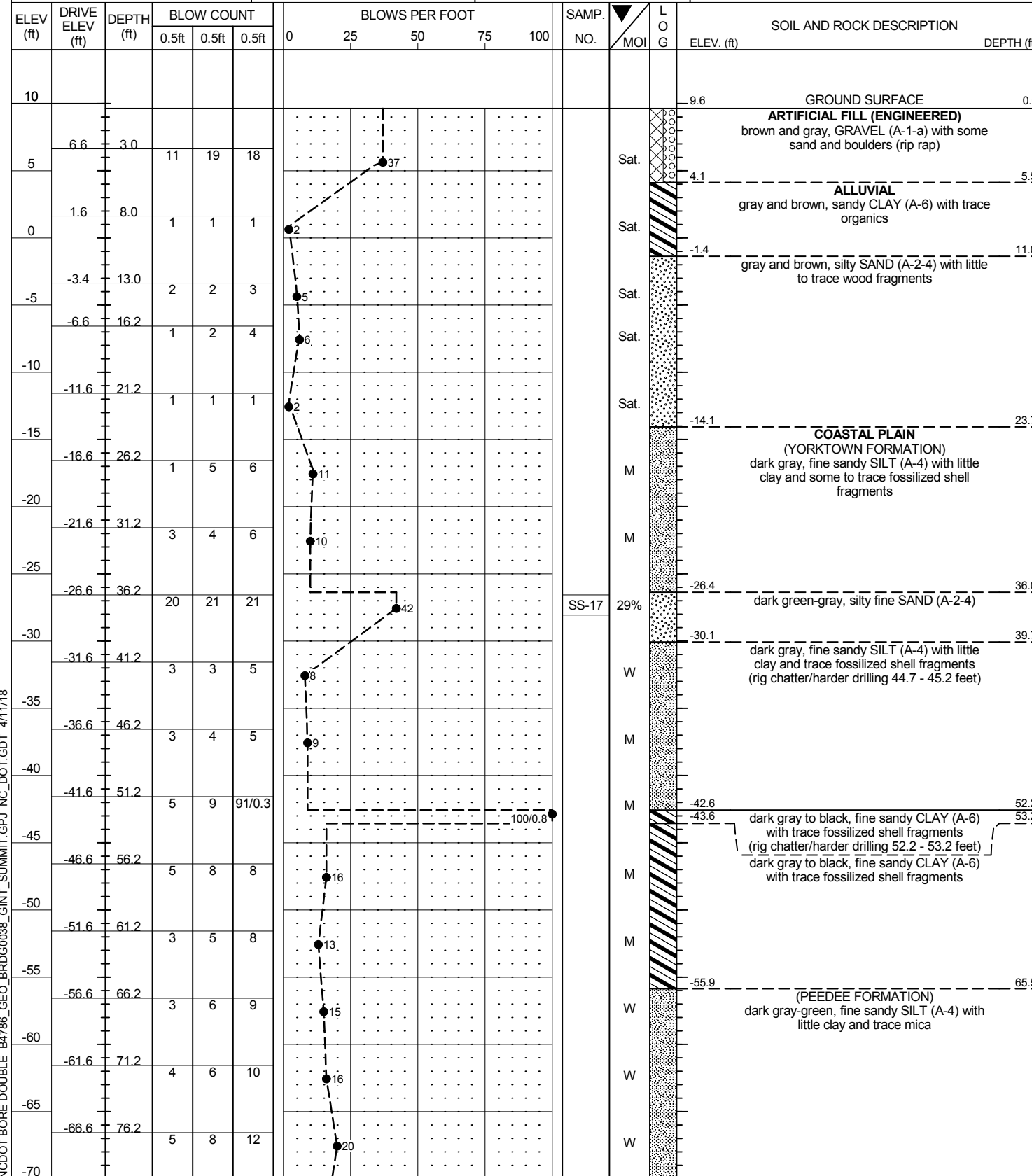


Notes:
 - Asphalt (0.0 - 0.6 feet)
 - Switched from Hollow Stem Augers to Casing/Mud Rotary after SPT at 9.1 feet.
 - ST-2 (STA: 25+13, OFF: 7'LT, DEPTH: 24.3' - 26.3')
 - ST-3 (STA: 25+13, OFF: 7'LT, DEPTH: 26.3' - 28.3')

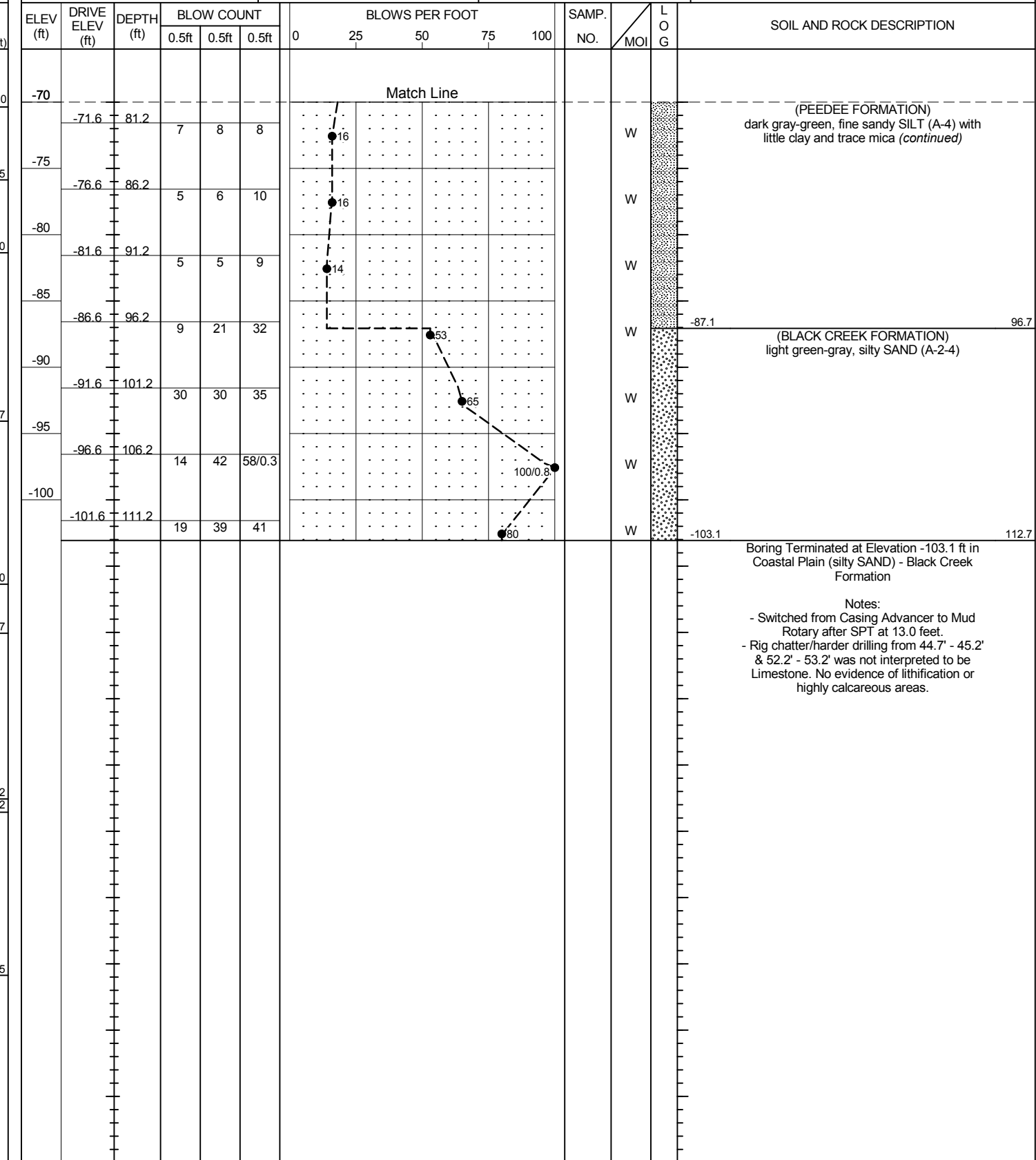
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38222.1.FR2	TIP B-4786	COUNTY PITT	GEOLOGIST Worley, B.
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville			GROUND WTR (ft)
BORING NO. B1-B	STATION 25+87	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.6 ft	TOTAL DEPTH 112.7 ft	NORTHING 683,645	EASTING 2,478,359
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Moseley, M.G.	START DATE 02/01/18	COMP. DATE 02/02/18	SURFACE WATER DEPTH N/A



WBS 38222.1.FR2	TIP B-4786	COUNTY PITT	GEOLOGIST Worley, B.
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville			GROUND WTR (ft)
BORING NO. B1-B	STATION 25+87	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.6 ft	TOTAL DEPTH 112.7 ft	NORTHING 683,645	EASTING 2,478,359
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Moseley, M.G.	START DATE 02/01/18	COMP. DATE 02/02/18	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B4786_GEO_BRDG0038_GINT_SUMMIT.GPJ_NC_DOT.GDT 4/11/18

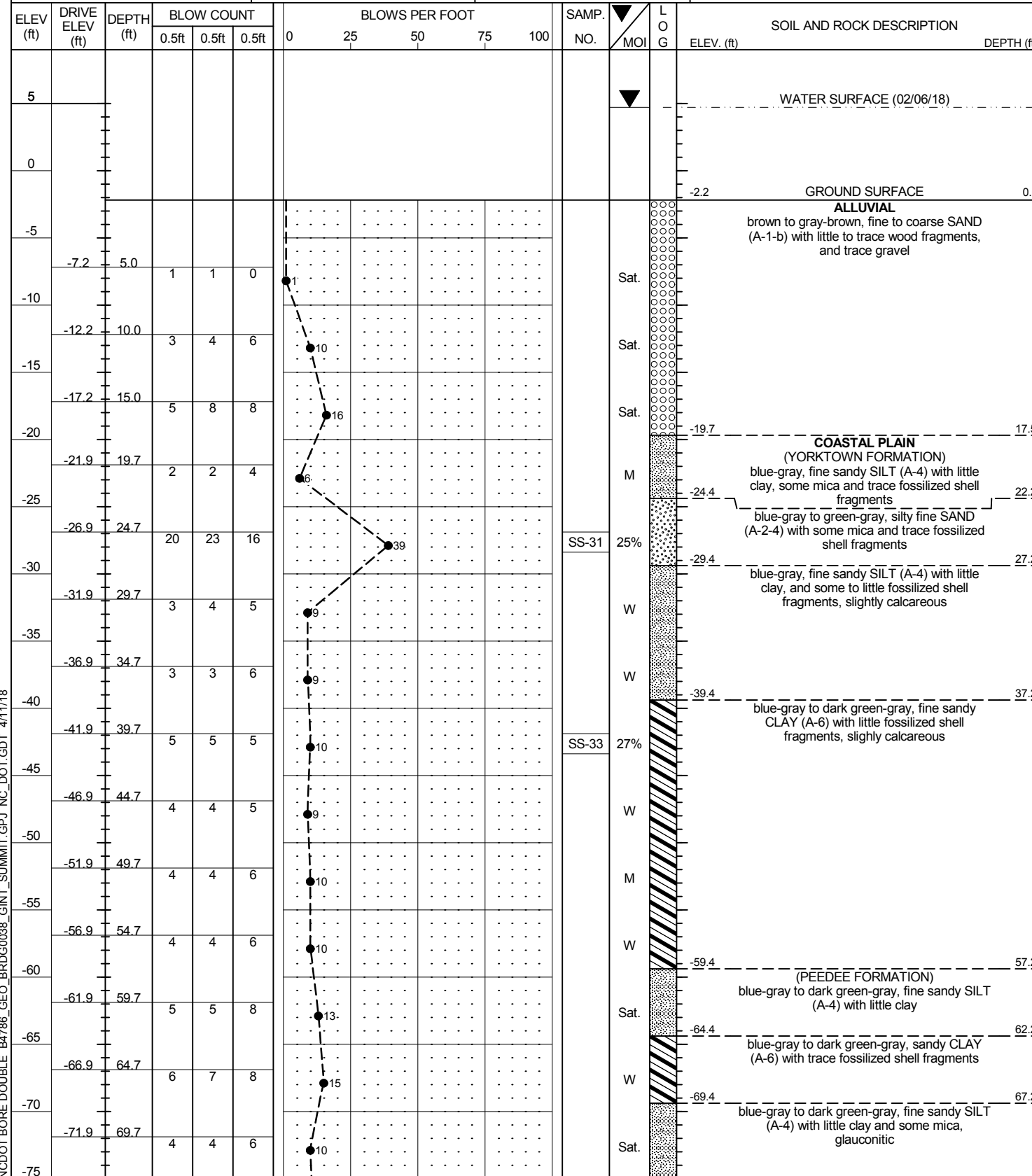
Boring Terminated at Elevation -103.1 ft in Coastal Plain (silty SAND) - Black Creek Formation

Notes:
 - Switched from Casing Advancer to Mud Rotary after SPT at 13.0 feet.
 - Rig chatter/harder drilling from 44.7' - 45.2' & 52.2' - 53.2' was not interpreted to be Limestone. No evidence of lithification or highly calcareous areas.

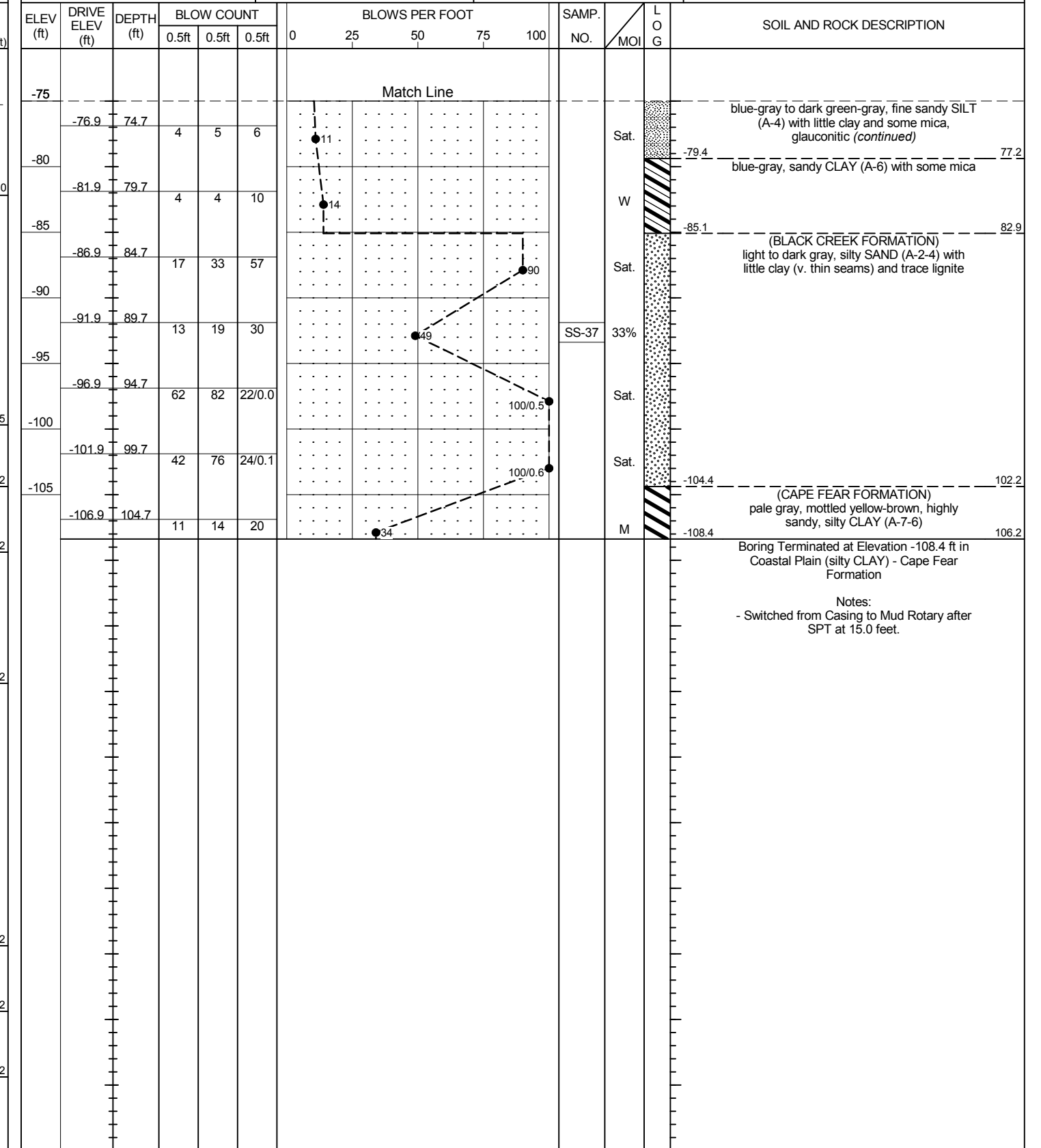
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38222.1.FR2	TIP B-4786	COUNTY PITT	GEOLOGIST Smith, B.
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville			GROUND WTR (ft)
BORING NO. B3-B	STATION 27+36	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. -2.2 ft	TOTAL DEPTH 106.2 ft	NORTHING 683,767	EASTING 2,478,445
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Moseley, M.G.	START DATE 02/06/18	COMP. DATE 02/06/18	SURFACE WATER DEPTH 6.9ft



WBS 38222.1.FR2	TIP B-4786	COUNTY PITT	GEOLOGIST Smith, B.
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville			GROUND WTR (ft)
BORING NO. B3-B	STATION 27+36	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. -2.2 ft	TOTAL DEPTH 106.2 ft	NORTHING 683,767	EASTING 2,478,445
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Moseley, M.G.	START DATE 02/06/18	COMP. DATE 02/06/18	SURFACE WATER DEPTH 6.9ft



NCDOT BORE DOUBLE B4786_GEO_BRDG0038_GINT_SUMMIT.GPJ_NC_DOT.GDT 4/11/18

Boring Terminated at Elevation -108.4 ft in Coastal Plain (silty CLAY) - Cape Fear Formation

Notes:
- Switched from Casing to Mud Rotary after SPT at 15.0 feet.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.									
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)								
BORING NO. B7-B		STATION 30+23		OFFSET 8 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 10.5 ft		TOTAL DEPTH 118.8 ft		NORTHING 684,001		EASTING 2,478,611									
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.G.		START DATE 02/13/18		COMP. DATE 02/14/18		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					
15															
10															
5	6.3	4.2	2	3	3										
0	1.3	9.2	3	3	5										
-5	-3.7	14.2	3	2	2										
-10	-8.7	19.2	4	8	11										
-15	-13.7	24.2	8	8	7										
-20	-18.7	29.2	4	4	6										
-25	-21.8	32.3	3	3	4										
-30	-26.8	37.3	7	15	28										
-35	-31.8	42.3	4	4	5										
-40	-36.8	47.3	6	8	6										
-45	-41.8	52.3	5	6	8										
-50	-46.8	57.3	3	4	5										
-55	-51.8	62.3	4	4	6										
-60	-56.8	67.3	4	6	7										
-65	-61.8	72.3	5	6	7										

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.									
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)								
BORING NO. B7-B		STATION 30+23		OFFSET 8 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 10.5 ft		TOTAL DEPTH 118.8 ft		NORTHING 684,001		EASTING 2,478,611									
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.G.		START DATE 02/13/18		COMP. DATE 02/14/18		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					
-65															
-70	-66.8	77.3	4	4	6										
-75	-71.8	82.3	3	5	7										
-80	-76.8	87.3	4	5	7										
-85	-81.8	92.3	4	5	6										
-90	-86.8	97.3	29	23	28										
-95	-91.8	102.3	33	80	20/0.1										
-100	-96.8	107.3	14	30	68										
-105	-101.8	112.3	34	67	33/0.1										
-110	-106.8	117.3	62	24	25										

NCDOT BORE DOUBLE B4786_GEO_BRDG0038_GINT_SUMMIT.GPJ_NC_DOT.GDT 4/11/18

blue-gray to dark green-gray, fine sandy CLAY (A-6) with little mica (continued)

(BLACK CREEK FORMATION)
light gray to gray, silty SAND (A-2-4) with little clay (v. thin seams), some mica, and little to trace lignite

(CAPE FEAR FORMATION)
gray, mottled yellow-brown, highly sandy, silty CLAY (A-7-6)
Boring Terminated at Elevation -108.3 ft in Coastal Plain (silty CLAY) - Cape Fear Formation

Notes:
- Switched from Casing Advancer to Mud Rotary after SPT at 29.2 feet.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.	
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)
BORING NO. EB2-A		STATION 30+81		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 27.0 ft		TOTAL DEPTH 120.6 ft		NORTHING 684,058		EASTING 2,478,632	
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Moseley, M.G.		START DATE 02/15/18		COMP. DATE 02/15/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
30																
25	23.0	4.0	5	14	49											
20	18.0	9.0	4	7	8											
15	12.9	14.1	8	8	7											
10	7.9	19.1	7	8	7											
5	2.9	24.1	2	2	3											
0	-2.1	29.1	2	2	3											
-5	-7.1	34.1	6	8	15											
-10	-12.1	39.1	9	7	8											
-15	-17.1	44.1	3	3	5											
-20	-22.1	49.1	2	3	5											
-25	-27.1	54.1	9	16	70											
-30	-32.1	59.1	3	3	4											
-35	-37.1	64.1	3	4	5											
-40	-42.1	69.1	4	4	6											
-45	-47.1	74.1	4	4	5											
-50																

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Smith, B.	
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)
BORING NO. EB2-A		STATION 30+81		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 27.0 ft		TOTAL DEPTH 120.6 ft		NORTHING 684,058		EASTING 2,478,632	
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER Moseley, M.G.		START DATE 02/15/18		COMP. DATE 02/15/18		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-50																
-55	-52.1	79.1	4	4	7											
-60	-57.1	84.1	4	4	7											
-65	-62.1	89.1	5	6	7											
-70	-67.1	94.1	5	5	7											
-75	-72.1	99.1	4	4	10											
-80	-77.1	104.1	4	4	9											
-85	-82.1	109.1	4	4	7											
-90	-87.1	114.1	16	47	53/0.4											
	-92.1	119.1	45	35	33											

NCDOT BORE DOUBLE B4786_GEO_BRDG0038_GINT_SUMMIT.GPJ_NC_DOT.GDT 4/11/18

Boring Terminated at Elevation -93.6 ft in Coastal Plain (silty SAND) - Black Creek Formation

Notes:
 - Asphalt (0.0 - 0.5 ft)
 - Switched from Hollow Stem Augers to Casing/Mud Rotary after SPT at 9.0 feet.
 - ST-1 (STA: 30+78, OFF: 8'LT, DEPTH: 25.2' 27.2')
 - ST-1 was not submitted for testing.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 MATERIALS & TESTS UNIT
 SOILS LABORATORY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 MATERIALS & TESTS UNIT
 SOILS LABORATORY

T. I. P. No. B-4786

T. I. P. No. B-4786

REPORT ON SAMPLES OF Bridge No. 38 over the Tar River

REPORT ON SAMPLES OF Bridge No. 38 over the Tar River

Project 38222.1.FR2 County Pitt Owner B. Smith
 Date: Sampled 1/31/18 - 2/16/18 Received 2/21/18 Reported _____
 Sampled from Bridge By B. Smith & B. Worley
 Submitted by B. Smith 2008 Standard Specifications

Project 38222.1.FR2 County Pitt Owner B. Smith
 Date: Sampled 1/31/18 - 2/16/18 Received 2/21/18 Reported _____
 Sampled from Bridge By B. Smith & B. Worley
 Submitted by B. Smith 2008 Standard Specifications

3/8/18

3/8/18

TEST RESULTS

Proj. Sample No.	SS-4	SS-5	SS-7	SS-10	SS-17	SS-23
Boring No.	EB1-A	EB1-A	EB1-A	EB1-A	B1-B	B2-A
Retained #4 Sieve %	0	0	0	0	0	0
Passing #10 Sieve %	100	100	100	100	100	99
Passing #40 Sieve %	100	99	96	98	99	94
Passing #200 Sieve %	87	81	39	40	23	22

TEST RESULTS

Proj. Sample No.	SS-24	SS-27	SS-31	SS-33	SS-37	SS-40
Boring No.	B2-A	B2-A	B3-B	B3-B	B3-B	B4-A
Retained #4 Sieve %	0	0	0	0	4	1
Passing #10 Sieve %	99	100	100	100	94	98
Passing #40 Sieve %	94	100	100	99	89	93
Passing #200 Sieve %	52	51	16	67	23	47

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	0.8	2.3	6.2	5.7	1.7	10.3
Fine Sand Ret - #270 %	17.3	31.4	70.7	75.0	83.3	74.1
Silt 0.05 - 0.005 mm %	29.7	50.2	9.2	7.2	7.2	7.8
Clay < 0.005 mm %	52.2	16.1	14.0	12.0	7.8	7.8
Passing #40 Sieve %	99.7	98.8	96.9	98.5	99.2	94.5
Passing #200 Sieve %	86.7	80.7	39.3	39.6	23.4	22.2

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	9.0	0.4	0.6	2.8	15.6	11.9
Fine Sand Ret - #270 %	60.1	73.8	89.9	50.4	62.6	53.8
Silt 0.05 - 0.005 mm %	11.9	9.0	3.6	16.2	6.1	11.8
Clay < 0.005 mm %	18.9	16.8	5.9	30.6	15.7	22.6
Passing #40 Sieve %	95.1	99.7	99.8	98.9	94.5	94.9
Passing #200 Sieve %	52.2	50.8	15.9	66.9	24.9	47.5

L. L.	40	46	28	24	25	20
P. I.	18	2	2	2	1	0
AASHTO Classification	A-6	A-5	A-4	A-4	A-2-4	A-2-4
Group Index	16	5	0	0	0	0
pH	N/A	N/A	N/A	N/A	N/A	N/A
Station	25+20	25+20	25+20	25+20	25+87	26+57
OFFSET	7'LT	7'LT	7'LT	7'LT	8'RT	8'LT
ALIGNMENT	-L-	-L-	-L-	-L-	-L-	-L-
Depth (Ft)	23.8	28.8	43.8	93.8	36.2	22.9
to	25.3	30.3	45.3	95.3	37.7	24.4
Natural Moisture %	40.3	47.1	34.5	31.4	29.4	40.5

L. L.	30	30	25	37	21	33
P. I.	4	2	0	16	0	7
AASHTO Classification	A-4	A-4	A-2-4	A-6	A-2-4	A-4
Group Index	0	0	0	9	0	1
pH	N/A	N/A	N/A	N/A	N/A	N/A
Station	26+57	26+57	27+36	27+36	27+36	27+90
OFFSET	8'LT	8'LT	8'RT	8'RT	8'RT	8'LT
ALIGNMENT	-L-	-L-	-L-	-L-	-L-	-L-
Depth (Ft)	32.9	67.9	24.7	39.7	89.7	29.3
to	34.4	69.4	26.2	41.2	91.2	30.8
Natural Moisture %	29.0	32.4	25.1	27.2	32.9	27.5

Aaron Hackett
 Soils Engineer

Aaron Hackett
 Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

T. I. P. No. B-4786

T. I. P. No. B-4786

REPORT ON SAMPLES OF Bridge No. 38 over the Tar River

REPORT ON SAMPLES OF Bridge No. 38 over the Tar River

Project 38222.1.FR2 **County** Pitt **Owner** B. Smith
Date: Sampled 1/31/18 - 2/16/18 **Received** 2/21/18 **Reported** _____
Sampled from Bridge **By** B. Smith & B. Worley
Submitted by B. Smith 2008 Standard Specifications

Project 38222.1.FR2 **County** Pitt **Owner** B. Smith
Date: Sampled 1/31/18 - 2/16/18 **Received** 2/21/18 **Reported** _____
Sampled from Bridge **By** B. Smith & B. Worley
Submitted by B. Smith 2008 Standard Specifications

3/8/18

TEST RESULTS

Proj. Sample No.	SS-44	SS-46	SS-48	SS-50	SS-52	SS-56
Boring No.	B4-A	B4-A	B5-B	B5-B	B5-B	B7-B
Retained #4 Sieve	% 0	0	0	2	0	3
Passing #10 Sieve	% 99	91	97	93	99	89
Passing #40 Sieve	% 93	90	87	92	98	85
Passing #200 Sieve	% 41	64	40	69	65	39

3/8/18

TEST RESULTS

Proj. Sample No.	SS-59	SS-61	SS-69	SS-74	SS-76
Boring No.	B7-B	B7-B	EB2-A	EB2-A	EB2-A
Retained #4 Sieve	% 0	0	1	0	0
Passing #10 Sieve	% 100	99	95	97	94
Passing #40 Sieve	% 100	95	94	96	94
Passing #200 Sieve	% 15	55	78	37	46

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	% 14.7	4.7	19.6	4.1	2.6	26.0
Fine Sand Ret - #270	% 54.9	34.5	51.3	25.3	48.5	38.1
Silt 0.05 - 0.005 mm	% 14.0	19.3	11.3	25.3	18.3	14.0
Clay < 0.005 mm	% 16.4	41.6	17.8	45.2	30.6	21.8
Passing #40 Sieve	% 93.6	98.6	89.5	99.4	98.9	96.1
Passing #200 Sieve	% 41.7	70.3	41.1	74.2	65.5	44.0

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%					
Coarse Sand Ret - #60	% 77.1	14.7	5.0	9.5	14.0
Fine Sand Ret - #270	% 8.9	56.5	15.7	68.2	54.4
Silt 0.05 - 0.005 mm	% 1.8	10.9	30.7	0.0	15.8
Clay < 0.005 mm	% 12.1	18.0	48.6	22.2	15.8
Passing #40 Sieve	% 99.9	95.5	99.3	98.1	99.8
Passing #200 Sieve	% 14.7	55.2	82.2	38.2	48.5

L. L.	34	45	34	36	36	44
P. I.	7	27	9	13	14	23
AASHTO Classification	A-4	A-7-6	A-4	A-6	A-6	A-7-6
Group Index	0	15	1	8	7	4
pH	N/A	N/A	N/A	N/A	N/A	N/A
Station	27+90	27+90	28+63	28+63	28+63	30+23
OFFSET	8'LT	8'LT	8'RT	8'RT	8'RT	8'RT
ALIGNMENT	-L-	-L-	-L-	-L-	-L-	-L-
Depth (Ft)	69.3	104.3	10.3	25.3	50.3	9.2
to	70.8	105.8	11.8	26.8	51.8	10.7
Natural Moisture %	34.4	16.5	30.4	25.0	25.9	40.3

L. L.	27	27	25	42	32
P. I.	0	5	0	23	12
AASHTO Classification	A-2-4	A-4	A-4	A-7-6	A-6
Group Index	0	1	0	3	2
pH	N/A	N/A	N/A	N/A	N/A
Station	30+23	30+23	30+81	30+81	30+81
OFFSET	8'RT	8'RT	8'LT	8'LT	8'LT
ALIGNMENT	-L-	-L-	-L-	-L-	-L-
Depth (Ft)	37.3	57.3	24.1	59.1	89.1
to	38.8	58.8	25.6	60.6	90.6
Natural Moisture %	33.0	24.0	27.5	28.7	26.8



Soils Engineer



Soils Engineer



March 7, 2018

Project No. R-2018-050-001

Mr. Brad Worley
Summit Design & Eng. Services
504 Meadowlands Dr.
Hillsborough, NC 27278

Brad.worley@summitde.net

Transmittal
Laboratory Test Results
17-0535.I40 B4786 Bridge 38

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
Geotechnics, Inc.

Michael P. Smith
Regional Manager

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

SPECIFIC GRAVITY

AASHTO T-100-15 / ASTM D 854-14

Client	Summit Design & Eng. Services	Boring No.	EB1-A (25+13, 7'LT)
Client Reference	17-0535.I40 B-4786 Bridge 38	Depth (ft)	24.3-26.3
Project No.	R-2018-050-001	Sample No.	ST-2
Lab ID	R-2018-050-001-001	Visual Description	Gray Clay (Minus No.4 sieve material, airdried)

Replicate Number	1	2
Pycnometer ID	R 544	R 545
Weight of Pycnometer + Soil + Water (gm)	710.55	725.3
Temperature, T (°Celsius)	21.8	21.8
Weight of Pycnometer + Water (gm)	664.02	661.78
Tare Number	544	545
Weight of Tare + Dry Soil (gm)	241.47	266.84
Weight of Tare (gm)	165.86	163.66
Weight of Dry Soil (gm)	75.61	103.18
Specific Gravity of Soil @ T	2.600	2.602
Specific Gravity of Water @ T	0.9978	0.9978
Conversion Factor for Temperature T	0.9996	0.9996
Specific Gravity @ 20° Celsius	2.601	2.602

Average Specific Gravity @ 20° Celsius	2.60
--	------

Tested By SFS Date 3/6/18 Checked By GEM Date 3/6/18

DCN: CT-S5 Date: 03/24/05 Revision: 10/2018 PROJECTS\SUMMIT D&E\2018-050 SUMMIT D&E - B-4786 BRIDGE 38\2018-050-001-001 Specific Gravity Soils RAL.xlsm]Sheet1

DCN: Data Transmittal Letter Date: 1/28/05 Rev.: 1

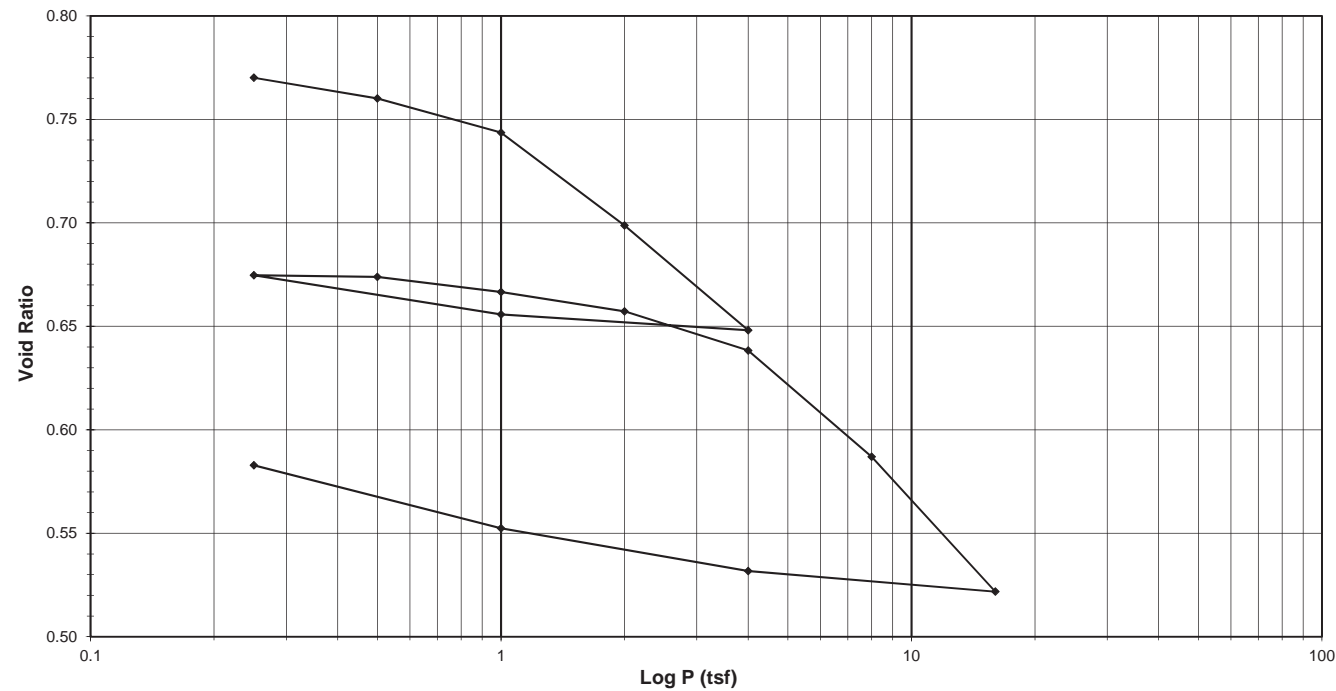


ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11

Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Reference 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-04-0411 Date 2/27/18 Approved By MPS Date 3/6/18



ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11

Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Reference 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R470
 1 Division = 0.0001 (in.)

Sample Properties	Initial	Final
<i>Water Content</i>		
Tare Number	825	815
Wt. Tare & WS (g)	395.14	280.99
Wt. Tare & DS (g)	335.43	253.14
Wt. Water (g)	59.71	27.85
Wt. Tare (g)	136.83	136.07
Wt. DS (g)	198.60	117.07
Water Content (%)	30.07	23.79
<i>Sample Parameters</i>		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.8831
Sample Volume (cc)	80.44	71.04
Wt. Wet Sample + Ring (g)	365.34	358.02
Wt. of Ring (g)	213.58	213.58
Wt. of Wet Sample (g)	151.76	144.44
Wet Density (pcf)	117.73	126.88
Wet Density (g/cc)	1.89	2.03
Water Content (%)	30.07	23.79
Wt. of Dry Sample (g)	116.68	116.68
Dry Density (pcf)	90.51	102.50
Dry Density (g/cc)	1.45	1.64
Void Ratio	0.7925	0.5829
Saturation (%)	98.64	106.11
Specific Gravity	2.60	Measured

Test Data Summary							
Applied Pressure (tsf)	Final Dial Reading (div)	Machine Deflection (div)	Corrected Reading (div)	Height of Sample (mm)	Volume (cc)	Dry Density (g/cc)	Void Ratio
Seating	0	0	0	25.400	80.440	1.45052	0.79246
0.25	135.6	10.9	124.7	25.083	79.437	1.46883	0.77011
0.5	202.6	21.9	180.8	24.941	78.986	1.47723	0.76006
1	306.9	34.2	272.7	24.707	78.246	1.49119	0.74357
2	576.2	53.1	523.1	24.071	76.232	1.53059	0.69869
4	880.2	74.5	805.7	23.354	73.959	1.57763	0.64805
1	802.2	39.6	762.6	23.463	74.306	1.57027	0.65577
0.25	676.6	19.4	657.2	23.731	75.153	1.55256	0.67466
0.5	687.2	25.4	661.8	23.719	75.116	1.55332	0.67383
1	738.3	36.0	702.3	23.616	74.790	1.56009	0.66657
2	808.6	54.4	754.2	23.484	74.373	1.56884	0.65727
4	934.3	74.5	859.9	23.216	73.523	1.58698	0.63833
8	1256.9	110.2	1146.7	22.487	71.216	1.63839	0.58692
16	1664.3	154.4	1509.9	21.565	68.294	1.70849	0.52181
4	1543.6	89.3	1454.4	21.706	68.741	1.69738	0.53177
1	1387.5	48.1	1339.4	21.998	69.665	1.67486	0.55237
0.25	1191.0	21.9	1169.1	22.430	71.035	1.64256	0.58290

Tested By 129-04-0411 Date 2/27/18 Input Checked By GEM Date 3/6/18



ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11

Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Reference 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

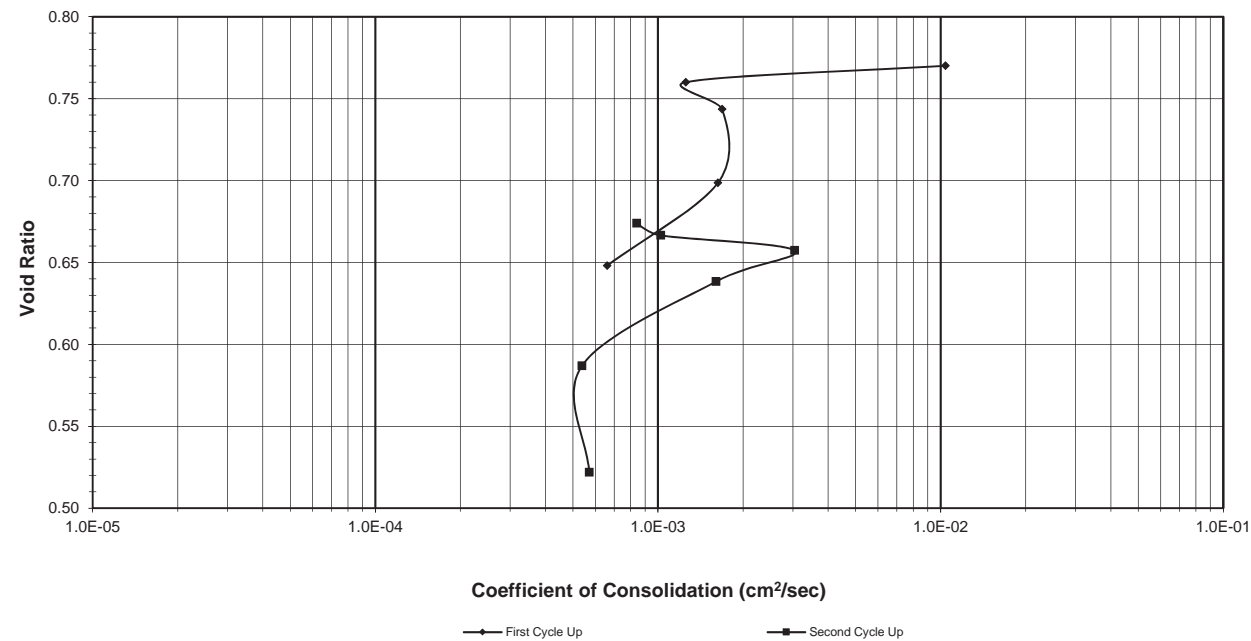
ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11

Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Reference 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R470
 1 Division = 0.0001 (in.)



Sample Properties	Initial	Final	C _v Test Data Summary				Time t ₅₀ (min.)	C _v (cm ² /sec)
			Load Increment (tsf)	Dial Reading @ t ₅₀ (div)	Machine Deflection (div)	Corrected Dial Reading @ t ₅₀ (div)		
Water Content								
Tare Number	825	815						
Wt. Tare & WS (g)	395.14	280.99						
Wt. Tare & DS (g)	335.43	253.14						
Wt. Water (g)	59.71	27.85	0 - 0.25	103.1	10.9	92.2	2.517	0.50 0.01040
Wt. Tare (g)	136.83	136.07	0.25 - 0.5	170.6	21.9	148.7	2.502	4.10 0.00125
Wt. DS (g)	198.60	117.07	0.5 - 1.0	260.6	34.2	226.4	2.482	3.00 0.00169
Water Content (%)	30.07	23.79	1.0 - 2.0	443.4	53.1	390.3	2.441	3.00 0.00163
			2.0 - 4.0	728.4	74.5	653.9	2.374	7.00 0.00066
			4.0 - 1.0	NA	39.6	NA	NA	NA NA
Sample Parameters			1.0 - 0.25	NA	19.4	NA	NA	NA NA
Sample Diameter (in)	2.5	2.5	0.25 - 0.5	683.1	25.4	657.7	2.373	5.50 0.00084
Sample Height (in)	1.000	0.883	0.5 - 1.0	714.3	36.0	678.3	2.368	4.50 0.00102
Sample Volume (cc)	80.44	71.04	1.0 - 2.0	772.0	54.4	717.6	2.358	1.50 0.00304
Wt. Wet Sample + Ring (g)	365.34	358.02	2.0 - 4.0	865.3	74.5	790.8	2.339	2.80 0.00160
Wt. of Ring (g)	213.58	213.58	4.0 - 8.0	1092.8	110.2	982.6	2.290	8.00 0.00054
Wt. of Wet Sample (g)	151.76	144.44	8.0 - 16.0	1464.7	154.4	1310.3	2.207	7.00 0.00057
Wet Density (pcf)	117.73	126.88	16.0 - 4.0	NA	89.3	NA	NA	NA NA
Wet Density (g/cc)	1.89	2.03	4.0 - 1.0	NA	48.1	NA	NA	NA NA
Water Content (%)	30.07	23.79	1.0 - 0.25	NA	21.9	NA	NA	NA NA
Wt. of Dry Sample (g)	116.68	116.68						
Dry Density (pcf)	90.51	102.50						
Dry Density (g/cc)	1.45	1.64						
Void Ratio	0.7925	0.5829						
Saturation (%)	98.64	106.11						
Specific Gravity	2.6	Measured						

Tested By 129-04-0411 Date 2/27/18 Input Checked By GEM Date 3/6/18

page 4 of 4

DCN: CT-24E Date: 5/3/12 Revision: 6

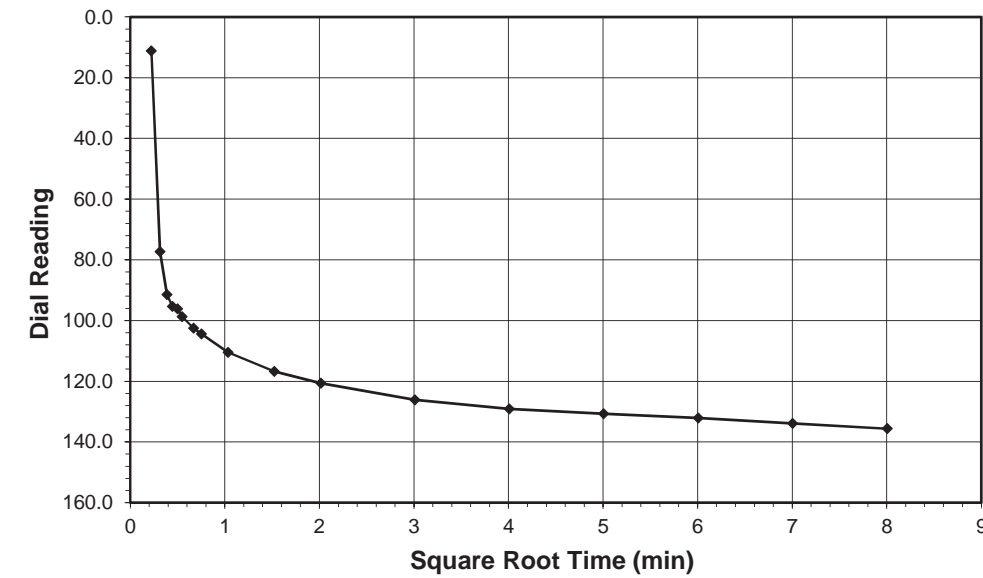
Z:\2018 PROJECTS\SUMMIT D&E\2018-050 SUMMIT D&E - B-4786 BRIDGE 38\2018-050-001-001 GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



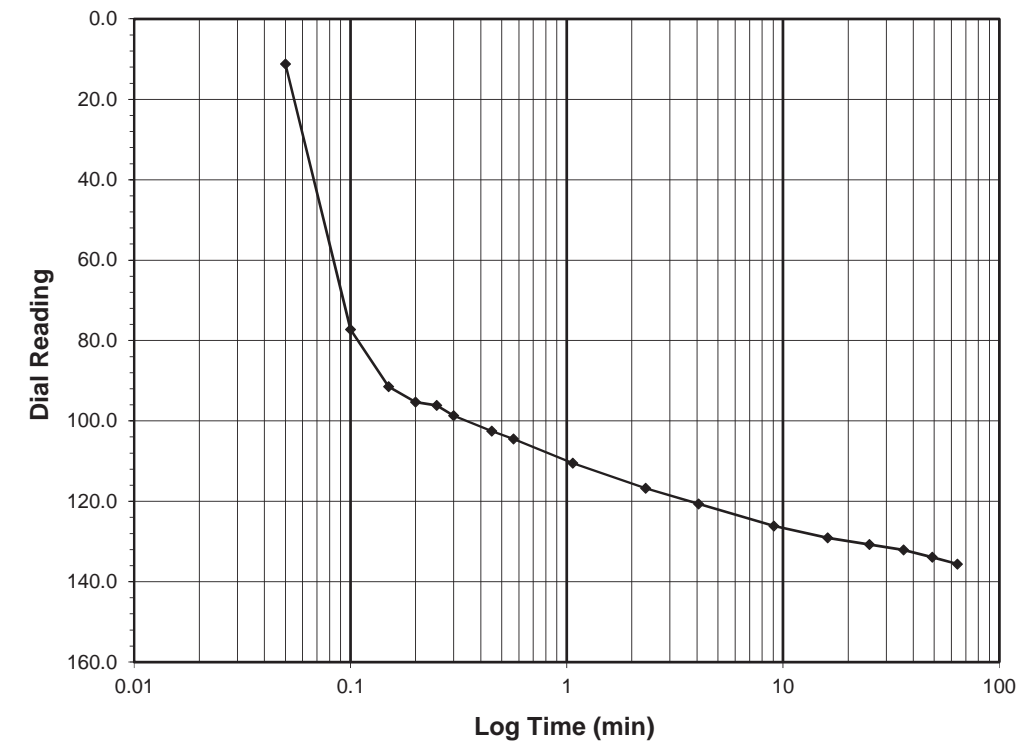
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 0.0-0.25
Final Reading (div): 135.6
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 2/27/18
 Start Time: 15:07:56

Elapsed Time (min)	Dial Reading (div)
Initial	0.0
0.05	11.2
0.10	77.3
0.15	91.5
0.20	95.3
0.25	96.2
0.30	98.7
0.45	102.5
0.57	104.5
1.07	110.5
2.32	116.8
4.07	120.6
9.07	126.2
16.07	129.1
25.07	130.7
36.07	132.1
49.07	133.9
64.07	135.6



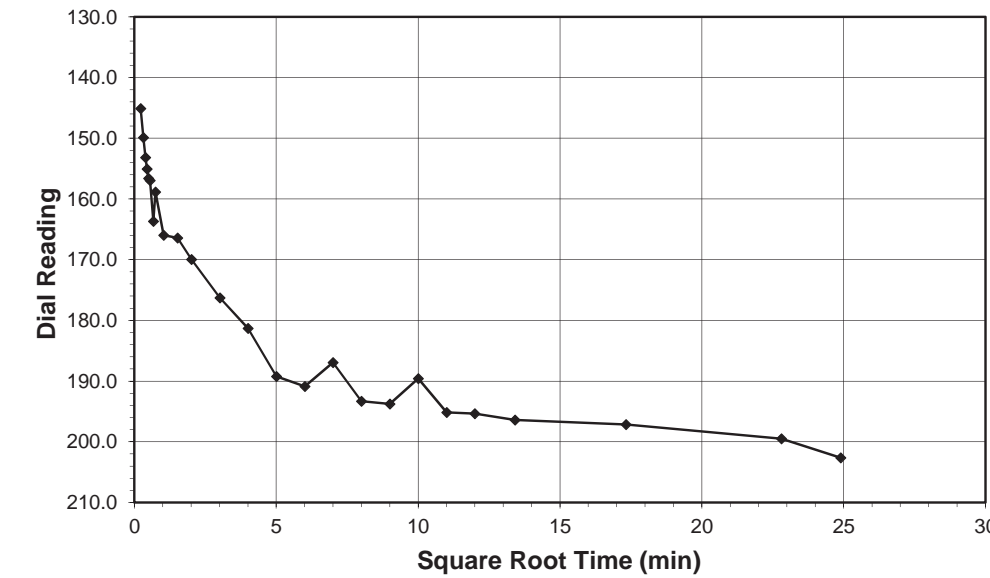
Tested By 129-04-0411 Date 2/27/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



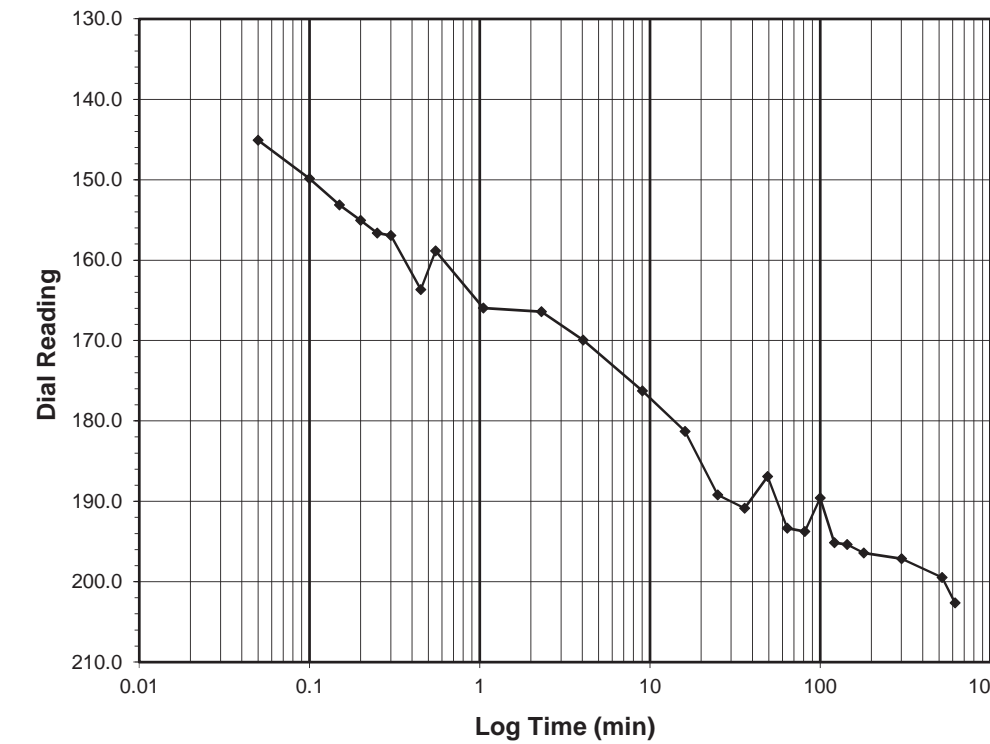
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 0.25-0.5
Final Reading (div): 202.6
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 2/27/18
 Start Time: 23:48:23

Elapsed Time (min)	Dial Reading (div)
Initial	135.6
0.05	145.1
0.10	149.9
0.15	153.1
0.20	155.1
0.25	156.6
0.30	156.9
0.45	163.7
0.55	158.9
1.05	166.0
2.30	166.4
4.05	169.9
9.05	176.3
16.05	181.3
25.05	189.2
36.05	190.9
49.05	186.9
64.05	193.3
81.07	193.7
100.07	189.6
121.07	195.1
144.07	195.4
180.07	196.4
300.07	197.2
520.07	199.5
619.85	202.6



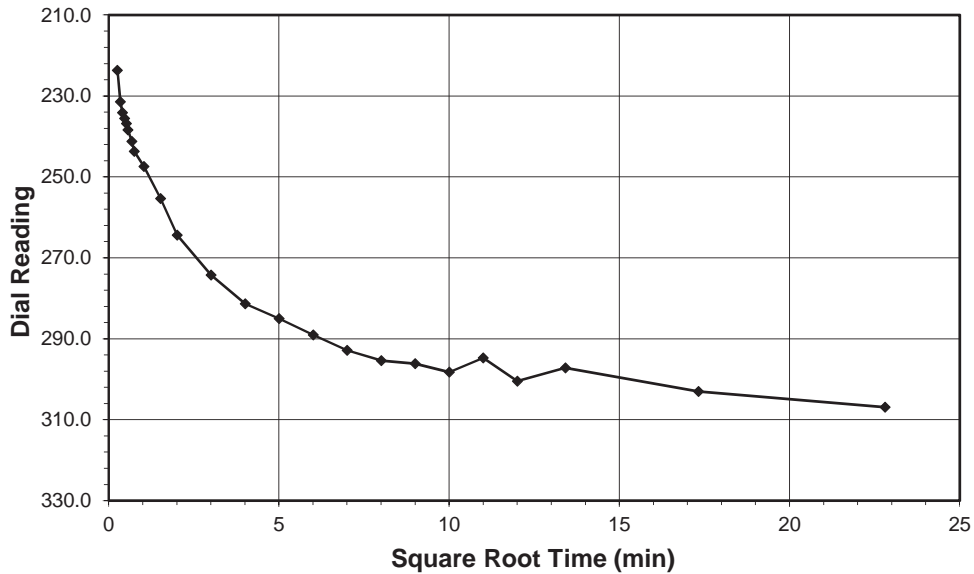
Tested By 129-04-0411 Date 2/27/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

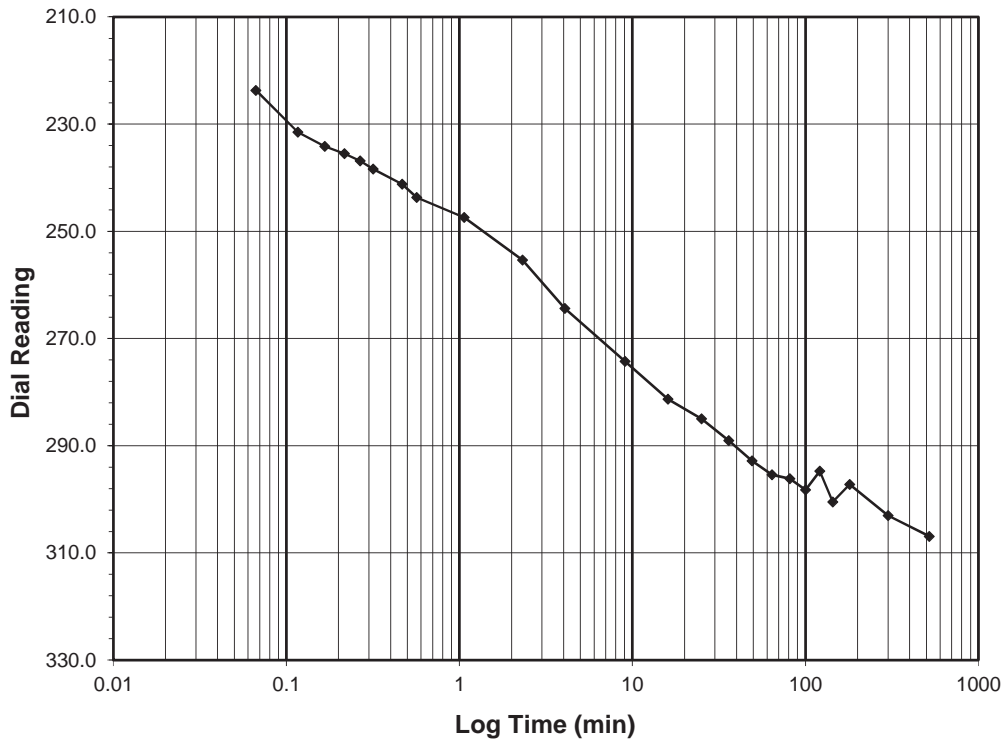
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0
Final Reading (div) 306.9
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 2/28/18
 Start Time 10:08:15

Elapsed Time (min)	Dial Reading (div)
Initial	202.6
0.07	223.7
0.12	231.5
0.17	234.2
0.22	235.5
0.27	236.8
0.32	238.4
0.47	241.2
0.57	243.7
1.07	247.4
2.32	255.4
4.07	264.4
9.07	274.3
16.07	281.3
25.07	285.0
36.07	289.0
49.07	292.8
64.08	295.4
81.08	296.2
100.08	298.2
121.08	294.7
144.08	300.5
180.08	297.2
300.08	303.0
520.08	306.9

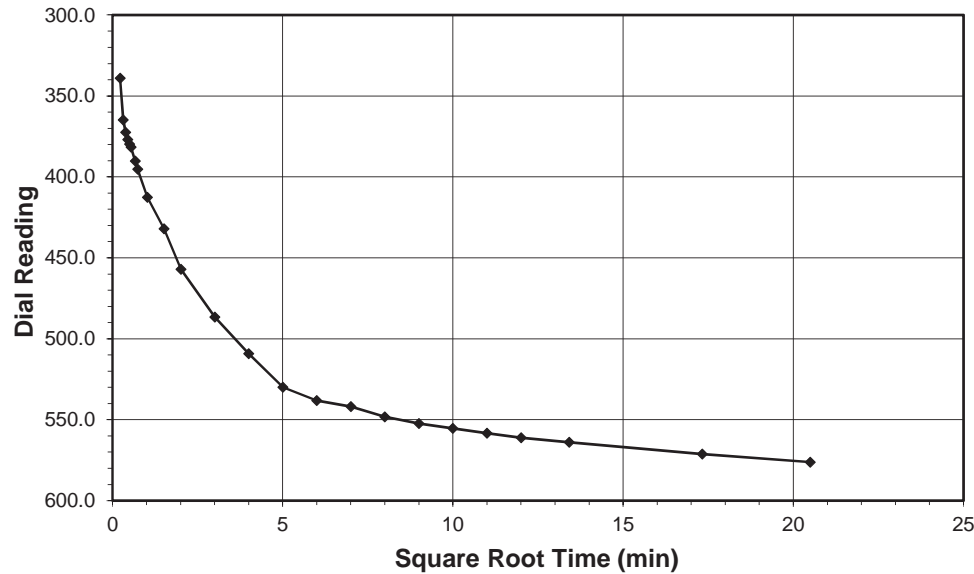


ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

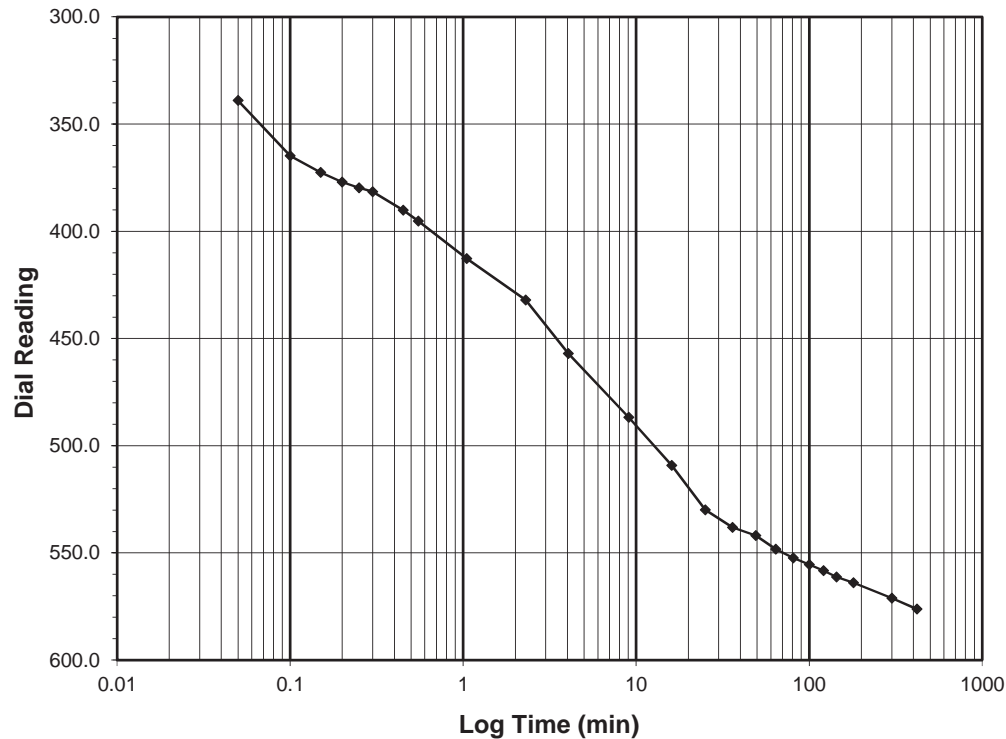
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0
Final Reading (div) 576.2
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 2/28/18
 Start Time 18:48:42

Elapsed Time (min)	Dial Reading (div)
Initial	306.9
0.05	339.0
0.10	364.8
0.15	372.5
0.20	377.0
0.25	379.7
0.30	381.6
0.45	390.2
0.55	395.2
1.05	412.7
2.30	432.1
4.05	457.0
9.05	486.7
16.05	509.2
25.05	529.9
36.05	538.1
49.05	542.0
64.05	548.2
81.05	552.4
100.05	555.4
121.05	558.3
144.05	561.2
180.05	563.9
300.07	571.1
420.28	576.2



Tested By 129-04-0411 Date 2/28/18 Checked By GEM Date 3/6/18

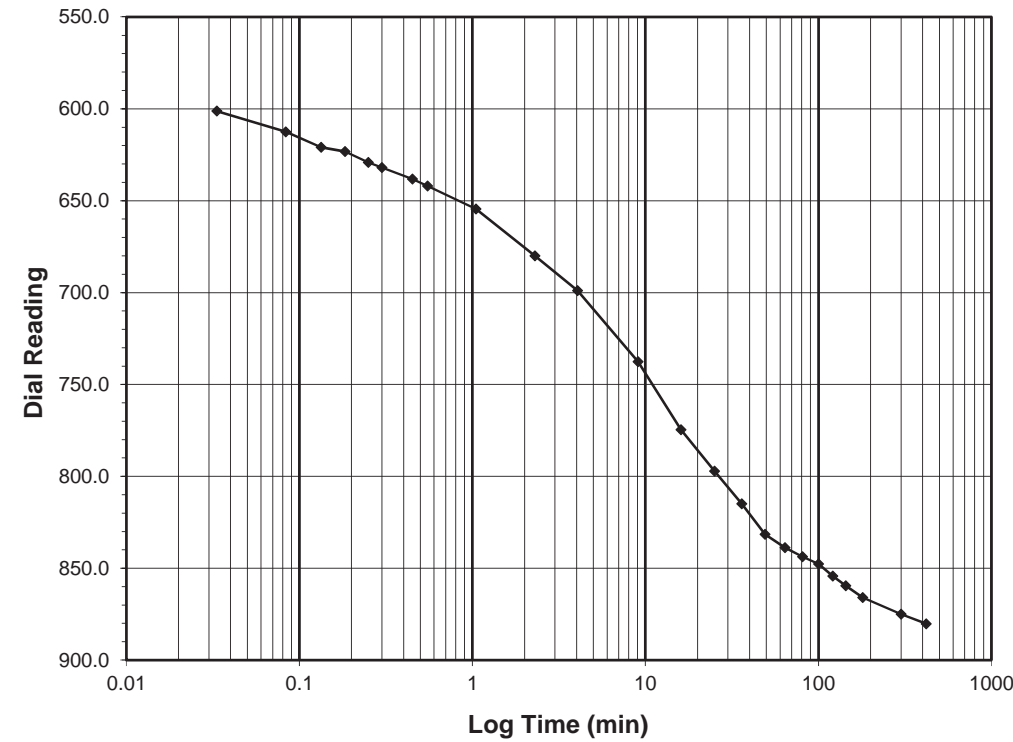
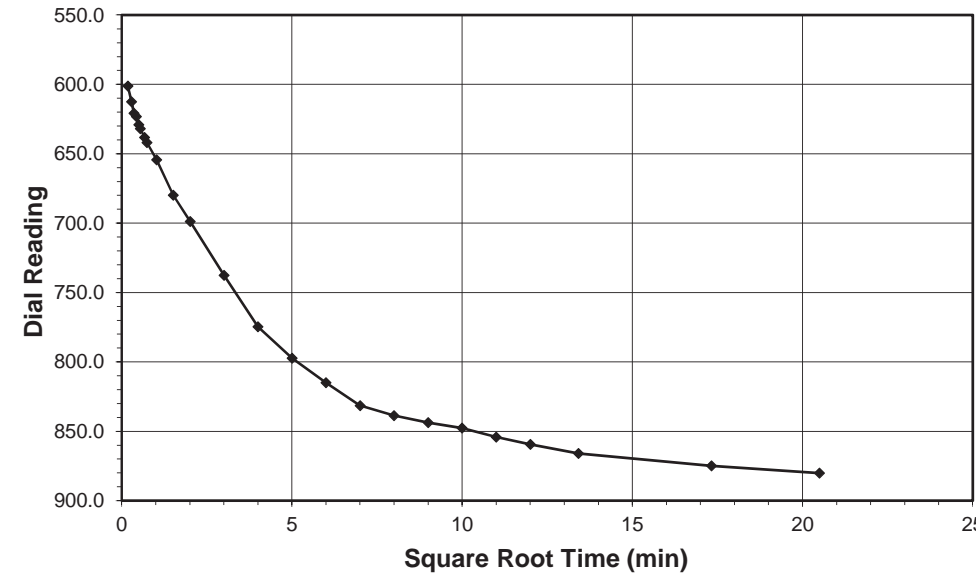
Tested By 129-04-0411 Date 2/28/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 2.0-4.0
 Final Reading (div): 880.2
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/1/18
 Start Time: 1:48:59

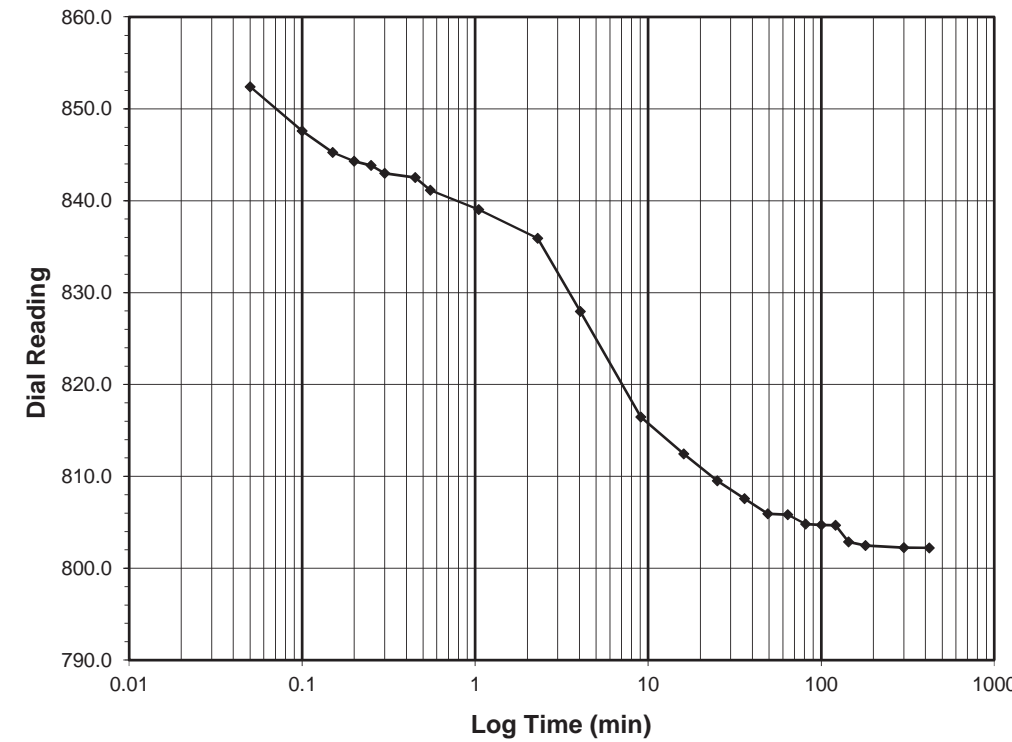
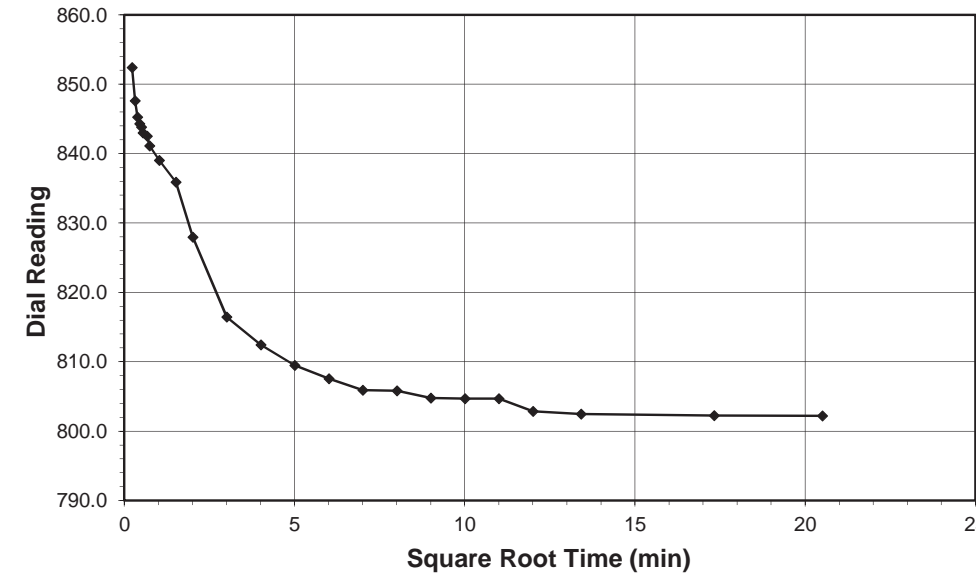
Elapsed Time (min)	Dial Reading (div)
Initial	576.2
0.03	601.2
0.08	612.5
0.13	620.9
0.18	623.3
0.25	629.1
0.30	631.9
0.45	638.2
0.55	641.9
1.05	654.4
2.30	680.0
4.05	698.9
9.05	737.6
16.05	774.7
25.05	797.2
36.05	815.0
49.05	831.6
64.05	838.8
81.05	843.7
100.05	847.7
121.07	854.2
144.07	859.5
180.07	865.9
300.07	874.9
420.32	880.2

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 4.0-1.0
 Final Reading (div): 802.2
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/1/18
 Start Time: 8:49:19

Elapsed Time (min)	Dial Reading (div)
Initial	880.2
0.05	852.4
0.10	847.6
0.15	845.3
0.20	844.3
0.25	843.8
0.30	843.0
0.45	842.5
0.55	841.1
1.05	839.0
2.30	835.9
4.05	827.9
9.07	816.4
16.07	812.4
25.07	809.5
36.07	807.6
49.07	805.9
64.07	805.8
81.07	804.8
100.07	804.7
121.07	804.7
144.07	802.9
180.07	802.5
300.07	802.2
420.40	802.2

Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

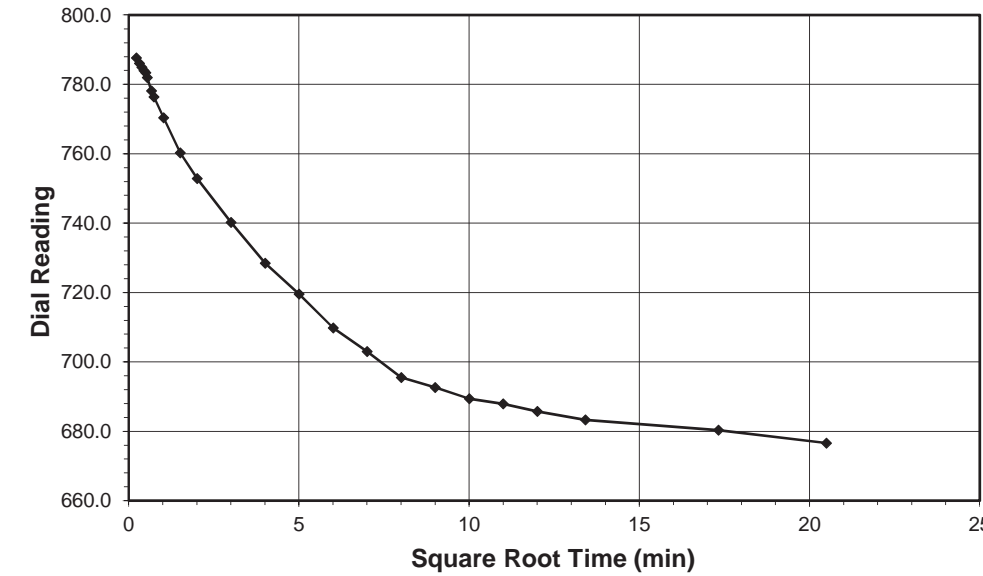
Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

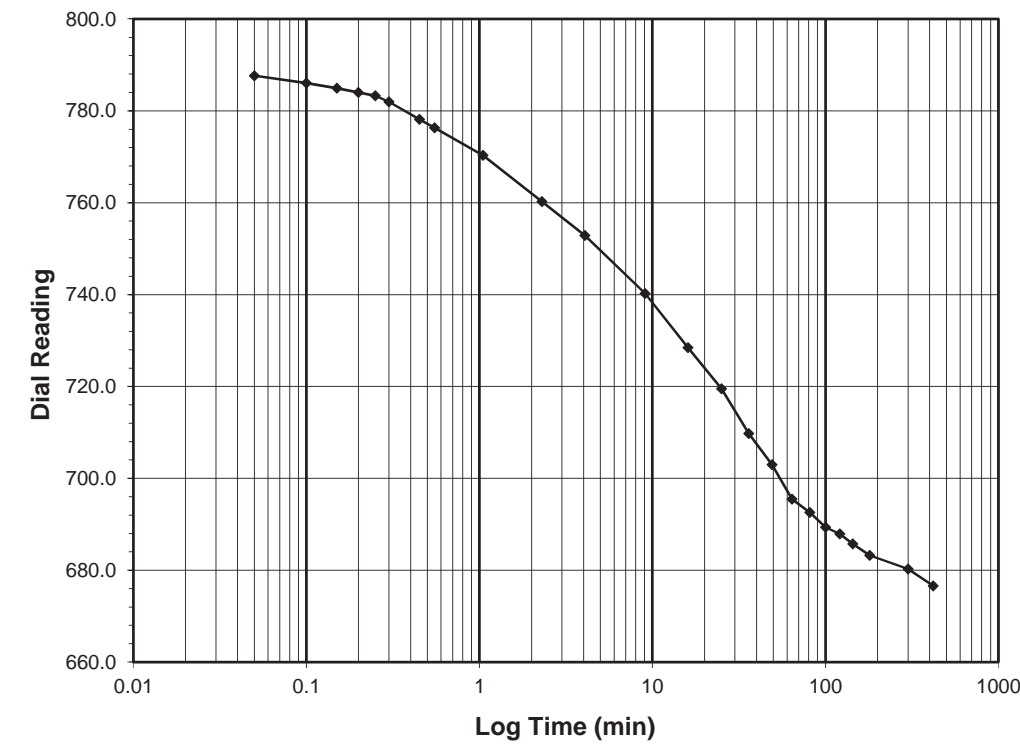
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25
Final Reading (div) 676.6
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 3/1/18
 Start Time 15:49:43

Elapsed Time (min)	Dial Reading (div)
Initial	802.2
0.05	787.6
0.10	786.0
0.15	784.9
0.20	784.0
0.25	783.3
0.30	781.9
0.45	778.1
0.55	776.3
1.05	770.3
2.30	760.2
4.07	752.8
9.07	740.2
16.07	728.4
25.07	719.5
36.07	709.8
49.07	703.0
64.07	695.5
81.07	692.6
100.07	689.4
121.07	687.9
144.07	685.7
180.07	683.2
300.07	680.3
420.23	676.6

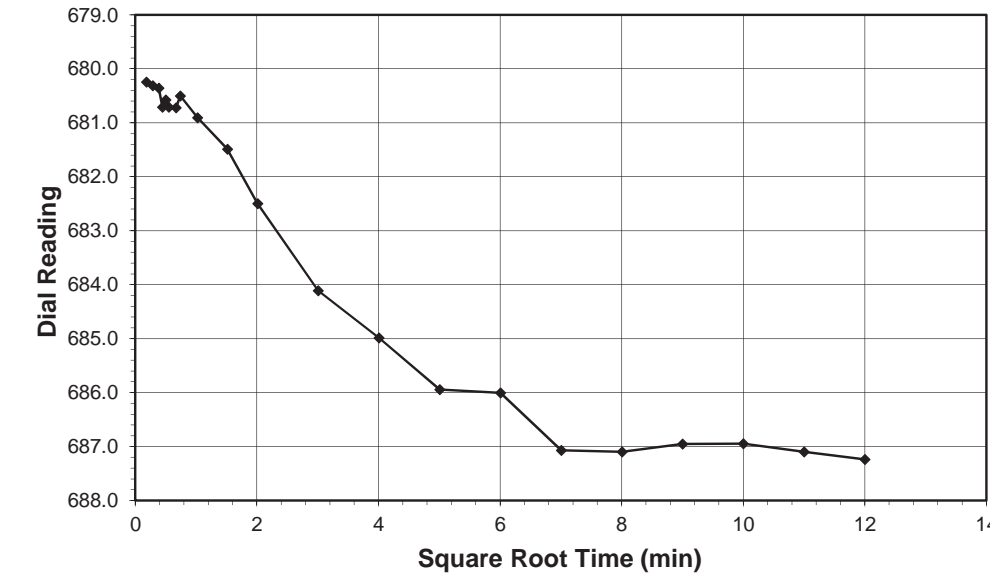


ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

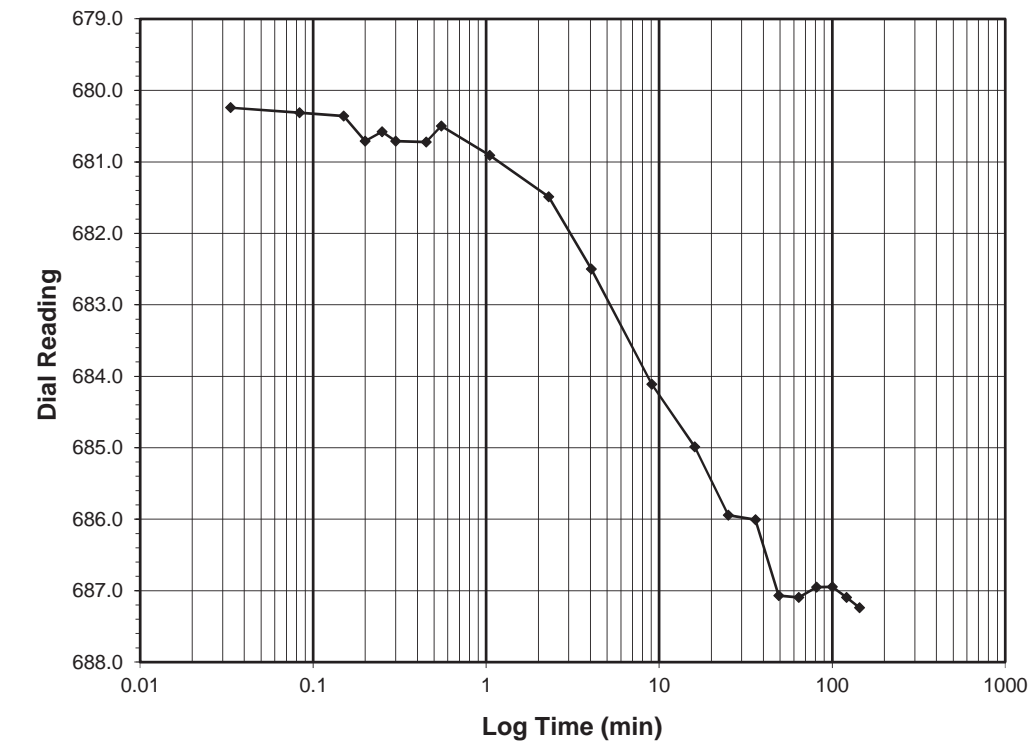
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5
Final Reading (div) 687.2
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 3/1/18
 Start Time 22:49:57

Elapsed Time (min)	Dial Reading (div)
Initial	676.6
0.03	680.2
0.08	680.3
0.15	680.4
0.20	680.7
0.25	680.6
0.30	680.7
0.45	680.7
0.55	680.5
1.05	680.9
2.30	681.5
4.05	682.5
9.05	684.1
16.05	685.0
25.05	685.9
36.07	686.0
49.07	687.1
64.07	687.1
81.07	687.0
100.07	686.9
121.07	687.1
144.07	687.2



Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

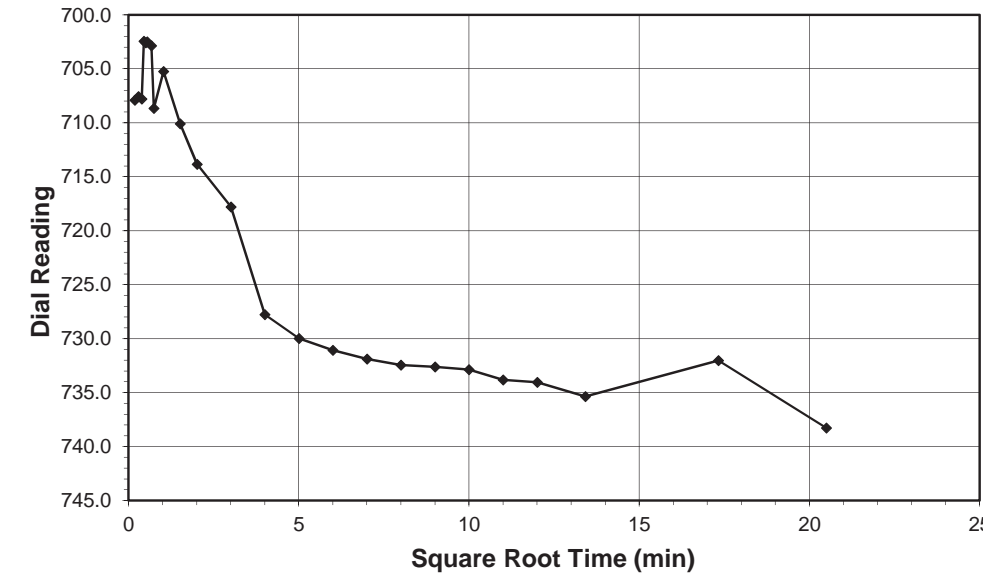
Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



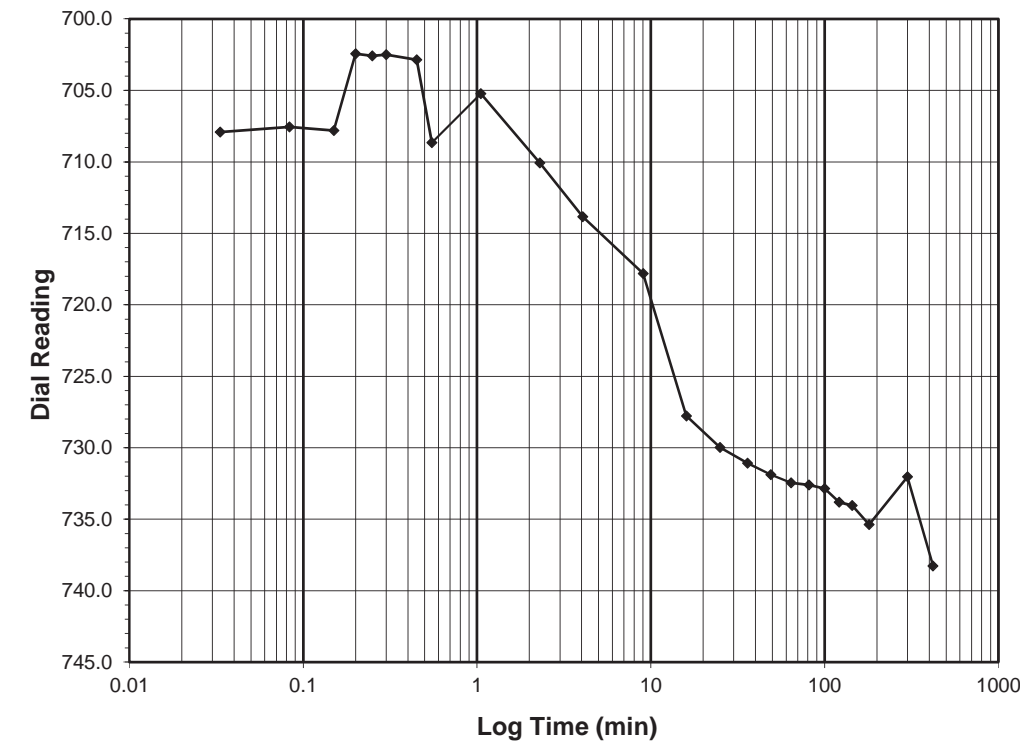
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 0.5-1.0
Final Reading (div): 738.3
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/2/18
 Start Time: 5:50:15

Elapsed Time (min)	Dial Reading (div)
Initial	687.2
0.03	707.9
0.08	707.6
0.15	707.8
0.20	702.4
0.25	702.6
0.30	702.5
0.45	702.9
0.55	708.7
1.05	705.2
2.30	710.1
4.05	713.8
9.05	717.8
16.05	727.8
25.05	730.0
36.05	731.1
49.05	731.9
64.05	732.4
81.05	732.6
100.05	732.9
121.05	733.8
144.05	734.0
180.05	735.4
300.05	732.0
420.15	738.3

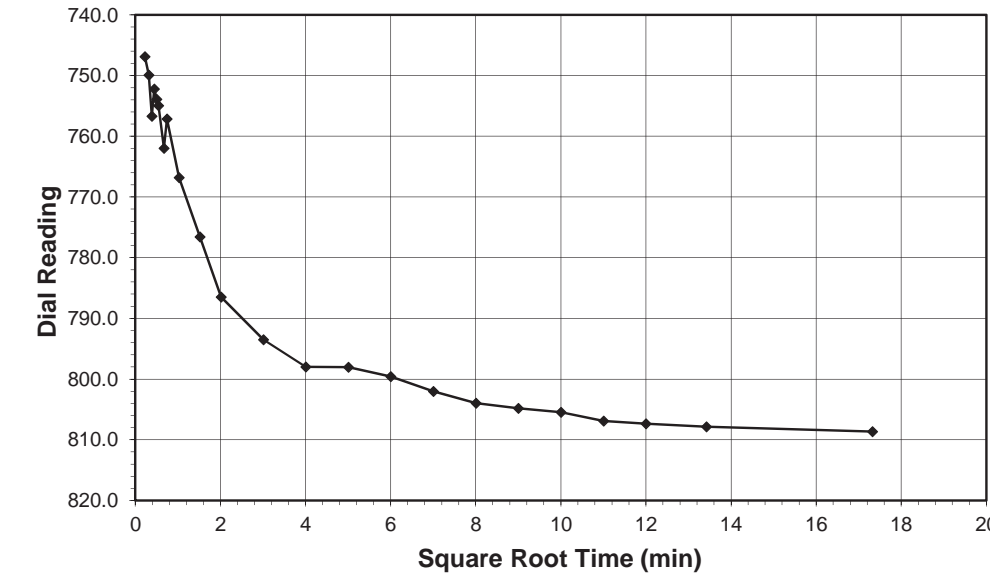


ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



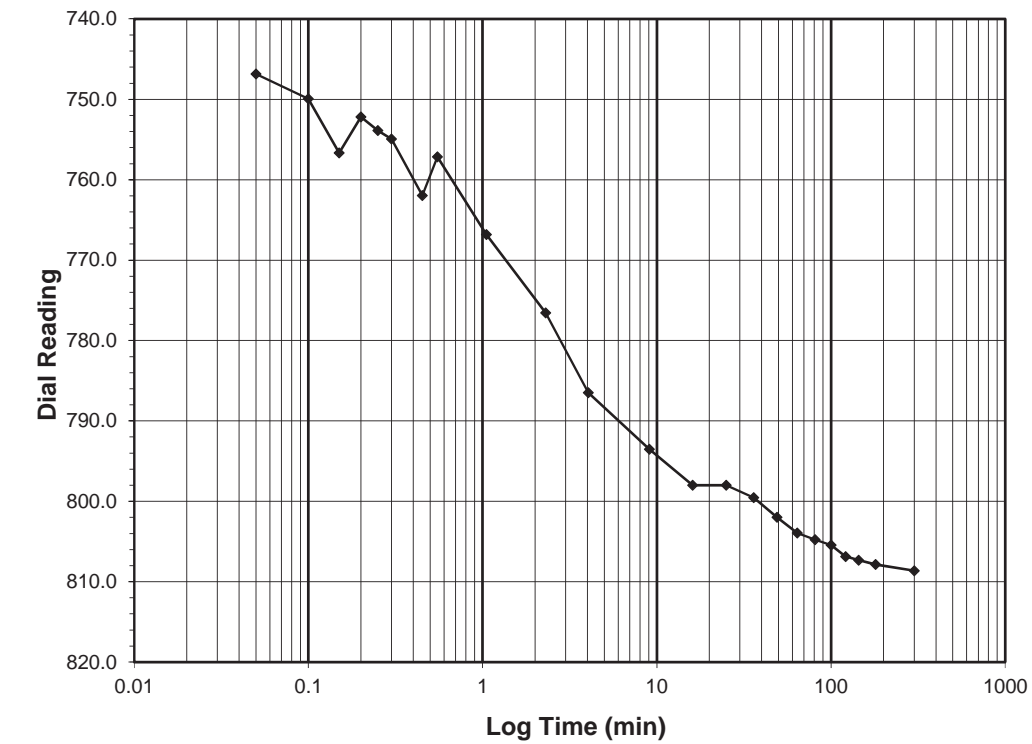
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 1.0-2.0
Final Reading (div): 808.6
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/2/18
 Start Time: 12:50:25

Elapsed Time (min)	Dial Reading (div)
Initial	738.3
0.05	746.9
0.10	749.9
0.15	756.7
0.20	752.2
0.25	753.9
0.30	754.9
0.45	762.0
0.55	757.1
1.05	766.8
2.30	776.6
4.05	786.5
9.05	793.5
16.05	798.0
25.05	798.0
36.05	799.6
49.05	802.0
64.07	803.9
81.07	804.8
100.07	805.4
121.07	806.9
144.07	807.3
180.07	807.9
300.07	808.6



Tested By 129-04-0411 Date 3/2/18 Checked By GEM Date 3/6/18

Tested By 129-04-0411 Date 3/2/18 Checked By GEM Date 3/6/18

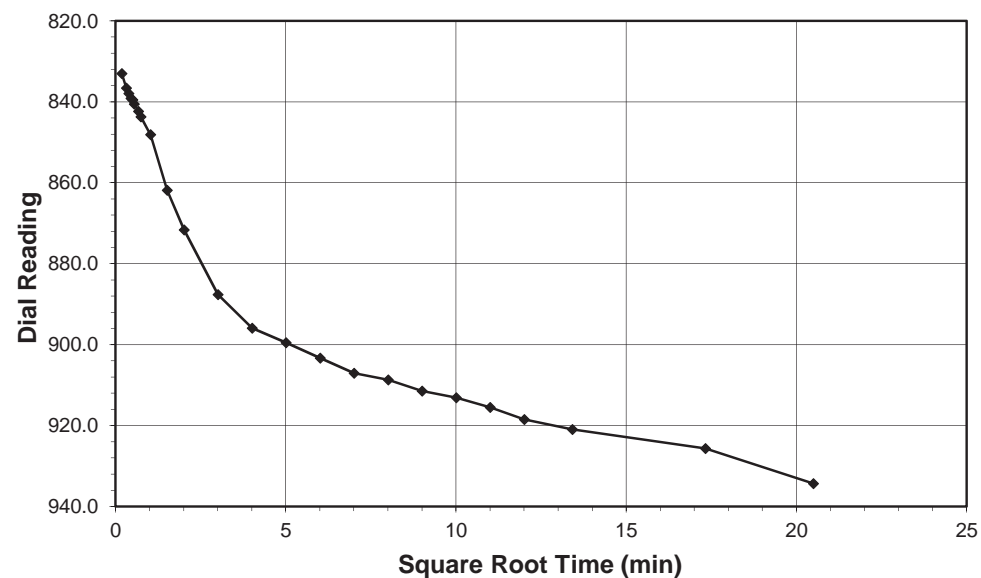
ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11



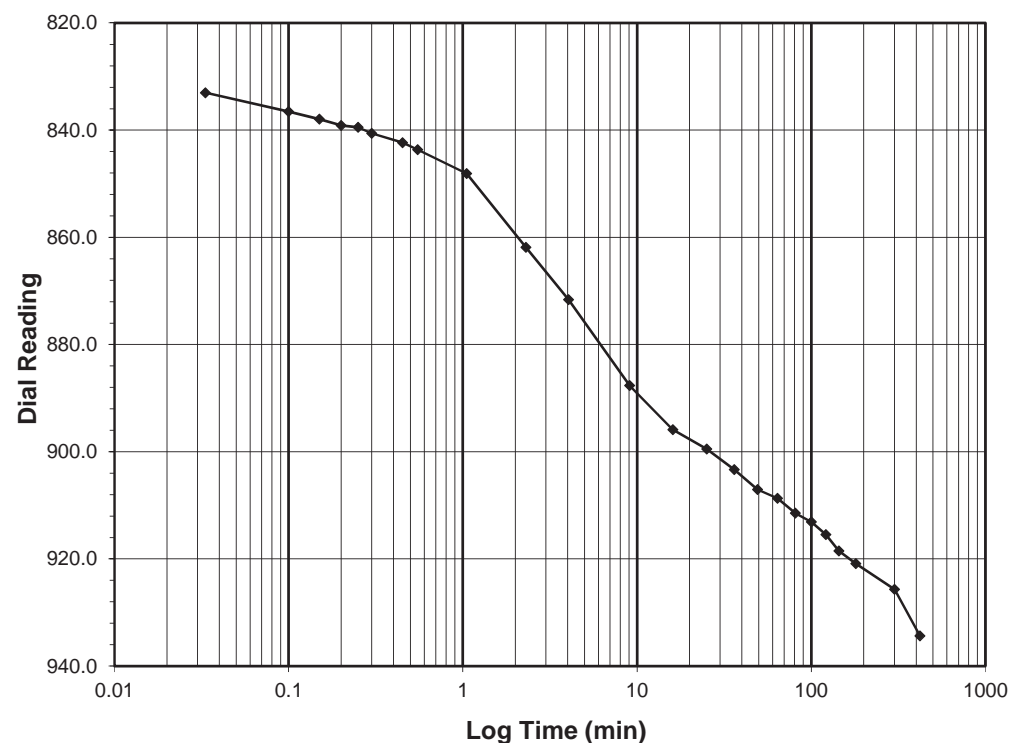
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0
Final Reading (div) 934.3
 Consolidometer No. **R470**
 1 Division (in) 0.0001
 Start Date 3/2/18
 Start Time 19:50:47

Elapsed Time (min)	Dial Reading (div)
Initial	808.6
0.03	833.0
0.10	836.6
0.15	838.0
0.20	839.1
0.25	839.5
0.30	840.6
0.45	842.3
0.55	843.7
1.05	848.1
2.30	861.9
4.05	871.6
9.07	887.6
16.07	895.9
25.07	899.5
36.07	903.3
49.07	907.1
64.07	908.7
81.07	911.5
100.07	913.1
121.07	915.5
144.07	918.5
180.07	920.9
300.07	925.7
420.22	934.3



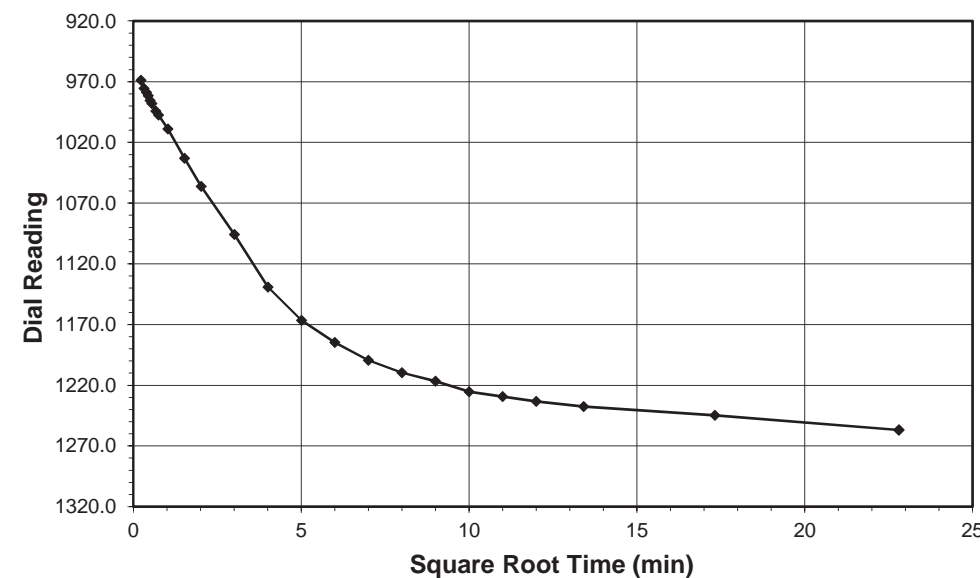
ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-11



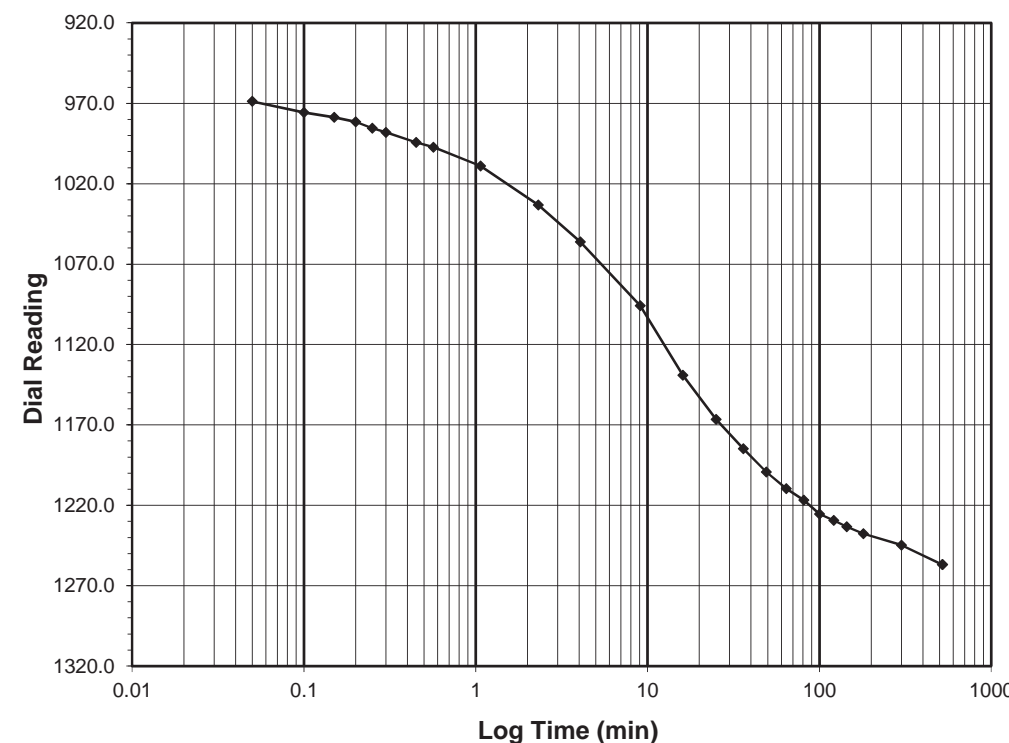
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-8.0
Final Reading (div) 1256.9
 Consolidometer No. **R470**
 1 Division (in) 0.0001
 Start Date 3/3/18
 Start Time 2:51:01

Elapsed Time (min)	Dial Reading (div)
Initial	934.3
0.05	968.7
0.10	975.6
0.15	978.7
0.20	981.5
0.25	985.5
0.30	988.1
0.45	994.2
0.57	997.4
1.07	1008.9
2.32	1033.2
4.07	1056.2
9.07	1095.9
16.07	1139.2
25.07	1166.5
36.07	1184.8
49.07	1199.3
64.07	1209.6
81.07	1216.7
100.07	1225.4
121.07	1229.4
144.07	1233.3
180.07	1237.6
300.07	1244.9
520.07	1256.9
520.38	1256.8



Tested By 129-04-0411 Date 3/2/18 Checked By GEM Date 3/6/18

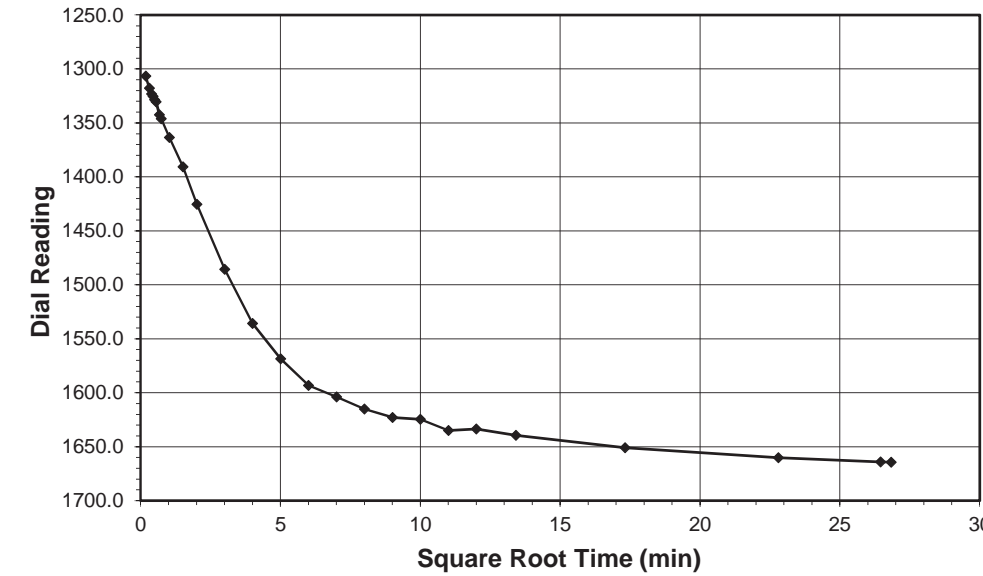
Tested By 129-04-0411 Date 3/3/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



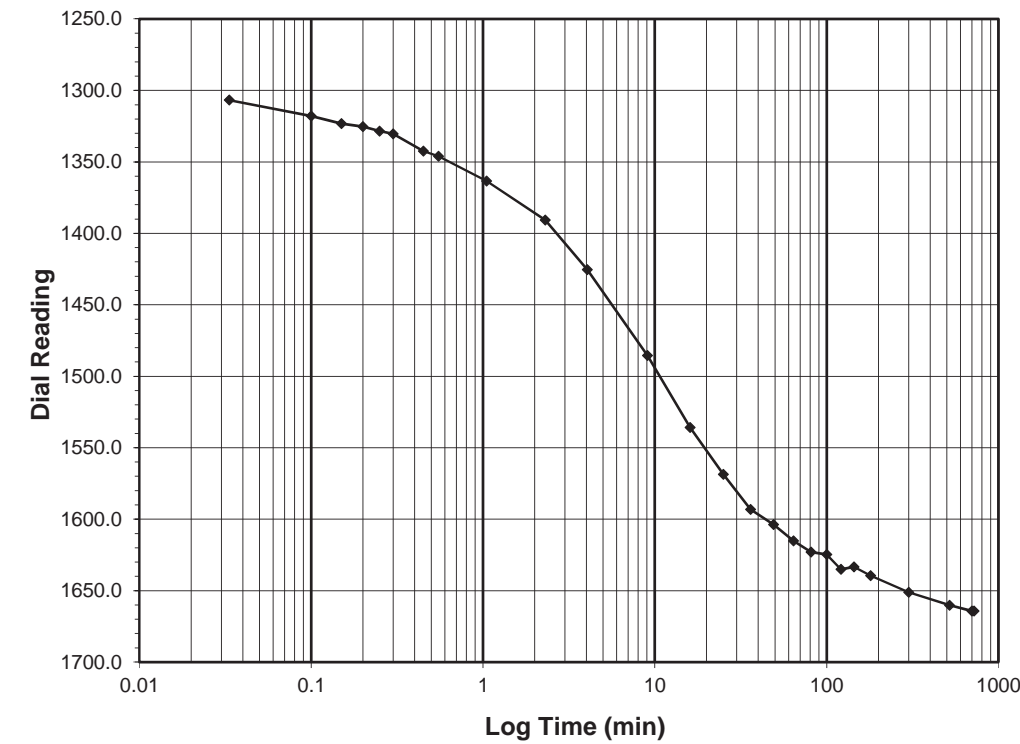
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 8.0-16.0
Final Reading (div) 1664.3
 Consolidometer No. **R470**
 1 Division (in) 0.0001
 Start Date 3/3/18
 Start Time 11:31:24

Elapsed Time (min)	Dial Reading (div)
Initial	1256.9
0.03	1306.8
0.10	1317.9
0.15	1323.2
0.20	1325.3
0.25	1328.5
0.30	1330.4
0.45	1342.5
0.55	1346.0
1.05	1363.4
2.30	1390.7
4.05	1425.5
9.05	1485.6
16.05	1535.8
25.05	1568.7
36.05	1593.2
49.05	1603.8
64.07	1615.2
81.07	1623.0
100.07	1624.7
121.07	1635.1
144.07	1633.5
180.07	1639.5
300.07	1651.1
520.07	1660.2
700.07	1664.2
720.15	1664.3

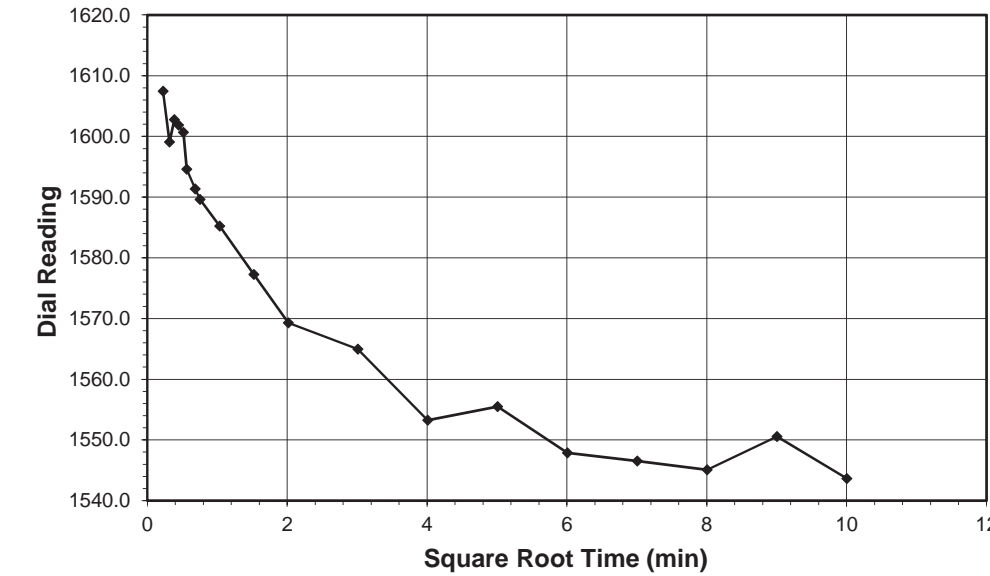


ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



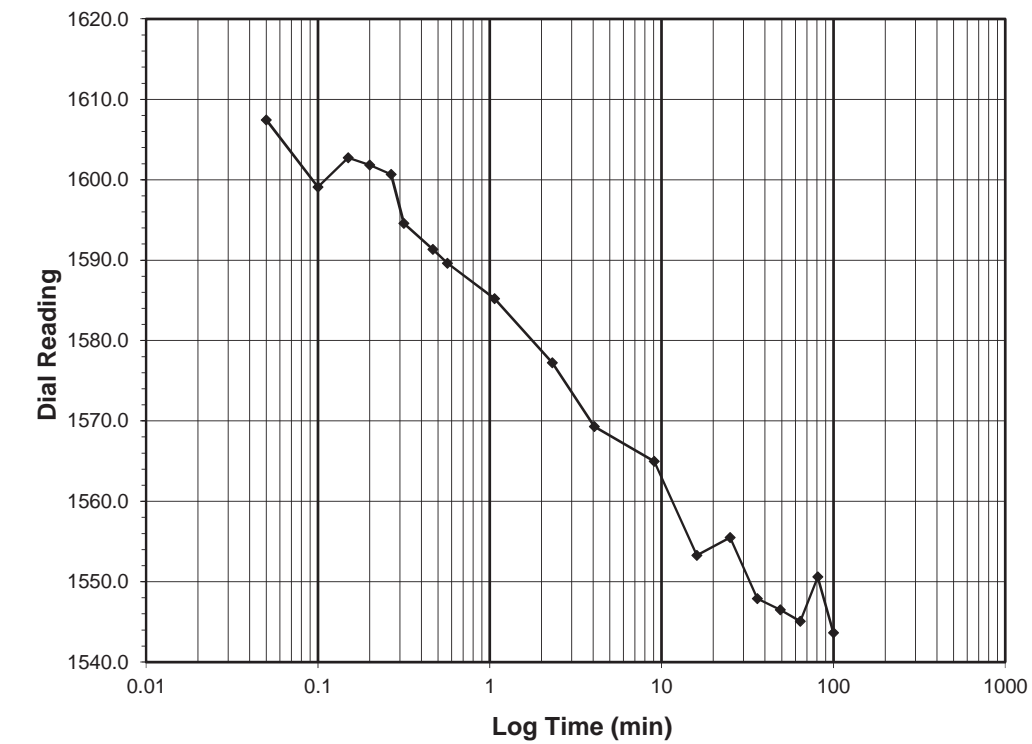
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3
 Project No. R-2018-050-001 Sample No. ST-2
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 16.0-4.0
Final Reading (div) 1543.6
 Consolidometer No. **R470**
 1 Division (in) 0.0001
 Start Date 3/3/18
 Start Time 23:31:34

Elapsed Time (min)	Dial Reading (div)
Initial	1664.3
0.05	1607.5
0.10	1599.1
0.15	1602.7
0.20	1601.8
0.27	1600.7
0.32	1594.6
0.47	1591.4
0.57	1589.6
1.07	1585.2
2.32	1577.2
4.07	1569.3
9.07	1565.0
16.07	1553.3
25.08	1555.5
36.08	1547.9
49.08	1546.5
64.08	1545.1
81.08	1550.6
100.08	1543.6



Tested By 129-04-0411 Date 3/3/18 Checked By GEM Date 3/6/18

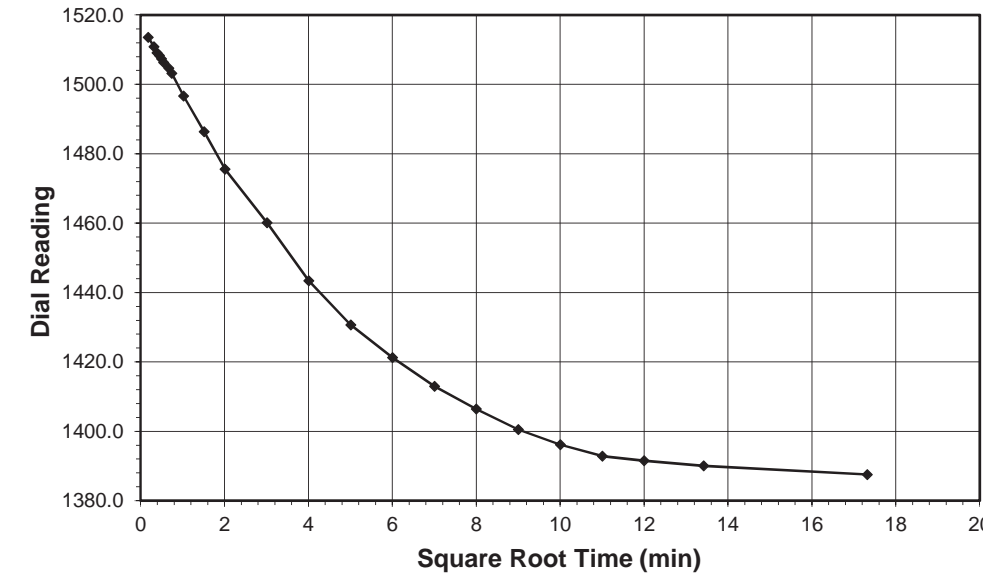
Tested By 129-04-0411 Date 3/3/18 Checked By GEM Date 3/6/18

ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



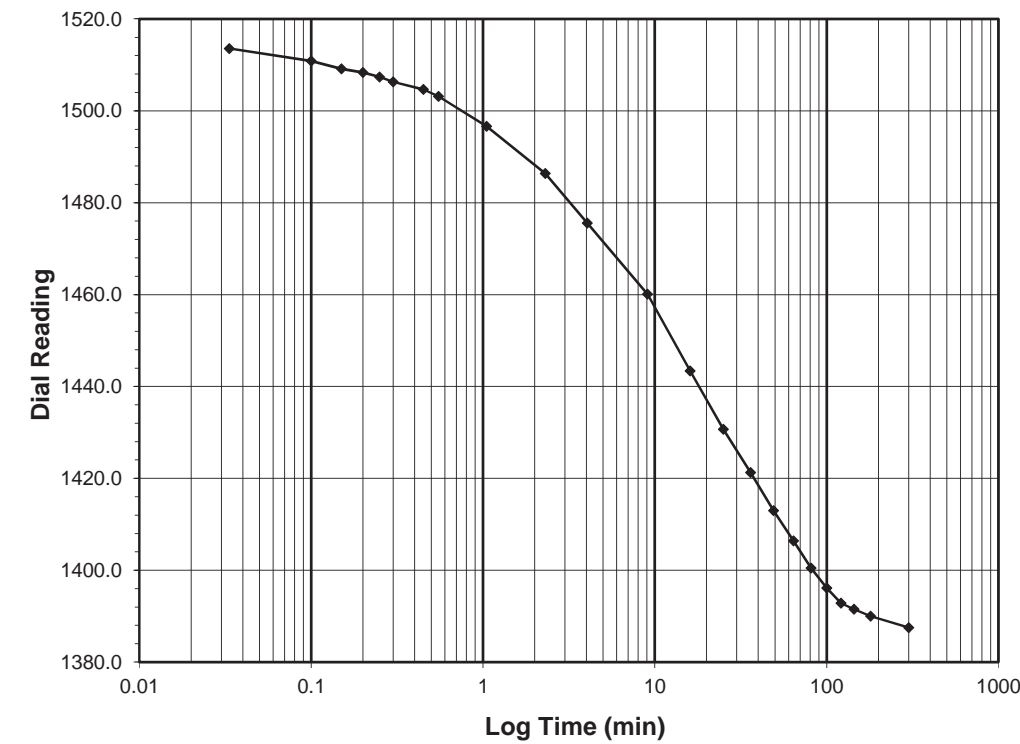
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 4.0-1.0
Final Reading (div): 1387.5
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/4/18
 Start Time: 6:31:59

Elapsed Time (min)	Dial Reading (div)
Initial	1543.6
0.03	1513.6
0.10	1510.8
0.15	1509.1
0.20	1508.3
0.25	1507.4
0.30	1506.3
0.45	1504.7
0.55	1503.1
1.05	1496.6
2.30	1486.4
4.05	1475.5
9.07	1460.1
16.07	1443.3
25.07	1430.7
36.07	1421.3
49.07	1412.9
64.07	1406.4
81.07	1400.5
100.07	1396.1
121.07	1392.8
144.07	1391.5
180.07	1390.0
300.07	1387.5

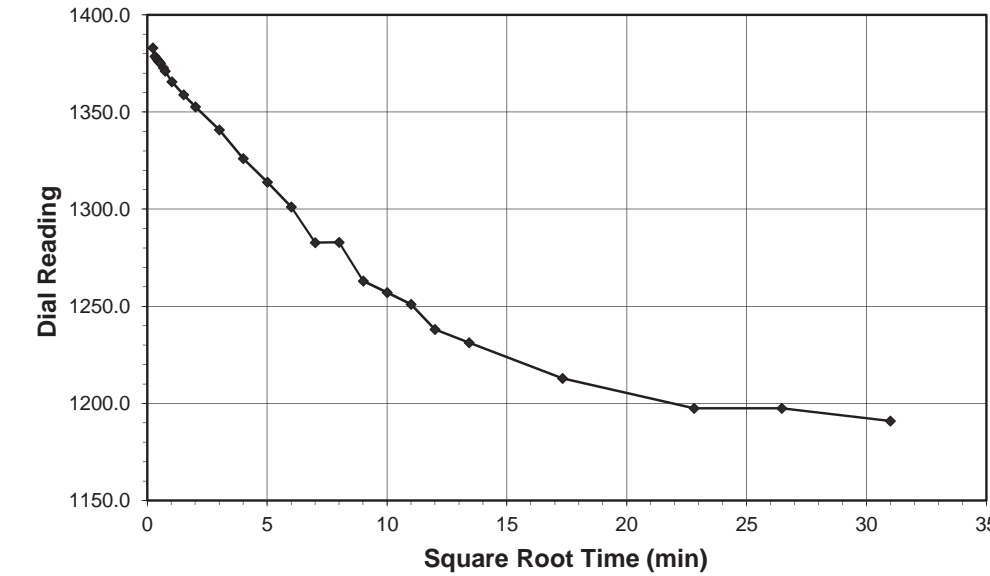


ONE DIMENSIONAL CONSOLIDATION
ASTM D 2435-11



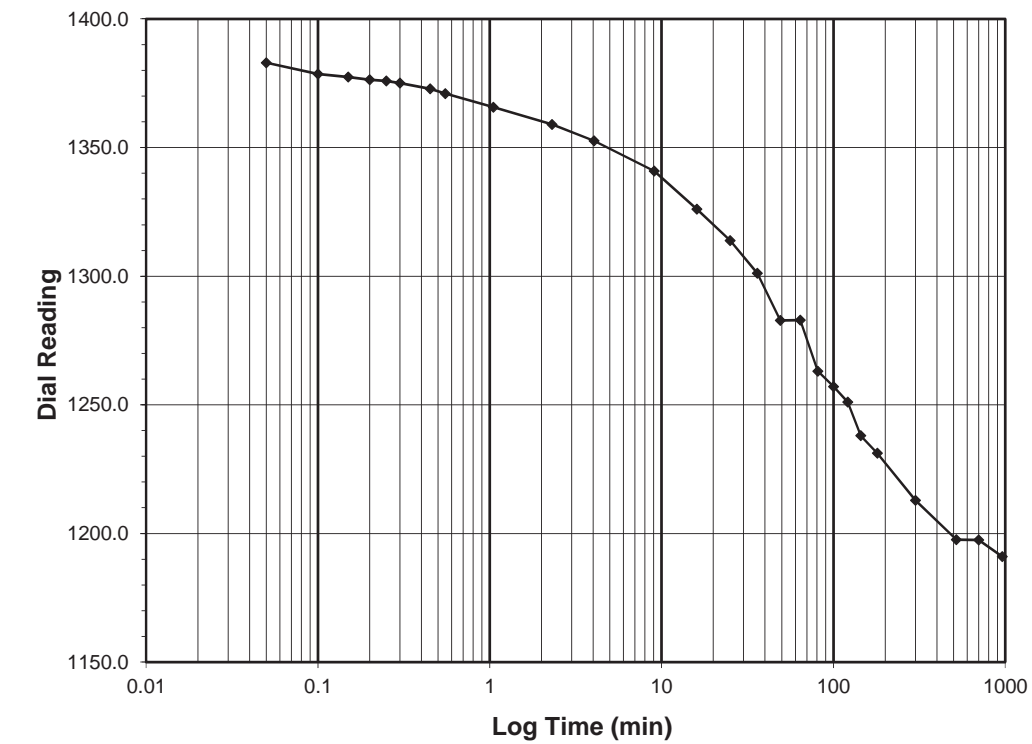
Client: Summit Design & Eng. Services
 Client Project: 17-0535.140 B-4786 Bridge 38
 Project No.: R-2018-050-001
 Lab ID: R-2018-050-001-001
 Boring No.: EB1-A (25+13, 7'LT)
 Depth (ft): 24.3-26.3
 Sample No.: ST-2
 Visual Description: GRAY CLAY

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 1.0-0.25
Final Reading (div): 1191.0
 Consolidometer No.: R470
 1 Division (in): 0.0001
 Start Date: 3/4/18
 Start Time: 13:32:11

Elapsed Time (min)	Dial Reading (div)
Initial	1387.5
0.05	1383.0
0.10	1378.6
0.15	1377.5
0.20	1376.4
0.25	1375.9
0.30	1375.1
0.45	1372.8
0.55	1371.0
1.05	1365.6
2.30	1358.9
4.05	1352.6
9.05	1340.8
16.05	1326.0
25.05	1313.9
36.05	1301.1
49.05	1282.8
64.05	1282.9
81.05	1263.1
100.05	1257.1
121.05	1251.1
144.05	1238.1
180.05	1231.2
300.07	1212.8
520.07	1197.6
700.07	1197.5
960.07	1191.0



Tested By 129-04-0411 Date 3/4/18 Checked By GEM Date 3/6/18

Tested By 129-04-0411 Date 3/4/18 Checked By GEM Date 3/6/18



SHELBY TUBE UNIT WEIGHT

D 7263-09

Client	Summit Design & Eng. Services	Boring No.	EB1-A (25+13, 7'LT)
Client Reference	17-0535.140 B-4786 Bridge 38	Depth Pushed(ft)	26.3-28.3
Project No.	R-2018-050-001	Shelby Tube No.	ST-3
Lab ID	R-2018-050-001-002	Recovery(ft)	2.3

MOISTURE CONTENT

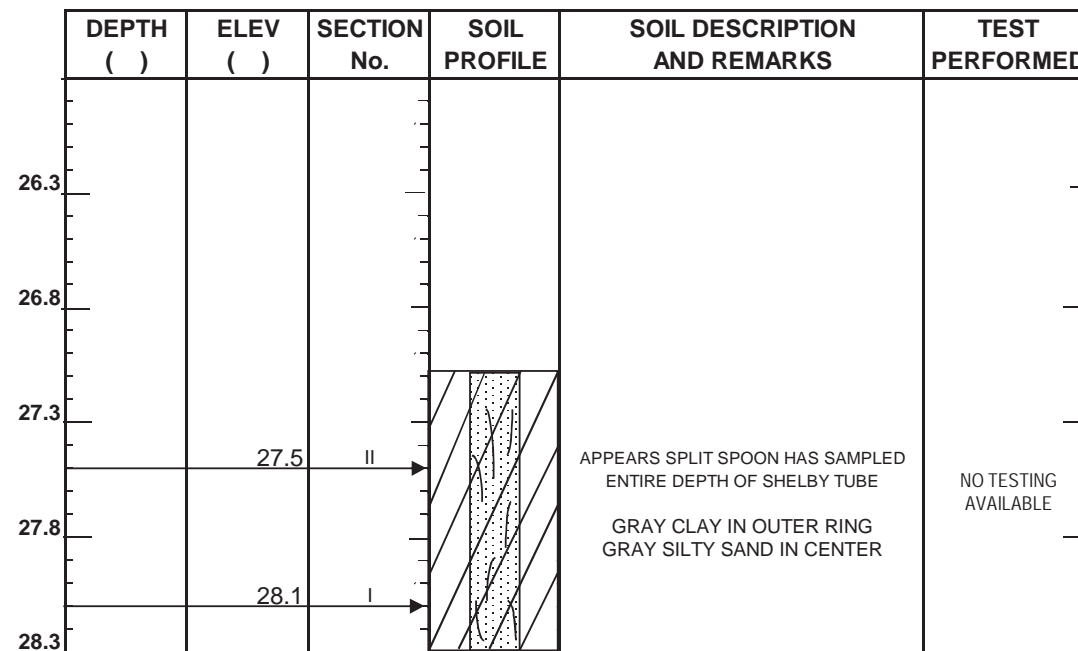
Section Number	1	2	3	4	5
Tare Number					
Wt. Tare & WS(gm.)					
Wt. Tare & DS(gm.)					
Wt. Tare(gm.)					
Moisture Content(%)					

UNIT WEIGHT

Wt. Tube & WS.(gms.)
 Wt. Of Tube(gms.)
 Wt. Of WS.(gms.)
 Length 1 (in.)
 Length 2 (in.)
 Length 3 (in.)
 Top Diameter (in.)
 Middle Diameter (in.)
 Bottom Diameter (in.)
 Sample Volume (cc)
 Moisture Content(%)
 Unit Wet Wt.(gms/cc)
 Unit Wet Wt.(pcf.)
 Unit Dry Wt.(gms/cc)
 Unit Dry Wt.(pcf.)



SOIL PROFILE AND SAMPLING



Note: When full recovery is not achieved, the elevation can not be accurately defined.
 Indicate each cut of the tube with an arrow.
 Indicate dividing line between soil types with a solid line.
 Indicate wax by cross-hatching. Indicate soil types by standard symbols.

Tested By SFS Date 2/27/18 Checked By GEM Date 2/27/18

SITE PHOTOGRAPHS

Bridge No. 38 on -L- (US 13) over the Tar River



Looking Southwest towards End Bent 1



Looking Northeast towards End Bent 2



Looking Northeast towards End Bent 2