

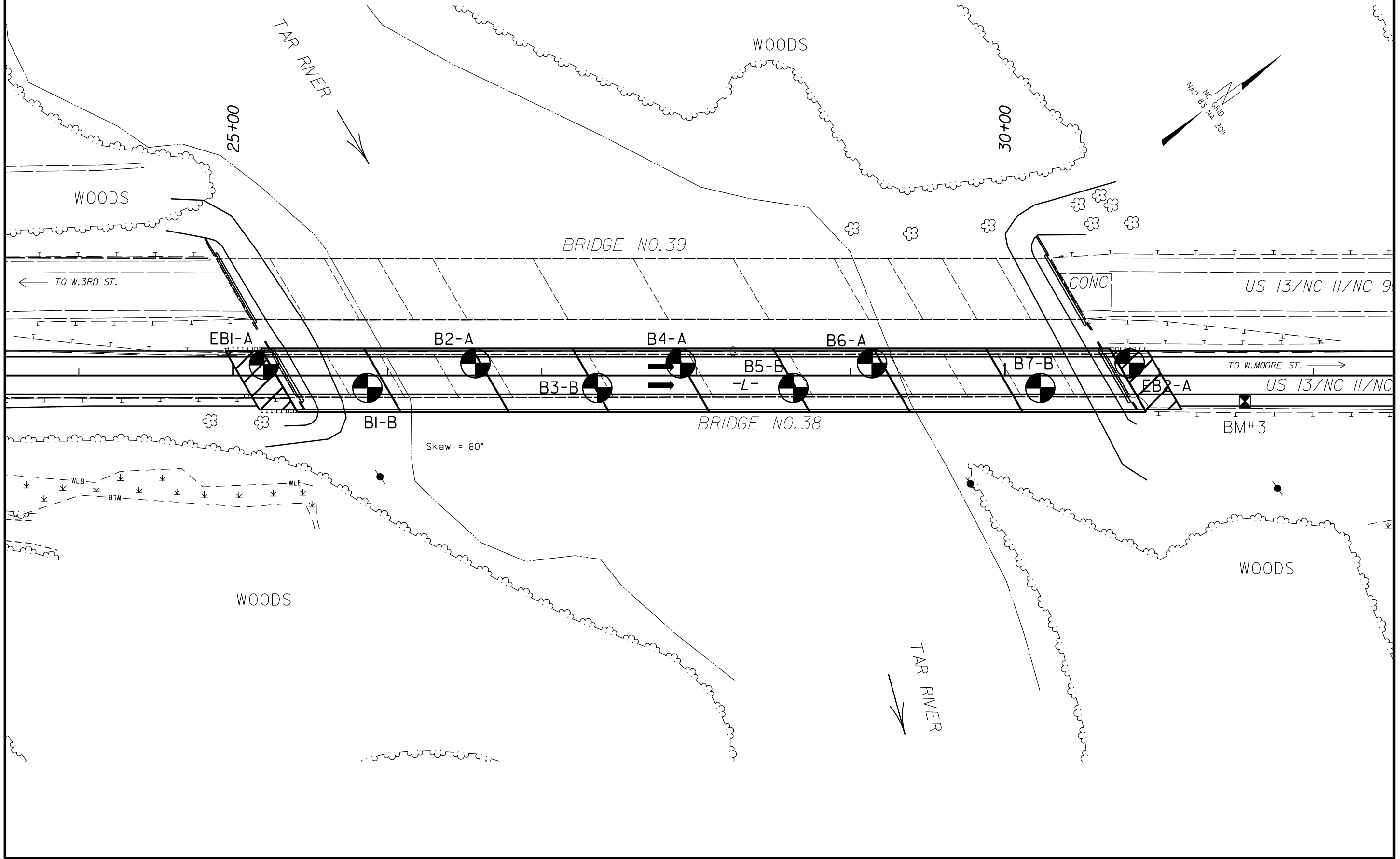


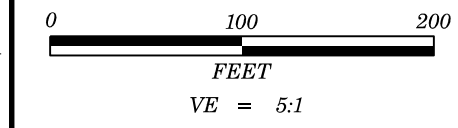
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT**

# 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><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - 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><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - 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. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SRC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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. <b>TOPSOIL (TS)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>							
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>				<b>ANGULARITY OF GRAINS</b>				<b>WEATHERED ROCK (WR)</b>				<b>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>							
<p>GENERAL CLASS. GRANULAR MATERIALS (&lt; 35% PASSING #200) SILT-CLAY MATERIALS (&gt; 35% PASSING #200) ORGANIC MATERIALS</p>				<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				<p>CRYSTALLINE ROCK (CR)</p>				<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>							
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>				<p>NON-CRYSTALLINE ROCK (NCR)</p>				<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>							
<p>PERCENTAGE OF MATERIAL</p>				<p>GROUND WATER</p>				<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>				<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>							
<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p>				<p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p>				<p>WEATHERING</p>				<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>							
<p>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC &gt; 10% &gt; 20% HIGHLY 35% AND ABOVE</p>				<p>STATIC WATER LEVEL AFTER 24 HOURS</p>				<p>VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p>				<p>VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p>							
<p>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p>				<p>SPRING OR SEEP</p>				<p>SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p>				<p>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.</p>							
<p>MISCELLANEOUS SYMBOLS</p>				<p>RECOMMENDATION SYMBOLS</p>				<p>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></p>				<p>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 &gt; 100 BPF</i></p>							
<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p>				<p>UNDERCUT</p>				<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>				<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>							
<p>SOIL SYMBOL</p>				<p>SHALLOW UNDERCUT</p>				<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>				<p>ABBREVIATIONS</p>							
<p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p>				<p>TEST BORING</p>				<p>SLOPE INDICATOR INSTALLATION</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>INFERRED SOIL BOUNDARY</p>				<p>TEST BORING WITH CORE</p>				<p>CONE PENETROMETER TEST</p>				<p>MEG. - 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>INFERRED ROCK LINE</p>				<p>MONITORING WELL</p>				<p>SOUNDING ROD</p>				<p>VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W<sub>g</sub> - DRY UNIT WEIGHT</p>							
<p>ALLUVIAL SOIL BOUNDARY</p>				<p>SPT N-VALUE</p>				<p>TEST BORING WITH CORE</p>				<p>SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>							
<p>TEXTURE OR GRAIN SIZE</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.</p>				<p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p>							
<p>U.S. STD. SIEVE SIZE OPENING (MM)</p>				<p>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.</p>				<p>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.</p>				<p>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.</p>							
<p>BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)</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.</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.</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.</p>							
<p>GRAIN SIZE</p>				<p>RECOMMENDATION SYMBOLS</p>				<p>MODERATELY 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.</p>				<p>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.</p>							
<p>SOIL MOISTURE - CORRELATION OF TERMS</p>				<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</p>				<p>FIELD MOISTURE DESCRIPTION</p>				<p>GUIDE FOR FIELD MOISTURE DESCRIPTION</p>							
<p>LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT</p>				<p>- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</p>				<p>- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</p>				<p>- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE</p>							
<p>PLASTICITY</p>				<p>- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>							
<p>NON PLASTIC 0-5 SLIGHTLY PLASTIC 6-15 MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OR MORE</p>				<p>DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>							
<p>COLOR</p>				<p>EQUIPMENT USED ON SUBJECT PROJECT</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>							
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>				<p>DRILL UNITS: <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 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 CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N 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>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>			
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<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>							
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<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>				<p>FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p>							
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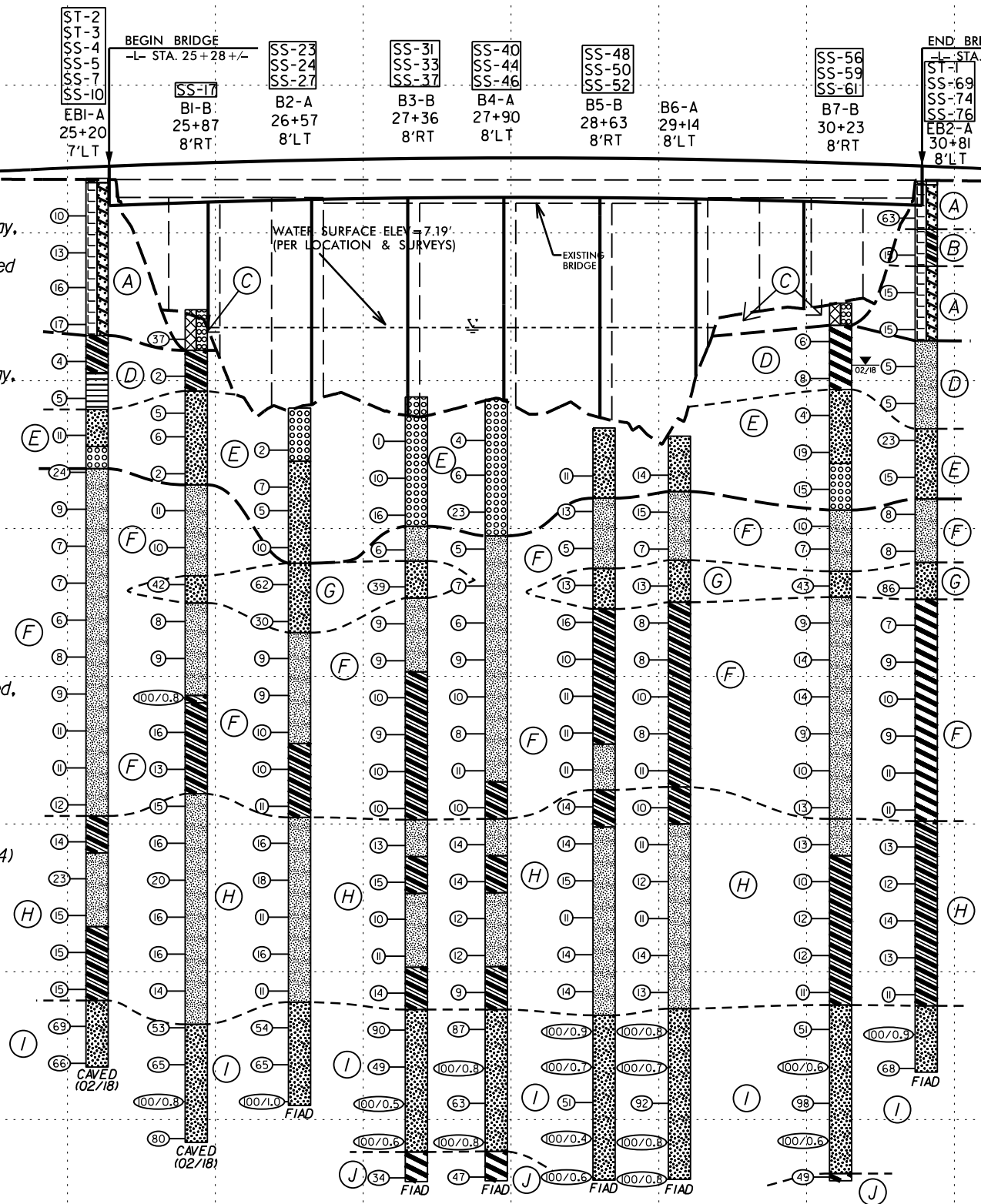




BEGIN GRADE  
-L- STA. 22+00.00  
ELEV=27.86'

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)



22+00    23+00    24+00    25+00    26+00    27+00    28+00    29+00    30+00    31+00    32+00    33+00    34+00    35+00

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.

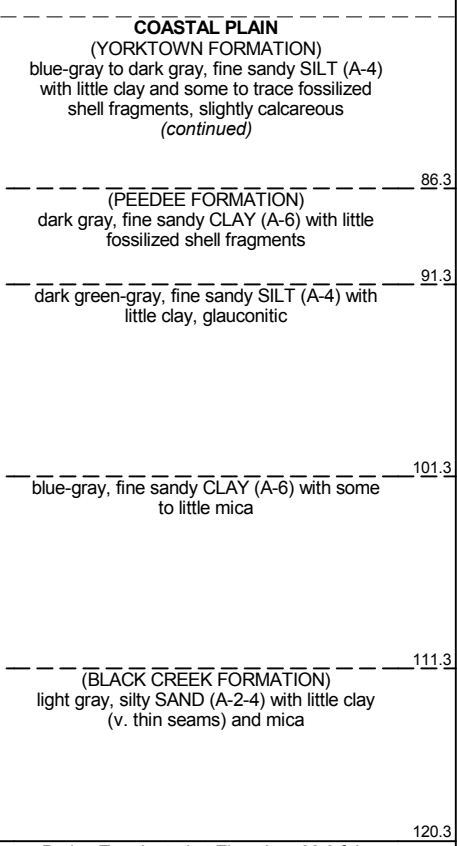
# GEOTECHNICAL BORING REPORT

## 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	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	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 Smith, B.	
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)
BORING NO. B2-A		STATION 26+57		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -3.7 ft		TOTAL DEPTH 94.4 ft		NORTHING 683,712		EASTING 2,478,386	
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 02/05/18		COMP. DATE 02/05/18		SURFACE WATER DEPTH 8.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
0																
-5																
-10	-8.4	4.7	2	1	1											
-15	-13.4	9.7	1	1	6											
-20	-16.6	12.9	2	2	3											
-25	-21.6	17.9	5	5	5											
-30	-26.6	22.9	12	22	40											
-35	-31.6	27.9	28	18	12											
-40	-36.6	32.9	3	4	5											
-45	-41.6	37.9	3	4	5											
-50	-46.6	42.9	3	5	5											
-55	-51.6	47.9	4	4	6											
-60	-56.6	52.9	4	5	6											
-65	-61.6	57.9	4	7	9											
-70	-66.6	62.9	6	8	10											
-75	-71.6	67.9	5	5	6											

NCDOT BORE DOUBLE B4786\_GEO\_BRDG0038\_GINT\_SUMMIT.GPJ\_NC\_DOT.GDT 4/11/18

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. B2-A		STATION 26+57		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -3.7 ft		TOTAL DEPTH 94.4 ft		NORTHING 683,712		EASTING 2,478,386	
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 02/05/18		COMP. DATE 02/05/18		SURFACE WATER DEPTH 8.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75																
-80	-76.6	72.9	5	6	10											
-85	-81.6	77.9	4	5	6											
-90	-86.6	82.9	15	24	30											
-95	-91.6	87.9	15	30	35											
-98.1	-96.6	92.9	24	43	57											

(PEEDEE FORMATION)  
blue-gray and dark green-gray, fine sandy SILT (A-4) with little clay, some mica, and trace fossilized shell fragments, glauconitic  
*(continued)*

(BLACK CREEK FORMATION)  
light to dark gray, silty SAND (A-2-4) with little clay (v. thin seams)

Boring Terminated at Elevation -98.1 ft in Coastal Plain (silty SAND) - Black Creek Formation

Notes:  
- Switched from Casing Advancer to Mud Rotary after SPT at 9.7 feet.









# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Gross, A.	
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)
BORING NO. B6-A		STATION 29+14		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -7.5 ft		TOTAL DEPTH 100.6 ft		NORTHING 683,921		EASTING 2,478,535	
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 02/09/18		COMP. DATE 02/09/18		SURFACE WATER DEPTH 11.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
0																
-5																
-10																
-11.8	4.3		4	6	8											
-15																
-16.8	9.3		5	6	9											
-20																
-21.8	14.3		2	3	4											
-25																
-26.8	19.3		5	5	8											
-30																
-31.8	24.3		3	4	4											
-35																
-36.8	29.3		3	4	4											
-40																
-41.8	34.3		4	4	6											
-45																
-46.8	39.3		3	4	4											
-50																
-51.8	44.3		4	5	6											
-55																
-56.8	49.3		4	4	6											
-60																
-61.8	54.3		6	5	6											
-65																
-66.8	59.3		6	6	6											
-70																
-71.8	64.3		4	5	6											
-75																

WBS 38222.1.FR2		TIP B-4786		COUNTY PITT		GEOLOGIST Gross, A.	
SITE DESCRIPTION Replace Bridge No. 38 over the Tar River on US 13 in Greenville							GROUND WTR (ft)
BORING NO. B6-A		STATION 29+14		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -7.5 ft		TOTAL DEPTH 100.6 ft		NORTHING 683,921		EASTING 2,478,535	
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 02/09/18		COMP. DATE 02/09/18		SURFACE WATER DEPTH 11.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75																
-76.8	69.3		4	6	8											
-80																
-81.8	74.3		3	6	7											
-85																
-86.8	79.3		34	75	25/0.3											
-90																
-91.8	84.3		24	69	31/0.2											
-95																
-96.8	89.3		33	43	49											
-100																
-101.8	94.3		23	35	65/0.3											
-105																
-106.8	99.3		47	64	36/0.3											
-108.1																

NCDOT BORE DOUBLE B4786\_GEO\_BRDG0038\_GINT\_SUMMIT.GPJ\_NC\_DOT.GDT 4/11/18

Boring Terminated at Elevation -108.1 ft in Coastal Plain (silty SAND) - Black Creek Formation

Notes:  
- Switch from Casing to Mud Rotary did not change sample interval due to rig adjustments.

# 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	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
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	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
-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											
	-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)

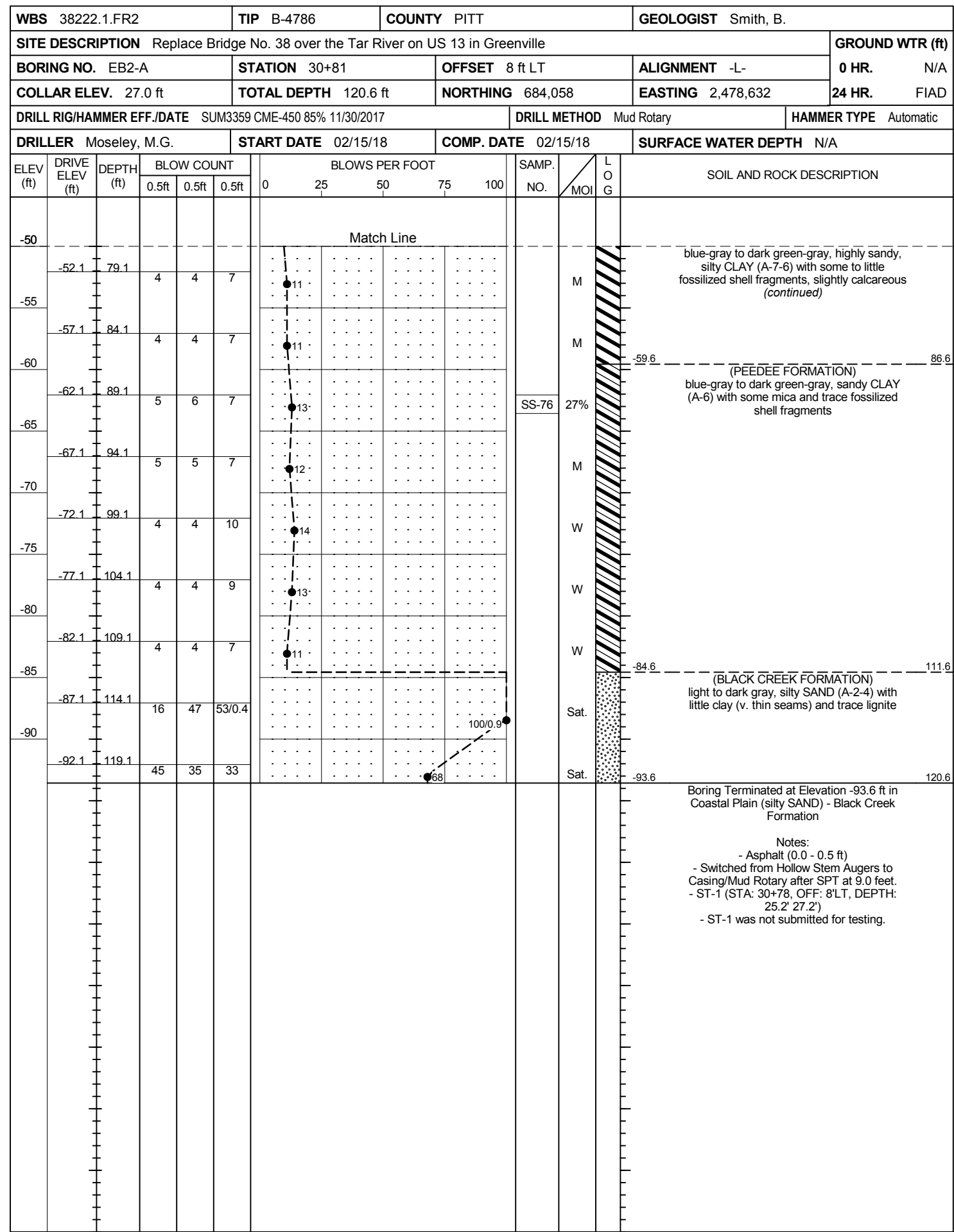
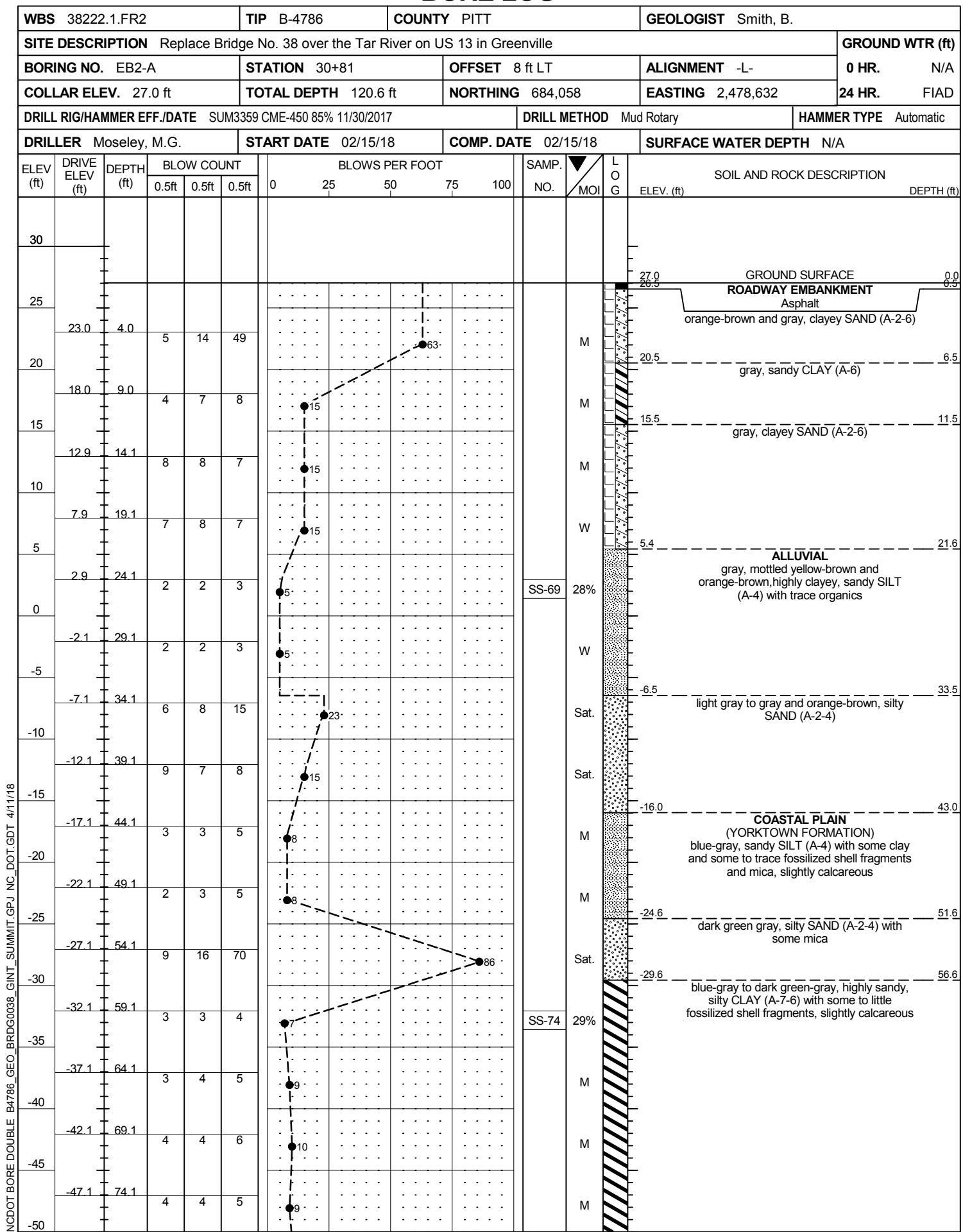
(BLACK CREEK FORMATION)  
light gray to gray, silty SAND (A-2-4) with little clay (v. thin seams), some mica, and little to trace lignite

(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



NCDOT BORE DOUBLE B4786\_GEO\_BRDG0038\_GINT\_SUMMIT.GPJ\_NC\_DOT.GDT 4/11/18

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

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAY  
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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

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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.	<b>B4-A</b>	<b>B4-A</b>	<b>B5-B</b>	<b>B5-B</b>	<b>B5-B</b>	<b>B7-B</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.	<b>B7-B</b>	<b>B7-B</b>	<b>EB2-A</b>	<b>EB2-A</b>	<b>EB2-A</b>
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](mailto: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	<b>Gray Clay</b> (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



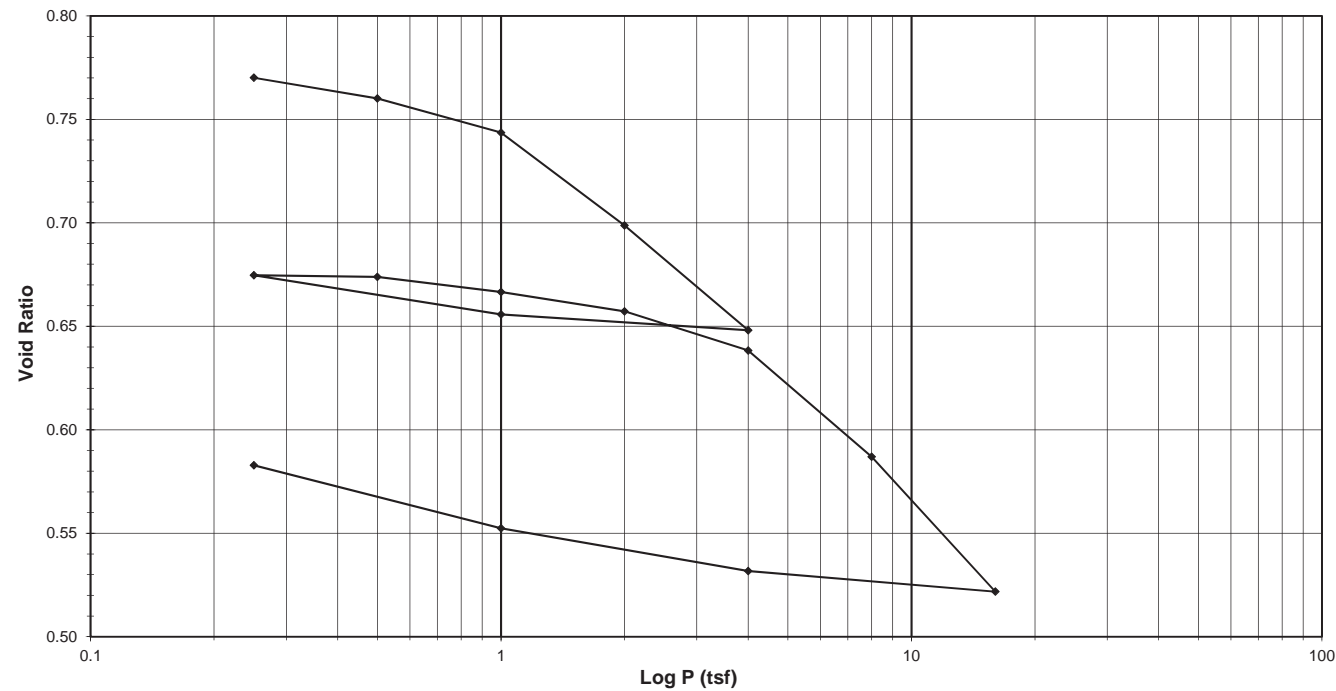


**ONE DIMENSIONAL CONSOLIDATION**

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	<b>0.79246</b>
0.25	135.6	10.9	124.7	25.083	79.437	1.46883	<b>0.77011</b>
0.5	202.6	21.9	180.8	24.941	78.986	1.47723	<b>0.76006</b>
1	306.9	34.2	272.7	24.707	78.246	1.49119	<b>0.74357</b>
2	576.2	53.1	523.1	24.071	76.232	1.53059	<b>0.69869</b>
4	880.2	74.5	805.7	23.354	73.959	1.57763	<b>0.64805</b>
1	802.2	39.6	762.6	23.463	74.306	1.57027	<b>0.65577</b>
0.25	676.6	19.4	657.2	23.731	75.153	1.55256	<b>0.67466</b>
0.5	687.2	25.4	661.8	23.719	75.116	1.55332	<b>0.67383</b>
1	738.3	36.0	702.3	23.616	74.790	1.56009	<b>0.66657</b>
2	808.6	54.4	754.2	23.484	74.373	1.56884	<b>0.65727</b>
4	934.3	74.5	859.9	23.216	73.523	1.58698	<b>0.63833</b>
8	1256.9	110.2	1146.7	22.487	71.216	1.63839	<b>0.58692</b>
16	1664.3	154.4	1509.9	21.565	68.294	1.70849	<b>0.52181</b>
4	1543.6	89.3	1454.4	21.706	68.741	1.69738	<b>0.53177</b>
1	1387.5	48.1	1339.4	21.998	69.665	1.67486	<b>0.55237</b>
0.25	1191.0	21.9	1169.1	22.430	71.035	1.64256	<b>0.58290</b>

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

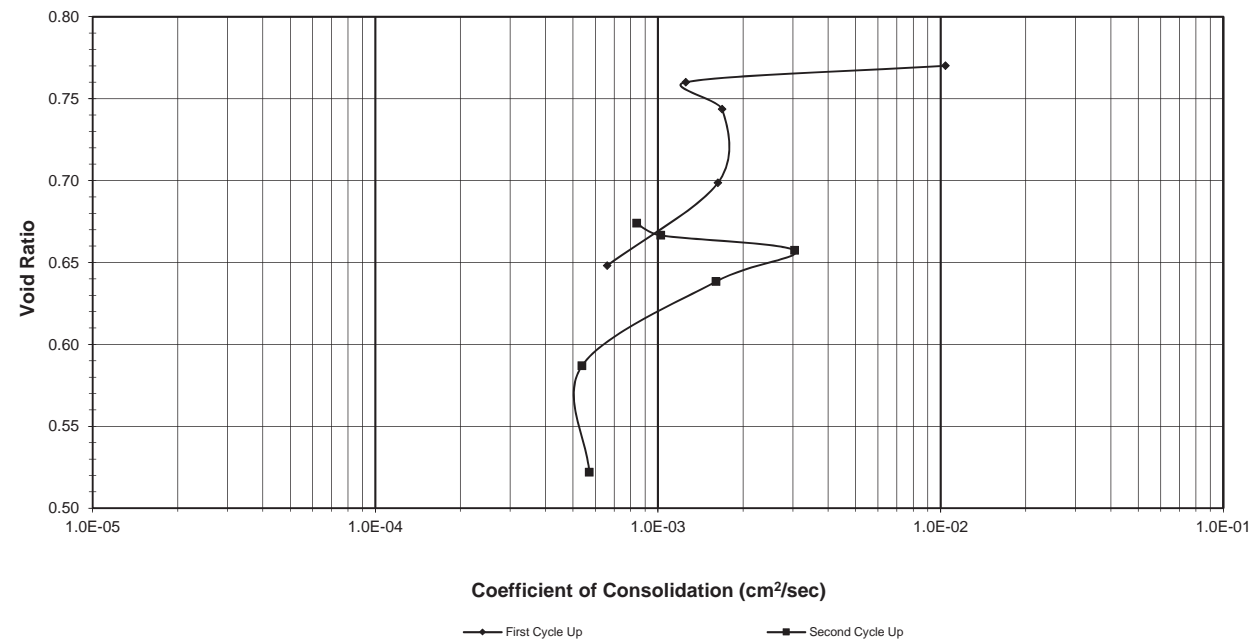
**ONE DIMENSIONAL CONSOLIDATION**

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 <sub>v</sub> Test Data Summary				Time t <sub>50</sub> (min.)	C <sub>v</sub> (cm <sup>2</sup> /sec)
			Load Increment (tsf)	Dial Reading @ t <sub>50</sub> (div)	Machine Deflection (div)	Corrected Dial Reading @ t <sub>50</sub> (div)		
Water Content								
Tare Number	825	815						
Wt. Tare & WS (g)	395.14	280.99	0 - 0.25	103.1	10.9	92.2	2.517	0.50 0.01040
Wt. Tare & DS (g)	335.43	253.14	0.25 - 0.5	170.6	21.9	148.7	2.502	4.10 0.00125
Wt. Water (g)	59.71	27.85	0.5 - 1.0	260.6	34.2	226.4	2.482	3.00 0.00169
Wt. Tare (g)	136.83	136.07	1.0 - 2.0	443.4	53.1	390.3	2.441	3.00 0.00163
Wt. DS (g)	198.60	117.07	2.0 - 4.0	728.4	74.5	653.9	2.374	7.00 0.00066
Water Content (%)	30.07	23.79	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						

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

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

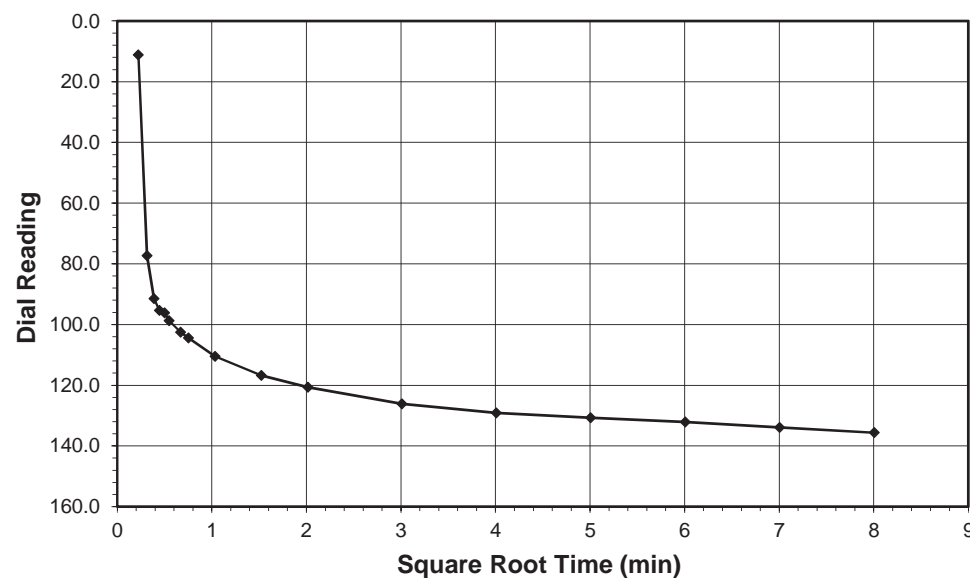
Tested By 129-04-0411 Date 2/27/18 Input Checked By GEM Date 3/6/18

**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



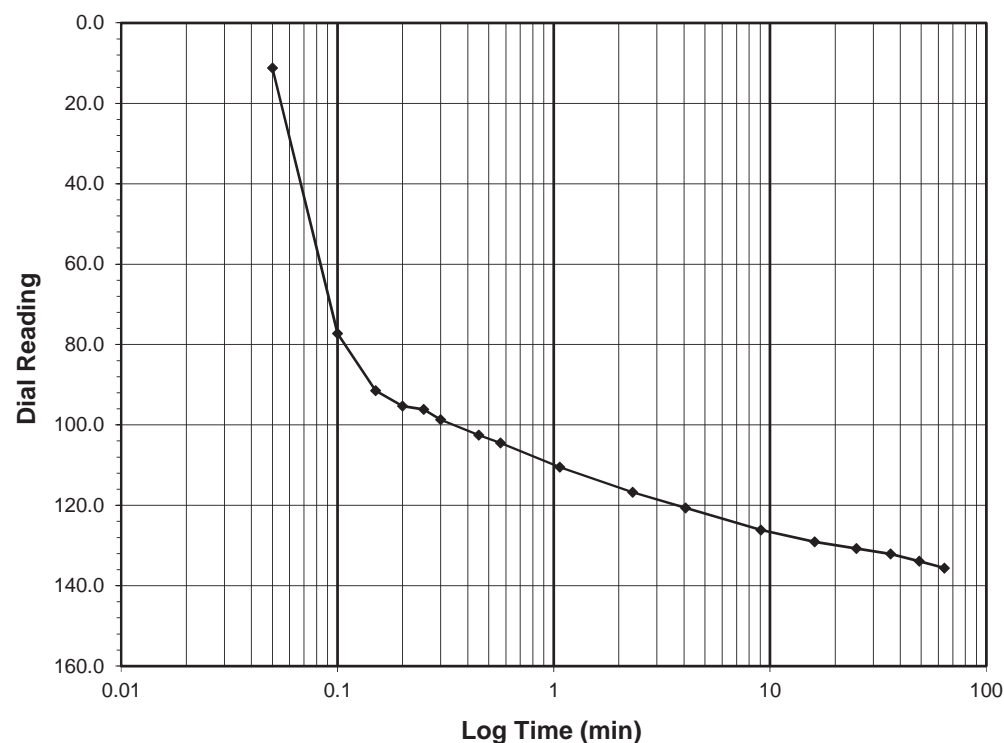
Client: Summit Design & Eng. Services  
 Client Project: 17-0535.140 B-4786 Bridge 38  
 Project No.: R-2018-050-001  
 Lab ID: R-2018-050-001-001  
 Boring No.: EB1-A (25+13, 7'LT)  
 Depth (ft): 24.3-26.3  
 Sample No.: ST-2  
 Visual Description: GRAY CLAY

**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)
<b>Initial</b>	<b>0.0</b>
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



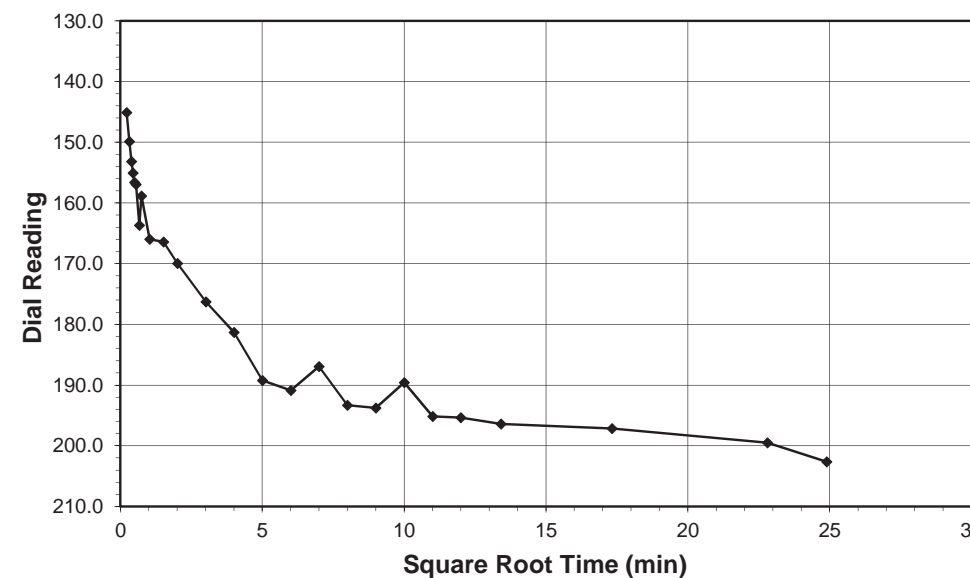
Tested By 129-04-0411 Date 2/27/18 Checked By GEM Date 3/6/18

**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



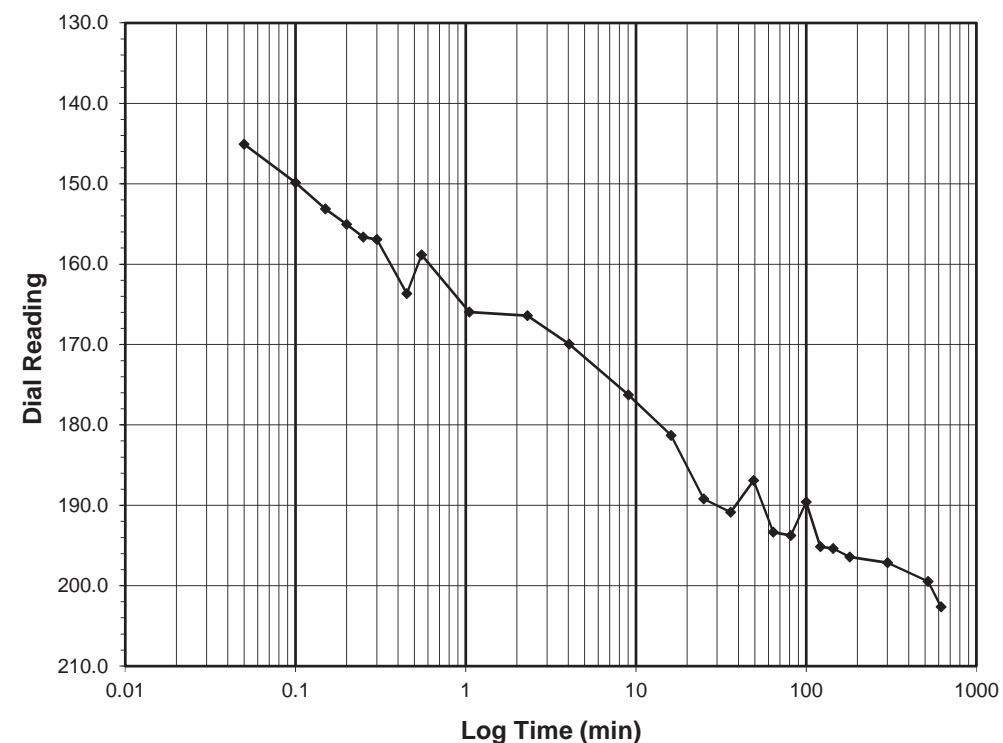
Client: Summit Design & Eng. Services  
 Client Project: 17-0535.140 B-4786 Bridge 38  
 Project No.: R-2018-050-001  
 Lab ID: R-2018-050-001-001  
 Boring No.: EB1-A (25+13, 7'LT)  
 Depth (ft): 24.3-26.3  
 Sample No.: ST-2  
 Visual Description: GRAY CLAY

**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)
<b>Initial</b>	<b>135.6</b>
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



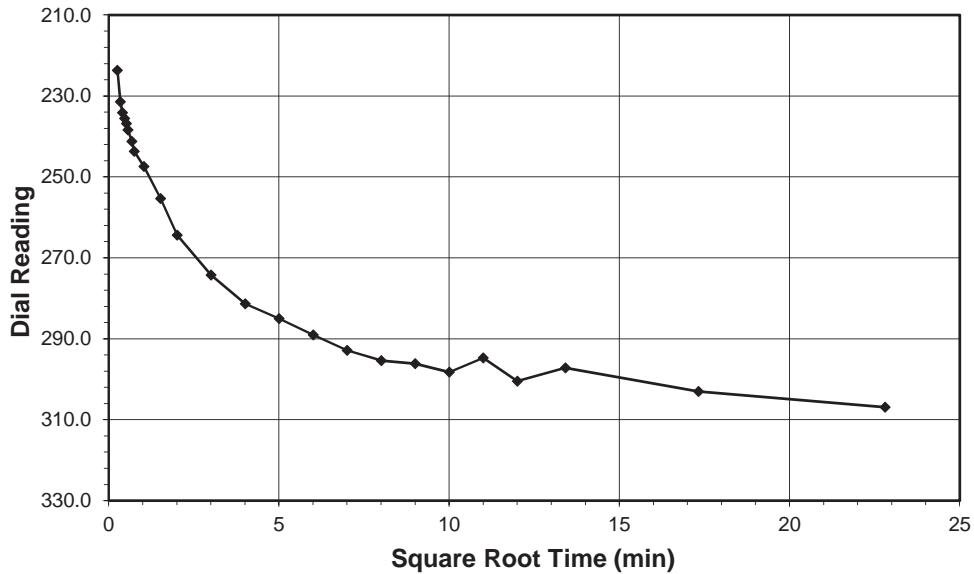
Tested By 129-04-0411 Date 2/27/18 Checked By GEM Date 3/6/18

**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

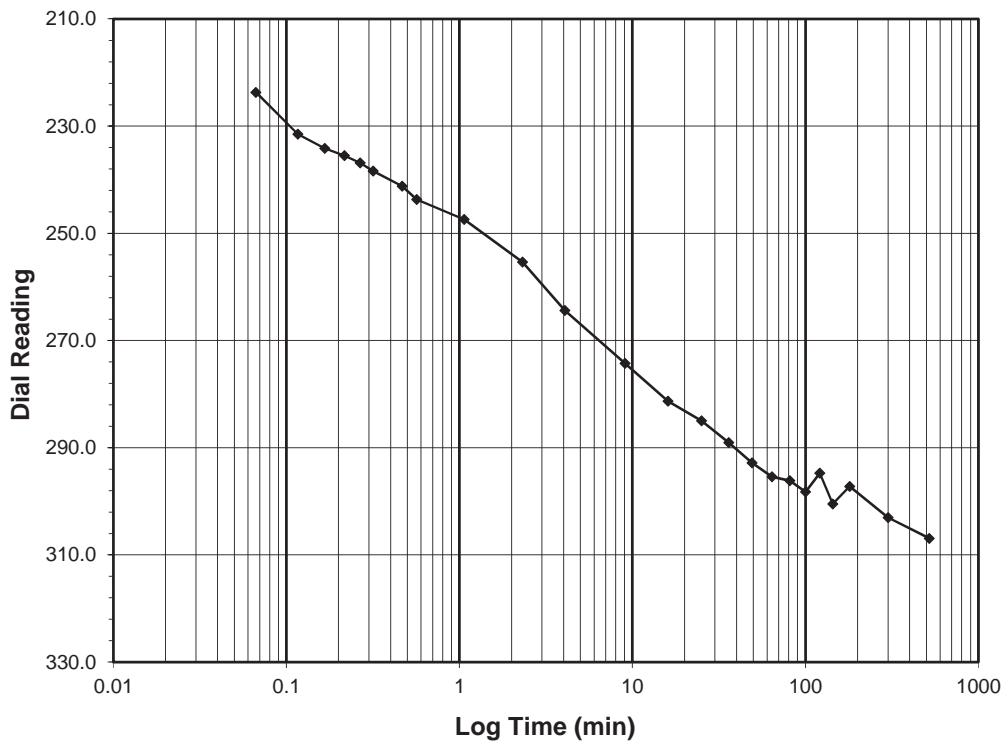
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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)
<b>Initial</b>	<b>202.6</b>
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

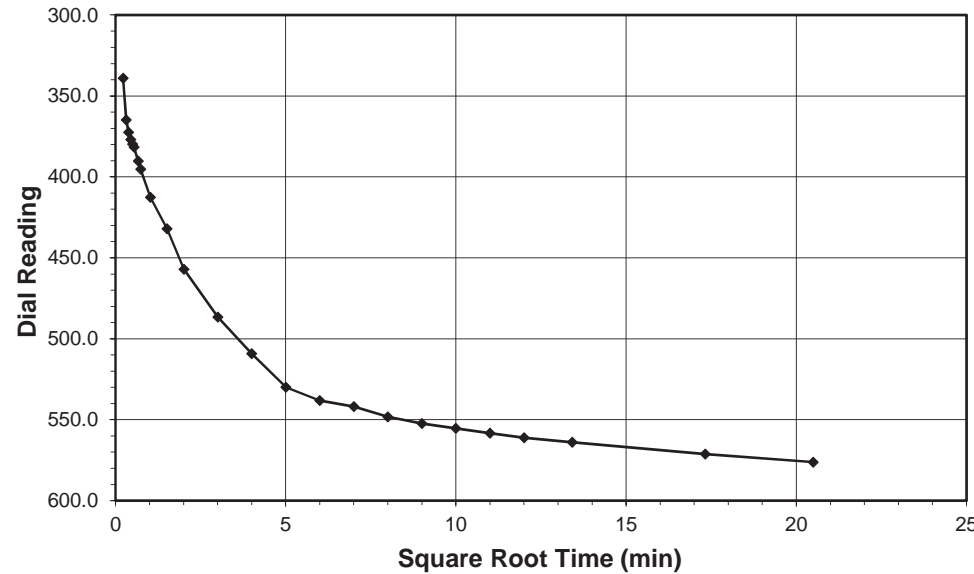


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



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

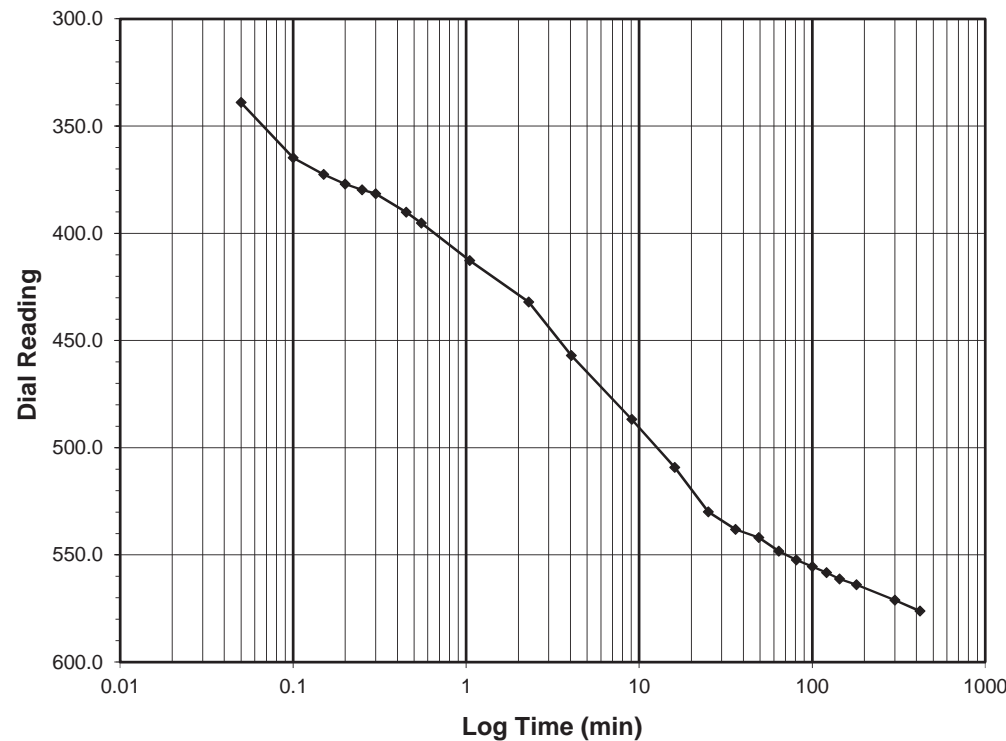
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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)
<b>Initial</b>	<b>306.9</b>
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

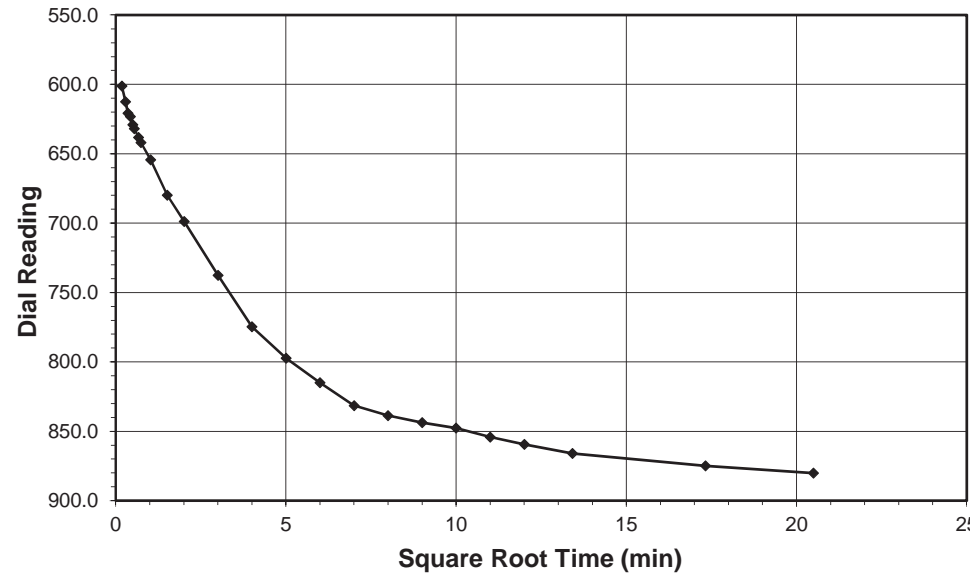
Tested By 129-04-0411 Date 2/28/18 Checked By GEM Date 3/6/18

**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



Client Summit Design & Eng. Services 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

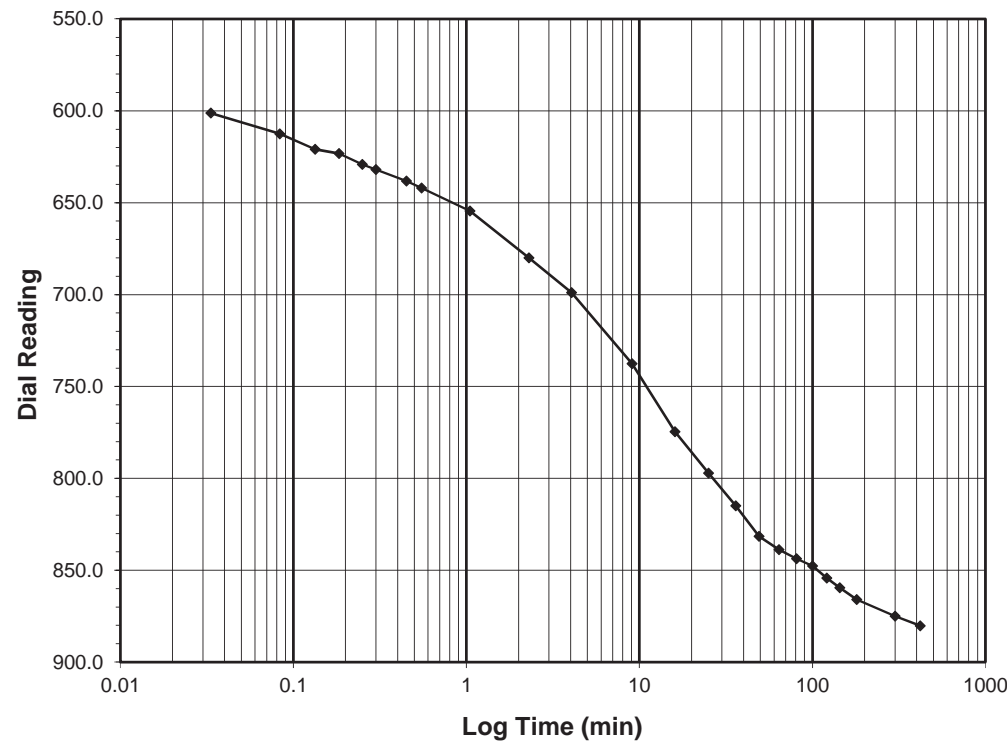
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 2.0-4.0**  
**Final Reading (div) 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)
<b>Initial</b>	<b>576.2</b>
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

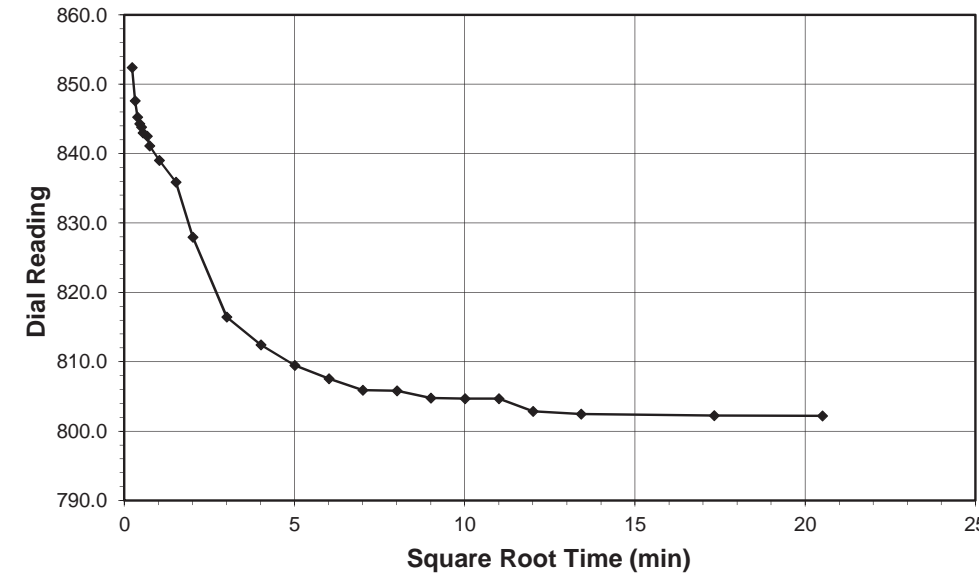


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



Client Summit Design & Eng. Services 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

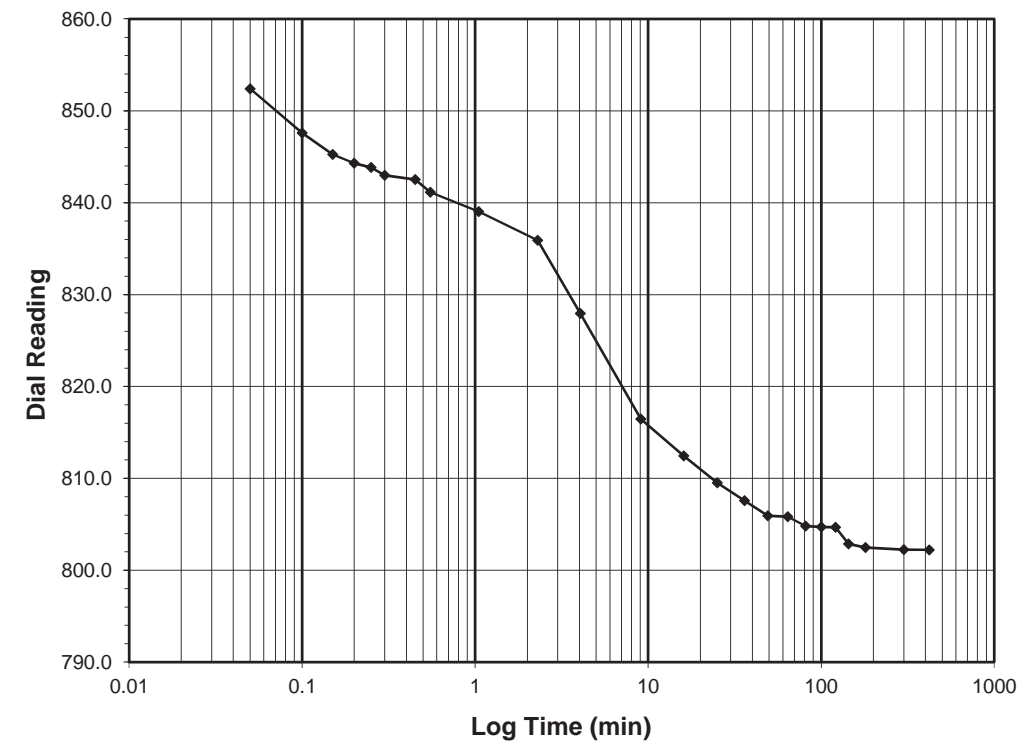
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 4.0-1.0**  
**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)
<b>Initial</b>	<b>880.2</b>
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

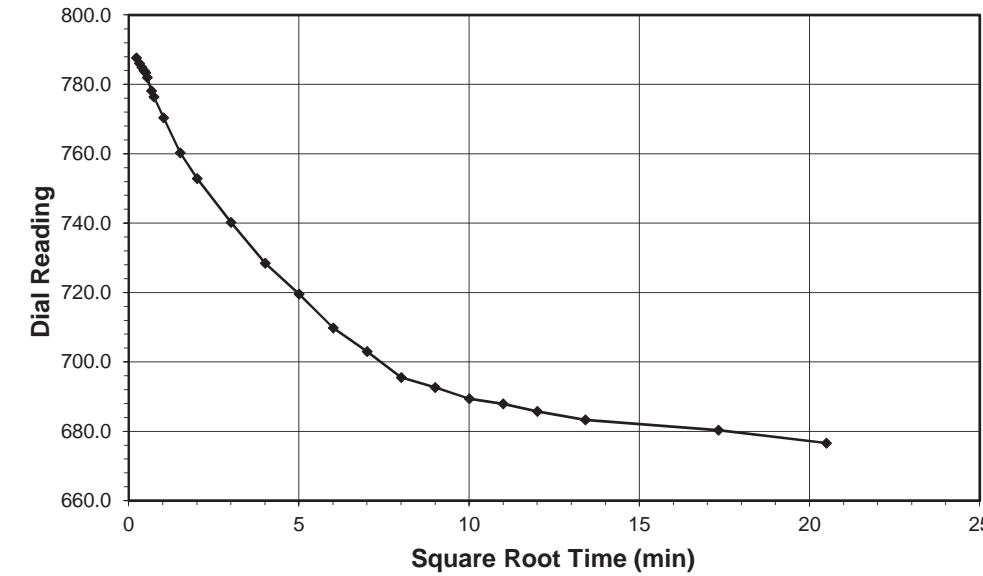
Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

**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

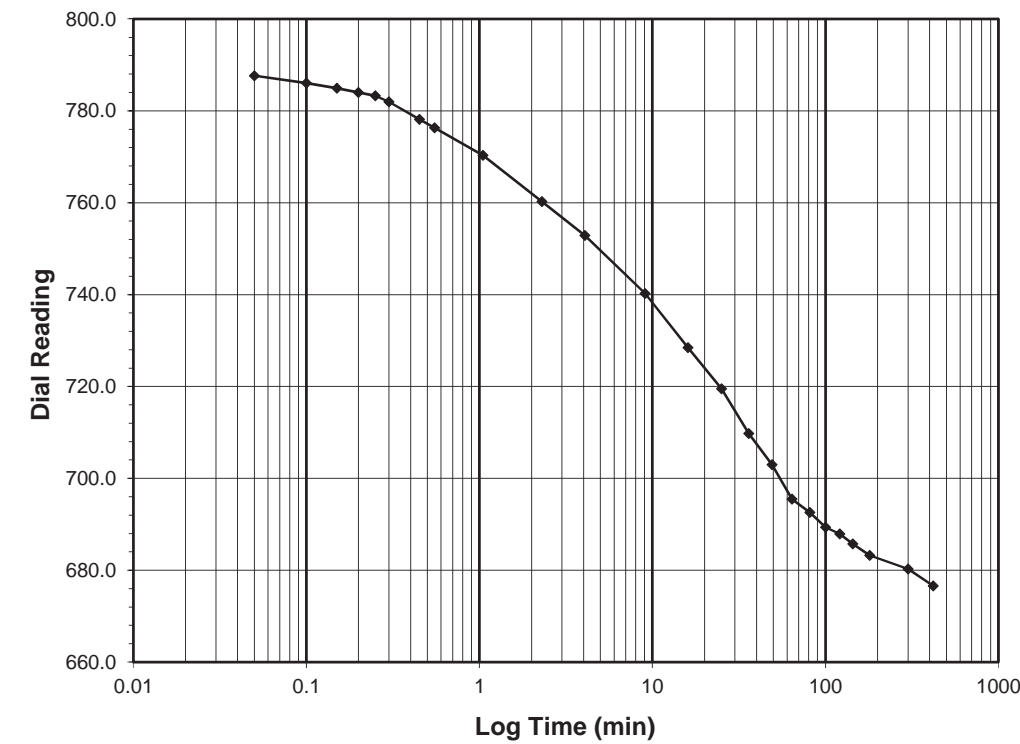
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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

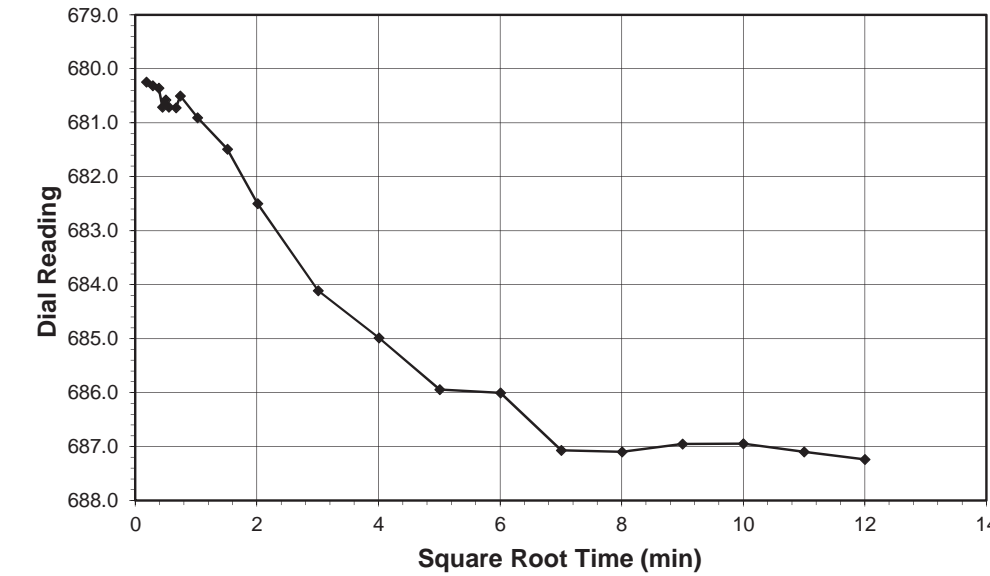


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



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

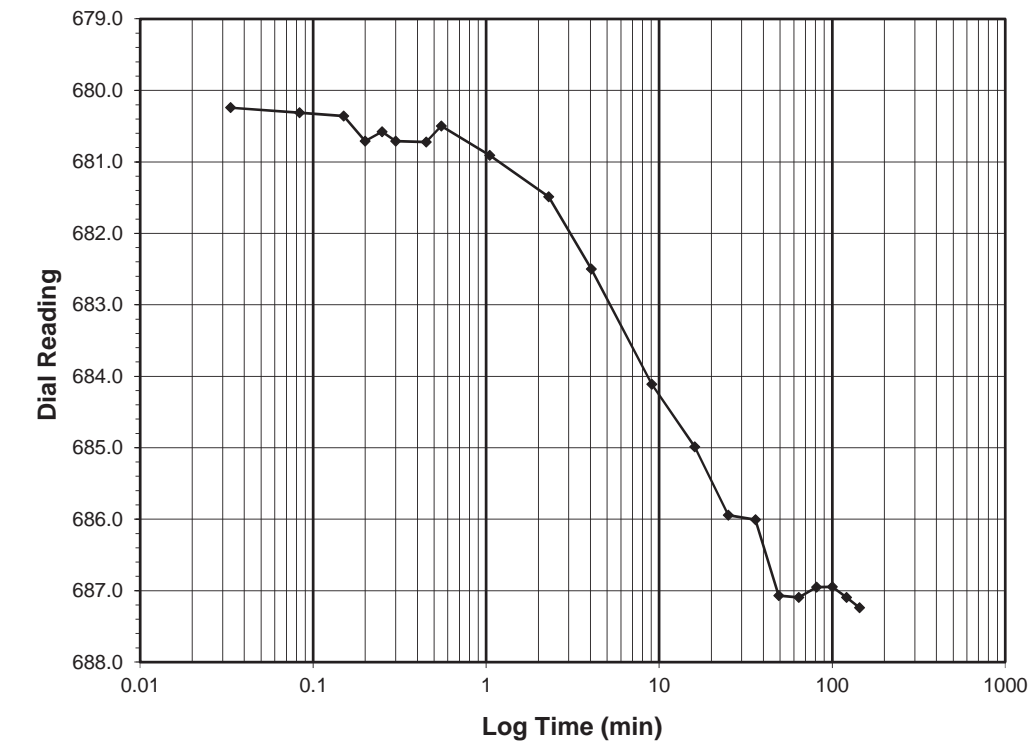
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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

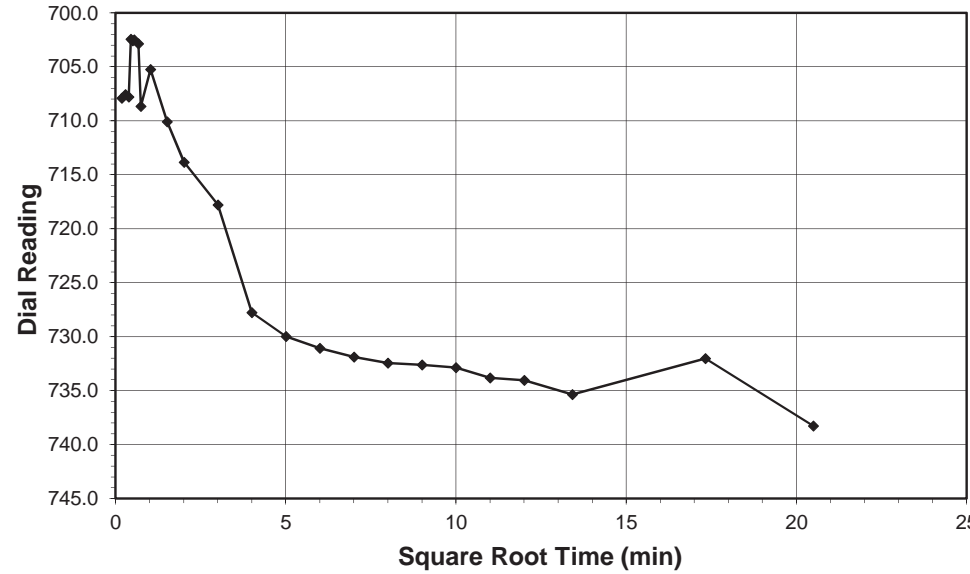
Tested By 129-04-0411 Date 3/1/18 Checked By GEM Date 3/6/18

**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



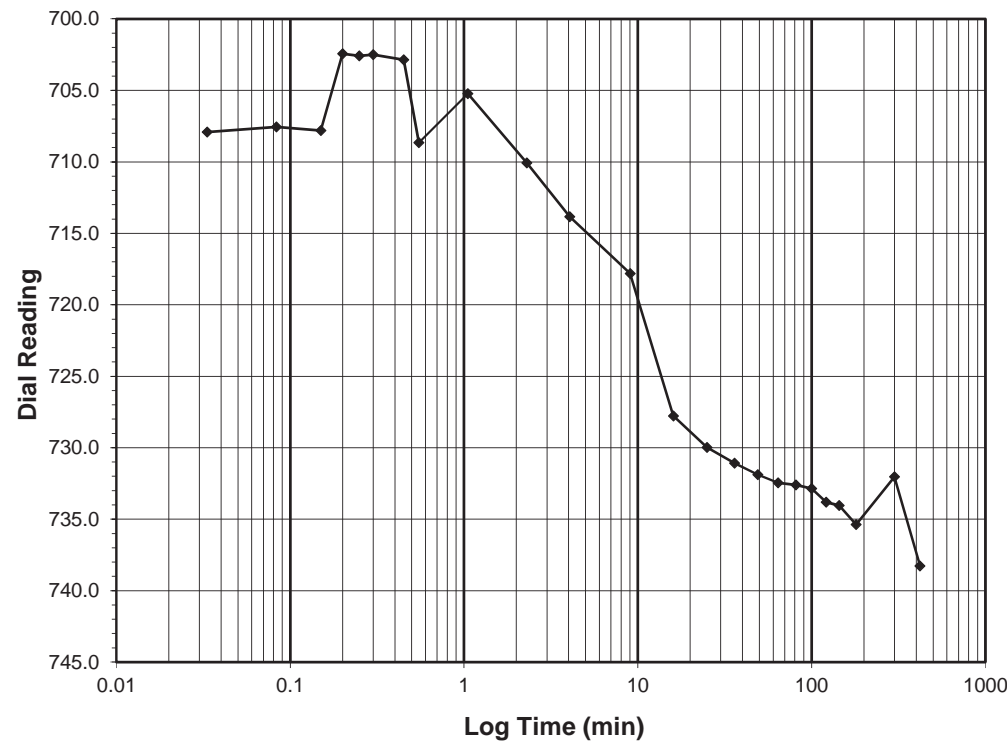
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)  
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3  
 Project No. R-2018-050-001 Sample No. ST-2  
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 0.5-1.0**  
**Final Reading (div) 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)
<b>Initial</b>	<b>687.2</b>
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

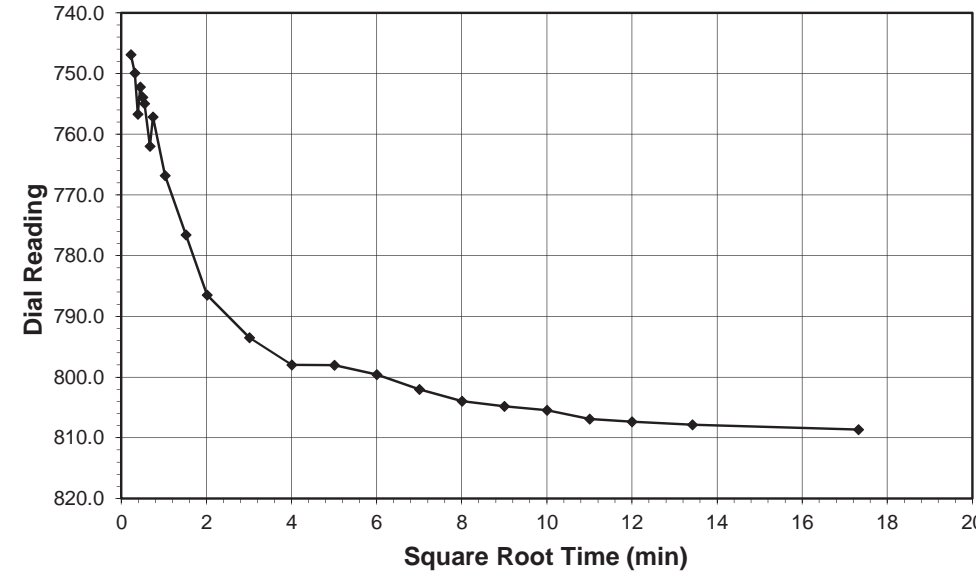


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



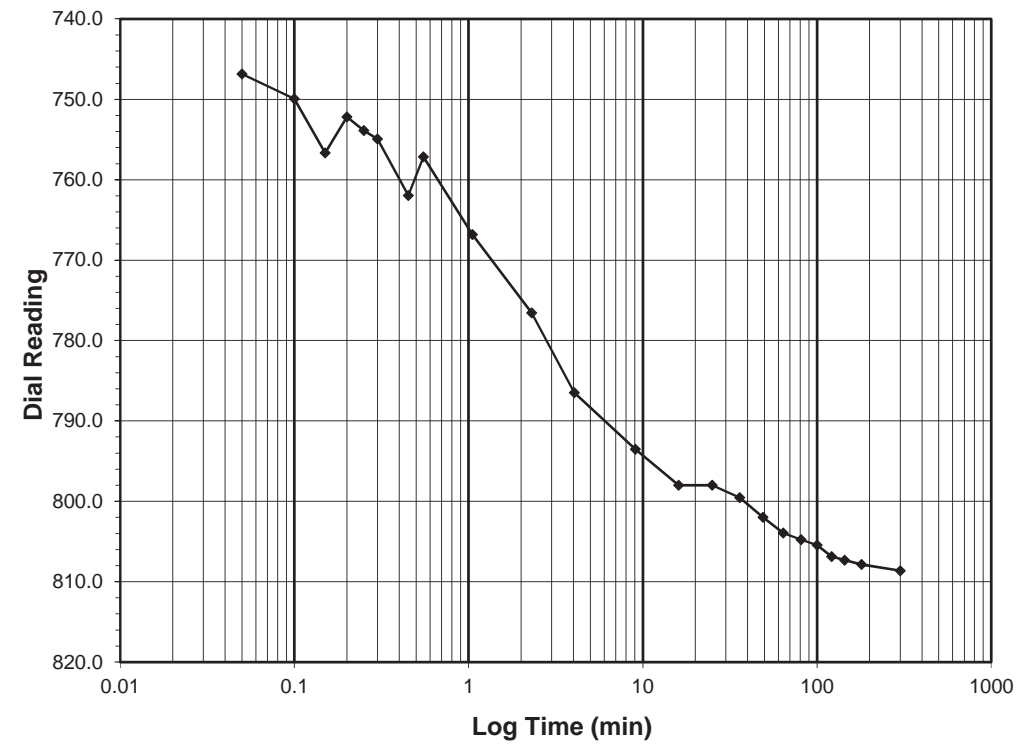
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)  
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3  
 Project No. R-2018-050-001 Sample No. ST-2  
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 1.0-2.0**  
**Final Reading (div) 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)
<b>Initial</b>	<b>738.3</b>
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

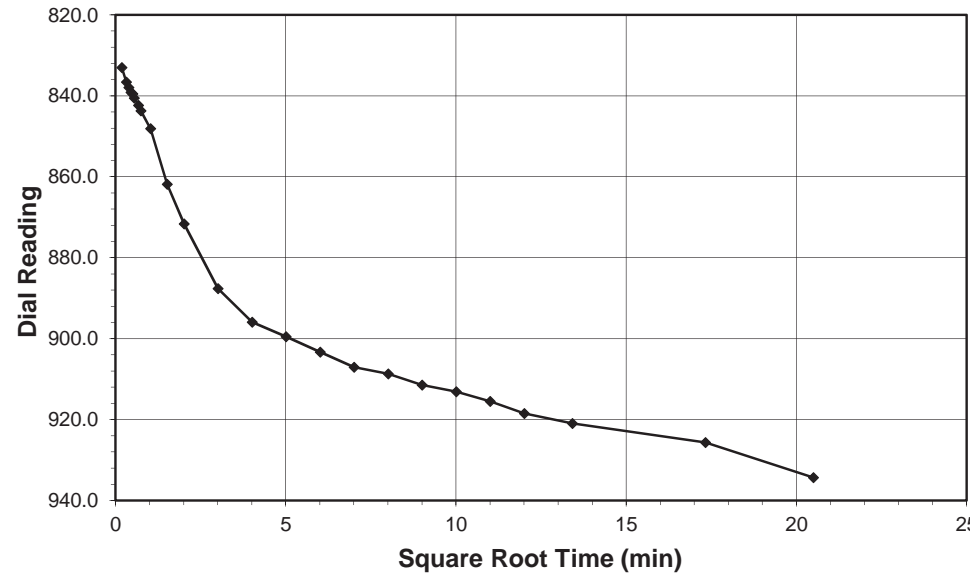
Tested By 129-04-0411 Date 3/2/18 Checked By GEM Date 3/6/18

**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

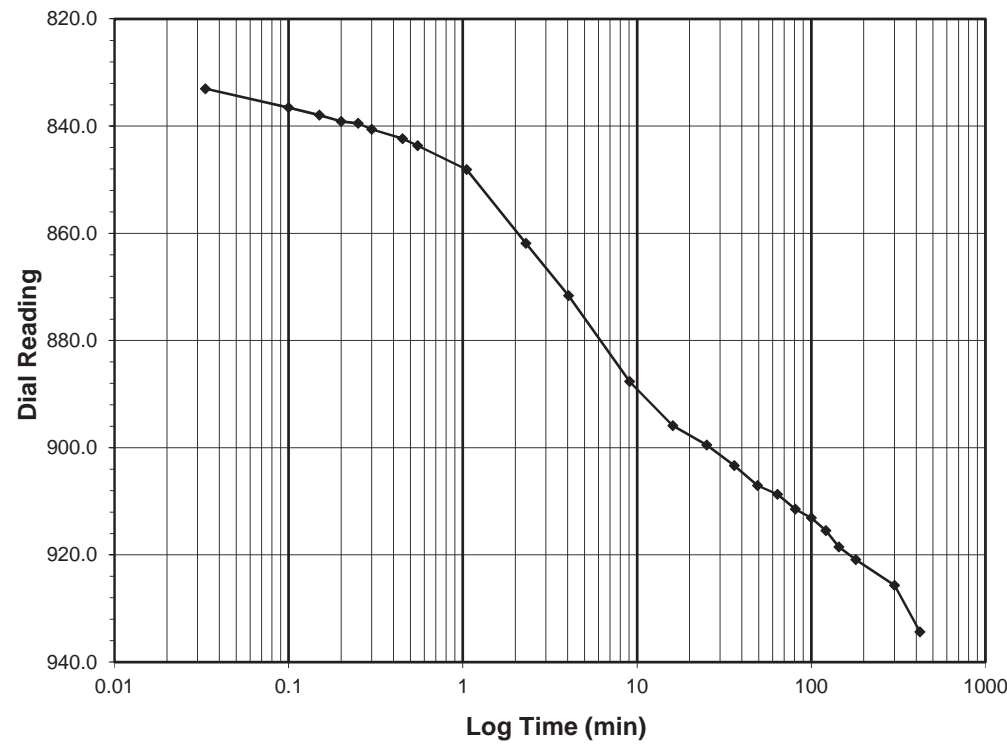
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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)
<b>Initial</b>	<b>808.6</b>
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

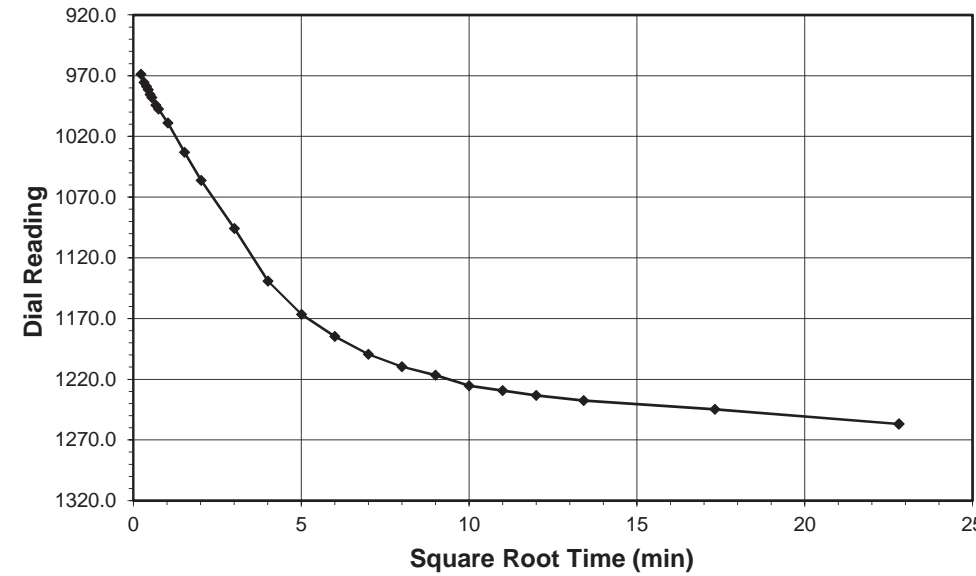


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



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

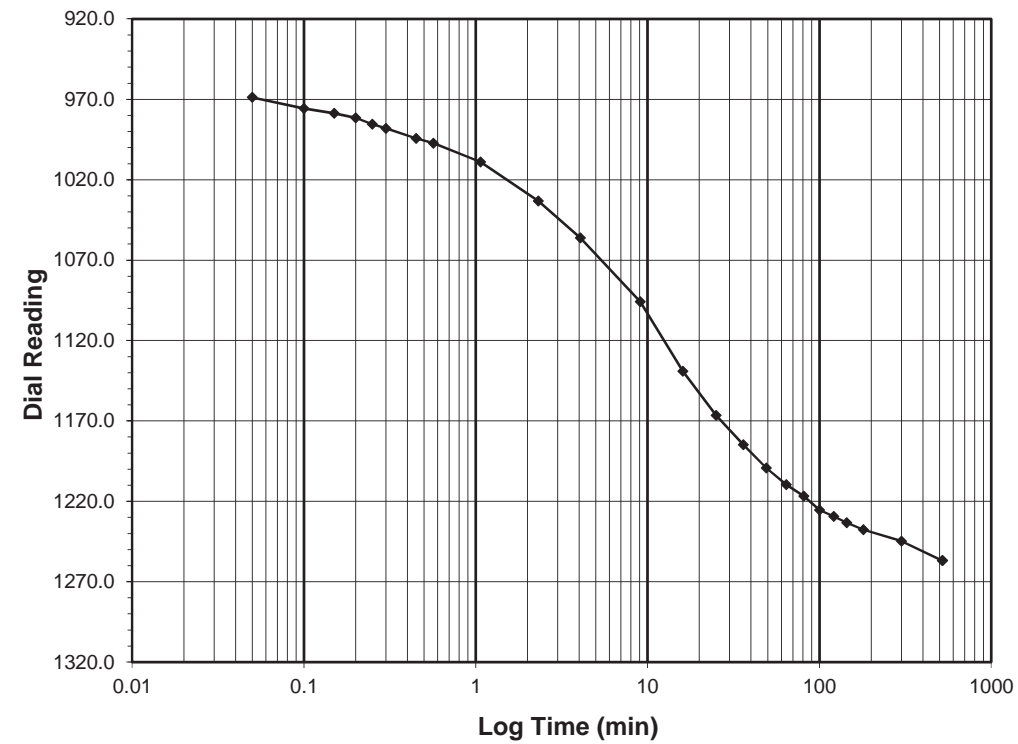
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**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)
<b>Initial</b>	<b>934.3</b>
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

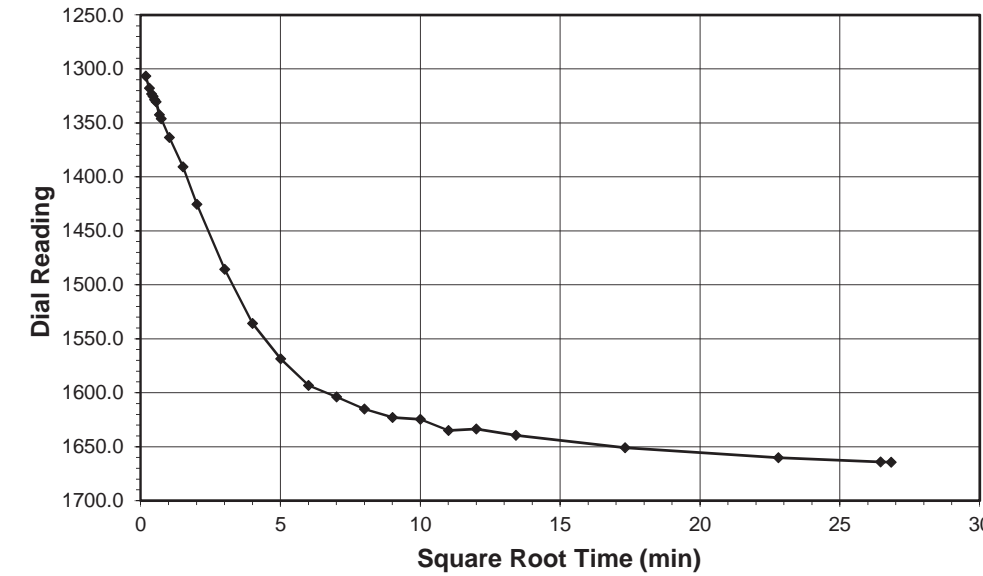


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



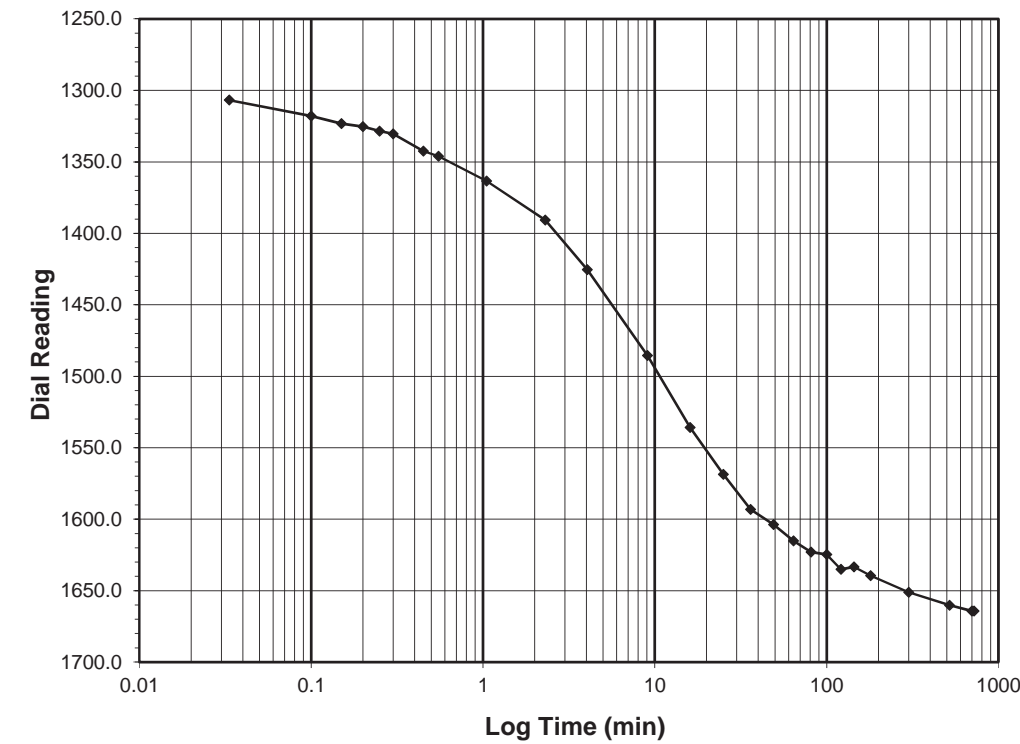
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)  
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3  
 Project No. R-2018-050-001 Sample No. ST-2  
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

**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)
<b>Initial</b>	<b>1256.9</b>
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

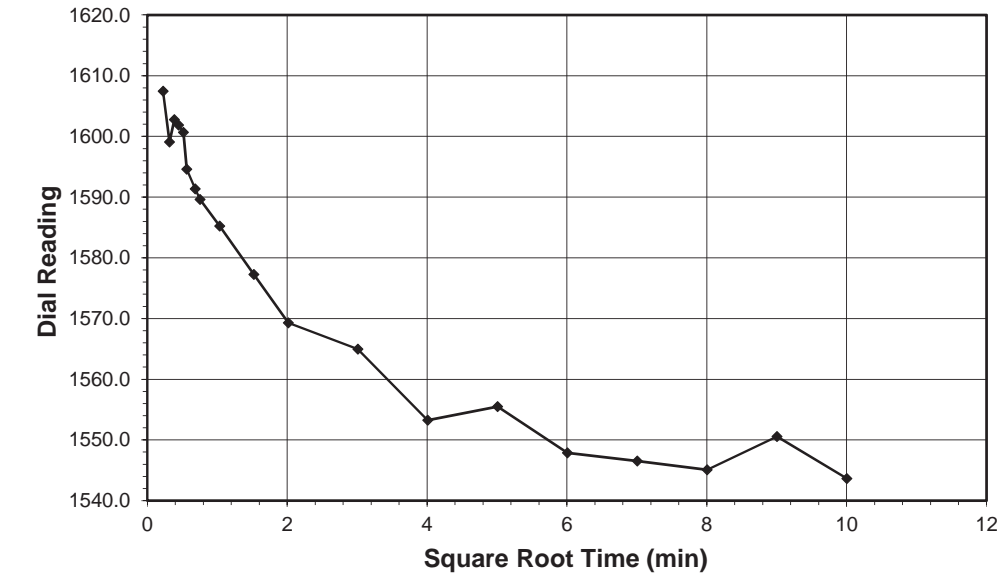


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



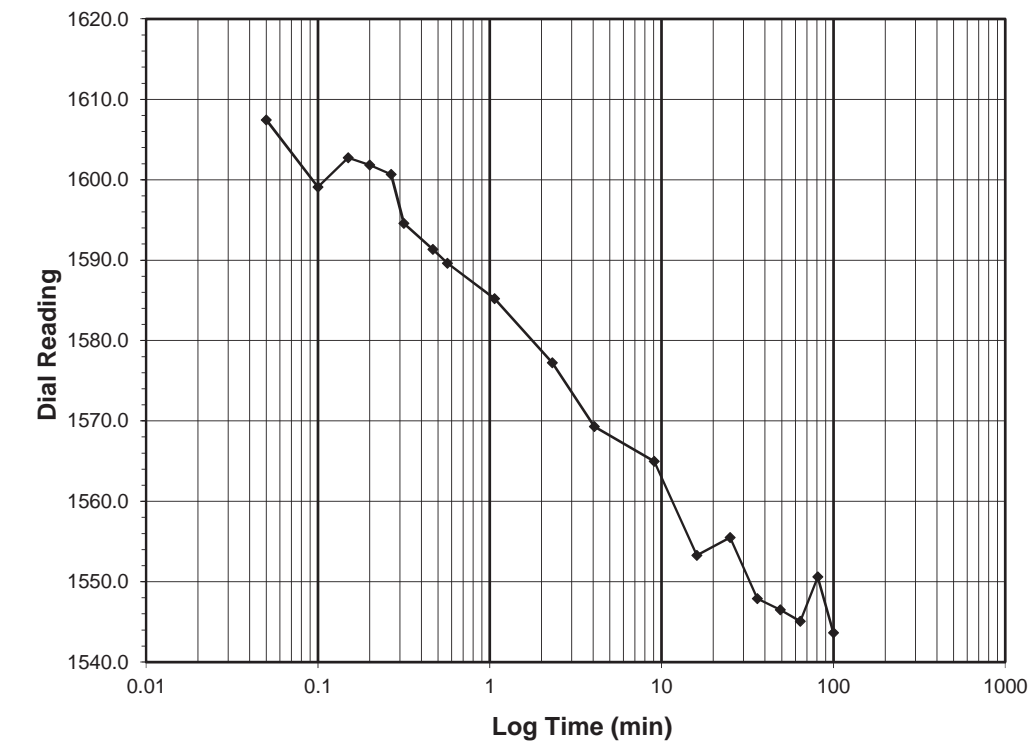
Client Summit Design & Eng. Services Boring No. EB1-A (25+13, 7'LT)  
 Client Project 17-0535.140 B-4786 Bridge 38 Depth (ft) 24.3-26.3  
 Project No. R-2018-050-001 Sample No. ST-2  
 Lab ID R-2018-050-001-001 Visual Description GRAY CLAY

**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)
<b>Initial</b>	<b>1664.3</b>
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

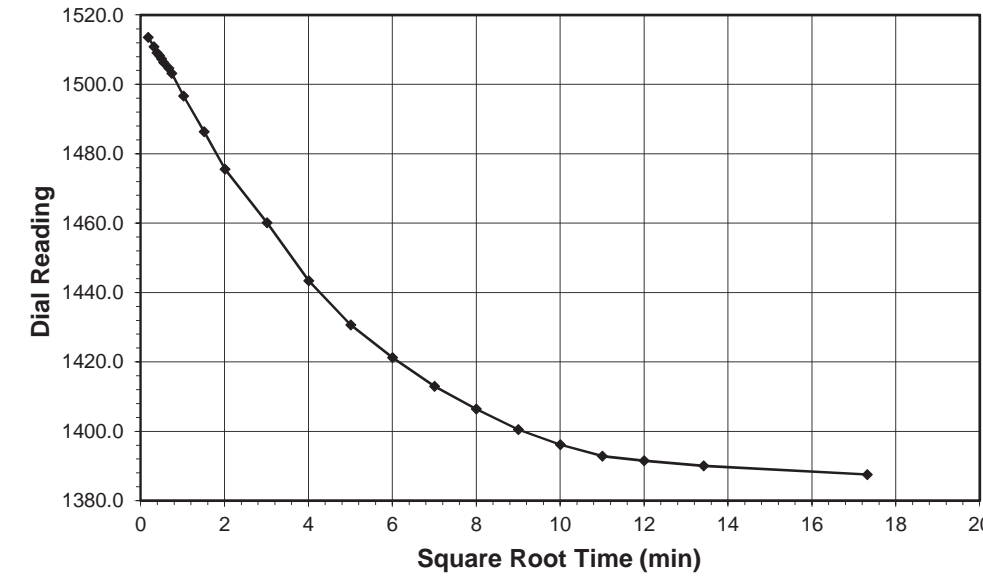
Tested By 129-04-0411 Date 3/3/18 Checked By GEM Date 3/6/18

**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



Client Summit Design & Eng. Services 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

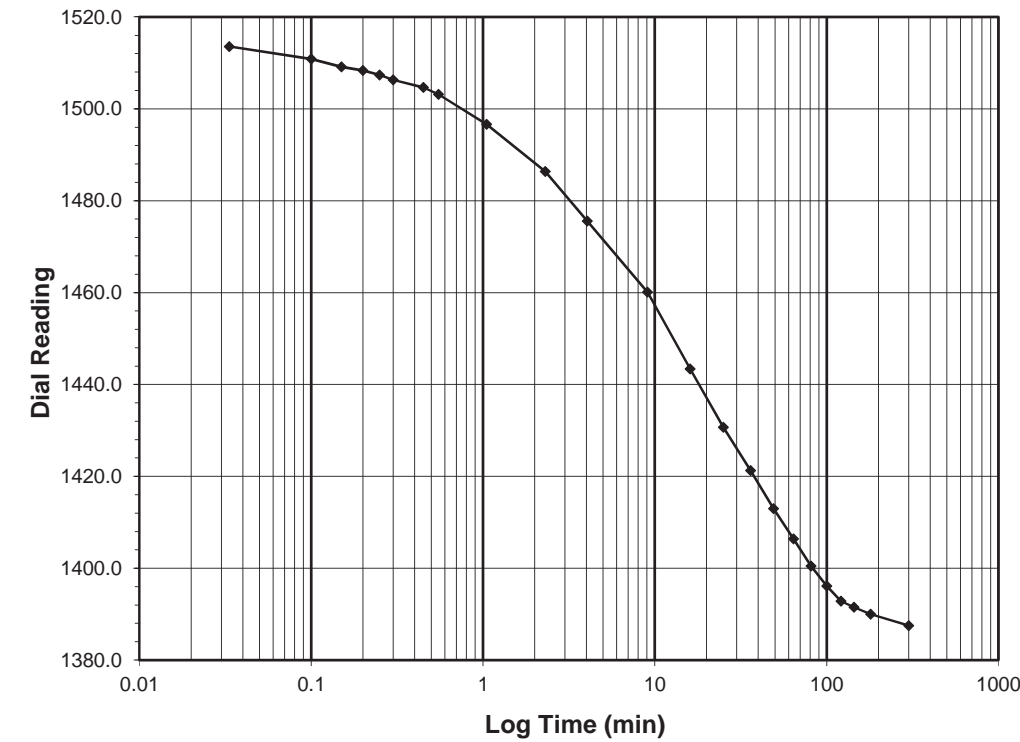
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 4.0-1.0**  
**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)
<b>Initial</b>	<b>1543.6</b>
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

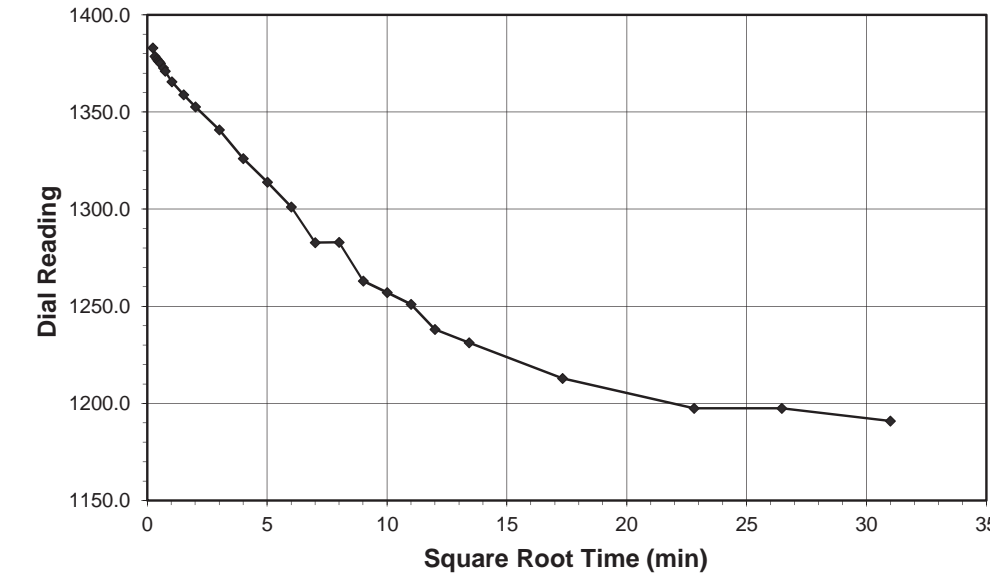


**ONE DIMENSIONAL CONSOLIDATION**  
ASTM D 2435-11



Client Summit Design & Eng. Services 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

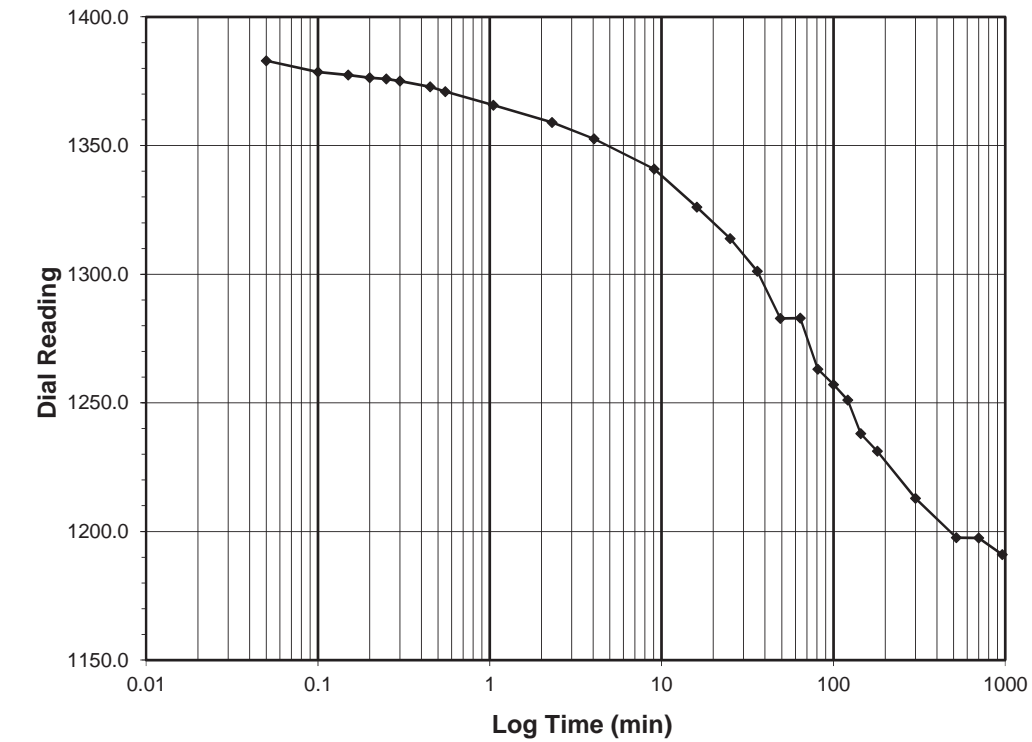
**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Test Load (tsf) 1.0-0.25**  
**Final Reading (div) 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)
<b>Initial</b>	<b>1387.5</b>
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

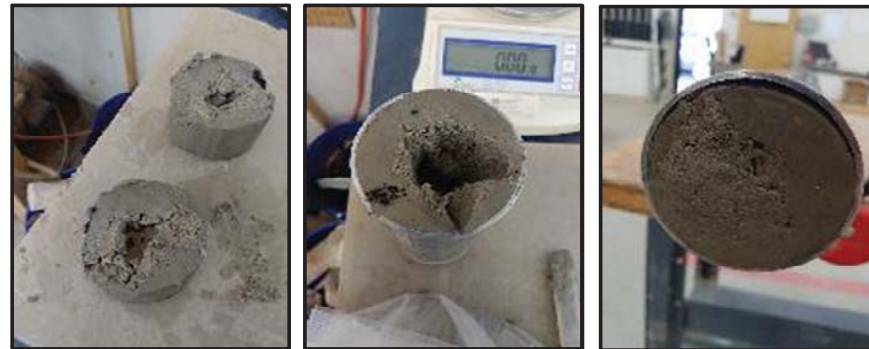
Client	Summit Design & Eng. Services	Boring No.	EB1-A (25+13, 7'LT)
Client Reference	17-0535.140 B-4786 Bridge 38	Depth Pushed(ft)	26.3-28.3
Project No.	R-2018-050-001	Shelby Tube No.	ST-3
Lab ID	R-2018-050-001-002	Recovery(ft)	2.3

**MOISTURE CONTENT**

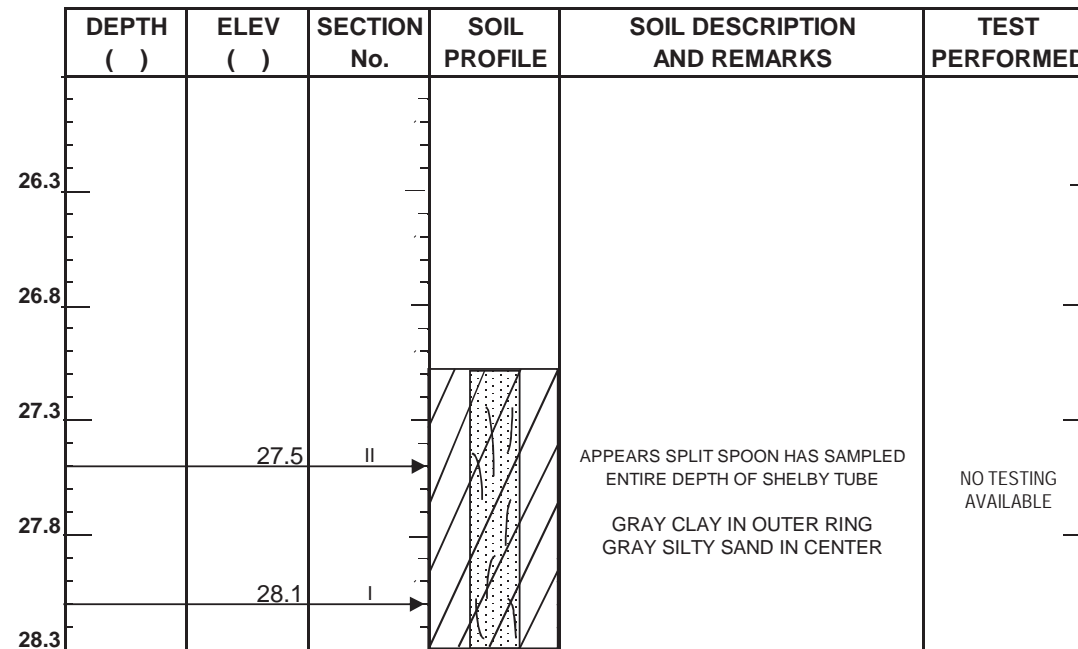
Section Number	1	2	3	4	5
Tare Number					
Wt. Tare & WS(gm.)					
Wt. Tare & DS(gm.)					
Wt. Tare(gm.)					
Moisture Content(%)					

**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