

REFERENCE: BR-0160

PROJECT: 67160

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

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | BR-0160 | 1 | 57 |

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STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK
 PROJECT DESCRIPTION REPLACE BRIDGE ON NC 179B
OVER CALABASH RIVER BETWEEN SR 1810
AND NC 179
 SITE DESCRIPTION BRIDGE 15 AT -L- STATION
21+77.5

CAUTION NOTICE

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

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

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

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

PERSONNEL

P. GRAINGER
C. BENHOFF
P. MCCAIN
T. PARL

INVESTIGATED BY P. GRAINGER
 DRAWN BY P. GRAINGER
 CHECKED BY K. BUSSEY
 SUBMITTED BY HDR
 DATE 03/02/2022



DocuSigned by:
Michael Batten 03/21/2023
 F85D9455EC5740A SIGNATURE DATE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | | | | | | | | | | | | GRADATION | | | | | | | | ROCK DESCRIPTION | | | | | | | | TERMS AND DEFINITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 | | | | | | | | | | | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. | | | | | | | | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. | | | | | | | | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENISE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | | | ANGULARITY OF GRAINS | | | | | | | | CRYSTALLINE ROCK (CR) | | | | | | | | CALCAREOUS (CALC.) | | | | | | | |
| THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | | | | | | | | | | | | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | | | | | CRYSTALLINE ROCK (CR) - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. | | | | | | | | CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. | | | | | | | |
| MINERALOGICAL COMPOSITION | | | | | | | | | | | | COMPRESSION | | | | | | | | NON-CRYSTALLINE ROCK (NCR) | | | | | | | | COLLUVIUM | | | | | | | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | | | | | | | | | | | | SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | | | | | | | | FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. | | | | | | | | ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. | | | | | | | |
| GROUP CLASS. A-1, A-1-b, A-1-c, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7.5, A-7.6, A-3, A-4, A-5, A-6, A-7 | | | | | | | | | | | | PERCENTAGE OF MATERIAL | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK (CP) | | | | | | | | CORE RECOVERY (REC.) | | | | | | | |
| SYMBOL | | | | | | | | | | | | ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL | | | | | | | | WEATHERING | | | | | | | | DIP | | | | | | | |
| % PASSING #10 #40 #200 | | | | | | | | | | | | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | | | | | | | | FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. | | | | | | | | DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. | | | | | | | |
| MATERIAL PASSING #40 LL PI | | | | | | | | | | | | GROUND WATER | | | | | | | | VERY SLIGHT (V.SL.) | | | | | | | | DIP DIRECTION (DIP AZIMUTH) | | | | | | | |
| GROUP INDEX | | | | | | | | | | | | WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING | | | | | | | | SLIGHT (SL.) | | | | | | | | FAULT | | | | | | | |
| USUAL TYPES OF MAJOR MATERIALS | | | | | | | | | | | | STATIC WATER LEVEL AFTER 24 HOURS | | | | | | | | MODERATE (MOD.) | | | | | | | | FISSILE | | | | | | | |
| GEN. RATING AS SUBGRADE | | | | | | | | | | | | PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA | | | | | | | | SEVERE (SEV.) | | | | | | | | FLOAT | | | | | | | |
| PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 | | | | | | | | | | | | SPRING OR SEEP | | | | | | | | MODERATELY SEVERE (MOD. SEV.) | | | | | | | | FLOOD PLAIN (FP) | | | | | | | |
| CONSISTENCY OR DENSENESS | | | | | | | | | | | | MISCELLANEOUS SYMBOLS | | | | | | | | COMPLETE | | | | | | | | FORMATION (FM) | | | | | | | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | | | | | | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION | | | | | | | | COMPLETE | | | | | | | | JOINT | | | | | | | |
| GENERALLY GRANULAR MATERIAL (NON-COHESSIVE) | | | | | | | | | | | | SOIL SYMBOL | | | | | | | | SEVERE (SEV.) | | | | | | | | LEDGE | | | | | | | |
| GENERALLY SILT-CLAY MATERIAL (COHESSIVE) | | | | | | | | | | | | ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT | | | | | | | | VERY SEVERE (V.SEV.) | | | | | | | | MOTTLED (MOT.) | | | | | | | |
| U.S. STD. SIEVE SIZE OPENING (MM) | | | | | | | | | | | | INFERRED SOIL BOUNDARY | | | | | | | | MODERATELY SEVERE (MOD. SEV.) | | | | | | | | PERCHED WATER | | | | | | | |
| BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) | | | | | | | | | | | | INFERRED ROCK LINE | | | | | | | | SEVERE (SEV.) | | | | | | | | RESIDUAL (RES.) SOIL | | | | | | | |
| GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3 | | | | | | | | | | | | ALLUVIAL SOIL BOUNDARY | | | | | | | | VERY HARD | | | | | | | | ROCK QUALITY DESIGNATION (ROD) | | | | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | | | | | | | | | | RECOMMENDATION SYMBOLS | | | | | | | | HARD | | | | | | | | SAPROLITE (SAP.) | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | | | | | | | | MODERATELY HARD | | | | | | | | SILL | | | | | | | |
| LL LIQUID LIMIT PLASTIC RANGE (PI) PL PLASTIC LIMIT OM OPTIMUM MOISTURE SHRINKAGE LIMIT | | | | | | | | | | | | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | | | | | | MEDIUM HARD | | | | | | | | SLICKENISE | | | | | | | |
| - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | ABBREVIATIONS | | | | | | | | SOFT | | | | | | | | STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) | | | | | | | |
| - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | AR - AUGER REFUSAL | | | | | | | | VERY SOFT | | | | | | | | STRATA CORE RECOVERY (SREC.) | | | | | | | |
| - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | BT - BORING TERMINATED | | | | | | | | COMPLETE | | | | | | | | STRATA ROCK QUALITY DESIGNATION (SROD) | | | | | | | |
| - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | CL - CLAY | | | | | | | | HARD | | | | | | | | TOPSOIL (TS.) | | | | | | | |
| PLASTICITY | | | | | | | | | | | | CPT - CONE PENETRATION TEST | | | | | | | | VERY HARD | | | | | | | | BENCH MARK: BM #1 | | | | | | | |
| NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC | | | | | | | | | | | | CSE - COARSE | | | | | | | | HARD | | | | | | | | ELEVATION: 11.88 FEET | | | | | | | |
| PLASTICITY INDEX (PI) VERY LOW SLIGHT MEDIUM HIGH | | | | | | | | | | | | DMT - DILATOMETER TEST | | | | | | | | MODERATELY HARD | | | | | | | | NOTES: | | | | | | | |
| COLOR | | | | | | | | | | | | DPT - DYNAMIC PENETRATION TEST | | | | | | | | MODERATELY HARD | | | | | | | | BORING COORDINATES OBTAINED FROM TRIMBLE R12 GNSS RECEIVER CERTIFIED WITH FCC PART 15 (CLASS B DEVICE), 24, 32; RCM; PTCRB; BT SIG | | | | | | | |
| DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | | | | | | | | | | | E - VOID RATIO | | | | | | | | SOFT | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | FOSS. - FOSSILIFEROUS | | | | | | | | VERY SOFT | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | FRAC. - FRACTURED, FRACTURES | | | | | | | | COMPLETE | | | | | | | | | | | | | | | |
| EQUIPMENT USED ON SUBJECT PROJECT | | | | | | | | | | | | FRAGS. - FRAGMENTS | | | | | | | | FRACTION SPACING | | | | | | | | BEDDING | | | | | | | |
| DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST DIEDRICH D-50 | | | | | | | | | | | | HI. - HIGHLY | | | | | | | | 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 | | | | | | | |
| ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE STEEL TEETH TRICONE 2 15/16" TUNG-CARB. CORE BIT MUD ROTARY | | | | | | | | | | | | UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | | | | | | | | INDURATION | | | | | | | | 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. | | | | | | | |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

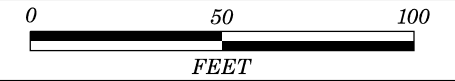
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

| GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) | | SURFACE CONDITIONS | | | | | GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) | | SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) | | | | | |
|---|--|--|--|---|--|---|--|---|--|------------------------------------|---|--|--|----|
| <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p> | | VERY GOOD | GOOD | FAIR | POOR | VERY POOR | <p>From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.</p> | | VERY GOOD | GOOD | FAIR | POOR | VERY POOR | |
| | | Very rough, fresh unweathered surfaces | Rough, slightly weathered, iron stained surfaces | Smooth, moderately weathered and altered surfaces | Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments | Slickensided, highly weathered surfaces with soft clay coatings or fillings | | | Very Rough, fresh unweathered surfaces | Rough, slightly weathered surfaces | Smooth, moderately weathered and altered surfaces | Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments | Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings | |
| STRUCTURE | | DECREASING SURFACE QUALITY → | | | | | COMPOSITION AND STRUCTURE | | | | | | | |
| | INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities | 90 | | | N/A | N/A | | A. Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability. | 70 | | | | | |
| | BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets | 80 | | | | | | B. Sandstone with thin inter-layers of siltstone | 60 | | | | | |
| | VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets | | 70 | | | | | C. Sandstone and siltstone in similar amounts | | 50 | | | | |
| | BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity | | 60 | | | | | D. Siltstone or silty shale with sandstone layers | | | 40 | | | |
| | DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces | | | 50 | | | | E. Weak siltstone or clayey shale with sandstone layers | | | | 30 | | |
| | LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes | | | 40 | | | | F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure | | | | | 20 | |
| | | | | 30 | | | | G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers | | | | | | 10 |
| | | | | 20 | | | | H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces. | | | | | | |
| | | | | 10 | | | | | | | | | | |
| | | N/A | N/A | | | | | | | | | | | |

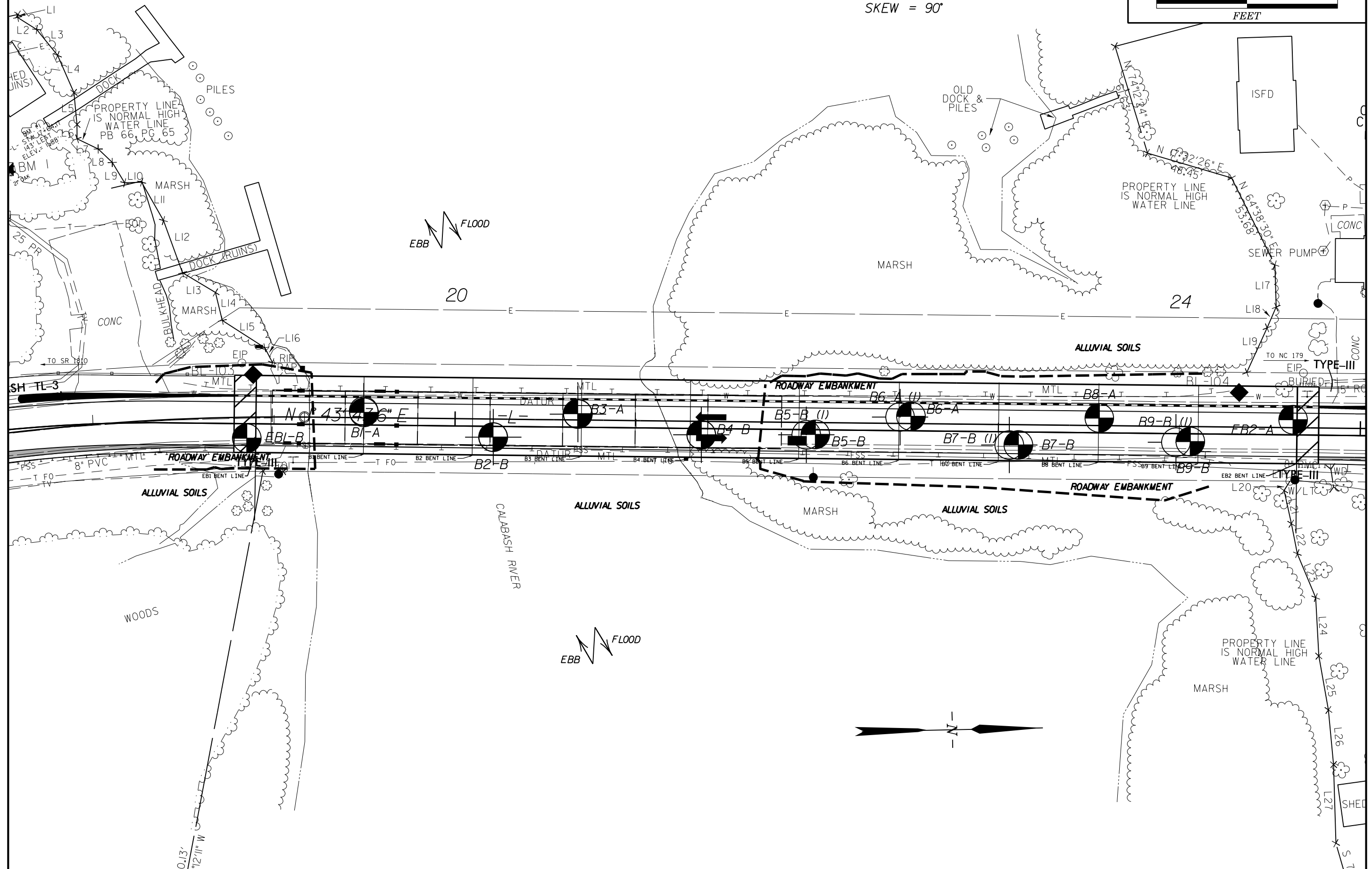
→ Means deformation after tectonic disturbance

SITE PLAN



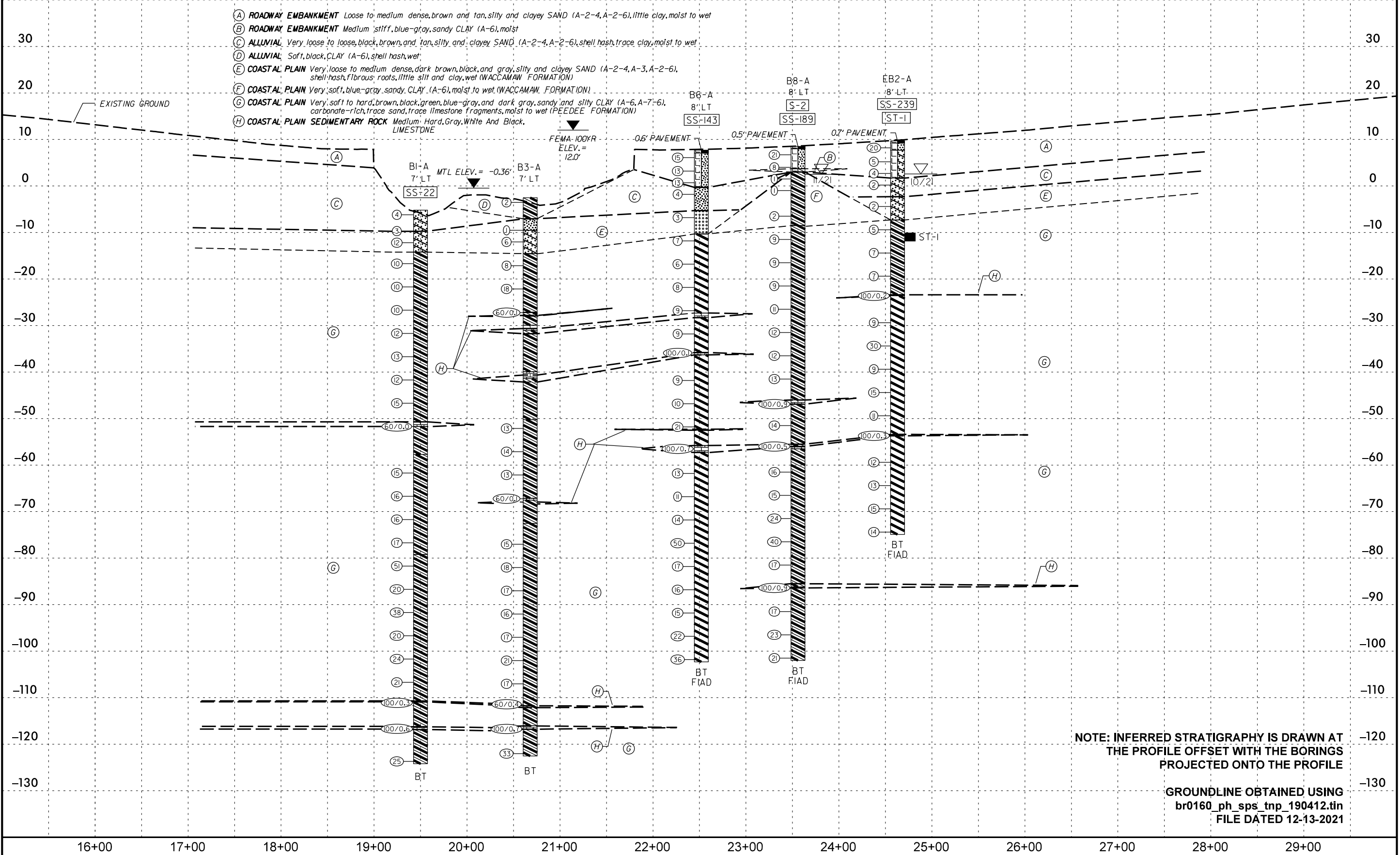
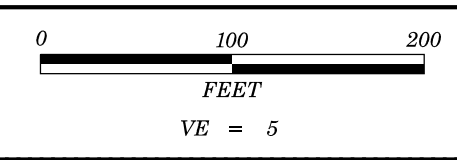
| | | |
|-----|----------------|--------|
| L17 | N 89° 24'55" E | 23.27' |
| L18 | S 65° 21'19" E | 12.58' |
| L19 | S 64° 26'18" E | 27.08' |

SKEW = 90°



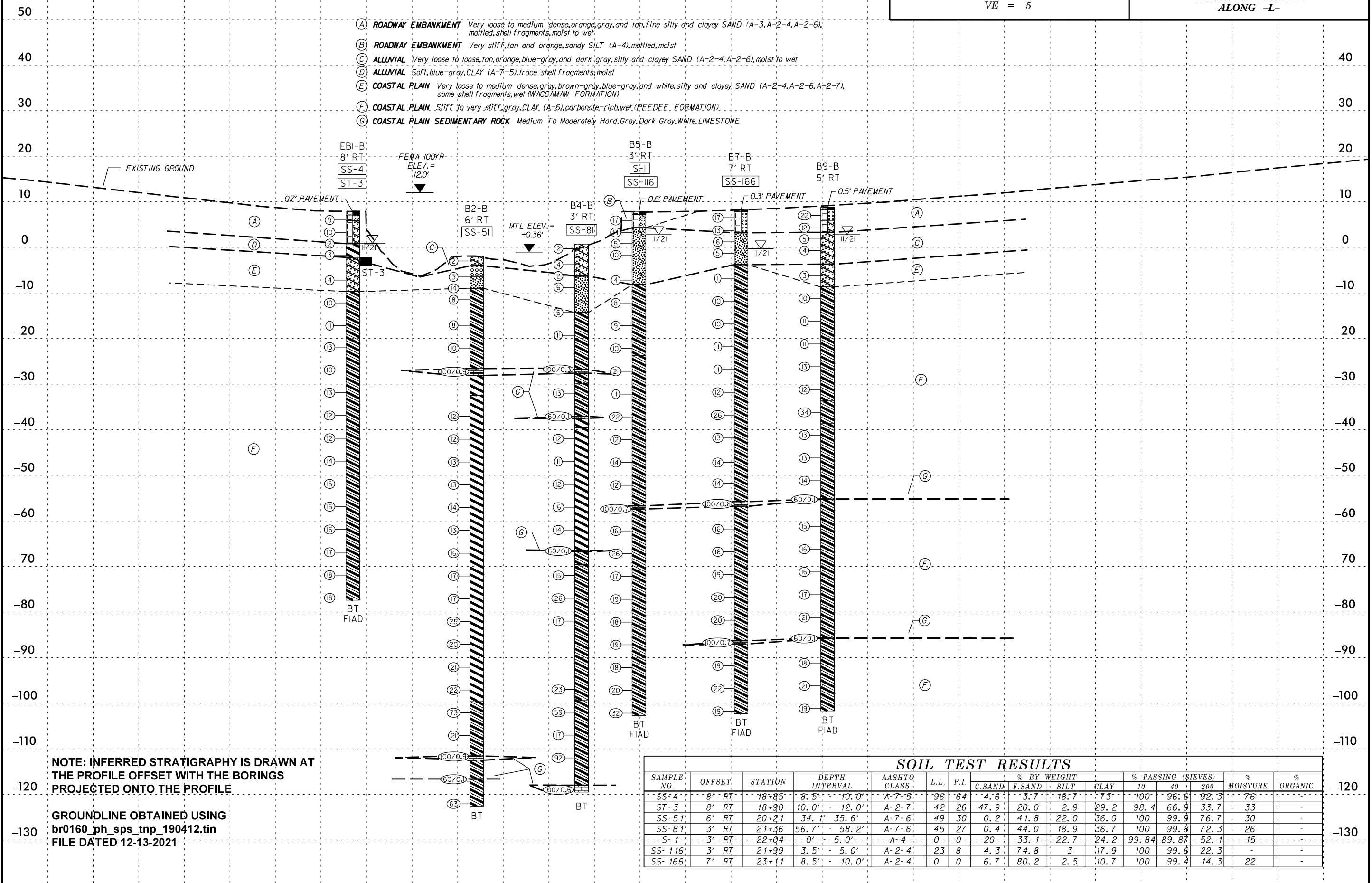
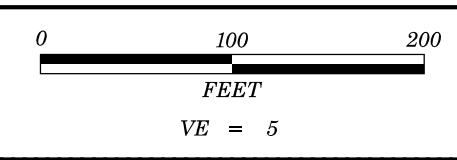
SOIL TEST RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
|------------|--------|---------|----------------|---------------|------|------|-------------|--------|------|------|--------------------|-------|------|------------|-----------|
| | | | | | | | C.SAND | F.SAND | SILT | CLAY | 10 | 40 | 200 | | |
| SS-22 | 7' LT | 19+50 | 6.0' - 7.5' | A-2-6 | 31 | 18 | 5.8 | 74.5 | 3.3 | 16.4 | 100 | 99.6 | 21.0 | 36 | - |
| SS-143 | 8' LT | 22+52 | 13.5' - 15.0' | A-3 | 0 | 0 | 23.6 | 69.3 | 1.3 | 5.8 | 100 | 90.13 | 7.7 | - | - |
| S-2 | 8' LT | 23+56 | 0.5' - 4.8' | A-2-4 | 21 | 5 | 6.0 | 67.4 | 5.5 | 21.1 | 100 | 99.5 | 28.3 | 17 | - |
| SS-189 | 8' LT | 23+56 | 6.0' - 7.5' | A-6 | 40 | 23 | 4.5 | 46.8 | 16.8 | 31.9 | 96.7 | 94.0 | 55.3 | 28 | - |
| SS-239 | 8' LT | 24+63 | 13.1' - 14.6' | A-2-6 | 40 | 20 | 54.4 | 14.8 | 7.6 | 23.2 | 100 | 65.3 | 32.2 | - | - |
| ST-1 | 8' LT | 24+58 | 19.6' - 21.6' | A-6 | 35 | 17 | 1.7 | 50.8 | 14.8 | 32.7 | 100 | 99.1 | 56.7 | 27 | - |



- (A) ROADWAY EMBANKMENT Loose to medium dense, brown and tan, silty and clayey SAND (A-2-4, A-2-6), little clay, moist to wet
- (B) ROADWAY EMBANKMENT Medium stiff, blue-gray, sandy CLAY (A-6), moist
- (C) ALLUVIAL Very loose to loose, black, brown, and tan, silty and clayey SAND (A-2-4, A-2-6), shell hash, trace clay, moist to wet
- (D) ALLUVIAL Soft, black, CLAY (A-6), shell hash, wet
- (E) COASTAL PLAIN Very loose to medium dense, dark brown, black, and gray, silty and clayey SAND (A-2-4, A-3, A-2-6), shell hash, fibrous roots, little silt and clay, wet (WACCAMAW FORMATION)
- (F) COASTAL PLAIN Very soft, blue-gray, sandy CLAY (A-6), moist to wet (WACCAMAW FORMATION)
- (G) COASTAL PLAIN Very soft to hard, brown, black, green, blue-gray, and dark gray, sandy and silty CLAY (A-6, A-7-6), carbonate-rich, trace sand, trace limestone fragments, moist to wet (PEEDEE FORMATION)
- (H) COASTAL PLAIN SEDIMENTARY ROCK Medium: Hard, Gray, White And Black, LIMESTONE

NOTE: INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE
 GROUNDLINE OBTAINED USING br0160_ph_sps_tnp_190412.tin FILE DATED 12-13-2021



- (A) ROADWAY EMBANKMENT Very loose to medium dense, orange, gray, and tan, fine silty and clayey SAND (A-3, A-2-4, A-2-6), mottled, shell fragments, moist to wet.
- (B) ROADWAY EMBANKMENT Very stiff, tan and orange, sandy SILT (A-4), mottled, moist
- (C) ALLUVIAL Very loose to loose, tan, orange, blue-gray, and dark gray, silty and clayey SAND (A-2-4, A-2-6), moist to wet
- (D) ALLUVIAL Soft, blue-gray, CLAY (A-7-5), trace shell fragments, moist
- (E) COASTAL PLAIN Very loose to medium dense, gray, brown-gray, blue-gray, and white, silty and clayey SAND (A-2-4, A-2-6, A-2-7), some shell fragments, wet (WACCAMAW FORMATION)
- (F) COASTAL PLAIN Stiff to very stiff, gray, CLAY (A-6), carbonate-rich, wet (PEEDEE FORMATION)
- (G) COASTAL PLAIN SEDIMENTARY ROCK Medium To Moderately Hard, Gray, Dark Gray, White, LIMESTONE

NOTE: INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

GROUNDLINE OBTAINED USING br0160_ph_sps_tnp_190412.tin FILE DATED 12-13-2021

SOIL TEST RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | LL | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
|------------|--------|---------|----------------|---------------|----|------|-------------|--------|------|------|--------------------|-------|------|------------|-----------|
| | | | | | | | C.SAND | F.SAND | SILT | CLAY | 10 | 40 | 200 | | |
| SS-4 | 8' RT | 18+85 | 8.5' - 10.0' | A-7-5 | 96 | 64 | 4.6 | 3.7 | 18.7 | 73 | 100 | 96.6 | 92.3 | 76 | - |
| ST-3 | 8' RT | 18+90 | 10.0' - 12.0' | A-2-7 | 42 | 26 | 47.9 | 20.0 | 2.9 | 29.2 | 98.4 | 66.9 | 33.7 | 33 | - |
| SS-51 | 6' RT | 20+21 | 34.1' - 35.6' | A-7-6 | 49 | 30 | 0.2 | 41.8 | 22.0 | 36.0 | 100 | 99.9 | 76.7 | 30 | - |
| SS-81 | 3' RT | 21+36 | 56.7' - 58.2' | A-7-6 | 45 | 27 | 0.4 | 44.0 | 18.9 | 36.7 | 100 | 99.8 | 72.3 | 26 | - |
| S-1 | 3' RT | 22+04 | 0' - 5.0' | A-4 | 0 | 0 | 20 | 33.1 | 22.7 | 24.2 | 99.84 | 89.87 | 52.1 | 15 | - |
| SS-116 | 3' RT | 21+99 | 3.5' - 5.0' | A-2-4 | 23 | 8 | 4.3 | 74.8 | 3 | 17.9 | 100 | 99.6 | 22.3 | - | - |
| SS-166 | 7' RT | 23+11 | 8.5' - 10.0' | A-2-4 | 0 | 0 | 6.7 | 80.2 | 2.5 | 10.7 | 100 | 99.4 | 14.3 | 22 | - |

GEOTECHNICAL BORING REPORT

BORE LOG

| | | | | | | | |
|--|--|----------------------|---------------------------------|---------------------|--|---------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B1-A | | STATION 19+50 | | OFFSET 7 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. -5.4 ft | | TOTAL DEPTH 119.0 ft | | NORTHING 51,024 | | EASTING 2,136,756 | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | DRILL METHOD Mud Rotary w/ Core | | | HAMMER TYPE Automatic | |
| DRILLER Edmondson, J. M. | | START DATE 11/16/21 | | COMP. DATE 11/17/21 | | SURFACE WATER DEPTH 5.4ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | | |
| -5 | -5.4 | 0.0 | 0 | 1 | 3 | | | | | | | | | | |
| -10 | -8.9 | 3.5 | 2 | 1 | 2 | | | | | | | | | | |
| -15 | -11.4 | 6.0 | 3 | 5 | 7 | | | | | | | | | | |
| -20 | -15.9 | 10.5 | 3 | 4 | 6 | | | | | | | | | | |
| -25 | -20.9 | 15.5 | 3 | 5 | 5 | | | | | | | | | | |
| -30 | -25.9 | 20.5 | 4 | 4 | 6 | | | | | | | | | | |
| -35 | -30.9 | 25.5 | 3 | 6 | 6 | | | | | | | | | | |
| -40 | -35.9 | 30.5 | 3 | 6 | 7 | | | | | | | | | | |
| -45 | -40.9 | 35.5 | 4 | 5 | 7 | | | | | | | | | | |
| -50 | -45.9 | 40.5 | 4 | 6 | 9 | | | | | | | | | | |
| -55 | -50.9 | 45.5 | 60/0.0 | | | | | | | | | | | | |
| -60 | -60.9 | 55.5 | 5 | 7 | 8 | | | | | | | | | | |
| -65 | -65.9 | 60.5 | 4 | 7 | 9 | | | | | | | | | | |
| -70 | -70.9 | 65.5 | 5 | 7 | 9 | | | | | | | | | | |
| -75 | | | | | | | | | | | | | | | |

| | | | | | | | |
|--|--|----------------------|---------------------------------|---------------------|--|---------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B1-A | | STATION 19+50 | | OFFSET 7 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. -5.4 ft | | TOTAL DEPTH 119.0 ft | | NORTHING 51,024 | | EASTING 2,136,756 | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | DRILL METHOD Mud Rotary w/ Core | | | HAMMER TYPE Automatic | |
| DRILLER Edmondson, J. M. | | START DATE 11/16/21 | | COMP. DATE 11/17/21 | | SURFACE WATER DEPTH 5.4ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|--------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| -75 | -75.9 | 70.5 | 6 | 8 | 9 | | | | | | | | | | |
| -80 | -80.9 | 75.5 | 6 | 29 | 22 | | | | | | | | | | |
| -85 | -85.9 | 80.5 | 6 | 9 | 11 | | | | | | | | | | |
| -90 | -90.9 | 85.5 | 27 | 15 | 23 | | | | | | | | | | |
| -95 | -95.9 | 90.5 | 6 | 9 | 11 | | | | | | | | | | |
| -100 | -100.9 | 95.5 | 7 | 10 | 14 | | | | | | | | | | |
| -105 | -105.9 | 100.5 | 7 | 9 | 12 | | | | | | | | | | |
| -110 | -110.9 | 105.5 | 100/0.3 | | | | | | | | | | | | |
| -115 | -115.9 | 110.5 | 9 | 31 | 69/0.1 | | | | | | | | | | |
| -120 | -122.9 | 117.5 | 6 | 11 | 14 | | | | | | | | | | |

NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT_2/21/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | |
|--|---------------|----------------------|----------|--|----------|---------------------------|-----------------|---------|--------|---|------------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B1-A | | STATION 19+50 | | OFFSET 7 ft LT | | ALIGNMENT -L- | 0 HR. N/A | | | | |
| COLLAR ELEV. -5.4 ft | | TOTAL DEPTH 119.0 ft | | NORTHING 51,024 | | EASTING 2,136,756 | 24 HR. N/A | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | | | | | |
| DRILLER Edmondson, J. M. | | START DATE 11/16/21 | | COMP. DATE 11/17/21 | | SURFACE WATER DEPTH 5.4ft | | | | | |
| CORE SIZE NQ | | TOTAL RUN 7.0 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | | |
| -50.9 | -50.9 | 45.5 | 2.0 | 01:40/1.0 | (0.4) | (0.0) | (0.4) | (0.0) | -50.9 | Begin Coring @ 45.5 ft | 45.5 |
| | -52.9 | 47.5 | | N=60/0.0 01:40/1.0 | 20% | 0% | 40% | 0% | | | |
| -55 | | | 5.0 | 0:18/1.0 | (5.0) | (0.0) | (5.0) | (0.0) | -57.9 | Dark gray, CLAY (A-6), carbonate-rich, little recovery (PEEDEE FORMATION) | 52.5 |
| | -57.9 | 52.5 | | 0:16/1.0 0:14/1.0 0:25/1.0 0:18/1.0 0:24/1.0 | 100% | 0% | 83% | 0% | | | |
| -60 | | | | N=15 | | | | | | | |
| -65 | | | | N=16 | | | | | | | |
| -70 | | | | N=16 | | | | | | | |
| -75 | | | | N=17 | | | | | | | |
| -80 | | | | N=51 | | | | | -79.4 | | 74.0 |
| -85 | | | | N=20 | | | | | | | |
| -90 | | | | N=38 | | | | | | | |
| -95 | | | | N=20 | | | | | | | |
| -100 | | | | N=24 | | | | | | | |
| -105 | | | | N=21 | | | | | | | |
| -110 | | | | N=100/0.3 | | | | | -110.9 | COASTAL PLAIN SEDIMENTARY ROCK | 105.5 |
| | | | | | | | | | -111.1 | COASTAL PLAIN | 105.2 |
| -115 | | | | N=100/0.6 | | | | | -116.4 | COASTAL PLAIN SEDIMENTARY ROCK | 111.0 |
| | | | | | | | | | -117.0 | COASTAL PLAIN | 111.6 |
| -120 | | | | N=25 | | | | | | | |
| | | | | | | | | | -124.4 | Boring Terminated at Elevation -124.4 ft in Clay (Peedee Formation) | 119.0 |
| | | | | | | | | | | Bridge deck: Asphalt 0.4', Concrete 1.9'. | |

NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT_2/2/22

GEOTECHNICAL BORING REPORT

BORE LOG


| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | | | | | |
|--|-----------------|----------------------|---------------------------------|---------------------|--------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|--|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. B2-B | | STATION 20+21 | | OFFSET 6 ft RT | | ALIGNMENT -L- | | | | | | | | | |
| COLLAR ELEV. -1.7 ft | | TOTAL DEPTH 120.6 ft | | NORTHING 51,095 | | EASTING 2,136,771 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | DRILL METHOD Mud Rotary w/ Core | | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER Edmondson, J. M. | | START DATE 11/17/21 | | COMP. DATE 11/18/21 | | SURFACE WATER DEPTH 0.2ft | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 0 | -1.7 | 0.0 | 2 | 1 | 1 | | | | | | | | | | |
| -5 | -5.2 | 3.5 | 2 | 1 | 2 | | | | | | | | | | |
| -10 | -7.7 | 6.0 | 2 | 11 | 3 | | | | | | | | | | |
| -15 | -10.2 | 8.5 | 2 | 4 | 4 | | | | | | | | | | |
| -20 | -15.8 | 14.1 | 3 | 3 | 5 | | | | | | | | | | |
| -25 | -20.8 | 19.1 | 3 | 3 | 7 | | | | | | | | | | |
| -30 | -25.8 | 24.1 | 3 | 4 | 96/0.4 | | | | | | | | | | |
| -35 | -35.8 | 34.1 | 4 | 5 | 7 | | | | | | | | | | |
| -40 | -40.8 | 39.1 | 4 | 5 | 7 | | | | | | | | | | |
| -45 | -45.8 | 44.1 | 4 | 5 | 8 | | | | | | | | | | |
| -50 | -50.8 | 49.1 | 4 | 6 | 7 | | | | | | | | | | |
| -55 | -55.8 | 54.1 | 4 | 6 | 8 | | | | | | | | | | |
| -60 | -60.8 | 59.1 | 4 | 5 | 8 | | | | | | | | | | |
| -65 | -65.8 | 64.1 | 5 | 5 | 11 | | | | | | | | | | |
| -70 | -70.8 | 69.1 | 5 | 7 | 10 | | | | | | | | | | |
| -75 | -75.8 | 74.1 | 5 | 8 | 9 | | | | | | | | | | |
| -80 | | | | | | | | | | | | | | | |

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | | | | | |
|--|-----------------|----------------------|---------------------------------|---------------------|--------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|--|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. B2-B | | STATION 20+21 | | OFFSET 6 ft RT | | ALIGNMENT -L- | | | | | | | | | |
| COLLAR ELEV. -1.7 ft | | TOTAL DEPTH 120.6 ft | | NORTHING 51,095 | | EASTING 2,136,771 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | DRILL METHOD Mud Rotary w/ Core | | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER Edmondson, J. M. | | START DATE 11/17/21 | | COMP. DATE 11/18/21 | | SURFACE WATER DEPTH 0.2ft | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| -80 | -80.8 | 79.1 | 8 | 12 | 13 | | | | | | | | | | |
| -85 | -85.8 | 84.1 | 6 | 8 | 12 | | | | | | | | | | |
| -90 | -90.8 | 89.1 | 6 | 9 | 12 | | | | | | | | | | |
| -95 | -95.8 | 94.1 | 7 | 8 | 14 | | | | | | | | | | |
| -100 | -100.8 | 99.1 | 6 | 9 | 64 | | | | | | | | | | |
| -105 | -105.8 | 104.1 | 8 | 10 | 11 | | | | | | | | | | |
| -110 | -110.8 | 109.1 | 66 | 30 | 70/0.4 | | | | | | | | | | |
| -115 | -115.8 | 114.1 | 45 | 60/0.1 | | | | | | | | | | | |
| -120 | -120.8 | 119.1 | 29 | 31 | 32 | | | | | | | | | | |

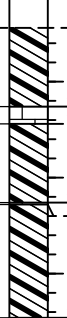
NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 2/21/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | |
|--|---------------|----------------------|----------|---------------------------------|----------|---------------------------|-----------------|---------|--|--|------------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B2-B | | STATION 20+21 | | OFFSET 6 ft RT | | ALIGNMENT -L- | | | | | |
| COLLAR ELEV. -1.7 ft | | TOTAL DEPTH 120.6 ft | | NORTHING 51,095 | | EASTING 2,136,771 | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | | | | | |
| DRILLER Edmondson, J. M. | | START DATE 11/17/21 | | COMP. DATE 11/18/21 | | SURFACE WATER DEPTH 0.2ft | | | | | |
| CORE SIZE NQ | | TOTAL RUN 5.0 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | | |
| -27.2 | -27.2 | 25.5 | 5.0 | 02:55 | (3.0) | (0.6) | (0.6) | (0.6) |  | Begin Coring @ 25.5 ft Gray, LIMESTONE, fresh, moderately indurated, medium hard, thinly bedded (PEEDEE FORMATION). Top of rock encountered at 24.6'. | 25.5 |
| -30 | -32.2 | 30.5 | | 02:21 0:21 0:32 0:25 | 60% | 12% | 100% | 100% | | COASTAL PLAIN Gray, CLAY (A-7-6), carbonate-rich (PEEDEE FORMATION) | 30.5 |
| -35 | | | | N=12 | | | | | SS-51 | | |
| -40 | | | | N=12 | | | | | | | |
| -45 | | | | N=13 | | | | | | | |
| -50 | | | | N=13 | | | | | | | |
| -55 | | | | N=14 | | | | | | | |
| -60 | | | | N=13 | | | | | | | |
| -65 | | | | N=16 | | | | | | | |
| -70 | | | | N=17 | | | | | | | |
| -75 | | | | N=17 | | | | | | | |
| -80 | | | | N=25 | | | | | | | |
| -85 | | | | N=20 | | | | | | | |
| -90 | | | | N=21 | | | | | | | |
| -95 | | | | N=22 | | | | | | | |
| -100 | | | | N=73 | | | | | | | |
| -105 | | | | N=21 | | | | | | | |

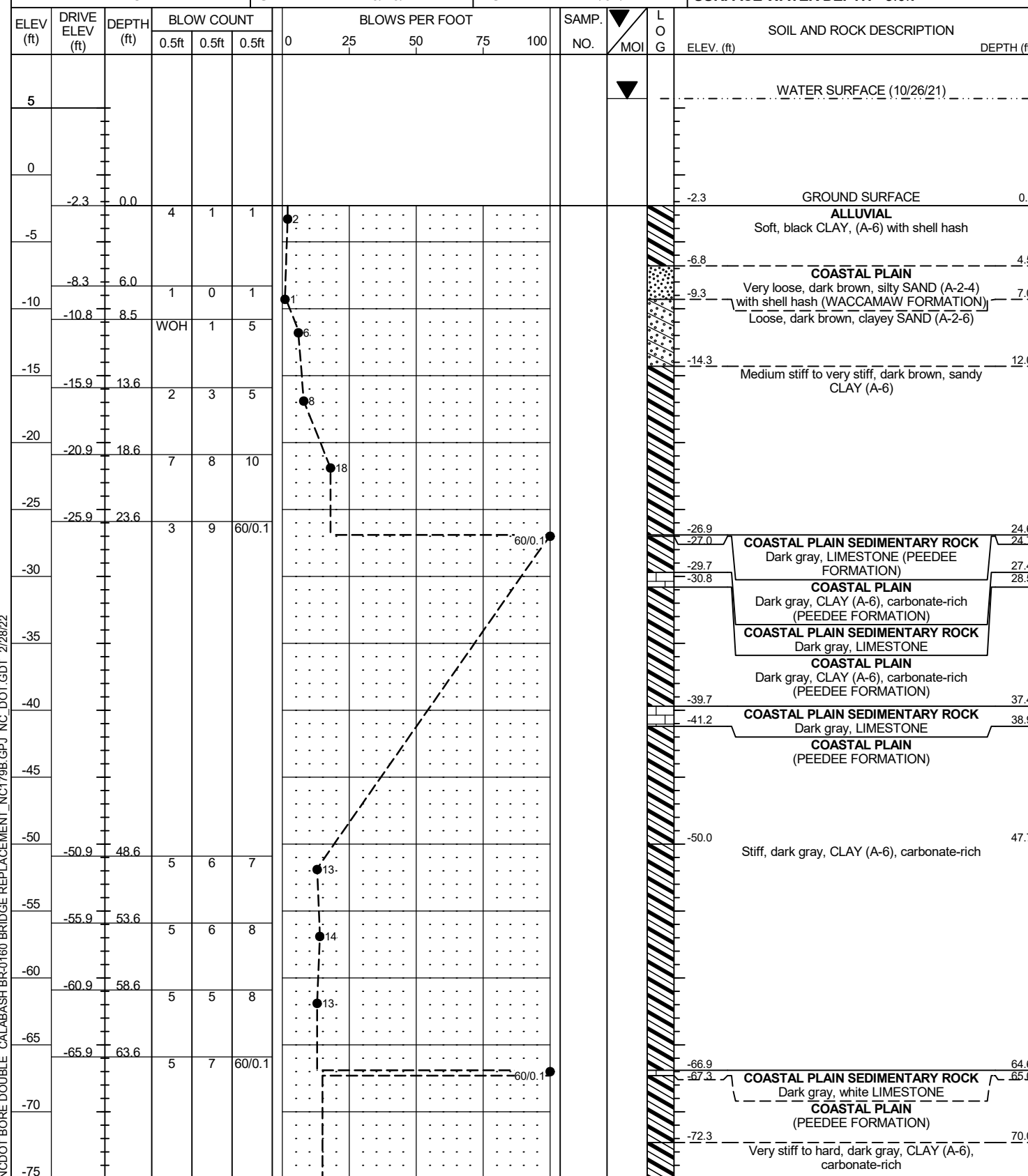
NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT NC179B.GPJ NC_DOT.GDT 2/21/22

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | | |
|--|---------------|----------------------|----------|---------------------------------|----------|---------------------------|-----------------|---------|---|---|--|-------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. B2-B | | STATION 20+21 | | OFFSET 6 ft RT | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. -1.7 ft | | TOTAL DEPTH 120.6 ft | | NORTHING 51,095 | | EASTING 2,136,771 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | | | | | | |
| DRILLER Edmondson, J. M. | | START DATE 11/17/21 | | COMP. DATE 11/18/21 | | SURFACE WATER DEPTH 0.2ft | | | | | | |
| CORE SIZE NQ | | TOTAL RUN 5.0 ft | | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) | |
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | | | |
| -107.2 | | | | | | | | |  | Begin Coring @ 105.5 ft | | |
| -110 | | | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK COASTAL PLAIN | 109.6 110.5 | |
| -115 | | | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK COASTAL PLAIN | 114.6 114.7 | |
| -120 | | | | | | | | | | | | |
| | | | | | | | | | | | Boring Terminated at Elevation -122.3 ft in Clay (Peedee Formation) Bridge deck: Asphalt 0.5', Concrete 1.5'. | 120.6 |

GEOTECHNICAL BORING REPORT

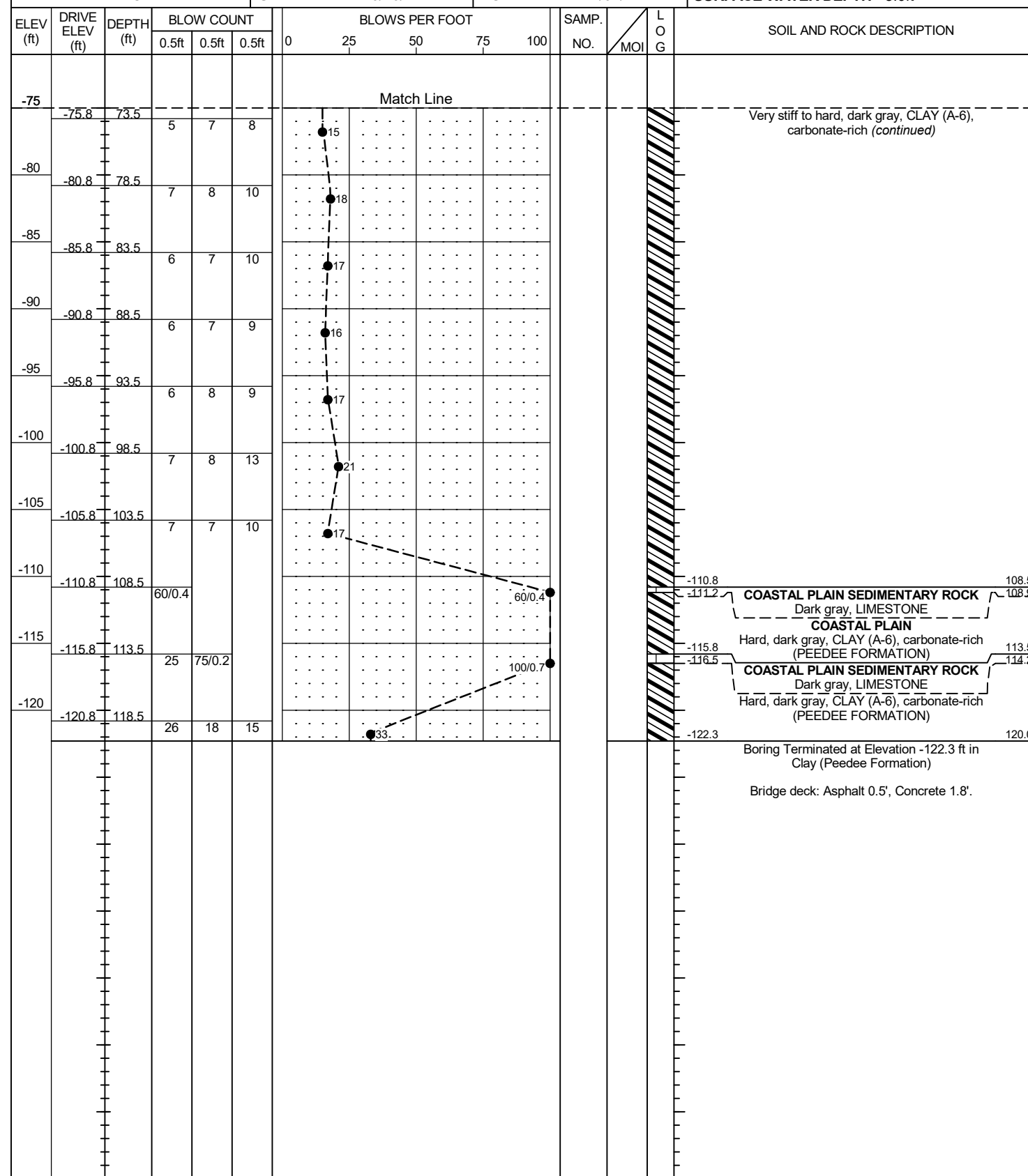
BORE LOG

| | | | |
|---|-----------------------------|--|----------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST P. Grainger |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B3-A | STATION 20+68 | OFFSET 7 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. -2.3 ft | TOTAL DEPTH 120.0 ft | NORTHING 51,142 | EASTING 2,136,759 |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | DRILL METHOD Mud Rotary w/ Core | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 10/26/21 | COMP. DATE 11/02/21 | SURFACE WATER DEPTH 8.0ft |



NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 2/28/22

| | | | |
|---|-----------------------------|--|----------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST P. Grainger |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B3-A | STATION 20+68 | OFFSET 7 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. -2.3 ft | TOTAL DEPTH 120.0 ft | NORTHING 51,142 | EASTING 2,136,759 |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | DRILL METHOD Mud Rotary w/ Core | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 10/26/21 | COMP. DATE 11/02/21 | SURFACE WATER DEPTH 8.0ft |



GEOTECHNICAL BORING REPORT

CORE LOG

| | | | | | | | |
|--|--|----------------------|--|---------------------------------|--|---------------------------|--|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | GROUND WTR (ft) | |
| BORING NO. B3-A | | STATION 20+68 | | OFFSET 7 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. -2.3 ft | | TOTAL DEPTH 120.0 ft | | NORTHING 51,142 | | EASTING 2,136,759 | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 10/26/21 | | COMP. DATE 11/02/21 | | SURFACE WATER DEPTH 8.0ft | |
| CORE SIZE NQ | | TOTAL RUN 28.4 ft | | | | | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | L O G | DESCRIPTION AND REMARKS | DEPTH (ft) |
|-----------|---------------|------------|----------|---------------------|----------|---------|----------|---------|-------|--|------------|
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | | |
| -27 | -27.0 | 24.7 | 3.0 | 00:30 | (1.2) | (0.3) | (0.9) | (0.0) | / | Begin Coring @ 24.7 ft | 24.7 |
| | | | | 00:32 | 40% | 10% | 33% | 0% | | COASTAL PLAIN | |
| -30 | -30.0 | 27.7 | 5.0 | 01:35 | (2.9) | (1.6) | (1.1) | (1.1) | / | Dark gray, CLAY (A-6), carbonate-rich (PEEDEE FORMATION) | 27.4 |
| | | | | 01:55 | 58% | 32% | 100% | 100% | | COASTAL PLAIN SEDIMENTARY ROCK | 28.5 |
| | | | | 00:20 | (7.2) | (0.0) | (7.2) | (0.0) | | Dark gray, LIMESTONE, friable to moderately indurated, thinly bedded | |
| -35 | -35.0 | 32.7 | 5.0 | 00:23 | (5.2) | (0.3) | (5.2) | (0.3) | / | COASTAL PLAIN | |
| | | | | 00:23 | 104% | 6% | 81% | 0% | | Dark gray, CLAY (A-7-6), carbonate-rich (PEEDEE FORMATION) | |
| | | | | 00:24 | | | | | | | |
| -40 | -40.0 | 37.7 | 5.0 | 00:55 | (1.1) | (0.8) | (1.1) | (0.8) | / | COASTAL PLAIN SEDIMENTARY ROCK | 37.4 |
| | | | | 01:19 | 73% | 8% | 73% | 53% | | Dark gray, LIMESTONE | 38.9 |
| | | | | 00:12 | (7.6) | (0.0) | (7.6) | (0.0) | | COASTAL PLAIN | |
| -45 | -45.0 | 42.7 | 5.0 | 00:20 | (4.6) | (0.0) | (4.6) | (0.0) | / | Dark gray, CLAY (A-6), carbonate-rich (PEEDEE FORMATION) | |
| | | | | 00:15 | 92% | 0% | 92% | 0% | | | |
| | | | | 00:30 | | | | | | | |
| -50 | -50.0 | 47.7 | | 00:30 | | | | | / | | 47.7 |
| | | | | | | | | | | N=13 | |
| | | | | | | | | | | N=14 | |
| | | | | | | | | | | N=13 | |
| | | | | | | | | | | N=60/0.1 | |
| -65 | -66.9 | 64.6 | 0.4 | 01:15 | (0.4) | (0.4) | (0.4) | (0.4) | / | COASTAL PLAIN SEDIMENTARY ROCK | 64.6 |
| | -67.3 | 65.0 | 5.0 | 02:03 | 100% | 100% | 100% | 100% | | Dark gray, white, LIMESTONE, medium hard, indurated, fresh | 65.0 |
| -70 | -70.0 | 70.0 | | 00:20 | (3.8) | (0.0) | (3.8) | (0.0) | / | COASTAL PLAIN | |
| | | | | 00:29 | 76% | 0% | 76% | 0% | | Dark gray, CLAY (A-6), carbonate-rich | 70.0 |
| | | | | | | | | | / | | |
| | | | | | | | | | | N=15 | |
| | | | | | | | | | | N=18 | |
| | | | | | | | | | | N=17 | |
| | | | | | | | | | | N=16 | |
| | | | | | | | | | | N=17 | |
| | | | | | | | | | | N=21 | |
| | | | | | | | | | | N=17 | |
| | | | | | | | | | | | |

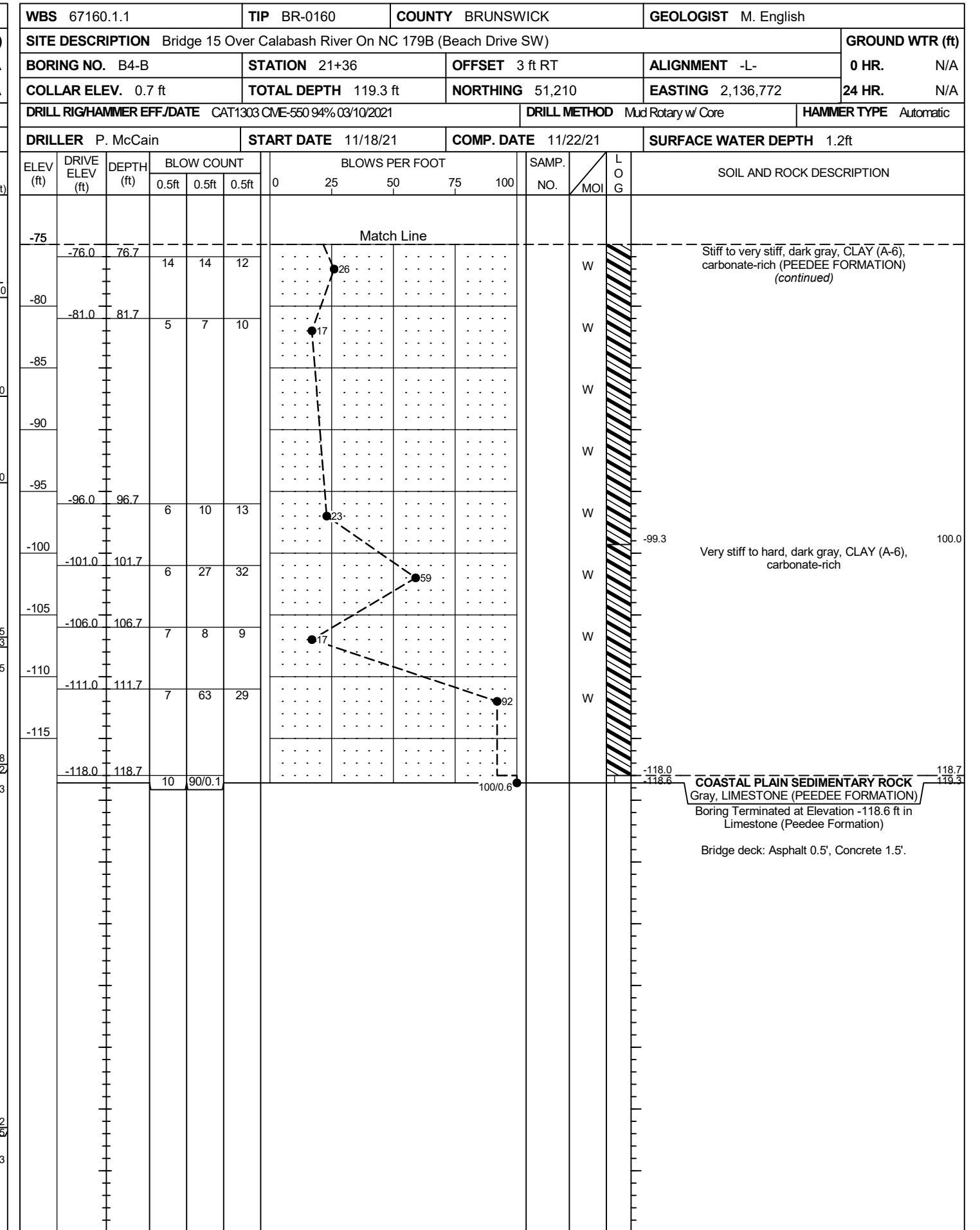
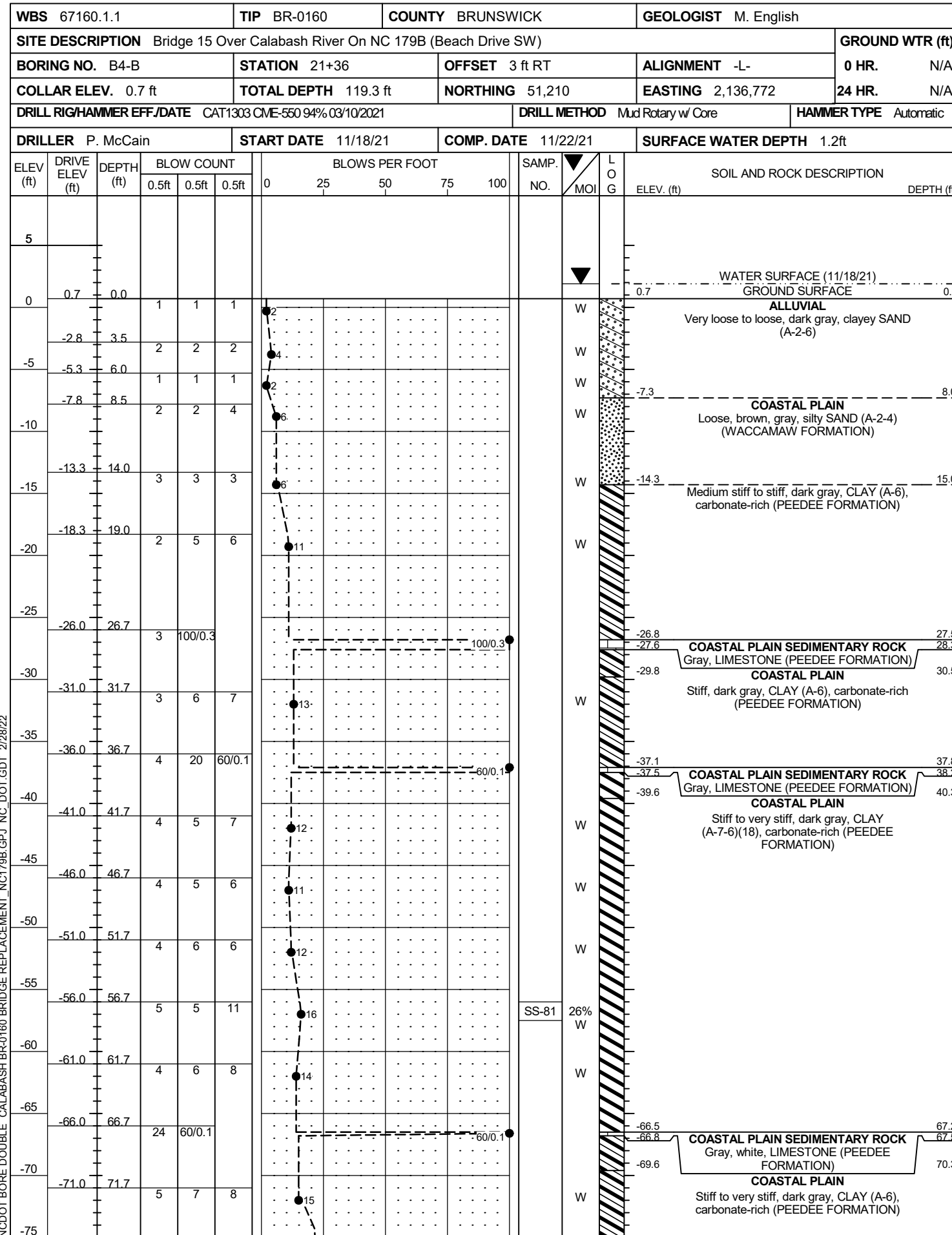
| | | | | | | | |
|--|--|----------------------|--|---------------------------------|--|---------------------------|--|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | GROUND WTR (ft) | |
| BORING NO. B3-A | | STATION 20+68 | | OFFSET 7 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. -2.3 ft | | TOTAL DEPTH 120.0 ft | | NORTHING 51,142 | | EASTING 2,136,759 | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 10/26/21 | | COMP. DATE 11/02/21 | | SURFACE WATER DEPTH 8.0ft | |
| CORE SIZE NQ | | TOTAL RUN 28.4 ft | | | | | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | L O G | DESCRIPTION AND REMARKS | DEPTH (ft) |
|-----------|---------------|------------|----------|---------------------|----------|---------|----------|---------|-------|--|------------|
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | | |
| -107 | | | | | | | | | / | Begin Coring @ 104.7 ft | |
| | | | | | | | | | | | |
| -110 | | | | | | | | | / | | |
| | | | | | | | | | | N=60/0.4 | -110.8 |
| | | | | | | | | | | -112.2 | 108.2 |
| | | | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK | |
| | | | | | | | | | | COASTAL PLAIN | |
| -115 | | | | | | | | | / | | |
| | | | | | | | | | | N=100/0.7 | -115.8 |
| | | | | | | | | | | -116.5 | 114.2 |
| | | | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK | |
| | | | | | | | | | | COASTAL PLAIN | |
| -120 | | | | | | | | | / | | |
| | | | | | | | | | | N=33 | -122.3 |
| | | | | | | | | | | Boring Terminated at Elevation -122.3 ft in Clay (Pee Dee Formation) | |
| | | | | | | | | | | Bridge deck: Asphalt 0.5', Concrete 1.8'. | |

NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 3/2/22

GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 2/28/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST M. English | | | | |
|--|---------------|----------------------|----------|---------------------------------|----------|---------------------------|-----------------|---------|-----|---|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | |
| BORING NO. B4-B | | STATION 21+36 | | OFFSET 3 ft RT | | ALIGNMENT -L- | | | | |
| COLLAR ELEV. 0.7 ft | | TOTAL DEPTH 119.3 ft | | NORTHING 51,210 | | EASTING 2,136,772 | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | | | | |
| DRILLER P. McCain | | START DATE 11/18/21 | | COMP. DATE 11/22/21 | | SURFACE WATER DEPTH 1.2ft | | | | |
| CORE SIZE NQ | | TOTAL RUN 8.5 ft | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS |
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | |
| -26.8 | -26.8 | 27.5 | 3.0 | 03:21 | (2.9) | (0.8) | (0.8) | (0.8) | | Begin Coring @ 27.5 ft |
| -30 | -29.8 | 30.5 | | 0:28 0:26 | 97% | 27% | 100% | 100% | | COASTAL PLAIN SEDIMENTARY ROCK Gray, LIMESTONE, fresh, moderately indurated, medium hard, thinly bedded (PEEDEE FORMATION) |
| -35 | | | | N=13 | | | (2.1) | (0.0) | | COASTAL PLAIN Dark gray, CLAY (A-6), carbonate-rich (PEEDEE FORMATION) |
| -37.1 | | 37.8 | | N=60/0.1 | | | (0.4) | (0.4) | | |
| -40 | -39.6 | 40.3 | 2.5 | 3:42 0:37 0:27/0.5 | (1.9) | (0.5) | (0.4) | (0.4) | | COASTAL PLAIN SEDIMENTARY ROCK Gray, LIMESTONE, fresh, moderately indurated, medium hard, thinly bedded (PEEDEE FORMATION) |
| -45 | | | | N=12 | | | (1.5) | (0.0) | | COASTAL PLAIN Dark gray, CLAY (A-6), carbonate-rich (PEEDEE FORMATION) |
| -50 | | | | N=11 | | | | | | |
| -55 | | | | N=12 | | | | | | |
| -60 | | | | N=16 | | | | | | SS-81 |
| -65 | | | | N=14 | | | | | | |
| -66.6 | | 67.3 | | N=60/0.1 | | | (0.3) | (0.3) | | |
| -70 | -69.6 | 70.3 | 3.0 | 5:27 0:49 0:42 | (3.0) | (0.3) | (0.3) | (0.3) | | COASTAL PLAIN SEDIMENTARY ROCK Gray, white, LIMESTONE, thinly bedded, moderately indurated, fresh, medium hard, (PEEDEE FORMATION) |
| -75 | | | | N=15 | | | (2.7) | (0.0) | | COASTAL PLAIN Dark gray, CLAY (A-6), carbonate-rich (PEEDEE FORMATION) |
| -80 | | | | N=26 | | | | | | |
| -85 | | | | N=17 | | | | | | |
| -90 | | | | N=23 | | | | | | |
| -95 | | | | N=59 | | | | | | |
| -100 | | | | | | | | | | |
| -105 | | | | | | | | | | |

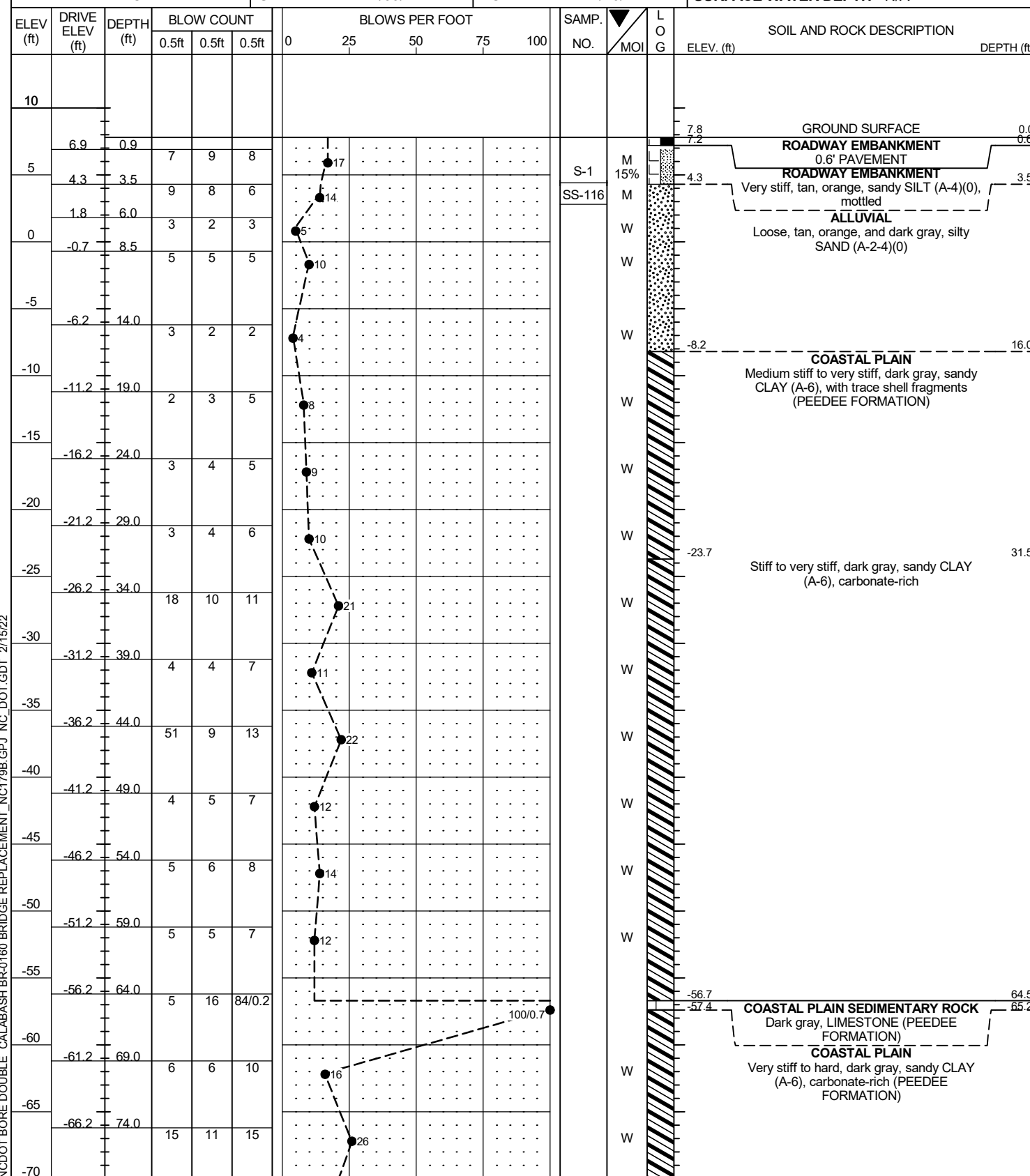
NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 2/21/22

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST M. English | | | | |
|--|---------------|----------------------|----------|---------------------------------|----------|---------------------------|-----------------|---------|-----|---|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | |
| BORING NO. B4-B | | STATION 21+36 | | OFFSET 3 ft RT | | ALIGNMENT -L- | | | | |
| COLLAR ELEV. 0.7 ft | | TOTAL DEPTH 119.3 ft | | NORTHING 51,210 | | EASTING 2,136,772 | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Mud Rotary w/ Core | | HAMMER TYPE Automatic | | | | |
| DRILLER P. McCain | | START DATE 11/18/21 | | COMP. DATE 11/22/21 | | SURFACE WATER DEPTH 1.2ft | | | | |
| CORE SIZE NQ | | TOTAL RUN 8.5 ft | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS |
| | | | | | REC. (%) | RQD (%) | REC. (%) | RQD (%) | | |
| -106.8 | | | | N=17 | | | | | | Begin Coring @ 107.5 ft |
| -110 | | | | N=92 | | | | | | |
| -115 | | | | N=100/0.6 | | | | | | |
| -118.0 | | 118.6 | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK Boring Terminated at Elevation -118.6 ft in Limestone (Pee Dee Formation) |
| -119.3 | | | | | | | | | | Bridge deck: Asphalt 0.5', Concrete 1.5'. |

GEOTECHNICAL BORING REPORT

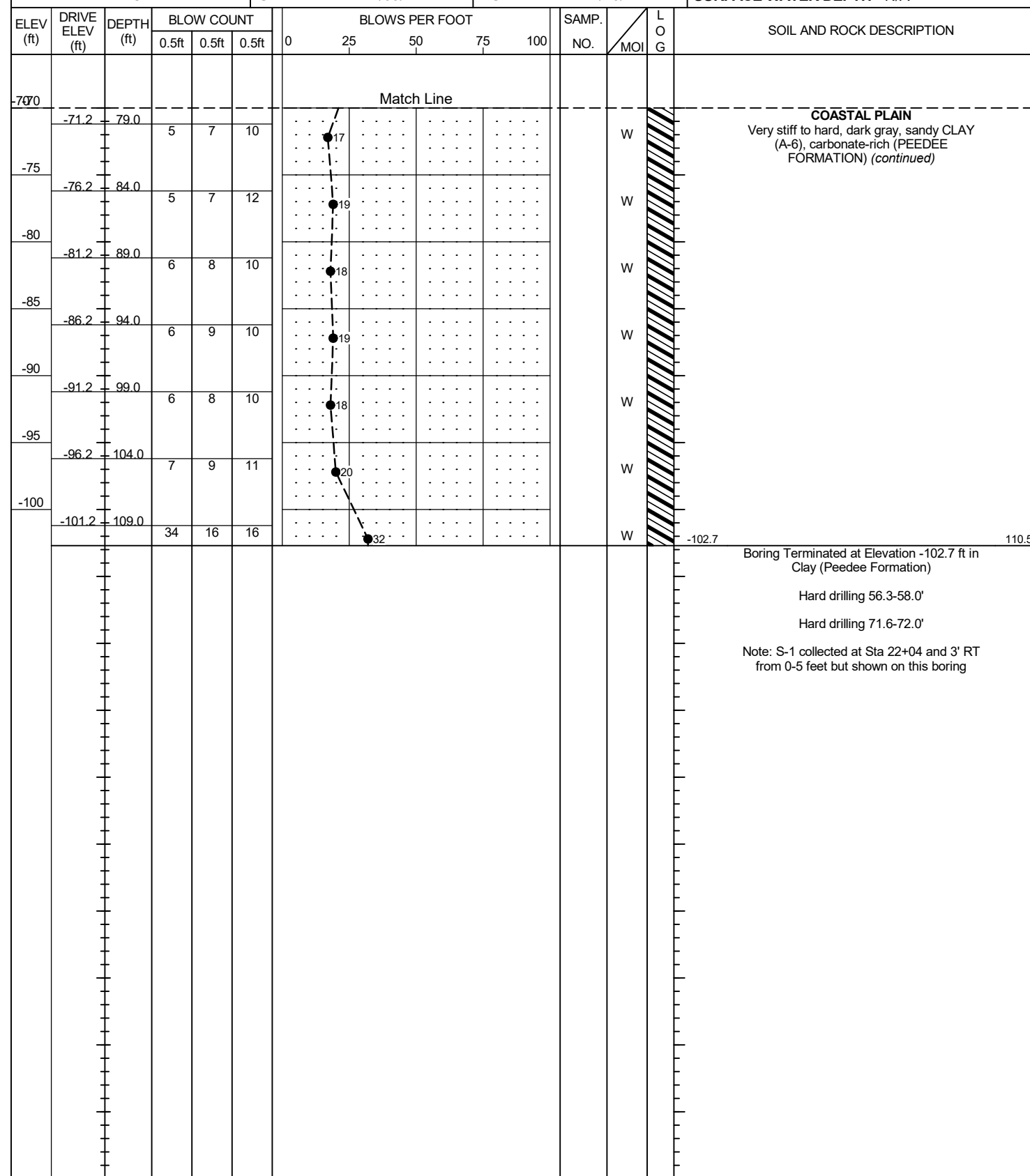
BORE LOG

| | | | |
|---|-----------------------------|--------------------------------|--------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST P. Grainger |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B5-B | STATION 21+99 | OFFSET 3 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 7.8 ft | TOTAL DEPTH 110.5 ft | NORTHING 51,273 | EASTING 2,136,773 |
| DRILL RIG/HAMMER EFF./DATE CAT0071 DIEDRICH D-50 95% 01/22/2021 | | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 11/09/21 | COMP. DATE 11/10/21 | SURFACE WATER DEPTH N/A |



NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT_2/15/22

| | | | |
|---|-----------------------------|--------------------------------|--------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST P. Grainger |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B5-B | STATION 21+99 | OFFSET 3 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 7.8 ft | TOTAL DEPTH 110.5 ft | NORTHING 51,273 | EASTING 2,136,773 |
| DRILL RIG/HAMMER EFF./DATE CAT0071 DIEDRICH D-50 95% 01/22/2021 | | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 11/09/21 | COMP. DATE 11/10/21 | SURFACE WATER DEPTH N/A |



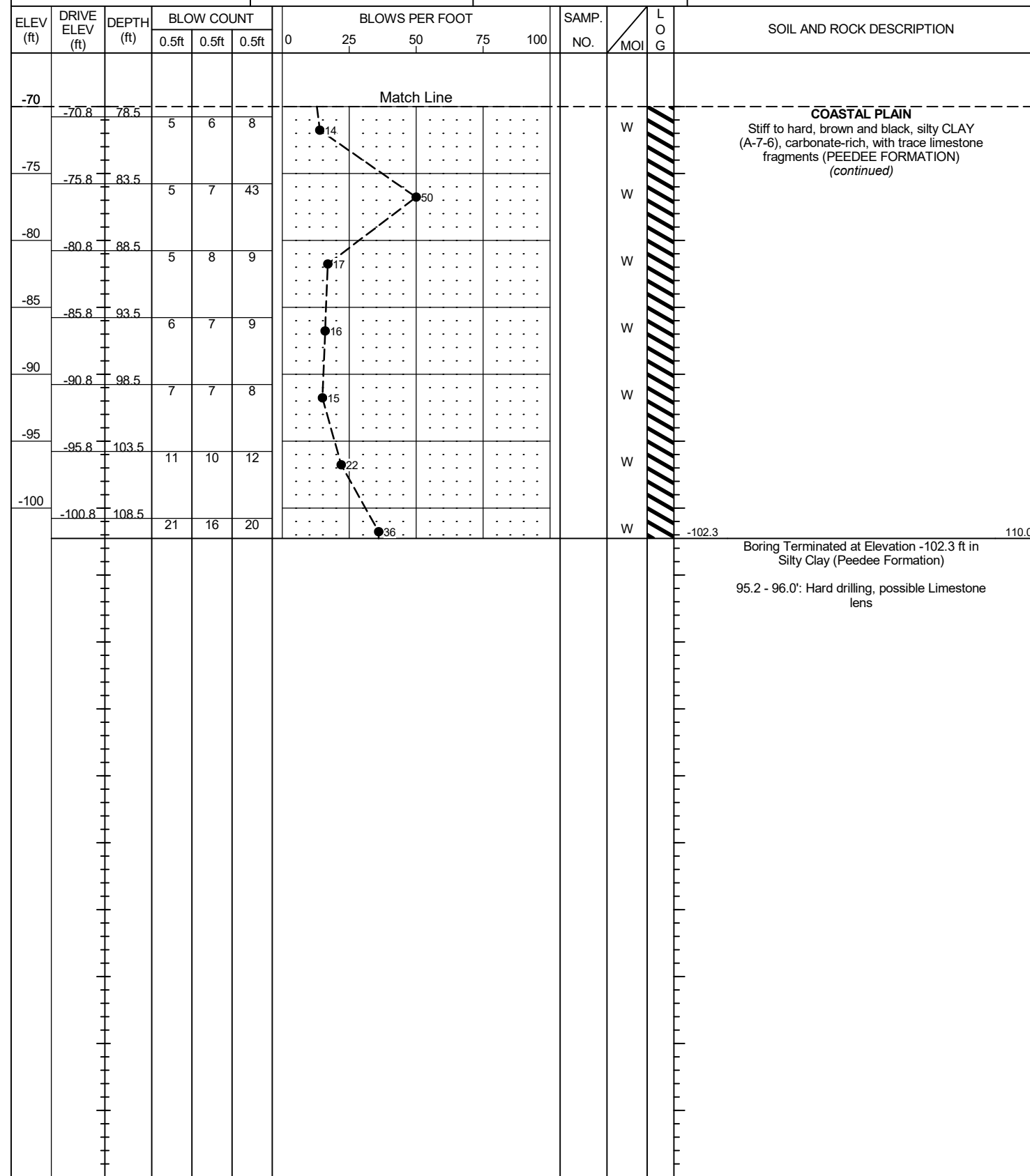
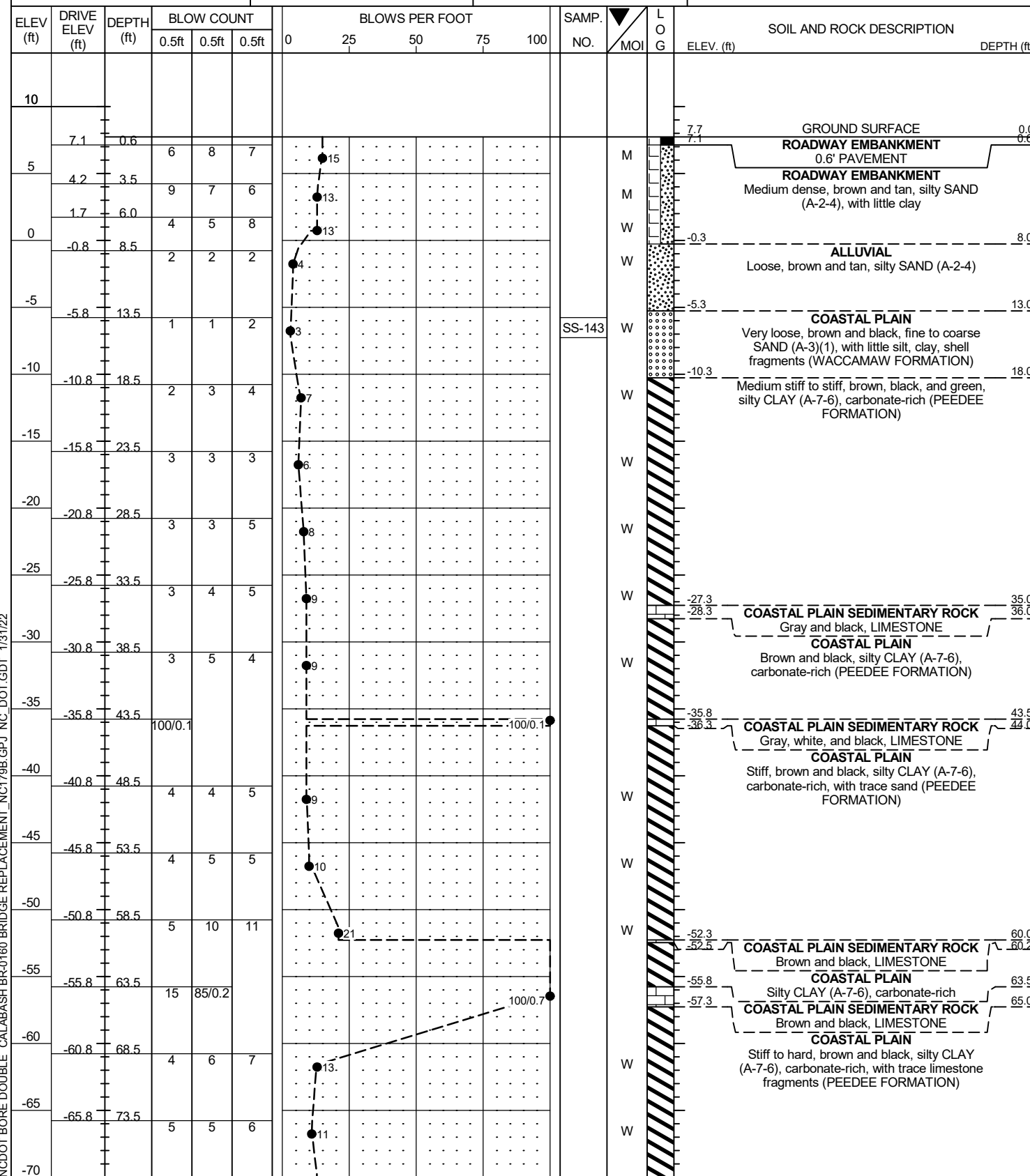
Boring Terminated at Elevation -102.7 ft in Clay (Pee Dee Formation)
 Hard drilling 56.3-58.0'
 Hard drilling 71.6-72.0'
 Note: S-1 collected at Sta 22+04 and 3' RT from 0-5 feet but shown on this boring

GEOTECHNICAL BORING REPORT

BORE LOG

| | | | |
|---|-----------------------------|--------------------------------|--------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST C. Benhoff |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B6-A | STATION 22+52 | OFFSET 8 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 7.7 ft | TOTAL DEPTH 110.0 ft | NORTHING 51,326 | EASTING 2,136,764 |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 10/20/21 | COMP. DATE 10/21/21 | SURFACE WATER DEPTH N/A |

| | | | |
|---|-----------------------------|--------------------------------|--------------------------------|
| WBS 67160.1.1 | TIP BR-0160 | COUNTY BRUNSWICK | GEOLOGIST C. Benhoff |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | GROUND WTR (ft) |
| BORING NO. B6-A | STATION 22+52 | OFFSET 8 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 7.7 ft | TOTAL DEPTH 110.0 ft | NORTHING 51,326 | EASTING 2,136,764 |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic |
| DRILLER P. McCain | START DATE 10/20/21 | COMP. DATE 10/21/21 | SURFACE WATER DEPTH N/A |



NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 1/31/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST C. Benhoff | | | | | |
|--|---------------|---------------------|----------|--------------------------|-------------|-------------------------|-----------------|------------|-----|---|------------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B6-A (1) | | STATION 22+46 | | OFFSET 8 ft LT | | ALIGNMENT -L- | | | | | |
| COLLAR ELEV. 7.7 ft | | TOTAL DEPTH 46.1 ft | | NORTHING 51,320 | | EASTING 2,136,764 | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Core Boring | | HAMMER TYPE Automatic | | | | | |
| DRILLER P. McCain | | START DATE 10/21/21 | | COMP. DATE 11/03/21 | | SURFACE WATER DEPTH N/A | | | | | |
| CORE SIZE NQ | | TOTAL RUN 10.4 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (ft) % | RQD (ft) % | REC. (ft) % | RQD (ft) % | | | |
| -27.26 | | | | | | | | | | Begin Coring @ 35.0 ft | |
| | -27.3 | 35.0 | 2.4 | 0:49 | (1.0) | (1.0) | (1.0) | (1.0) | | COASTAL PLAIN SEDIMENTARY ROCK | |
| | -29.7 | 37.4 | | 0:56 | 42% | 42% | 42% | 42% | | Gray and black, clayey, LIMESTONE, fresh, medium indurated, thinly bedded (PEEDEE FORMATION) | 37.4 |
| | | | 4.0 | 0:23/0.4 | (0.0) | (0.0) | (0.0) | (0.0) | | COASTAL PLAIN | |
| | | | | 0:46 | 0% | 0% | 0% | 0% | | Dark gray, CLAY (A-7-6), carbonate-rich (PEEDEE FORMATION) | |
| | -33.7 | 41.4 | | 0:36 | | | | | | | |
| | -34.4 | 42.1 | | 0:32 | | | | | | | |
| | | | 4.0 | 1:17 | | | | | | | |
| | | | | 0:11 | (4.0) | (0.6) | (3.4) | (0.0) | | Interpreted as dark gray, CLAY (A-7-6), carbonate-rich | 42.1 |
| | | | | 0:41 | 100% | 15% | 100% | 0% | | | |
| | | | | 0:53 | | | | | | | |
| | | | | 0:18 | | | | | | | |
| | -38.4 | 46.1 | | | | | (0.6) | (0.6) | | COASTAL PLAIN SEDIMENTARY ROCK | 45.5 |
| | | | | | | | 100% | 100% | | Gray, white and black, LIMESTONE, fresh, medium hard | 46.1 |
| | | | | | | | | | | Boring Terminated at Elevation -38.4 ft in Clay (Pee Dee Formation) | |
| | | | | | | | | | | Offset core boring 5' north of SPT boring B-6A | |
| | | | | | | | | | | Run 3 start depth at 42.1' instead of bottom of previous run (41.4') See soil description interpretation. | |
| | | | | | | | | | | Additional 0.3' recovery at top of Run 3 discarded due to trip in operation. | |

NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 1/31/22

GEOTECHNICAL BORING REPORT

BORE LOG

| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B7-B | | STATION 23+11 | | OFFSET 7 ft RT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.2 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,385 | | EASTING 2,136,781 | |
| DRILL RIG/HAMMER EFF./DATE CAT0071 DIEDRICH D-50 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/10/21 | | COMP. DATE 11/11/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|--------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 10 | | | | | | | | | | | | | | | |
| | 7.5 | 0.7 | 7 | 8 | 9 | | | | | | | | | | |
| 5 | 4.7 | 3.5 | 7 | 6 | 7 | | | | | | | | | | |
| | 2.2 | 6.0 | WOH | 1 | 5 | | | | | | | | | | |
| 0 | -0.3 | 8.5 | | 1 | 2 | 3 | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -5 | -5.8 | 14.0 | 1 | 0 | 1 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -10 | -10.8 | 19.0 | 2 | 4 | 6 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -15 | -15.8 | 24.0 | 2 | 4 | 6 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -20 | -20.8 | 29.0 | 3 | 5 | 6 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -25 | -25.8 | 34.0 | 3 | 5 | 6 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -30 | -30.8 | 39.0 | 4 | 5 | 7 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -35 | -35.8 | 44.0 | 35 | 13 | 13 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -40 | -40.8 | 49.0 | 3 | 7 | 6 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -45 | -45.8 | 54.0 | 4 | 5 | 9 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -50 | -50.8 | 59.0 | 5 | 6 | 8 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -55 | -55.8 | 64.0 | 70 | 30/0.1 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -60 | -60.8 | 69.0 | 5 | 7 | 9 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -65 | -65.8 | 74.0 | 5 | 8 | 8 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -70 | | | | | | | | | | | | | | | |

| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B7-B | | STATION 23+11 | | OFFSET 7 ft RT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.2 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,385 | | EASTING 2,136,781 | |
| DRILL RIG/HAMMER EFF./DATE CAT0071 DIEDRICH D-50 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/10/21 | | COMP. DATE 11/11/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|--------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| -70 | -70.8 | 79.0 | 6 | 8 | 11 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -75 | -75.8 | 84.0 | 7 | 10 | 10 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -80 | -80.8 | 89.0 | 6 | 10 | 10 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -85 | -85.8 | 94.0 | 7 | 10 | 90/0.2 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -90 | -90.8 | 99.0 | 6 | 8 | 11 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -95 | -95.8 | 104.0 | 6 | 10 | 12 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -100 | -100.8 | 109.0 | 7 | 8 | 11 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 1/31/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | | | | | |
|--|---------------|---------------------|----------|--------------------------|-------------|-------------------------|-----------------|------------|-----|---|------------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B7-B (1) | | STATION 23+06 | | OFFSET 7 ft RT | | ALIGNMENT -L- | | | | | |
| COLLAR ELEV. 8.0 ft | | TOTAL DEPTH 46.3 ft | | NORTHING 51,380 | | EASTING 2,136,781 | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | DRILL METHOD Core Boring | | HAMMER TYPE Automatic | | | | | |
| DRILLER P. McCain | | START DATE 11/11/21 | | COMP. DATE 11/12/21 | | SURFACE WATER DEPTH N/A | | | | | |
| CORE SIZE NQ | | TOTAL RUN 5.0 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (ft) % | RQD (ft) % | REC. (ft) % | RQD (ft) % | | | |
| -33.3 | -33.3 | 41.3 | 5.0 | 0:21/0.5 | (3.9) | (0.0) | (2.5) | (0.0) | | Begin Coring @ 41.3 ft | |
| -35 | -33.3 | 41.3 | 5.0 | 0:58 | 78% | 0% | 100% | 0% | | COASTAL PLAIN | 43.8 |
| | | | | 1:33 | | | | | | Dark gray, CLAY (A-7-6), carbonate- rich (PEEDEE FORMATION) | 44.0 |
| | | | | 0:46 | | | (0.2) | (0.0) | | COASTAL PLAIN SEDIMENTARY ROCK | 44.8 |
| | | | | 1:02 | | | 100% | 0% | | Gray, white, LIMESTONE, fresh, medium indurated, medium hard, thinly bedded | 44.9 |
| | -38.3 | 46.3 | | | | | (0.8) | (0.0) | | COASTAL PLAIN | 46.3 |
| | | | | | | | 100% | 0% | | Dark gray, CLAY (A-7-6), carbonate- rich (PEEDEE FORMATION) | |
| | | | | | | | (0.1) | (0.0) | | COASTAL PLAIN SEDIMENTARY ROCK | |
| | | | | | | | 100% | 0% | | Gray, white, LIMESTONE, fresh, medium indurated, medium hard, thinly bedded | |
| | | | | | | | (0.3) | (0.0) | | COASTAL PLAIN | |
| | | | | | | | 21% | 0% | | Dark gray, CLAY (A-7-6), carbonate- rich (PEEDEE FORMATION). Last 0.5' of core run had very fast drilling rate, mostly washed out | |
| | | | | | | | | | | Boring Terminated at Elevation -38.3 ft in Clay (Pee Dee Formation) | |
| | | | | | | | | | | Offset core boring 5' north of SPT boring B-7B | |

NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 1/31/22

GEOTECHNICAL BORING REPORT

BORE LOG

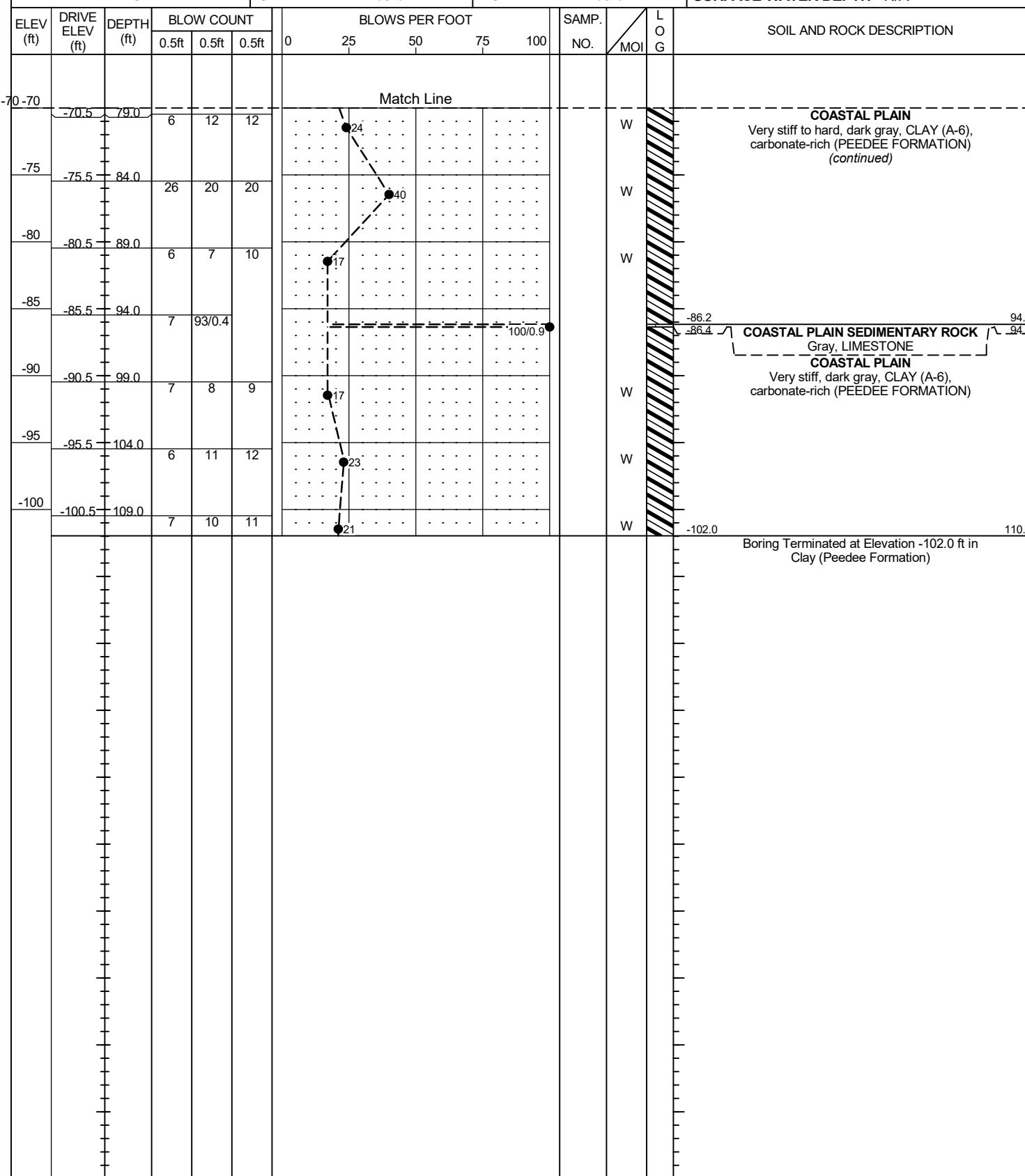
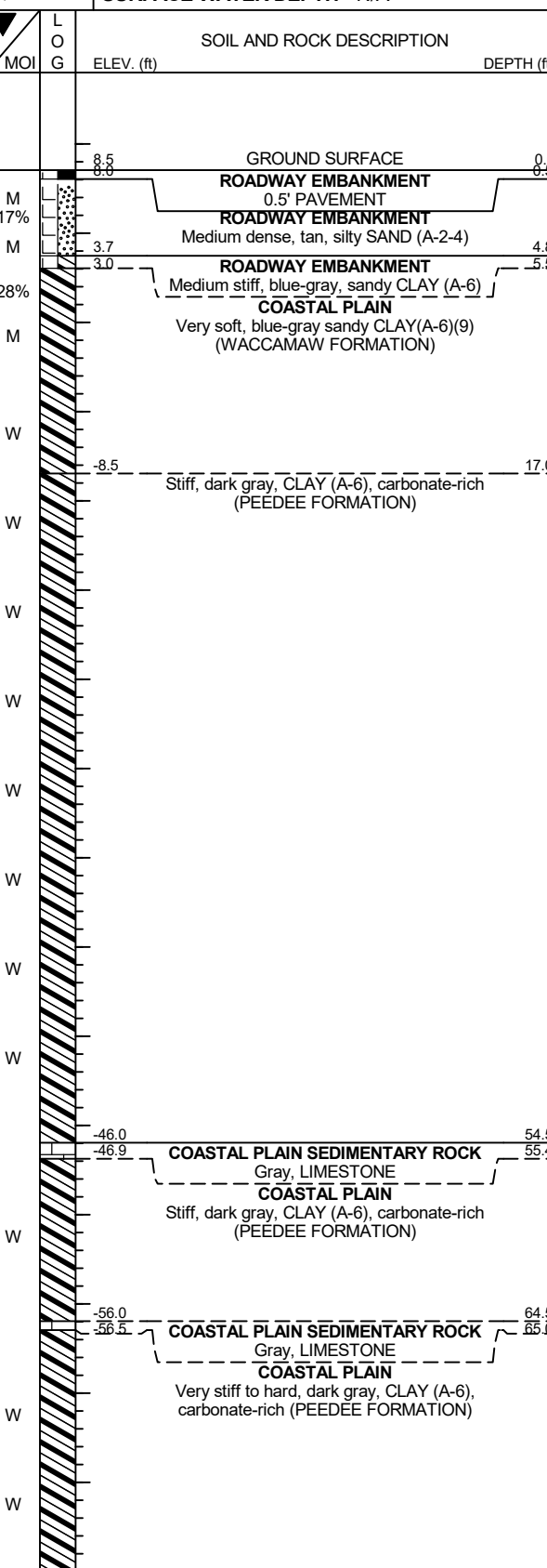
| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B8-A | | STATION 23+56 | | OFFSET 8 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.5 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,430 | | EASTING 2,136,767 | |
| DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/04/21 | | COMP. DATE 11/04/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
|-----------|-----------------|------------|------------|--------|--------|----------------|----|----|----|-----|-----------|-----|---------------------------|--|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 10 | | | | | | | | | | | | | | | |
| | 7.7 | 0.8 | | | | | | | | | | | | | |
| 5 | 5.0 | 3.5 | 5 | 11 | 10 | | | | | | | | | | |
| | 2.5 | 6.0 | 1 | 1 | 0 | | | | | | | | | | |
| 0 | 0.0 | 8.5 | WOH | 1 | 0 | | | | | | | | | | |
| -5 | -5.5 | 14.0 | 1 | 1 | 1 | | | | | | | | | | |
| -10 | -10.5 | 19.0 | 3 | 5 | 4 | | | | | | | | | | |
| -15 | -15.5 | 24.0 | 3 | 4 | 5 | | | | | | | | | | |
| -20 | -20.5 | 29.0 | 3 | 4 | 5 | | | | | | | | | | |
| -25 | -25.5 | 34.0 | 3 | 5 | 6 | | | | | | | | | | |
| -30 | -30.5 | 39.0 | 3 | 6 | 6 | | | | | | | | | | |
| -35 | -35.5 | 44.0 | 4 | 5 | 7 | | | | | | | | | | |
| -40 | -40.5 | 49.0 | 5 | 5 | 8 | | | | | | | | | | |
| -45 | -45.5 | 54.0 | 4 | 5 | 95/0.4 | | | | | | | | | | |
| -50 | -50.5 | 59.0 | 5 | 6 | 8 | | | | | | | | | | |
| -55 | -55.5 | 64.0 | 6 | 94/0.0 | | | | | | | | | | | |
| -60 | -60.5 | 69.0 | 4 | 7 | 9 | | | | | | | | | | |
| -65 | -65.5 | 74.0 | 6 | 7 | 8 | | | | | | | | | | |
| -70 | | | | | | | | | | | | | | | |

| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B8-A | | STATION 23+56 | | OFFSET 8 ft LT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.5 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,430 | | EASTING 2,136,767 | |
| DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/04/21 | | COMP. DATE 11/04/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
|-----------|-----------------|------------|------------|--------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|--|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| -70 | -70.5 | 79.0 | 6 | 12 | 12 | | | | | | | | | | |
| -75 | -75.5 | 84.0 | 26 | 20 | 20 | | | | | | | | | | |
| -80 | -80.5 | 89.0 | 6 | 7 | 10 | | | | | | | | | | |
| -85 | -85.5 | 94.0 | 7 | 93/0.4 | | | | | | | | | | | |
| -90 | -90.5 | 99.0 | 7 | 8 | 9 | | | | | | | | | | |
| -95 | -95.5 | 104.0 | 6 | 11 | 12 | | | | | | | | | | |
| -100 | -100.5 | 109.0 | 7 | 10 | 11 | | | | | | | | | | |

NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 1/31/22



GEOTECHNICAL BORING REPORT

BORE LOG

| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B9-B | | STATION 24+06 | | OFFSET 5 ft RT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.8 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,480 | | EASTING 2,136,781 | |
| DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/05/21 | | COMP. DATE 11/05/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|---------------------------------------|-----|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 10 | 8.0 | 0.8 | 7 | 13 | 9 | | | | | | | | | 8.8 | GROUND SURFACE | 0.0 | |
| | | | | | | | | | | | | | | 8.3 | ROADWAY EMBANKMENT | 0.5 | |
| | | | | | | | | | | | | | | 5.8 | ROADWAY EMBANKMENT | 3.0 | |
| 5 | 5.3 | 3.5 | 6 | 6 | 6 | | | | | | | | | 3.3 | ROADWAY EMBANKMENT | 5.5 | |
| | | | | | | | | | | | | | | | ALLUVIAL | | |
| | | | | | | | | | | | | | | | Loose, blue-gray, clayey SAND (A-2-6) | | |
| 0 | 0.3 | 8.5 | 2 | 2 | 2 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -5 | -5.2 | 14.0 | 2 | 1 | 2 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -10 | -10.2 | 19.0 | 3 | 4 | 6 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -15 | -15.2 | 24.0 | 3 | 4 | 7 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -20 | -20.2 | 29.0 | 3 | 5 | 6 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -25 | -25.2 | 34.0 | 4 | 5 | 8 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -30 | -30.2 | 39.0 | 3 | 6 | 6 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -35 | -35.2 | 44.0 | 53 | 17 | 17 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -40 | -40.2 | 49.0 | 4 | 6 | 7 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -45 | -45.2 | 54.0 | 4 | 6 | 7 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -50 | -50.2 | 59.0 | 5 | 6 | 8 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -55 | -55.2 | 64.0 | 60/0.1 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -60 | -60.2 | 69.0 | 5 | 6 | 9 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -65 | -65.2 | 74.0 | 5 | 6 | 10 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -70 | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|--|--|----------------------|-------------------------|---------------------|--|-------------------------|-----------------|
| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST P. Grainger | |
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) |
| BORING NO. B9-B | | STATION 24+06 | | OFFSET 5 ft RT | | ALIGNMENT -L- | |
| COLLAR ELEV. 8.8 ft | | TOTAL DEPTH 110.5 ft | | NORTHING 51,480 | | EASTING 2,136,781 | |
| DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 95% 01/22/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | |
| DRILLER P. McCain | | START DATE 11/05/21 | | COMP. DATE 11/05/21 | | SURFACE WATER DEPTH N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | | |
|-----------|-----------------|------------|------------|--------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|--|--|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| -70 | -70.2 | 79.0 | 6 | 7 | 9 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -75 | -75.2 | 84.0 | 5 | 8 | 9 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -80 | -80.2 | 89.0 | 6 | 10 | 11 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -85 | -85.2 | 94.0 | 7 | 60/0.1 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -90 | -90.2 | 99.0 | 6 | 9 | 9 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -95 | -95.2 | 104.0 | 7 | 8 | 13 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| -100 | -100.2 | 109.0 | 7 | 6 | 13 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 1/31/22

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 67160.1.1 | | | TIP BR-0160 | | | COUNTY BRUNSWICK | | | GEOLOGIST P. Grainger | | | |
|--|---------------|------------|---------------------|----------------------|------------|--------------------------|-----------|-----------------|-------------------------|-----|---|--------------|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B9-B (1) | | | STATION 23+98 | | | OFFSET 5 ft RT | | | ALIGNMENT -L- | | | |
| COLLAR ELEV. 9.0 ft | | | TOTAL DEPTH 67.3 ft | | | NORTHING 51,472 | | | EASTING 2,136,781 | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | | | | DRILL METHOD Core Boring | | | HAMMER TYPE Automatic | | | |
| DRILLER P. McCain | | | START DATE 11/23/21 | | | COMP. DATE 11/29/21 | | | SURFACE WATER DEPTH N/A | | | |
| CORE SIZE NQ | | | TOTAL RUN 8.8 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC (ft) % | RQD (ft) % | | REC (ft) % | RQD (ft) % | | | |
| -19.7 | -19.7 | 28.7 | 2.2 | 0:26 | (2.2) | (0.0) | | (2.2) | (0.0) | | Begin Coring @ 28.7 ft | |
| | -21.9 | 30.9 | | 0:26 | 100% | 0% | | 81% | 0% | | COASTAL PLAIN Dark gray, carbonate-rich CLAY (A-7-6) (PEEDEE FORMATION) | 31.4 |
| | -24.9 | 33.9 | 3.0 | 2:31 0:29 0:39 | (1.2) | (0.4) | | (0.5) | (0.4) | | COASTAL PLAIN SEDIMENTARY ROCK Dark gray, LIMESTONE, fresh, moderately indurated, moderately hard, thinly bedded | 33.9 |
| | | | | | | | | (0.0) | (0.0) | | COASTAL PLAIN No recovery (interpreted as CLAY (A-7-6) (PEEDEE FORMATION) based on quick drill rate) | |
| -30 | | | | | | | | | | | | |
| -35 | | | | | | | | | | | | |
| -40 | | | | | | | | | | | | |
| -45 | | | | | | | | | | | | |
| -50 | | | | | | | | | | | | |
| | -54.7 | 63.7 | 3.6 | 3:47 1:52 0:52 | (1.4) | (1.1) | | (1.1) | (1.1) | | COASTAL PLAIN SEDIMENTARY ROCK Dark gray, LIMESTONE, fresh, moderately indurated, moderately hard, thinly bedded | 63.7 64.8 |
| | -58.3 | 67.3 | | 0:34/0.6 | (0.3) | (0.0) | | (0.3) | (0.0) | | COASTAL PLAIN Dark gray, carbonate-rich, CLAY (A-7-6) (PEEDEE FORMATION) | 67.3 |
| | | | | | | | | | | | Boring Terminated at Elevation -58.3 ft in Clay (Peedee Formation) | |
| | | | | | | | | | | | Offset core boring 5' south of SPT boring B-9B | |

NCDOT CORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ_NC_DOT.GDT 1/31/22

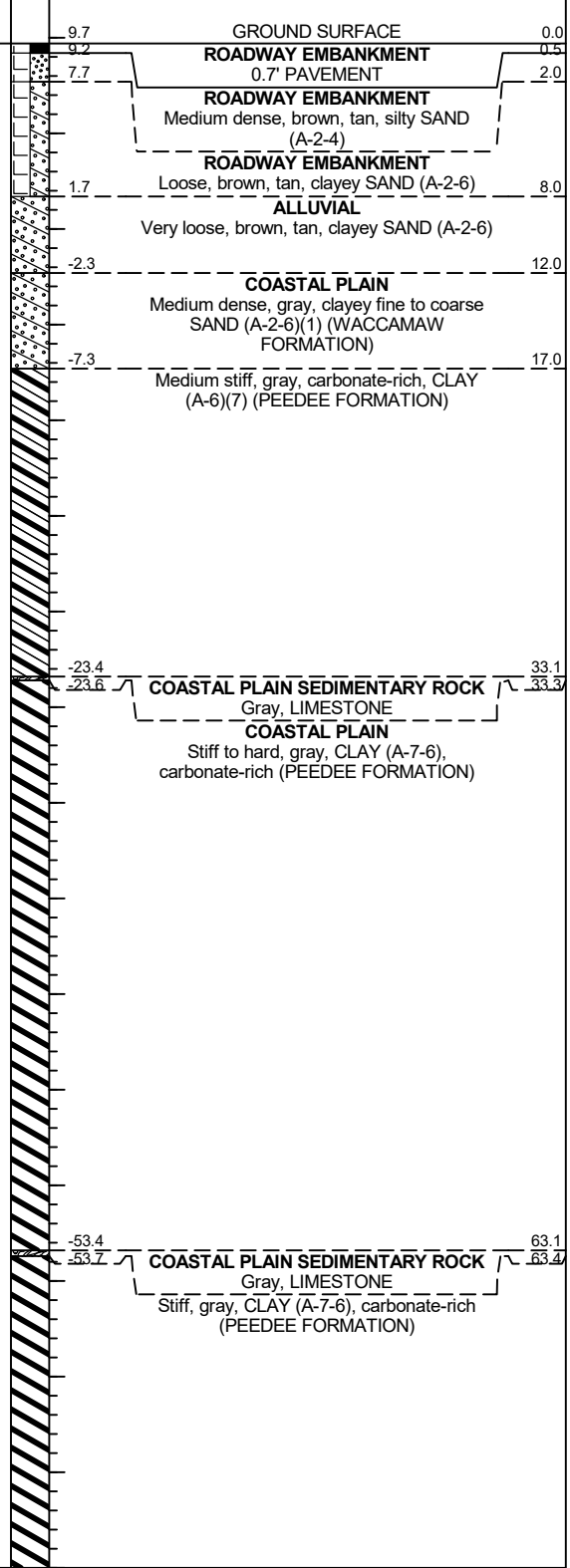
GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST C. Benhoff | | | | | | | | | | | |
|--|-----------------|---------------------|-------------------------|---------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|--|--|--|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB2-A | | STATION 24+63 | | OFFSET 8 ft LT | | ALIGNMENT -L- | | | | | | | | | | | |
| COLLAR ELEV. 9.7 ft | | TOTAL DEPTH 84.6 ft | | NORTHING 51,537 | | EASTING 2,136,770 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER Thelmer | | START DATE 10/19/21 | | COMP. DATE 10/19/21 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 10 | 9.2 | 0.5 | 10 | 10 | 10 | | | | | | | | | | | | |
| | 6.2 | 3.5 | 3 | 2 | 3 | | | | | | | | | | | | |
| 5 | 3.7 | 6.0 | 4 | 2 | 2 | | | | | | | | | | | | |
| | 1.2 | 8.5 | WOH | 1 | 1 | | | | | | | | | | | | |
| 0 | -3.4 | 13.1 | WOH | 1 | 1 | | | | | | | | | | | | |
| -5 | -8.4 | 18.1 | 9 | 3 | 2 | | | | | | | | | | | | |
| -10 | -13.4 | 23.1 | 3 | 3 | 4 | | | | | | | | | | | | |
| -15 | -18.4 | 28.1 | 3 | 3 | 4 | | | | | | | | | | | | |
| -20 | -23.4 | 33.1 | 100/0.2 | | | | | | | | | | | | | | |
| -25 | -28.4 | 38.1 | 4 | 3 | 6 | | | | | | | | | | | | |
| -30 | -33.4 | 43.1 | 19 | 8 | 22 | | | | | | | | | | | | |
| -35 | -38.4 | 48.1 | 4 | 4 | 5 | | | | | | | | | | | | |
| -40 | -43.4 | 53.1 | 4 | 4 | 11 | | | | | | | | | | | | |
| -45 | -48.4 | 58.1 | 4 | 5 | 6 | | | | | | | | | | | | |
| -50 | -53.4 | 63.1 | 100/0.3 | | | | | | | | | | | | | | |
| -55 | -58.4 | 68.1 | 5 | 5 | 7 | | | | | | | | | | | | |
| -60 | -63.4 | 73.1 | 4 | 6 | 7 | | | | | | | | | | | | |
| -65 | -68.4 | 78.1 | 5 | 8 | 7 | | | | | | | | | | | | |
| -70 | | | | | | | | | | | | | | | | | |

| WBS 67160.1.1 | | TIP BR-0160 | | COUNTY BRUNSWICK | | GEOLOGIST C. Benhoff | | | | | | | | | | | |
|--|-----------------|---------------------|-------------------------|---------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|--|--|--|
| SITE DESCRIPTION Bridge 15 Over Calabash River On NC 179B (Beach Drive SW) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB2-A | | STATION 24+63 | | OFFSET 8 ft LT | | ALIGNMENT -L- | | | | | | | | | | | |
| COLLAR ELEV. 9.7 ft | | TOTAL DEPTH 84.6 ft | | NORTHING 51,537 | | EASTING 2,136,770 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 94% 03/10/2021 | | | DRILL METHOD Mud Rotary | | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER Thelmer | | START DATE 10/19/21 | | COMP. DATE 10/19/21 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| -70 | | | | | | | | | | | | | | | | | |
| | -73.4 | 83.1 | 5 | 6 | 8 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE CALABASH BR-0160 BRIDGE REPLACEMENT_NC179B.GPJ NC_DOT.GDT 1/31/22



Stiff, gray, CLAY (A-7-6), carbonate-rich (PEEDEE FORMATION) (continued)

Boring Terminated at Elevation -74.9 ft in Clay (Pee Dee Formation)

NOTES
ST-1 was classified as gray, carbonate-rich, CLAY (A-6)(7) in offset hole Sta. 24+58, 8' LT

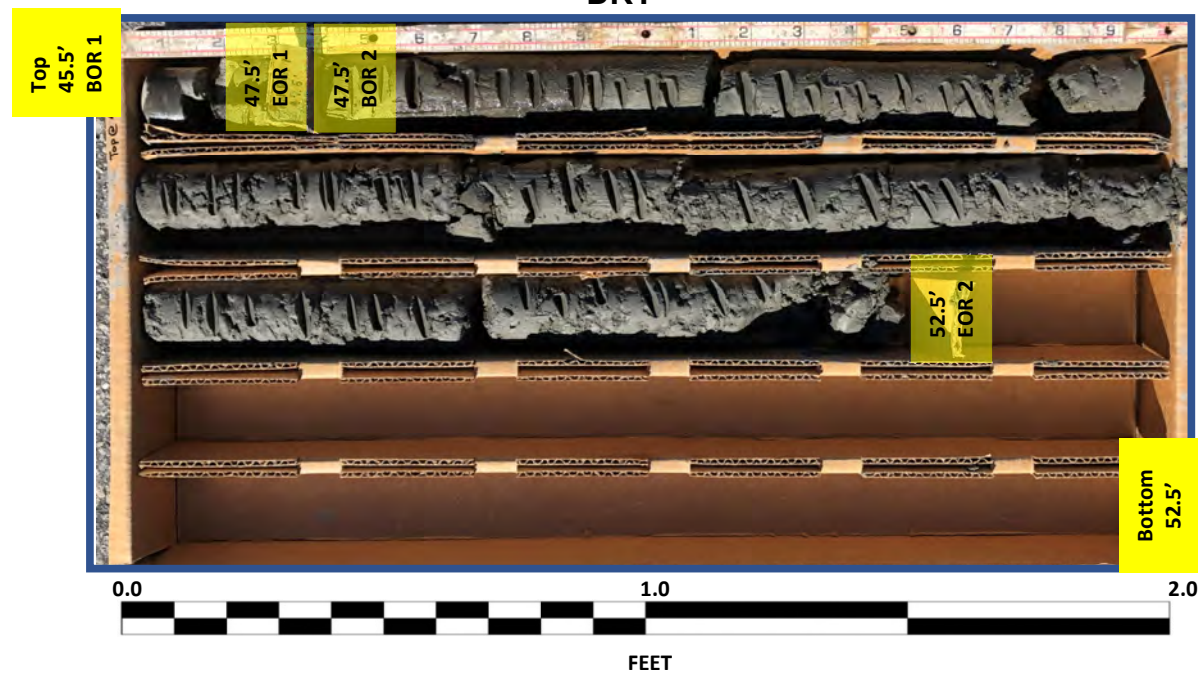
Other Samples:
ST-1 (19.6 - 21.6)

CORE PHOTOGRAPHIC RECORD

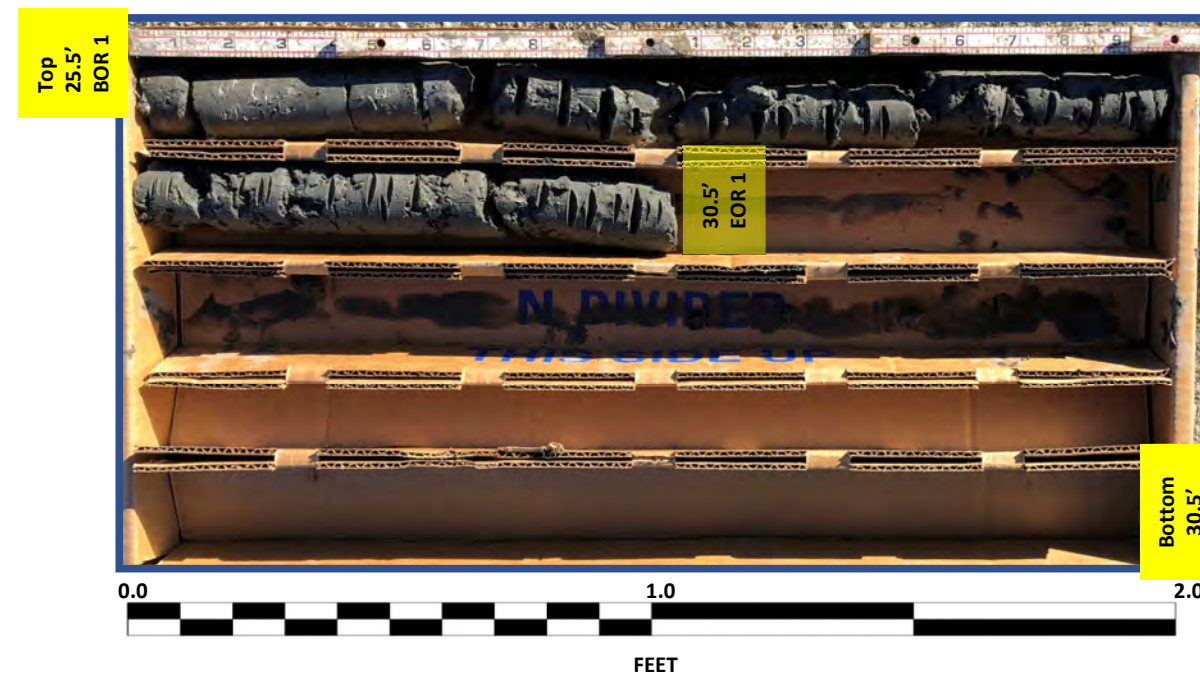
67160.1.1 (BR-0160)

Bridge 15 Over Calabash River On NC 179B (Beach Drive SW)

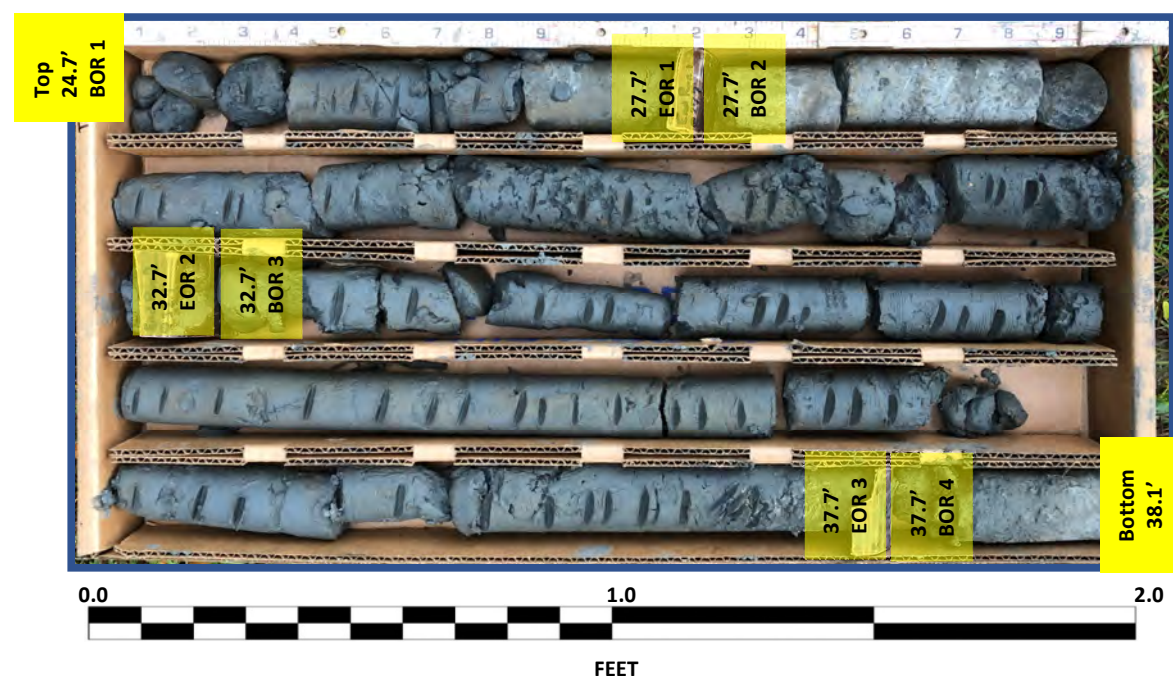
B1-A
Box 1 of 1: 45.5 – 52.5 FEET
DRY



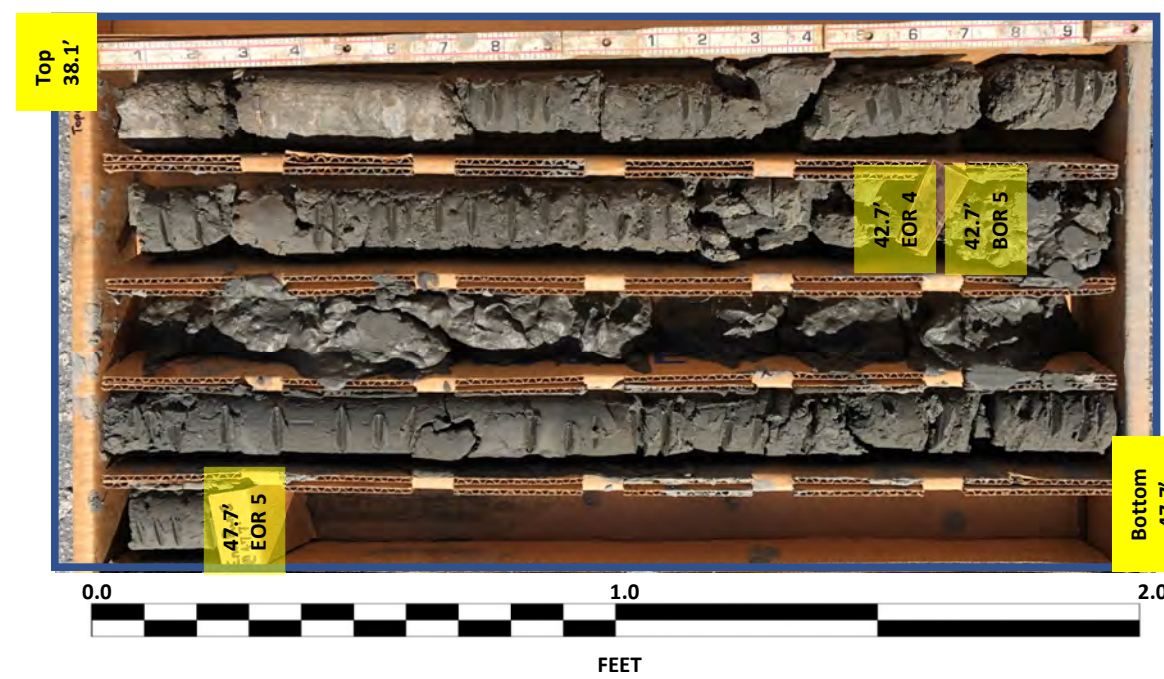
B2-B
Box 1 of 1: 25.5 – 30.5 FEET
DRY



B-3A
Box 1 of 3: 24.7 – 38.1 FEET
DRY



B-3A
Box 2 of 3: 38.1 – 47.7 FEET
DRY

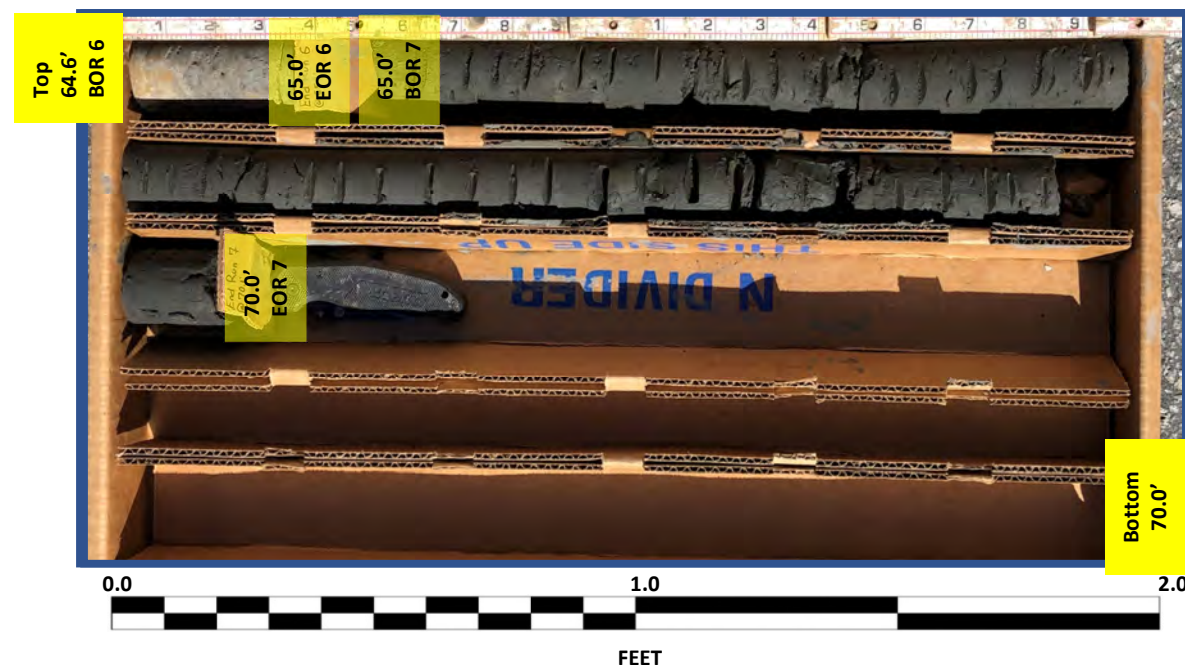


CORE PHOTOGRAPHIC RECORD

67160.1.1 (BR-0160)

Bridge 15 Over Calabash River On NC 179B (Beach Drive SW)

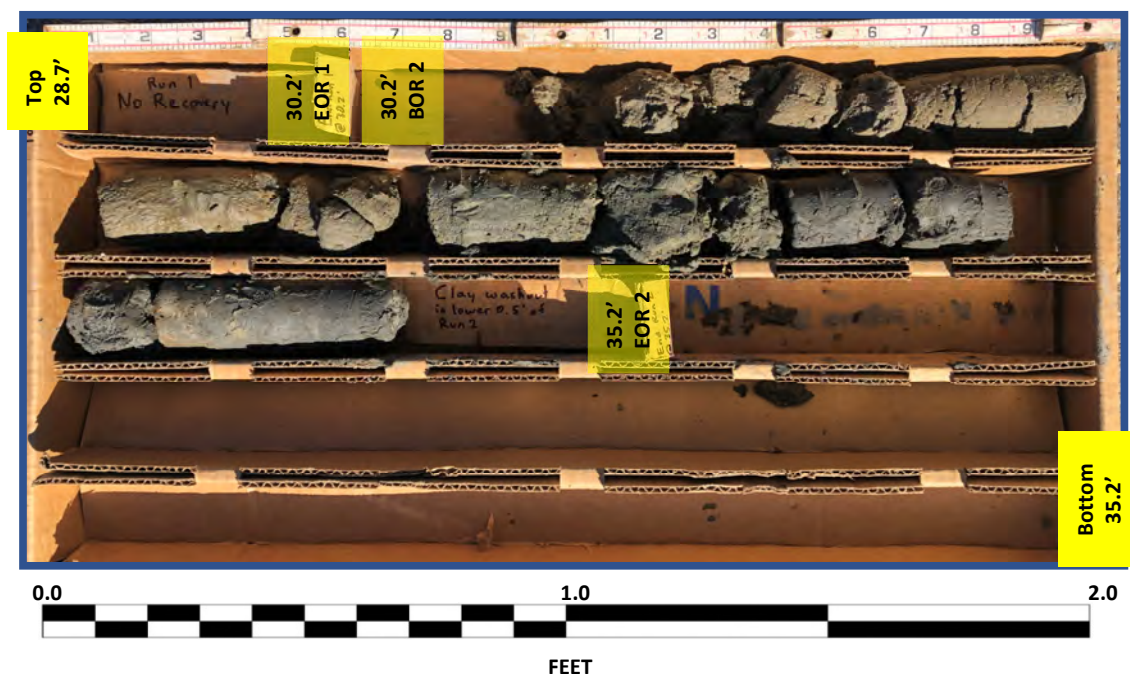
B-3A
Box 3 of 3: 64.6 – 70.0 FEET
DRY



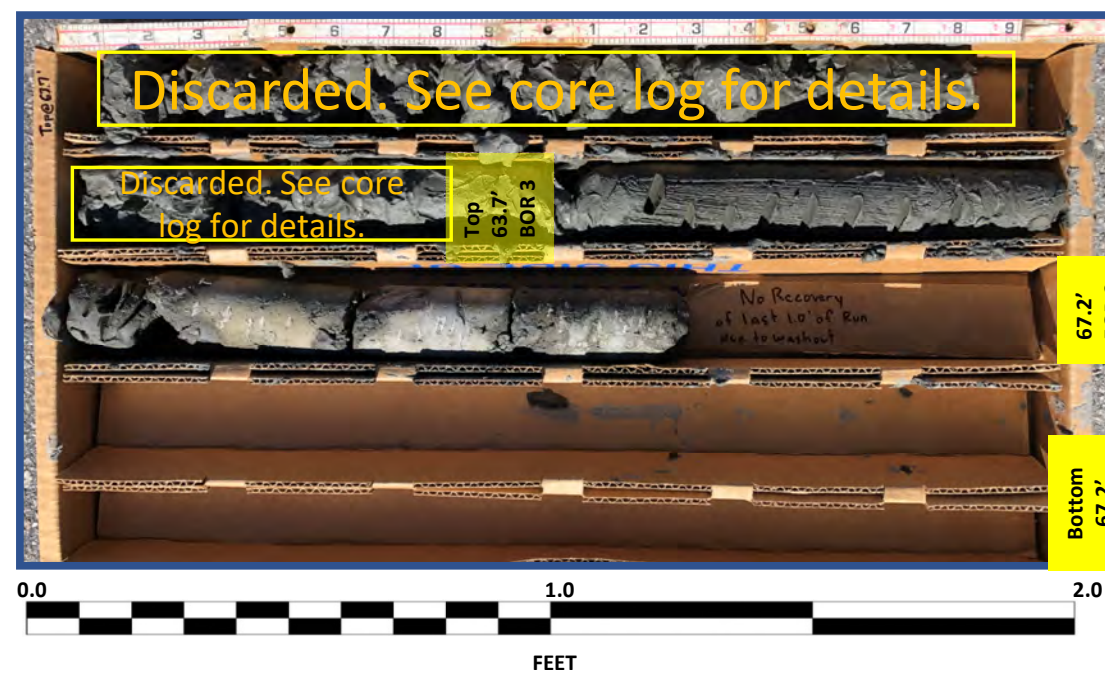
B4-B
Box 1 of 1: 27.5 – 70.3 FEET
DRY



B5-B (1)
Box 1 of 2: 28.7 – 35.2 FEET
DRY



B5-B (1)
Box 2 of 2: 63.7 – 67.2 FEET
DRY

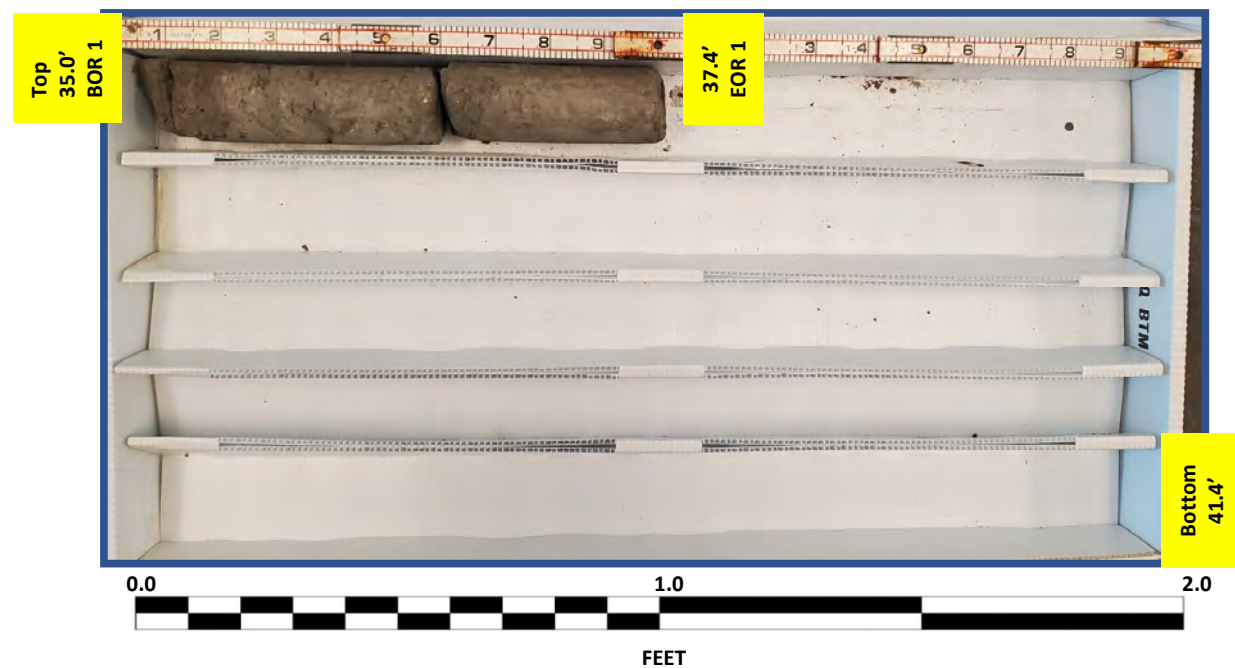


CORE PHOTOGRAPHIC RECORD

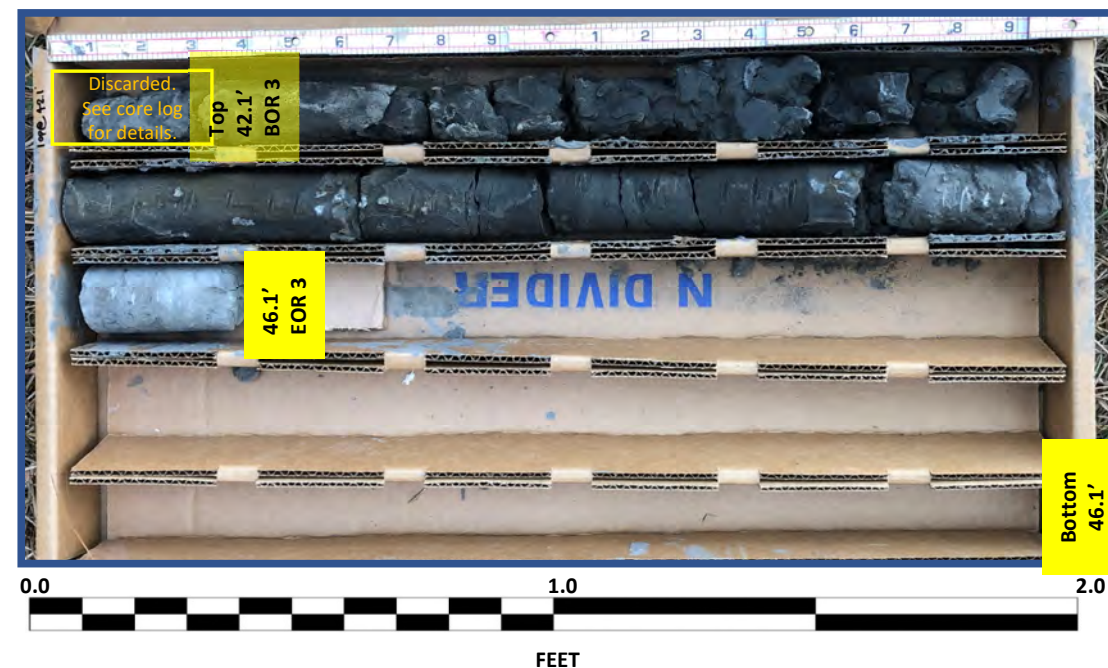
67160.1.1 (BR-0160)

Bridge 15 Over Calabash River On NC 179B (Beach Drive SW)

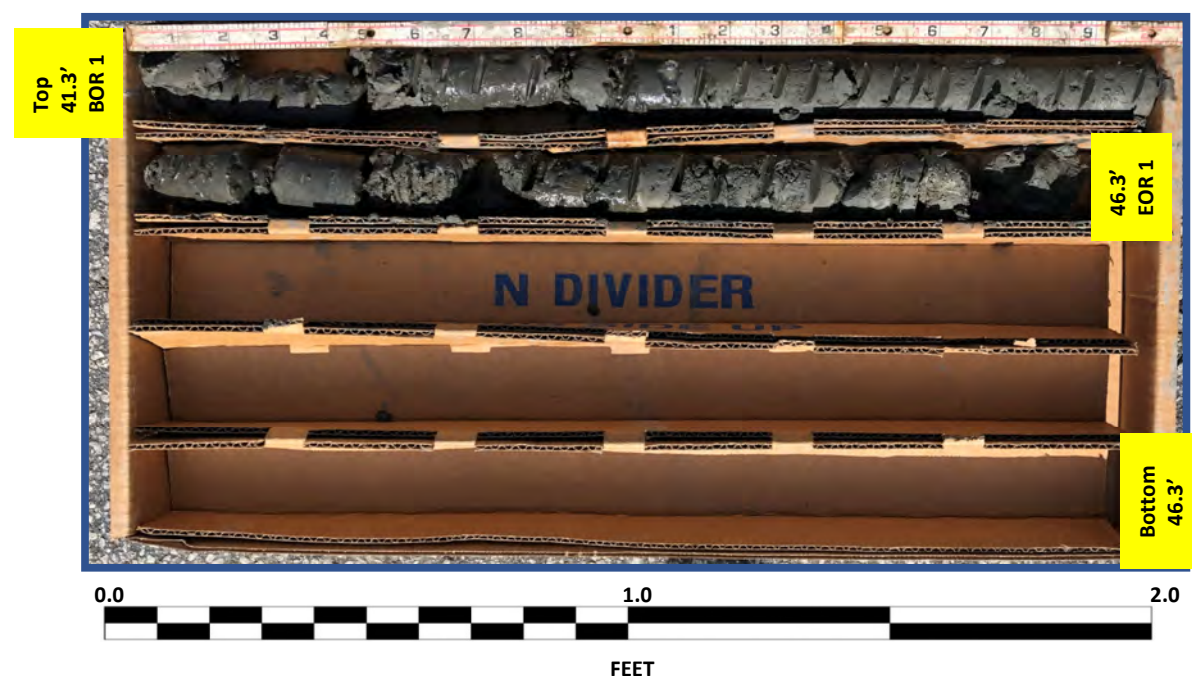
B6-A (1)
Box 1 of 2: 35.0 – 41.4 FEET
DRY



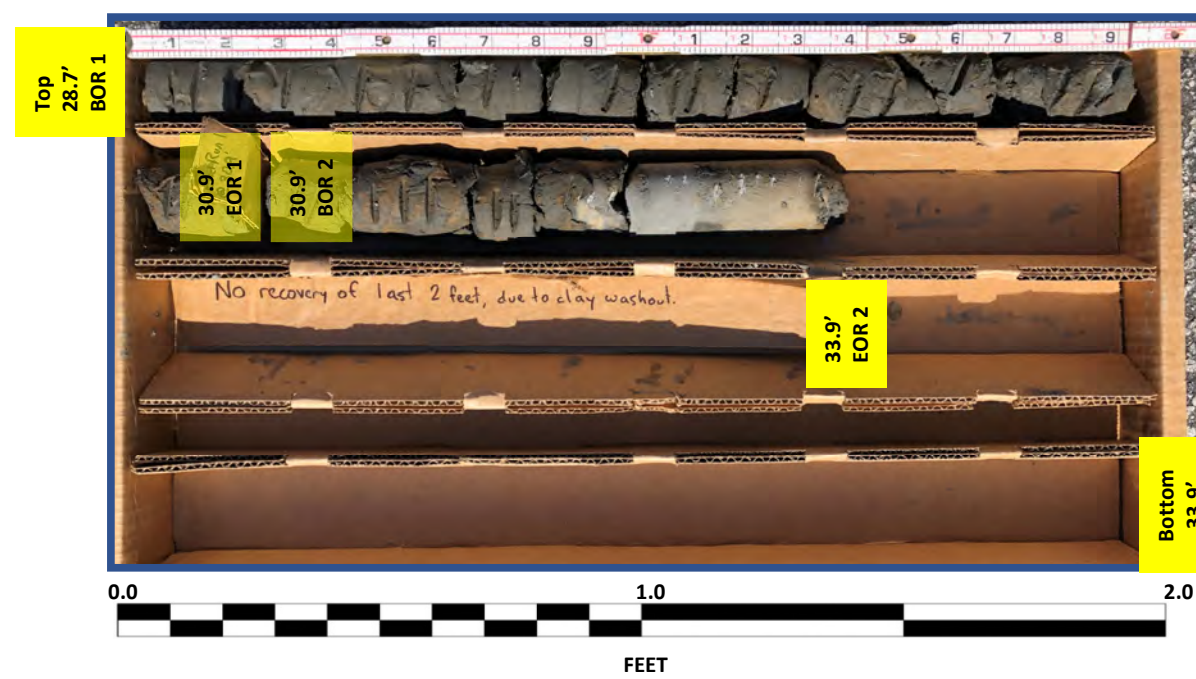
B6-A (1)
Box 2 of 2: 42.1 – 46.1 FEET
DRY



B7-B (1)
Box 1 of 1: 41.3 – 46.3 FEET
DRY



B9-B (1)
Box 1 of 2: 28.7 – 33.9 FEET
DRY

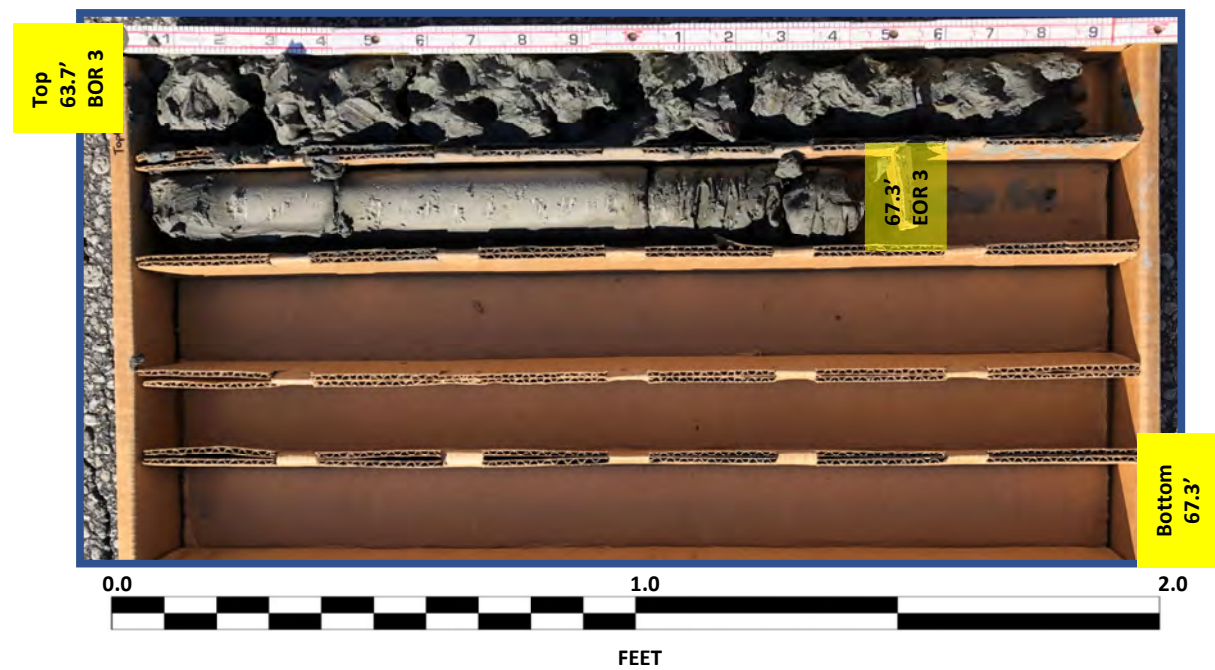


CORE PHOTOGRAPHIC RECORD

67160.1.1 (BR-0160)

Bridge 15 Over Calabash River On NC 179B (Beach Drive SW)

B9-B (1)
Box 2 of 2: 63.7 – 67.3 FEET
DRY



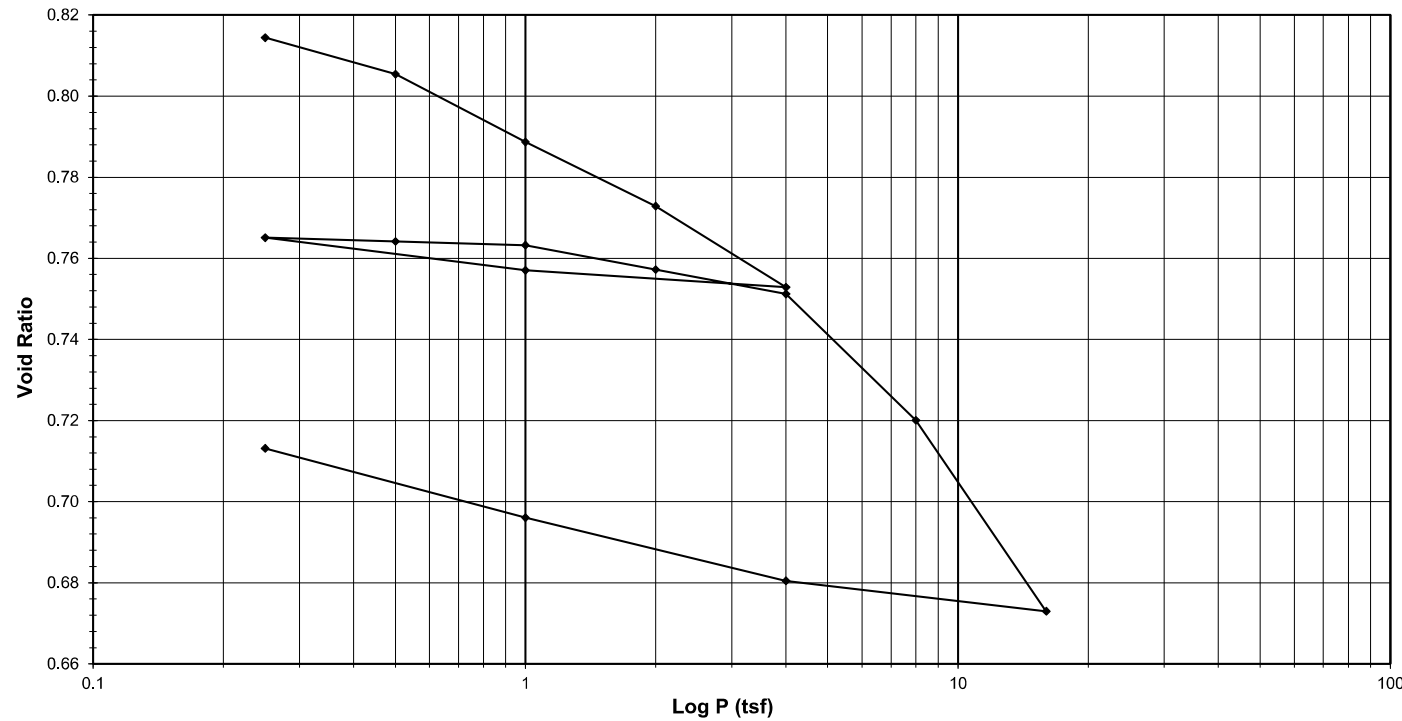
Consolidation and Strength Test Results



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB2-A
 Client Reference BR-0160 Calabash Depth (ft) 19.6-21.6
 Project No. R-2021-312-001 Sample No. ST-1
 Lab ID R-2021-312-001-003 Visual Description Gray Sandy Lean Clay

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-07-0411 Date 12/9/2021 Approved By MPS Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB2-A
 Client Reference BR-0160 Calabash Depth (ft) 19.6-21.6
 Project No. R-2021-312-001 Sample No. ST-1
 Lab ID R-2021-312-001-003 Visual Description Gray Sandy Lean 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 | 491 | 714 |
| Wt. Tare & WS (g) | 469.62 | 239.22 |
| Wt. Tare & DS (g) | 390.17 | 209.01 |
| Wt. Water (g) | 79.45 | 30.21 |
| Wt. Tare (g) | 100.37 | 87.34 |
| Wt. DS (g) | 289.80 | 121.67 |
| Water Content (%) | 27.42 | 24.83 |
| <i>Sample Parameters</i> | | |
| Sample Diameter (in) | 2.5 | 2.5 |
| Sample Height (in) | 1.0000 | 0.9428 |
| Sample Volume (cc) | 80.44 | 75.84 |
| Wt. Wet Sample + Ring (g) | 366.99 | 363.89 |
| Wt. of Ring (g) | 214.13 | 214.13 |
| Wt. of Wet Sample (g) | 152.86 | 149.76 |
| Wet Density (pcf) | 118.58 | 123.22 |
| Wet Density (g/cc) | 1.90 | 1.97 |
| Water Content (%) | 27.42 | 24.83 |
| Wt. of Dry Sample (g) | 119.97 | 119.97 |
| Dry Density (pcf) | 93.06 | 98.71 |
| Dry Density (g/cc) | 1.49 | 1.58 |
| Void Ratio | 0.8171 | 0.7131 |
| Saturation (%) | 90.93 | 94.36 |
| Specific Gravity | 2.71 | 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 | 1.49142 | 0.81706 |
| 0.25 | 59.7 | 45.2 | 14.5 | 25.363 | 80.323 | 1.49359 | 0.81442 |
| 0.5 | 128.7 | 64.6 | 64.1 | 25.237 | 79.924 | 1.50104 | 0.80542 |
| 1 | 246.1 | 90.0 | 156.1 | 25.003 | 79.184 | 1.51508 | 0.78869 |
| 2 | 365.9 | 122.6 | 243.2 | 24.782 | 78.483 | 1.52861 | 0.77286 |
| 4 | 510.5 | 157.2 | 353.3 | 24.503 | 77.598 | 1.54605 | 0.75286 |
| 1 | 449.2 | 118.9 | 330.3 | 24.561 | 77.783 | 1.54237 | 0.75704 |
| 0.25 | 368.3 | 82.3 | 285.9 | 24.674 | 78.140 | 1.53532 | 0.76510 |
| 0.5 | 380.7 | 89.8 | 290.9 | 24.661 | 78.100 | 1.53611 | 0.76420 |
| 1 | 400.3 | 104.4 | 295.9 | 24.648 | 78.059 | 1.53690 | 0.76329 |
| 2 | 457.0 | 127.9 | 329.1 | 24.564 | 77.792 | 1.54218 | 0.75725 |
| 4 | 520.9 | 158.5 | 362.4 | 24.479 | 77.524 | 1.54751 | 0.75120 |
| 8 | 729.6 | 195.7 | 533.9 | 24.044 | 76.145 | 1.57553 | 0.72005 |
| 16 | 1037.1 | 244.2 | 792.9 | 23.386 | 74.062 | 1.61986 | 0.67298 |
| 4 | 932.4 | 180.9 | 751.5 | 23.491 | 74.394 | 1.61262 | 0.68050 |
| 1 | 801.3 | 135.2 | 666.1 | 23.708 | 75.082 | 1.59786 | 0.69602 |
| 0.25 | 671.0 | 99.0 | 571.9 | 23.947 | 75.839 | 1.58190 | 0.71313 |

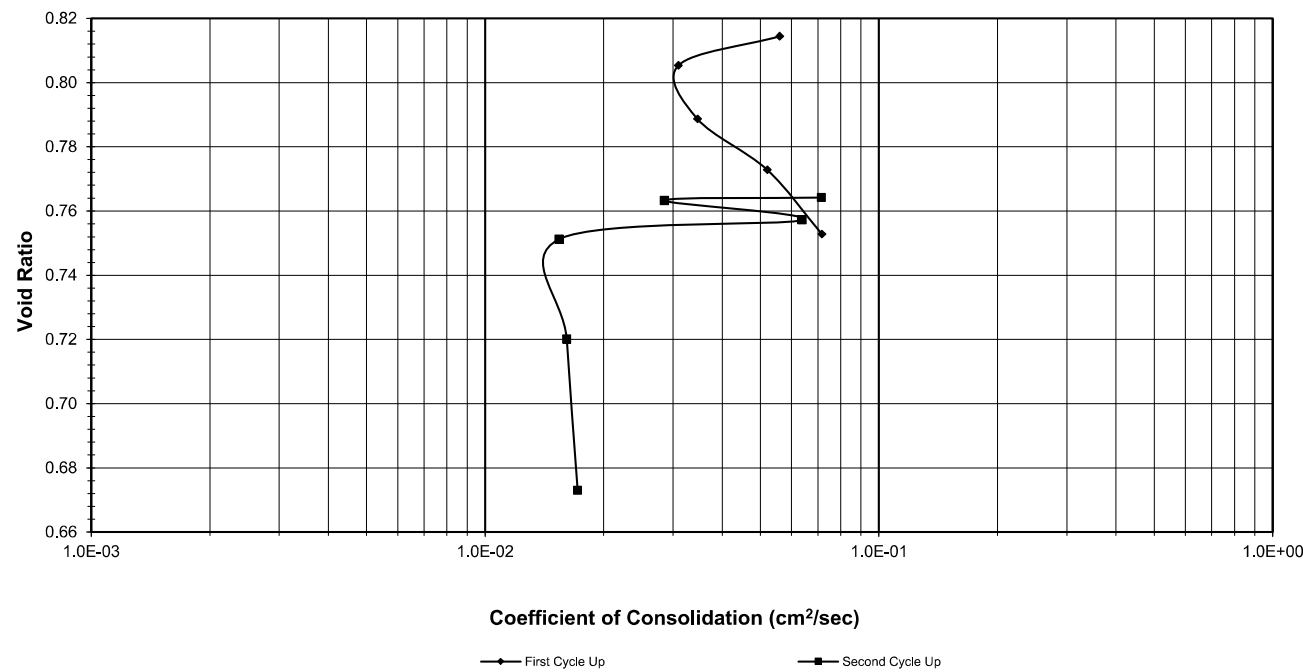
Tested By 129-07-0411 Date 12/9/2021 Input Checked By GEM Date 12/30/2021



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB2-A
 Client Reference BR-0160 Calabash Depth (ft) 19.6-21.6
 Project No. R-2021-312-001 Sample No. ST-1
 Lab ID R-2021-312-001-003 Visual Description Gray Sandy Lean Clay

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-07-0411 Date 12/9/2021 Input Checked By GEM Date 12/30/2021

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

Y:\2021 PROJECTS\HDR\2021-312 - BR-0160 Calabash\2021-312-001-003 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB2-A
 Client Reference BR-0160 Calabash Depth (ft) 19.6-21.6
 Project No. R-2021-312-001 Sample No. ST-1
 Lab ID R-2021-312-001-003 Visual Description Gray Sandy Lean Clay

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

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

| Sample Properties | Initial | Final |
|---------------------------|---------|----------|
| Water Content | | |
| Tare Number | 491 | 714 |
| Wt. Tare & WS (g) | 469.62 | 239.22 |
| Wt. Tare & DS (g) | 390.17 | 209.01 |
| Wt. Water (g) | 79.45 | 30.21 |
| Wt. Tare (g) | 100.37 | 87.34 |
| Wt. DS (g) | 289.80 | 121.67 |
| Water Content (%) | 27.42 | 24.83 |
| Sample Parameters | | |
| Sample Diameter (in) | 2.5 | 2.5 |
| Sample Height (in) | 1.000 | 0.943 |
| Sample Volume (cc) | 80.44 | 75.84 |
| Wt. Wet Sample + Ring (g) | 366.99 | 363.89 |
| Wt. of Ring (g) | 214.13 | 214.13 |
| Wt. of Wet Sample (g) | 152.86 | 149.76 |
| Wet Density (pcf) | 118.58 | 123.22 |
| Wet Density (g/cc) | 1.90 | 1.97 |
| Water Content (%) | 27.42 | 24.83 |
| Wt. of Dry Sample (g) | 119.97 | 119.97 |
| Dry Density (pcf) | 93.06 | 98.71 |
| Dry Density (g/cc) | 1.49 | 1.58 |
| Void Ratio | 0.8171 | 0.7131 |
| Saturation (%) | 90.93 | 94.36 |
| Specific Gravity | 2.71 | Measured |

| Load Increment (tsf) | Dial Reading @ t ₅₀ (div) | Machine Deflection (div) | C _v Test Data Summary | | Time t ₅₀ (min.) | C _v (cm ² /sec) |
|----------------------|--------------------------------------|--------------------------|--|--------------------------------------|-----------------------------|---------------------------------------|
| | | | Corrected Dial Reading @ t ₅₀ (div) | Sample Height @ t ₅₀ (cm) | | |
| 0 - 0.25 | 26.5 | 45.2 | -18.7 | 2.545 | 0.10 | 0.05595 |
| 0.25 - 0.5 | 94.5 | 64.6 | 29.9 | 2.532 | 0.17 | 0.03097 |
| 0.5 - 1.0 | 188.9 | 90.0 | 98.9 | 2.515 | 0.15 | 0.03461 |
| 1.0 - 2.0 | 308.4 | 122.6 | 185.8 | 2.493 | 0.10 | 0.05205 |
| 2.0 - 4.0 | 423.0 | 157.2 | 265.8 | 2.472 | 0.07 | 0.07168 |
| 4.0 - 1.0 | NA | 118.9 | NA | NA | NA | NA |
| 1.0 - 0.25 | NA | 82.3 | NA | NA | NA | NA |
| 0.25 - 0.5 | 373.4 | 89.8 | 283.6 | 2.468 | 0.07 | 0.07142 |
| 0.5 - 1.0 | 389.9 | 104.4 | 285.4 | 2.467 | 0.18 | 0.02856 |
| 1.0 - 2.0 | 430.6 | 127.9 | 302.7 | 2.463 | 0.08 | 0.06384 |
| 2.0 - 4.0 | 504.5 | 158.5 | 346.0 | 2.452 | 0.32 | 0.01542 |
| 4.0 - 8.0 | 640.6 | 195.7 | 444.8 | 2.427 | 0.30 | 0.01612 |
| 8.0 - 16.0 | 888.1 | 244.2 | 643.8 | 2.376 | 0.27 | 0.01717 |
| 16.0 - 4.0 | NA | 180.9 | NA | NA | NA | NA |
| 4.0 - 1.0 | NA | 135.2 | NA | NA | NA | NA |
| 1.0 - 0.25 | NA | 99.0 | NA | NA | NA | NA |

Tested By 129-07-0411 Date 12/9/2021 Input Checked By GEM Date 12/30/2021

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

Y:\2021 PROJECTS\HDR\2021-312 - BR-0160 Calabash\2021-312-001-003 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

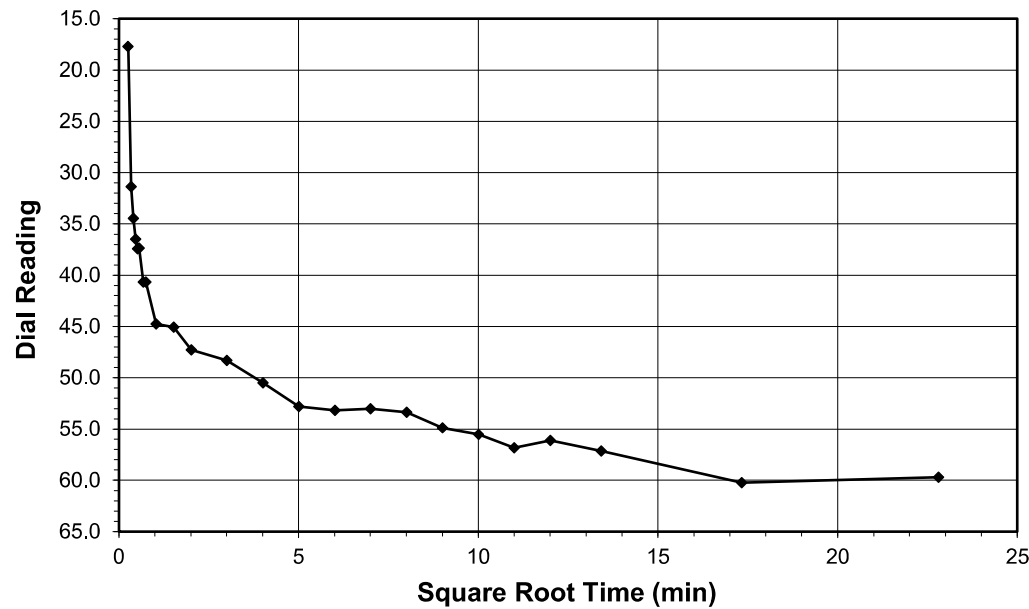
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

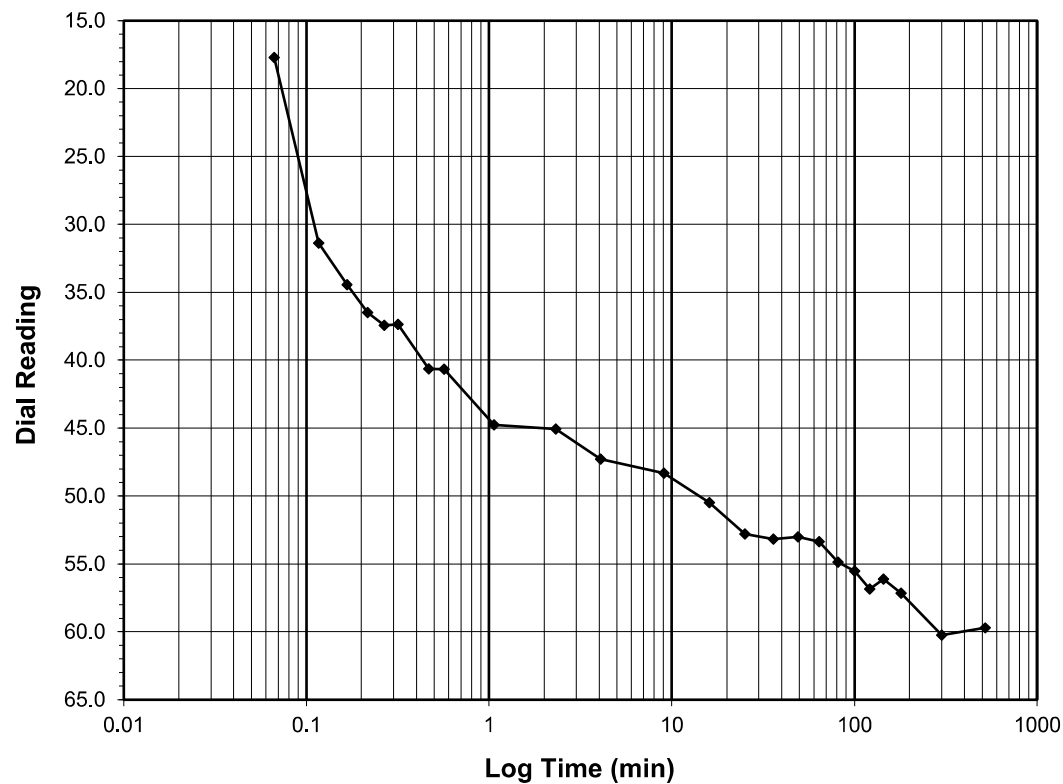
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.0-0.25**
 Final Reading (div) **59.7**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/9/2021
 Start Time: 11:53:53

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 0.0 |
| 0.07 | 17.7 |
| 0.12 | 31.4 |
| 0.17 | 34.4 |
| 0.22 | 36.5 |
| 0.27 | 37.4 |
| 0.32 | 37.3 |
| 0.47 | 40.6 |
| 0.57 | 40.7 |
| 1.07 | 44.8 |
| 2.32 | 45.1 |
| 4.07 | 47.3 |
| 9.07 | 48.3 |
| 16.07 | 50.5 |
| 25.07 | 52.8 |
| 36.07 | 53.2 |
| 49.07 | 53.0 |
| 64.07 | 53.4 |
| 81.07 | 54.9 |
| 100.07 | 55.5 |
| 121.07 | 56.8 |
| 144.07 | 56.1 |
| 180.07 | 57.1 |
| 300.07 | 60.2 |
| 520.07 | 59.7 |

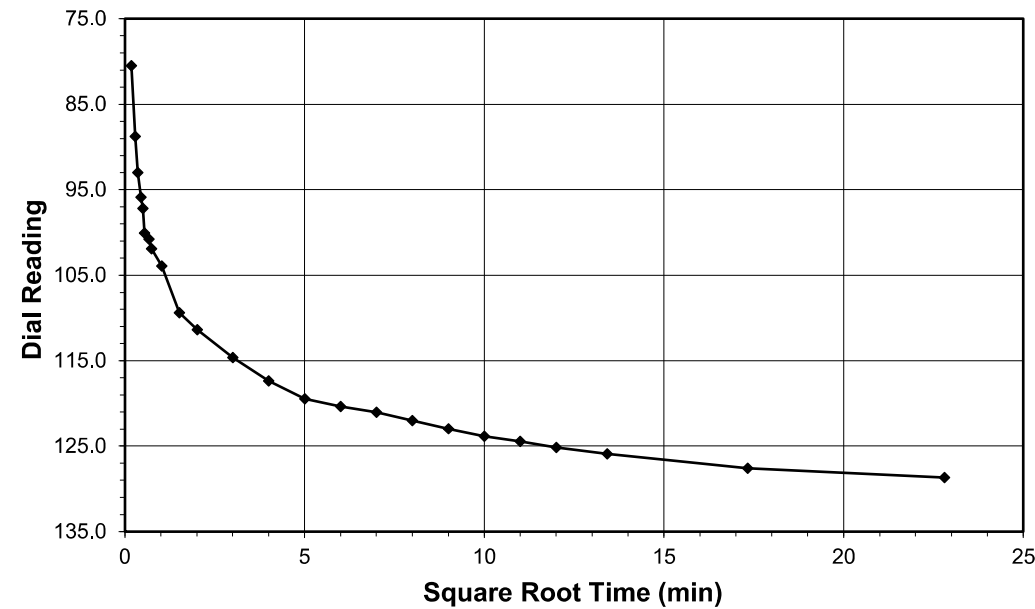


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

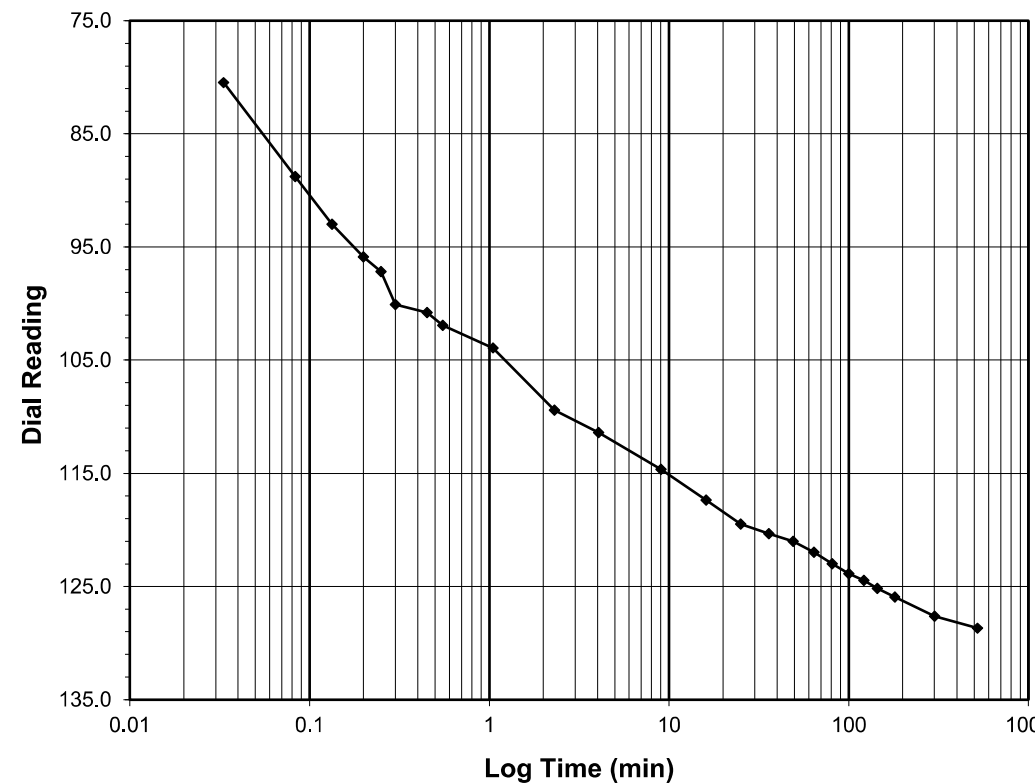
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.25-0.5**
 Final Reading (div) **128.7**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/9/2021
 Start Time: 21:54:11

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 59.7 |
| 0.03 | 80.5 |
| 0.08 | 88.8 |
| 0.13 | 93.0 |
| 0.20 | 95.9 |
| 0.25 | 97.2 |
| 0.30 | 100.1 |
| 0.45 | 100.8 |
| 0.55 | 101.9 |
| 1.05 | 103.9 |
| 2.30 | 109.4 |
| 4.05 | 111.4 |
| 9.05 | 114.6 |
| 16.05 | 117.4 |
| 25.05 | 119.5 |
| 36.05 | 120.3 |
| 49.05 | 121.0 |
| 64.05 | 122.0 |
| 81.05 | 123.0 |
| 100.05 | 123.9 |
| 121.05 | 124.4 |
| 144.05 | 125.2 |
| 180.05 | 125.9 |
| 300.05 | 127.6 |
| 520.05 | 128.7 |



Tested By 129-07-0411 Date 12/9/2021 Checked By GEM Date 12/30/2021

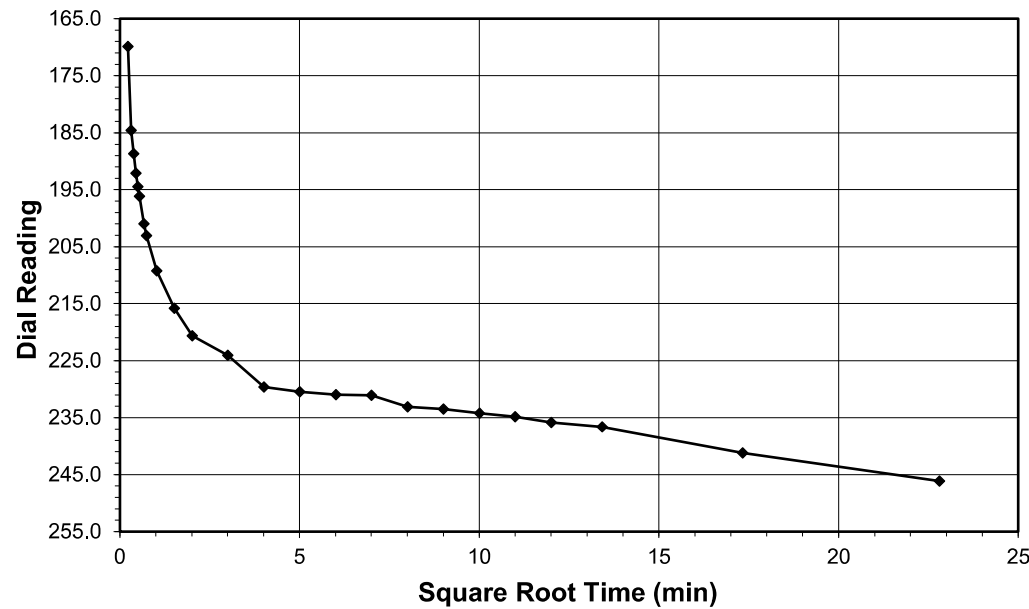
Tested By 129-07-0411 Date 12/9/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

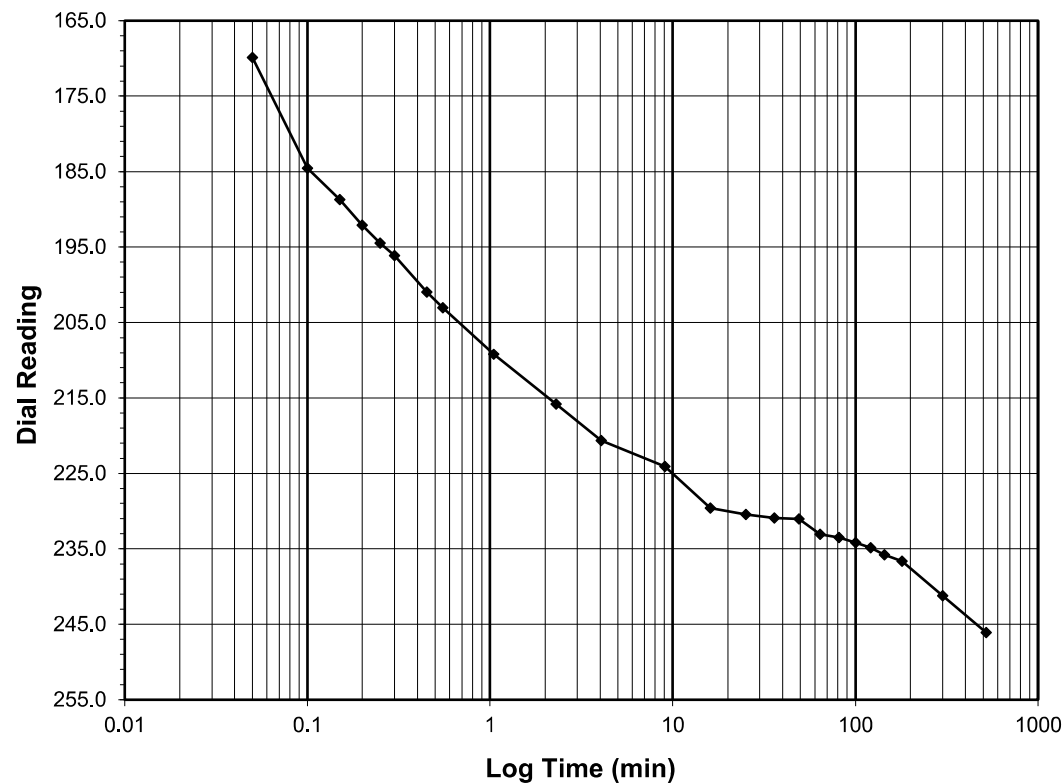
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0
 Final Reading (div) 246.1
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/10/2021
 Start Time 7:54:32

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 128.7 |
| 0.05 | 169.9 |
| 0.10 | 184.5 |
| 0.15 | 188.7 |
| 0.20 | 192.1 |
| 0.25 | 194.5 |
| 0.30 | 196.1 |
| 0.45 | 201.0 |
| 0.55 | 203.1 |
| 1.05 | 209.2 |
| 2.30 | 215.8 |
| 4.05 | 220.6 |
| 9.07 | 224.1 |
| 16.07 | 229.6 |
| 25.07 | 230.5 |
| 36.07 | 230.9 |
| 49.07 | 231.0 |
| 64.07 | 233.1 |
| 81.07 | 233.5 |
| 100.07 | 234.2 |
| 121.07 | 234.8 |
| 144.07 | 235.8 |
| 180.07 | 236.6 |
| 300.07 | 241.2 |
| 520.07 | 246.1 |



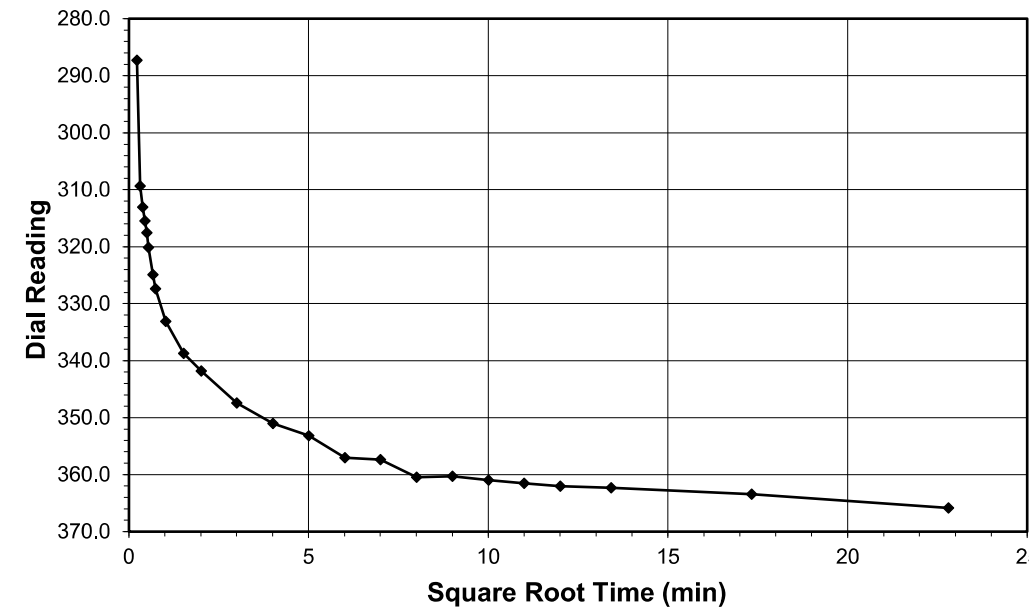
Tested By 129-07-0411 Date 12/10/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

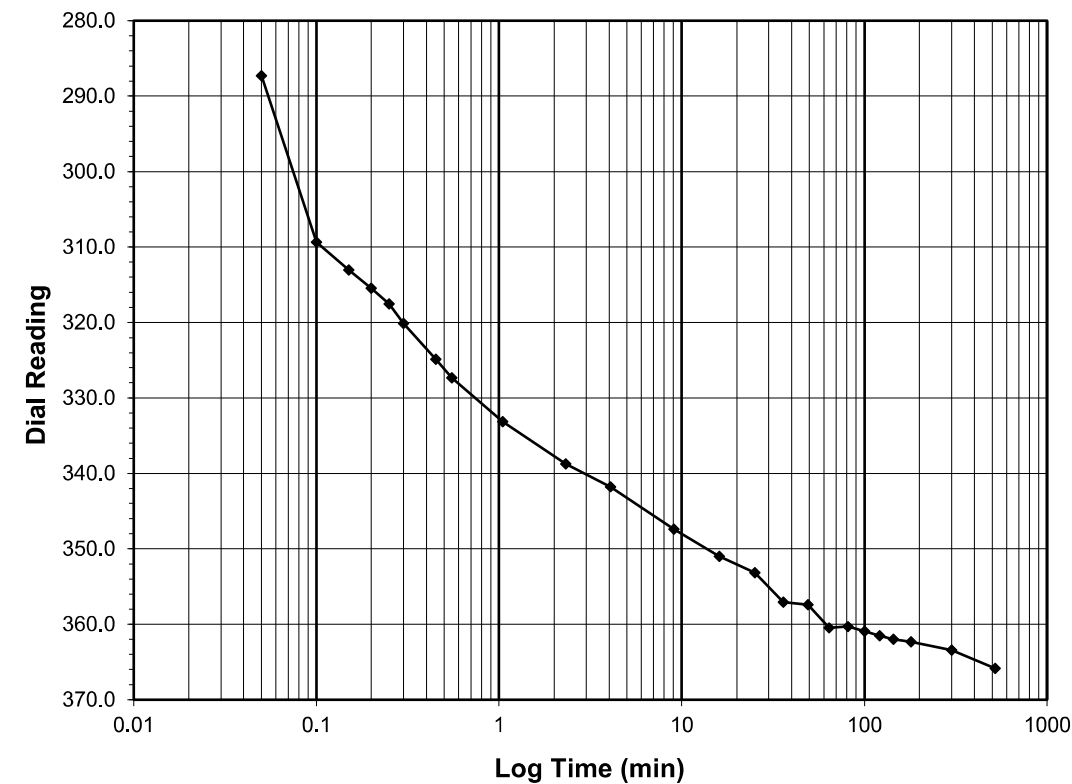
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0
 Final Reading (div) 365.9
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/10/2021
 Start Time 17:54:56

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 246.1 |
| 0.05 | 287.3 |
| 0.10 | 309.3 |
| 0.15 | 313.1 |
| 0.20 | 315.4 |
| 0.25 | 317.5 |
| 0.30 | 320.1 |
| 0.45 | 324.9 |
| 0.55 | 327.4 |
| 1.05 | 333.1 |
| 2.32 | 338.7 |
| 4.07 | 341.8 |
| 9.07 | 347.4 |
| 16.07 | 351.0 |
| 25.07 | 353.2 |
| 36.07 | 357.1 |
| 49.07 | 357.4 |
| 64.07 | 360.5 |
| 81.07 | 360.3 |
| 100.07 | 361.0 |
| 121.07 | 361.5 |
| 144.07 | 362.0 |
| 180.07 | 362.3 |
| 300.07 | 363.4 |
| 520.07 | 365.9 |



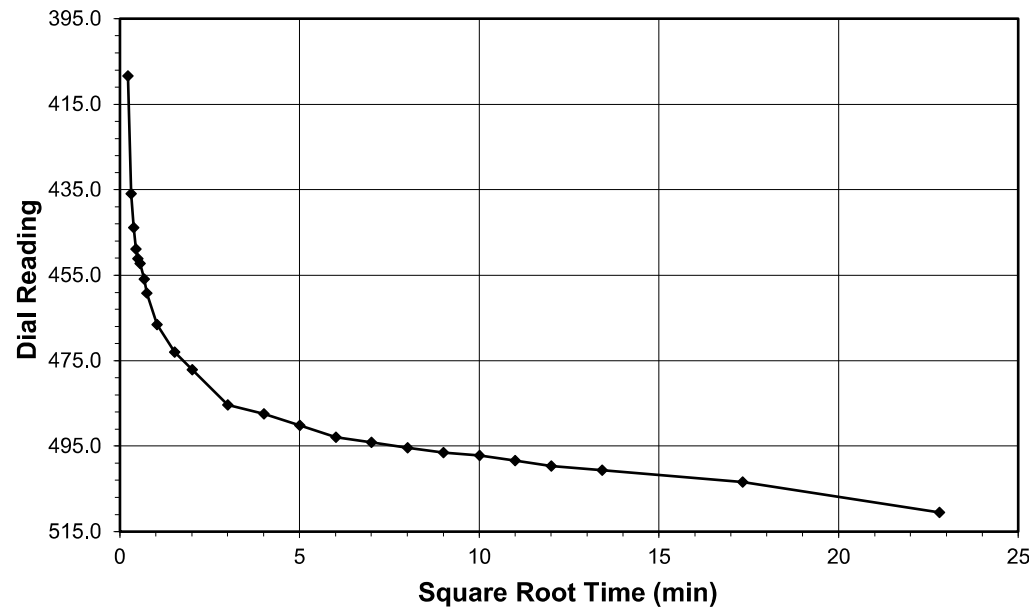
Tested By 129-07-0411 Date 12/10/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

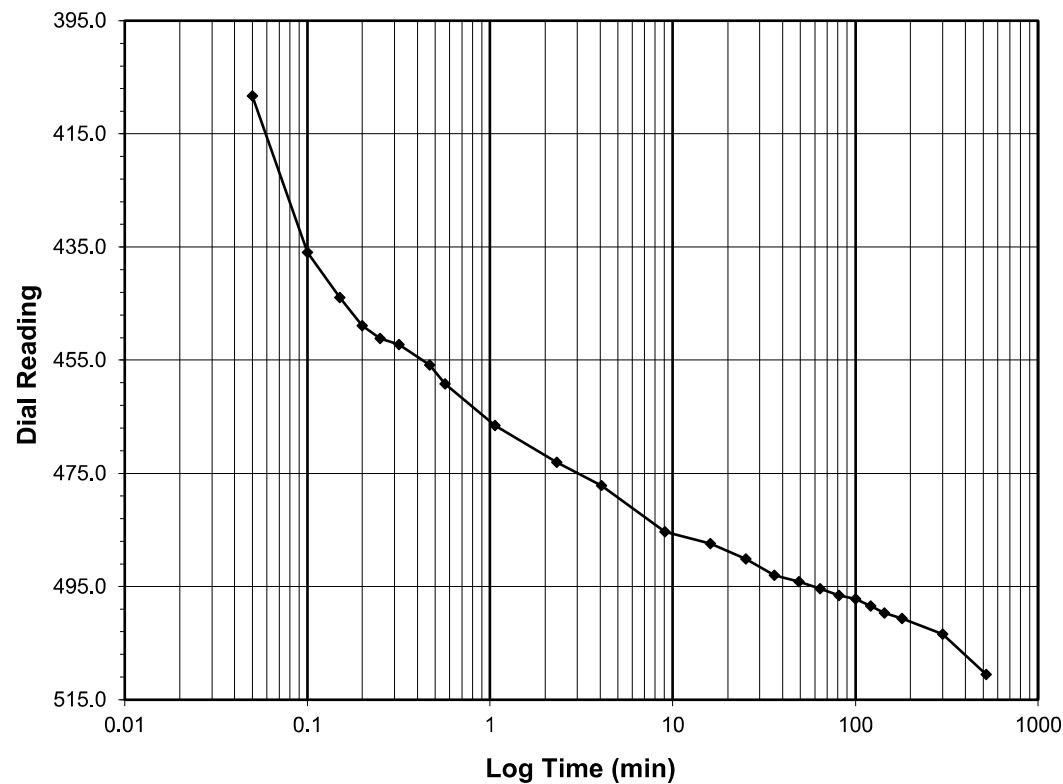
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 2.0-4.0
Final Reading (div): 510.5
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/11/2021
 Start Time: 3:54:56

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 365.9 |
| 0.05 | 408.3 |
| 0.10 | 436.0 |
| 0.15 | 443.9 |
| 0.20 | 448.9 |
| 0.25 | 451.1 |
| 0.32 | 452.2 |
| 0.47 | 455.9 |
| 0.57 | 459.2 |
| 1.07 | 466.6 |
| 2.32 | 473.0 |
| 4.07 | 477.1 |
| 9.07 | 485.3 |
| 16.07 | 487.4 |
| 25.07 | 490.1 |
| 36.07 | 493.0 |
| 49.07 | 494.2 |
| 64.07 | 495.4 |
| 81.07 | 496.5 |
| 100.07 | 497.2 |
| 121.07 | 498.4 |
| 144.07 | 499.7 |
| 180.07 | 500.6 |
| 300.07 | 503.4 |
| 520.07 | 510.5 |

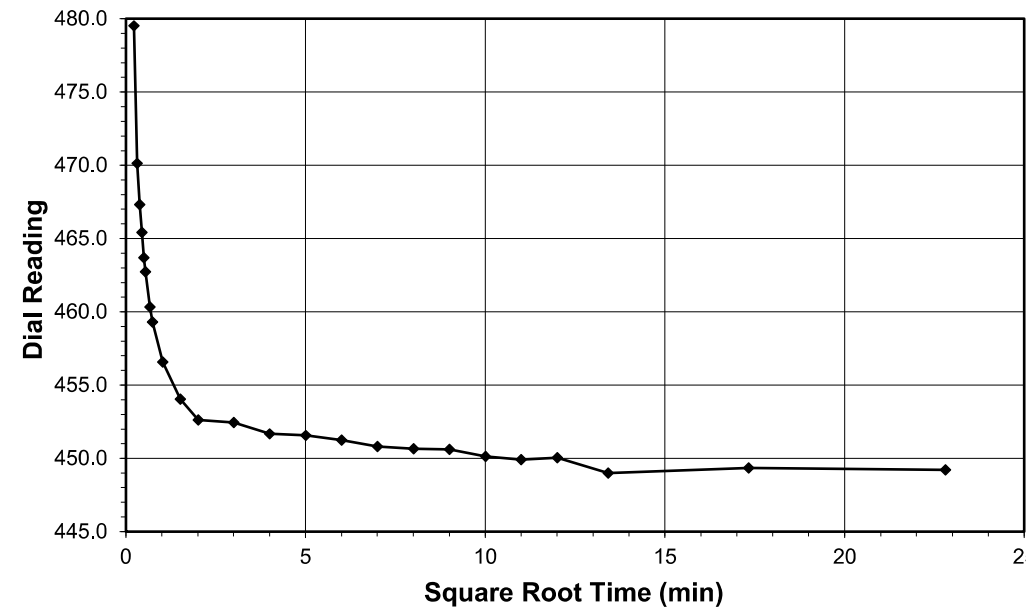


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

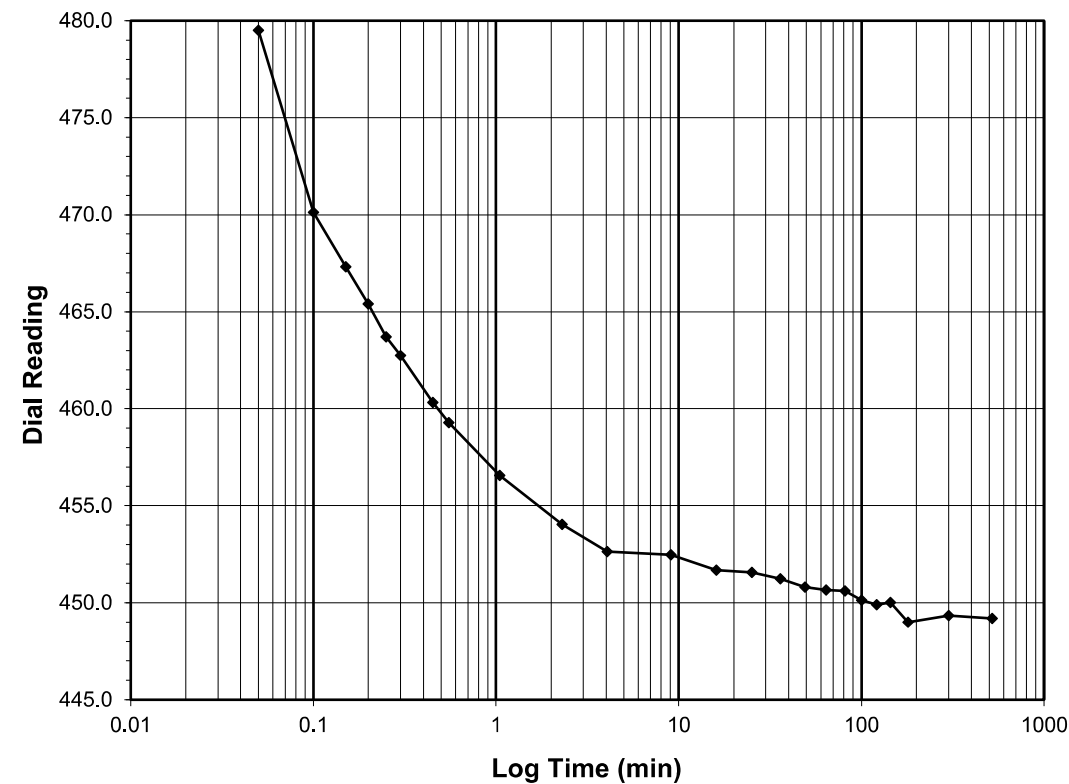
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 4.0-1.0
Final Reading (div): 449.2
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/11/2021
 Start Time: 13:55:25

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 510.5 |
| 0.05 | 479.5 |
| 0.10 | 470.1 |
| 0.15 | 467.3 |
| 0.20 | 465.4 |
| 0.25 | 463.7 |
| 0.30 | 462.7 |
| 0.45 | 460.3 |
| 0.55 | 459.3 |
| 1.05 | 456.6 |
| 2.30 | 454.0 |
| 4.05 | 452.6 |
| 9.05 | 452.5 |
| 16.05 | 451.7 |
| 25.05 | 451.6 |
| 36.05 | 451.2 |
| 49.07 | 450.8 |
| 64.07 | 450.7 |
| 81.07 | 450.6 |
| 100.07 | 450.1 |
| 121.07 | 449.9 |
| 144.07 | 450.0 |
| 180.07 | 449.0 |
| 300.07 | 449.3 |
| 520.07 | 449.2 |



Tested By 129-07-0411 Date 12/11/2021 Checked By GEM Date 12/30/2021

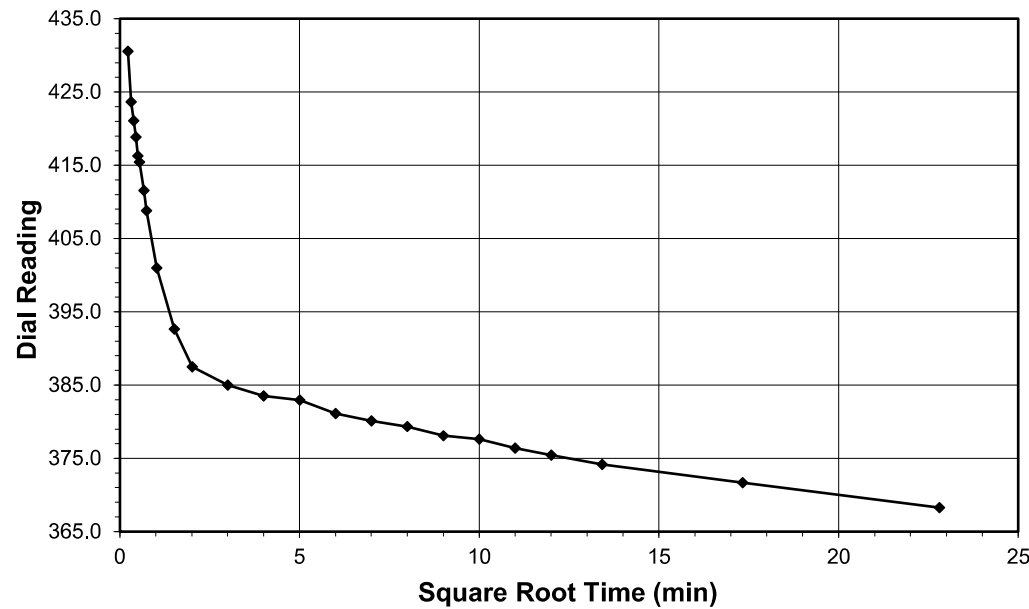
Tested By 129-07-0411 Date 12/11/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

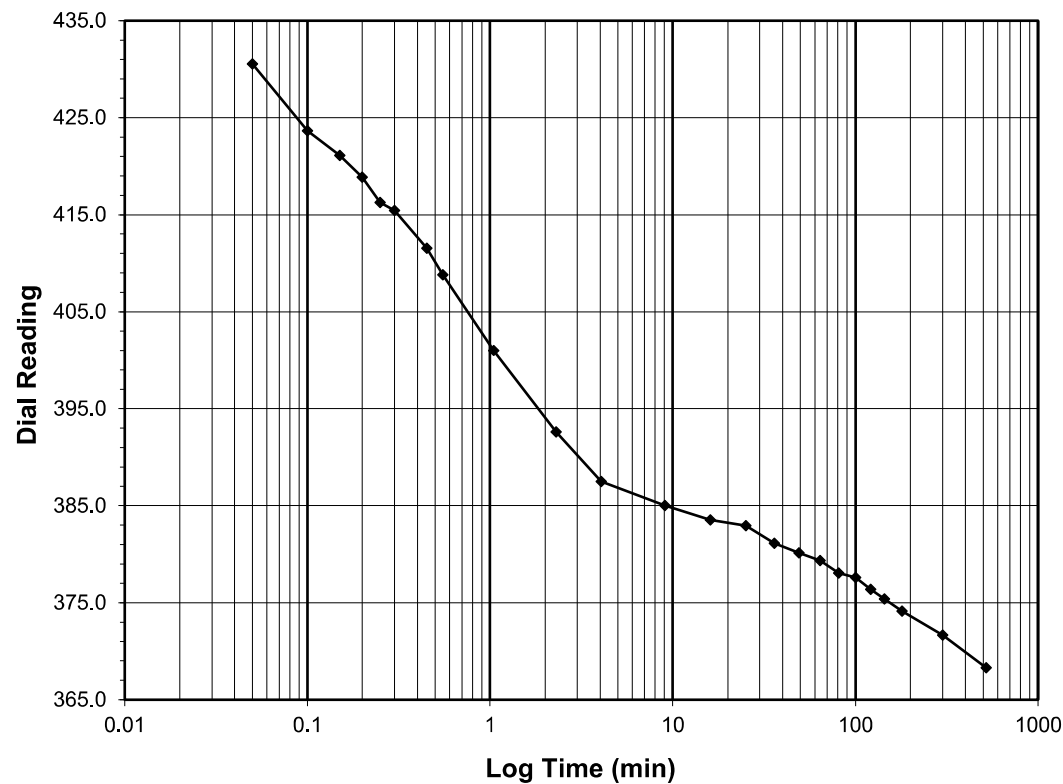
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25
 Final Reading (div) 368.3
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/11/2021
 Start Time 23:55:45

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 449.2 |
| 0.05 | 430.6 |
| 0.10 | 423.7 |
| 0.15 | 421.1 |
| 0.20 | 418.9 |
| 0.25 | 416.3 |
| 0.30 | 415.4 |
| 0.45 | 411.5 |
| 0.55 | 408.8 |
| 1.05 | 401.0 |
| 2.30 | 392.6 |
| 4.05 | 387.5 |
| 9.05 | 385.0 |
| 16.05 | 383.5 |
| 25.05 | 382.9 |
| 36.05 | 381.1 |
| 49.05 | 380.1 |
| 64.05 | 379.3 |
| 81.05 | 378.1 |
| 100.05 | 377.6 |
| 121.05 | 376.4 |
| 144.05 | 375.4 |
| 180.05 | 374.1 |
| 300.05 | 371.7 |
| 520.07 | 368.3 |



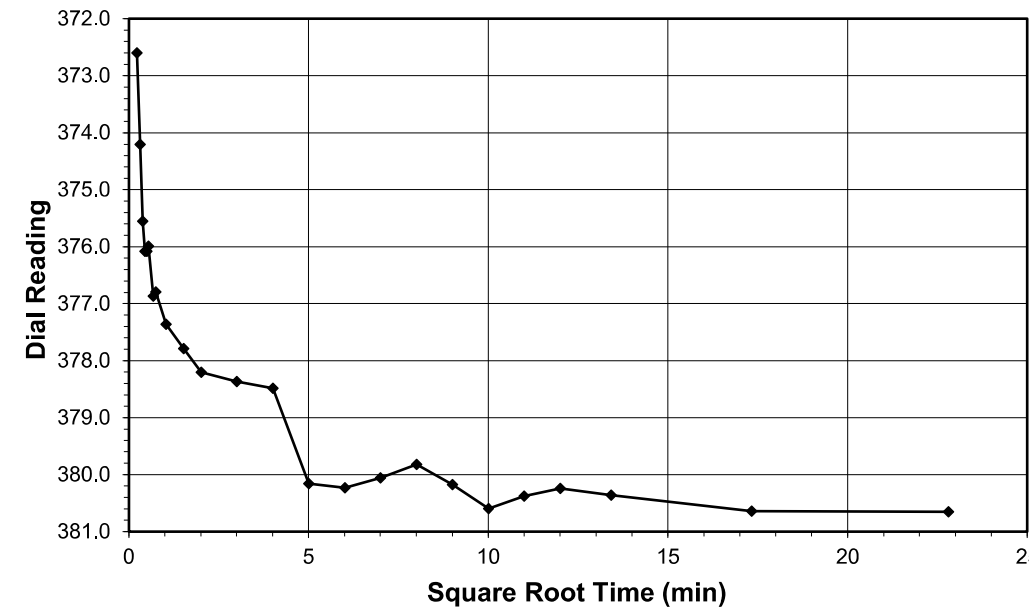
Tested By 129-07-0411 Date 12/11/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

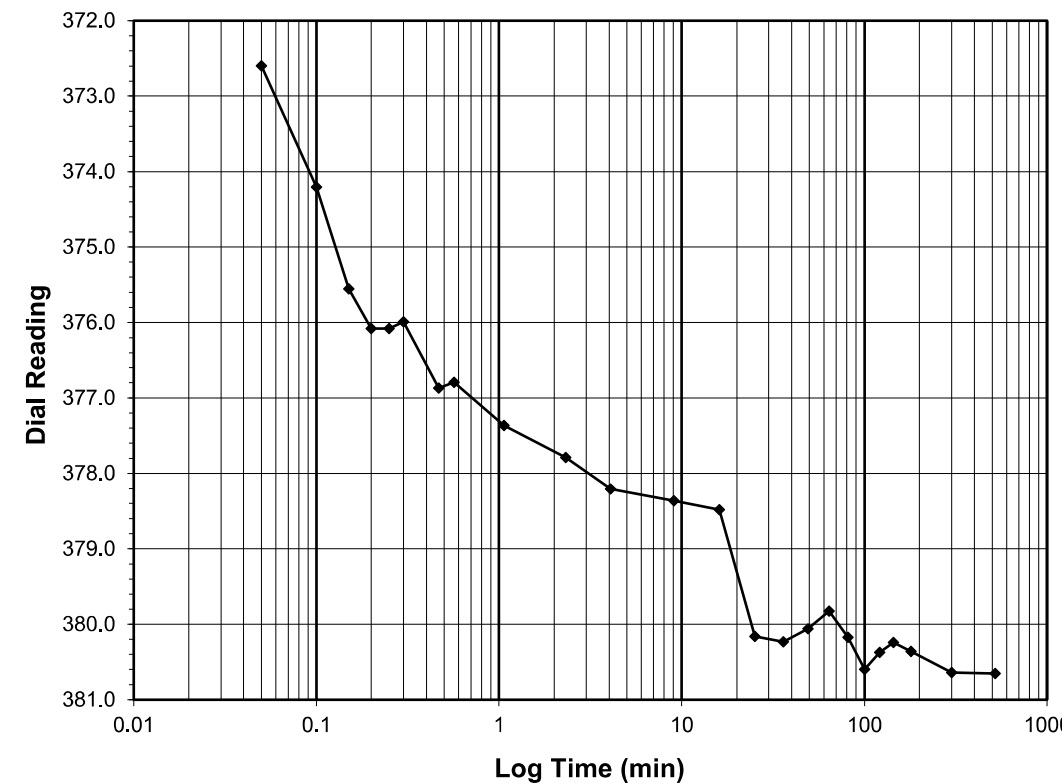
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5
 Final Reading (div) 380.7
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/12/2021
 Start Time 9:56:12

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 368.3 |
| 0.05 | 372.6 |
| 0.10 | 374.2 |
| 0.15 | 375.6 |
| 0.20 | 376.1 |
| 0.25 | 376.1 |
| 0.30 | 376.0 |
| 0.47 | 376.9 |
| 0.57 | 376.8 |
| 1.07 | 377.4 |
| 2.32 | 377.8 |
| 4.07 | 378.2 |
| 9.07 | 378.4 |
| 16.07 | 378.5 |
| 25.07 | 380.2 |
| 36.07 | 380.2 |
| 49.07 | 380.1 |
| 64.07 | 379.8 |
| 81.07 | 380.2 |
| 100.07 | 380.6 |
| 121.07 | 380.4 |
| 144.07 | 380.2 |
| 180.07 | 380.4 |
| 300.07 | 380.6 |
| 520.07 | 380.7 |



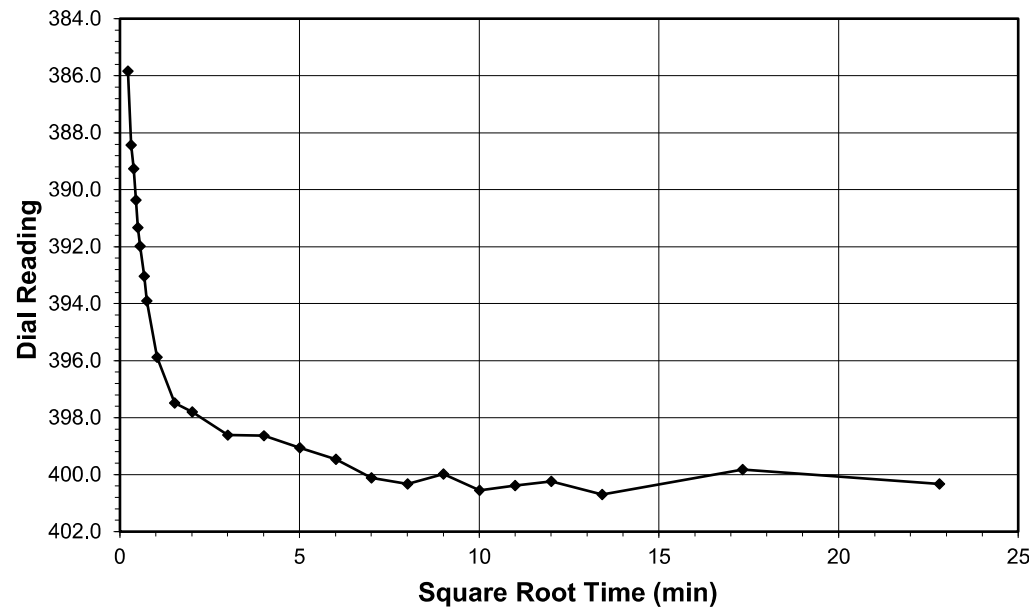
Tested By 129-07-0411 Date 12/12/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

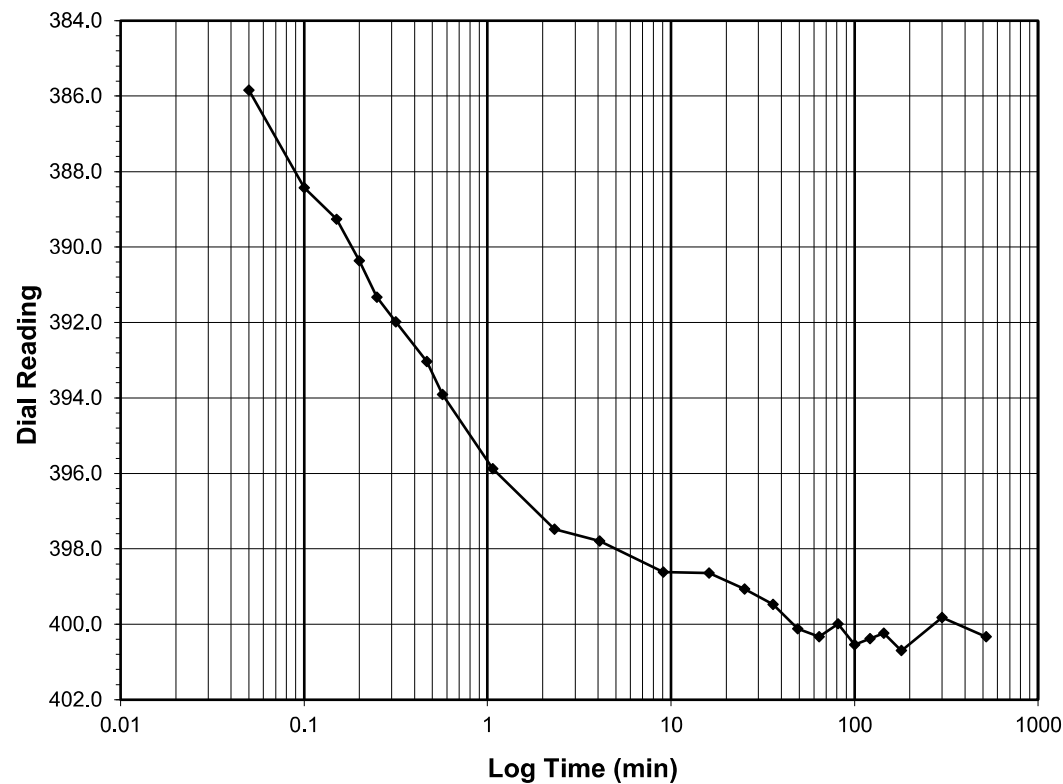
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.5-1.0**
 Final Reading (div) **400.3**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/12/2021
 Start Time: 19:56:36

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 380.7 |
| 0.05 | 385.8 |
| 0.10 | 388.4 |
| 0.15 | 389.3 |
| 0.20 | 390.4 |
| 0.25 | 391.3 |
| 0.32 | 392.0 |
| 0.47 | 393.0 |
| 0.57 | 393.9 |
| 1.07 | 395.9 |
| 2.32 | 397.5 |
| 4.07 | 397.8 |
| 9.07 | 398.6 |
| 16.07 | 398.6 |
| 25.07 | 399.1 |
| 36.07 | 399.5 |
| 49.07 | 400.1 |
| 64.07 | 400.3 |
| 81.07 | 400.0 |
| 100.07 | 400.5 |
| 121.07 | 400.4 |
| 144.07 | 400.2 |
| 180.07 | 400.7 |
| 300.07 | 399.8 |
| 520.07 | 400.3 |

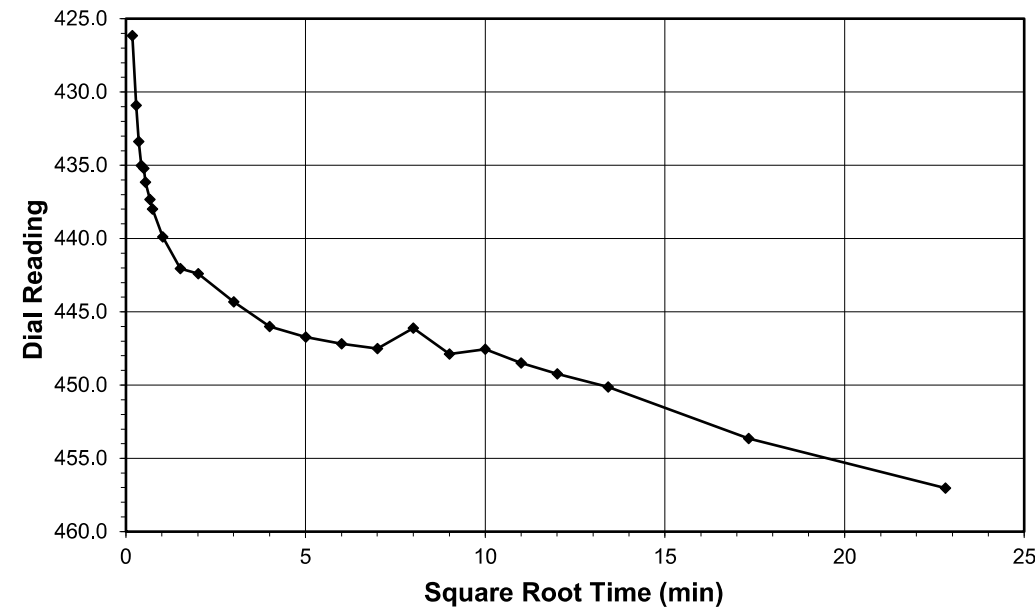


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

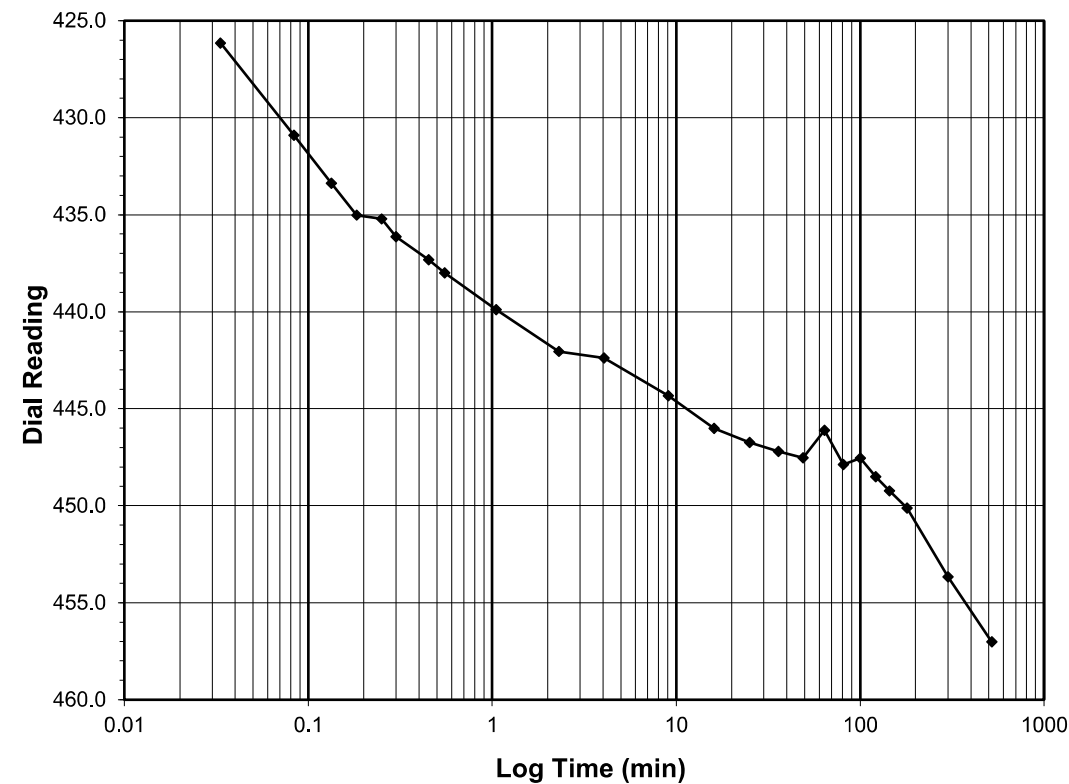
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **1.0-2.0**
 Final Reading (div) **457.0**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date: 12/13/2021
 Start Time: 5:56:37

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 400.3 |
| 0.03 | 426.2 |
| 0.08 | 430.9 |
| 0.13 | 433.4 |
| 0.18 | 435.0 |
| 0.25 | 435.2 |
| 0.30 | 436.1 |
| 0.45 | 437.3 |
| 0.55 | 438.0 |
| 1.05 | 439.9 |
| 2.30 | 442.0 |
| 4.05 | 442.4 |
| 9.05 | 444.3 |
| 16.05 | 446.0 |
| 25.05 | 446.7 |
| 36.05 | 447.2 |
| 49.05 | 447.5 |
| 64.05 | 446.1 |
| 81.05 | 447.9 |
| 100.05 | 447.5 |
| 121.05 | 448.5 |
| 144.05 | 449.2 |
| 180.05 | 450.1 |
| 300.05 | 453.7 |
| 520.05 | 457.0 |



Tested By 129-07-0411 Date 12/12/2021 Checked By GEM Date 12/30/2021

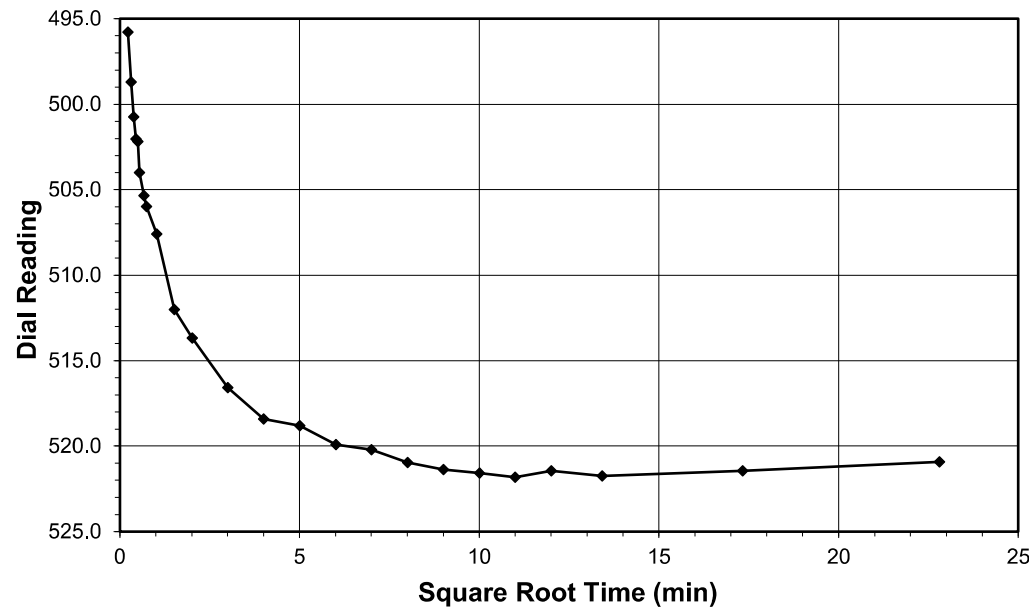
Tested By 129-07-0411 Date 12/13/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

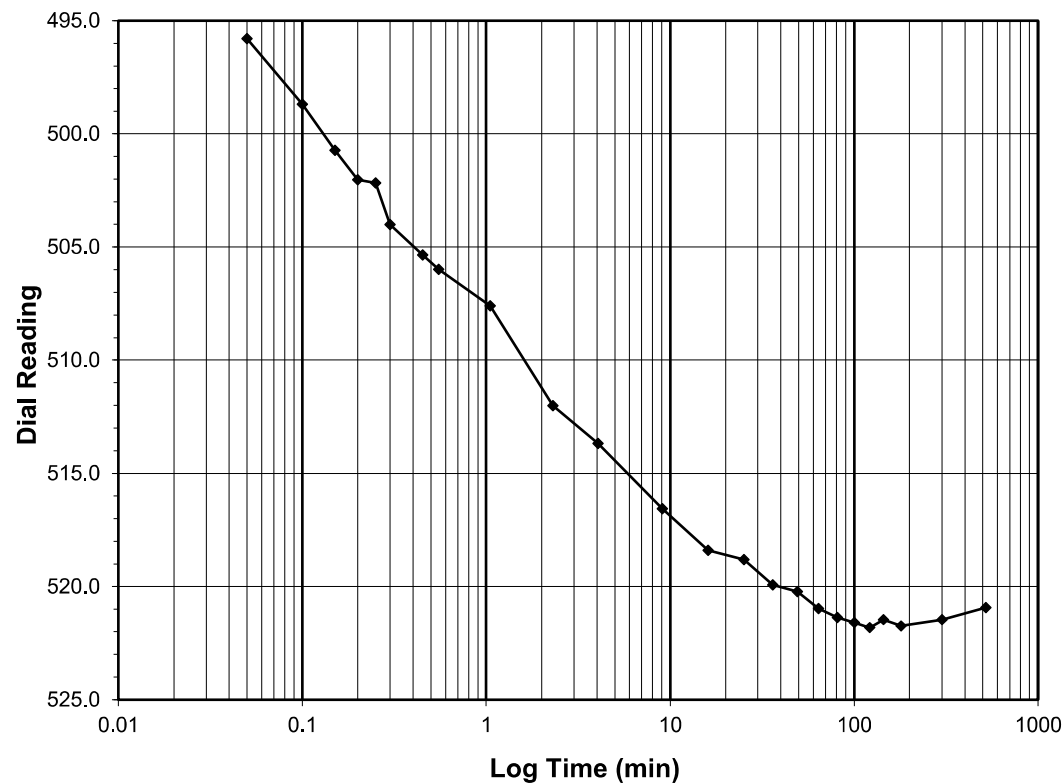
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **2.0-4.0**
 Final Reading (div) **520.9**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 12/13/2021
 Start Time 15:57:04

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 457.0 |
| 0.05 | 495.8 |
| 0.10 | 498.7 |
| 0.15 | 500.7 |
| 0.20 | 502.0 |
| 0.25 | 502.2 |
| 0.30 | 504.0 |
| 0.45 | 505.4 |
| 0.55 | 506.0 |
| 1.05 | 507.6 |
| 2.30 | 512.0 |
| 4.05 | 513.7 |
| 9.05 | 516.6 |
| 16.05 | 518.4 |
| 25.07 | 518.8 |
| 36.07 | 519.9 |
| 49.07 | 520.2 |
| 64.07 | 521.0 |
| 81.07 | 521.4 |
| 100.07 | 521.6 |
| 121.07 | 521.8 |
| 144.07 | 521.5 |
| 180.07 | 521.7 |
| 300.07 | 521.5 |
| 520.07 | 520.9 |



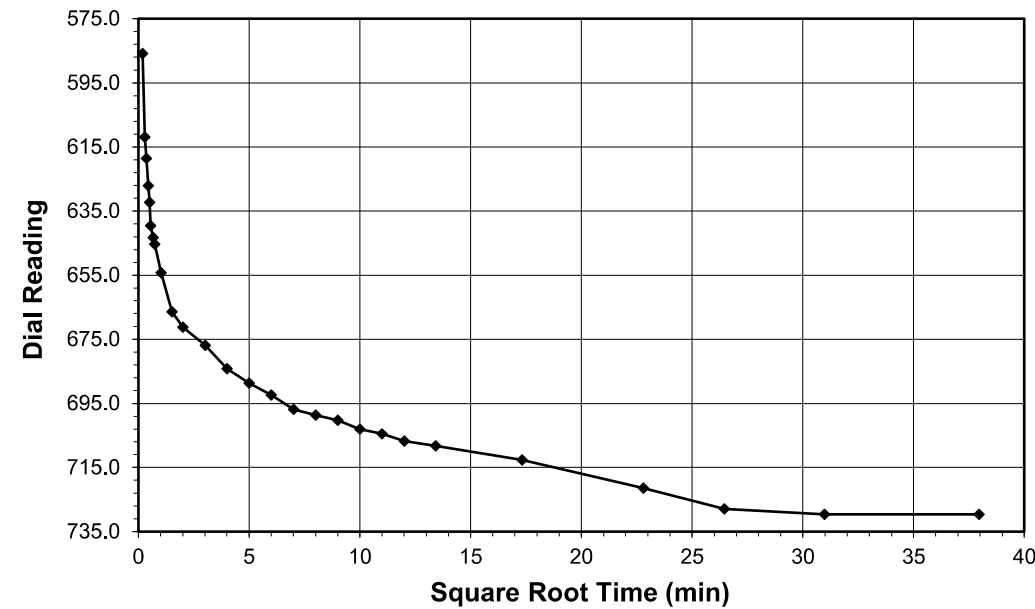
Tested By 129-07-0411 Date 12/13/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

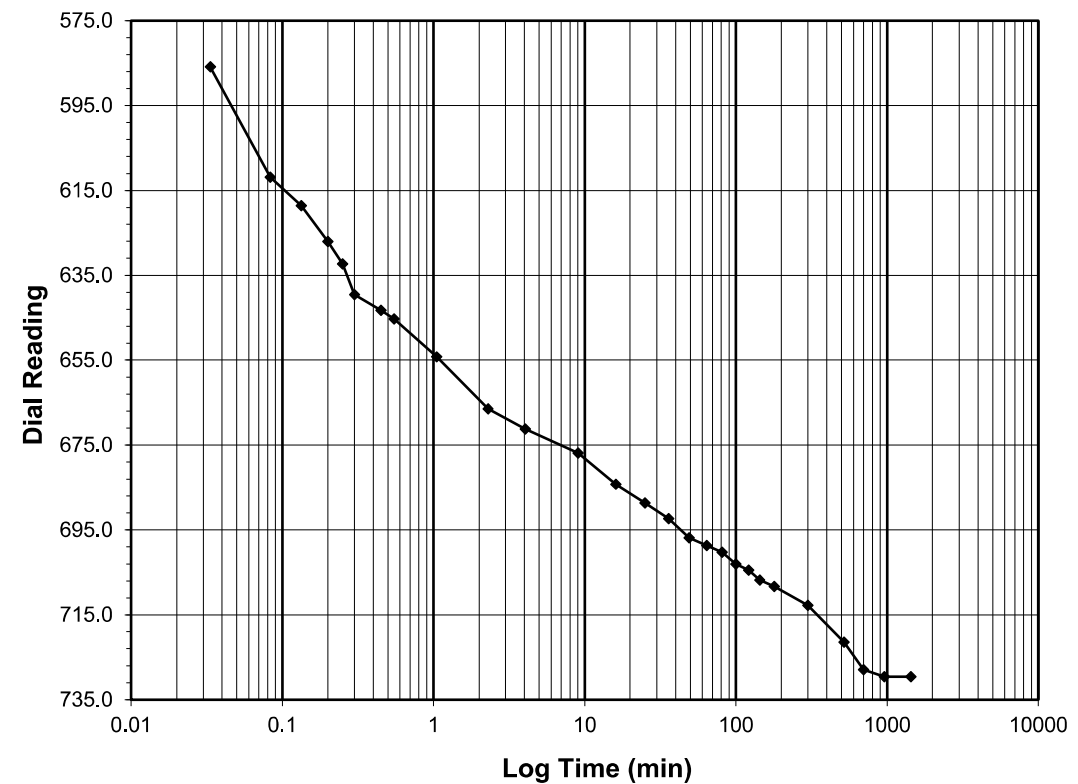
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **4.0-8.0**
 Final Reading (div) **729.6**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 12/14/2021
 Start Time 1:57:31

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 520.9 |
| 0.03 | 585.8 |
| 0.08 | 611.8 |
| 0.13 | 618.5 |
| 0.20 | 627.1 |
| 0.25 | 632.3 |
| 0.30 | 639.5 |
| 0.45 | 643.2 |
| 0.55 | 645.3 |
| 1.05 | 654.2 |
| 2.30 | 666.5 |
| 4.05 | 671.2 |
| 9.05 | 676.9 |
| 16.05 | 684.2 |
| 25.05 | 688.7 |
| 36.05 | 692.4 |
| 49.05 | 696.9 |
| 64.05 | 698.7 |
| 81.07 | 700.3 |
| 100.07 | 703.1 |
| 121.07 | 704.5 |
| 144.07 | 706.8 |
| 180.07 | 708.3 |
| 300.07 | 712.7 |
| 520.07 | 721.5 |
| 700.07 | 727.9 |
| 960.07 | 729.6 |
| 1440.00 | 729.6 |



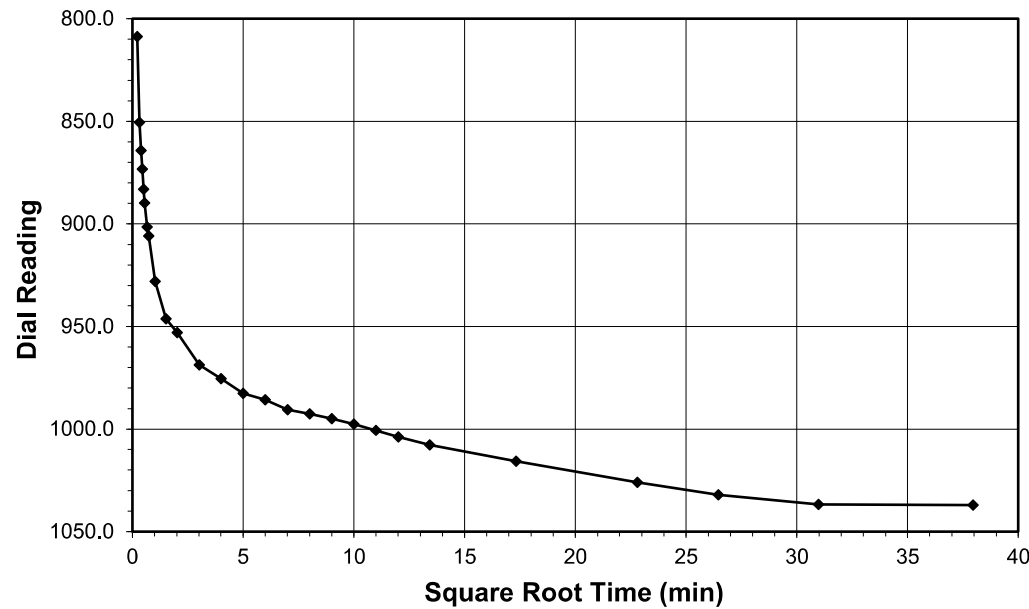
Tested By 129-07-0411 Date 12/14/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

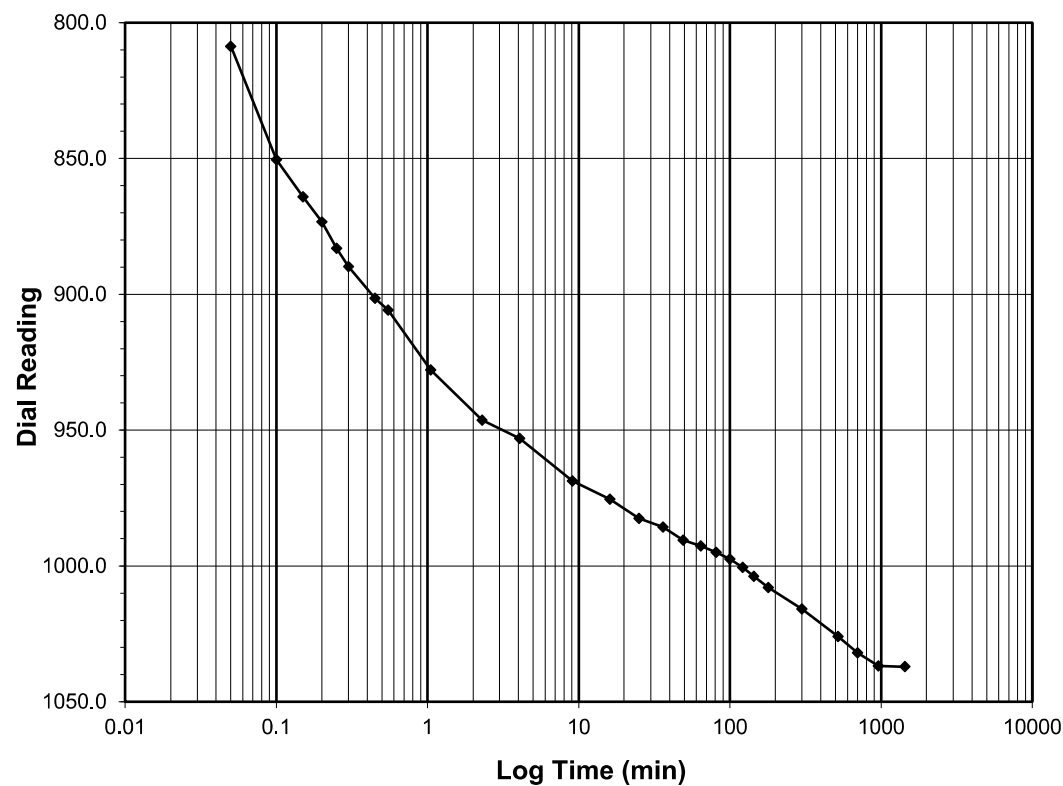
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 8.0-16.0
 Final Reading (div) 1037.1
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/15/2021
 Start Time 1:57:32

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 729.6 |
| 0.05 | 808.7 |
| 0.10 | 850.4 |
| 0.15 | 864.1 |
| 0.20 | 873.3 |
| 0.25 | 883.1 |
| 0.30 | 889.8 |
| 0.45 | 901.4 |
| 0.55 | 905.8 |
| 1.05 | 927.9 |
| 2.30 | 946.3 |
| 4.07 | 953.0 |
| 9.07 | 968.7 |
| 16.07 | 975.5 |
| 25.07 | 982.6 |
| 36.07 | 985.8 |
| 49.07 | 990.5 |
| 64.07 | 992.6 |
| 81.07 | 995.0 |
| 100.07 | 997.5 |
| 121.07 | 1000.6 |
| 144.07 | 1003.9 |
| 180.07 | 1007.9 |
| 300.07 | 1015.8 |
| 520.07 | 1026.0 |
| 700.07 | 1032.1 |
| 960.07 | 1036.8 |
| 1440.05 | 1037.1 |

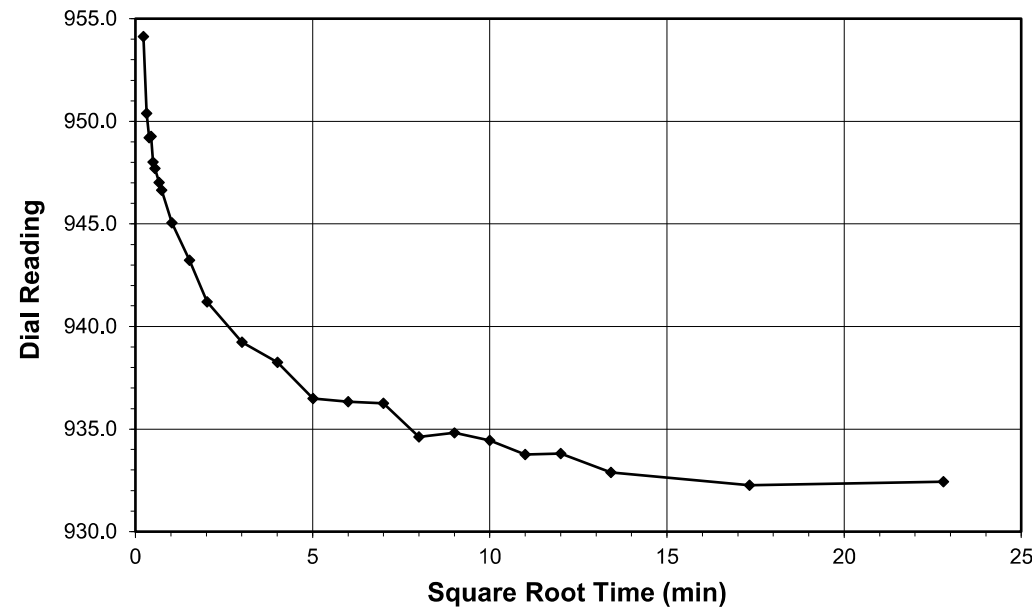


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

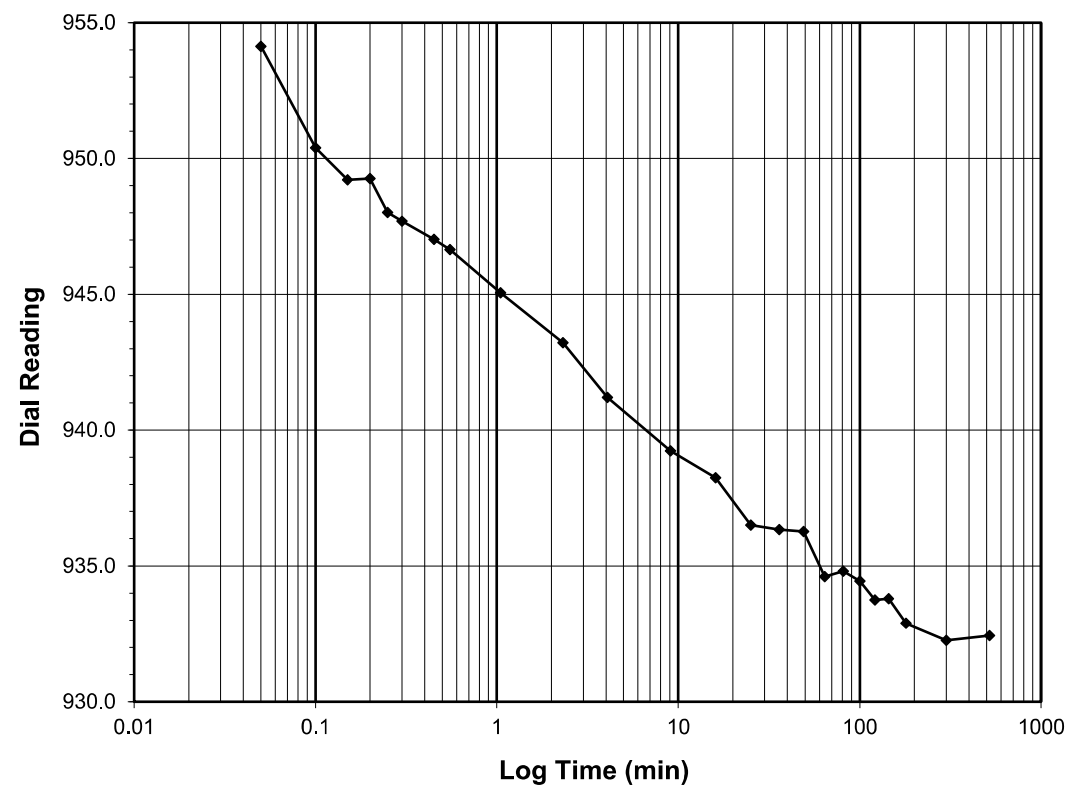
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 16.0-4.0
 Final Reading (div) 932.4
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 12/16/2021
 Start Time 1:57:35

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1037.1 |
| 0.05 | 954.1 |
| 0.10 | 950.4 |
| 0.15 | 949.2 |
| 0.20 | 949.3 |
| 0.25 | 948.0 |
| 0.30 | 947.7 |
| 0.45 | 947.0 |
| 0.55 | 946.6 |
| 1.05 | 945.1 |
| 2.32 | 943.2 |
| 4.07 | 941.2 |
| 9.07 | 939.2 |
| 16.07 | 938.2 |
| 25.07 | 936.5 |
| 36.07 | 936.3 |
| 49.07 | 936.3 |
| 64.07 | 934.6 |
| 81.07 | 934.8 |
| 100.07 | 934.4 |
| 121.07 | 933.7 |
| 144.07 | 933.8 |
| 180.07 | 932.9 |
| 300.08 | 932.3 |
| 520.08 | 932.4 |



Tested By 129-07-0411 Date 12/15/2021 Checked By GEM Date 12/30/2021

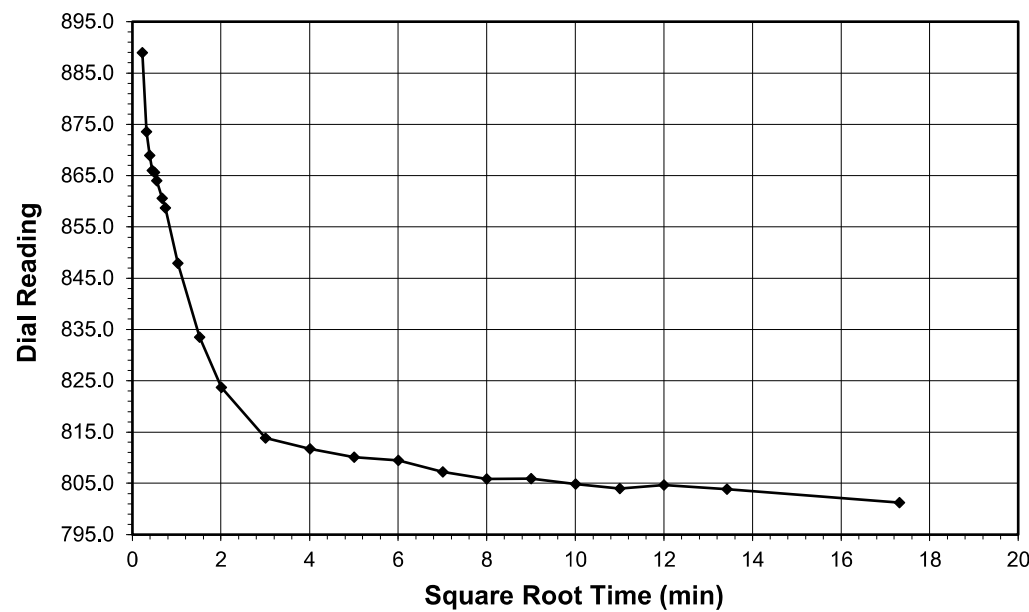
Tested By 129-07-0411 Date 12/16/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

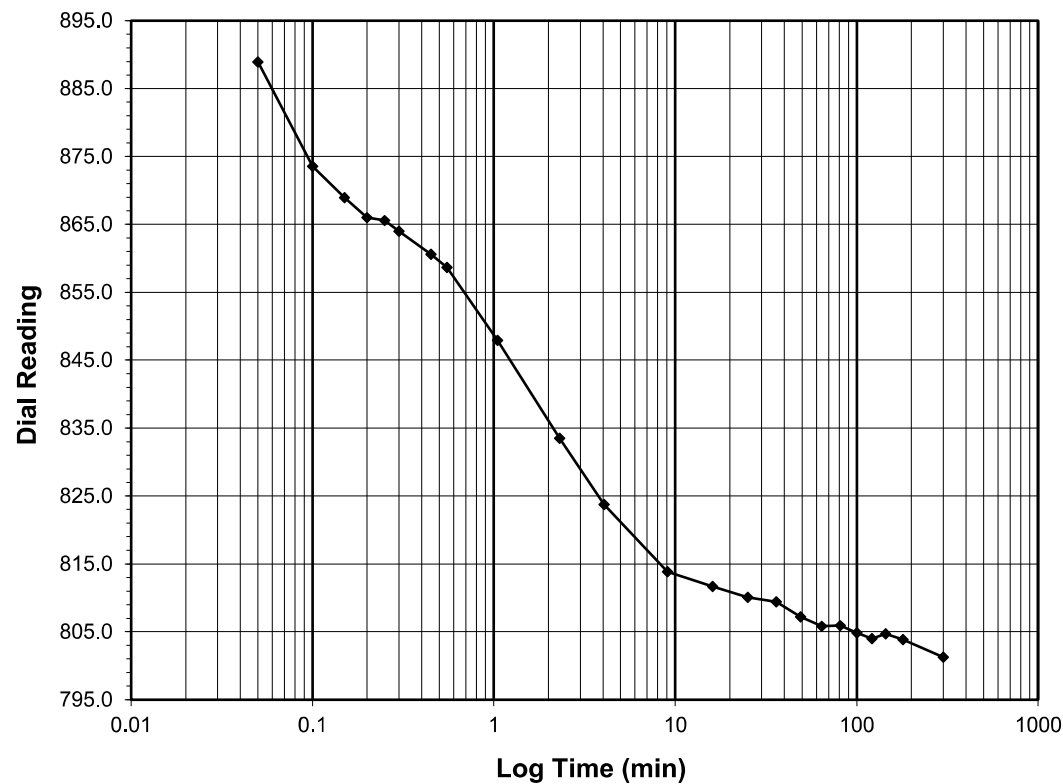
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **4.0-1.0**
 Final Reading (div) **801.3**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 12/16/2021
 Start Time 11:57:56

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 932.4 |
| 0.05 | 889.0 |
| 0.10 | 873.5 |
| 0.15 | 869.0 |
| 0.20 | 866.0 |
| 0.25 | 865.6 |
| 0.30 | 864.0 |
| 0.45 | 860.6 |
| 0.55 | 858.7 |
| 1.05 | 847.9 |
| 2.30 | 833.5 |
| 4.05 | 823.7 |
| 9.05 | 813.8 |
| 16.05 | 811.7 |
| 25.07 | 810.1 |
| 36.07 | 809.4 |
| 49.07 | 807.2 |
| 64.07 | 805.8 |
| 81.07 | 805.9 |
| 100.07 | 804.8 |
| 121.07 | 804.0 |
| 144.07 | 804.7 |
| 180.07 | 803.9 |
| 300.07 | 801.3 |



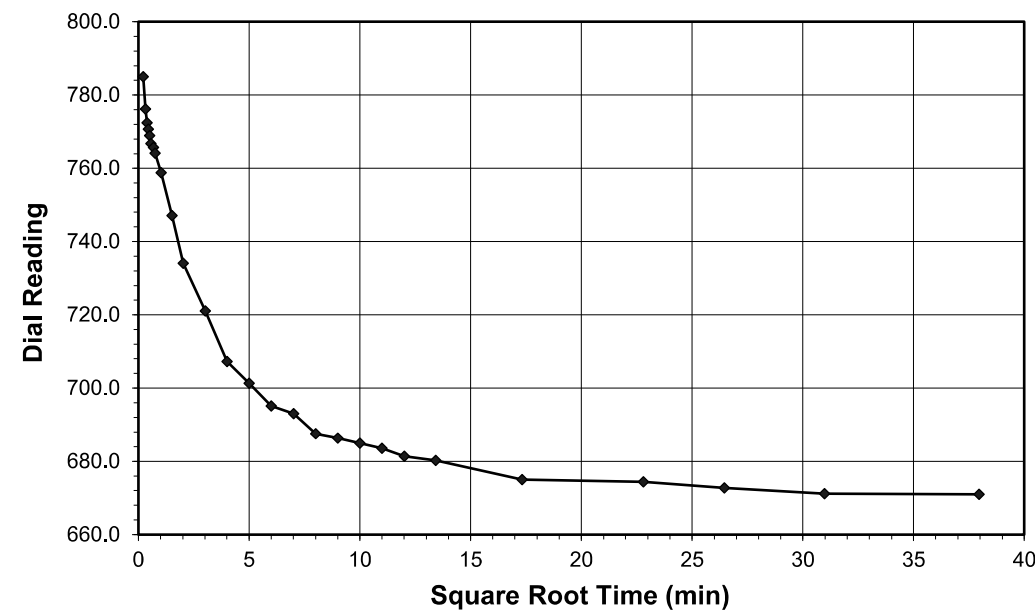
Tested By 129-07-0411 Date 12/16/2021 Checked By GEM Date 12/30/2021

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Boring No.: EB2-A
 Depth (ft): 19.6-21.6
 Sample No.: ST-1
 Visual Description: Gray Sandy Lean Clay

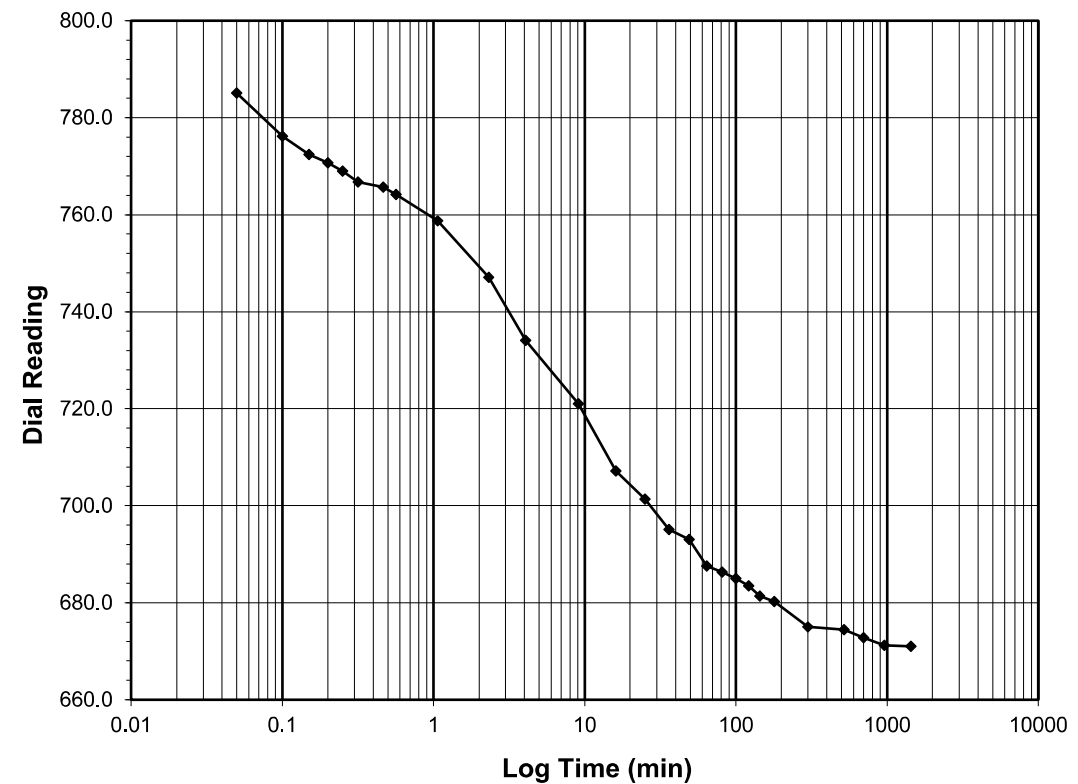
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **1.0-0.25**
 Final Reading (div) **671.0**
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 12/16/2021
 Start Time 16:58:06

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 801.3 |
| 0.05 | 785.0 |
| 0.10 | 776.2 |
| 0.15 | 772.4 |
| 0.20 | 770.7 |
| 0.25 | 769.0 |
| 0.32 | 766.8 |
| 0.47 | 765.7 |
| 0.57 | 764.2 |
| 1.07 | 758.7 |
| 2.32 | 747.1 |
| 4.07 | 734.1 |
| 9.07 | 721.0 |
| 16.07 | 707.2 |
| 25.07 | 701.3 |
| 36.07 | 695.1 |
| 49.07 | 693.1 |
| 64.07 | 687.6 |
| 81.07 | 686.3 |
| 100.07 | 685.0 |
| 121.07 | 683.5 |
| 144.07 | 681.4 |
| 180.07 | 680.2 |
| 300.08 | 675.0 |
| 520.08 | 674.4 |
| 700.08 | 672.8 |
| 960.08 | 671.2 |
| 1440.08 | 671.0 |



Tested By 129-07-0411 Date 12/16/2021 Checked By GEM Date 12/30/2021



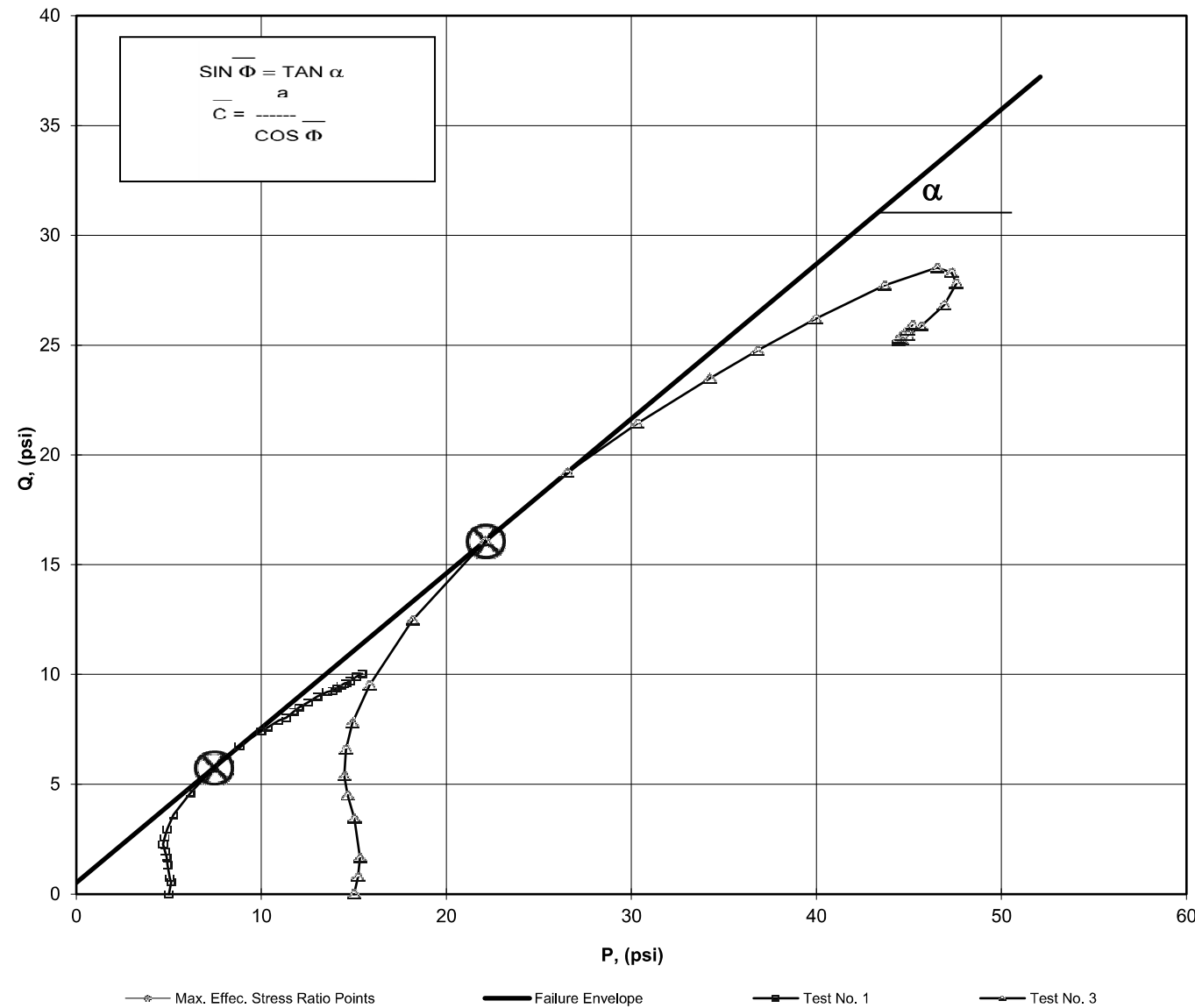
**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

**MOHR TOTAL STRENGTH ENVELOPE
AASHTO T-297**

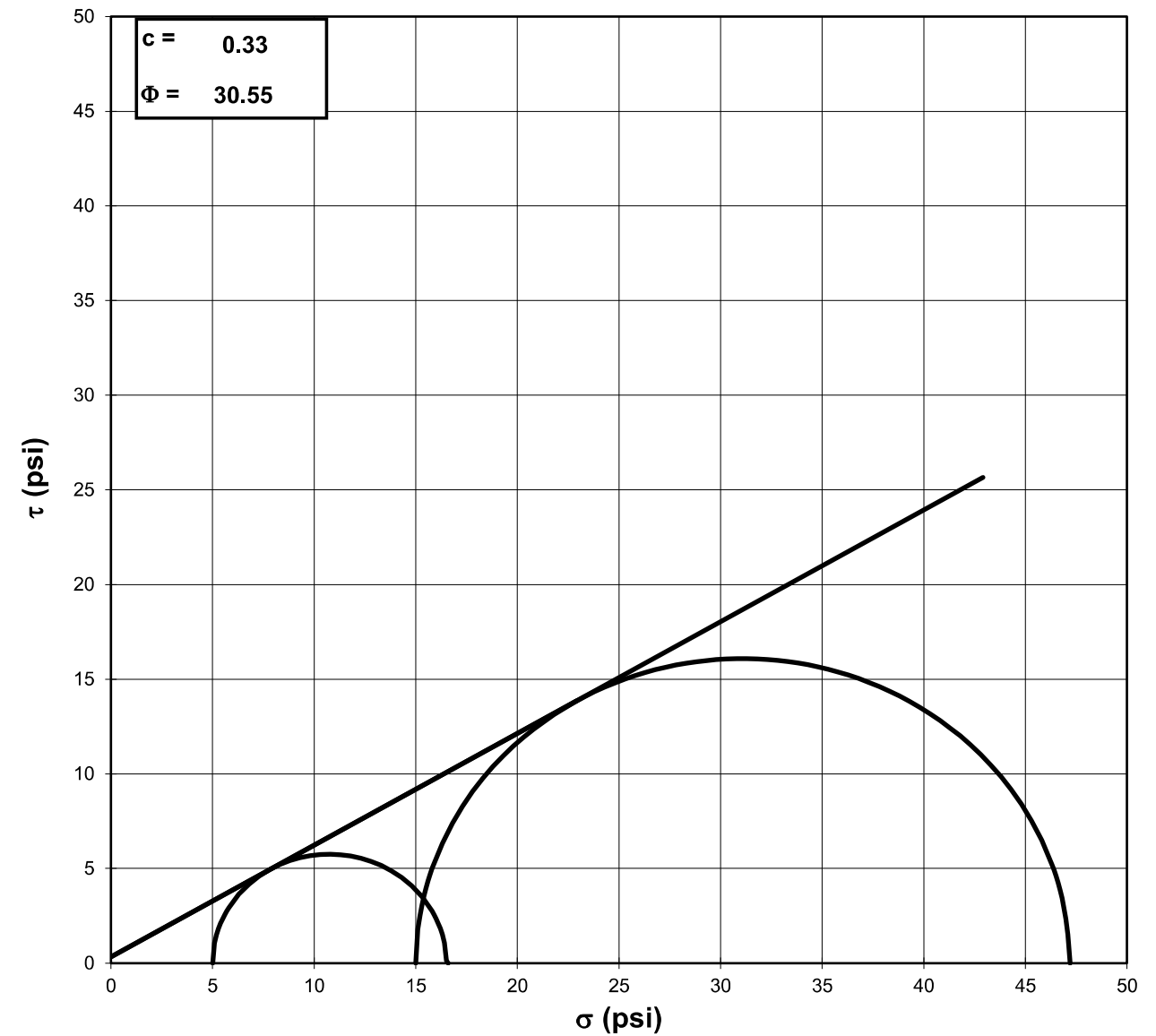
Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003

Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003
 Visual Description: Gray Sandy Silt (Undisturbed)

Consolidated Undrained Triaxial Test with Pore Pressure



| | | | | | |
|----------|----------|-------------|-----------|----------|--------------|
| a | = | 0.52 | C̄ | = | 0.73 |
| α | = | 35.2 | Φ̄ | = | 44.79 |



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-07-0411 Date: 12/8/21 Approved By: MPS Date: 12/29/21

Tested By: 129-07-0411 Date: 12/8/21 Approved By: MPS Date: 12/29/21

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297



Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003

Visual Description: Gray Sandy Silt (Undisturbed)

| | |
|-----------|---|
| Stage No. | 0 |
| Test No. | 1 |

INITIAL SAMPLE DIMENSIONS (in)

| | | | |
|--------------|-------|-------------|-------|
| Length 1: | 5.802 | Diameter 1: | 2.831 |
| Length 2: | 5.786 | Diameter 2: | 2.865 |
| Length 3: | 5.756 | Diameter 3: | 2.855 |
| Length 4: | 5.800 | Diameter 4: | 2.854 |
| Avg. Length: | 5.786 | Avg. Diam.: | 2.851 |

PRESSURES (psi)

| | |
|---------------------------|------|
| Cell Pressure (psi) | 55.0 |
| Back Pressure (psi) | 50.0 |
| Eff. Conf. Pressure (psi) | 5.0 |

Response (%) 99

VOLUME CHANGE

| | |
|------------------------------|------|
| Initial Burette Reading (ml) | 24.0 |
| Final Burette Reading (ml) | 16.1 |
| Final Change (ml) | 7.9 |

MAXIMUM OBLIQUITY POINTS

| | |
|-------------|------|
| \bar{P} = | 7.43 |
| Q = | 5.75 |

| | |
|--|-----|
| Initial Dial Reading (mil) | 395 |
| Dial Reading After Saturation (mil) | 390 |
| Dial Reading After Consolidation (mil) | 418 |

| LOAD (LB) | DEFORMATION (IN) | PORE PRESSURE (PSI) |
|-----------|------------------|---------------------|
| 13.5 | 0.000 | 50.0 |
| 20.2 | 0.002 | 50.4 |
| 23.0 | 0.003 | 50.7 |
| 30.3 | 0.009 | 51.4 |
| 34.9 | 0.014 | 51.8 |
| 38.3 | 0.020 | 52.2 |
| 42.5 | 0.029 | 52.6 |
| 46.4 | 0.038 | 52.8 |
| 51.4 | 0.049 | 53.0 |
| 59.8 | 0.070 | 53.4 |
| 72.7 | 0.099 | 53.4 |
| 88.2 | 0.133 | 53.3 |
| 101.8 | 0.168 | 52.9 |
| 111.2 | 0.208 | 52.4 |
| 114.0 | 0.237 | 52.2 |
| 118.8 | 0.278 | 52.0 |
| 121.7 | 0.333 | 51.7 |
| 126.7 | 0.392 | 51.6 |
| 130.2 | 0.435 | 51.5 |
| 134.6 | 0.494 | 51.2 |
| 139.4 | 0.538 | 51.0 |
| 143.3 | 0.581 | 50.6 |
| 145.2 | 0.626 | 50.4 |
| 147.8 | 0.655 | 50.3 |
| 150.3 | 0.684 | 50.2 |
| 152.2 | 0.712 | 50.1 |
| 153.1 | 0.741 | 50.0 |
| 156.2 | 0.784 | 49.9 |
| 160.2 | 0.828 | 49.8 |
| 163.1 | 0.857 | 49.6 |
| 165.1 | 0.887 | 49.5 |

Tested By: 129-07-0411 Date: 12/8/21 Input Checked By: GEM Date: 12/29/21

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297



Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003

Visual Description: Gray Sandy Silt (Undisturbed)

| | | | |
|------------------------------------|-----|-----------|---|
| Effective Confining Pressure (psi) | 5.0 | Stage No. | 0 |
| | | Test No. | 1 |

INITIAL DIMENSIONS

| | |
|--|-------|
| Initial Sample Length (in) | 5.79 |
| Initial Sample Diameter (in) | 2.85 |
| Initial Sample Area (in ²) | 6.38 |
| Initial Sample Volume (in ³) | 36.94 |

VOLUME CHANGE

| | |
|---|-------|
| Volume After Consolidation (in ³) | 36.56 |
| Length After Consolidation (in) | 5.76 |
| Area After Consolidation (in ²) | 6.343 |

| Strain (%) | Deviator Stress PSI | ΔU | $\bar{\sigma}_1$ | $\bar{\sigma}_3$ | Effective Principal Stress Ratio | \bar{A} | \bar{P} | Q |
|------------|---------------------|------------|------------------|------------------|----------------------------------|-----------|-----------|---|
|------------|---------------------|------------|------------------|------------------|----------------------------------|-----------|-----------|---|

| | | | | | | | | |
|-------|-------|-------|-------|-----|-------|-------|-------|-------|
| 0.03 | 1.06 | 0.40 | 5.66 | 4.6 | 1.230 | 0.38 | 5.13 | 0.53 |
| 0.05 | 1.49 | 0.69 | 5.80 | 4.3 | 1.346 | 0.47 | 5.06 | 0.75 |
| 0.15 | 2.64 | 1.39 | 6.25 | 3.6 | 1.732 | 0.53 | 4.93 | 1.32 |
| 0.25 | 3.37 | 1.81 | 6.57 | 3.2 | 2.056 | 0.54 | 4.88 | 1.69 |
| 0.35 | 3.90 | 2.16 | 6.74 | 2.8 | 2.372 | 0.56 | 4.79 | 1.95 |
| 0.51 | 4.55 | 2.58 | 6.96 | 2.4 | 2.882 | 0.57 | 4.69 | 2.27 |
| 0.66 | 5.15 | 2.80 | 7.35 | 2.2 | 3.339 | 0.55 | 4.78 | 2.58 |
| 0.86 | 5.92 | 3.05 | 7.88 | 2.0 | 4.032 | 0.52 | 4.91 | 2.96 |
| 1.21 | 7.22 | 3.36 | 8.86 | 1.6 | 5.401 | 0.47 | 5.25 | 3.61 |
| 1.71 | 9.18 | 3.43 | 10.75 | 1.6 | 6.856 | 0.38 | 6.16 | 4.59 |
| 2.31 | 11.50 | 3.32 | 13.18 | 1.7 | 7.850 | 0.29 | 7.43 | 5.75 |
| 2.91 | 13.51 | 2.93 | 15.58 | 2.1 | 7.542 | 0.22 | 8.82 | 6.76 |
| 3.61 | 14.84 | 2.42 | 17.42 | 2.6 | 6.744 | 0.16 | 10.00 | 7.42 |
| 4.12 | 15.19 | 2.23 | 17.97 | 2.8 | 6.479 | 0.15 | 10.37 | 7.60 |
| 4.82 | 15.80 | 1.96 | 18.84 | 3.0 | 6.203 | 0.13 | 10.94 | 7.90 |
| 5.78 | 16.07 | 1.69 | 19.37 | 3.3 | 5.862 | 0.11 | 11.34 | 8.03 |
| 6.80 | 16.63 | 1.55 | 20.08 | 3.4 | 5.827 | 0.09 | 11.76 | 8.32 |
| 7.55 | 17.01 | 1.46 | 20.56 | 3.5 | 5.803 | 0.09 | 12.05 | 8.51 |
| 8.57 | 17.45 | 1.20 | 21.26 | 3.8 | 5.587 | 0.07 | 12.53 | 8.73 |
| 9.33 | 18.00 | 0.97 | 22.03 | 4.0 | 5.465 | 0.05 | 13.03 | 9.00 |
| 10.08 | 18.40 | 0.64 | 22.76 | 4.4 | 5.221 | 0.04 | 13.56 | 9.20 |
| 10.86 | 18.51 | 0.42 | 23.10 | 4.6 | 5.040 | 0.02 | 13.84 | 9.26 |
| 11.36 | 18.77 | 0.30 | 23.47 | 4.7 | 4.990 | 0.02 | 14.09 | 9.39 |
| 11.86 | 19.01 | 0.17 | 23.84 | 4.8 | 4.936 | 0.01 | 14.33 | 9.50 |
| 12.36 | 19.16 | 0.10 | 24.06 | 4.9 | 4.910 | 0.01 | 14.48 | 9.58 |
| 12.86 | 19.18 | 0.01 | 24.17 | 5.0 | 4.845 | 0.00 | 14.58 | 9.59 |
| 13.61 | 19.44 | -0.07 | 24.51 | 5.1 | 4.833 | 0.00 | 14.79 | 9.72 |
| 14.37 | 19.80 | -0.24 | 25.04 | 5.2 | 4.782 | -0.01 | 15.14 | 9.90 |
| 14.88 | 20.07 | -0.42 | 25.49 | 5.4 | 4.704 | -0.02 | 15.45 | 10.03 |
| 15.39 | 20.23 | -0.47 | 25.70 | 5.5 | 4.697 | -0.02 | 15.59 | 10.11 |



**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**

AASHTO T-297

Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003

Visual Description: Gray Sandy Silt (Undisturbed)

| | |
|-----------|---|
| Stage No. | 0 |
| Test No. | 2 |

INITIAL SAMPLE DIMENSIONS (in)

| | | | |
|--------------|-------|-------------|-------|
| Length 1: | 6.170 | Diameter 1: | 2.885 |
| Length 2: | 6.172 | Diameter 2: | 2.890 |
| Length 3: | 6.186 | Diameter 3: | 2.887 |
| Length 4: | 6.184 | Diameter 4: | 2.859 |
| Avg. Length: | 6.178 | Avg. Diam.: | 2.880 |

PRESSURES (psi)

| | |
|----------------------------|------|
| Cell Pressure (psi) | 65.0 |
| Back Pressure (psi) | 50.0 |
| Eff. Conf. Pressure (psi) | 15.0 |
| Pore Pressure Response (%) | 99 |

VOLUME CHANGE

| | |
|------------------------------|------|
| Initial Burette Reading (ml) | 24.0 |
| Final Burette Reading (ml) | 11.2 |
| Final Change (ml) | 12.8 |

MAXIMUM OBLIQUITY POINTS

| | | |
|---|---|-------|
| P | = | 22.10 |
| Q | = | 16.09 |

| | |
|--|-----|
| Initial Dial Reading (mil) | 195 |
| Dial Reading After Saturation (mil) | 187 |
| Dial Reading After Consolidation (mil) | 242 |

| LOAD (LB) | DEFORMATION (IN) | PORE PRESSURE (PSI) |
|-----------|------------------|---------------------|
| 15.4 | 0.000 | 50.0 |
| 25.7 | 0.001 | 50.6 |
| 36.9 | 0.002 | 51.3 |
| 60.0 | 0.008 | 53.4 |
| 73.7 | 0.014 | 54.8 |
| 85.2 | 0.020 | 55.9 |
| 101.0 | 0.030 | 57.0 |
| 117.0 | 0.039 | 57.9 |
| 139.4 | 0.052 | 58.7 |
| 178.7 | 0.073 | 59.3 |
| 226.9 | 0.103 | 59.0 |
| 269.3 | 0.141 | 57.7 |
| 300.7 | 0.178 | 56.1 |
| 330.5 | 0.220 | 54.3 |
| 349.1 | 0.252 | 53.0 |
| 371.2 | 0.295 | 51.2 |
| 395.7 | 0.354 | 49.1 |
| 411.1 | 0.416 | 47.0 |
| 411.1 | 0.462 | 46.0 |
| 408.6 | 0.524 | 45.2 |
| 397.7 | 0.571 | 44.9 |
| 387.3 | 0.617 | 45.2 |
| 384.4 | 0.664 | 45.5 |
| 383.5 | 0.695 | 45.6 |
| 385.1 | 0.726 | 45.8 |
| 388.5 | 0.757 | 45.8 |
| 390.8 | 0.788 | 45.9 |
| 396.0 | 0.835 | 45.8 |
| 403.3 | 0.881 | 45.8 |
| 409.1 | 0.912 | 45.7 |
| 415.1 | 0.943 | 45.6 |

Tested By: 129-07-0411 Date: 12/8/2021 Input Checked By: GEM Date: 12/29/2021
 page 7 of 10 DCN: CT-S28 DATE: 4/12/13 REVISION: 3

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**

AASHTO T-297

Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003

Visual Description: Gray Sandy Silt (Undisturbed)

| | | | |
|------------------------------------|------|-----------|---|
| Effective Confining Pressure (psi) | 15.0 | Stage No. | 0 |
| | | Test No | 2 |

INITIAL DIMENSIONS

| | |
|--|-------|
| Initial Sample Length (in) | 6.18 |
| Initial Sample Diameter (in) | 2.88 |
| Initial Sample Area (in ²) | 6.52 |
| Initial Sample Volume (in ³) | 40.25 |

VOLUME CHANGE

| | |
|---|-------|
| Volume After Consolidation (in ³) | 39.63 |
| Length After Consolidation (in) | 6.13 |
| Area After Consolidation (in ²) | 6.464 |

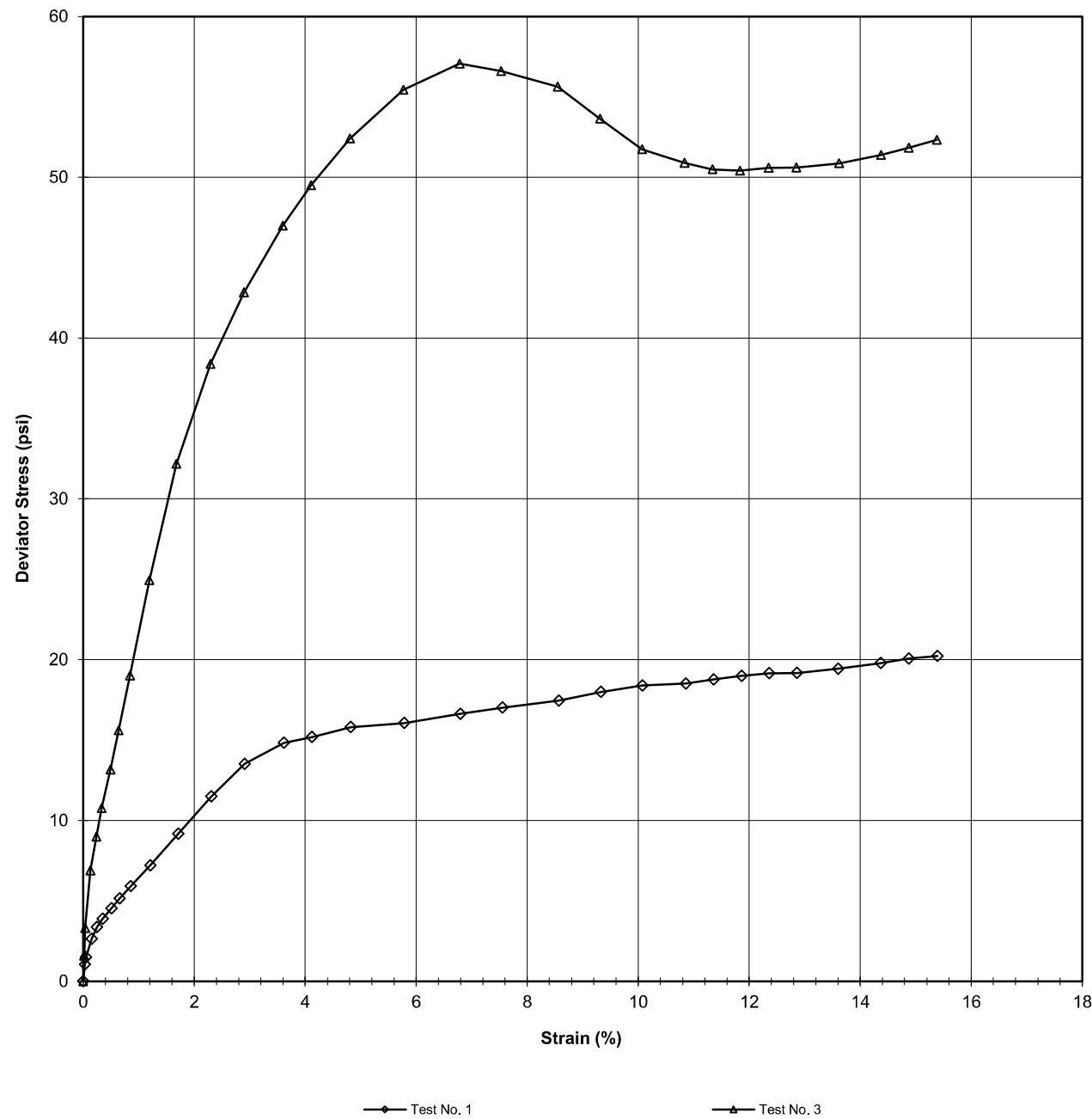
| Strain (%) | Deviator Stress PSI | Δ U | σ ₁ | σ ₃ | Effective Principal Stress Ratio | A | P | Q |
|------------|---------------------|-----|----------------|----------------|----------------------------------|---|---|---|
|------------|---------------------|-----|----------------|----------------|----------------------------------|---|---|---|

| | | | | | | | | |
|-------|-------|-------|-------|------|-------|-------|-------|-------|
| 0.01 | 1.58 | 0.57 | 16.01 | 14.4 | 1.110 | 0.37 | 15.22 | 0.79 |
| 0.03 | 3.31 | 1.33 | 16.99 | 13.7 | 1.242 | 0.40 | 15.33 | 1.66 |
| 0.13 | 6.89 | 3.43 | 18.46 | 11.6 | 1.595 | 0.50 | 15.02 | 3.44 |
| 0.24 | 9.00 | 4.85 | 19.15 | 10.2 | 1.886 | 0.54 | 14.65 | 4.50 |
| 0.33 | 10.76 | 5.89 | 19.87 | 9.1 | 2.182 | 0.55 | 14.49 | 5.38 |
| 0.49 | 13.17 | 7.02 | 21.15 | 8.0 | 2.650 | 0.54 | 14.57 | 6.58 |
| 0.64 | 15.61 | 7.89 | 22.72 | 7.1 | 3.195 | 0.51 | 14.91 | 7.80 |
| 0.84 | 19.02 | 8.67 | 25.35 | 6.3 | 4.004 | 0.46 | 15.84 | 9.51 |
| 1.19 | 24.95 | 9.31 | 30.65 | 5.7 | 5.382 | 0.38 | 18.17 | 12.48 |
| 1.68 | 32.17 | 8.99 | 38.18 | 6.0 | 6.351 | 0.28 | 22.10 | 16.09 |
| 2.29 | 38.38 | 7.67 | 45.71 | 7.3 | 6.236 | 0.20 | 26.52 | 19.19 |
| 2.90 | 42.85 | 6.11 | 51.74 | 8.9 | 5.819 | 0.14 | 30.32 | 21.42 |
| 3.60 | 46.98 | 4.25 | 57.73 | 10.7 | 5.373 | 0.09 | 34.24 | 23.49 |
| 4.10 | 49.50 | 2.95 | 61.55 | 12.0 | 5.108 | 0.06 | 36.80 | 24.75 |
| 4.81 | 52.40 | 1.23 | 66.17 | 13.8 | 4.805 | 0.02 | 39.97 | 26.20 |
| 5.77 | 55.44 | -0.95 | 71.39 | 15.9 | 4.476 | -0.02 | 43.67 | 27.72 |
| 6.78 | 57.06 | -2.99 | 75.05 | 18.0 | 4.172 | -0.05 | 46.52 | 28.53 |
| 7.53 | 56.60 | -4.00 | 75.60 | 19.0 | 3.979 | -0.07 | 47.30 | 28.30 |
| 8.55 | 55.63 | -4.76 | 75.39 | 19.8 | 3.816 | -0.09 | 47.57 | 27.81 |
| 9.31 | 53.63 | -5.09 | 73.72 | 20.1 | 3.670 | -0.10 | 46.90 | 26.82 |
| 10.07 | 51.74 | -4.81 | 71.55 | 19.8 | 3.612 | -0.09 | 45.68 | 25.87 |
| 10.84 | 50.90 | -4.50 | 70.40 | 19.5 | 3.610 | -0.09 | 44.95 | 25.45 |
| 11.34 | 50.49 | -4.37 | 69.86 | 19.4 | 3.607 | -0.09 | 44.61 | 25.24 |
| 11.83 | 50.42 | -4.24 | 69.66 | 19.2 | 3.621 | -0.08 | 44.45 | 25.21 |
| 12.35 | 50.59 | -4.17 | 69.75 | 19.2 | 3.639 | -0.08 | 44.46 | 25.29 |
| 12.85 | 50.61 | -4.14 | 69.76 | 19.1 | 3.644 | -0.08 | 44.45 | 25.31 |
| 13.62 | 50.86 | -4.16 | 70.01 | 19.2 | 3.655 | -0.08 | 44.59 | 25.43 |
| 14.38 | 51.38 | -4.24 | 70.62 | 19.2 | 3.671 | -0.08 | 44.93 | 25.69 |
| 14.88 | 51.84 | -4.27 | 71.11 | 19.3 | 3.691 | -0.08 | 45.19 | 25.92 |
| 15.38 | 52.32 | -4.40 | 71.72 | 19.4 | 3.696 | -0.09 | 45.56 | 26.16 |

page 8 of 10

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

Client: HDR engineering, Inc. Boring No.: EB2-A
 Client Reference: BR-0160 Calabash Depth (ft): 19.6-21.6
 Project No.: R-2021-312-001 Sample No.: ST-1
 Lab ID: R-2021-312-001-003
 Visual Description: Gray Sandy Silt (Undisturbed)



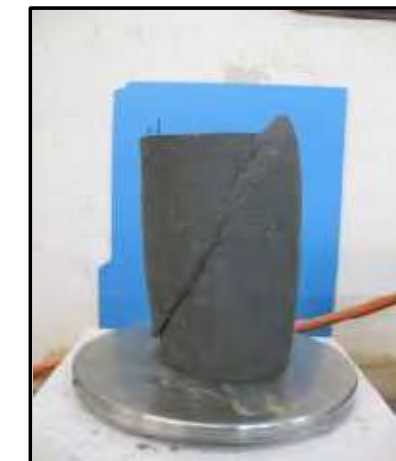
**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11**

Client: HDR engineering, Inc.
 Client Reference: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-003
 Visual Description: Gray Sandy Silt (Undisturbed)

Specific Gravity (measured) 2.71

SAMPLE CONDITION SUMMARY

| | | |
|--------------------------------|-----------|-----------|
| Boring No.: | EB2-A | EB2-A |
| Depth (ft): | 19.6-21.6 | 19.6-21.6 |
| Sample No.: | ST-1 | ST-1 |
| Test No. | T1 | T3 |
| Deformation Rate (in/min) | 0.002 | 0.002 |
| Back Pressure (psi) | 50.0 | 50.0 |
| Consolidation Time (days) | 1 | 1 |
| Moisture Content (%) (INITIAL) | 27.4 | 27.4 |
| Total Unit Weight (pcf) | 119.6 | 121.4 |
| Dry Unit Weight (pcf) | 93.9 | 95.3 |
| Moisture Content (%) (FINAL) | 30.3 | 26.4 |
| Initial State Void Ratio, e | 0.802 | 0.776 |
| Void Ratio at Shear, e | 0.784 | 0.748 |



Tested By: 129-07-0411 Date: 12/8/21 Input Checked By: GEM Date: 12/29/21
 page 10 of 10 DCN: CT-S28 DATE: 4/12/13 REVISION: 3

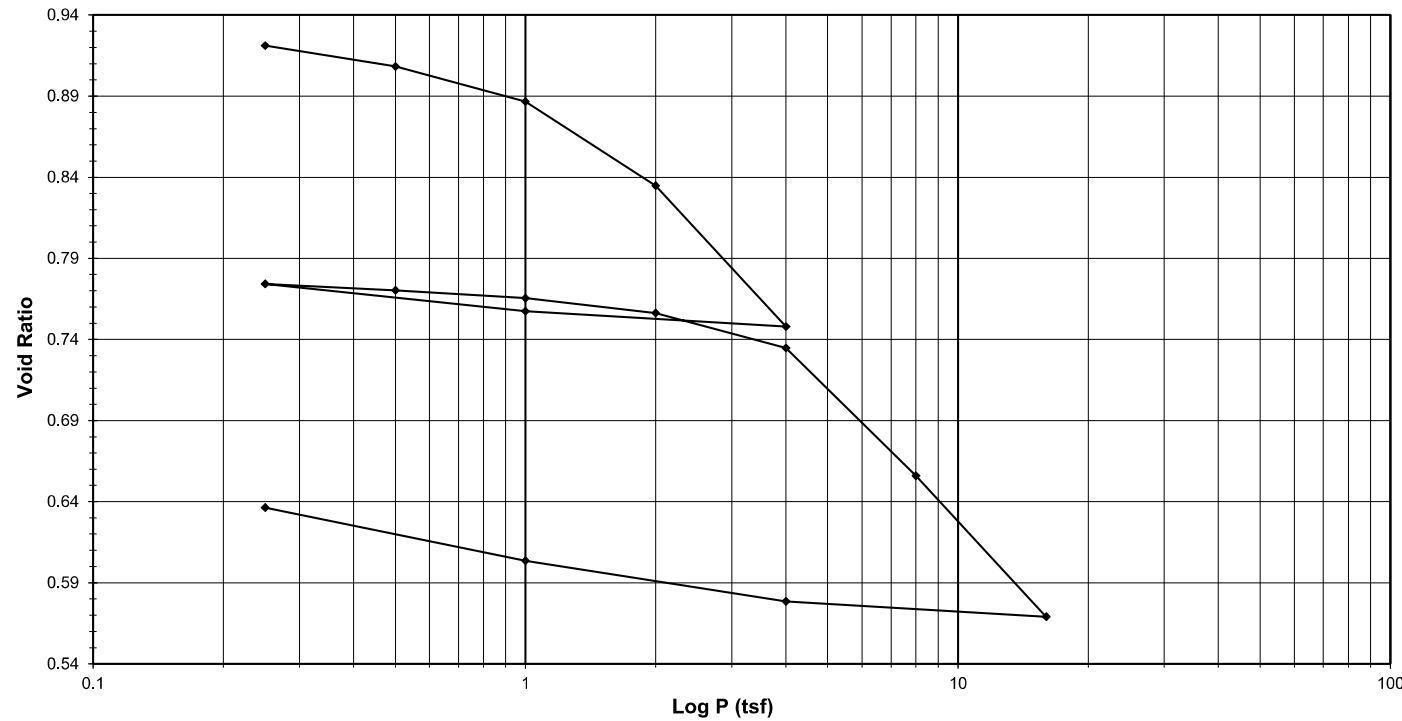
Tested By: 129-07-0411 Date: 12/8/2021 Approved By: MPS Date: 12/29/2021



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB1-B
 Client Reference BR-0160 Calabash Depth (ft) 10-12
 Project No. R-2021-312-001 Sample No. ST-3
 Lab ID R-2021-312-001-004 Visual Description Black Clayey Sand

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-07-0411 Date 12/17/2021 Approved By MPS Date 1/4/2022



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB1-B
 Client Reference BR-0160 Calabash Depth (ft) 10-12
 Project No. R-2021-312-001 Sample No. ST-3
 Lab ID R-2021-312-001-004 Visual Description Black Clayey Sand

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R554
 1 Division = 0.0001 (in.)

| Sample Properties | Initial | Final |
|---------------------------|---------|----------|
| <i>Water Content</i> | | |
| Tare Number | 424 | 714 |
| Wt. Tare & WS (g) | 455.09 | 226.81 |
| Wt. Tare & DS (g) | 365.94 | 200.82 |
| Wt. Water (g) | 89.15 | 25.99 |
| Wt. Tare (g) | 98.44 | 87.30 |
| Wt. DS (g) | 267.50 | 113.52 |
| Water Content (%) | 33.33 | 22.89 |
| <i>Sample Parameters</i> | | |
| Sample Diameter (in) | 2.5 | 2.5 |
| Sample Height (in) | 1.0000 | 0.8453 |
| Sample Volume (cc) | 80.44 | 67.99 |
| Wt. Wet Sample + Ring (g) | 253.90 | 242.20 |
| Wt. of Ring (g) | 104.32 | 104.32 |
| Wt. of Wet Sample (g) | 149.58 | 137.88 |
| Wet Density (pcf) | 116.03 | 126.53 |
| Wet Density (g/cc) | 1.86 | 2.03 |
| Water Content (%) | 33.33 | 22.89 |
| Wt. of Dry Sample (g) | 112.19 | 112.19 |
| Dry Density (pcf) | 87.03 | 102.96 |
| Dry Density (g/cc) | 1.39 | 1.65 |
| Void Ratio | 0.9359 | 0.6364 |
| Saturation (%) | 96.15 | 97.14 |
| Specific Gravity | 2.70 | 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 | 1.39471 | 0.93589 |
| 0.25 | 88.5 | 12.9 | 75.7 | 25.208 | 79.831 | 1.40535 | 0.92123 |
| 0.5 | 162.3 | 19.7 | 142.6 | 25.038 | 79.293 | 1.41488 | 0.90829 |
| 1 | 282.9 | 28.5 | 254.4 | 24.754 | 78.393 | 1.43112 | 0.88663 |
| 2 | 573.9 | 51.5 | 522.4 | 24.073 | 76.238 | 1.47158 | 0.83476 |
| 4 | 1042.1 | 71.6 | 970.5 | 22.935 | 72.633 | 1.54462 | 0.74800 |
| 1 | 968.9 | 46.6 | 922.2 | 23.057 | 73.021 | 1.53640 | 0.75735 |
| 0.25 | 857.5 | 22.5 | 835.1 | 23.279 | 73.722 | 1.52179 | 0.77422 |
| 0.5 | 879.2 | 23.9 | 855.4 | 23.227 | 73.559 | 1.52517 | 0.77029 |
| 1 | 913.1 | 32.9 | 880.1 | 23.164 | 73.360 | 1.52931 | 0.76550 |
| 2 | 979.4 | 51.6 | 927.8 | 23.043 | 72.976 | 1.53735 | 0.75627 |
| 4 | 1110.2 | 70.8 | 1039.5 | 22.760 | 72.078 | 1.55650 | 0.73466 |
| 8 | 1545.2 | 98.8 | 1446.4 | 21.726 | 68.805 | 1.63055 | 0.65588 |
| 16 | 2040.6 | 145.7 | 1894.9 | 20.587 | 65.197 | 1.72078 | 0.56906 |
| 4 | 1933.1 | 87.2 | 1845.9 | 20.711 | 65.591 | 1.71045 | 0.57853 |
| 1 | 1768.8 | 52.2 | 1716.6 | 21.040 | 66.631 | 1.68375 | 0.60357 |
| 0.25 | 1572.9 | 25.7 | 1547.2 | 21.470 | 67.994 | 1.65000 | 0.63636 |

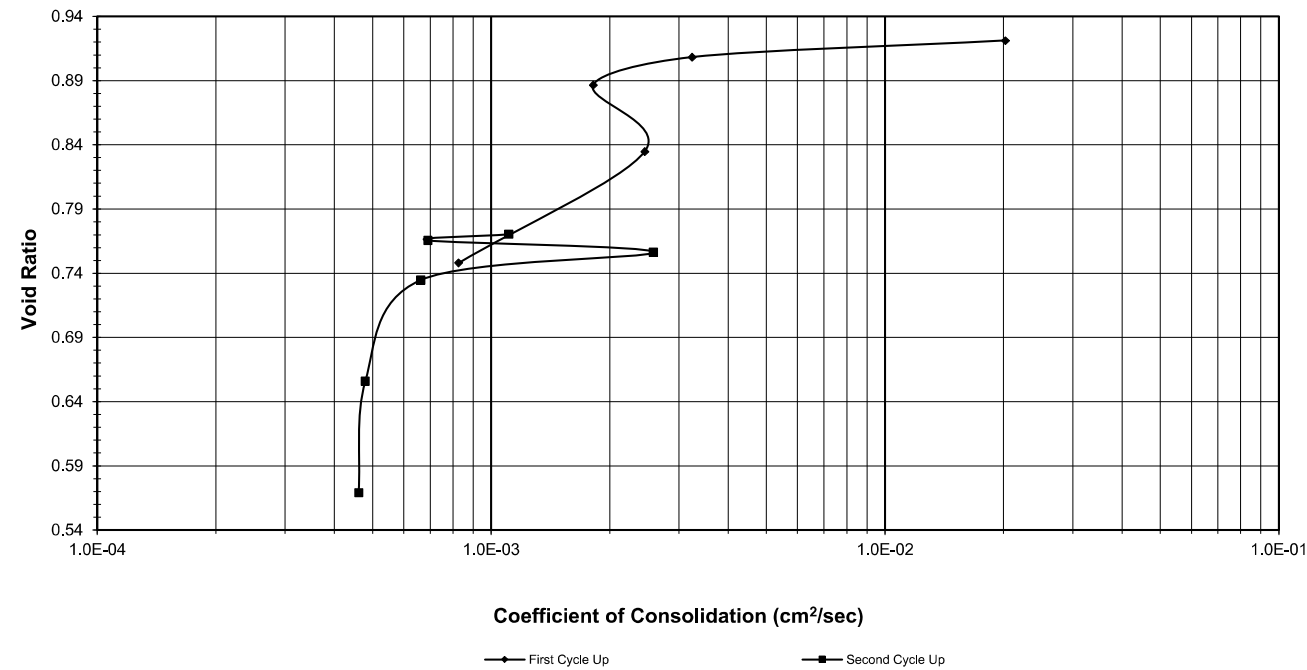
Tested By 129-07-0411 Date 12/17/2021 Input Checked By GEM Date 1/4/2022



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB1-B
 Client Reference BR-0160 Calabash Depth (ft) 10-12
 Project No. R-2021-312-001 Sample No. ST-3
 Lab ID R-2021-312-001-004 Visual Description Black Clayey Sand

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-07-0411 Date 12/17/2021 Input Checked By GEM Date 1/4/2022

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

Y:\2021 PROJECTS\HDR\2021-312 - BR-0160 Calabash\2021-312-001-004 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

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ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client HDR Engineering, Inc. Boring No. EB1-B
 Client Reference BR-0160 Calabash Depth (ft) 10-12
 Project No. R-2021-312-001 Sample No. ST-3
 Lab ID R-2021-312-001-004 Visual Description Black Clayey Sand

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R554
 1 Division = 0.0001 (in.)

| Sample Properties | Initial | Final |
|---------------------------|---------|----------|
| Water Content | | |
| Tare Number | 424 | 714 |
| Wt. Tare & WS (g) | 455.09 | 226.81 |
| Wt. Tare & DS (g) | 365.94 | 200.82 |
| Wt. Water (g) | 89.15 | 25.99 |
| Wt. Tare (g) | 98.44 | 87.30 |
| Wt. DS (g) | 267.50 | 113.52 |
| Water Content (%) | 33.33 | 22.89 |
| Sample Parameters | | |
| Sample Diameter (in) | 2.5 | 2.5 |
| Sample Height (in) | 1.000 | 0.845 |
| Sample Volume (cc) | 80.44 | 67.99 |
| Wt. Wet Sample + Ring (g) | 253.90 | 242.20 |
| Wt. of Ring (g) | 104.32 | 104.32 |
| Wt. of Wet Sample (g) | 149.58 | 137.88 |
| Wet Density (pcf) | 116.03 | 126.53 |
| Wet Density (g/cc) | 1.86 | 2.03 |
| Water Content (%) | 33.33 | 22.89 |
| Wt. of Dry Sample (g) | 112.19 | 112.19 |
| Dry Density (pcf) | 87.03 | 102.96 |
| Dry Density (g/cc) | 1.39 | 1.65 |
| Void Ratio | 0.9359 | 0.6364 |
| Saturation (%) | 96.15 | 97.14 |
| Specific Gravity | 2.70 | Measured |

| Load Increment (tsf) | Dial Reading @ t ₅₀ (div) | Machine Deflection (div) | C _v Test Data Summary | | Time t ₅₀ (min.) | C _v (cm ² /sec) |
|----------------------|--------------------------------------|--------------------------|--|--------------------------------------|-----------------------------|---------------------------------------|
| | | | Corrected Dial Reading @ t ₅₀ (div) | Sample Height @ t ₅₀ (cm) | | |
| 0 - 0.25 | 48.2 | 12.9 | 35.3 | 2.531 | 0.26 | 0.02022 |
| 0.25 - 0.5 | 126.8 | 19.7 | 107.0 | 2.513 | 1.60 | 0.00324 |
| 0.5 - 1.0 | 227.8 | 28.5 | 199.3 | 2.489 | 2.80 | 0.00182 |
| 1.0 - 2.0 | 422.6 | 51.5 | 371.0 | 2.446 | 2.00 | 0.00246 |
| 2.0 - 4.0 | 809.2 | 71.6 | 737.6 | 2.353 | 5.50 | 0.00083 |
| 4.0 - 1.0 | NA | 46.6 | NA | NA | NA | NA |
| 1.0 - 0.25 | NA | 22.5 | NA | NA | NA | NA |
| 0.25 - 0.5 | 867.7 | 23.9 | 843.8 | 2.326 | 4.00 | 0.00111 |
| 0.5 - 1.0 | 891.7 | 32.9 | 858.8 | 2.322 | 6.40 | 0.00069 |
| 1.0 - 2.0 | 946.4 | 51.6 | 894.8 | 2.313 | 1.70 | 0.00258 |
| 2.0 - 4.0 | 1050.2 | 70.8 | 979.4 | 2.291 | 6.50 | 0.00066 |
| 4.0 - 8.0 | 1326.8 | 98.8 | 1228.0 | 2.228 | 8.50 | 0.00048 |
| 8.0 - 16.0 | 1798.5 | 145.7 | 1652.8 | 2.120 | 8.00 | 0.00046 |
| 16.0 - 4.0 | NA | 87.2 | NA | NA | NA | NA |
| 4.0 - 1.0 | NA | 52.2 | NA | NA | NA | NA |
| 1.0 - 0.25 | NA | 25.7 | NA | NA | NA | NA |

Tested By 129-07-0411 Date 12/17/2021 Input Checked By GEM Date 1/4/2022

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

Y:\2021 PROJECTS\HDR\2021-312 - BR-0160 Calabash\2021-312-001-004 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

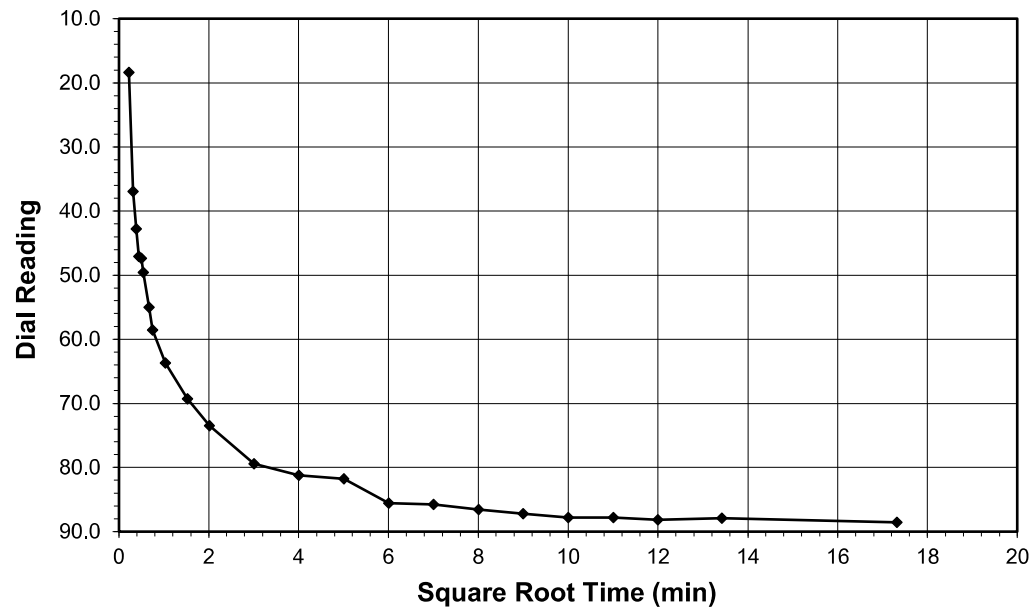
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ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

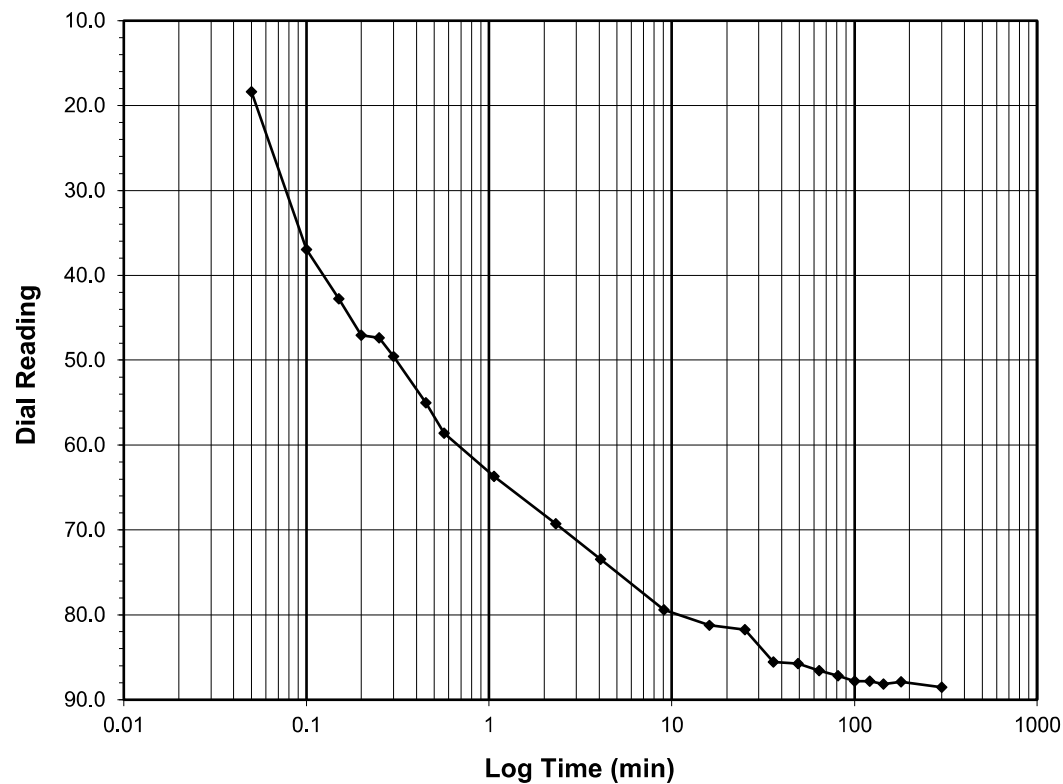
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.0-0.25**
 Final Reading (div) **88.5**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/17/2021
 Start Time 11:59:05

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 0.0 |
| 0.05 | 18.4 |
| 0.10 | 37.0 |
| 0.15 | 42.8 |
| 0.20 | 47.1 |
| 0.25 | 47.4 |
| 0.30 | 49.6 |
| 0.45 | 55.0 |
| 0.57 | 58.6 |
| 1.07 | 63.7 |
| 2.32 | 69.3 |
| 4.07 | 73.5 |
| 9.07 | 79.4 |
| 16.07 | 81.2 |
| 25.07 | 81.8 |
| 36.07 | 85.6 |
| 49.07 | 85.7 |
| 64.07 | 86.6 |
| 81.07 | 87.2 |
| 100.07 | 87.8 |
| 121.07 | 87.8 |
| 144.07 | 88.1 |
| 180.07 | 87.9 |
| 300.07 | 88.5 |

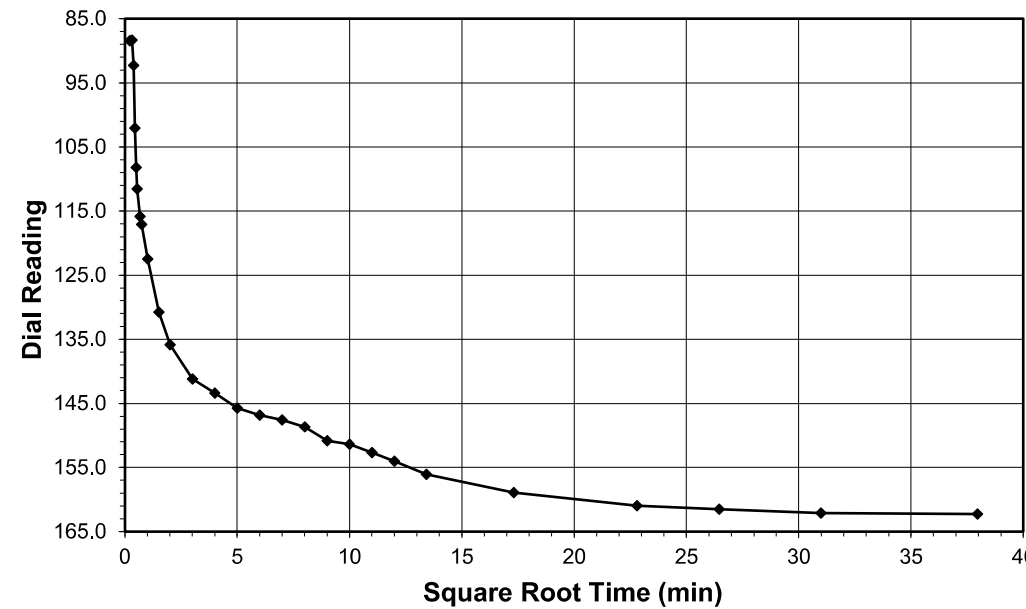


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

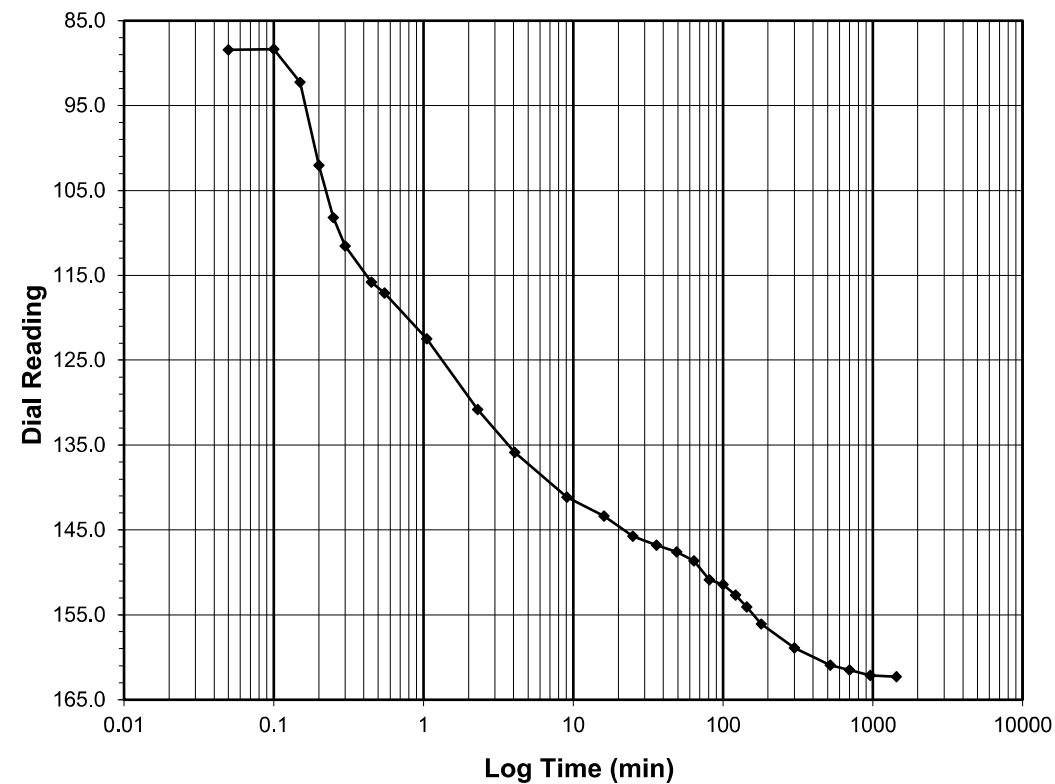
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.25-0.5**
 Final Reading (div) **162.3**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/17/2021
 Start Time 16:59:28

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 88.5 |
| 0.05 | 88.4 |
| 0.10 | 88.4 |
| 0.15 | 92.3 |
| 0.20 | 102.0 |
| 0.25 | 108.2 |
| 0.30 | 111.6 |
| 0.45 | 115.8 |
| 0.55 | 117.1 |
| 1.05 | 122.5 |
| 2.30 | 130.8 |
| 4.07 | 135.8 |
| 9.07 | 141.2 |
| 16.07 | 143.4 |
| 25.07 | 145.7 |
| 36.07 | 146.8 |
| 49.07 | 147.6 |
| 64.07 | 148.6 |
| 81.07 | 150.8 |
| 100.07 | 151.4 |
| 121.07 | 152.7 |
| 144.07 | 154.1 |
| 180.07 | 156.1 |
| 300.07 | 158.9 |
| 520.07 | 160.9 |
| 700.07 | 161.5 |
| 960.08 | 162.1 |
| 1440.08 | 162.3 |



Tested By 129-07-0411 Date 12/17/2021 Checked By GEM Date 1/4/2022

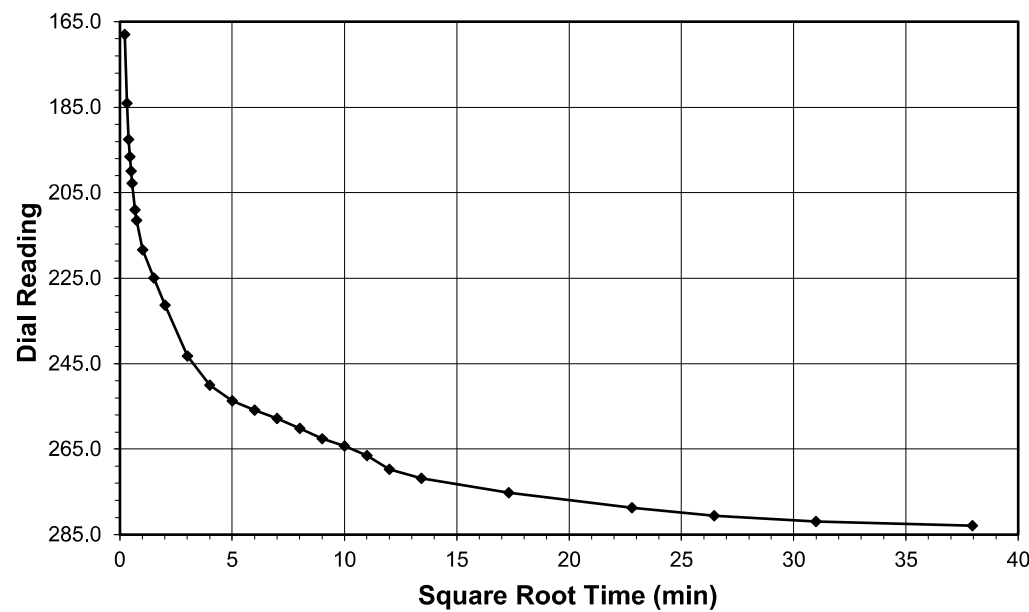
Tested By 129-07-0411 Date 12/17/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

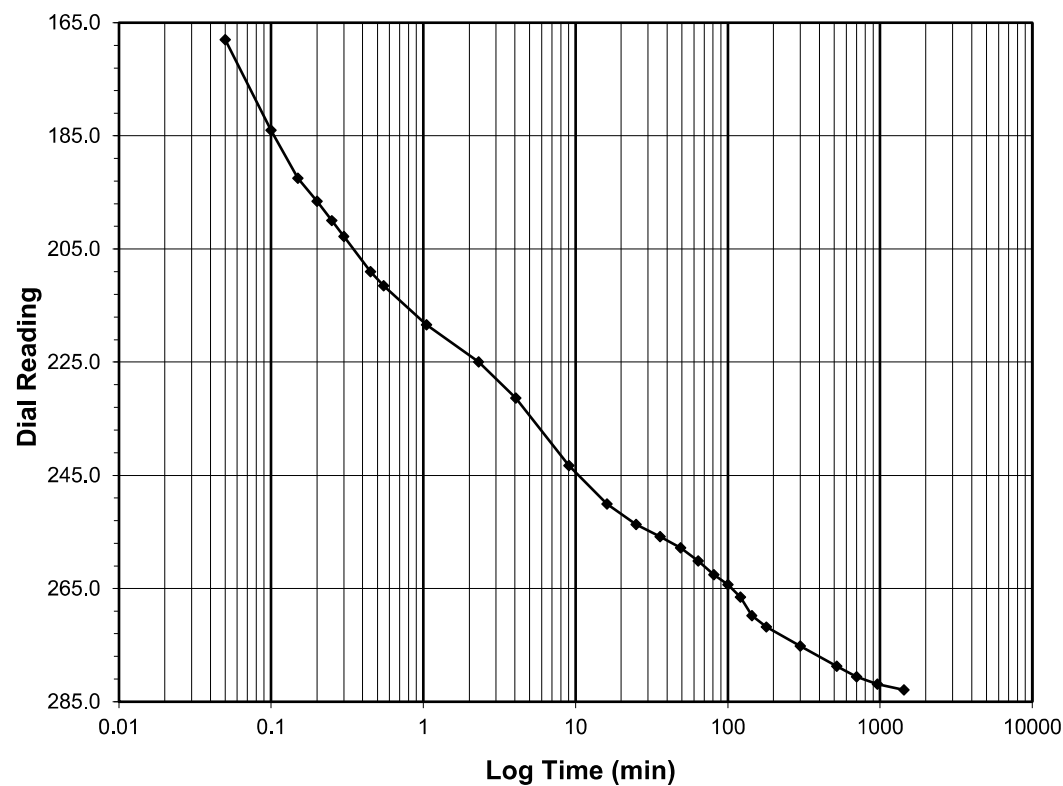
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **0.5-1.0**
 Final Reading (div) **282.9**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/18/2021
 Start Time 16:59:33

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 162.3 |
| 0.05 | 168.0 |
| 0.10 | 184.0 |
| 0.15 | 192.5 |
| 0.20 | 196.5 |
| 0.25 | 200.0 |
| 0.30 | 202.8 |
| 0.45 | 209.0 |
| 0.55 | 211.5 |
| 1.05 | 218.4 |
| 2.30 | 225.0 |
| 4.05 | 231.4 |
| 9.05 | 243.2 |
| 16.05 | 250.1 |
| 25.05 | 253.7 |
| 36.05 | 255.8 |
| 49.05 | 257.8 |
| 64.05 | 260.1 |
| 81.05 | 262.6 |
| 100.05 | 264.3 |
| 121.05 | 266.5 |
| 144.05 | 269.8 |
| 180.05 | 271.8 |
| 300.05 | 275.2 |
| 520.05 | 278.8 |
| 700.05 | 280.6 |
| 960.07 | 281.9 |
| 1440.07 | 282.9 |

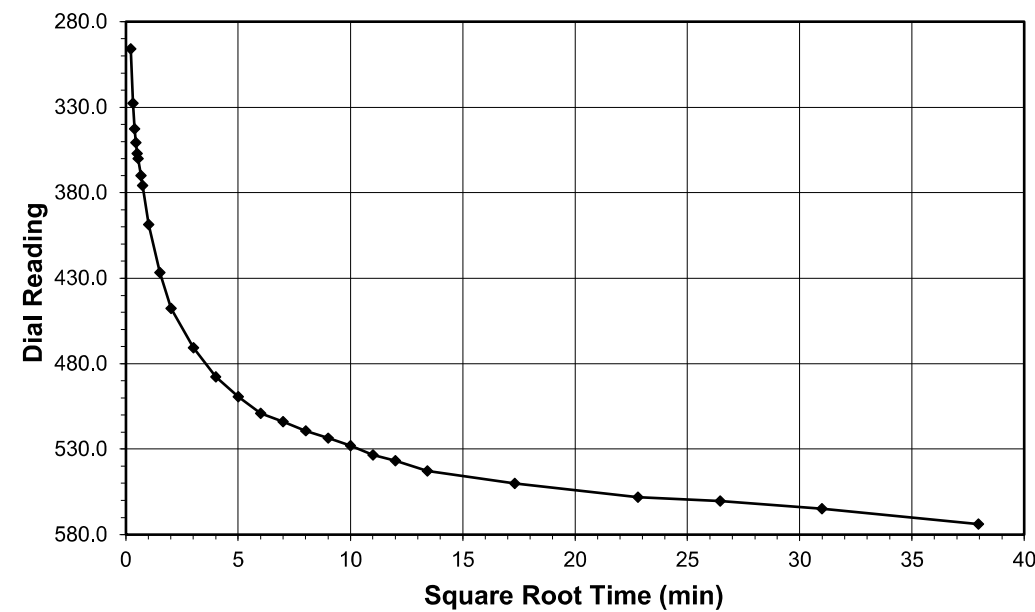


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

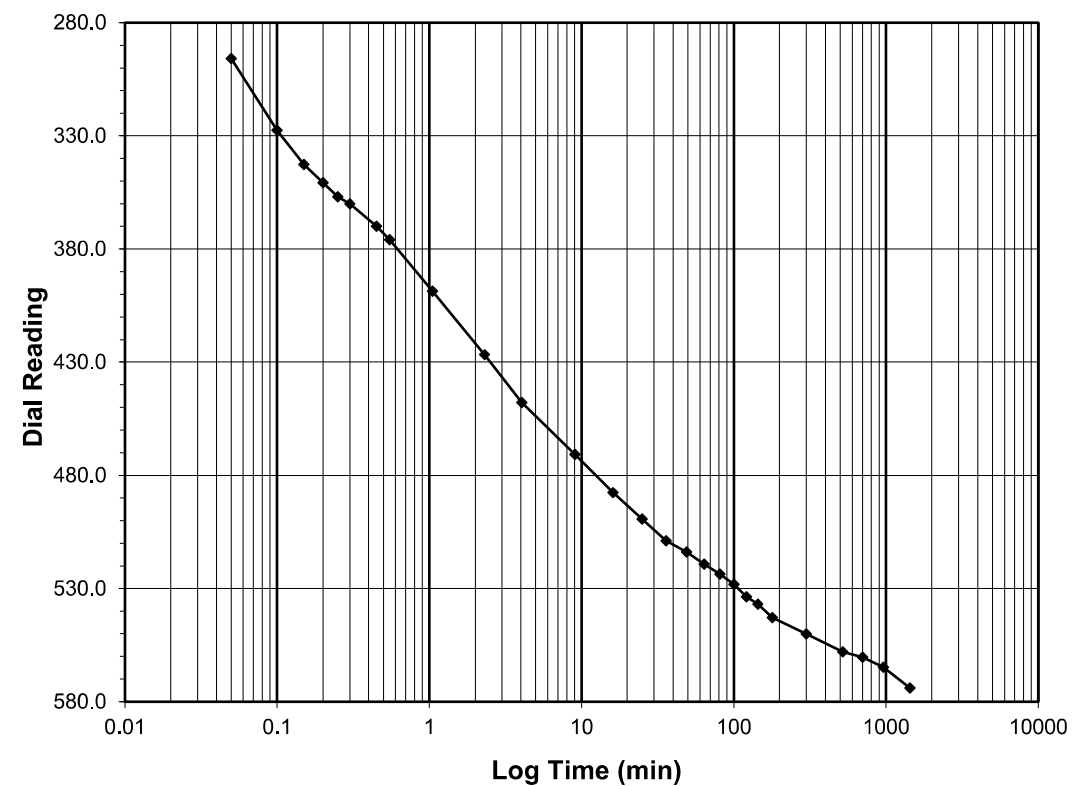
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **1.0-2.0**
 Final Reading (div) **573.9**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/19/2021
 Start Time 17:00:00

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 282.9 |
| 0.05 | 295.8 |
| 0.10 | 327.6 |
| 0.15 | 342.6 |
| 0.20 | 350.6 |
| 0.25 | 356.9 |
| 0.30 | 360.0 |
| 0.45 | 370.0 |
| 0.55 | 375.9 |
| 1.05 | 398.6 |
| 2.30 | 426.7 |
| 4.05 | 447.8 |
| 9.05 | 470.8 |
| 16.05 | 487.6 |
| 25.05 | 499.3 |
| 36.05 | 509.0 |
| 49.05 | 513.9 |
| 64.05 | 519.3 |
| 81.05 | 523.7 |
| 100.07 | 528.1 |
| 121.07 | 533.5 |
| 144.07 | 536.9 |
| 180.07 | 542.8 |
| 300.07 | 550.1 |
| 520.07 | 558.1 |
| 700.07 | 560.4 |
| 960.07 | 564.8 |
| 1440.08 | 573.9 |



Tested By 129-07-0411 Date 12/18/2021 Checked By GEM Date 1/4/2022

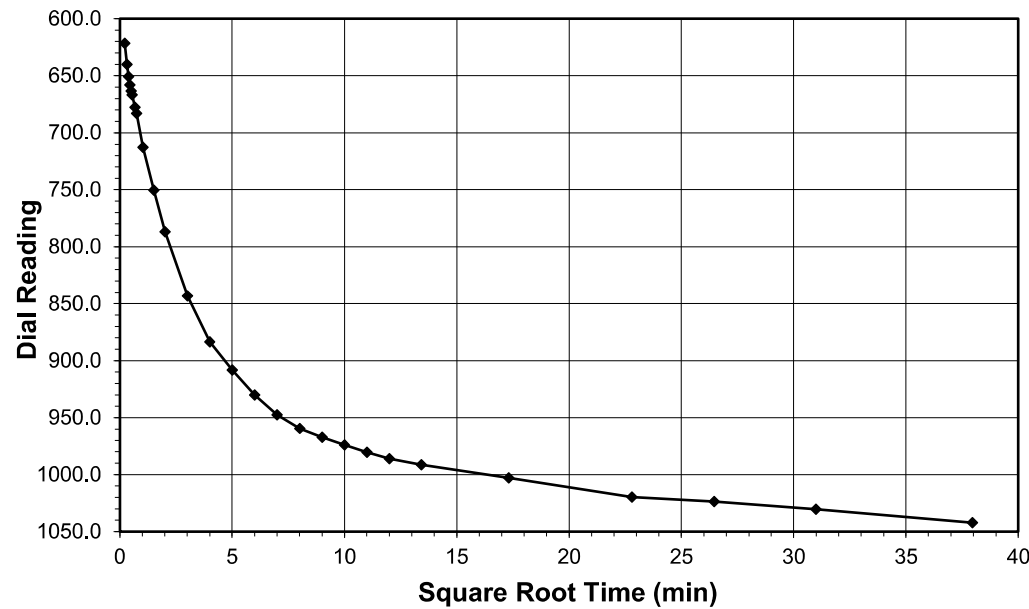
Tested By 129-07-0411 Date 12/19/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

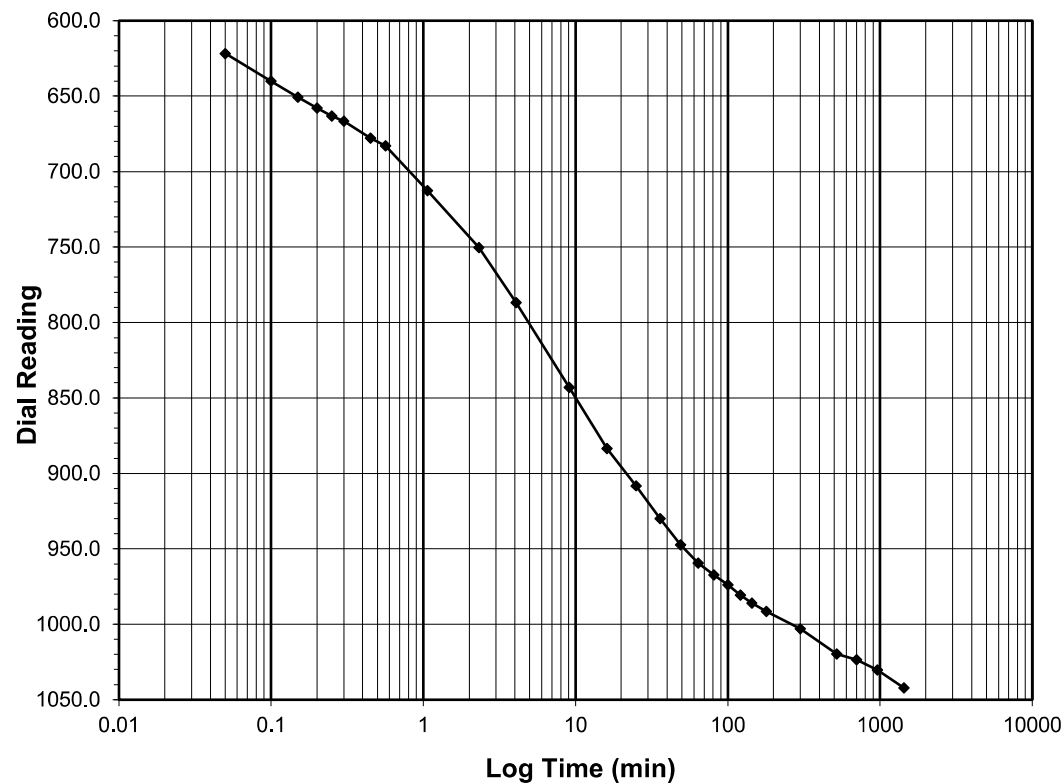
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0
 Final Reading (div) 1042.1
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/20/2021
 Start Time 17:00:27

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 573.9 |
| 0.05 | 621.7 |
| 0.10 | 640.0 |
| 0.15 | 650.8 |
| 0.20 | 658.0 |
| 0.25 | 663.3 |
| 0.30 | 666.7 |
| 0.45 | 677.8 |
| 0.57 | 682.9 |
| 1.07 | 712.6 |
| 2.32 | 750.4 |
| 4.07 | 786.8 |
| 9.07 | 843.2 |
| 16.07 | 883.6 |
| 25.07 | 908.2 |
| 36.07 | 930.1 |
| 49.07 | 947.4 |
| 64.07 | 959.5 |
| 81.07 | 967.4 |
| 100.07 | 973.9 |
| 121.07 | 980.6 |
| 144.08 | 986.0 |
| 180.08 | 991.4 |
| 300.08 | 1003.0 |
| 520.08 | 1019.7 |
| 700.08 | 1023.7 |
| 960.08 | 1030.2 |
| 1440.08 | 1042.1 |

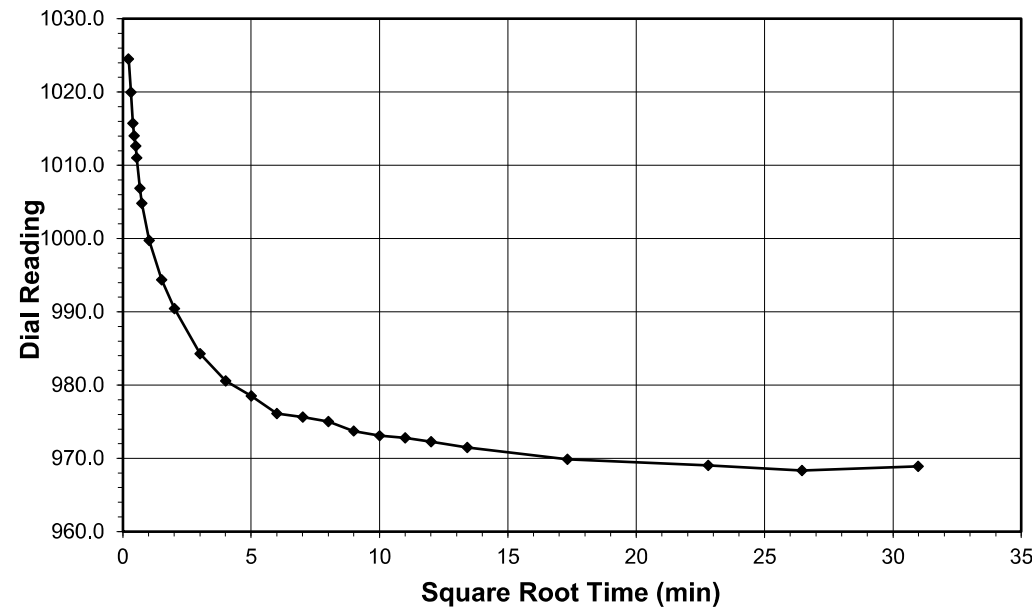


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

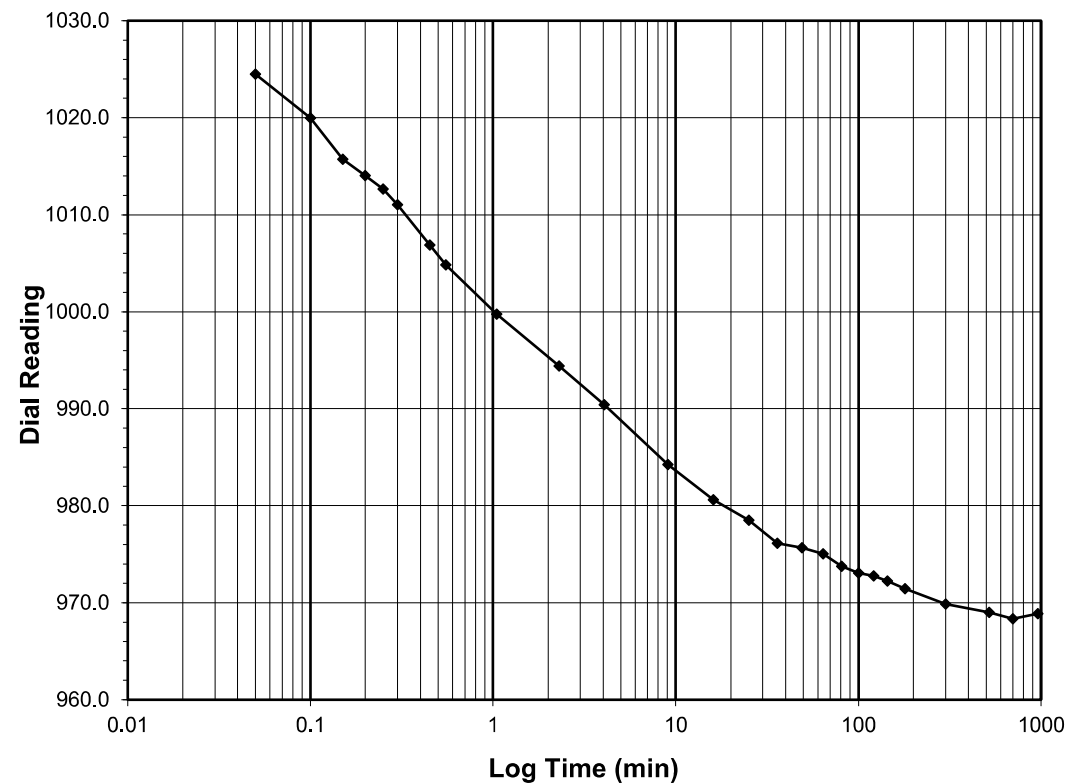
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-1.0
 Final Reading (div) 968.9
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/21/2021
 Start Time 17:00:52

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1042.1 |
| 0.05 | 1024.5 |
| 0.10 | 1020.0 |
| 0.15 | 1015.7 |
| 0.20 | 1014.1 |
| 0.25 | 1012.6 |
| 0.30 | 1011.0 |
| 0.45 | 1006.9 |
| 0.55 | 1004.8 |
| 1.05 | 999.7 |
| 2.30 | 994.4 |
| 4.05 | 990.4 |
| 9.05 | 984.3 |
| 16.05 | 980.6 |
| 25.05 | 978.5 |
| 36.05 | 976.1 |
| 49.05 | 975.7 |
| 64.05 | 975.0 |
| 81.05 | 973.7 |
| 100.07 | 973.1 |
| 121.07 | 972.8 |
| 144.07 | 972.2 |
| 180.07 | 971.5 |
| 300.07 | 969.9 |
| 520.07 | 969.0 |
| 700.07 | 968.3 |
| 960.07 | 968.9 |



Tested By 129-07-0411 Date 12/20/2021 Checked By GEM Date 1/4/2022

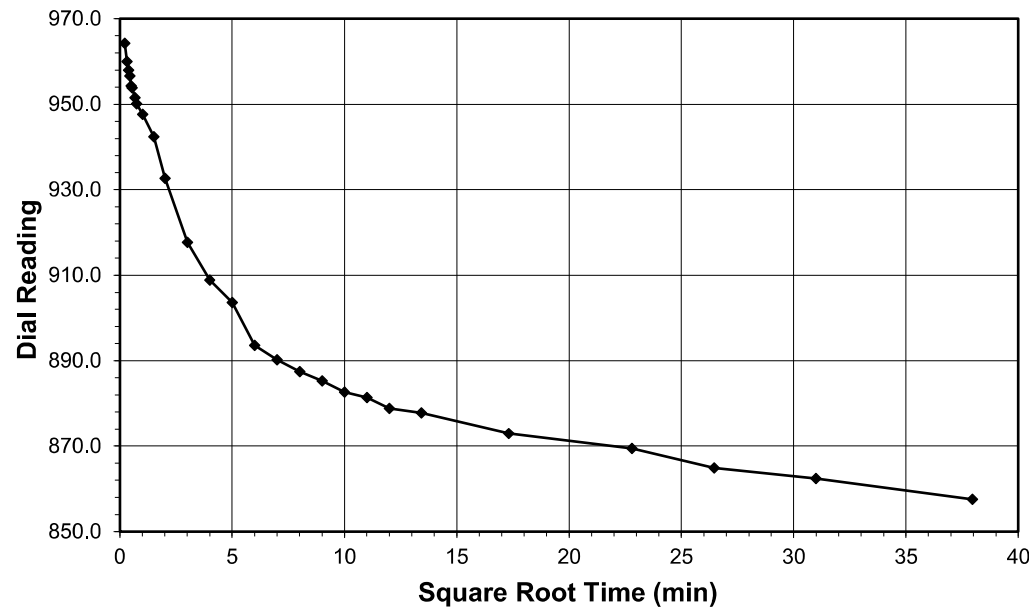
Tested By 129-07-0411 Date 12/21/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

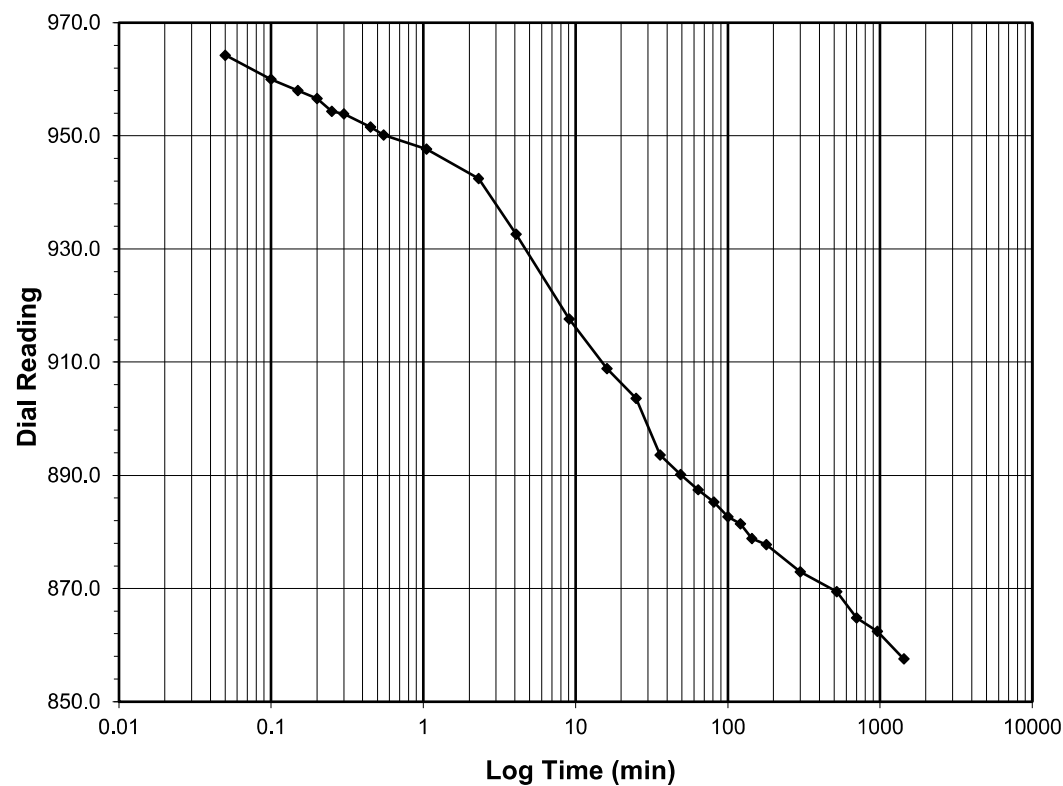
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25
 Final Reading (div) 857.5
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/22/2021
 Start Time 9:15:45

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 968.9 |
| 0.05 | 964.3 |
| 0.10 | 960.0 |
| 0.15 | 958.0 |
| 0.20 | 956.6 |
| 0.25 | 954.3 |
| 0.30 | 953.8 |
| 0.45 | 951.5 |
| 0.55 | 950.1 |
| 1.05 | 947.7 |
| 2.30 | 942.5 |
| 4.07 | 932.6 |
| 9.07 | 917.7 |
| 16.07 | 908.9 |
| 25.07 | 903.6 |
| 36.07 | 893.6 |
| 49.07 | 890.2 |
| 64.07 | 887.5 |
| 81.07 | 885.2 |
| 100.07 | 882.7 |
| 121.08 | 881.4 |
| 144.08 | 878.8 |
| 180.08 | 877.8 |
| 300.08 | 872.9 |
| 520.08 | 869.4 |
| 700.08 | 864.8 |
| 960.08 | 862.4 |
| 1440.08 | 857.5 |



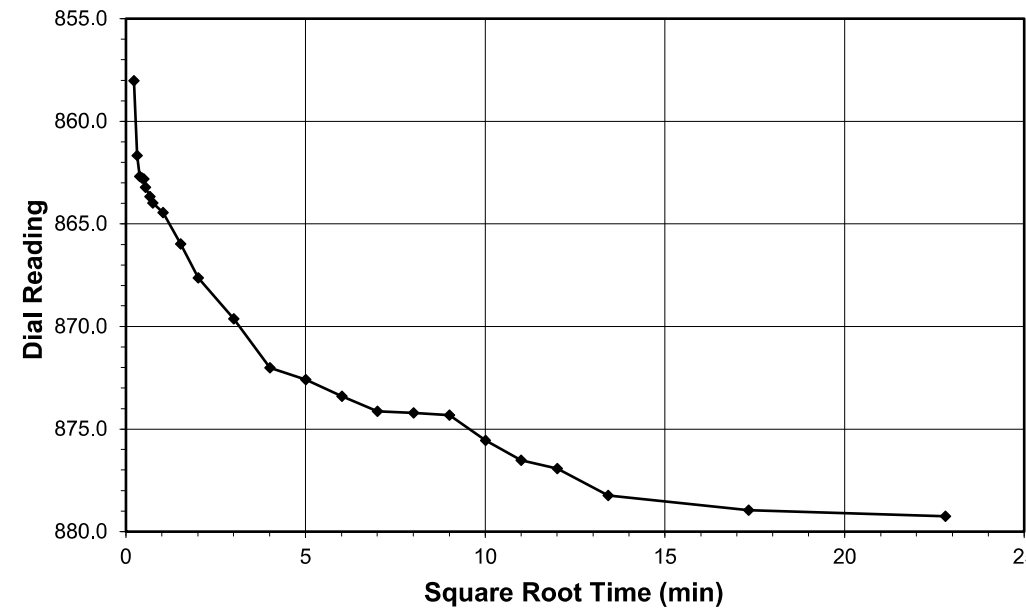
Tested By 129-07-0411 Date 12/22/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

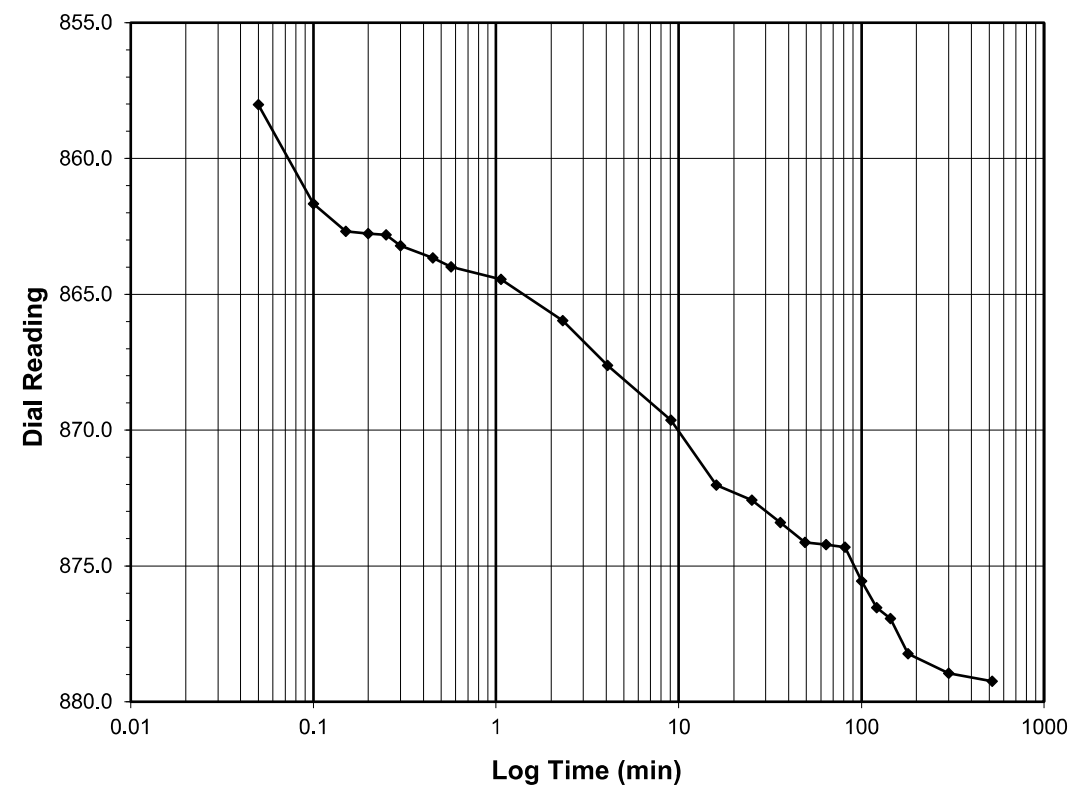
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5
 Final Reading (div) 879.2
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/23/2021
 Start Time 9:16:02

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 857.5 |
| 0.05 | 858.0 |
| 0.10 | 861.7 |
| 0.15 | 862.7 |
| 0.20 | 862.8 |
| 0.25 | 862.8 |
| 0.30 | 863.2 |
| 0.45 | 863.7 |
| 0.57 | 864.0 |
| 1.07 | 864.5 |
| 2.32 | 866.0 |
| 4.07 | 867.6 |
| 9.07 | 869.6 |
| 16.07 | 872.0 |
| 25.07 | 872.6 |
| 36.07 | 873.4 |
| 49.07 | 874.1 |
| 64.07 | 874.2 |
| 81.07 | 874.3 |
| 100.07 | 875.6 |
| 121.08 | 876.5 |
| 144.08 | 876.9 |
| 180.08 | 878.2 |
| 300.08 | 879.0 |
| 520.08 | 879.2 |



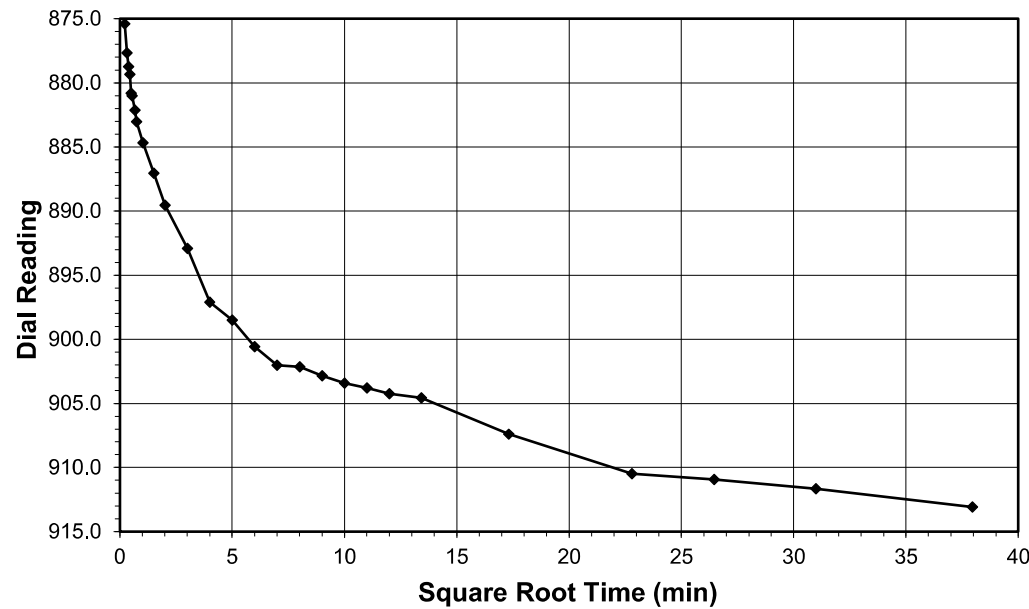
Tested By 129-07-0411 Date 12/23/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

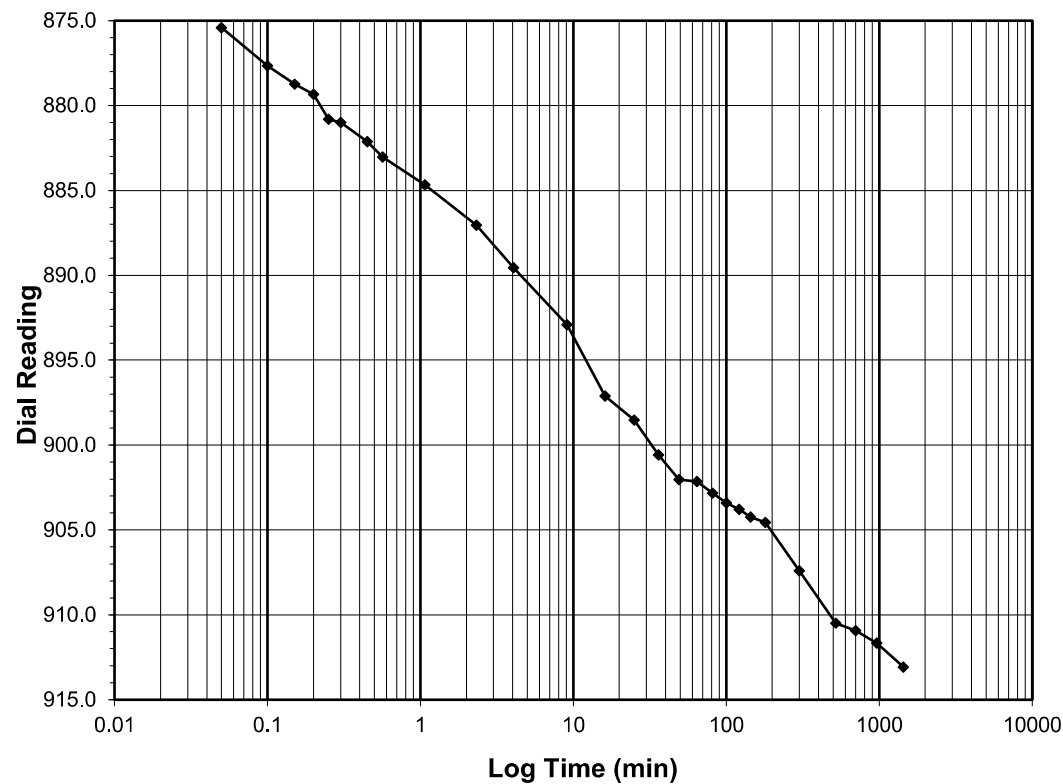
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0
 Final Reading (div) 913.1
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/24/2021
 Start Time 9:16:12

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 879.2 |
| 0.05 | 875.4 |
| 0.10 | 877.7 |
| 0.15 | 878.7 |
| 0.20 | 879.3 |
| 0.25 | 880.8 |
| 0.30 | 881.0 |
| 0.45 | 882.1 |
| 0.57 | 883.0 |
| 1.07 | 884.7 |
| 2.32 | 887.1 |
| 4.07 | 889.5 |
| 9.07 | 892.9 |
| 16.07 | 897.1 |
| 25.07 | 898.5 |
| 36.07 | 900.6 |
| 49.07 | 902.0 |
| 64.07 | 902.1 |
| 81.07 | 902.8 |
| 100.07 | 903.4 |
| 121.08 | 903.8 |
| 144.08 | 904.2 |
| 180.08 | 904.6 |
| 300.08 | 907.4 |
| 520.08 | 910.5 |
| 700.08 | 910.9 |
| 960.10 | 911.7 |
| 1440.02 | 913.1 |

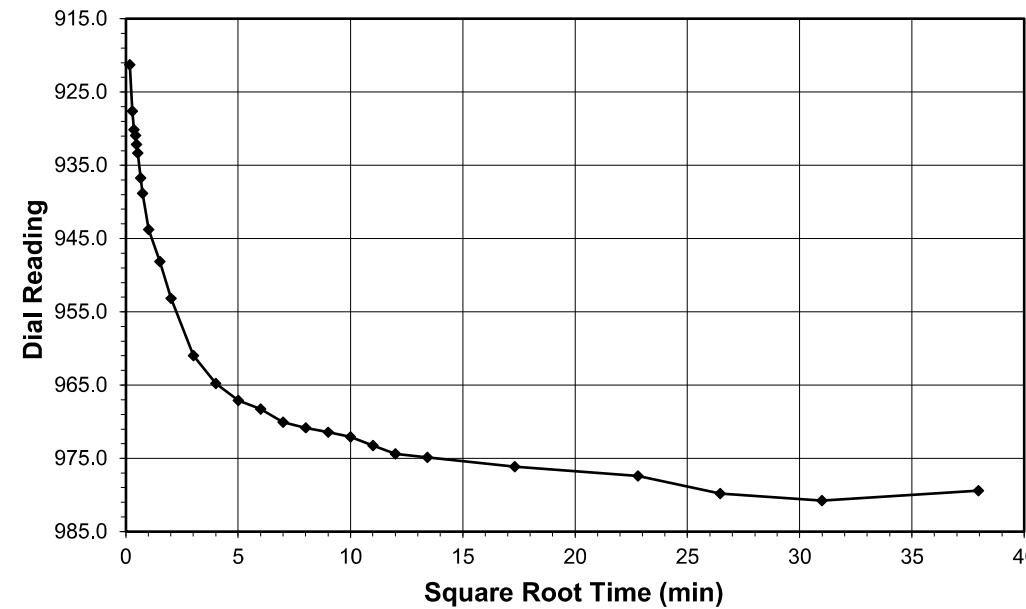


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

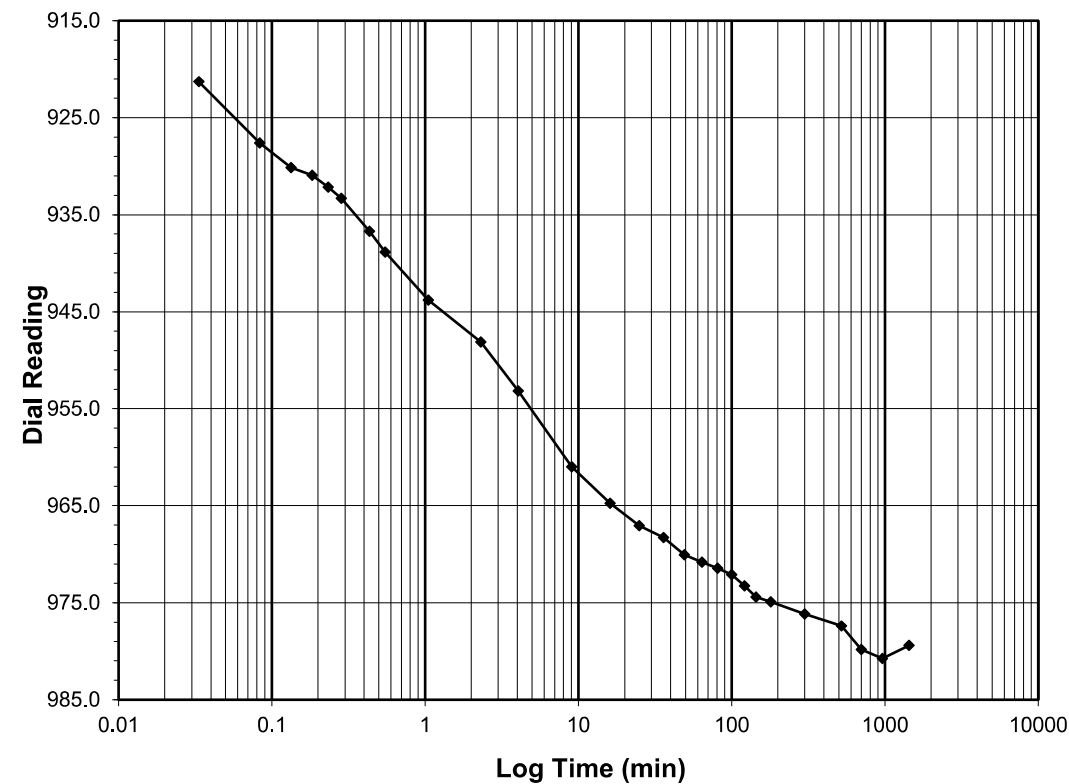
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0
 Final Reading (div) 979.4
 Consolidometer No. R554
 1 Division (in) 0.0001

Start Date 12/25/2021
 Start Time 9:16:13

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 913.1 |
| 0.03 | 921.3 |
| 0.08 | 927.6 |
| 0.13 | 930.1 |
| 0.18 | 930.9 |
| 0.23 | 932.1 |
| 0.28 | 933.3 |
| 0.43 | 936.7 |
| 0.55 | 938.8 |
| 1.05 | 943.8 |
| 2.30 | 948.1 |
| 4.05 | 953.2 |
| 9.05 | 961.0 |
| 16.05 | 964.8 |
| 25.05 | 967.1 |
| 36.05 | 968.3 |
| 49.05 | 970.1 |
| 64.05 | 970.8 |
| 81.05 | 971.4 |
| 100.05 | 972.1 |
| 121.05 | 973.3 |
| 144.05 | 974.4 |
| 180.07 | 974.9 |
| 300.07 | 976.1 |
| 520.07 | 977.4 |
| 700.07 | 979.8 |
| 960.07 | 980.8 |
| 1440.03 | 979.4 |



Tested By 129-07-0411 Date 12/24/2021 Checked By GEM Date 1/4/2022

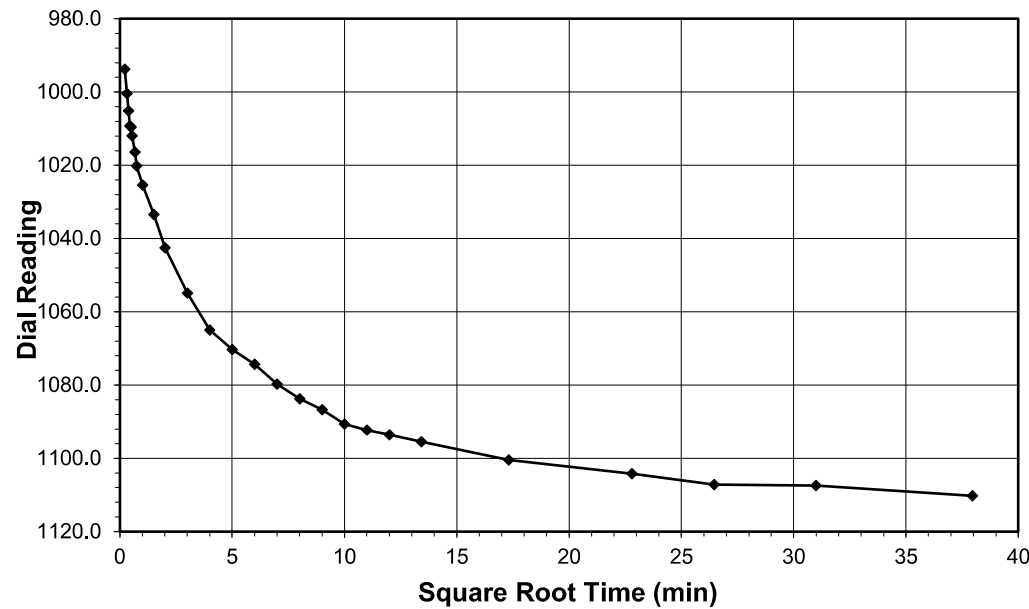
Tested By 129-07-0411 Date 12/25/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

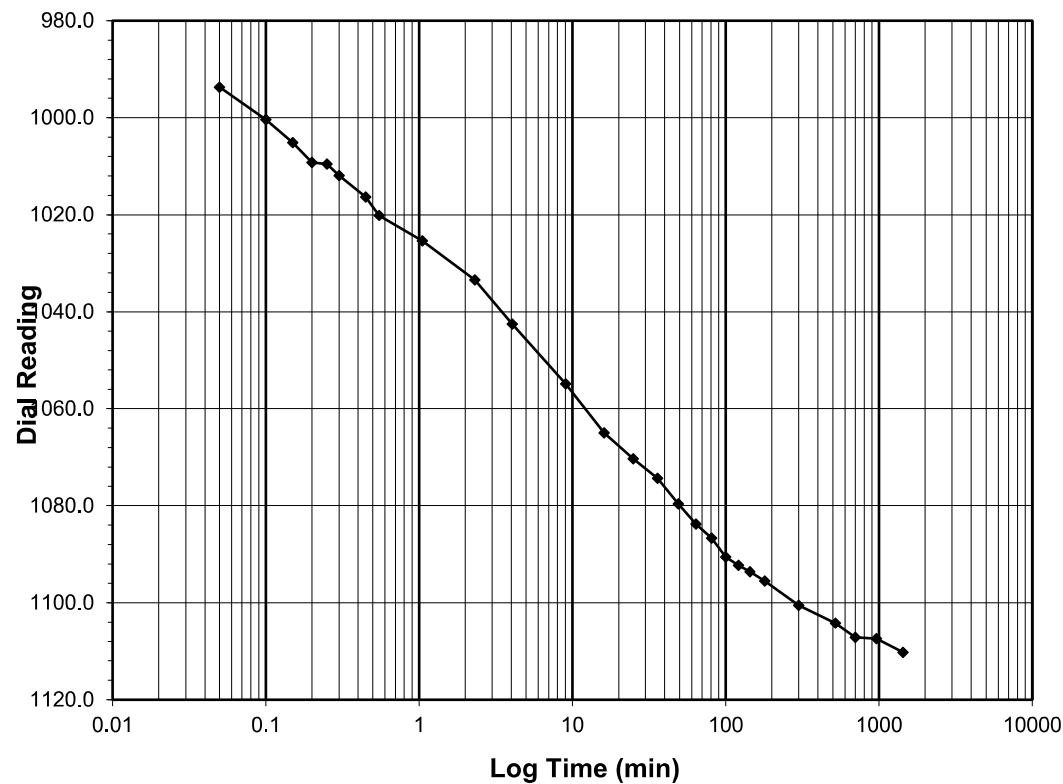
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **2.0-4.0**
 Final Reading (div) **1110.2**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/26/2021
 Start Time 9:16:16

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 979.4 |
| 0.05 | 993.7 |
| 0.10 | 1000.4 |
| 0.15 | 1005.1 |
| 0.20 | 1009.2 |
| 0.25 | 1009.5 |
| 0.30 | 1011.9 |
| 0.45 | 1016.4 |
| 0.55 | 1020.2 |
| 1.05 | 1025.4 |
| 2.30 | 1033.5 |
| 4.05 | 1042.5 |
| 9.05 | 1054.9 |
| 16.05 | 1065.0 |
| 25.05 | 1070.3 |
| 36.05 | 1074.3 |
| 49.05 | 1079.7 |
| 64.05 | 1083.8 |
| 81.05 | 1086.7 |
| 100.05 | 1090.6 |
| 121.05 | 1092.3 |
| 144.05 | 1093.6 |
| 180.05 | 1095.5 |
| 300.07 | 1100.5 |
| 520.07 | 1104.2 |
| 700.07 | 1107.2 |
| 960.07 | 1107.5 |
| 1440.07 | 1110.2 |



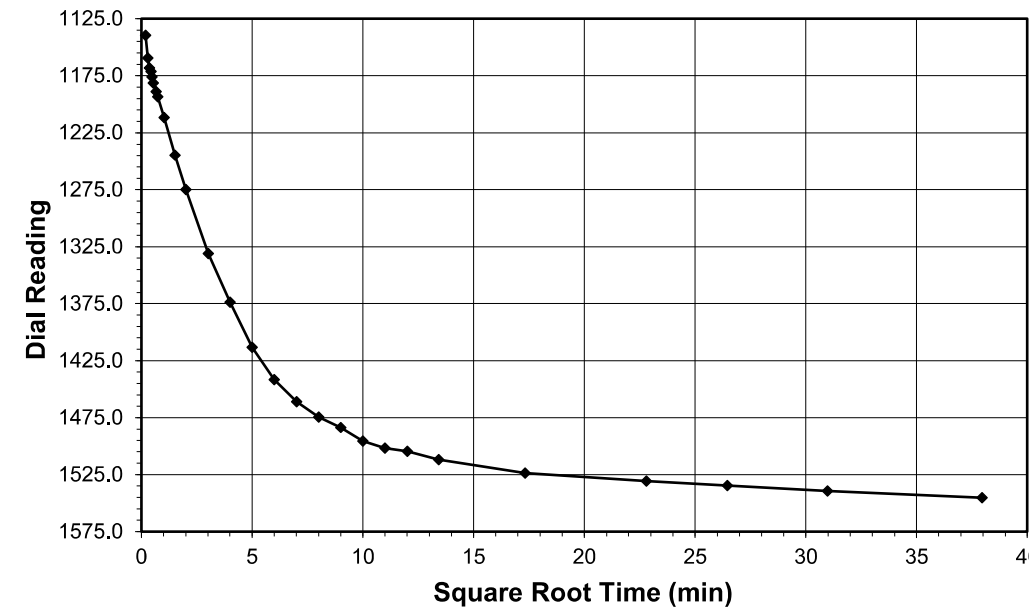
Tested By 129-07-0411 Date 12/26/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc.
 Client Project: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Boring No.: EB1-B
 Depth (ft): 10-12
 Sample No.: ST-3
 Visual Description: Black Clayey Sand

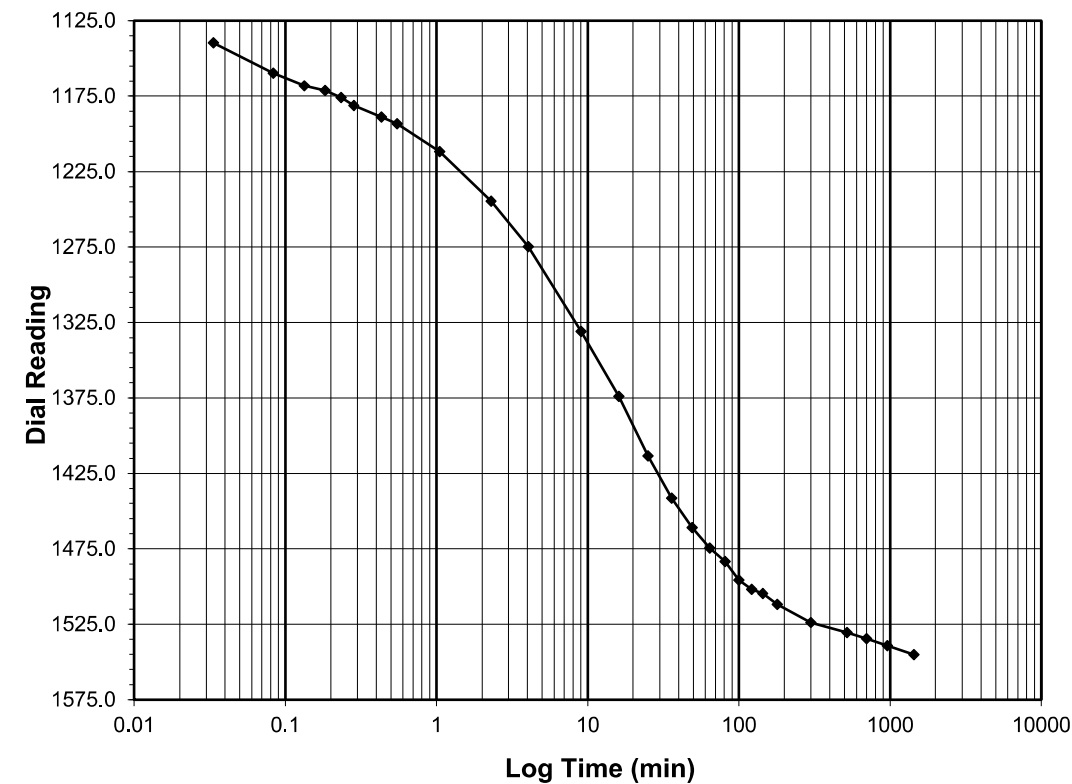
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **4.0-8.0**
 Final Reading (div) **1545.2**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/27/2021
 Start Time 9:16:23

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1110.2 |
| 0.03 | 1139.7 |
| 0.08 | 1159.6 |
| 0.13 | 1168.2 |
| 0.18 | 1171.3 |
| 0.23 | 1175.9 |
| 0.28 | 1181.2 |
| 0.43 | 1188.9 |
| 0.55 | 1193.4 |
| 1.05 | 1211.7 |
| 2.30 | 1244.6 |
| 4.05 | 1274.8 |
| 9.05 | 1330.8 |
| 16.05 | 1373.9 |
| 25.05 | 1413.3 |
| 36.05 | 1441.5 |
| 49.05 | 1461.0 |
| 64.05 | 1474.5 |
| 81.05 | 1483.5 |
| 100.05 | 1495.7 |
| 121.05 | 1501.9 |
| 144.05 | 1504.7 |
| 180.05 | 1511.8 |
| 300.07 | 1523.8 |
| 520.07 | 1530.7 |
| 700.07 | 1534.5 |
| 960.07 | 1539.3 |
| 1440.07 | 1545.2 |



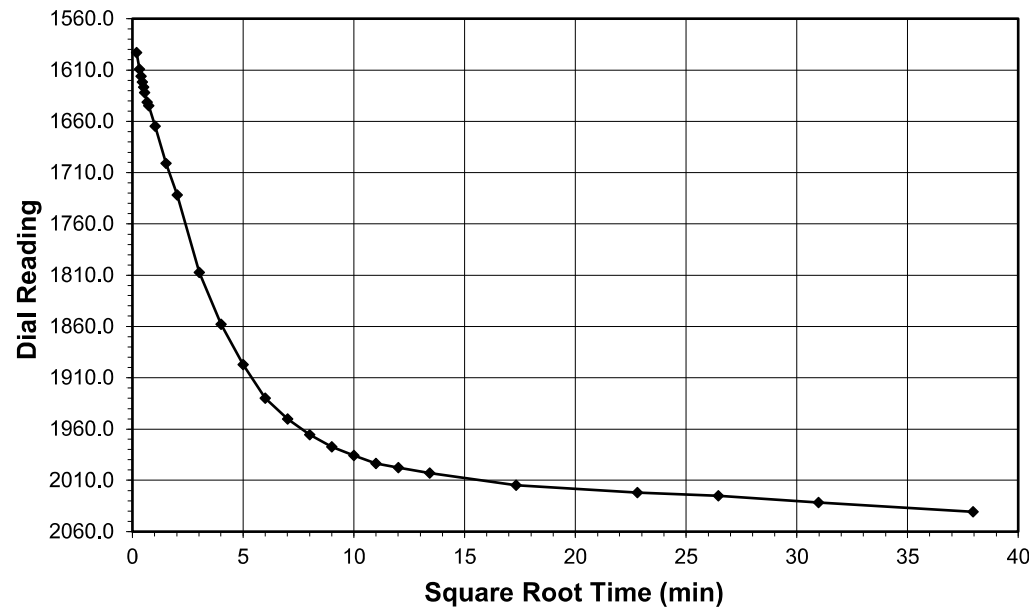
Tested By 129-07-0411 Date 12/27/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

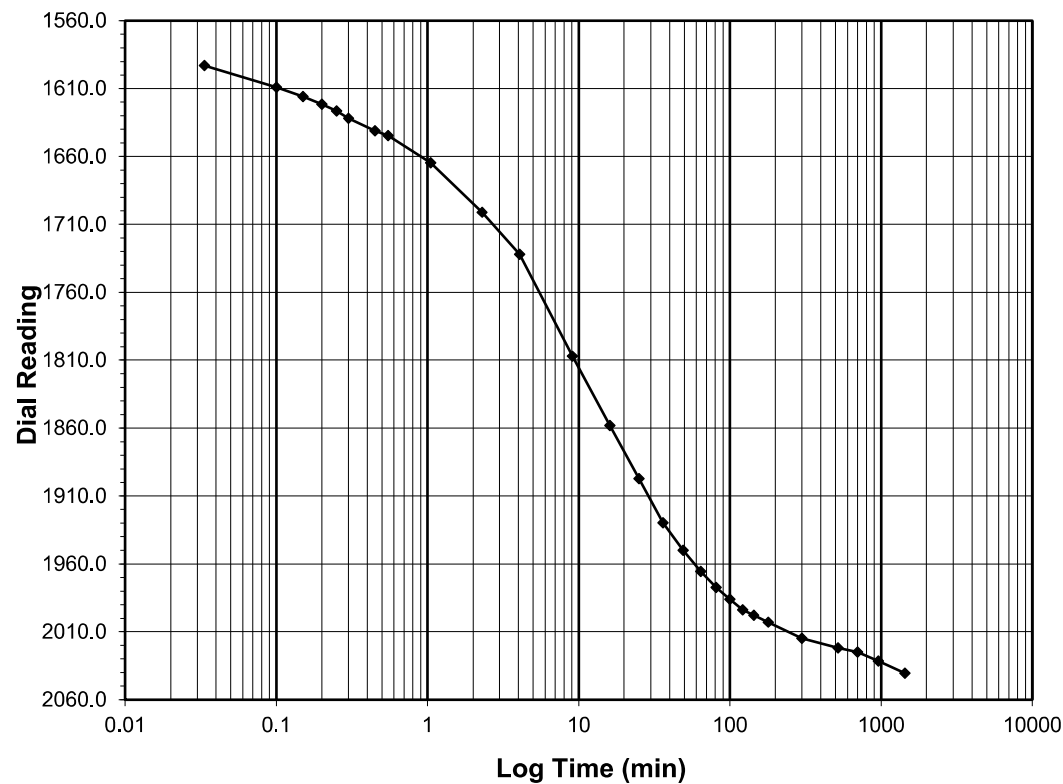
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **8.0-16.0**
 Final Reading (div) **2040.6**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/28/2021
 Start Time 9:16:34

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1545.2 |
| 0.03 | 1592.9 |
| 0.10 | 1609.1 |
| 0.15 | 1615.9 |
| 0.20 | 1621.7 |
| 0.25 | 1626.7 |
| 0.30 | 1631.9 |
| 0.45 | 1641.1 |
| 0.55 | 1644.6 |
| 1.05 | 1664.5 |
| 2.30 | 1701.1 |
| 4.07 | 1732.0 |
| 9.07 | 1807.1 |
| 16.07 | 1858.0 |
| 25.07 | 1897.1 |
| 36.07 | 1929.9 |
| 49.07 | 1949.9 |
| 64.07 | 1965.5 |
| 81.07 | 1977.4 |
| 100.07 | 1986.0 |
| 121.07 | 1993.6 |
| 144.07 | 1997.6 |
| 180.07 | 2002.9 |
| 300.08 | 2014.9 |
| 520.08 | 2022.0 |
| 700.08 | 2025.1 |
| 960.08 | 2031.6 |
| 1440.08 | 2040.6 |

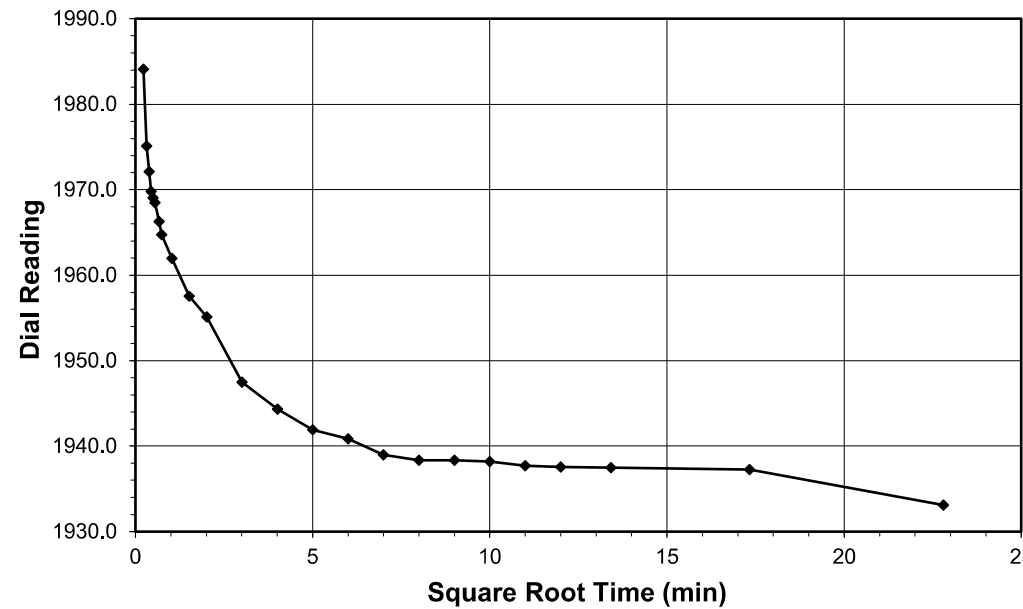


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

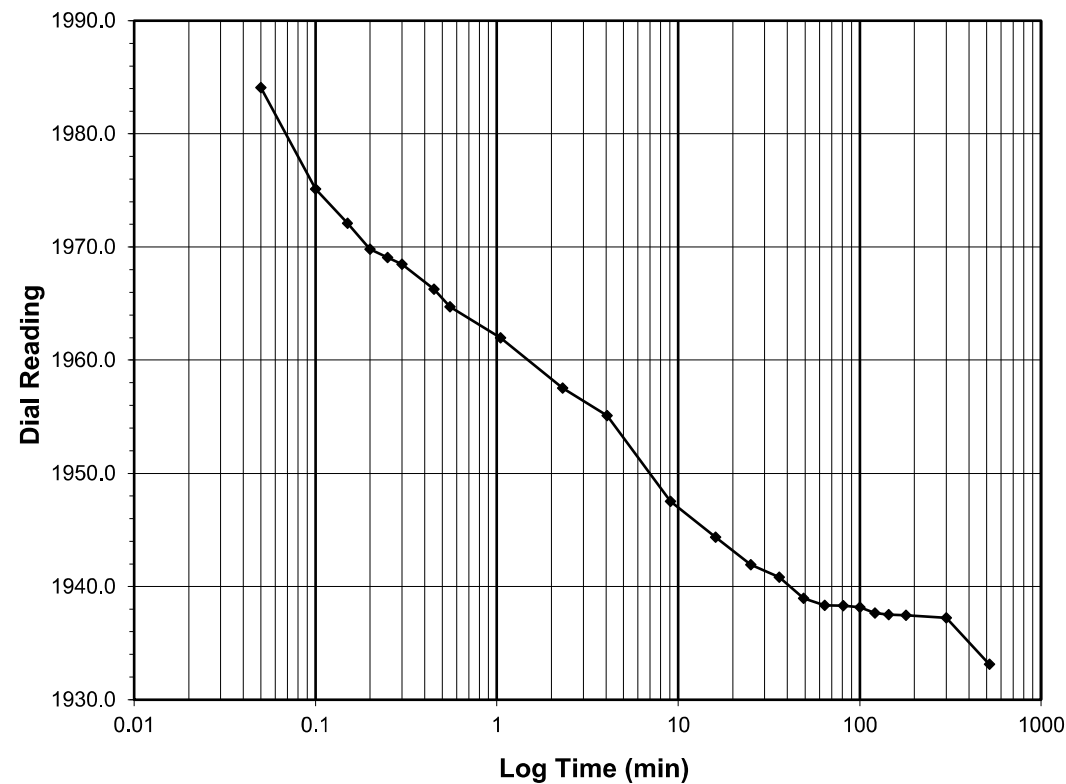
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **16.0-4.0**
 Final Reading (div) **1933.1**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/29/2021
 Start Time 9:16:52

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 2040.6 |
| 0.05 | 1984.1 |
| 0.10 | 1975.1 |
| 0.15 | 1972.1 |
| 0.20 | 1969.8 |
| 0.25 | 1969.1 |
| 0.30 | 1968.5 |
| 0.45 | 1966.3 |
| 0.55 | 1964.7 |
| 1.05 | 1962.0 |
| 2.30 | 1957.5 |
| 4.05 | 1955.1 |
| 9.05 | 1947.5 |
| 16.05 | 1944.4 |
| 25.05 | 1941.9 |
| 36.07 | 1940.8 |
| 49.07 | 1939.0 |
| 64.07 | 1938.3 |
| 81.07 | 1938.3 |
| 100.07 | 1938.2 |
| 121.07 | 1937.7 |
| 144.07 | 1937.5 |
| 180.07 | 1937.5 |
| 300.07 | 1937.2 |
| 520.07 | 1933.1 |



Tested By 129-07-0411 Date 12/28/2021 Checked By GEM Date 1/4/2022

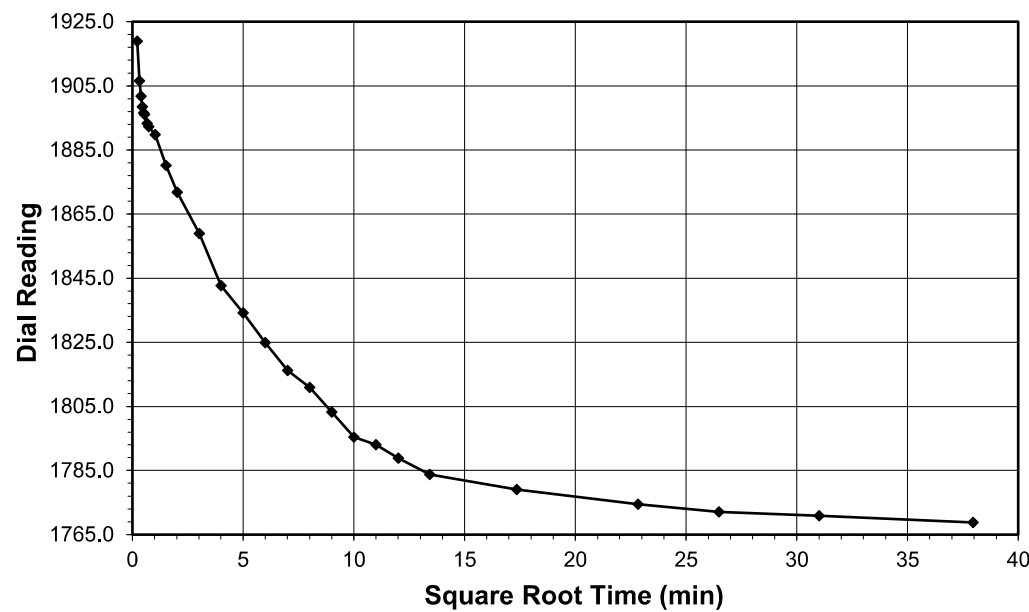
Tested By 129-07-0411 Date 12/29/2021 Checked By GEM Date 1/4/2022

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

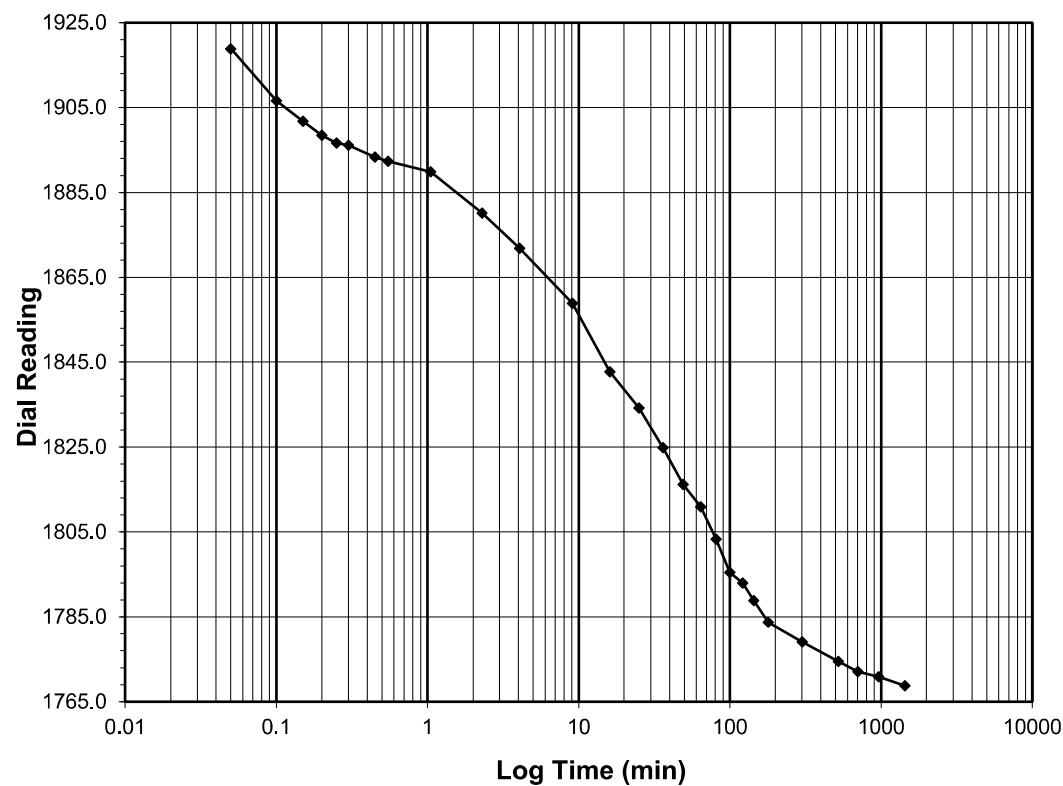
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **4.0-1.0**
 Final Reading (div) **1768.8**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/29/2021
 Start Time 17:57:00

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1933.1 |
| 0.05 | 1918.9 |
| 0.10 | 1906.6 |
| 0.15 | 1901.8 |
| 0.20 | 1898.5 |
| 0.25 | 1896.6 |
| 0.30 | 1896.1 |
| 0.45 | 1893.3 |
| 0.55 | 1892.3 |
| 1.05 | 1889.9 |
| 2.30 | 1880.2 |
| 4.07 | 1871.8 |
| 9.07 | 1858.9 |
| 16.07 | 1842.7 |
| 25.07 | 1834.2 |
| 36.07 | 1824.9 |
| 49.07 | 1816.2 |
| 64.07 | 1810.9 |
| 81.07 | 1803.3 |
| 100.08 | 1795.4 |
| 121.08 | 1793.0 |
| 144.08 | 1788.8 |
| 180.08 | 1783.7 |
| 301.08 | 1779.0 |
| 521.08 | 1774.5 |
| 701.08 | 1772.0 |
| 961.08 | 1770.8 |
| 1440.25 | 1768.8 |

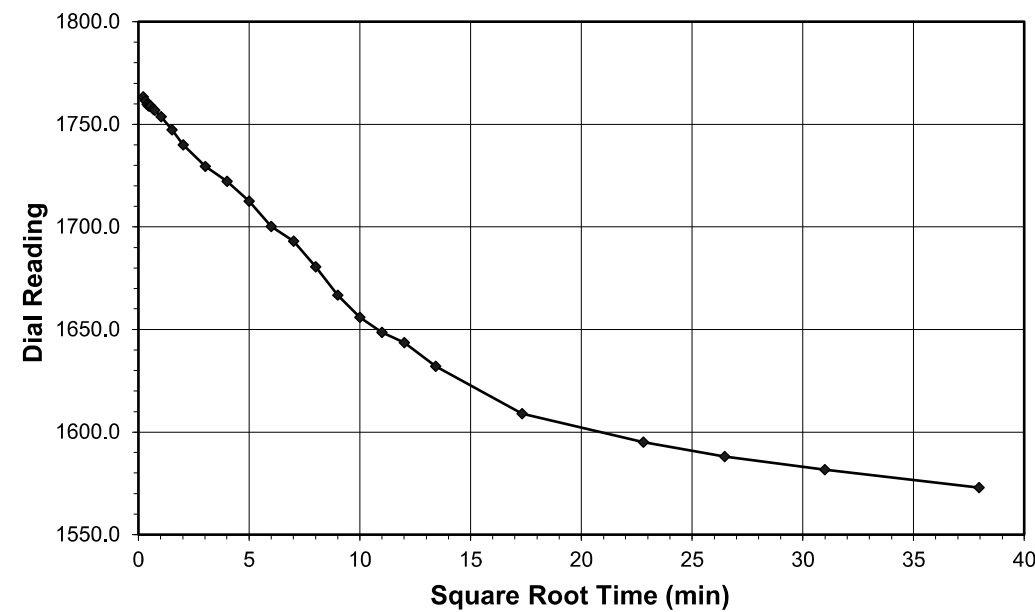


ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Project: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004 Visual Description: Black Clayey Sand

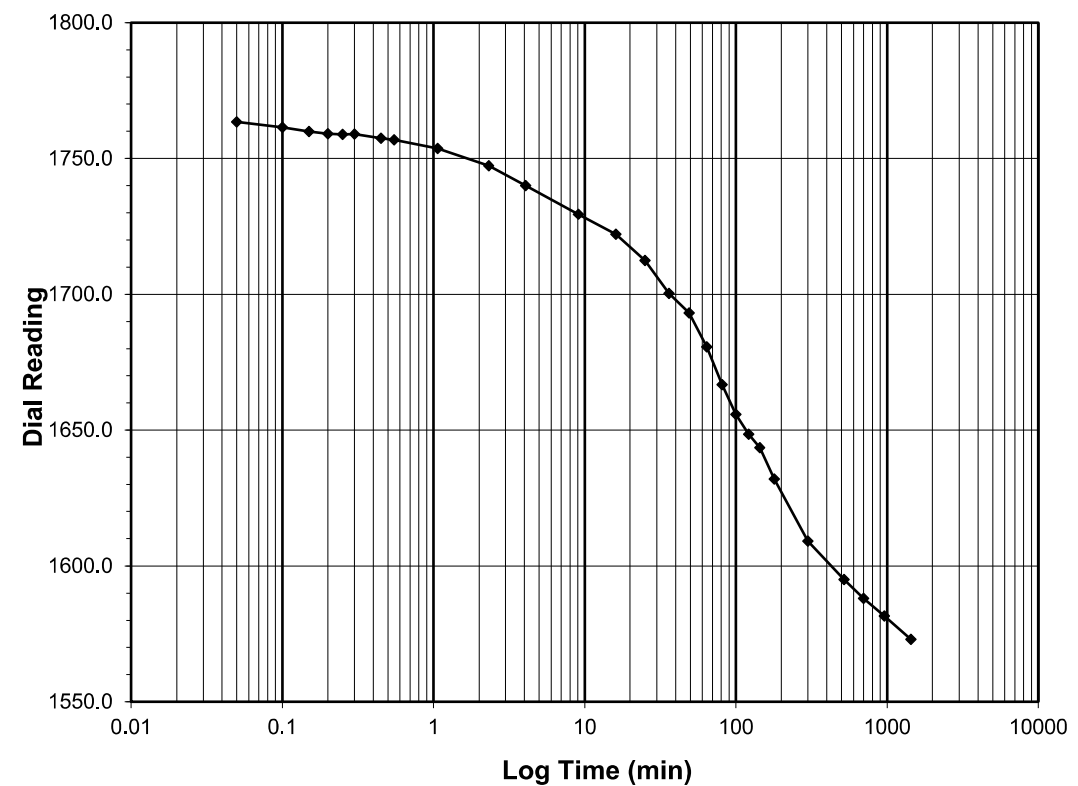
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) **1.0-0.25**
 Final Reading (div) **1572.9**
 Consolidometer No. **R554**
 1 Division (in) 0.0001

Start Date 12/30/2021
 Start Time 17:57:15

| Elapsed Time (min) | Dial Reading (div) |
|--------------------|--------------------|
| Initial | 1768.8 |
| 0.05 | 1763.4 |
| 0.10 | 1761.5 |
| 0.15 | 1759.9 |
| 0.20 | 1759.1 |
| 0.25 | 1758.9 |
| 0.30 | 1759.0 |
| 0.45 | 1757.4 |
| 0.55 | 1756.9 |
| 1.07 | 1753.7 |
| 2.32 | 1747.4 |
| 4.07 | 1740.1 |
| 9.07 | 1729.5 |
| 16.07 | 1722.1 |
| 25.07 | 1712.4 |
| 36.07 | 1700.3 |
| 49.07 | 1693.1 |
| 64.07 | 1680.7 |
| 81.07 | 1666.7 |
| 100.08 | 1655.8 |
| 121.08 | 1648.5 |
| 144.08 | 1643.5 |
| 180.08 | 1632.1 |
| 300.08 | 1609.1 |
| 520.08 | 1595.0 |
| 700.10 | 1588.0 |
| 960.10 | 1581.6 |
| 1440.10 | 1572.9 |



Tested By 129-07-0411 Date 12/29/2021 Checked By GEM Date 1/4/2022

Tested By 129-07-0411 Date 12/30/2021 Checked By GEM Date 1/4/2022



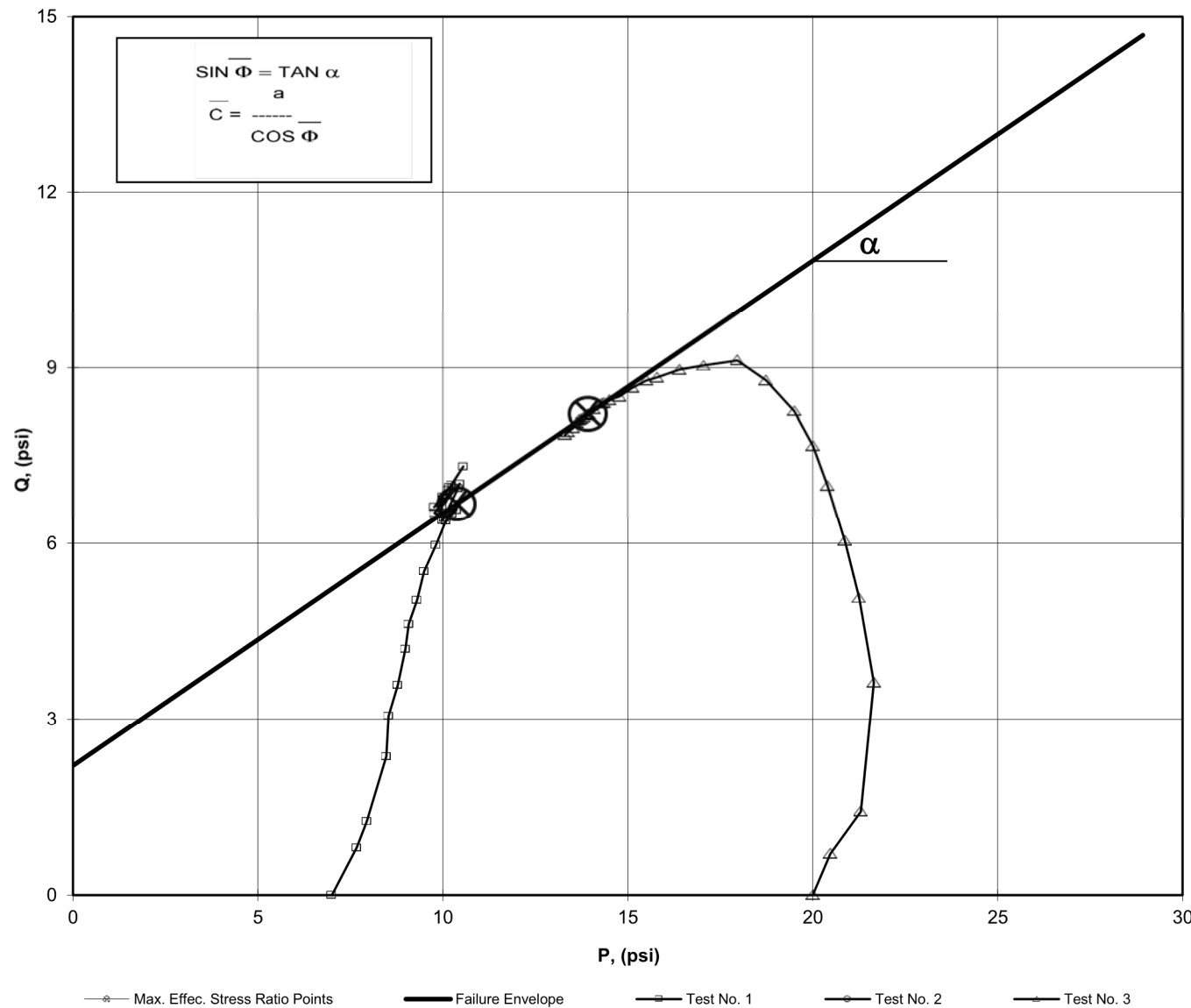
**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004

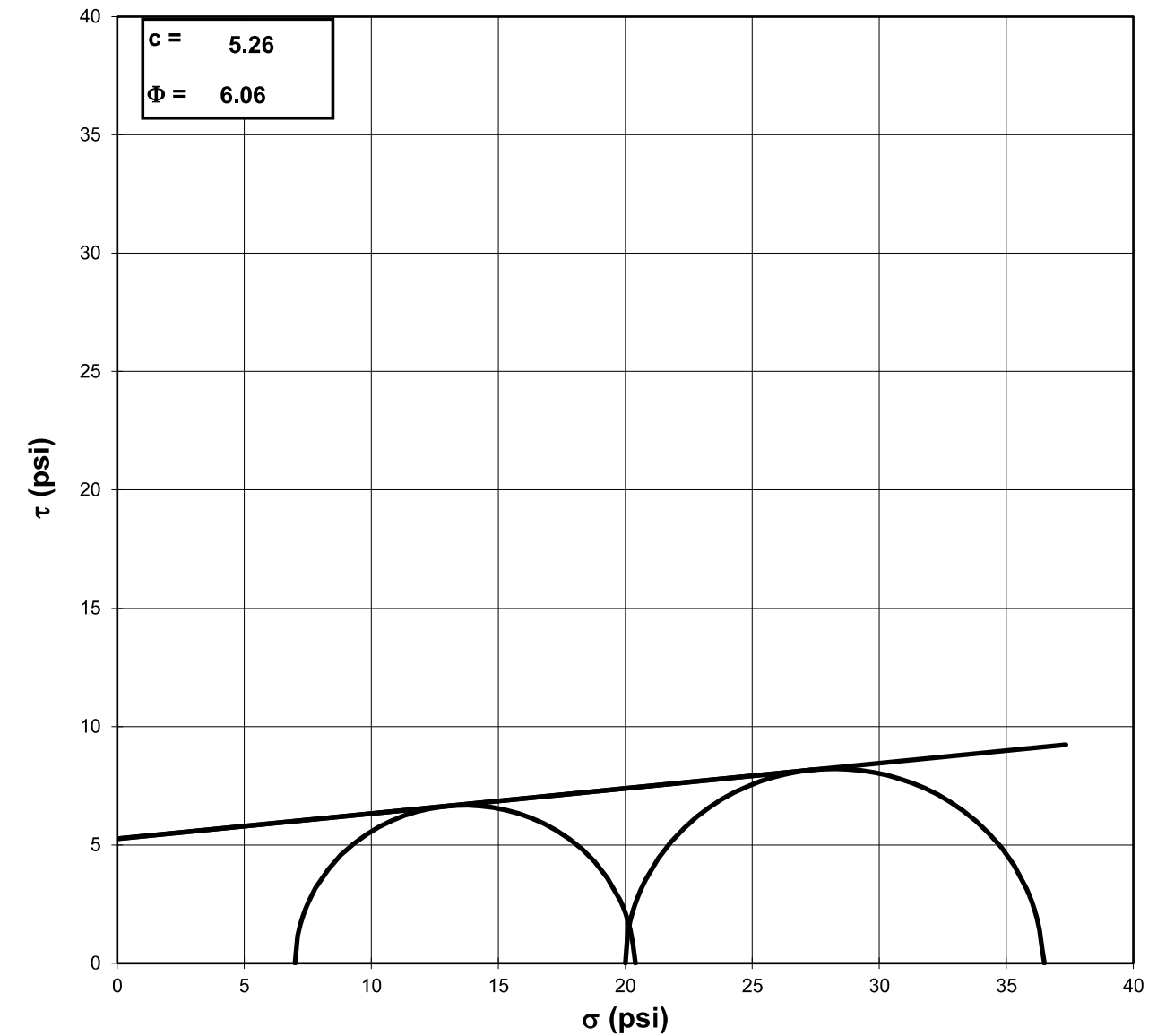
**MOHR TOTAL STRENGTH ENVELOPE
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004
 Visual Description: Black Clay (Undisturbed)

Consolidated Undrained Triaxial Test with Pore Pressure



| | | | | | |
|----------|---|-------------|-----------|---|--------------|
| a | = | 2.20 | C̄ | = | 2.44 |
| α | = | 23.3 | Φ̄ | = | 25.56 |



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-07-0411 Date: 12/20/21 Approved By: MPS Date: 12/29/21

Tested By: 129-07-0411 Date: 12/20/21 Approved By: MPS Date: 12/29/21

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004

Visual Description: Black Clay (Undisturbed)

| | |
|-----------|---|
| Stage No. | 0 |
| Test No. | 1 |

INITIAL SAMPLE DIMENSIONS (in)

| | | | |
|--------------|-------|-------------|-------|
| Length 1: | 6.138 | Diameter 1: | 2.831 |
| Length 2: | 6.151 | Diameter 2: | 2.835 |
| Length 3: | 6.126 | Diameter 3: | 2.840 |
| Length 4: | 6.140 | Diameter 4: | 2.839 |
| Avg. Length: | 6.139 | Avg. Diam.: | 2.836 |

PRESSURES (psi)

| | |
|----------------------------|------|
| Cell Pressure (psi) | 57.0 |
| Back Pressure (psi) | 50.0 |
| Eff. Conf. Pressure (psi) | 7.0 |
| Pore Pressure Response (%) | 99 |

VOLUME CHANGE

| | |
|------------------------------|------|
| Initial Burette Reading (ml) | 24.0 |
| Final Burette Reading (ml) | 13.1 |
| Final Change (ml) | 10.9 |

MAXIMUM OBLIQUITY POINTS

| | | |
|-----------|---|-------|
| \bar{P} | = | 10.37 |
| Q | = | 6.68 |

| | |
|--|-----|
| Initial Dial Reading (mil) | 277 |
| Dial Reading After Saturation (mil) | 278 |
| Dial Reading After Consolidation (mil) | 289 |

| LOAD (LB) | DEFORMATION (IN) | PORE PRESSURE (PSI) |
|-----------|------------------|---------------------|
| 20.9 | 0.000 | 50.0 |
| 30.9 | 0.001 | 50.1 |
| 36.4 | 0.003 | 50.3 |
| 50.3 | 0.008 | 50.9 |
| 59.0 | 0.014 | 51.5 |
| 65.6 | 0.020 | 51.8 |
| 73.3 | 0.029 | 52.2 |
| 78.7 | 0.038 | 52.5 |
| 84.0 | 0.051 | 52.7 |
| 90.3 | 0.072 | 53.0 |
| 96.5 | 0.103 | 53.2 |
| 102.2 | 0.140 | 53.3 |
| 105.1 | 0.177 | 53.2 |
| 107.0 | 0.219 | 53.3 |
| 105.3 | 0.249 | 53.3 |
| 104.9 | 0.292 | 53.4 |
| 105.3 | 0.351 | 53.4 |
| 113.6 | 0.414 | 53.5 |
| 115.4 | 0.459 | 53.6 |
| 111.2 | 0.519 | 53.7 |
| 109.8 | 0.565 | 53.6 |
| 111.0 | 0.612 | 53.7 |
| 117.8 | 0.658 | 53.7 |
| 119.0 | 0.688 | 53.8 |
| 124.1 | 0.719 | 53.8 |
| 118.9 | 0.749 | 53.8 |
| 117.9 | 0.779 | 53.8 |
| 118.1 | 0.825 | 53.8 |
| 117.0 | 0.872 | 53.9 |
| 122.4 | 0.903 | 53.8 |
| 122.0 | 0.933 | 53.8 |

Tested By: 129-07-0411 Date: 12/20/21 Input Checked By: GEM Date: 12/29/21

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297



Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004

Visual Description: Black Clay (Undisturbed)

| | | | |
|------------------------------------|-----|-----------|---|
| Effective Confining Pressure (psi) | 7.0 | Stage No. | 0 |
| | | Test No. | 1 |

INITIAL DIMENSIONS

| | |
|--|-------|
| Initial Sample Length (in) | 6.14 |
| Initial Sample Diameter (in) | 2.84 |
| Initial Sample Area (in ²) | 6.32 |
| Initial Sample Volume (in ³) | 38.78 |

VOLUME CHANGE

| | |
|---|-------|
| Volume After Consolidation (in ³) | 38.10 |
| Length After Consolidation (in) | 6.13 |
| Area After Consolidation (in ²) | 6.219 |

| Strain (%) | Deviator Stress (PSI) | ΔU | $\bar{\sigma}_1$ | $\bar{\sigma}_3$ | Effective Principal Stress Ratio | \bar{A} | \bar{P} | Q |
|------------|-----------------------|------------|------------------|------------------|----------------------------------|-----------|-----------|---|
|------------|-----------------------|------------|------------------|------------------|----------------------------------|-----------|-----------|---|

| | | | | | | | | |
|-------|-------|------|-------|-----|-------|------|-------|------|
| 0.02 | 1.61 | 0.13 | 8.48 | 6.9 | 1.235 | 0.08 | 7.67 | 0.81 |
| 0.05 | 2.50 | 0.31 | 9.20 | 6.7 | 1.374 | 0.12 | 7.94 | 1.25 |
| 0.13 | 4.73 | 0.89 | 10.83 | 6.1 | 1.774 | 0.19 | 8.47 | 2.36 |
| 0.23 | 6.12 | 1.53 | 11.59 | 5.5 | 2.118 | 0.25 | 8.53 | 3.06 |
| 0.33 | 7.17 | 1.80 | 12.37 | 5.2 | 2.378 | 0.25 | 8.79 | 3.58 |
| 0.47 | 8.40 | 2.21 | 13.18 | 4.8 | 2.753 | 0.27 | 8.99 | 4.20 |
| 0.62 | 9.25 | 2.54 | 13.70 | 4.5 | 3.075 | 0.28 | 9.08 | 4.62 |
| 0.82 | 10.07 | 2.73 | 14.34 | 4.3 | 3.356 | 0.27 | 9.31 | 5.03 |
| 1.18 | 11.04 | 3.02 | 15.01 | 4.0 | 3.777 | 0.28 | 9.49 | 5.52 |
| 1.69 | 11.95 | 3.16 | 15.79 | 3.8 | 4.108 | 0.27 | 9.82 | 5.97 |
| 2.29 | 12.77 | 3.30 | 16.47 | 3.7 | 4.451 | 0.26 | 10.09 | 6.39 |
| 2.89 | 13.15 | 3.21 | 16.94 | 3.8 | 4.470 | 0.25 | 10.37 | 6.58 |
| 3.57 | 13.35 | 3.31 | 17.04 | 3.7 | 4.616 | 0.25 | 10.37 | 6.68 |
| 4.07 | 13.03 | 3.27 | 16.75 | 3.7 | 4.494 | 0.25 | 10.24 | 6.51 |
| 4.76 | 12.87 | 3.40 | 16.47 | 3.6 | 4.570 | 0.27 | 10.04 | 6.43 |
| 5.73 | 12.80 | 3.41 | 16.40 | 3.6 | 4.565 | 0.27 | 9.99 | 6.40 |
| 6.76 | 13.90 | 3.54 | 17.36 | 3.5 | 5.023 | 0.26 | 10.41 | 6.95 |
| 7.49 | 14.06 | 3.57 | 17.49 | 3.4 | 5.104 | 0.26 | 10.46 | 7.03 |
| 8.48 | 13.29 | 3.67 | 16.62 | 3.3 | 4.991 | 0.28 | 9.97 | 6.64 |
| 9.22 | 12.98 | 3.56 | 16.42 | 3.4 | 4.770 | 0.28 | 9.93 | 6.49 |
| 9.99 | 13.05 | 3.75 | 16.30 | 3.3 | 5.013 | 0.29 | 9.77 | 6.52 |
| 10.74 | 13.92 | 3.69 | 17.23 | 3.3 | 5.202 | 0.27 | 10.27 | 6.96 |
| 11.23 | 14.00 | 3.78 | 17.23 | 3.2 | 5.346 | 0.27 | 10.22 | 7.00 |
| 11.73 | 14.65 | 3.77 | 17.88 | 3.2 | 5.536 | 0.26 | 10.55 | 7.32 |
| 12.23 | 13.84 | 3.79 | 17.05 | 3.2 | 5.307 | 0.28 | 10.13 | 6.92 |
| 12.72 | 13.61 | 3.81 | 16.80 | 3.2 | 5.274 | 0.28 | 9.99 | 6.81 |
| 13.47 | 13.53 | 3.76 | 16.78 | 3.2 | 5.172 | 0.28 | 10.01 | 6.77 |
| 14.23 | 13.26 | 3.86 | 16.40 | 3.1 | 5.227 | 0.29 | 9.77 | 6.63 |
| 14.74 | 13.93 | 3.78 | 17.14 | 3.2 | 5.327 | 0.27 | 10.18 | 6.96 |
| 15.22 | 13.79 | 3.79 | 17.00 | 3.2 | 5.295 | 0.28 | 10.11 | 6.90 |



**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**

AASHTO T-297

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004

Visual Description: Black Clay (Undisturbed)

| | |
|-----------|---|
| Stage No. | 0 |
| Test No. | 3 |

INITIAL SAMPLE DIMENSIONS (in)

| | | | |
|--------------|-------|-------------|-------|
| Length 1: | 6.075 | Diameter 1: | 2.839 |
| Length 2: | 6.116 | Diameter 2: | 2.834 |
| Length 3: | 6.096 | Diameter 3: | 2.846 |
| Length 4: | 6.072 | Diameter 4: | 2.849 |
| Avg. Length: | 6.090 | Avg. Diam.: | 2.842 |

PRESSURES (psi)

| | |
|----------------------------|------|
| Cell Pressure (psi) | 70.0 |
| Back Pressure (psi) | 50.0 |
| Eff. Conf. Pressure (psi) | 20.0 |
| Pore Pressure Response (%) | 100 |

VOLUME CHANGE

| | |
|------------------------------|------|
| Initial Burette Reading (ml) | 48.9 |
| Final Burette Reading (ml) | 16.2 |
| Final Change (ml) | 32.7 |

MAXIMUM OBLIQUITY POINTS

| | | |
|-----------|---|-------|
| \bar{P} | = | 13.93 |
| \bar{Q} | = | 8.21 |

| | |
|--|-----|
| Initial Dial Reading (mil) | 323 |
| Dial Reading After Saturation (mil) | 320 |
| Dial Reading After Consolidation (mil) | 351 |

| LOAD (LB) | DEFORMATION (IN) | PORE PRESSURE (PSI) |
|-----------|------------------|---------------------|
| 17.5 | 0.000 | 50.0 |
| 26.0 | 0.001 | 50.2 |
| 34.7 | 0.002 | 50.1 |
| 61.4 | 0.009 | 52.0 |
| 79.0 | 0.014 | 53.8 |
| 90.8 | 0.020 | 55.2 |
| 102.5 | 0.029 | 56.6 |
| 110.9 | 0.038 | 57.7 |
| 118.3 | 0.051 | 58.8 |
| 125.1 | 0.072 | 60.1 |
| 129.8 | 0.103 | 61.2 |
| 129.4 | 0.139 | 62.0 |
| 129.2 | 0.176 | 62.6 |
| 128.4 | 0.218 | 63.0 |
| 128.3 | 0.249 | 63.3 |
| 127.5 | 0.292 | 63.5 |
| 126.8 | 0.350 | 63.7 |
| 127.2 | 0.411 | 63.9 |
| 127.4 | 0.456 | 64.0 |
| 128.5 | 0.517 | 64.1 |
| 128.1 | 0.564 | 64.2 |
| 128.0 | 0.610 | 64.3 |
| 128.7 | 0.655 | 64.3 |
| 128.8 | 0.686 | 64.4 |
| 129.0 | 0.716 | 64.4 |
| 129.4 | 0.747 | 64.4 |
| 129.4 | 0.777 | 64.4 |
| 129.1 | 0.823 | 64.5 |
| 129.2 | 0.869 | 64.5 |
| 129.2 | 0.900 | 64.6 |
| 129.1 | 0.931 | 64.6 |

Tested By: 129-07-0411 Date: 12/20/2021 Input Checked By: GEM Date: 12/29/2021
 page 7 of 10 DCN: CT-S28 DATE: 4/12/13 REVISION: 3

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**

AASHTO T-297

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004

Visual Description: Black Clay (Undisturbed)

| | | | |
|------------------------------------|------|-----------|---|
| Effective Confining Pressure (psi) | 20.0 | Stage No. | 0 |
| | | Test No. | 3 |

INITIAL DIMENSIONS

| | |
|--|-------|
| Initial Sample Length (in) | 6.09 |
| Initial Sample Diameter (in) | 2.84 |
| Initial Sample Area (in ²) | 6.34 |
| Initial Sample Volume (in ³) | 38.63 |

VOLUME CHANGE

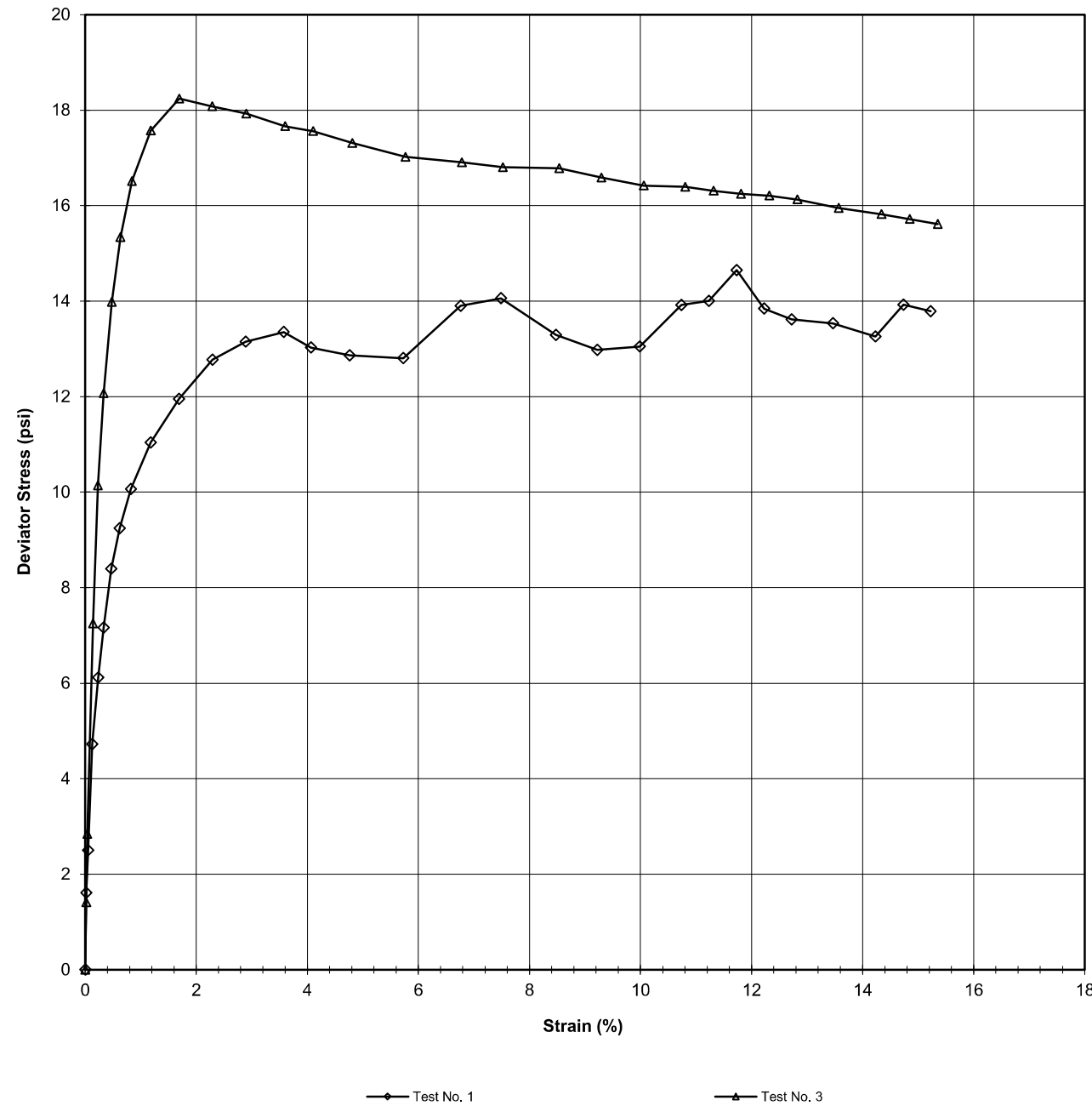
| | |
|---|-------|
| Volume After Consolidation (in ³) | 36.69 |
| Length After Consolidation (in) | 6.06 |
| Area After Consolidation (in ²) | 6.053 |

| Strain (%) | Deviator Stress PSI | ΔU | $\bar{\sigma}_1$ | $\bar{\sigma}_3$ | Effective Principal Stress Ratio | \bar{A} | \bar{P} | \bar{Q} |
|------------|---------------------|------------|------------------|------------------|----------------------------------|-----------|-----------|-----------|
| 0.02 | 1.41 | 0.23 | 21.18 | 19.8 | 1.071 | 0.16 | 20.48 | 0.70 |
| 0.04 | 2.84 | 0.12 | 22.73 | 19.9 | 1.143 | 0.04 | 21.30 | 1.42 |
| 0.14 | 7.25 | 1.97 | 25.28 | 18.0 | 1.402 | 0.27 | 21.65 | 3.63 |
| 0.23 | 10.14 | 3.82 | 26.33 | 16.2 | 1.627 | 0.38 | 21.25 | 5.07 |
| 0.33 | 12.07 | 5.16 | 26.91 | 14.8 | 1.814 | 0.43 | 20.87 | 6.03 |
| 0.48 | 13.98 | 6.59 | 27.39 | 13.4 | 2.043 | 0.47 | 20.40 | 6.99 |
| 0.63 | 15.34 | 7.66 | 27.68 | 12.3 | 2.244 | 0.50 | 20.01 | 7.67 |
| 0.84 | 16.52 | 8.76 | 27.76 | 11.2 | 2.469 | 0.53 | 19.50 | 8.26 |
| 1.18 | 17.57 | 10.05 | 27.52 | 9.9 | 2.766 | 0.57 | 18.73 | 8.78 |
| 1.69 | 18.24 | 11.16 | 27.09 | 8.8 | 3.063 | 0.61 | 17.97 | 9.12 |
| 2.29 | 18.08 | 12.00 | 26.08 | 8.0 | 3.259 | 0.66 | 17.04 | 9.04 |
| 2.90 | 17.93 | 12.57 | 25.36 | 7.4 | 3.414 | 0.70 | 16.39 | 8.96 |
| 3.60 | 17.66 | 13.04 | 24.62 | 7.0 | 3.539 | 0.74 | 15.79 | 8.83 |
| 4.10 | 17.56 | 13.28 | 24.28 | 6.7 | 3.615 | 0.76 | 15.50 | 8.78 |
| 4.81 | 17.31 | 13.53 | 23.78 | 6.5 | 3.677 | 0.78 | 15.12 | 8.66 |
| 5.77 | 17.02 | 13.74 | 23.28 | 6.3 | 3.719 | 0.81 | 14.77 | 8.51 |
| 6.78 | 16.90 | 13.95 | 22.96 | 6.1 | 3.793 | 0.83 | 14.50 | 8.45 |
| 7.52 | 16.80 | 14.05 | 22.76 | 6.0 | 3.822 | 0.84 | 14.36 | 8.40 |
| 8.53 | 16.78 | 14.09 | 22.69 | 5.9 | 3.840 | 0.84 | 14.30 | 8.39 |
| 9.30 | 16.59 | 14.21 | 22.37 | 5.8 | 3.867 | 0.86 | 14.08 | 8.29 |
| 10.06 | 16.42 | 14.28 | 22.14 | 5.7 | 3.873 | 0.87 | 13.93 | 8.21 |
| 10.81 | 16.39 | 14.28 | 22.11 | 5.7 | 3.866 | 0.87 | 13.92 | 8.20 |
| 11.32 | 16.31 | 14.35 | 21.96 | 5.6 | 3.887 | 0.88 | 13.80 | 8.16 |
| 11.81 | 16.25 | 14.38 | 21.87 | 5.6 | 3.892 | 0.89 | 13.74 | 8.12 |
| 12.32 | 16.21 | 14.43 | 21.78 | 5.6 | 3.909 | 0.89 | 13.68 | 8.10 |
| 12.83 | 16.13 | 14.44 | 21.68 | 5.6 | 3.903 | 0.90 | 13.62 | 8.06 |
| 13.57 | 15.95 | 14.45 | 21.50 | 5.5 | 3.875 | 0.91 | 13.52 | 7.97 |
| 14.34 | 15.82 | 14.54 | 21.28 | 5.5 | 3.897 | 0.92 | 13.37 | 7.91 |
| 14.85 | 15.72 | 14.56 | 21.16 | 5.4 | 3.888 | 0.93 | 13.30 | 7.86 |
| 15.35 | 15.62 | 14.56 | 21.06 | 5.4 | 3.871 | 0.93 | 13.25 | 7.81 |

page 8 of 10

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: BR-0160 Calabash Depth (ft): 10-12
 Project No.: R-2021-312-001 Sample No.: ST-3
 Lab ID: R-2021-312-001-004
 Visual Description: Black Clay (Undisturbed)



**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11**

Client: HDR Engineering, Inc.
 Client Reference: BR-0160 Calabash
 Project No.: R-2021-312-001
 Lab ID: R-2021-312-001-004
 Visual Description: Black Clay (Undisturbed)

Specific Gravity (measured) 2.7

SAMPLE CONDITION SUMMARY

| | | |
|--------------------------------|-------|-------|
| Boring No.: | EB1-B | EB1-B |
| Depth (ft): | 10-12 | 10-12 |
| Sample No.: | ST-3 | ST-3 |
| Test No. | T1 | T3 |
| Deformation Rate (in/min) | 0.002 | 0.002 |
| Back Pressure (psi) | 50.0 | 50.0 |
| Consolidation Time (days) | 1 | 1 |
| Moisture Content (%) (INITIAL) | 33.3 | 27.9 |
| Total Unit Weight (pcf) | 114.2 | 119.3 |
| Dry Unit Weight (pcf) | 85.6 | 93.3 |
| Moisture Content (%) (FINAL) | 28.5 | 36.8 |
| Initial State Void Ratio, e | 0.968 | 0.807 |
| Void Ratio at Shear, e | 0.934 | 0.717 |



Tested By: 129-07-0411 Date: 12/20/21 Input Checked By: GEM Date: 12/29/21
 page 10 of 10 DCN: CT-S28 DATE: 4/12/13 REVISION: 3

Tested By: 129-07-0411 Date: 12/20/2021 Approved By: MPS Date: 12/29/2021