

REFERENCE: R-2707D

PROJECT: 34497

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY CLEVELAND
 PROJECT DESCRIPTION US 74 (SHELBY BYPASS)
FROM EAST OF NC 180 TO WEST OF SR 2238
(LONG BRANCH ROAD)

PAVEMENT AND SUBGRADE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	1	14

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.

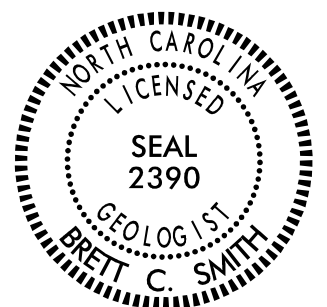
- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR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

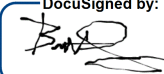
PERSONNEL

- B. SMITH, PG
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INVESTIGATED BY B. SMITH, PG
 DRAWN BY B. SMITH, PG
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 DATE MARCH, 2019

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DocuSigned by:  3/29/2019
 SIGNATURE... DATE

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

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										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 DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.									
MINERALOGICAL COMPOSITION										MINERALOGICAL COMPOSITION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										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.									
COMPRESSIBILITY										COMPRESSIBILITY										WEATHERING										WEATHERING									
SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV SLI) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY SEVERE (IV SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV SLI) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY SEVERE (IV SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.									
PERCENTAGE OF MATERIAL										PERCENTAGE OF MATERIAL										GROUND WATER										GROUND WATER									
ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP									
MISCELLANEOUS SYMBOLS										MISCELLANEOUS SYMBOLS										MISCELLANEOUS SYMBOLS										MISCELLANEOUS SYMBOLS									
ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION										DIP & DIP DIRECTION OF ROCK STRUCTURES SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE									
RECOMMENDATION SYMBOLS										RECOMMENDATION SYMBOLS										RECOMMENDATION SYMBOLS										RECOMMENDATION SYMBOLS									
UNDERCUT SHALLOW UNDERCUT										UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL										UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL									
ABBREVIATIONS										ABBREVIATIONS										ABBREVIATIONS										ABBREVIATIONS									
AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY										MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY										VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W _d - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W _d - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO									
TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE									
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053									
SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE - CORRELATION OF TERMS									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION									
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT									
PLASTICITY										PLASTICITY										PLASTICITY										PLASTICITY									
NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC									
COLOR										COLOR										COLOR										COLOR									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.									
EQUIPMENT USED ON SUBJECT PROJECT										EQUIPMENT USED ON SUBJECT PROJECT										EQUIPMENT USED ON SUBJECT PROJECT										EQUIPMENT USED ON SUBJECT PROJECT									
DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST CME-450										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 * TUNG-CARB. 4-INCH THIN WALL CORE BIT 2.25" SOLID-STEM AUGERS										HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -H -N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST KESSLER DCP										HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -H -N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST KESSLER DCP									
FRACTURE SPACING										FRACTURE SPACING										FRACTURE SPACING										FRACTURE SPACING									
TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET									
BEDDING										BEDDING										BEDDING										BEDDING									
TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET									
INDURATION										INDURATION										INDURATION										INDURATION									
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.									
BENCH MARK:										BENCH MARK:										BENCH MARK:										BENCH MARK:									
ELEVATION: FEET										ELEVATION: FEET										ELEVATION: FEET										ELEVATION: FEET									
NOTES:										NOTES:										NOTES:										NOTES:									
EB = EASTBOUND WB = WESTBOUND ISS = INSIDE SHOULDER OSS = OUTSIDE SHOULDER OSL = OUTSIDE LANE ISL = INSIDE LANE										EB = EASTBOUND WB = WESTBOUND ISS = INSIDE SHOULDER OSS = OUTSIDE SHOULDER OSL = OUTSIDE LANE ISL = INSIDE LANE										EB = EASTBOUND WB = WESTBOUND ISS = INSIDE SHOULDER OSS = OUTSIDE SHOULDER OSL = OUTSIDE LANE ISL = INSIDE LANE										EB = EASTBOUND WB = WESTBOUND ISS = INSIDE SHOULDER OSS = OUTSIDE SHOULDER OSL = OUTSIDE LANE ISL = INSIDE LANE									

Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 200
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

-Y4-

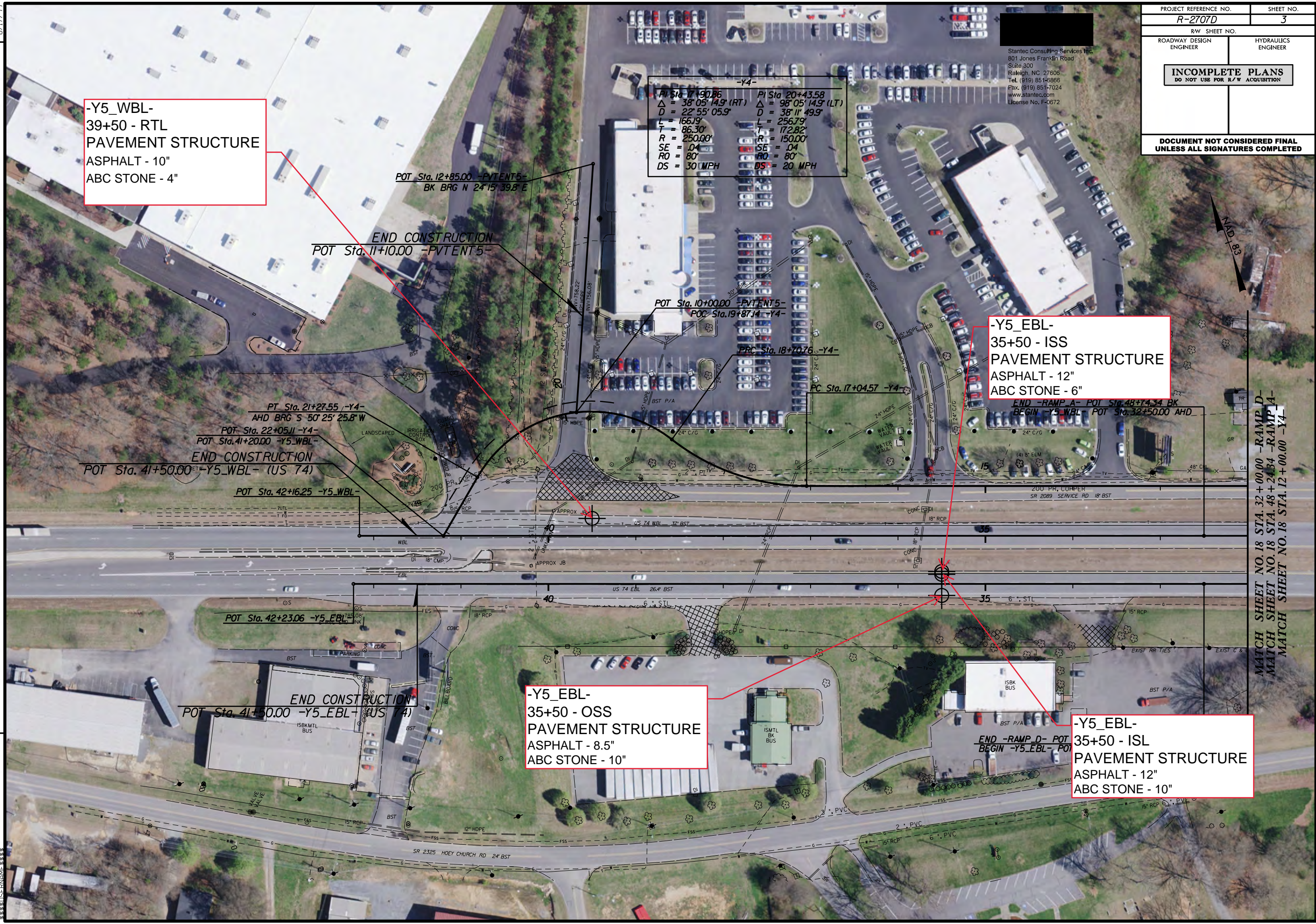
PI Sta. 17+90.86	PI Sta. 20+43.58
$\Delta = 38^{\circ} 05' 14.9" (RT)$	$\Delta = 98^{\circ} 05' 14.9" (LT)$
$D = 22^{\circ} 55' 05.9"$	$D = 38^{\circ} 11' 49.9"$
$L = 166.19'$	$L = 256.79'$
$T = 86.30'$	$T = 172.82'$
$R = 250.00'$	$R = 150.00'$
$SE = .04$	$SE = .04$
$RO = 80'$	$RO = 80'$
$DS = 30 MPH$	$DS = 20 MPH$

-Y5_WBL-
39+50 - RTL
PAVEMENT STRUCTURE
ASPHALT - 10"
ABC STONE - 4"

-Y5_EBL-
35+50 - ISS
PAVEMENT STRUCTURE
ASPHALT - 12"
ABC STONE - 6"

-Y5_EBL-
35+50 - OSS
PAVEMENT STRUCTURE
ASPHALT - 8.5"
ABC STONE - 10"

-Y5_EBL-
35+50 - ISL
PAVEMENT STRUCTURE
ASPHALT - 12"
ABC STONE - 10"



MATCH SHEET NO. 18 STA. 32+00.00 - RAMP D
 MATCH SHEET NO. 18 STA. 48+24.34 - RAMP A
 MATCH SHEET NO. 18 STA. 12+00.00 - Y4

REVISIONS
 25-FEB-2019 17:12 C:\Users\cmth\Documents\NCDDOT Projects\Active Projects\R-2707D_GEO_PDI.FielReport_Summit\CADD_GEO1TECH\PlanProf\VR2707D_RDY_PSH_26.dgn

NO.	DESCRIPTION

-RAMP_A-		
PG STA 46+00.00	PG STA 47+00.00	PG STA 48+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 46+00.00	LS = 47+00.00	LS = 48+00.00
LI = 46+00.00	LI = 47+00.00	LI = 48+00.00
ST = 66.77	ST = 66.77	ST = 66.77
R = 175.00'	R = 175.00'	R = 175.00'
CS = 65'	CS = 65'	CS = 65'
DS = 50 MPH	DS = 50 MPH	DS = 50 MPH

-RAMP_A-		
PG STA 49+00.00	PG STA 50+00.00	PG STA 51+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 49+00.00	LS = 50+00.00	LS = 51+00.00
LI = 49+00.00	LI = 50+00.00	LI = 51+00.00
ST = 66.77	ST = 66.77	ST = 66.77
R = 175.00'	R = 175.00'	R = 175.00'
CS = 65'	CS = 65'	CS = 65'
DS = 50 MPH	DS = 50 MPH	DS = 50 MPH

PROJECT NUMBER: HC2000	SHEET NO: 4
ROADWAY DESIGN: INCOMPLETE PLANS	ENGINEER: INCOMPLETE PLANS
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

-RAMP_A-
 46+00 - WB OSS
 PAVEMENT STRUCTURE
 ASPHALT - 10.5"
 ABC STONE - 12"

-RAMP_A-
 46+00 - WB OSL
 PAVEMENT STRUCTURE
 ASPHALT - 13"
 ABC STONE - 8"

-RAMP_A-
 46+00 - WB ISS
 PAVEMENT STRUCTURE
 ASPHALT - 11.5"
 ABC STONE - 10"

-RAMP_A-		-RAMP_D-	
PG STA 46+00.00	PG STA 47+00.00	PG STA 46+00.00	PG STA 47+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 46+00.00	LS = 47+00.00	LS = 46+00.00	LS = 47+00.00
LI = 46+00.00	LI = 47+00.00	LI = 46+00.00	LI = 47+00.00
ST = 66.77	ST = 66.77	ST = 66.77	ST = 66.77
R = 175.00'	R = 175.00'	R = 175.00'	R = 175.00'
CS = 65'	CS = 65'	CS = 65'	CS = 65'
DS = 50 MPH	DS = 50 MPH	DS = 50 MPH	DS = 50 MPH

-RAMP_D-		-RAMP_E-	
PG STA 48+00.00	PG STA 49+00.00	PG STA 48+00.00	PG STA 49+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 48+00.00	LS = 49+00.00	LS = 48+00.00	LS = 49+00.00
LI = 48+00.00	LI = 49+00.00	LI = 48+00.00	LI = 49+00.00
ST = 66.77	ST = 66.77	ST = 66.77	ST = 66.77
R = 175.00'	R = 175.00'	R = 175.00'	R = 175.00'
CS = 65'	CS = 65'	CS = 65'	CS = 65'
DS = 50 MPH	DS = 50 MPH	DS = 50 MPH	DS = 50 MPH

-RAMP_D-		-RAMP_F-	
PG STA 50+00.00	PG STA 51+00.00	PG STA 50+00.00	PG STA 51+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 50+00.00	LS = 51+00.00	LS = 50+00.00	LS = 51+00.00
LI = 50+00.00	LI = 51+00.00	LI = 50+00.00	LI = 51+00.00
ST = 66.77	ST = 66.77	ST = 66.77	ST = 66.77
R = 175.00'	R = 175.00'	R = 175.00'	R = 175.00'
CS = 65'	CS = 65'	CS = 65'	CS = 65'
DS = 50 MPH	DS = 50 MPH	DS = 50 MPH	DS = 50 MPH



LOCATION: SHAWNEE INTERCHANGE	COUNTY: CLEVELAND
PROJECT NO: HC2000	SHEET NO: 4
DESIGNED BY: INCOMPLETE PLANS	CHECKED BY: INCOMPLETE PLANS
DATE: 	DATE:

PROJECT NO: HC2000 SHEET NO: 4
 PROJECT NAME: SHAWNEE INTERCHANGE
 COUNTY: CLEVELAND
 DATE:
 DESIGNED BY:
 CHECKED BY:
 INCOMPLETE PLANS

**CONE PENETROMETER
DATA CODE SHEET**

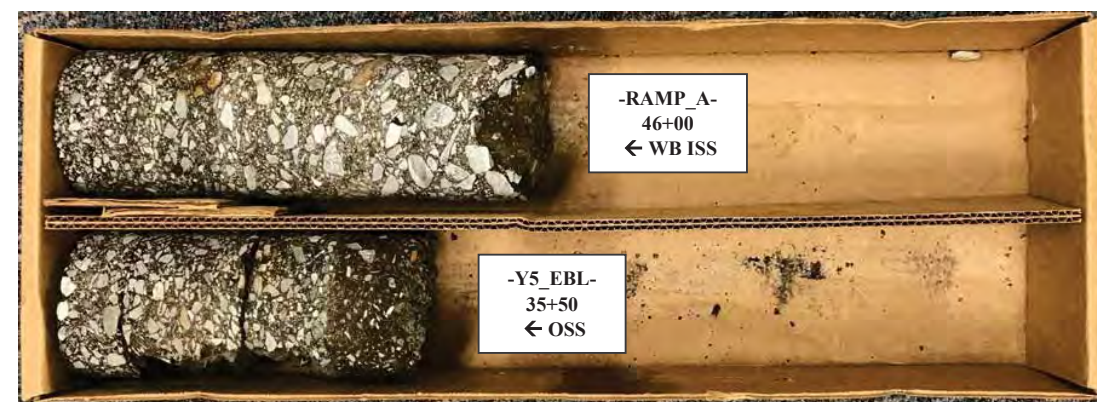
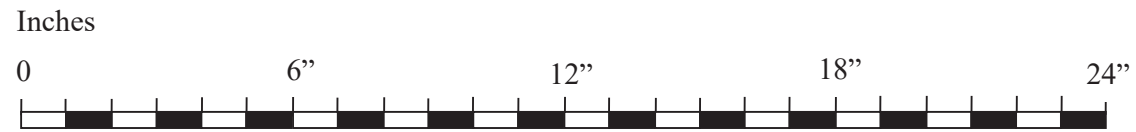
PROJECT NUMBER				PROJECT I.D.				ROUTE			
34497.1.2				R-2707D				US-74			
COUNTY				GEOLOGIST				TECHNICIANS			
Cleveland				Brett Smith, PG				Mike & Johnathon Moseley			
Station (location) information				Station (location) information				Station (location) information			
(-Y5 EBL-) 35+50 - ISS				(-Y5 EBL-) 35+50 - ISL				(-Y5 EBL-) 35+50 - ISS			
Date run				Date run				Date run			
1/8/19 - 1/9/19				1/8/19 - 1/9/19				1/8/19 - 1/9/19			
Datum	cut or fill	Northing	Easting	Datum	cut or fill	Northing	Easting	Datum	cut or fill	Northing	Easting
ABC	Fill - 2'	559,565	1,263,652	ABC	Fill - 2'	559,562	1,263,651	ABC	Fill - 2'	559,562	1,263,651
Cumulative Penetration in Centimeters						Cumulative Penetration in Centimeters					
0.9	87.9			0.8	41.8						
1.6	89.5			1.5	42.9						
2.2	91.1			1.8	44.1						
2.7	92.0			2.2	45.2						
3.3	92.6			2.6	46.1						
3.9				3.0	47.2						
4.6				3.4	48.1						
5.4				3.8	49.1						
6.3				4.3	49.8						
7.1				4.7	50.6						
8.1				5.0	51.4						
9.1				5.3	52.2						
10.3				5.8	53.0						
11.8				6.0	54.2						
14.5				6.3	55.6						
19.4				6.6	56.8						
22.3				7.0	58.1						
23.6				7.2	59.5						
25.0				7.6	60.9						
26.3				8.0	62.4						
27.7				8.1	63.8						
29.3				8.5	65.4						
30.9				9.0	66.8						
32.6				9.2	68.3						
34.3				9.6	69.6						
35.9				9.8	70.8						
37.9				10.1	72.2						
40.1				10.4	73.5						
42.4				10.8	74.8						
44.3				11.2	76.1						
45.9				11.6	77.5						
47.1				12.0	79.0						
48.4				12.5	80.3						
49.8				13.0	81.8						
51.4				13.5	83.1						
53.1				14.0	84.5						
54.7				14.5	85.8						
56.8				15.0	87.0						
59.4				15.5	88.4						
61.6				16.2	89.6						
63.7				17.3	90.8						
65.8				18.4	91.9						
67.3				19.7	92.4						
68.8				21.7							
70.6				24.5							
72.5				28.1							
74.6				30.7							
76.6				33.0							
78.5				35.1							
80.6				36.8							
82.6				38.1							
84.5				39.4							
86.2				40.6							

**CONE PENETROMETER
DATA CODE SHEET**

PROJECT NUMBER				PROJECT I.D.				ROUTE			
34497.1.2				R-2707D				US-74			
COUNTY				GEOLOGIST				TECHNICIANS			
Cleveland				Brett Smith, PG				Mike & Johnathon Moseley			
Station (location) information				Station (location) information				Station (location) information			
(-Y5 EBL-) 35+50 - OSS				(-Y5 WBL-) 39+50 - RTL				(-Y5 WBL-) 39+50 - RTL			
Date run				Date run				Date run			
1/8/19 - 1/9/19				1/8/19 - 1/9/19				1/8/19 - 1/9/19			
Datum	cut or fill	Northing	Easting	Datum	cut or fill	Northing	Easting	Datum	cut or fill	Northing	Easting
ABC	Fill - 2'	559,539	1,263,642	ABC	Fill - 3'	559,761	1,263,298	ABC	Fill - 3'	559,761	1,263,298
Cumulative Penetration in Centimeters						Cumulative Penetration in Centimeters					
0.9	12.7	71.0		0.6	66.5						
1.4	13.0	72.3		1.2	67.9						
1.7	13.2	73.6		1.6	69.4						
1.9	13.4	75.0		1.9	70.8						
2.0	13.7	76.1		2.4	72.1						
2.3	14.0	77.3		2.8	73.4						
2.5	14.4	78.5		3.2	75.0						
2.6	14.6	79.7		3.5	76.1						
3.1	14.9	80.9		3.9	77.4						
3.2	15.3	82.0		4.3	78.6						
3.4	15.7	83.2		4.5	79.9						
3.6	16.0	84.2		5.1	81.0						
3.7	16.4	85.4		5.7	82.1						
4.0	16.7	86.7		6.1	83.3						
4.2	17.3	87.9		6.5	84.5						
4.4	17.6	89.2		6.9	85.8						
4.6	18.0	90.0		7.5	87.0						
4.9	18.4	91.1		8.4	87.9						
5.2	18.8	91.7		9.8	88.6						
5.4	19.3	92.0		11.5							
5.6	19.9	92.4		14.5							
5.7	20.4			17.3							
5.9	21.0			19.5							
6.3	21.6			21.5							
6.4	22.2			23.1							
6.6	23.0			24.7							
6.7	24.0			26.3							
7.0	25.2			28.0							
7.1	26.9			29.7							
7.2	29.9			31.2							
7.5	32.0			32.8							
7.6	33.9			34.3							
7.8	35.5			35.8							
8.1	37.3			37.3							
8.2	38.9			38.8							
8.3	40.7			40.2							
8.4	42.6			41.7							
8.7	44.7			43.3							
8.9	47.1			44.8							
9.2	49.5			46.3							
9.4	51.8			47.7							
9.6	53.7			49.2							
9.8	55.1			50.6							
9.9	56.4			52.1							
10.1	57.9			53.4							
10.4	59.4			54.9							
10.9	60.8			56.4							
11.1	62.3			57.7							
11.5	63.6			59.1							
11.7	65.0			60.6							
11.9	66.6			62.0							
12.2	68.0			63.5							
12.4	69.4			65.0							

North Carolina Department of Transportation
Geotechnical Unit
Asphalt Core Photo

Project No: 34497.1.2	I.D. No.: R-2707D	County: Cleveland	Dates: 1/8/19 - 1/9/19
Site Description: US-74 (Shelby Bypass) from East of NC 180 to West of SR 2238 (Long Branch Road)			
Driller: Mike Moseley	Core Size: 4-inch	Drill Machine: CME - 450	
Geologist / Engineer: Brett Smith, PG			

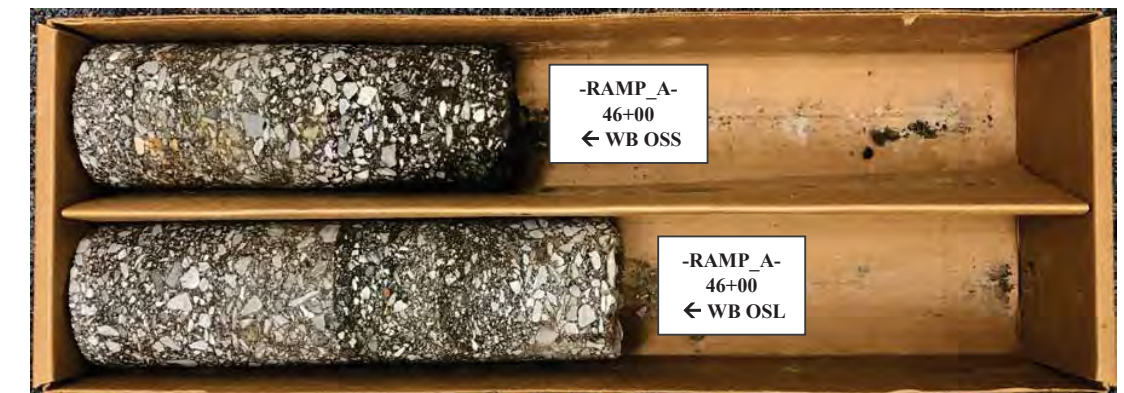
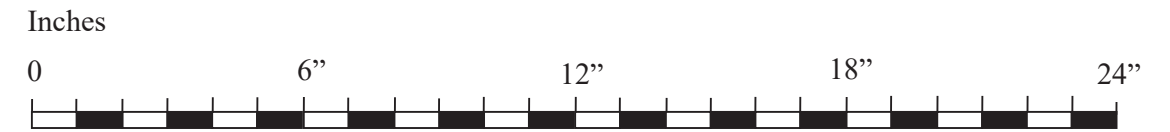


Notes:
EB = Eastbound
WB = Westbound
ISS/OSS = Inside Shoulder/Outside Shoulder
ISL/OSL = Inside Lane/Outside Lane



North Carolina Department of Transportation
Geotechnical Unit
Asphalt Core Photo

Project No: 34497.1.2	I.D. No.: R-2707D	County: Cleveland	Dates: 1/8/19 - 1/9/19
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Notes:
EB = Eastbound
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 MATERIALS & TESTS UNIT
 SOILS LABORATORY

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

T. I. P. No. R-2707D

REPORT ON SAMPLES OF PDI - US 74 Shelby Bypass

Project 34497.1.1 County Cleveland Owner Geotech
 Date: Sampled January 2019 Received 1/9/19 Reported 2/25/19
 Sampled from Pavement Design Investigation By Geotech
 Submitted by B. Smith 2008 Standard Specifications

T. I. P. No. R-2707D

REPORT ON SAMPLES OF PDI - US 74 Shelby Bypass

Project 34497.1.1 County Cleveland Owner Geotech
 Date: Sampled January 2019 Received 1/9/19 Reported 2/25/19
 Sampled from Pavement Design Investigation By Geotech
 Submitted by B. Smith 2008 Standard Specifications

2/25/19

TEST RESULTS

Proj. Sample No.	S-76	S-78	S-79	S-80	S-82
Boring No.	WB OSS	RTL	WB ISS	ISS	OSS
Retained #4 Sieve	2	3	3	1	1
Passing #10 Sieve	95	94	93	94	90
Passing #40 Sieve	32	78	74	73	36
Passing #200 Sieve	21	57	57	51	29

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%					
Coarse Sand Ret - #60	75.2	24.3	27.7	31.1	63.5
Fine Sand Ret - #270	3.9	20.9	16.4	20.6	7.7
Silt 0.05 - 0.005 mm	4.8	22.0	20.4	15.0	4.1
Clay < 0.005 mm	16.2	32.8	35.4	33.3	24.6
Passing #40 Sieve	34.2	83.3	79.6	77.4	39.7
Passing #200 Sieve	22.1	60.9	60.8	54.0	32.2

L. L.	42	43	35	39	43
P. I.	15	12	11	14	18
AASHTO Classification	A-2-7	A-7-5	A-6	A-6	A-2-7
Group Index	0	6	4	4	1
pH	N/A	N/A	N/A	N/A	N/A
Station	46+00	39+50	46+00	35+50	35+50
OFFSET	N/A	N/A	N/A	N/A	N/A
ALIGNMENT	RAMP_A	Y5_WBL	RAMP_A	Y5_EBL	Y5_EBL
Depth (Ft)	2.3	2.0	2.3	2.4	2.2
to	5.0	5.0	5.0	5.0	5.0
Natural Moisture %	18.5	23.1	20.6	16.0	22.1

Aaron Hackett
 Soils Engineer

3/6/19

TEST RESULTS

Proj. Sample No.	S-5	S-6	S-7
Boring No.	N/A	N/A	N/A
Retained #4 Sieve	19	1	2
Passing #10 Sieve	73	97	93
Passing #40 Sieve	42	54	64
Passing #200 Sieve	26	22	37

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%			
Coarse Sand Ret - #60	51.7	62.1	44.1
Fine Sand Ret - #270	16.8	19.9	20.4
Silt 0.05 - 0.005 mm	18.0	12.5	35.1
Clay < 0.005 mm	13.6	5.5	0.4
Passing #40 Sieve	58.1	55.7	68.6
Passing #200 Sieve	35.2	22.8	39.4

L. L.	50	36	41
P. I.	6	2	5
AASHTO Classification	A-2-5	A-2-4	A-5
Group Index	0	0	0
pH	N/A	N/A	N/A
Station	845+00	20+00	43+00
OFFSET	80' RT	16' LT	CL
ALIGNMENT	L	RAMP_D	RAMP_A
Depth (Ft)	0.5	0.5	0.5
to	3.5	3.5	3.5
Natural Moisture %	N/A	N/A	N/A

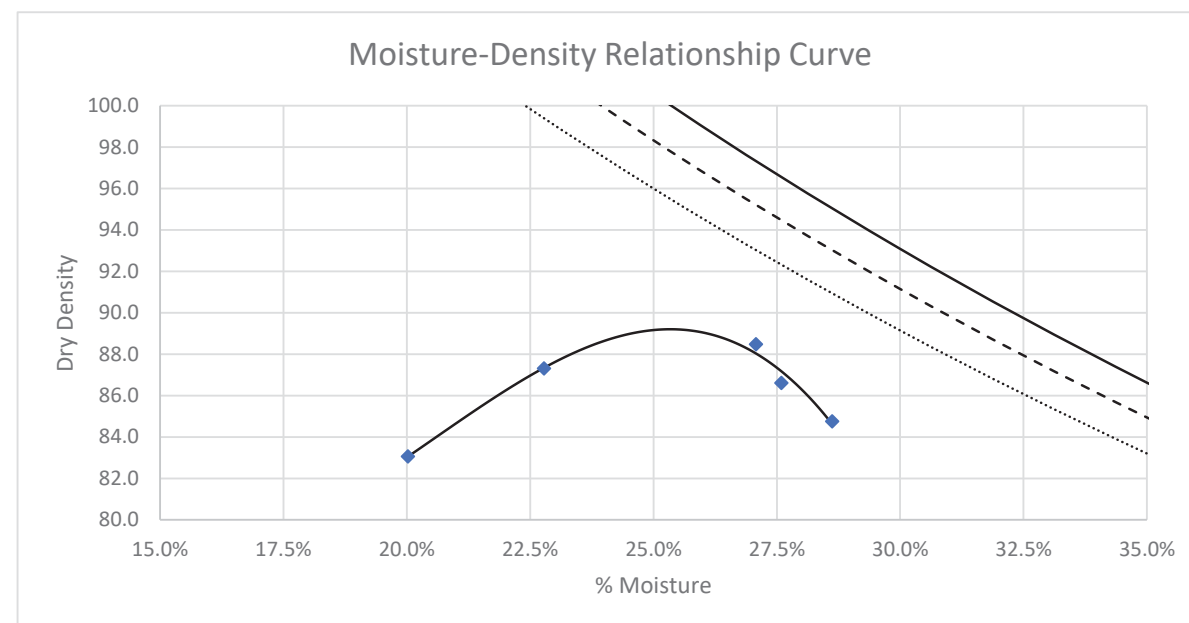
Aaron Hackett
 Soils Engineer

Standard Moisture-Density Relationship Report

ASTM D698

Project Number **18-0173.I46** Date **2/26/2019**
 Project Name **R-2707D** Sample Number **S-5**
 Client **NCDOT**

Sample Description **A-2-5** Maximum Dry Density **89.2**
 Sample Location **-L- 845+00 80' RT** Optimum Moisture **25.3%**



Natural Moisture: N/A	Rammer Type: Manual
Specific Gravity: 2.60 (Assumed)	Preparation Method: Dry
Liquid Limit: 50	Method: A
Plasticity Index: 6	Oversize Correction: Not Required
% Fines: 26.0%	
% Sand: 55.0%	
% Gravel: 19.0%	

Aaron Hackett, EI
Lab Manager

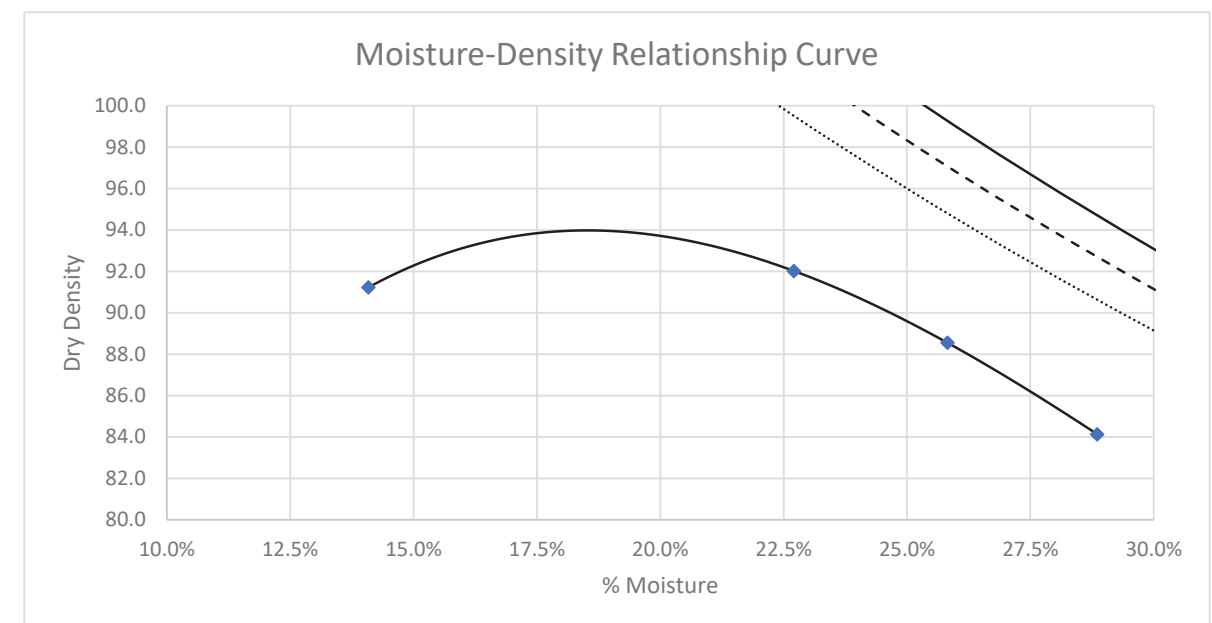
Jeff Elliott, PE
CMT & SI Department Manager

Standard Moisture-Density Relationship Report

ASTM D698

Project Number **18-0173.I46** Date **3/6/2019**
 Project Name **R-2707D** Sample Number **S-6**
 Client **NCDOT**

Sample Description **A-2-4** Maximum Dry Density **94.0**
 Sample Location **-RAMP_D- 20+00 16' LT** Optimum Moisture **18.5%**



Natural Moisture: N/A	Rammer Type: Manual
Specific Gravity: 2.60 (Assumed)	Preparation Method: Dry
Liquid Limit: 36	Method: A
Plasticity Index: 2	Oversize Correction: Not Required
% Fines: 22.0%	
% Sand: 77.0%	
% Gravel: 1.0%	

Aaron Hackett, EI
Lab Manager

Jeff Elliott, PE
CMT & SI Department Manager



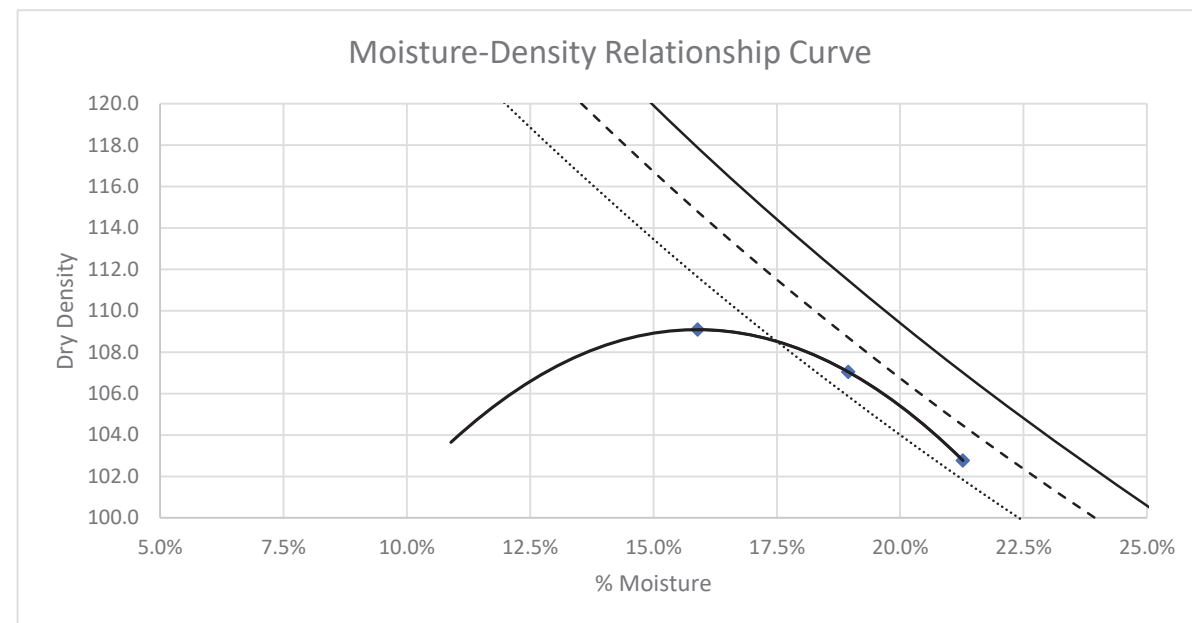
919.732.3883 SUMMIT-ENGINEER.COM
504 Meadowland Drive, Hillsborough, NC 27278

Standard Moisture-Density Relationship Report

ASTM D698

Project Number **18-0173.146** Date **3/6/2019**
Project Name **R-2707D** Sample Number **S-7**
Client **NCDOT**

Sample Description **A-5** Maximum Dry Density **109.1**
Sample Location **-RAMP_A- 43+00 CL** Optimum Moisture **15.9%**



Natural Moisture: **N/A**
Specific Gravity: **2.60 (Assumed)**
Liquid Limit: **41**
Plasticity Index: **5**
% Fines: **37.0%**
% Sand: **61.0%**
% Gravel: **2.0%**

Rammer Type: **Manual**
Preparation Method: **Dry**
Method: **A**
Oversize Correction: **Not Required**

Aaron Hackett, EI
Lab Manager

Jeff Elliott, PE
CMT & SI Department Manager



Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date **3/6/2019** Project Name **R-2707D**
Sample No. **S-5, Run #1** Project No. **18-0173.146**
Sample Location **-L- 845+00 80' RT** Client **NCDOT**

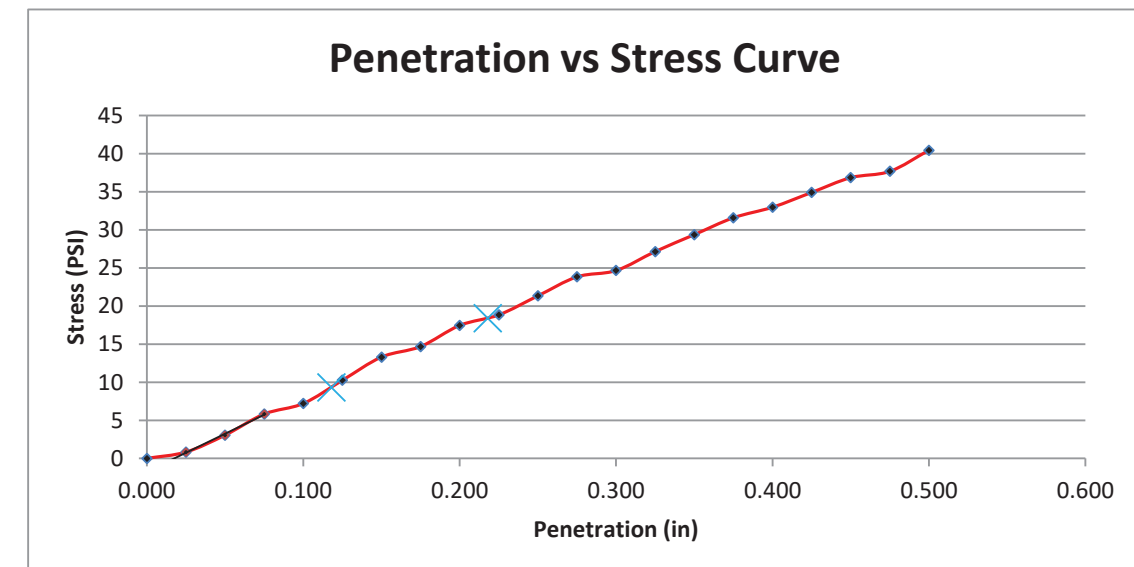
Proctor and Classification Data
Sample Description **N/A**
Classification **A-2-5**
Max. Dry Density **89.2**
Optimum Moisture **25.3%**

CBR Preparation Data
Rammer Used **5.5 lb, 12" drop**
Compaction Method **3 Layers, 56 Blows**
Surcharge Amount **10 lbs**
Soaked/Unsoaked **Soaked**

CBR Results
Compaction Moisture Content **27.4%** Dry unit weight (lbs/cu.ft) **89.7**
Moisture Content of Top 1" **31.7%** Percent of Max. Dry Density **100.6%**
After Soaking
Swell **0.6%**

CBR Values

Penetration (in)	0.1	0.2
Stress (psi)	9.30	18.40
CBR	0.9	1.2



Remarks: Zero-point correction applied. All material passed the 3/4" sieve.

Aaron Hackett
Lab Manager

Jeff Elliott, P.E.
CMT & SI Dept. Manager



Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-5, Run #2</u>	Project No.	<u>18-0173.146</u>
Sample Location	<u>-L- 845+00 80' RT</u>	Client	<u>NCDOT</u>



Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-6, Run #1</u>	Project No.	<u>18-0173.146</u>
Sample Location	<u>RAMP_D- 20+00 16' L'</u>	Client	<u>NCDOT</u>

Proctor and Classification Data

Sample Description	<u>N/A</u>
Classification	<u>A-2-5</u>
Max. Dry Density	<u>89.2</u>
Optimum Moisture	<u>25.3%</u>

CBR Preparation Data

Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

Proctor and Classification Data

Sample Description	<u>N/A</u>
Classification	<u>A-2-4</u>
Max. Dry Density	<u>94.0</u>
Optimum Moisture	<u>18.5%</u>

CBR Preparation Data

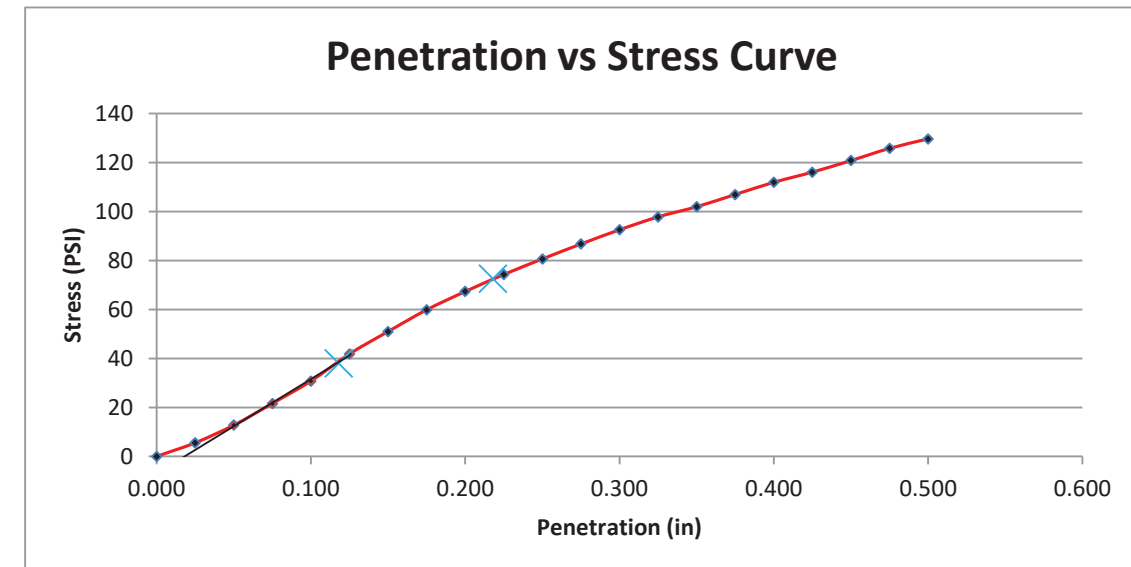
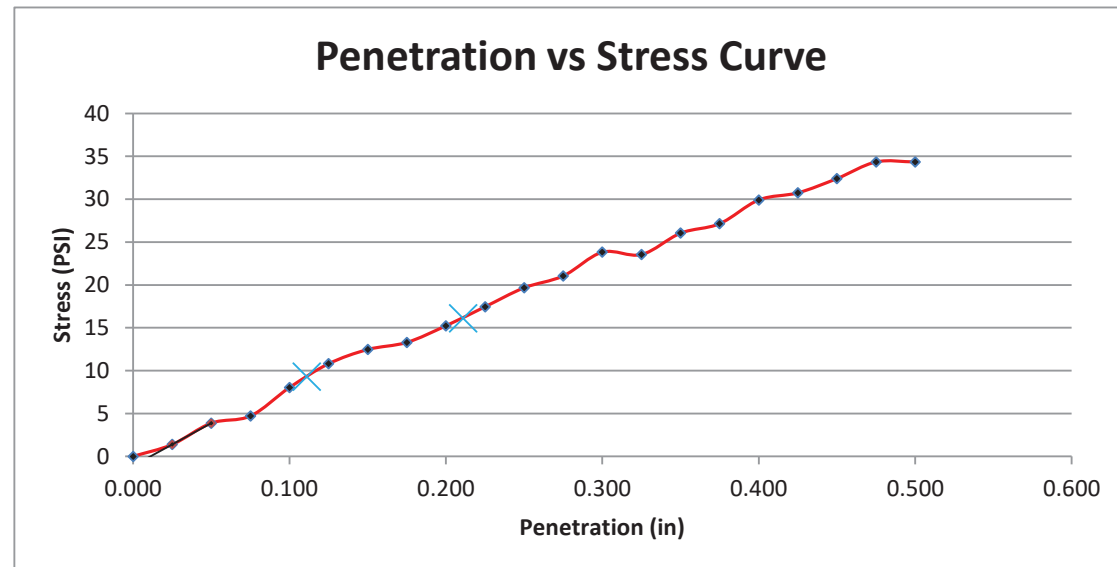
Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

CBR Results

Compaction Moisture Content	<u>29.1%</u>	Dry unit weight (lbs/cu.ft)	<u>88.1</u>
Moisture Content of Top 1"		Percent of Max. Dry Density	<u>98.8%</u>
After Soaking	<u>28.4%</u>		
		CBR Values	
Swell	<u>0.2%</u>	Penetration (in)	<u>0.1 0.2</u>
		Stress (psi)	<u>9.30 16.10</u>
		CBR	<u>0.9 1.1</u>

CBR Results

Compaction Moisture Content	<u>10.0%</u>	Dry unit weight (lbs/cu.ft)	<u>89.7</u>
Moisture Content of Top 1"		Percent of Max. Dry Density	<u>95.4%</u>
After Soaking	<u>30.0%</u>		
		CBR Values	
Swell	<u>N/A</u>	Penetration (in)	<u>0.1 0.2</u>
		Stress (psi)	<u>38.00 72.50</u>
		CBR	<u>3.8 4.8</u>



Remarks: Zero-point correction applied. All material passed the 3/4" sieve.

Remarks: Zero-point correction applied. All material passed the 3/4" sieve.

Aaron Hackett
Lab Manager

Jeff Elliott, P.E.
CMT & SI Dept. Manager

Aaron Hackett
Lab Manager

Jeff Elliott, P.E.
CMT & SI Dept. Manager



Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-6, Run #2</u>	Project No.	<u>18-0173.146</u>
Sample Location	<u>RAMP_D- 20+00 16' L'</u>	Client	<u>NCDOT</u>



Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-7, Run #1</u>	Project No.	<u>18-0173.146</u>
Sample Location	<u>-RAMP_A- 43+00 CL</u>	Client	<u>NCDOT</u>

Proctor and Classification Data

Sample Description	<u>N/A</u>
Classification	<u>A-2-4</u>
Max. Dry Density	<u>94.0</u>
Optimum Moisture	<u>18.5%</u>

CBR Preparation Data

Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

Proctor and Classification Data

Sample Description	<u>N/A</u>
Classification	<u>A-5</u>
Max. Dry Density	<u>109.1</u>
Optimum Moisture	<u>15.9%</u>

CBR Preparation Data

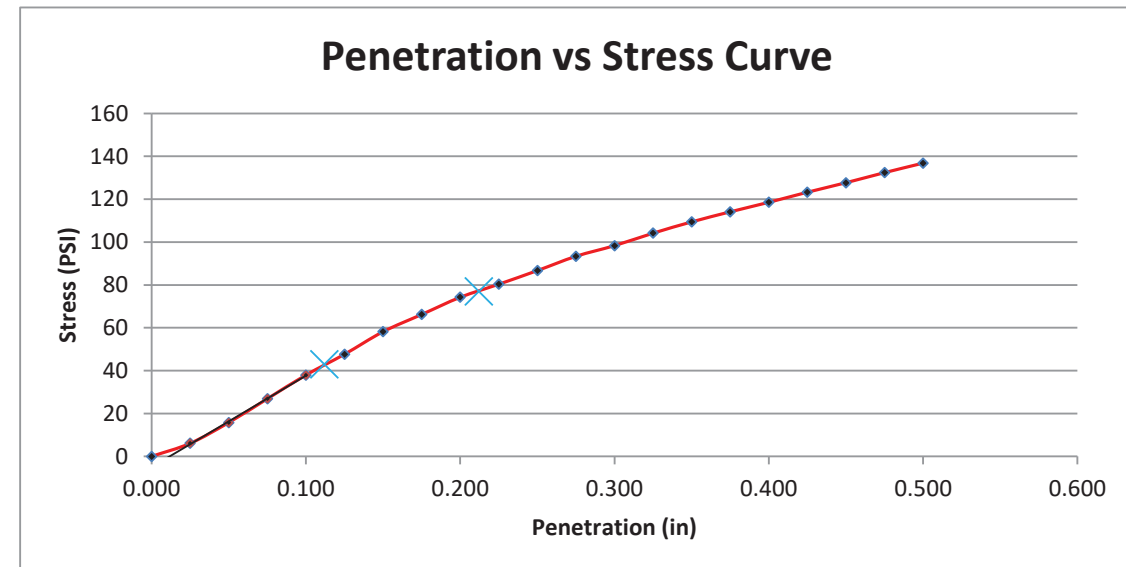
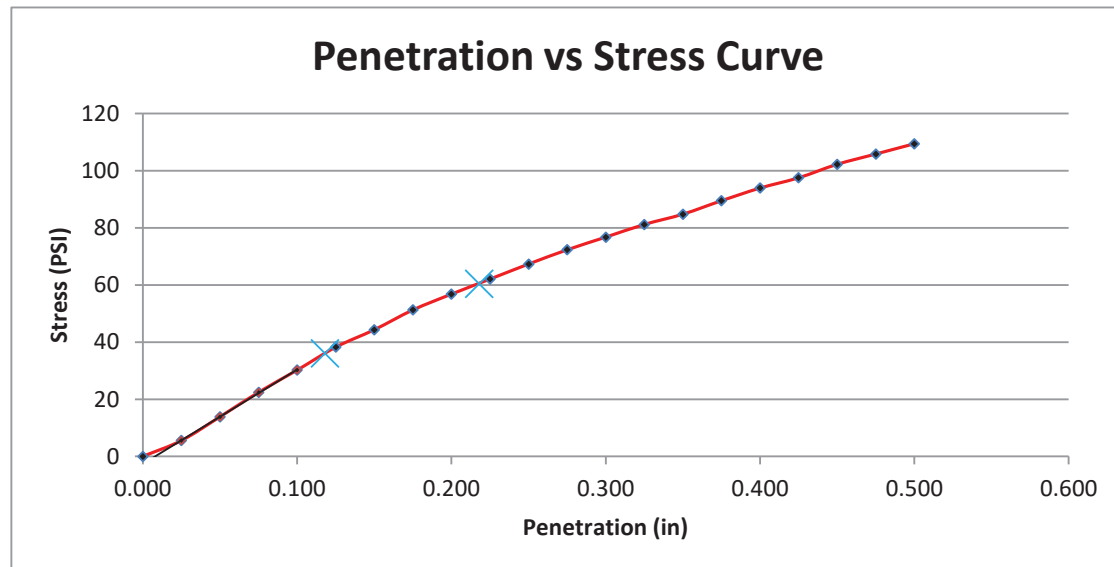
Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

CBR Results

Compaction Moisture Content	<u>9.8%</u>	Dry unit weight (lbs/cu.ft)	<u>87.3</u>
Moisture Content of Top 1"		Percent of Max. Dry Density	<u>92.9%</u>
After Soaking	<u>32.0%</u>		
		CBR Values	
Swell	<u>1.1%</u>	Penetration (in)	<u>0.1 0.2</u>
		Stress (psi)	<u>36.00 60.40</u>
		CBR	<u>3.6 4.0</u>

CBR Results

Compaction Moisture Content	<u>12.3%</u>	Dry unit weight (lbs/cu.ft)	<u>109.9</u>
Moisture Content of Top 1"		Percent of Max. Dry Density	<u>100.7%</u>
After Soaking	<u>23.0%</u>		
		CBR Values	
Swell	<u>1.3%</u>	Penetration (in)	<u>0.1 0.2</u>
		Stress (psi)	<u>43.00 77.00</u>
		CBR	<u>4.3 5.1</u>



Remarks: Zero-point correction applied. All material passed the 3/4" sieve.

Remarks: Zero-point correction applied. All material passed the 3/4" sieve.

Aaron Hackett
Lab Manager

Jeff Elliott, P.E.
CMT & SI Dept. Manager

Aaron Hackett
Lab Manager

Jeff Elliott, P.E.
CMT & SI Dept. Manager

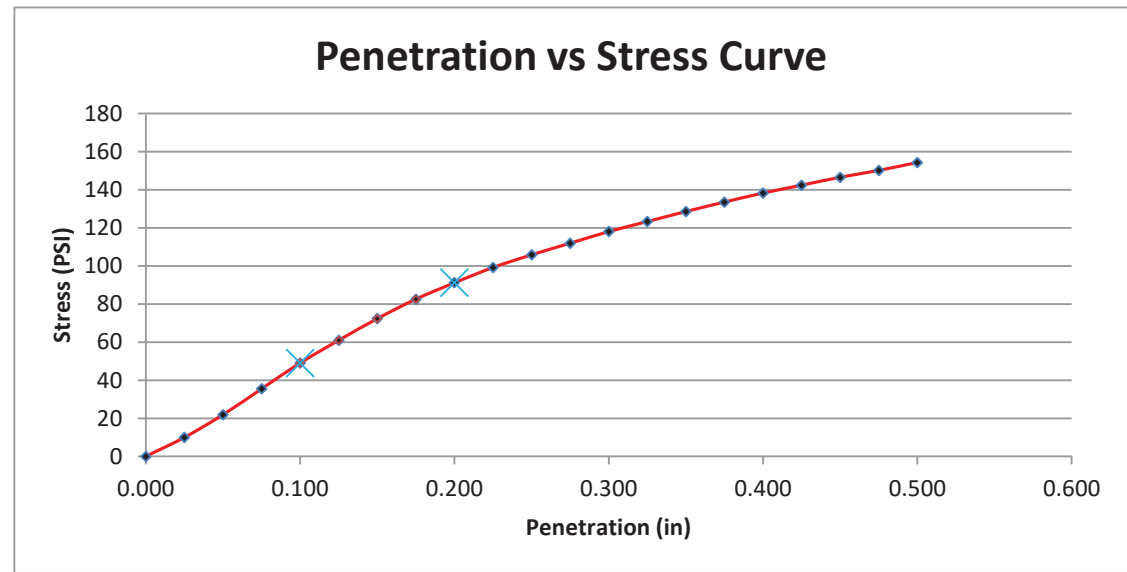


Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-7, Run #2</u>	Project No.	<u>18-0173.I46</u>
Sample Location	<u>-RAMP_A- 43+00 CL</u>	Client	<u>NCDOT</u>

Proctor and Classification Data		CBR Preparation Data	
Sample Description	<u>N/A</u>	Rammer Used	<u>5.5 lb, 12" drop</u>
Classification	<u>A-5</u>	Compaction Method	<u>3 Layers, 56 Blows</u>
Max. Dry Density	<u>109.1</u>	Surcharge Amount	<u>10 lbs</u>
Optimum Moisture	<u>15.9%</u>	Soaked/Unsoaked	<u>Soaked</u>

CBR Results			
Compaction Moisture Content	<u>12.3%</u>	Dry unit weight (lbs/cu.ft)	<u>108.9</u>
Moisture Content of Top 1"		Percent of Max. Dry Density	<u>99.9%</u>
After Soaking	<u>22.1%</u>		
		CBR Values	
Swell	<u>1.3%</u>	Penetration (in)	<u>0.1 0.2</u>
		Stress (psi)	<u>49.03 91.13</u>
		CBR	<u>4.9 6.1</u>



Remarks: No zero-point correction. All material passed the 3/4" sieve.

<u>Aaron Hackett</u> Lab Manager	<u>Jeff Elliott, P.E.</u> CMT & SI Dept. Manager
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