

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.

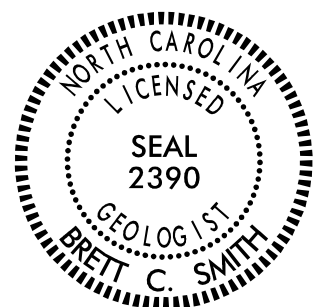
- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR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

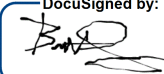
PERSONNEL

B. SMITH, PG
A. RULEY
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INVESTIGATED BY B. SMITH, PG
 DRAWN BY B. SMITH, PG
 CHECKED BY B. WORLEY, PG
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 DATE MARCH, 2019

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 SIGNATURE... DATE

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

SOIL DESCRIPTION

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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for GENERAL CLASS., GRANULAR MATERIALS (<= 35% PASSING #200), SILT-CLAY MATERIALS (> 35% PASSING #200), ORGANIC MATERIALS, GROUP CLASS., SYMBOL, % PASSING #10 #40 #200, MATERIAL PASSING #40 LL PI, GROUP INDEX, USUAL TYPES OF MAJOR MATERIALS, GEN. RATING AS SUBGRADE.

PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

Table with columns for PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2).

TEXTURE OR GRAIN SIZE

Table with columns for U.S. STD. SIEVE SIZE OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.).

SOIL MOISTURE - CORRELATION OF TERMS

Table with columns for SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION.

PLASTICITY

Table with columns for NON PLASTIC, SLIGHTLY PLASTIC, MODERATELY PLASTIC, HIGHLY PLASTIC, PLASTICITY INDEX (PI), DRY STRENGTH.

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL

Table with columns for ORGANIC MATERIAL, GRANULAR SOILS, SILT - CLAY SOILS, OTHER MATERIAL.

GROUND WATER

Water level symbols and descriptions: 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

Diagrammatic symbols for 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, TEST BORING, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, CONE PENETROMETER TEST, SOUNDING ROD, TEST BORING WITH CORE, SPT N-VALUE.

RECOMMENDATION SYMBOLS

Symbols for 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.

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, WE. - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO.

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.

ROCK DESCRIPTION

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:

Table with columns for WEATHERED ROCK (WR), CRYSTALLINE ROCK (CR), NON-CRYSTALLINE ROCK (NCR), COASTAL PLAIN SEDIMENTARY ROCK (CP). Includes diagrams and descriptions for each rock type.

WEATHERING

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.

ROCK HARDNESS

VERY HARD: CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD: CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD: CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD: CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT: CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT: CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

FRACTURE SPACING

Table with columns for TERM, SPACING, BEDDING, THICKNESS.

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.

TERMS AND DEFINITIONS

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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

ELEVATION: FEET

NOTES:

EB = EASTBOUND
WB = WESTBOUND
ISS = INSIDE SHOULDER
OSS = OUTSIDE SHOULDER
OSL = OUTSIDE LANE
ISL = INSIDE LANE

PROJECT REFERENCE NO.	SHEET NO.
R-2707D	3
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

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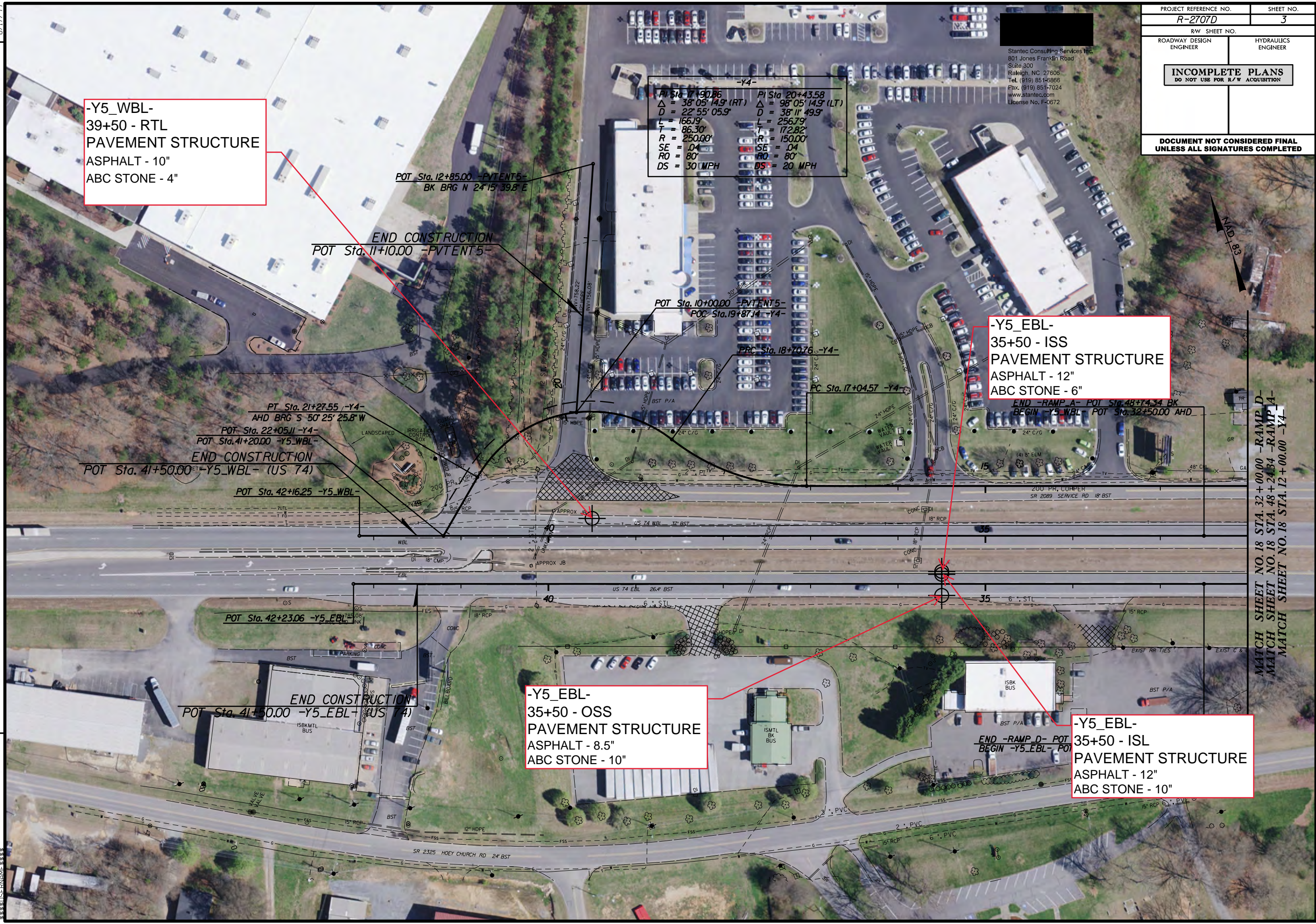
-Y4-	
PI Sta. 17+90.86	PI Sta. 20+43.58
$\Delta = 38^{\circ} 05' 14.9" (RT)$	$\Delta = 98^{\circ} 05' 14.9" (LT)$
$D = 22^{\circ} 55' 05.9"$	$D = 38^{\circ} 11' 49.9"$
$L = 166.19'$	$L = 256.79'$
$T = 86.30'$	$T = 172.82'$
$R = 250.00'$	$R = 150.00'$
$SE = .04$	$SE = .04$
$RO = 80'$	$RO = 80'$
$DS = 30 MPH$	$DS = 20 MPH$

-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"



END CONSTRUCTION
POT Sta. 11+10.00 -PVTENT5-

END CONSTRUCTION
POT Sta. 41+50.00 -Y5_WBL- (US 74)

END CONSTRUCTION
POT Sta. 41+50.00 -Y5_EBL- (US 74)

END -RAMP A- POT Sta. 48+74.34 BK
BEGIN -Y5_WBL- POT Sta. 32+50.00 AHD

END -RAMP D- POT
BEGIN -Y5_EBL- POT

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_GEO\TECH\Plan\Prof\VR2707D_RDY_PSH_26.dgn

8/17/99

NO.	REVISIONS

-RAMP_A-		
PG STA 46+00.00	PG STA 46+00.00	PG STA 46+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+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 46+00.00	PG STA 46+00.00	PG STA 46+00.00
Δ = 7.25 34.8'	Δ = 7.25 34.8'	Δ = 7.25 34.8'
LS = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+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 46+00.00	PG STA 46+00.00	PG STA 46+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 = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+00.00	LI = 46+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_A-		-RAMP_D-	
PG STA 46+00.00	PG STA 46+00.00	PG STA 46+00.00	PG STA 46+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 = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+00.00	LI = 46+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_A-		-RAMP_D-	
PG STA 46+00.00	PG STA 46+00.00	PG STA 46+00.00	PG STA 46+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 = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+00.00	LI = 46+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_A-		-RAMP_D-	
PG STA 46+00.00	PG STA 46+00.00	PG STA 46+00.00	PG STA 46+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 = 46+00.00	LS = 46+00.00	LS = 46+00.00
LI = 46+00.00	LI = 46+00.00	LI = 46+00.00	LI = 46+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
DATE: 10/20/20	DESIGNED BY:
CHECKED BY: 	DATE:

PROJECT: SHAWNEE INTERCHANGE
 SHEET: 4
 DATE: 10/20/20
 COUNTY: CLEVELAND

PAVEMENT INVESTIGATION DATA SHEET

Project: 34497.1.2
TIP: R-2707D

Route: US-74
County: Cleveland

Date: 1/8/19 - 1/9/19
Notes By: Brett Smith, PG

Position (Sta., Lane, Shldr.)	Cut/Fill (Est. of Amount in feet)	Width (ft.)		Offset Distance from White Line (ft.)	Crown "C" or Super "S" (in.)	Gross to Top of Soil	Thickness (in.)				Subgrade				GPS Coordinates		
		Lane(s)	Shoulder				Asphalt	ABC	Stabilized Subgrade Soil	Concrete	Description	AASHTO Classification	Soil Moisture	Probe Depth (ft.)	Asphalt Notes	Northing	Easting
(-Y5_EBL-) 35+50 - ISS	Fill 2	ISL = 12 OSL = 12	ISS = 3 OSS = 4	26	C - 4	18	12	6	N/A	N/A	(1.5'-5.0') RES: brown, slightly plastic, sandy CLAY with some mica Sample No. S-80 (2.4 - 5.0 feet)	A-6	16%	5	Asphalt in good condition, no signs of distress observed.	559,565	1,263,652
(-Y5_EBL-) 35+50 - ISL	Fill 2	ISL = 12 OSL = 12	ISS = 3 OSS = 4	22	C - 4	22	12	10	N/A	N/A	(1.8'-5.0') RES: brown, slightly plastic, sandy CLAY with some mica	A-6	M	5	Asphalt in good condition, no signs of distress observed.	559,562	1,263,651
(-Y5_EBL-) 35+50 - OSS	Fill 2	ISL = 12 OSL = 12	ISS = 3 OSS = 4	2	C - 4	18.5	8.5	10	N/A	N/A	(1.5'-5.0') RES: red, moderately plastic, clayey SAND with some mica Sample No. S-82 (2.2 - 5.0 feet)	A-2-7	22%	5	Low severity transverse cracking observed.	559,539	1,263,642
(-Y5_WBL-) 39+50 - RTL	Fill 3	ISL = 12 OSL = 12 RTL = 12	ISS = 3 OSS = 2	3	C - 4	14	10	4	N/A	N/A	(1.2'-3.0') RE: brown, slightly plastic, highly sandy, silty CLAY (3.0'-5.0') RES: brown, slightly plastic, highly sandy, silty CLAY Sample No. S-78 (2.0 - 5.0 feet)	A-7-5	23%	5	Low severity fatigue cracking observed near the inside edge of right turn lane.	559,761	1,263,298
(-RAMP_A-) 46+00 - WB ISS	Fill 5	ISL = 12 OSL = 12	ISS = 2 OSS = 3	26	S-LT	21.5	11.5	10	N/A	N/A	(1.7'-5.0') RE: brown, slightly plastic, sandy CLAY with some mica Sample No. S-79 (2.3- 5.0 feet)	A-6	21%	5	Low severity edge cracking observed on ISS.	559,387	1,264,198
(-RAMP_A-) 46+00 - WB OSL	Fill 5	ISL = 12 OSL = 12	ISS = 2 OSS = 3	2	S-LT	21	13	8	N/A	N/A	(1.7'-5.0') RE: brown, slightly plastic, clayey SAND with some mica	A-2-7	M	5	Asphalt in good condition, no signs of distress observed.	559,410	1,264,205
(-RAMP_A-) 46+00 - WB OSS	Fill 5	ISL = 12 OSL = 12	ISS = 2 OSS = 3	1	S-LT	22.5	10.5	12	N/A	N/A	(1.8'-5.0') RE: brown, slightly plastic, clayey SAND with some mica Sample No. S-76 (2.3- 5.0 feet)	A-2-7	19%	5	Asphalt in good condition, no signs of distress observed.	559,413	1,264,206

Notes:
 OSL = Outside Lane CTL = Center Turn Lane OSS = Outside Shoulder DL = Deceleration Lane WB = Westbound
 ISL = Inside Lane LTL = Left Turn Lane ISS = Inside Shoulder HA = Hand Auger EB = Eastbound
 RTL = Right Turn Lane PS = Paved Shoulder ACC = Acceleration Lane N/M = not measured

**CONE PENETROMETER
DATA CODE SHEET**

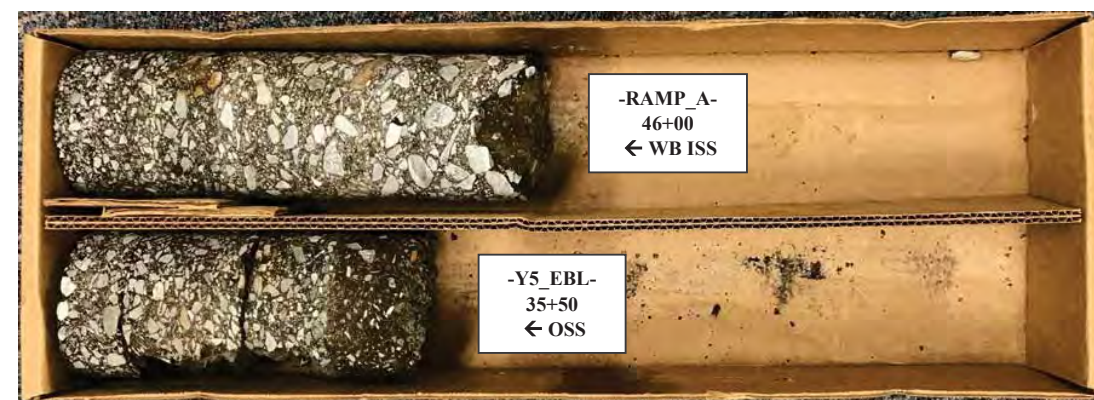
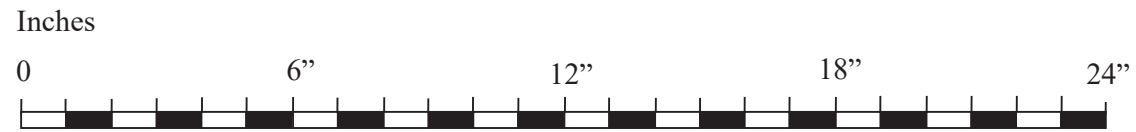
PROJECT NUMBER				PROJECT I.D.				ROUTE			
34497.1.2				R-2707D				US-74			
COUNTY				GEOLOGIST				TECHNICIANS			
Cleveland				Brett Smith, PG				Mike & Johnathon Moseley			
Station (location) information				Station (location) information				Station (location) information			
(-Y5 EBL-) 35+50 - ISS				(-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			

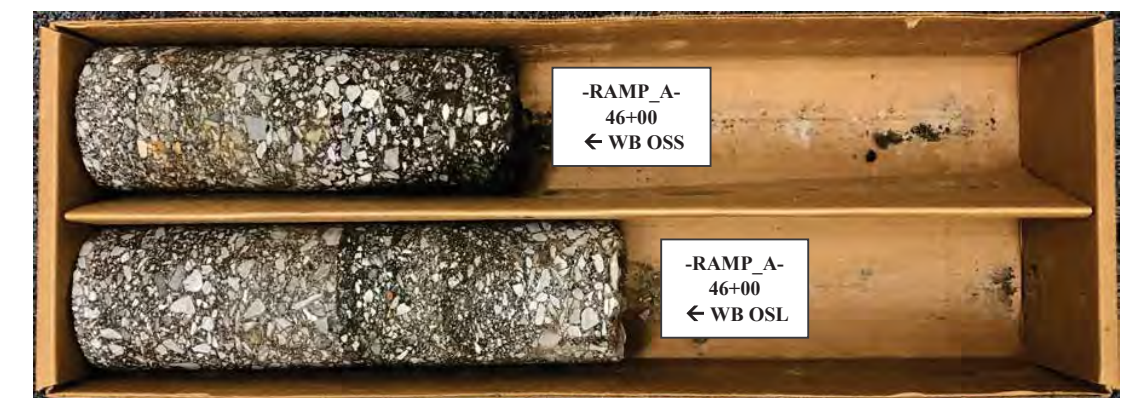
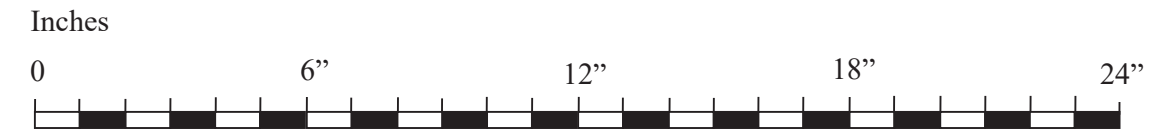


Notes:
EB = Eastbound
WB = Westbound
ISS/OSS = Inside Shoulder/Outside Shoulder
ISL/OSL = Inside Lane/Outside Lane



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
Site Description: US-74 (Shelby Bypass) from East of NC 180 to West of SR 2238 (Long Branch Road)			
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Notes:
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ISL/OSL = Inside Lane/Outside Lane



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



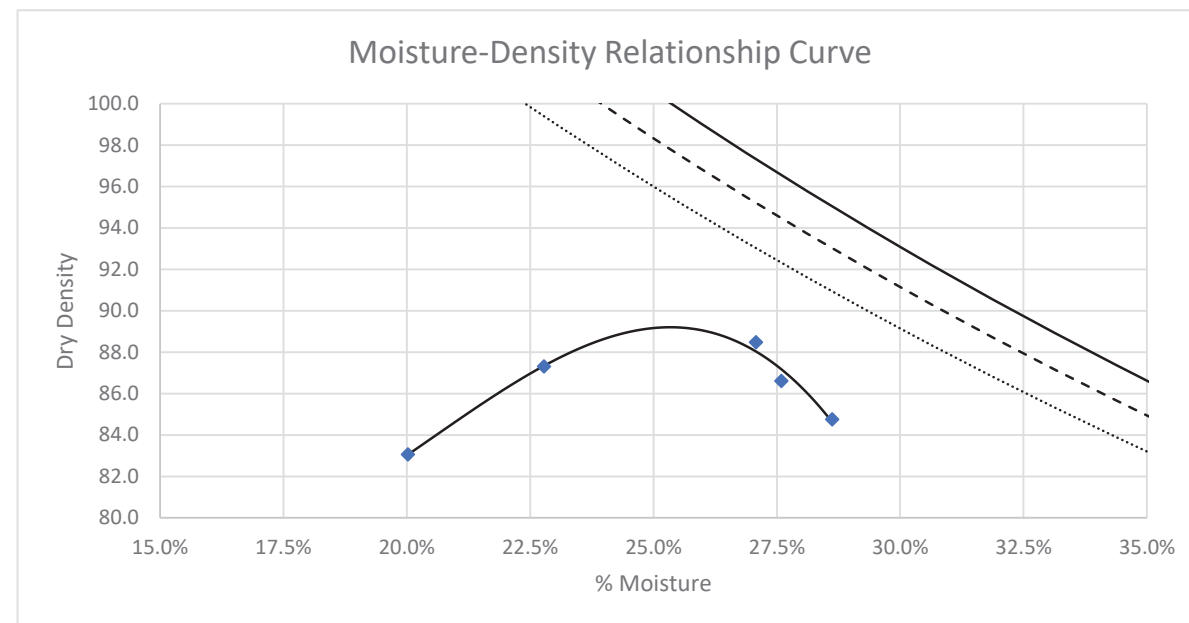
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504 Meadowland Drive, Hillsborough, NC 27278

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



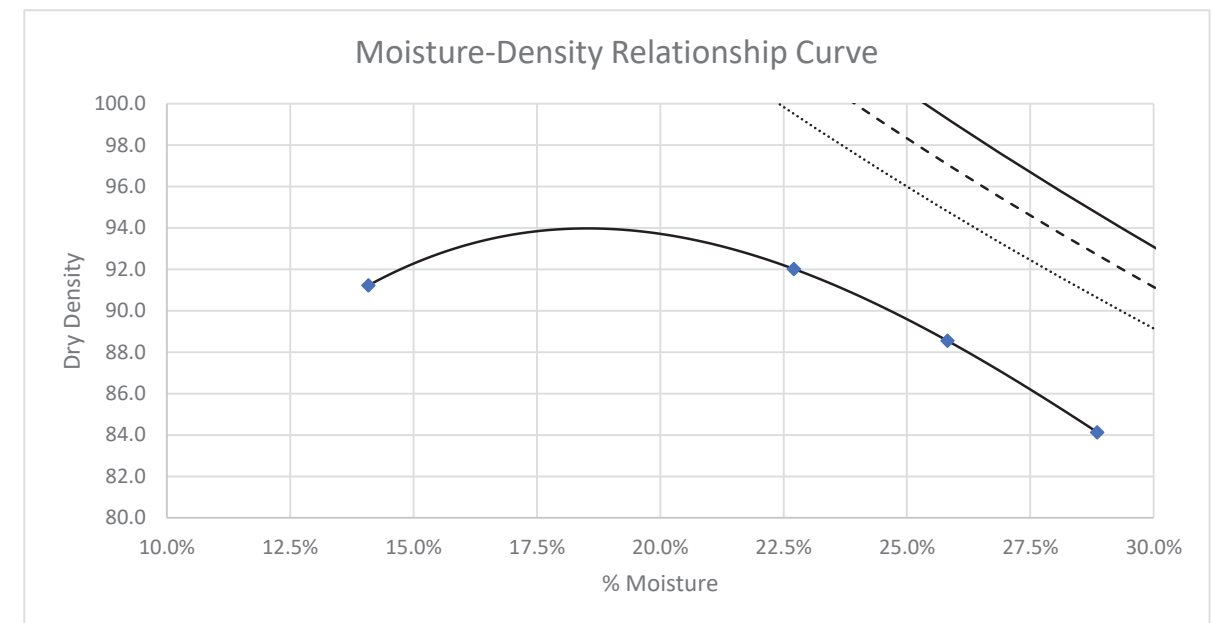
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504 Meadowland Drive, Hillsborough, NC 27278

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



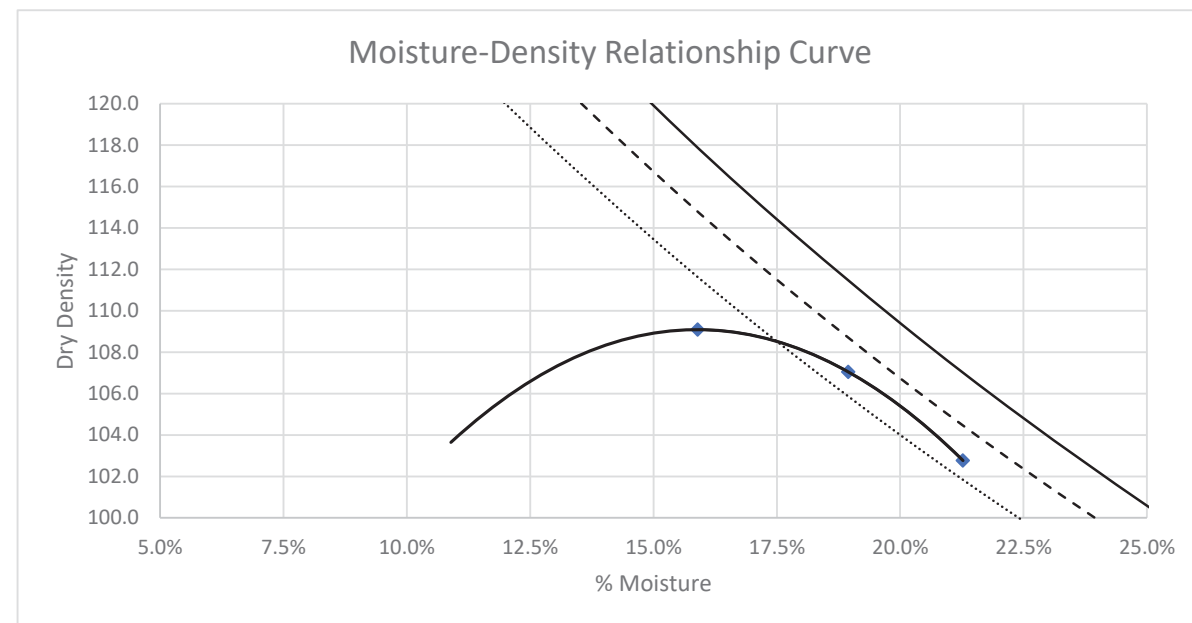
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504 Meadowland Drive, Hillsborough, NC 27278

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**

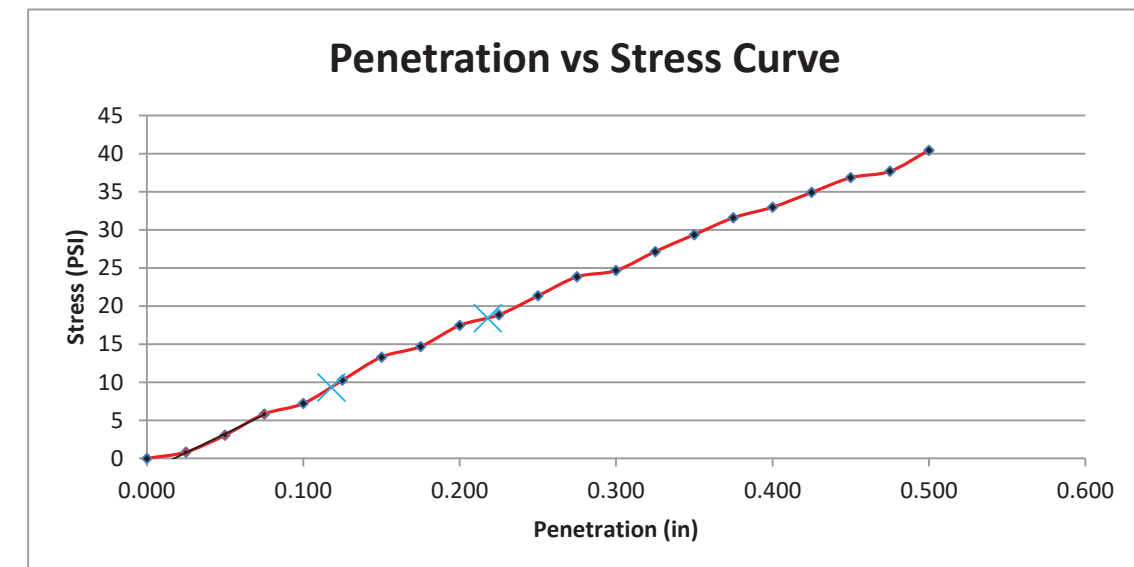
Proctor and Classification Data
Sample Description **N/A**
Classification **A-2-5**
Max. Dry Density **89.2**
Optimum Moisture **25.3%**

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

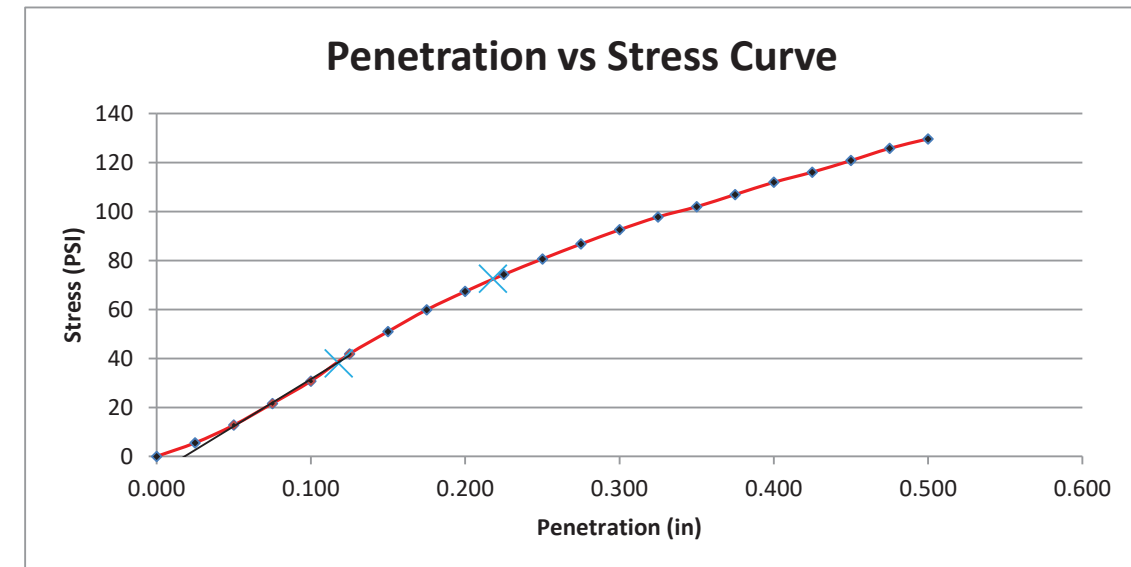
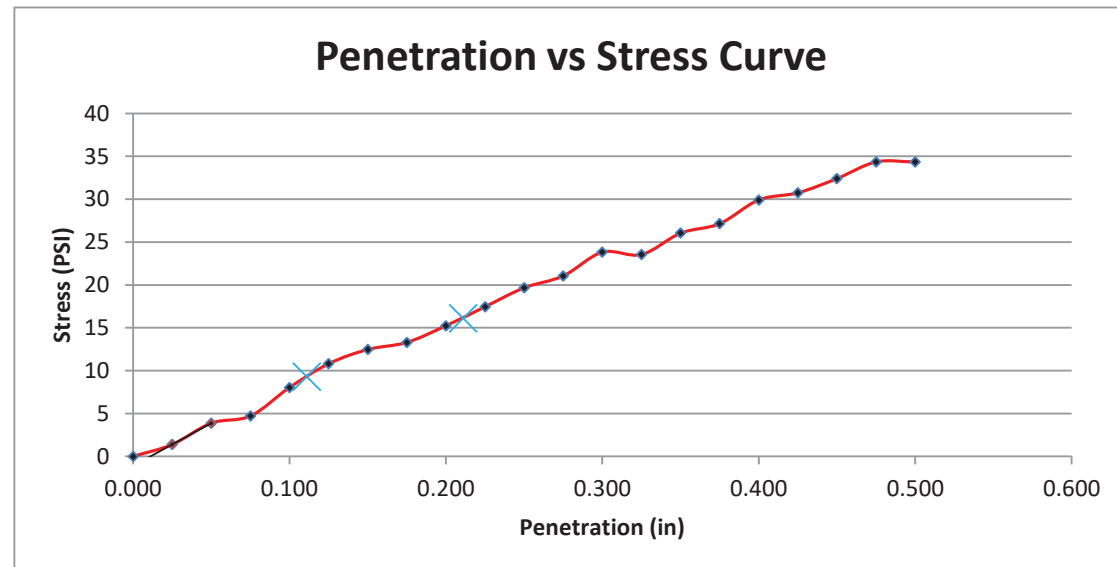
Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

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.

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CMT & SI Dept. Manager

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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

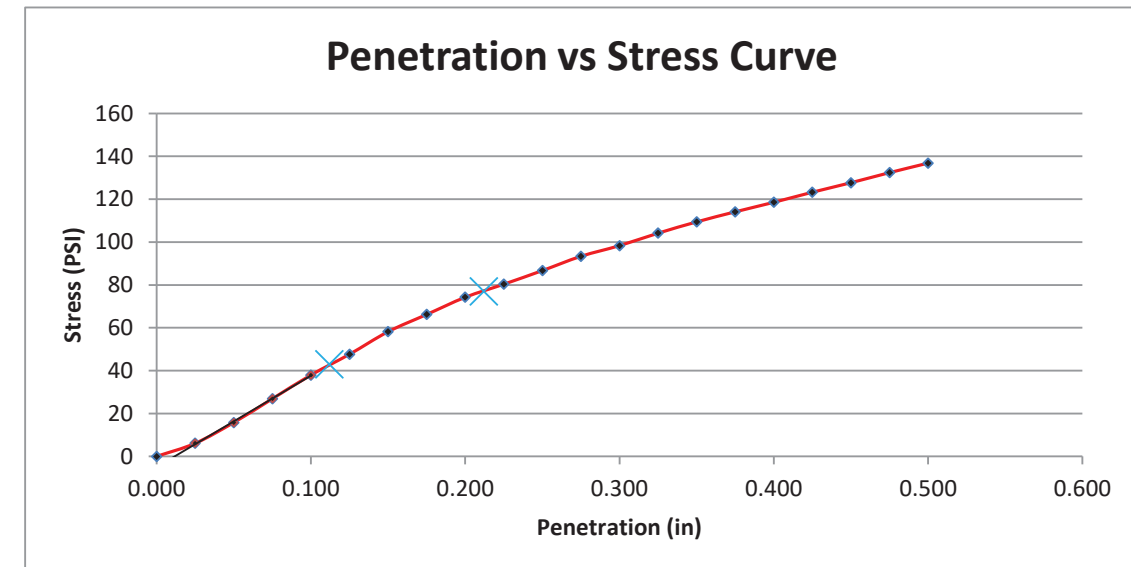
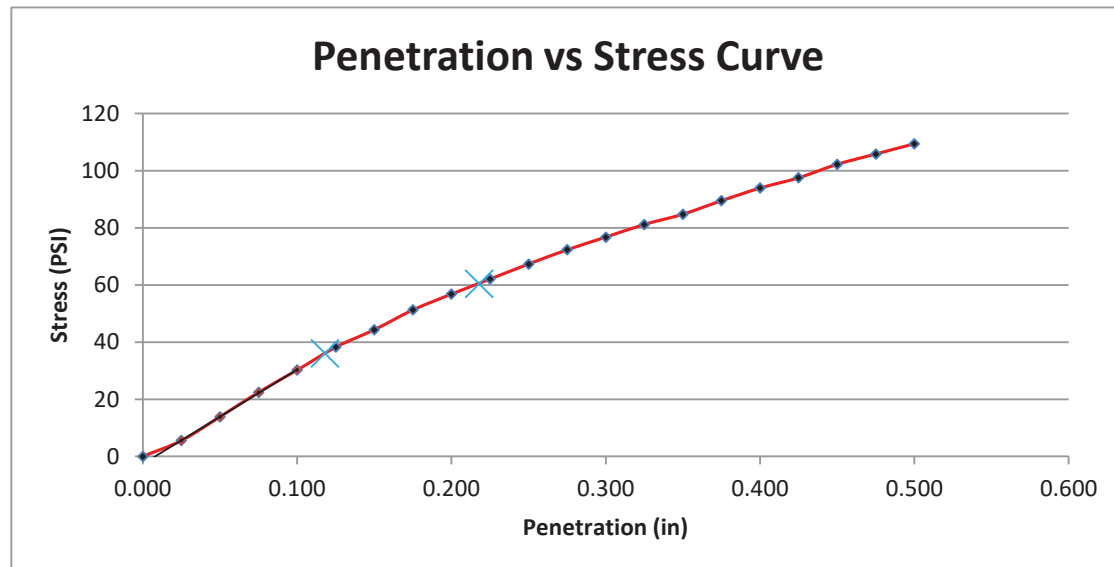
Rammer Used	<u>5.5 lb, 12" drop</u>
Compaction Method	<u>3 Layers, 56 Blows</u>
Surcharge Amount	<u>10 lbs</u>
Soaked/Unsoaked	<u>Soaked</u>

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.

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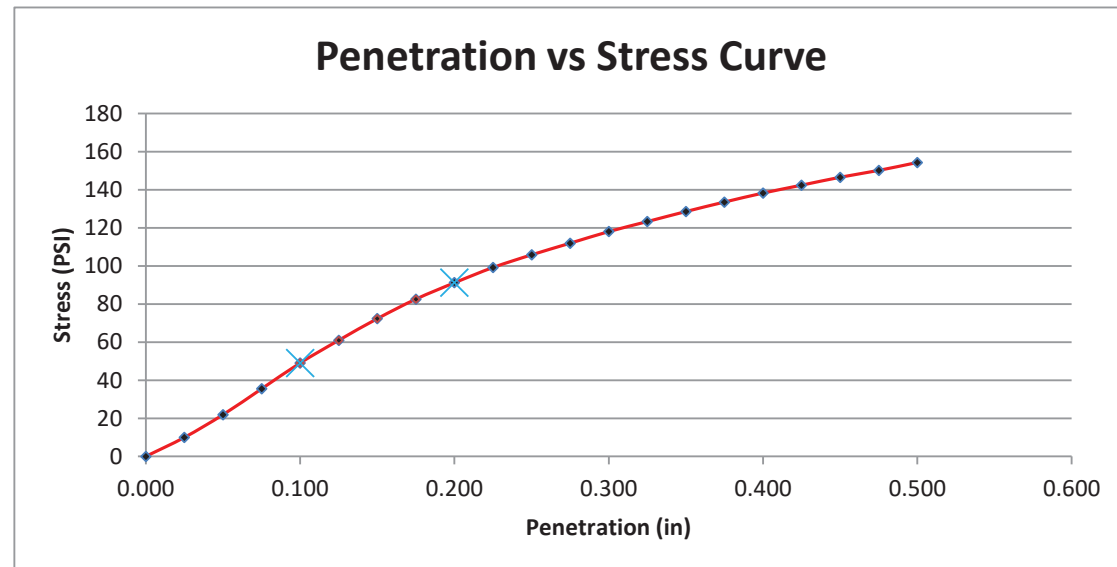


Report on California Bearing Ratio (ASTM D 1883/AASHTO T 193)

Date	<u>3/6/2019</u>	Project Name	<u>R-2707D</u>
Sample No.	<u>S-7, Run #2</u>	Project No.	<u>18-0173.146</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.

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