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STATE OF NORTH CAROLINA

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

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ROADWAY SUBSURFACE INVESTIGATION

COUNTY <u>HENDERSON</u> PROJECT DESCRIPTION NC 225 INTERSECTION IMPROVEMENTS FROM SR 1164 TO SR 1779

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5105	1	20

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 1991 707-680. 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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS OF THE INVESTIGATION. THE STATEM LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE INVESTIGATION. THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AS WELL AS A CRUPP NOW CHARTSE CACCORDING 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 WARRAYT OR CUARANTEE 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 FOO THE THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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 OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
 OR CONTRACT FOR THE PROJECT.
 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
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INVESTIGATED BY DJG
DRAWN BY _HUNSBERGER, W. S.
CHECKED BY HAMM, J. R.
SUBMITTED BY FALCON
DATE DECEMBER 2017



UNLESS ALL SIGNATURES COMPLETED

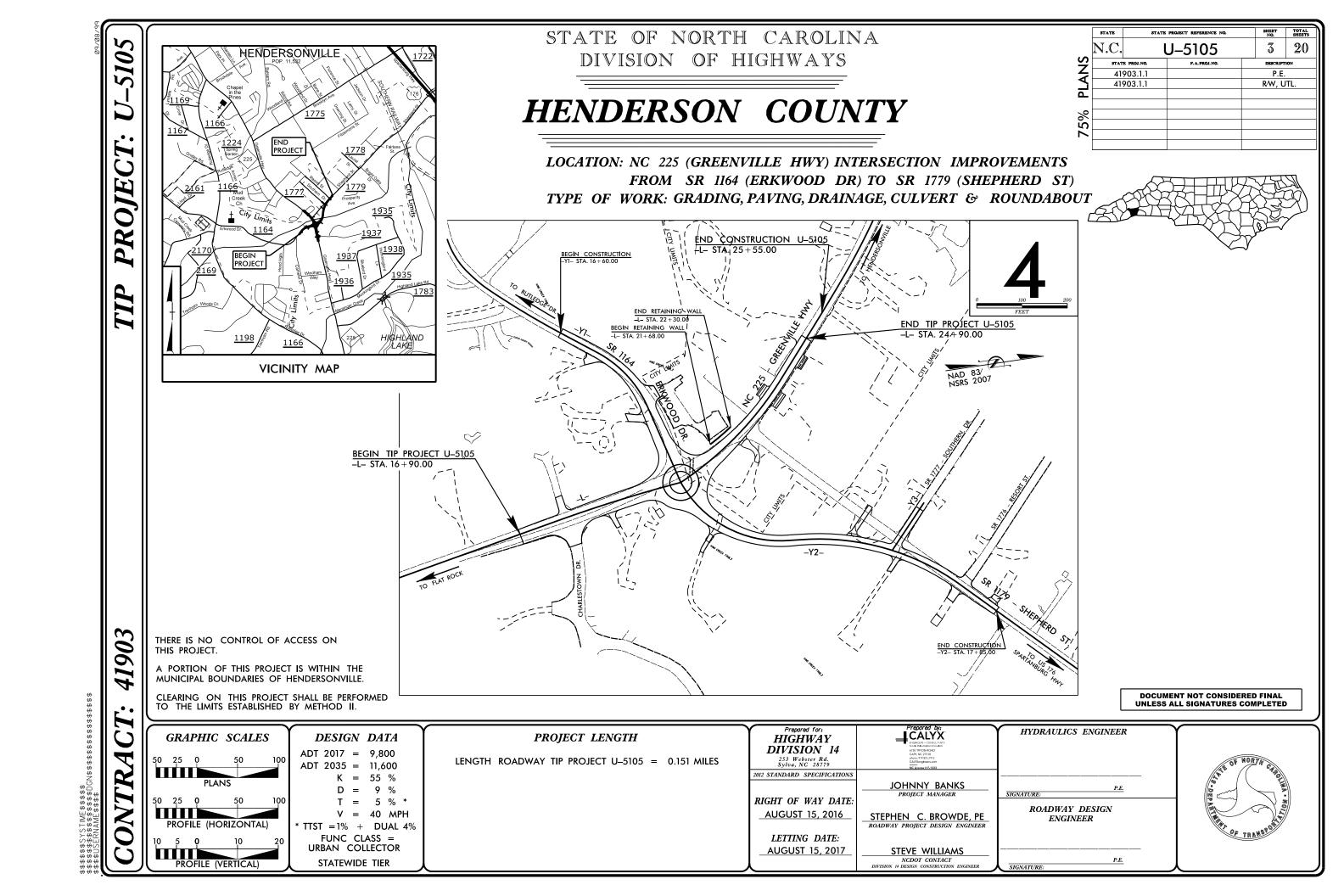
PROJECT REFERENCE NO. SHEET NO. 2

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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.	
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.	
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.	
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING	
VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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	
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN IGNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND	
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	POCK (CB). WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.	
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNEISS, GABBRU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.	
CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD VEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.	
SYMBOL 0000 d000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED	
% PASSING SUIT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.	
*10 50 MX GRANULAR CLAY MUCK, *40 30 MX 50 MX 51 MN SOILS SOILS SOILS PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT	
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.	
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE I - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.	
PASSING *40 48 MX 41 MN	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE	
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 11 MN HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.	
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOUS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.	
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.	
OF MAJOR GRAYEL, AND SAND GRAYEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM	
CEN BATING FAIR TO	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.	
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.	
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	- UU- SPRING ON SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE	
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.	
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.	
CONSISTENCY (N-VALUE) CONFICE STACHOLD	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.	
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SPOT ONT TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.	
GRANULAR LUUSE 4 10 100	VST PMT INSTRICTION	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS	
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.	
VERT DENSE 2 2	CODE DODING A COUNDING DOD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.	
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.	
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF	
MATERIAL STIFF 8 TO 15 1 TO 2	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE	
HARD > 30 → 4	INSTREATION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE. SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT	
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.	
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND	
DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	HIGHT IN THE TOP 2 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.	
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT	
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.	
GRAIN MM 305 75 2.0 0.25 0.005 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF	
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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	
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.	
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED 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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.	
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL	
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT,) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	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.	
LL L10UID L1MIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
PLASTIC SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING		
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BORING ELEVATIONS TAKEN FROM .TIN FILE	
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET	
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	<u> </u>	
REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:	
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING	
PLASTICITY	CME-55	INDURATION		
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550	RUBBING WITH FINGER FREES NUMEROUS GRAINS;		
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER,		
COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER			
	X MOBILE B-57 TRICONE TUNGCARB. X SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: DIFFICULT TO BREAK WITH HAMMER.		
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.	CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;		
MODIFIERS SOUR HS LION, DHAN, SINEMAED, EIG. ARE USED IU DESCRIBE AFFEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 1-XX-1	





Roadway Subsurface Investigation Report - Inventory

NC 225 Intersection Improvements from SR 1164 to SR 1779
Henderson County, North Carolina
TIP: U-5105 WBS: 41903.1.1
Falcon Project No.: G16011.00

Prepared for:

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December 20, 2017

SHEET 3A Tip No.: U-5105 WBS No.: 41903.1.1

TIP: U-5105
COUNTY: Henderson

DESCRIPTION: NC 225 Intersection Improvements

SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of the construction of a new roundabout at the intersection of Erkwood Drive and NC 225 (Greenville Highway) with minor widening, realigning and grade changes along the existing roads to accommodate the new roundabout. Shepherd Street will be relocated to intersect NC 225 opposite Erkwood Drive.

Included in this project is a retaining wall along NC 225 (alignment -L-). The retaining wall was investigated as a part of this project and structure borings are presented herein. The Retaining Wall Investigation will be provided under separate cover.

The investigation was conducted between July 28th and August 5th, 2016 in general accordance with our Proposal to Provide Geotechnical Engineering Services, dated September 30th, 2015. The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of nine (9) borings (both Standard Penetration Test (SPT) and Hand Auger borings) were drilled for the proposed roadway alignments. All SPT borings were drilled using a Mobil B-57 ATV drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers and an automatic hammer. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard Proctor compaction and laboratory soaked California Bearing Ratio (CBR) testing. Four (4) locations near tie-in areas along the existing roadway were cored, measured and Dual Mass Dynamic Cone Penetrometer (DCP) testing completed to correlate in-situ CBR values for the existing subgrade to depths of up to three feet below subgrade. The dual mass DCP used is manufactured by Kessler Soils Engineering Products, Inc. CBR values were estimated using software provided by the manufacturer which utilizes correlations established by the Army Corps of Engineers Waterways Experiment Station.



The following alignments, totaling approximately 1,900 feet were explicitly investigated.

Alignment	Station (ft)
-L- (NC 225)	16+90.00 - 24+90.00
-Y1- (Erkwood Dr)	16+60.00 - 20+40.90
-Y2- (Shepherd St)	10+60.14 - 17+85.00

AREAS OF SPECIAL GEOTECHNICAL INTEREST

I. The following locations contain very soft to soft/very loose soils with an N-value less than 4 near the ground surface:

<u>Alignment</u>
-L-
-L-
-Y2-
-Y2-
-Y2-

II. The following locations contain organic soils near the ground surface:

Station (ft)	<u>Alignment</u>
18+89	-L-
22+32	-Y1-
13+00	-Y2-

III. Shallow ground water was measured within the following areas and may cause groundwater related stability problems during construction:

Station (ft)	<u>Alignment</u>
20+11	-Y1-
13+00	-Y2-

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SHEET 3B Tip No.: U-5105 WBS No.: 41903.1.1

IV. Alluvial soils were encountered at the following locations. The potential for wet, soft or organic soils should be anticipated at these locations:

Station (ft)	<u>Alignment</u>
21+76	-L-
22+32	-L-
11+11	-Y2-
13+00	-Y2-

V. Artificial fill was encountered at the following locations:

Station (ft)	<u>Alignment</u>
17+99	-Y1-
20+11	-Y1-
15+26	-Y2-

VI. Roadway Embankment was encountered at the following locations:

Station (ft)	<u>Alignment</u>
18+89	-L-
21+76	-L-





PHYSIOGRAPHY AND GEOLOGY

According to the *Geologic Map of North Carolina* (1985), the site is located in the Blue Ridge Belt geologic formation. Specifically, rocks at the site are noted as the Henderson Gneiss **(Chg)**, consisting of Henderson Gneiss, monzonitic to granodioritic; inequigranular.

Project topography is relatively flat given the mountainous terrain of the geopgraphic area. Portions of the project traverse two existing intersections, existing wooded areas, open grassy yards, existing residences, and grassy roadway rights-of-way. The alignment crosses one small stream, to the south of the proposed intersection. Existing roadways in the immediate vicinity are constructed predominantly at grade, with some of the cuts on the order of 5 to 7 feet and limited fill sections.

SHEET 3C Tip No.: U-5105 WBS No.: 41903.1.1

SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, artificial fills not associated with roadway construction, cultivated soils, alluvial and residual soils, and weathered rock. Areas where soils at the ground surface are of a unique geologic origin (i.e. not residual) are approximately delineated on the boring location plans based on subsurface conditions encountered in nearby borings, and various topographical, vegetative, or other visual surface features.

Roadway Embankment soils were encountered at the ground surface beneath and adjacent to existing roadways. These consist of 3 to 4 feet of moist to wet, very loose, silty sand (A-2-4) and sandy clay (A-6).

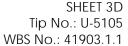
Artificial Fill soils were encountered at the ground surface beneath and adjacent to existing roadways. These consist of 3 to 5 feet of moist, very loose, silty and clayey sand (A-2-4 and A-2-5).

Alluvial soils were encountered at the ground surface near the historic floodplains of natural waterways. These soils extended to depths of up to approximately 3 to 6 feet and consist of moist to wet, very loose, silty and clayey sand (A-1-b, A-2-4 and A-2-6) and wet, soft sandy clay (A-6) with trace amounts of organic material.

Residual soils were encountered at the ground surface or beneath fills, roadway embankments, or alluvial soils. Residual soils encountered consist predominantly of fine silty clays (A-7) with occurrences of silty and clayey sands (A-1-b, A-2-4, and A-2-5).

Weathered Rock (WR) is a very hard, material with properties intermediate of soil and rock. For this project, WR is classified by having an N-value of 100 blows per one foot or less. WR was encountered at B-7 at a depth of 19 feet below ground surface.

Topsoil and garden soil were encountered ranging in thickness from 0.3 to 1.0 feet.





GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in some cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential areas were backfilled immediately after completion due to safety considerations.

The project crosses a small stream in the eastern portion of the project area. Detailed groundwater measurements are included in the attached subsurface profiles, and noted areas of shallow groundwater are included in the Areas of Special Geotechnical Interest earlier in this report.

ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

<u>Sample</u>	<u>Location</u>	Depth (ft)	<u>Test</u>
BS-1	17+30, 41 ft LT, -L-	1.0 - 8.0	Lab Soaked CBR, Standard Proctor
BS-2	17+99, 30 ft RT, -Y1-	1.0 - 6.0	Lab Soaked CBR, Standard Proctor

Classification test results for bulk samples are included in the subsurface profiles and cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in Appendix B.

CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

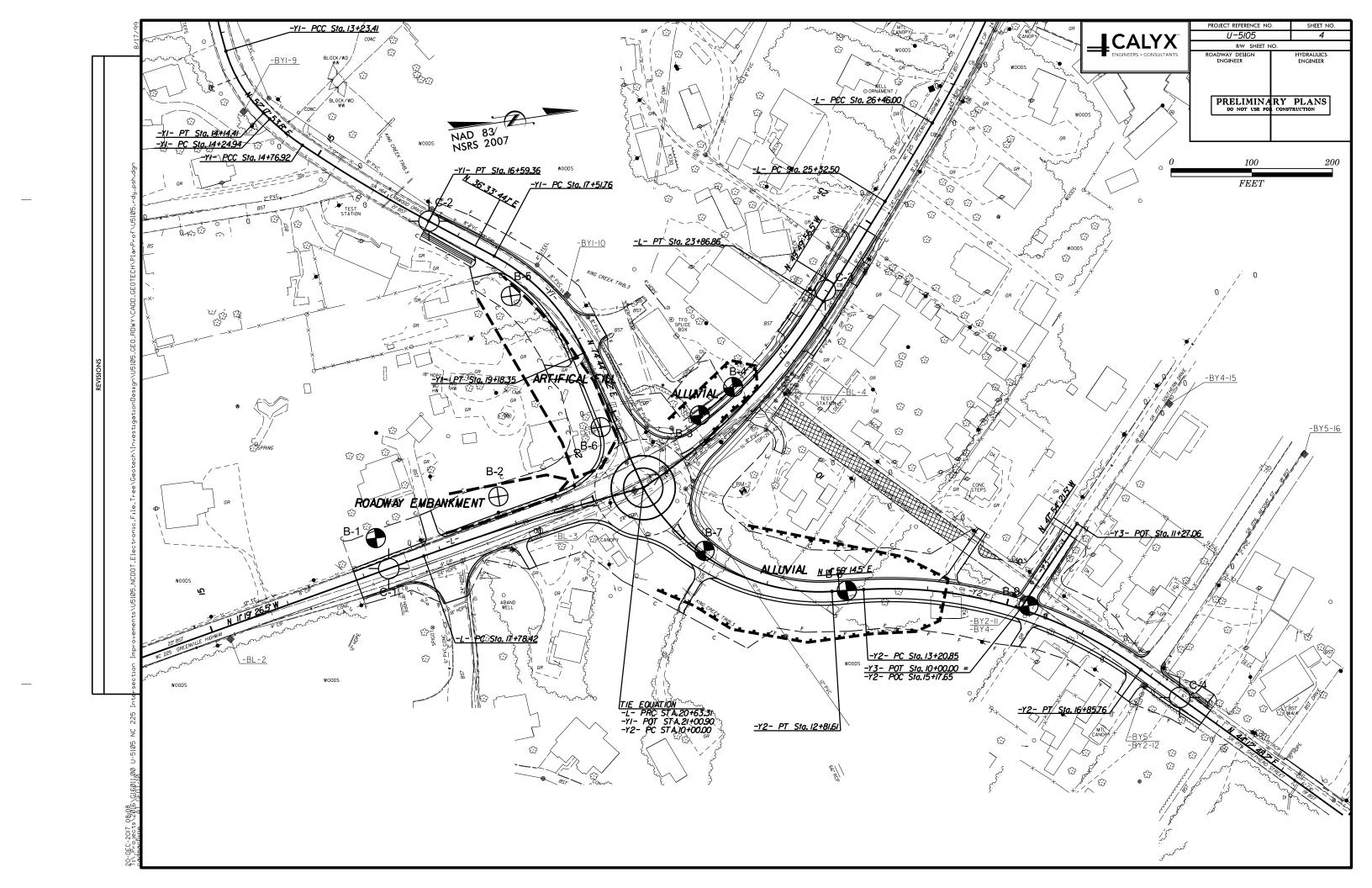
Report Prepared By:

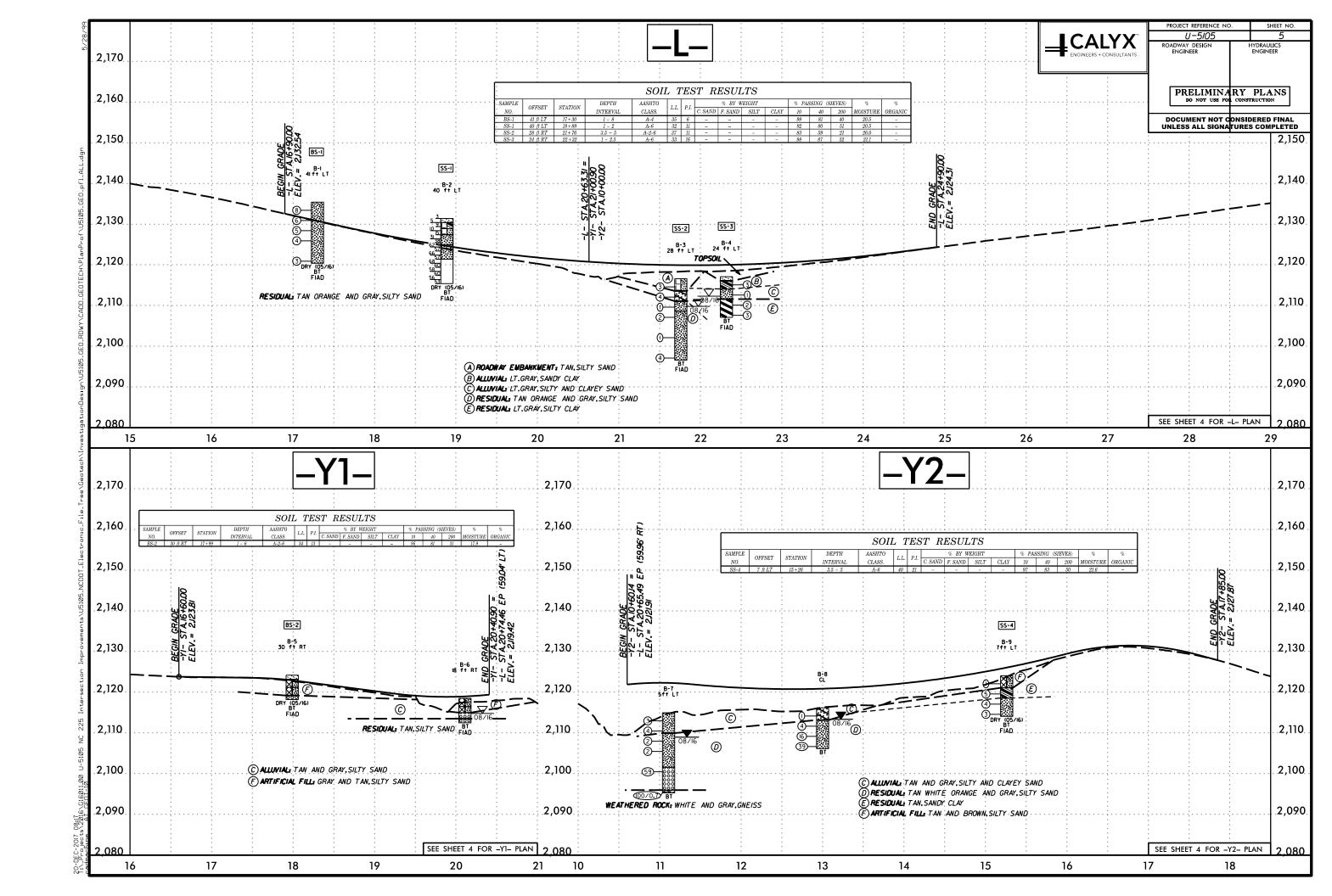
Report Reviewed By:

W. Scott Hunsberger, PE Geotechnical Engineer

Jeremy R. Hamm, PE

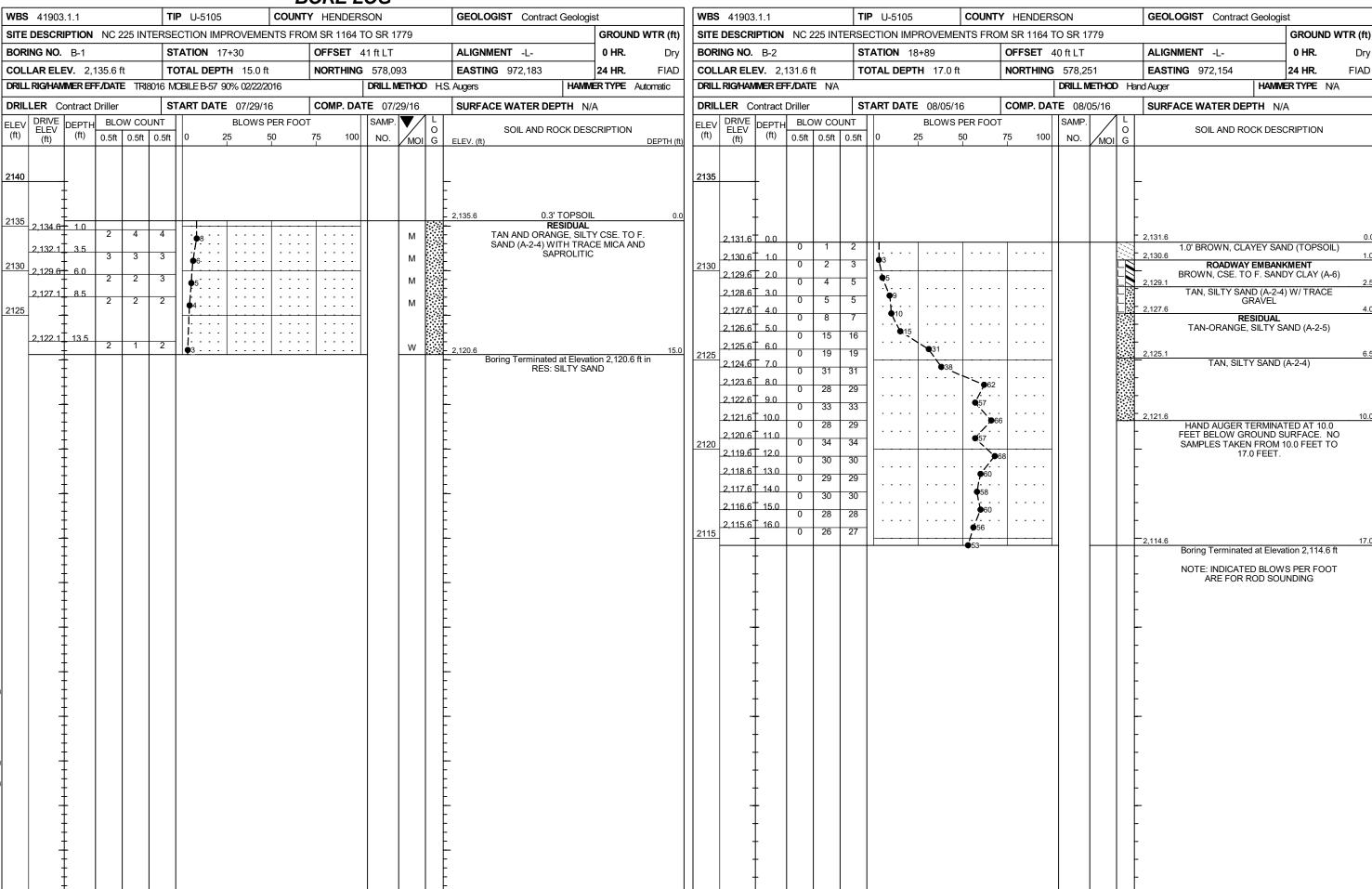
Geotechnical Engineering Manager





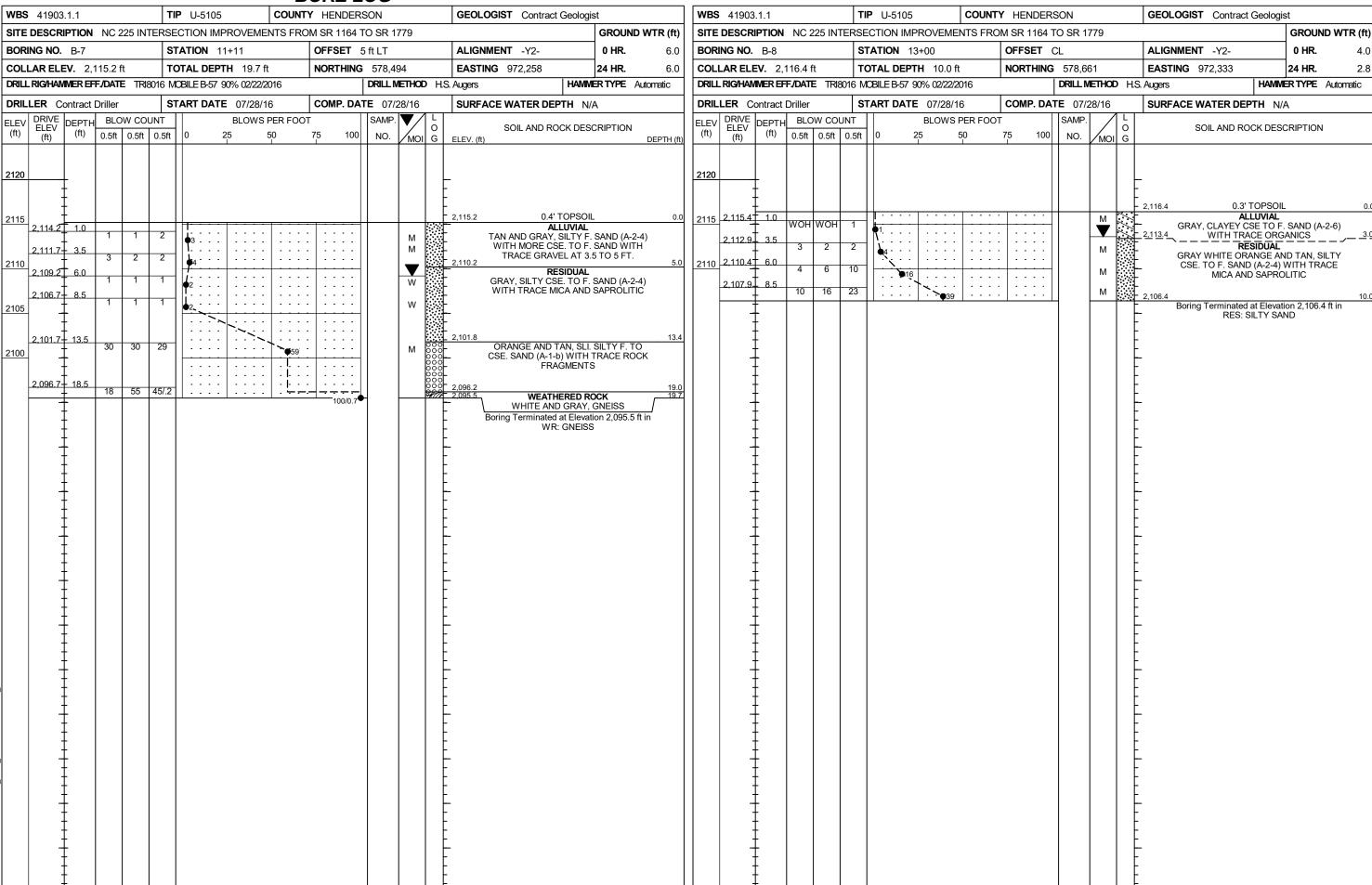
PROJECT REFERENCE NO. U-5105 6 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION APPENDIX A **BORING LOGS** REFERENCE: 41903

12/20/17
INITIALS DATE



	BORE		_						
WBS 41903.1.1 TIP (U-5105 COUNTY HENDER	RSON	GEOLOGIST Contract Geologi	1	WBS 41903.1.1	TIP U-5105 COUN	TY HENDERSON	GEOLOGIST Contract Geologist	
SITE DESCRIPTION NC 225 INTERSECTI			. 22+27.95 (-WALL-)	GROUND WTR (ft)	SITE DESCRIPTION NC 225 INT	TERSECTION IMPROVEMENTS - W	/alL FROM STA. 21+68.00	TO STA. 22+27.95 (-WALL-)	GROUND WTR (ft)
BORING NO. B-3 STAT	ION 21+76 OFFSET	28 ft LT	ALIGNMENT -L-	0 HR. 6.8	BORING NO. B-4	STATION 22+32	OFFSET 24 ft LT	ALIGNMENT -L-	0 HR. 4.8
· · · · · · · · · · · · · · · · · · ·		3 578,513	EASTING 972,091	24 HR. FIAD	COLLAR ELEV. 2,117.3 ft	TOTAL DEPTH 10.0 ft	NORTHING 578,559		24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE TRI8016 MOBIL	EB-57 90% 02/22/2016	DRILL METHOD H.S	S. Augers HAMM	MER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE TRIS	8016 MOBILE B-57 90% 02/22/2016	DRILL METH	IOD H.S. Augers HAMINE	R TYPE Automatic
	RT DATE 07/28/16 COMP. DA	TE 07/28/16	SURFACE WATER DEPTH N/	/A	DRILLER Contract Driller	START DATE 07/28/16	COMP. DATE 07/28/16	6 SURFACE WATER DEPTH N/A	
ELEV (ft)	BLOWS PER FOOT 25 50 75 100	SAMP. L O NO. MOI G	SOIL AND ROCK DES	CRIPTION DEPTH (ft)	ELEV CHI	UNT BLOWS PER FOO	75 400	L O SOIL AND ROCK DESC	RIPTION
2120			- 2,116.8 0.7' TOPSOII		2120			- 2,117.3	0.0
2,115.8 1.0 2 1 2			ROADWAY EMBAN	KMENT	2,116.3 1.0 1 2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SS-3 219	2,116.3 1.0' GRAY, CLAYEY SAND ALLUVIAL	(TOPSOIL) 1.0
2112 27 35	3	M M	TAN, SILTY CSE. TO F. S	SAND (A-2-4) 3.0	2 113 8 3 3 1	73		LT. GRAY, SANDY CLAY (A-6) WITH ,— <u>3.0</u>
† WOH 2 2 1	i4 :	SS-2 26%	ALLUVIAL 2,111.3 LT. GRAY, CLAYEY CSE. (A-2-6)	. TO F. SAND 5.5	2,111.3T 6.0	¹ t		2.111.8 LT. GRAY, SILTY CSE. TO	D F. SAND
2110 2,110.8 6.0 1 WOH 1			'		2110 1 WOH	2 2	· · · · · w	(A-2-4) WITH TRACE	MICA
2,108.3 8.5		W W	LT. GRAY, SILTY CSE. (A-2-4) WITH TRACE		2,108.8 8.5 WOH 2	1		IT GRAY SILTY CLAY (
	2		ORÂNGE TAN AND LT. (GRAY, SILTY				Boring Terminated at Elevation	n 2,107.3 ft in
2,103.3 13.5			_ CSE. TO F. SAND (A-2-4)	SAPROLITIC				RES: SILTY CLA	Y
2,103.3 13.3 WOH WOH 1 P1.		w 💥							
2100			-						
2,098.3 18.5 1 2 2									
	4	M	2,096.8 Boring Terminated at Elevat					-	
±			- RES: SILTY SA	ND				-	
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		BORE LOG															
WBS 41903.1.1	TIP U-5105 COUN	NTY HENDERSON	GEOLOGIST Contract Geolog	jist	WBS	41903.1.1			TIP U-5105	COU	NTY HENDER	RSON	GE	EOLOGIST Contra	ct Geologist		
SITE DESCRIPTION NC 225 INTE	RSECTION IMPROVEMENTS FF	ROM SR 1164 TO SR 1779		GROUND WTR (ft)	SITE D	ESCRIPT	ION NC 2	25 INTER	SECTION IMPR	OVEMENTS FI	ROM SR 1164	TO SR 1779			G	ROUND WT	۲R (ft)
BORING NO. B-5	STATION 17+99	OFFSET 30 ft RT	ALIGNMENT -Y1-	0 HR. Dry	BORIN	IG NO. B	-6		STATION 20+	11	OFFSET	18 ft RT	AL	IGNMENT -Y1-	0	HR.	3.7
COLLAR ELEV. 2,124.2 ft	TOTAL DEPTH 6.0 ft	NORTHING 578,303	EASTING 971,911	24 HR. FIAD	COLLA	AR ELEV.	2,118.5 ft	ť	TOTAL DEPTH	6.0 ft	NORTHIN	3 578,389	EA	ASTING 972,088	24	HR.	FIAD
DRILL RIG/HAMMER EFF/DATE N/A		DRILL METHOD	and Auger HAMN	MERTYPE N/A	DRILL F	RIG/HAMME	R EFF/DATE	E N/A				DRILL METH	HOD Hand Au	ger	HAMMER 1	YPE N/A	
DRILLER Contract Driller	START DATE 07/29/16	COMP. DATE 07/29/16	SURFACE WATER DEPTH N	/A	DRILL	ER Contr	act Driller		START DATE	08/05/16	COMP. DA	TE 08/05/1	16 SU	IRFACE WATER D	EPTH N/A		
ELEV CHI		75 400	SOIL AND ROCK DES	SCRIPTION DEPTH (ft)	ELEV (ft)	DRIVE ELEV (ft) (ft)	PTH BLO	W COUNT	ift 0 25	BLOWS PER FO	OOT 75 100	SAMP.	L 0 101 G	SOIL AND F	ROCK DESCRI	PTION	
2125	<u> </u>		2,124.2 2,123.2 1.0' tAN, SILTY SAND	0.0 (TOPSOIL) 1.0	2120								- 2,11		2' TOPSOIL		0.0
2125 2120 21		· · · · · · ·	Z,124.2 Z,123.2 Z,121.2 TAN, CLAYEY SILTY SAND TRACE ROO TAN, SILTY SAND (A-2-4) ROOTS ALLUVIAL TAN AND GRAY, SLIGHTI CSE. SAND (A-1-b) W GRAVEL Boring Terminated at Eleva ALLUVIAL: SILTY	JUL D (A-2-5) WITH 3.0 TS 5.0 O WITH TRACE 6.0 LY SILTY F. TO ITH TRACE stion 2,118.2 ft in	2115								M	G.5 GRAY AND TAN (A-2-4) WI LT. GRAY AN TAN, SLI. SILTY WITH TAN, SLI. SILTY WITH TRACE Boring Terminate	TIFICIAL FILL I, SILTY CSE. T TH TRACE GR. TH TRACE GR. AND (A-2-5) ALLUVIAL F. TO CSE. SA TRACE GRAVE RESIDUAL F. TO CSE. SA MICA AND SAF	ND (A-1-b) ROLITIC 2,112.5 ft in	3.5 5.0 6.0
			- - - - - - - - -			+ + + + + + + + + + + + + + + + + + + +							- - - - - - - - - - - - - - - - - - -				



		D	JRE LUG		
VBS 41903.1.1		TIP U-5105 COUNTY	HENDERSON	GEOLOGIST Contract Geologis	st
SITE DESCRIPTION N	C 225 INTE	RSECTION IMPROVEMENTS FRO	I SR 1164 TO SR 1779		GROUND WTR (ft)
ORING NO. B-9		STATION 15+26	OFFSET 7 ft LT	ALIGNMENT -Y2-	0 HR. Dry
COLLAR ELEV. 2,124	.3 ft	TOTAL DEPTH 10.0 ft	NORTHING 578,881	EASTING 972,385	24 HR. FIAD
RILL RIG/HAMMER EFF/D	ATE TRI801	16 MOBILE B-57 90% 02/22/2016	DRILL METHOD H.S.	Augers HAMM	ER TYPE Automatic
RILLER Contract Dril	ler	START DATE 07/28/16	COMP. DATE 07/28/16	SURFACE WATER DEPTH N/A	4
ELEV (ft) 0.	SLOW COUN 5ft 0.5ft 0	─	5 100 NO. MOI G	SOIL AND ROCK DESC	CRIPTION DEPTH (I
2,120.8 3.5 2,118.3 6.0 3	1 2 3 2	1	SS-4 22%	2,124.3 O.3' TOPSOIL ARTIFICIAL FII TAN AND BROWN, SILTY SAND (A-2-4) WITH TRA RESIDUAL TAN AND WHITE, SILTY SAND (A-2-4) WITH TRAC SAPROLITIC 2,114.3 Boring Terminated at Elevat RES: SILTY SAI	CE GRAVEL3. CLAY (A-6)5. CSE. TO F. E MICA AND10.

SHEET 11

PROJECT REFERENCE NO. U-5105 12 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION APPENDIX B LABORATORY RESULTS REFERENCE: 41903

12/20/17 INITIALS DATE

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

NC 225 INTERSECTION IMPROVEMENTS FROM SR 1164 TO SR 1779

WBS NO.: 41903.1.1; TIP NO.: U-5105

HENDERSON COUNTY, NORTH CAROLINA FALCON ENGINEERING, INC. PROJECT NO: G16011.00

	BORING SAMPLE AASHTO Classification			TOTAL SAMPLE PERCENT PASSING			Atterberg Limit Test Results		
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	LL	PL	PI	%
В	-1	BS-1							
	A-4		99	81	40	35	29	6	20.5
17+30 -L-	41 ft LT	1.0-8.0							
В	-2	SS-1					21	11	20.5
	A-6		92	80	51	32			
18+89 -L-	40 ft LT	1.0-2.0							
В	-3	SS-2							
	A-2-6		83	59	21	37	26	11	26.0
21+76 -L-	28 ft RT	3.5-5.0							
В	-4	SS-3		87	52	33	17	16	
	A-6		98						21.1
22+32	24 ft RT	1.0-2.5							
В	B-5 B								
	A-2-6		95	81	31	34	21	13	17.9
17+99 -Y1-	30 ft RT	1.0-6.0							
B-9 SS-4 A-6		SS-4	_				19	_	21.6
			97	83	50	40		21	
15+26 -Y2-	7 ft LT	3.5-5.0							

SIGNATURE

FALCON

105-03-0803

Notes: LL = Liquid Limit

PL = Plastic Limit

PI = Plasticity Index = LL-PL

Falcon Engineering, Inc.

PAVEMENT SECTION AND SUBGRADE CONDITION SUMMARY

NC 225 INTERSECTION IMPROVEMENTS FROM SR 1164 TO SR 1779

HENDERSON COUNTY, NORTH CAROLINA

WBS No.: 41903.1.1 ; TIP: U-5105 Falcon Project No.: G16011.00

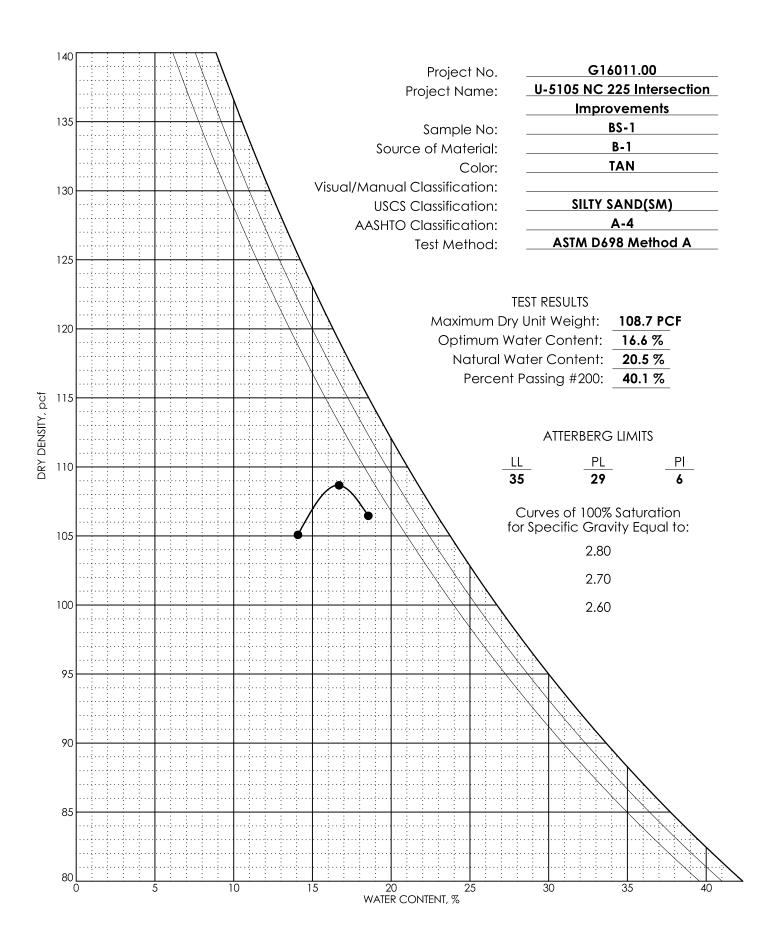
	TEST LOCATION			PAVEMENT SECTION THICKNESS (INCHES)			
STATION	OFFSET	LANE	НМА	AGGREGATE BASE	TOTAL	IN-SITU CBR	NOTES
17+32 -L-	CL	CENTER	10.00	8	18.00	7	Alligator cracking/distress evident in NB lane at apparent narrow widening location
24+00 -L-	5 ft LT	SOUTH	9.00	9	18.00	6	-
16+60 -Y1-	CL	NORTH	8.00	12	20.00	2	Evidence of previous subgrade improvements
17+45 -Y2-	CL	NORTH	5.00	10	15.00	6	-
REPRESENTATIVE AVERAGE			8.00	10	17.75	N/A	-

FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110

LABORATORY COMPACTION TEST RESULTS

9/2/2016

PHONE: 919.871.0800 FAX: 919.871.0803



SHEET 15

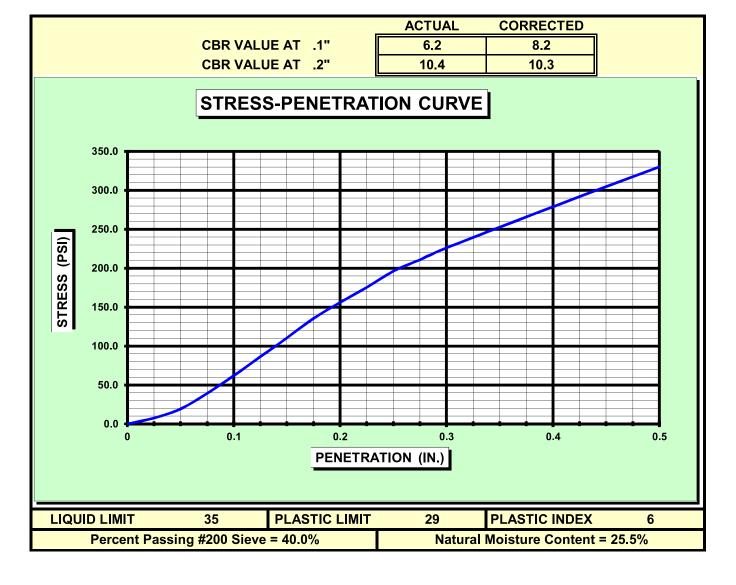
FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL **AASHTO T-193 \ ASTM D-1883**

PROJECT #: G16011.00 DATE: 8/23/2016 U-5105 NC 225 Improvements PROJECT NAME: **BORING:** B-1 SAMPLE: BS-1 DEPTH: 1-8' A-4 **SOIL DESCRIPTION:**

COMPACTION METHOD	ASTM D698	SOAK	96 HRS.
MAXIMUM DRY DENSITY	109.1 PCF	STRAIN RATE	.05 IN/MIN.
OPTIMUM MOISTURE CONTENT	17.1%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	106.5 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	17.2%	FINAL MOISTURE CONTENT	22.7%
PERCENT COMPACTION	97.6%	SWELL	1.58%

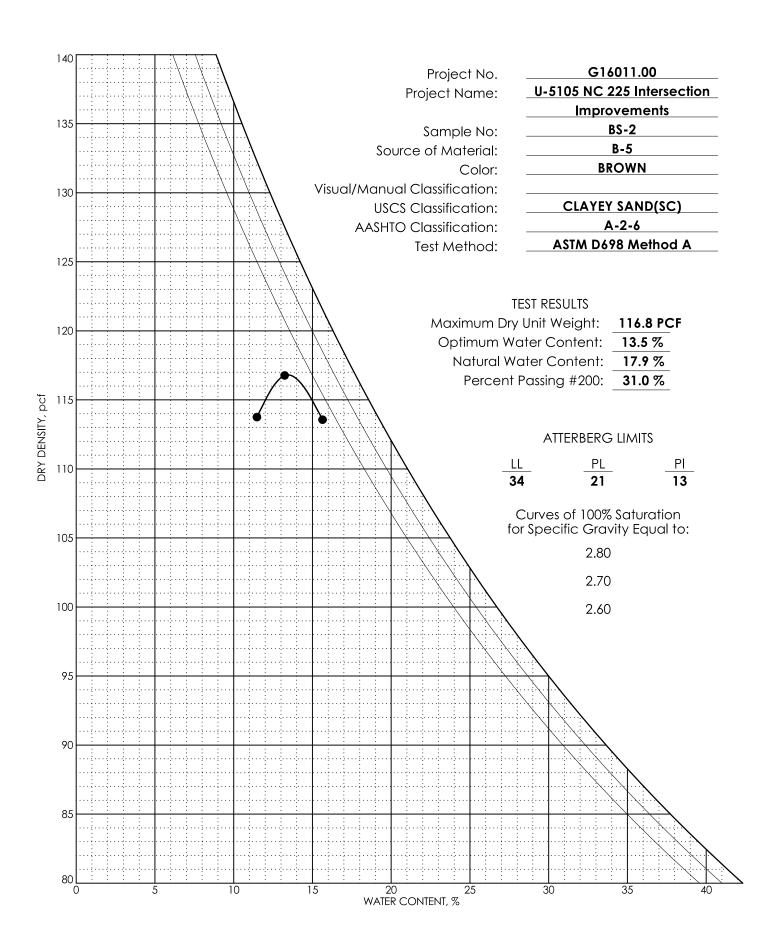


FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110

LABORATORY COMPACTION TEST RESULTS

9/2/2016

PHONE: 919.871.0800 FAX: 919.871.0803



SHEET 16

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL **AASHTO T-193 \ ASTM D-1883**

PROJECT #: G16011.00 DATE: 8/23/2016 U-5105 NC 225 Improvements PROJECT NAME: **BORING:** B-5 SAMPLE: BS-2 DEPTH: 1-6' A-2-6 **SOIL DESCRIPTION:**

COMPACTION METHOD	ASTM D698	SOAK	96 HRS.
MAXIMUM DRY DENSITY	109.1 PCF	STRAIN RATE	.05 IN/MIN.
OPTIMUM MOISTURE CONTENT	17.1%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	106.5 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	17.2%	FINAL MOISTURE CONTENT	22.7%
PERCENT COMPACTION	97.6%	SWELL	1.58%

