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REFERENCE

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<u>LINE</u> **STATION SHEETS** 19+50 TO 48+60

STATE OF NORTH CAROLINA

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE

PROJECT DESCRIPTION ACCESS ROAD CONNECTING FROM I-26 TO NC 191 (BREVARD RD)

INVENTORY

STATE PROJECT REFERENCE NO. 22 HE-0001B

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) 707-6850. 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 METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE CINVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR INVESTIGATIONS AND AND THE OBSERVED OF COLINATIC 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, 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.

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.

J. MANNING M. SERZEGA INVESTIGATED BY M. SNYDER DRAWN BY M. SNYDER CHECKED BY <u>J. GARDNER</u> SUBMITTED BY M. SNYDER

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5/25/2023

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PROJECT REFERENCE NO. SHEET NO.

HE-0001B

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	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.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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	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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.		
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT		
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION MINERAL NAMES SLICH AS QUARTZ EELDSPAR MICA TALC MADEIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.		
CLASS. (≤35% PASSING *200) (>35% PASSING *200) Class. (≤35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOOLD FIELD SPI REPOSAL IF TESTED, ROCK TIPE INCLODES GRANTE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.		
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM		
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.		
% PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	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.		
*10 50 MX GRANULAR SILS GRANULAR CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.		
*28/8 15 MX 25 MX 18 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL GRANULAR SILT - CLAY SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE		
MATERIAL PASSING •40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.		
LL — — 48 MX 41 MN LITTLE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN MODERATE HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.		
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	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 STUNE FRANCS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		(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.		
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM		
GEN RATING EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	<u> </u>	(MOD.) 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	PARENT MATERIAL.		
AS SUBGRADE	SPRING OR SEEP	WITH FRESH ROCK.	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		
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.		
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED	III OF MOS	(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.		
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) OF ROCK STRUCTURES ROADWAY EMBANKMENT (RE) 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 SPIT TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED 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 10 GRANULAR MEDIUM DENSE 10 10 30 N/A	N vsi Pril	ID SUME EXTENT, SUME PRAGMENTS OF STRUNG ROCK USUALLY REMAIN. 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 (NON-COHESIVE) VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE		
VERY SOFT	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	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	OF AN INTERVENING IMPERVIOUS STRATUM.		
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TEST BORING	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.		
MATERIAL STIFF 8 TO 15 1 TO 2	MUNITURING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (RQD) - 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		
(COHESIVE) VERY STIFF 15 TO 3Ø 2 TO 4 HARD > 3Ø > 4	ALLUVIAL SOIL BOUNDARY ALLUVI	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.		
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAV	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND		
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	HOED IN THE TOP 2 FEET 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 (CLD) (CD) (CD) (CD) (CD) (CD) (CD)	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNDERCUT UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO Ø.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT		
(CSE, SD.) (F SD.) (SC.)	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 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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		
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.		
COTI MOTOTIDE CON E ETEL D MOTOTIDE	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY		
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.		
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY		
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.		
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.		
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS ω - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	BENCH MARK: BORING COLLAR ELEVATIONS FROM HEOOOLLS_TIN,TIN DATED 6/15/2022.		
MOTOT (M) COLID. AT OD NEAD ODTIMIN MOTOTUDE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: N/A FEET		
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR 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			
DECUMPES ADDITIONAL MATER TO	CLAY BITS X AUTOMATIC MANUAL	CLOSE Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.03 - Ø.16 FEET VERY CLOSE LESS THAN Ø.16 FEET THICKLY LAMINATED Ø.008 - Ø.03 FEET	NOTES:		
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 G'CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET			
PLASTICITY	8' HOLLOW AUGERS	INDURATION			
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
NON PLASTIC Ø-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;			
HIGHLY PLASTIC 26 OR MORE HIGH COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.			
	X CME-550X TRICONE TRICONE 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;			
1.002. IENO COOL NO EZOTT, DIRING CITIENNED, ETG. RILE COED TO DESCRIBE RELEMENTOES		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1		

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PROJECT

See Sheet 1B For Conventional Symbols BEGIN PROJECT VICINITY MAP

BEGIN TIP PROJECT HE-0001B

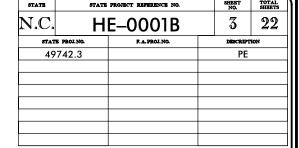
-Y-STA. 19 + 50.00

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

LOCATION: ACCESS ROAD CONNECTING FROM I-26 TO NC 191 (BREVARD RD)

TYPE OF WORK: GRADING, PAVING, AND DRAINAGE







END TIP PROJECT HE-0001B -Y-STA.48+57.94

5 -Y- (EAST FREDERICK LAW OLMSTED WAY)

CLEARING ON THIS PROJECT WILL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

DESIGN DATA ADT 2021 = 9,100

ADT 2045 = 18,600D = 55 %T = 10%

V = 40 MPH* TTST = 1% DUAL 4%

FUNC CLASS = MINOR ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT HE-0001B = 0.550 Miles

TOTAL LENGTH TIP PROJECT HE-0001B = 0.550 Miles

NCDOT CONTACT:

MCCRAY COATES, PE

Prepared for the North Carolina Department of Transportati In the Office of:



2018 STANDARD SPECIFICATIONS

LETTING DATE:

N/A

RIGHT OF WAY DATE:

ANGELA B. PRIDGEN, PE PROJECT DESIGN ENGINEER

RICKY A. TIPTON, PE

HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER



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gannettfleming.com

May 12, 2023

State Project:49742.3TIP No.:HE-0001BCounty:Buncombe

Description: Access Road Connecting I-26 to NC 191 (Brevard Rd)

Subject: Roadway Subsurface Inventory Report

PROJECT DESCRIPTION

The proposed project (HE-0001B) consists of approximately 0.55-miles of new alignment roadway (-Y-) to connect a future diverging diamond interchange (DDI) to Frederick Law Olmstead Way East and NC 191 (Brevard Rd). The new alignment roadway will be a two-lane typical section with embankments up to 25 feet and cut sections as deep as 85 feet.

The geotechnical investigation for HE-0001B was performed from August to September of 2022. Seventeen (17) Standard Penetration test (SPT) borings were performed with CME 550X ATV-mounted drill rigs equipped with automatic hammers. Representative soil samples were collected from split spoon samples and soil cuttings for field visual classification and laboratory analysis and classification.

The following alignments, totaling 0.6 miles, were investigated. Selected cross sections of these alignments are included in this report.

<u>Line</u> <u>Stations (+/-)</u> -Y- 19+50 – 48+60

PHYSIOGRAPHY AND GEOLOGY

The proposed project is located within the Blue Ridge Physiographic Province. The terrain within the project corridor consists of rolling hills and mountainsides.

The proposed project is underlain by Late Proterozoic Mica Schist and Biotite Gneiss. The occurrence of these rock types is indicated by the weathered and crystalline rock samples recovered during the geotechnical investigation, as well as the composition of the local residual soils. The overlying residual soils are a result of physical and chemical weathering of the underlying parent bedrock.

SOIL PROPERTIES

The soils encountered during the geotechnical investigation consisted of alluvial and residual soils.

Alluvial Soils: Alluvial soils are assumed to be present within existing streams crossing the proposed alignment.

Residual Soils: Soils classified as residual soils generally consisted of silty and clayey sand (A-2-4, A-2-5, A-2-6), sandy and clayey silt (A-4, A-5), and sandy and silty clay (A-6, A-7-5, A-7-6). Varying amounts of mica, manganese, and rock fragments were noted within soils interpreted as residual soils.

ROCK PROPERTIES

Weathered Rock: Weathered Rock is defined by penetration by split spoon of less than 1.0 foot per 100 blows. Weathered Rock was encountered in ten (10) borings. Four (4) of these borings encountered intermediate lenses of Weathered Rock that transitioned back to residual soils at greater depths. These lenses ranged in thickness from 0.8 to 7.5 feet. Weathered Rock was encountered at elevations ranging from 2,064 to 2,128 feet, excluding the intermediate lenses.

Crystalline Rock: Crystalline Rock is defined by auger refusal and/or SPT refusal with penetration by split spoon of less than or equal to 0.1 feet per 60 blows. Crystalline Rock was encountered in eight (8) borings at elevations ranging from 2,050 to 2,125 feet. Crystalline Rock encountered at the site is visually identified as Mica Schist and Biotite Gneiss.

GROUNDWATER

Groundwater measurements were attempted in most of the borings immediately upon completion of drilling and/or a minimum of 24-hr after completion of drilling. Groundwater was encountered during drilling operations (0-hr) in one (1) boring at a depth of 56.9 feet and elevation of 2,096 feet. Stabilized groundwater table (24-hr) measurements were recorded in two (2) borings at depths ranging from 4.0 to 51.5 feet and elevations ranging from 2,087 to 2,102 feet. Groundwater was not encountered in the remaining borings.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

Alluvial Soils: The following areas are assumed to contain alluvial soils associated with existing streams crossing the proposed alignment:

<u>Line</u>	Stations (+/-)	<u>Offset</u>			
-Y-	26+10 - 26+45	LT & RT			
-Y-	34+10 - 34+30	LT & RT			
-Y-	38+40 - 38+90	IT & RT			

Cohesive Soils: The following areas contain cohesive soils at existing subgrade in fill areas or near proposed subgrade in cut areas and have the potential to cause subgrade problems during construction:

<u>Line</u>	Stations (+/-)	<u>Offset</u>
-Y-	25+75 - 30+50	LT & RT
-Y-	38+25 - 42+00	LT & RT
-Y-	44+00 - 46+00	LT & RT

Highly Plastic Soils: Highly plastic soils with plasticity indices (PI) greater than 25 within proposed cut sections or greater than 35 within 3-ft of subgrade were not encountered.



Sheet 3A

Sheet 3B

Roadway Subsurface Inventory Report TIP No. HE-0001B / Gannett Fleming Project No. 069172, Task 015 May 12, 2023

Weathered Rock: The following areas contain weathered rock above or within six (6) feet of proposed grade and have the potential to require ripping or blasting for removal:

<u>Line</u> -Y-	Stations (+/-)	<u>Offset</u>			
-Y-	19+50 - 25+00	LT & RT			
-Y-	35+00 - 37+50	LT & RT			

Crystalline Rock: The following areas contain crystalline rock above or within six (6) feet of proposed grade and will likely require ripping or blasting for removal:

<u>Line</u>	Stations (+/-)	<u>Offset</u>
-Y-	19+50 - 21+50	LT & CT
-Y-	36+50 - 37+50	CT

Groundwater: Groundwater was not encountered within proposed cut sections.

The following areas exhibited groundwater within six (6) feet of the proposed grade:

<u>Line</u>	Stations (+/-)	<u>Offset</u>		
-Y-	36+50 - 37+50	LT		

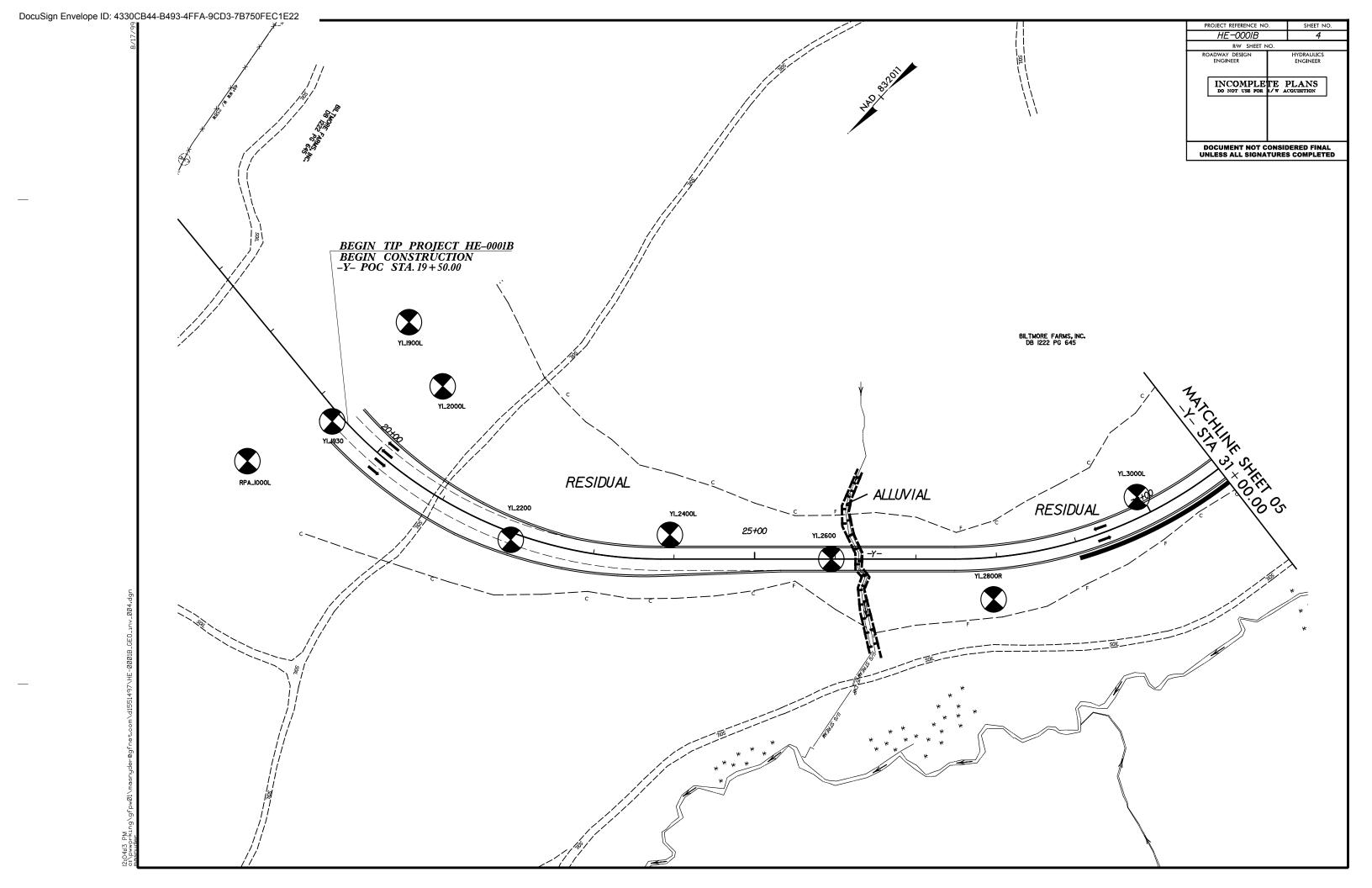
Sincerely,

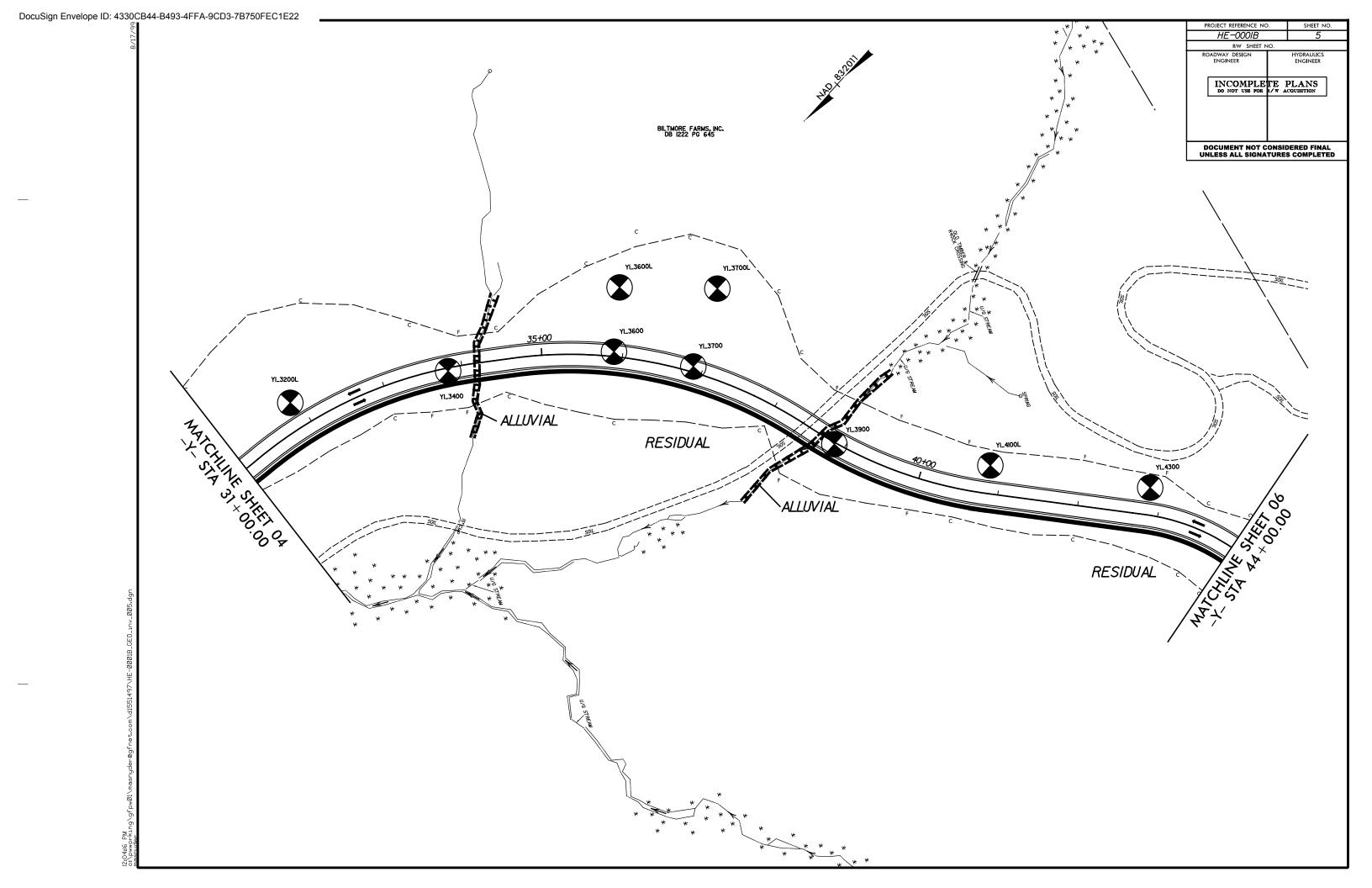
Gannett Fleming, Inc.

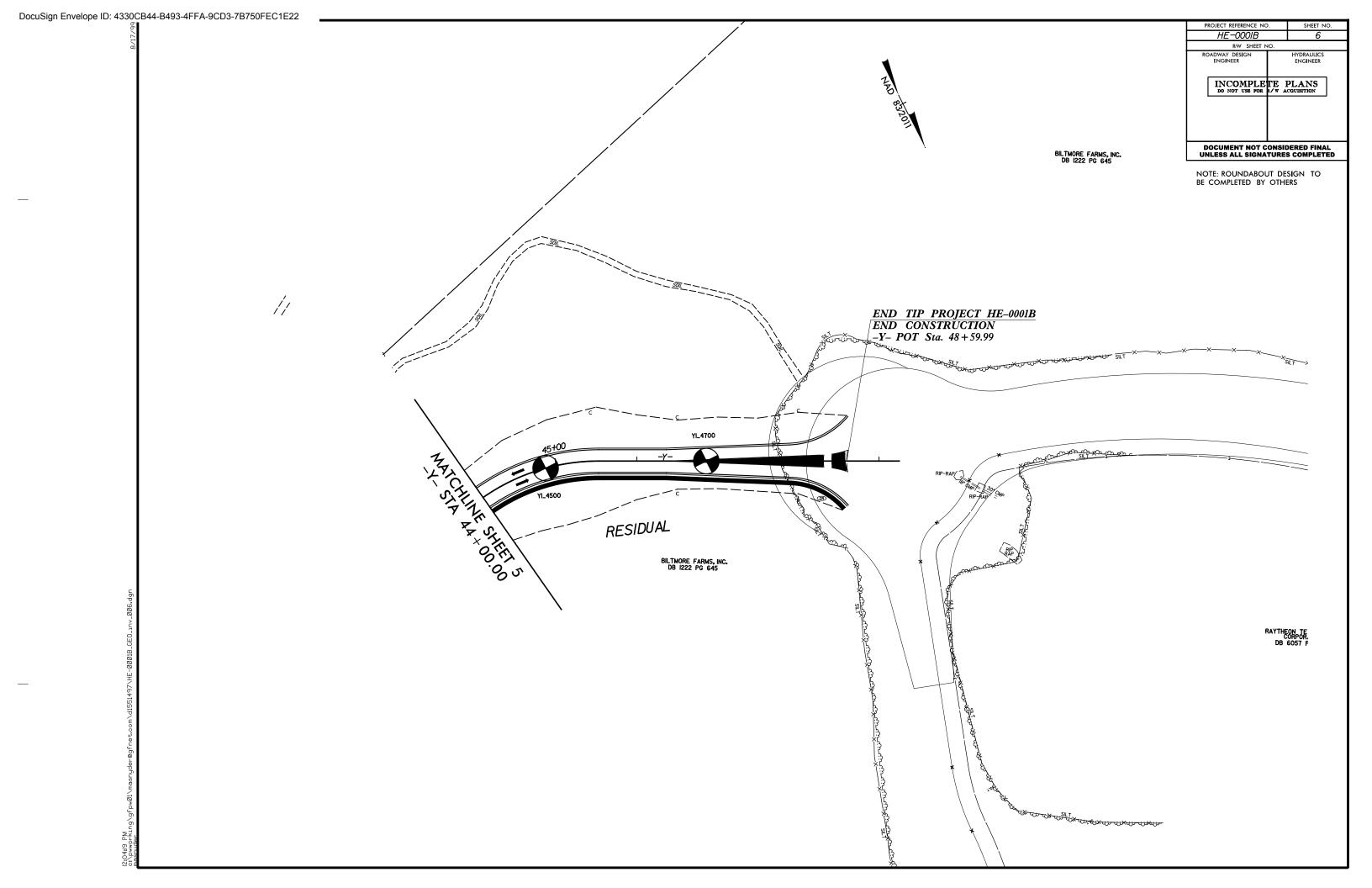
Matthew Snyder, P.E.

Senior Project Geotechnical Engineer









WBS 49742.3 TIP HE-0001B Buncombe County

SOIL TEST RESULTS																
SAMPLE	ALIONIMENIT	07.47.01	OFFOFT	DEPTH	AASHTO		5.	% BY WEIGHT				% PASSING SIEVE			%	۵/ ۵۵۵۸۸۱۱۵
NO.	ALIGNMENT	STATION	OFFSET	INTERVAL	CLASS.	L.L.	P.I.	C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	% ORGANIC
SS-1180	-Y-	19+00	140' LT	8.5-10.0	A-5(0)	41	1	5.6	66.2	26.1	2.1	99	98	41	13.7	-
SS-1149	-Y-	19+05	124' RT	18.5-20.0	A-7-5(6)	61	12	7.9	29.0	25.8	37.3	79	75	54	20.6	-
SS-1116	-Y-	19+34	12' RT	13.9-15.4	A-4(0)	35	0	12.1	54.7	26.3	6.9	100	95	45	30.5	-
SS-1189	-Y-	20+09	115' LT	19.0-20.5	A-5(10)	74	6	7.2	28.2	53.2	11.4	100	98	69	53.5	-
SS-1095	-Y-	21+97	9' RT	23.3-24.8	A-2-5(0)	41	6	21.2	62.7	11.6	4.5	100	91	30	10.4	-
SS-1103	-Y-	23+95	30' LT	8.7-10.2	A-2-4(0)	37	0	14.8	65.1	17.2	2.9	99	94	31	13.2	-
SS-1112	-Y-	25+95	CL	9.5-11.0	A-5(0)	55	4	27.0	33.5	29.9	9.6	91	76	42	31.7	-
SS-1073	-Y-	27+92	52' RT	2.5-4.0	A-7-5(5)	52	12	10.1	49.4	11.8	28.7	97	93	52	20.6	-
SS-1078	-Y-	29+93	24' LT	8.9-10.4	A-2-5(0)	47	0	15.4	62.9	17.5	4.2	98	91	35	14.5	-
SS-1082	-Y-	31+90	33' LT	0.0-1.5	A-6(5)	39	14	8.1	38.7	14.1	39.1	88	85	55	18.7	-
SS-1088	-Y-	31+90	33' LT	27.7-29.2	A-2-5(0)	54	1	24.4	51.9	14.9	8.8	86	79	29	23.6	-
SS-1043	-Y-	35+89	6' LT	14.4-15.9	A-4(1)	30	4	7.6	50.8	31.7	9.9	100	98	57	12.8	-
SS-1048	-Y-	35+89	6' LT	39.4-40.9	A-4(0)	37	2	9.3	55.6	31.3	3.8	100	98	52	19.9	-
SS-1031	-Y-	35+88	86' LT	9.2-10.7	A-4(0)	38	2	11.4	62.6	22.2	3.8	100	97	45	12.4	-
SS-1037	-Y-	35+88	86' LT	44.2-45.7	A-5(1)	48	5	16.8	51.3	24.0	7.9	99	92	45	27.0	-
SS-1050	-Y-	36+88	7' LT	0.0-1.5	A-7-5(13)	53	19	10.9	27.3	19.1	42.7	99	94	68	20.2	-
SS-1064	-Y-	36+89	108' LT	23.8-25.3	A-7-5(3)	53	12	21.6	37.9	24.2	16.3	88	80	44	31.7	-
SS-1069	-Y-	36+89	108' LT	48.8-50.3	A-4(1)	30	4	14.6	40.8	32.7	11.9	99	94	55	20.1	-
SS-1010	-Y-	40+86	35' LT	0.0-1.5	A-7-6(12)	47	21	9.9	29.6	20.3	40.2	96	93	63	22.6	-
SS-1018	-Y-	42+86	34' LT	8.4-9.9	A-7-5(15)	65	26	11.0	33.3	15.2	40.5	92	86	60	32.6	-
SS-1007	-Y-	44+86	CL	18.0-19.5	A-7-5(21)	66	16	1.1	22.8	47.2	28.9	100	100	87	47.2	-