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CONTENTS

DESCRIPTION

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

BORE LOGS

PROFILE

SHEET NO.

5-9

5898 186/B ~ Ö REFERENCE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _ **HAYWOOD**

PROJECT DESCRIPTION US 23/US 74/US 19 (GREAT SMOKY MOUNTAIN HWY) FROM WEST OF NC 209(CRABTREE RD.) TO EAST OF RUSS AVE. SITE DESCRIPTION RETAINING WALL #8 FROM -DET01 EB- STA. 34 + 83.83 TO 29 + 30.48

STATE PROJECT REFERENCE NO. B-3186/B-5898 9

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.

CENERAL 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 LABDRATORY 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 NIDICATED 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 WARRAYT OR CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE TO MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY 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.

R. DUGGER
N. YACOBI
GEOTECHNOLOGY, INC

INVESTIGATED BY __C. SWAFFORD

DRAWN BY __T. LYNN

CHECKED BY K. BUSSEY

SUBMITTED BY _HDR

DATE NOVEMBER 2021

HDR Engineering, Inc. of the Carolinas 555 Fayetteville St, Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116



kenneth R. Bussey, Jr.

9/6/2023

SIGNATURE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.

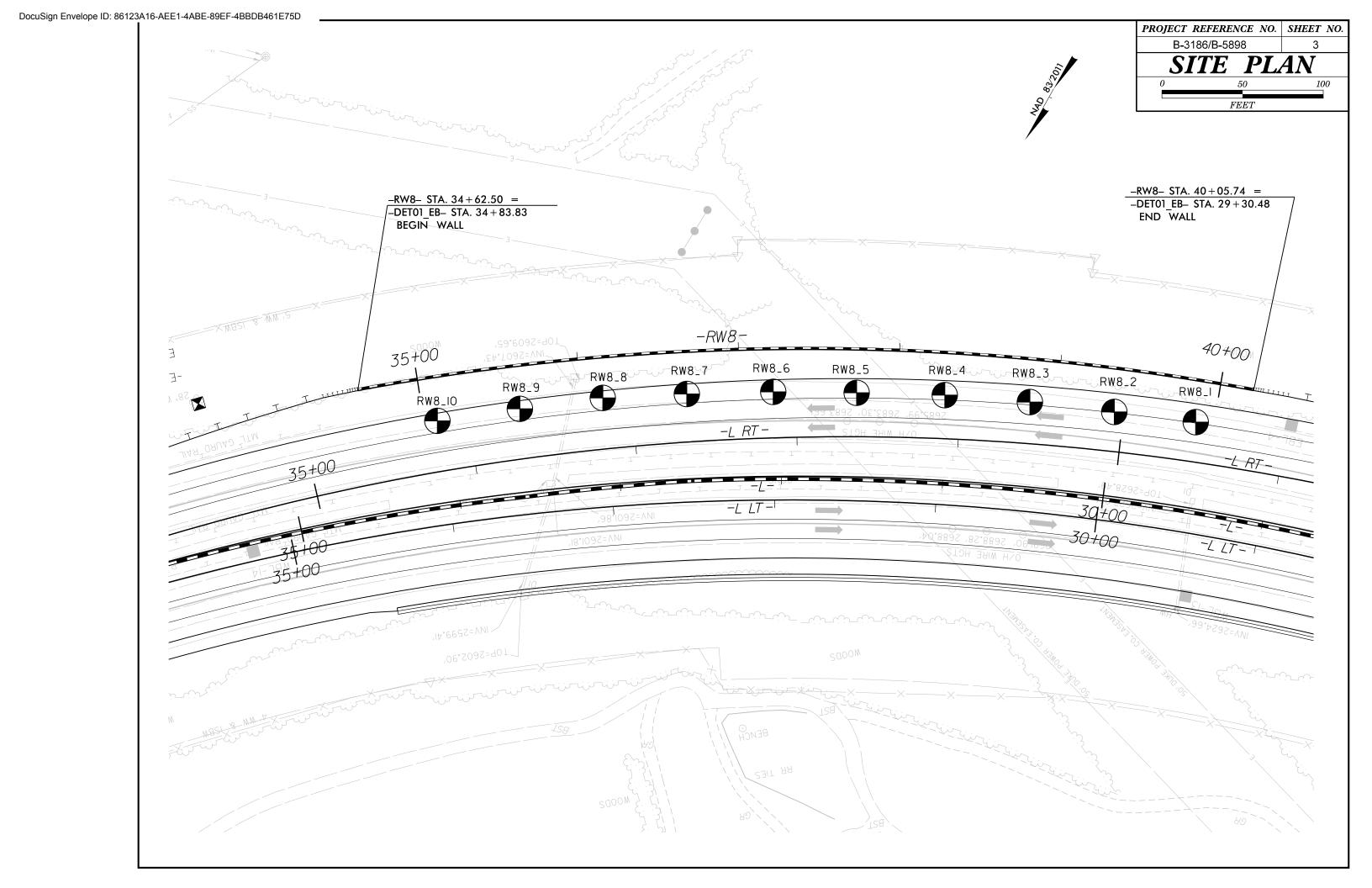
B-3186/B-5898

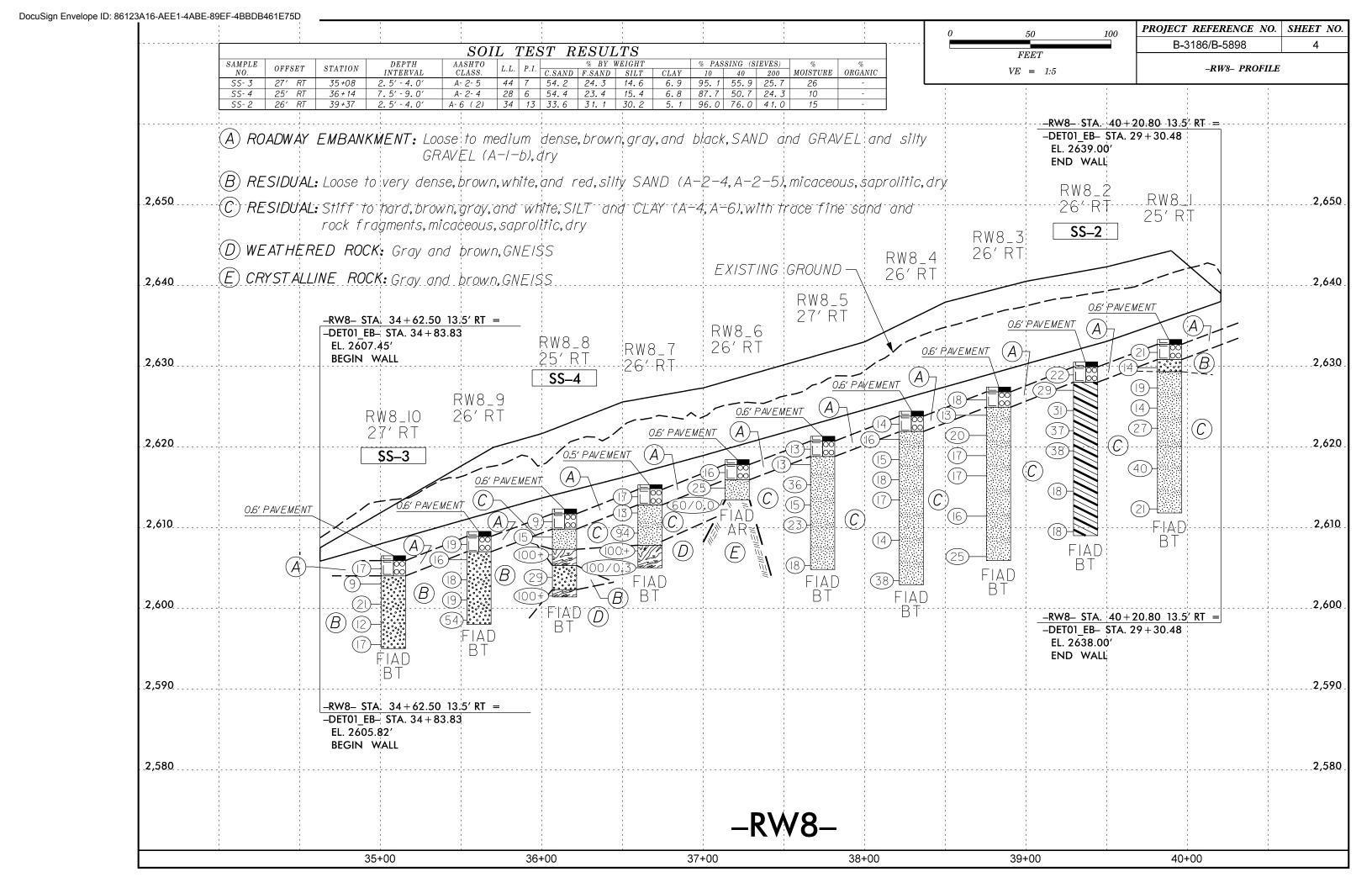
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO 1 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING;	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	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 SUPERACE
CLASS. (≤ 35% PASSING #200) (> 35% PASSING #200) GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	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 REFUSAL IF TESTED, ROCK TIPE INCLUDES GRANTE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. 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) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD 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 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 - 50 HIGHLY COMPRESSIBLE LL > 50 LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
7. PASSING GRANULAR SILT- GRANULAR SILT- GRANULAR SILT- MUCK, CLAY MUCK, CLAY PEAT	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*2000 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS 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 HAMMER IF CRYSTALLINE.	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40 LL 48 MX 41 MN LITTLE OR P1 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN LITTLE OR HIGHLY	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	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 OF A CRYSTALLINE NATURE.	HORIZONTAL. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
CROUP INDEX	GROUND WATER ✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN.RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		(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. 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	SPRING OR SEEP	WITH FRESH ROCK. 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 FIELD.
CONSISTENCY OR DENSENESS COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE 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.	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) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL 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	SOIL SYMBOL SOIL	(SEV.) 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, MOULD YIELD SPT IN VALUES > 100 BPF	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
MATERIAL DENSE 30 TO 50 VERY DENSE > 50 VERY SOFT < 2 < 0.25	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER TEST INFERRED SOIL BOUNDARY ————————————————————————————————————	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE 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	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.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - 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 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 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053 DOWNERS CORNE CORNE FINE CLAY	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - EMBANKENT OR BACKFILL UNDERCUT	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.	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.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY (GL.) (CDB.) (GR.) (CSE.SD.) (F SD.) (SL.) (CL.)	ABBRE VIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	BY MODERATE BLOWS. 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 I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7G- DRY UNIT WEIGHT CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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 TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN 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
LL _ LIQUID LIMIT	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACI FRACTURED, FRACTURES TOR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULIDE REGULRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: N/A
- MOICT - (M) COLID. AT OR NEAR ORTIMIN MOICTURE	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE - MUIST - (M) SULID; AT OK NEAK UPTIMUM MUISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	MIDE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE CLIZE	VERY CLOSE	BORING ELEVATIONS OBTAINED USING b3186_br0022_r4047_Merged_l-12-21.+in
PLASTICITY	X 8" HOLLOW AUGERSBH	INDURATION	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (P]) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	X CME-550X HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
NUN PLASTIC U-5 VERY LUW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS: CASING W/ ADVANCER CASING W/ ADVANCER	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER POST HOLE DIGGER TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. 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	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
		STATE STEERS HOTOS STRIPS.	DHIE: 0-13-14





	BORE LOG					
WBS 38330.1.FS1 TIP B-3186 / B-5898 COUNTY			WBS 38330.1.FS1		HAYWOOD	GEOLOGIST N. Yacobi
SITE DESCRIPTION Retaining Wall No. 8 from -DET01_EB- STA 34+83			SITE DESCRIPTION Retaining Wa			GROUND WTR (ft)
_		0 HR. Dry	BORING NO. RW8_9		OFFSET 26 ft RT	ALIGNMENT -RW8- 0 HR. Dry
			COLLAR ELEV. 2,609.5 ft		NORTHING 665,656	EASTING 818,373 24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE GTC CME550X 9083	,		DRILL RIG/HAMMER EFF./DATE GTC CI		DRILL METHOD HS	
	COMP. DATE 01/26/21 SURFACE WATER DEPTH N/A		DRILLER L. Wanstrath	l l	COMP. DATE 01/27/21	SURFACE WATER DEPTH N/A
DENTH BLOW COUNT BLOWS PER FOOT	75 100 NO. MOI G ELEV. (ft)	RIPTION DEPTH (ft)	ELEV (ft)	BLOWS PER FOOT 0 25 50 7	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION
2610 2605 2,604.0 2.5 7 10 7 17 17 17 17 17 17 17 17 17 17 17 17 1	I Loo o Look 1889 UNROUM DENSE DROWN SANDS	CE 0.0 0.6 MENT 2.5	2,607.0 2.5 4 9 2,604.5 5.0 8 8	8	D	2,609.5 GROUND SURFACE 0.0 2,609.5 0.6' PAVEMENT 0.6 ROADWAY EMBANKMENT 2.6 GRAVEL (A-1-b) RESIDUAL Medium dense to very dense, brown, white
2,601.5 5.0 6 8 13 21	D RESIDUAL Loose to medium dense, white red, fine to coarse SAND (A-2 silt and trace clay, micaceous	2-5) with little	2,602.0 7.5 4 8 2,599.5 10.0 16 32 2		D D	2,598.0 2,598.0 Boring Terminated at Elevation 2,598.0 ft in
2,596.5 10.0 6 7 10 1 10 10 10 10 10 10 10 10 10 10 10 1	.	11.5				Boring Terminated at Elevation 2,598.0 ft in SAND
						 - - - -

		BORE LOG						
WBS 38330.1.FS1	TIP B-3186 / B-5898 COUNT		GEOLOGIST N. Yacobi		WBS 38330.1.FS1	TIP B-3186 / B-5898 COU		GEOLOGIST N. Yacobi
SITE DESCRIPTION Retaining W	/all No. 8 from -DET01_EB- STA 34+	1		GROUND WTR (ft)	SITE DESCRIPTION Retaining V	Wall No. 8 from -DET01_EB- STA 3	4+83.83 to 29+30.48	GROUND WTR (ft)
BORING NO. RW8_8	STATION 36+14	OFFSET 25 ft RT	ALIGNMENT -RW8-	0 HR. Dry	BORING NO. RW8_7	STATION 36+67	OFFSET 26 ft RT	ALIGNMENT -RW8- 0 HR. Dry
COLLAR ELEV. 2,612.3 ft	TOTAL DEPTH 10.9 ft	<u> </u>		24 HR. FIAD	COLLAR ELEV. 2,615.3 ft		NORTHING 665,597	EASTING 818,287 24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE GTO	CME550X 9083	DRILL METHOD H.	S. Augers HAM	MERTYPE Automatic	DRILL RIG/HAMMER EFF/DATE GTO	C CIVE550X 9083	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic
DRILLER L. Wanstrath	START DATE 01/27/21	COMP. DATE 01/27/21	SURFACE WATER DEPTH N	N/A	DRILLER L. Wanstrath	START DATE 01/27/21	COMP. DATE 01/27/21	SURFACE WATER DEPTH N/A
COLLAR ELEV. 2,612.3 ft DRILL RIGHAMMER EFF/DATE GTO	TOTAL DEPTH 10.9 ft CME550X 9083 START DATE 01/27/21 DINT BLOWS PER FOO 0.5ft 0 25 50 5 49	NORTHING 665,625 DRILL METHOD H.	EASTING 818,331 S. Augers HAMI SURFACE WATER DEPTH N SOIL AND ROCK DESERTED STATES OF THE STATES	24 HR. FIAD MER TYPE Automatic N/A SCRIPTION DEPTH (ft) PARCE OB OB OB OB OB OB OB OB OB O	COLLAR ELEV. 2,615.3 ft DRILL RIGHAMMER EFF,/DATE GTO	TOTAL DEPTH 10.3 ft CCME550X 9083 START DATE 01/27/21 UNT BLOWS PER FO 0.5ft 0 25 50 9 17 17 13 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	NORTHING 665,597 DRILL METHOD COMP. DATE 01/27/21 DOT 75 100 NO. MOI	EASTING 818,287 HAWMER TYPE Automatic SURFACE WATER DEPTH N/A SOIL AND ROCK DESCRIPTION
NCDOT BORE DOUBLE B3186_GEO_SPT.GPJ NC_DOT.GDT 5/26/21								

		BORE LOG						
WBS 38330.1.FS1	TIP B-3186 / B-5898 COUN		GEOLOGIST N. Yacobi	•	WBS 38330.1.FS1	TIP B-3186 / B-5898 COU		GEOLOGIST N. Yacobi
SITE DESCRIPTION Retaining Wa		1		GROUND WTR (ft)	SITE DESCRIPTION Retaining	Wall No. 8 from -DET01_EB- STA 3		GROUND WTR (ft)
BORING NO. RW8_6	STATION 37+21	OFFSET 26 ft RT	ALIGNMENT -RW8-	0 HR. Dry	BORING NO. RW8_5	STATION 37+74	OFFSET 27 ft RT	ALIGNMENT -RW8- 0 HR. Dry
COLLAR ELEV. 2,618.4 ft	TOTAL DEPTH 5.0 ft	NORTHING 665,570	EASTING 818,241	24 HR. FIAD	COLLAR ELEV. 2,621.3 ft	TOTAL DEPTH 16.5 ft	NORTHING 665,545	
DRILL RIG/HAMMER EFF/DATE GTC	DME550X 9083	DRILL METI-	HOD H.S. Augers HAN	MIMIER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE G	TC OME550X 9083	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic
DRILLER L. Wanstrath	START DATE 01/27/21	COMP. DATE 01/27/2		N/A	DRILLER L. Wanstrath	START DATE 01/27/21	COMP. DATE 01/27/21	SURFACE WATER DEPTH N/A
BORING NO. RW8_6 COLLAR ELEV. 2,618.4 ft DRILL RIG/HAMMER EFF,/DATE GTC (DRILLER L. Wanstrath ELEV (ft) DRIVE (ft) DEPTH BLOW COUL (ft) (ft) 0.5ft 0.5ft (2620	STATION 37+21 TOTAL DEPTH 5.0 ft EXCESSOX 9083 START DATE 01/27/21 NT BLOWS PER FOX 0.5ft 0 25 50	OFFSET 26 ft RT NORTHING 665,570 DRILL METHOD TO SAMP. TO NO. M	HOD H.S. Augers HAN 21 SURFACE WATER DEPTH O SOIL AND ROCK DE MOI G ELEV. (ft) - 2,618.4 GROUND SUI - 2,618.4 GROUND SUI - 2,618.5 ROADWAY EMBA	0 HR. Dry 24 HR. FIAD WIMER TYPE Automatic N/A ESCRIPTION DEPTH (ft) RFACE 0.0 MENT ANKMENT d gray, SAND and v-1-b) 5.0 x, and gray, SILT olitic with Standard sal at Elevation	BORING NO. RW8_5 COLLAR ELEV. 2,621.3 ft DRILL RIG/HAMMER EFF/DATE G DRILLER L. Wanstrath ELEV (ft) DEPTH BLOW COLLECTION (ft) 0.5ft 0.5ft 2625 2620 2,620.7 0.6 6 6 2,618.8 2.5 8 6 2,618.8 2.5 8 6 2,613.7 10.0 18 21 2,613.8 7.5 5 5	STATION 37+74 TOTAL DEPTH 16.5 ft TC CME550X 9083 START DATE 01/27/21 OUNT BLOWS PER FO 10.5ft 0 25 50 10.5ft 0 25 50 10.5ft 0 25 10.5ft 0 25	OFFSET 27 ft RT NORTHING 665,545 DRILL METHOD COMP. DATE 01/27/21 OOT 75 100 NO. MOI D D D D D D D D D D D D D	ALIGNMENT -RW8- 0 HR. Dry EASTING 818,196 24 HR. FIAD H.S. Augers HAMMER TYPE Automatic SURFACE WATER DEPTH N/A SOIL AND ROCK DESCRIPTION
NCDOT BORE DOUBLE B3186_GEO_SPT.GPJ NC_DOT.GDT 5/26/21								

BORE LOG	,				
WBS 38330.1.FS1 TIP B-3186 / B-5898 COUNTY HAYWOOD	GEOLOGIST N. Yacobi	WBS 38330.1.FS1	TIP B-3186 / B-5898 COUN	ITY HAYWOOD	GEOLOGIST N. Yacobi
SITE DESCRIPTION Retaining Wall No. 8 from -DET01_EB- STA 34+83.83 to 29+30.48	GROUND WTR (ft)	SITE DESCRIPTION Retaining W	_		GROUND WTR (ft)
_	ALIGNMENT -RW8- 0 HR. Dry	BORING NO. RW8_3	STATION 38+83	OFFSET 26 ft RT	ALIGNMENT -RW8- 0 HR. Dry
COLLAR ELEV. 2,624.4 ft TOTAL DEPTH 21.5 ft NORTHING 665,520	EASTING 818,149 24 HR. FIAD	COLLAR ELEV. 2,627.4 ft	TOTAL DEPTH 21.5 ft	NORTHING 665,498	EASTING 818,099 24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE GTC CME550X 9083 DRILL METHOD H.S.	Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE GTC		DRILL METHOD	H.S. Augers HAMMER TYPE Automatic
	SURFACE WATER DEPTH N/A	DRILLER L. Wanstrath	START DATE 01/27/21	COMP. DATE 01/27/21	SURFACE WATER DEPTH N/A
ELEV (ft) DEPTH BLOW COUNT BLOWS PER FOOT SAMP. COUNT COUN	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV (ft) DRIVE ELEV (ft) DEPTH BLOW COU	JNT BLOWS PER FO 0.5ft 0 25 50	OT SAMP. SAMP. 100 NO. MOI C	
2,621.9 2.5 6 7 7 8 8 8 16 16 17	2.624.4 GROUND SURFACE 0.0 2.623.6 0.6 PAVEMENT 0.6 ROADWAY EMBANKMENT 2.5 Medium dense, brown and black, SAND 1 and GRAVEL (A-1-b)	2630 2,626.8 0.6 10 10 2625 2,624.9 2.5	8 18	D E	2,627.4 GROUND SURFACE 0.0 2,624.9 ROADWAY EMBANKMENT Medium dense, gray and brown, SAND and J GRAVEI (A.1-b)
2,619.4 5.0 4 6 9 2,616.9 7.5 10 10 8 2,614.4 10.0 7 7 10 10 10 8	RESIDUAL Stiff to hard, white, gray, brown and black, SILT (A-4), micaceous, saprolitic	2,622 4 5.0 9 9 2,619 9 7.5 7 8	9 017	D	Medium dense, gray and brown, SAND and f GRAVEL (A-1-b)
2610 2,609.4 15.0 6 6 8 114		2,617.4 10.0 8 8 2615 2,612.4 15.0 8 8	9	D	
2,604.4 20.0 12 15 23	2,602.9 21.5 Boring Terminated at Elevation 2,602.9 ft in SILT	2,607.4 20.0 12 13	12 25		21.5 Boring Terminated at Elevation 2,605.9 ft in
MODOL BOKE DOUBLE BSIRS GEO. SPILORU MY, DOLLORU SARATI					SILT

		BORE LOG	1										
WBS 38330.1.FS1	TIP B-3186 / B-5898 COUN		GEOLOGIST N. Yacobi		WBS 38330			TIP B-3186 / B-5898 COUI			GE	OLOGIST N. Yacobi	T
	Wall No. 8 from -DET01_EB- STA 34			ROUND WTR (ft)			etaining W	/all No. 8 from -DET01_EB- STA 3					GROUND WTR (ft
BORING NO. RW8_2	STATION 39+37	OFFSET 26 ft RT		DHR. Dry	BORING NO.			STATION 39+89	OFFSET			IGNMENT -RW8-	0 HR. Dry
COLLAR ELEV. 2,630.5 ft	TOTAL DEPTH 21.5 ft	NORTHING 665,477	<u> </u>	HR. FIAD	COLLAR ELE			TOTAL DEPTH 21.5 ft	NORTHING			STING 818,003	24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE GT		DRILL METHOD H.		TYPE Automatic	DRILL RIG/HAIV						THOD H.S. Auge		AMMER TYPE Automatic
DRILLER L. Wanstrath	START DATE 01/26/21	COMP. DATE 01/27/21	SURFACE WATER DEPTH N/A		DRILLER L.			START DATE 01/26/21	COMP. DA		5/21 SU	RFACE WATER DEPTH	N/A
ELEV (ft) DEPTH BLOW CO	0.5ft 0 25 50	75 400	SOIL AND ROCK DESCRIF	PTION DEPTH (ft)	ELEV DRIVE ELEV (ft)	OEPTH B	LOW COU		75 100	SAMP.	MOI G	SOIL AND ROCK I	DESCRIPTION
2635					2635 2,632.7-	- - - 0.6) 11	10			- 2,633 - 2,633	\ U.U.I.AVL	MENT - 0
2630 2,629.9 0.6			- 2,630.5 GROUND SURFACE - 2,629.9 0 6' PAVEMENT	E 0.0	2630 2,630.8-			8 21			D 2,631	Medium dense grav	and brown silty I
	10 •22		2 628 0 ROADWAY EMBANKME	ENT 2.5	2,628.3			14			D 2,629	GRAVEL (A-1-b) Ir— 4
8 12	17 29	. D	Medium dense, gray and brown, GRAVEL (A-1-b)	, SAND and / — — — 	2,625.8-	7.5	9	10 19			D E	Medium dense, tan and (A-2-4), mid	l brown, silty SAND /
1 1 1	16	SS-2 15%	RESIDUAL Very stiff to hard, brown, silty, fin	ne to coarse	2625 2,623.3	- 5	8	6			D _	Stiff to hard, brown, ta (A-4), with trace sa	n and white, SILT
2,623.0 7.5	21	: : : : : D	sandy CLAY (A-6)(2), micaceous	us, saprolitic	2,023.3	- 4	12	15 27			D _	saproli	
2620 2,620.5 10.0 15 17		<u> </u> _□	-		2620	-							
			-		2,618.3	15.0	2 17	23			D		
2615 2,615.5 15.0			- -		2615	-							
6 9	9 18		-		2,613.3	20.0		11			E F		
2 640 5 70 0		· · · · ·				9	10	11 21		┨ ├	D 2,611	.8 Boring Terminated at El	evation 2.611.8 ft in
2610 2,610.5 20.0 8 7	11 18		2,609.0	21.5							-	SILT	
			Boring Terminated at Elevation 2 CLAY	2,609.0 ft in	-	-							
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