SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

SHEET NO. **DESCRIPTION** TITLE SHEET 2 LEGEND (SOIL & ROCK) 3 PROJECT TITLE SHEET 4 - 5 PLAN SHEETS 6 - 7 PROFILES BORE LOGS

8

STATE OF NORTH CAROLINA

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER / PENDER PROJECT DESCRIPTION I-40 FROM MILE **MARKER 413 TO 415**

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	15403.1065018 / 15403.1071014	1	8

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) TO7-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAIL

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARES 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 STIU (UN-PLACE) TEST DATA CAN BE RELED ON ONLY TO THE DEGREE OF RELIABILITY INTERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL 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 OF CONTRACTOR IS CALIFONED THAT AND WHICH AS HELE AS SHOWN ON THE BUBSURFACE 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 GUARANTICE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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 NECESSART 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 CONDENS ENCOUNTERED AND THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

	PERSONNEL
	BUNCH, C. M.
-	TURNAGE, J. R.
-	COLON-MIRANDA, J.
INVESTIGATED E	_{ЗҮ} _ ВUNCH, С. М .
	IELDS, W. D.
CHECKED BY	NASH, A. A.
SUBMITTED BY	RIGGS, Jr., A. F.
DATE OCTO	DBER 2019
Consulting En 2401 BRENTWO RALEIGH, NOI NC REGISTERED	in the Office of: COCO gineers and Scientists OD ROAD, SUITE 107 TTH CAROLINA 27604 ENGINEERING FIRM: F-0869 O GEOLOGIC FIRM: C-367
	CARO ESSION NATION SEAL 14155 GINEE RIGGS

DocuSigned by: Abur F. Kings, Mr.	7/31/2020
5228073BBA4F482	DATE
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

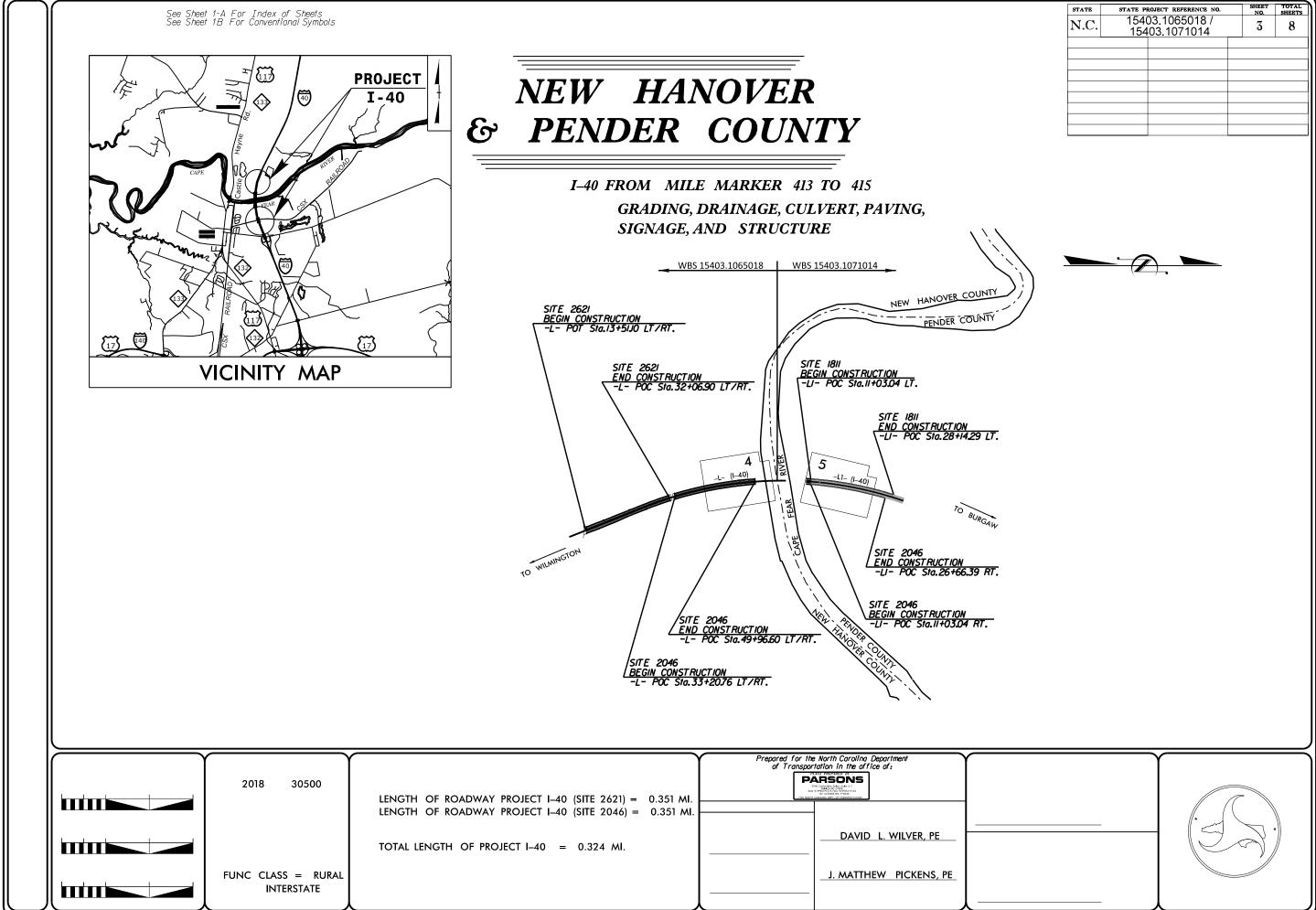
SOIL DESCRIPTION		GRADATION	ROCK DESCRIPTION		
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIAL		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTEN ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD		
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLO ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLAS	SIFICATION	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 0.1		
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOL CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FA		ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK I REPRESENTED BY A ZONE OF WEATHERED ROCK.		
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXA	PLE.	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:		
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A	'-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT		
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.		
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC I CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200) (> 35%, PASSING *200) (> 35%, PASSING *200)	TERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROU ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INC		
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4	-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.		
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6		COMPRESSIBILITY	NUN-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL I		
SYMBOL COCCESSION CONSTRAINTS		SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT		
7 PASSING		HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS		
*10 50 MX GRANULAR CL		PERCENTAGE OF MATERIAL			
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL			
MATERIAL		ORGANIC MATERIAL 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 F HAMMER IF CRYSTALLINE.		
PASSING #40 SOILS WITH		LITTLE ORGANIC MATTER 3 - 5%. 5 - 12%. LITTLE 10 - 20%.	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY CO		
LL 40 MX 41 MN	UTCHEN	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 HA		
MUDERATE	HIGHLY ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE.		
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF ORGANIC	SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROC (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL		
DE MATTER		✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER		
MATERIALS SAND GRAVEL AND SAND SOILS SOILS		STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS.		
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR	R UNSUITABLE	$\underline{\bigtriangledown}$ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH		
AS SUBGRADE POOR POOR POOR POOR		O-MA SPRING OR SEEP	WITH FRESH ROCK.		
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30			MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FE		
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LO		
DDIMARY COLL TYPE UMPHUTNESS UP DENETRATION DESIGNER COMPRESS	UNCONFINED E STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND W IF TESTED, WOULD YIELD SPT REFUSAL		
	/FT ²)	WITH SOIL DESCRIPTION IN OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EV		
GENERALLY VERY LOOSE < 4		SOIL SYMBOL	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS AN		
GRANII AR LUUSE 4 TU 10	/ A	VST PMT	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF		
MATERIAL DENSE 30 TO 50	/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE		
(NON-COHESIVE) VERY DENSE > 50			SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF		
	.25		(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VA</u>		
	TO 0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY I		
MATERIAL STIFF 8 TO 15 1	0 2		SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DISECUMBLE ONE I		
	04 4	TTTTT ALLUVIAL SOIL BOUNDARY A INSTALLATION - SPT N-VALUE	ALSO AN EXAMPLE.		
TEXTURE OR GRAIN SIZE		RECOMMENDATION SYMBOLS	ROCK HARDNESS		
			VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053			SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BL		
		SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.		
BUULDER LUBBLE GRAVEL SAND SAND SILT	CLAY (CL.)		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DE		
(USE. SU.) (F SU.)		ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DE		
GRAIN MM 305 75 2.0 0.25 0.05 0 SIZE IN. 12 3	005	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 OF		
		CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD I		
SOIL MOISTURE - CORRELATION OF TERMS		CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.		
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE		CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT		
	DESCRIPTION				
		DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.		
- SATURATED - USUALLY LIQUID; VERY WET,	JSUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK 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.		
- SATURATED - USUALLY LIQUID; VERY WET. (SAT.) FROM BELOW THE GROUND	JSUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE		
- SATURATED - USUALLY LIQUID; VERY WET (SAT.) FROM BELOW THE GROUND	JSUALLY ATER TABLE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY R5 - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINGERNAIL.		
LL LIQUID LIMIT	JSUALLY ATER TABLE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE F05SL FOSSILIFEROUS SLI SLITY ST - SHELBY TUBE FRAC FRACTURED, FRACTURES TCR - TRICORE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS #/ MOISTURE CONTENT CBR - CALIFORNIA BEARING	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READLY WITH POINT OF PICK. OF MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINGERNAIL. FRACTURE SPACING BEDDING		
LL LIQUID LIMIT	JSUALLY ATER TABLE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLIT, SLITY ST - SHELBY TUBE FOSS, - FOSSILIFEROUS SLI SLIT, SLITY RS - ROCK FRACL - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS, - FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI, - HIGHLY V - VERY RATIO	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT OR MORE IN THICKNESS CAN BE EXCAVATED READLY WITH POINT OF PICK. OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINCERNALL FRACTURE SPACING EERM SPACING TERM SPACING TERM		
LL - LIQUID LIMIT PLASTIC - LIQUID LIMIT RANGE - PLASTIC LIMIT (PI) PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYIN - WET - (W) SEMISOLID; REQUIRES DRYIN - WOIST - (W) SOLID; AL OR NEAR OPTIMUM	JSUALLY ATER TABLE TO	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE FOSS, - FOSSILIFEROUS SLI SLITY RS - ROCK FRACL - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS, - FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READLY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINGERNAIL. FRACTURE SPACING IERM FINGEN SPACING IERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED I.1		
LL LIQUID LIMIT PLASTIC (PI) PL PLASTIC LIMIT (PI) PL PLASTIC LIMIT	JSUALLY ATER TABLE TO	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACS FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE;	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINCERNALL. FRACTURE SPACING TERM SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 1.4 WIDE 3 TO 10 FEET		
LL - LIQUID LIMIT - SATURATED - USUALLY LIQUID; VERY WET, RANGE - LIQUID LIMIT - WET - (W) SEMISOLID; REQUIRES DRYIN (PI) PL - PLASTIC LIMIT - WET - (W) SOLID; AT OR NEAR OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM SL SHRINKAGE LIMIT - OPT - OPT - (D) REQUIRES ADDITIONAL WATE	USUALLY ATER TABLE TO MOISTURE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACS FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READLY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINCERNAIL. FRACTURE SPACING TERM FRACTURE SPACING TERM VERY WIDE MORE THAN 10 FEET WIDE VERY WIDE 3 TO 10 FEET 3 THICKLY BEDDED 3.16 3 TO 3 FEET 3 THICKLY BEDDED		
LL LIQUID LIMIT - SATURATED - USUALLY LIQUID: VERY WET, (SAT.) FROM BELOW THE GROUND PLASTIC - WET - (W) SEMISOLID: REQUIRES DRYIN (PI) PL - PLASTIC LIMIT OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMU	USUALLY ATER TABLE TO MOISTURE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLIT, Y ST - SHELBY TUBE FOSS, - FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACL - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL CBR - FINE V - VERY RATIO HI HIGHLY V - VERY RATIO DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC CME-55 6' CONTINUOUS FLIGHT AUGER CORE SIZE:	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFL, CAN BE EXCAVATED READLY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINCERNAIL. FRACTURE SPACING TERM SPACING YERY WIDE MORE THAN 10 FEET VERY WIDE 3 TO 10 FEET VIDE 3 TO 10 FEET THICKLY BEDDED 1.1.6 MODERATELY CLOSE 1 TO 3 FEET VERY CLOSE LESS THAN 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET		
LL - LIQUID LIMIT - SATURATED - USUALLY LIQUID; VERY WET, RANGE - LIQUID LIMIT - WET - (W) SEMISOLID; REQUIRES DRYIN (PI) PL - PLASTIC LIMIT - WET - (W) SOLID; AT OR NEAR OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM SL SHRINKAGE LIMIT - OPT - OPT - (D) REQUIRES ADDITIONAL WATE	USUALLY ATER TABLE TO MOISTURE	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SLIT, SLITY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING W - MOISTURE CONTENT RATIO HI HIGHLY V - VERY RATIO DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS AUTOMATIC CME-55 8' HOLLOW AUGERS CORE SIZE:	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READLY WITH POINT OF PICK, SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHE FINCERNAIL. FRACTURE SPACING TERM VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED VERY WIDE 3 TO 10 FEET WIDE 3 TO 10 FEET WIDE 3 TO 10 FEET WIDE CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET THICKLY BEDDED 0.16 VERY CLOSE LESS THAN 0.16 FEET INCLELY ANIMATED VERY CLOSE INDURATION		
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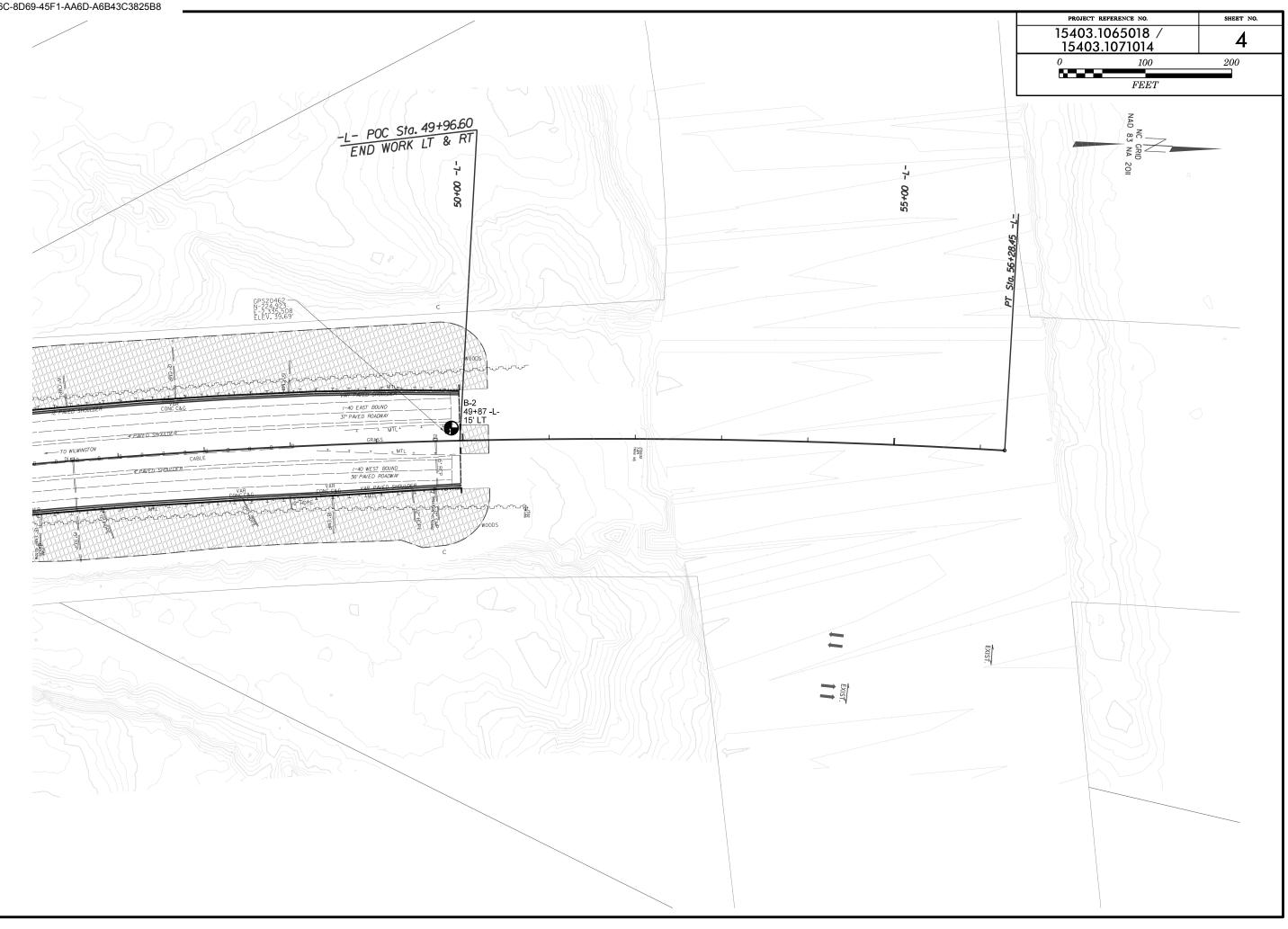
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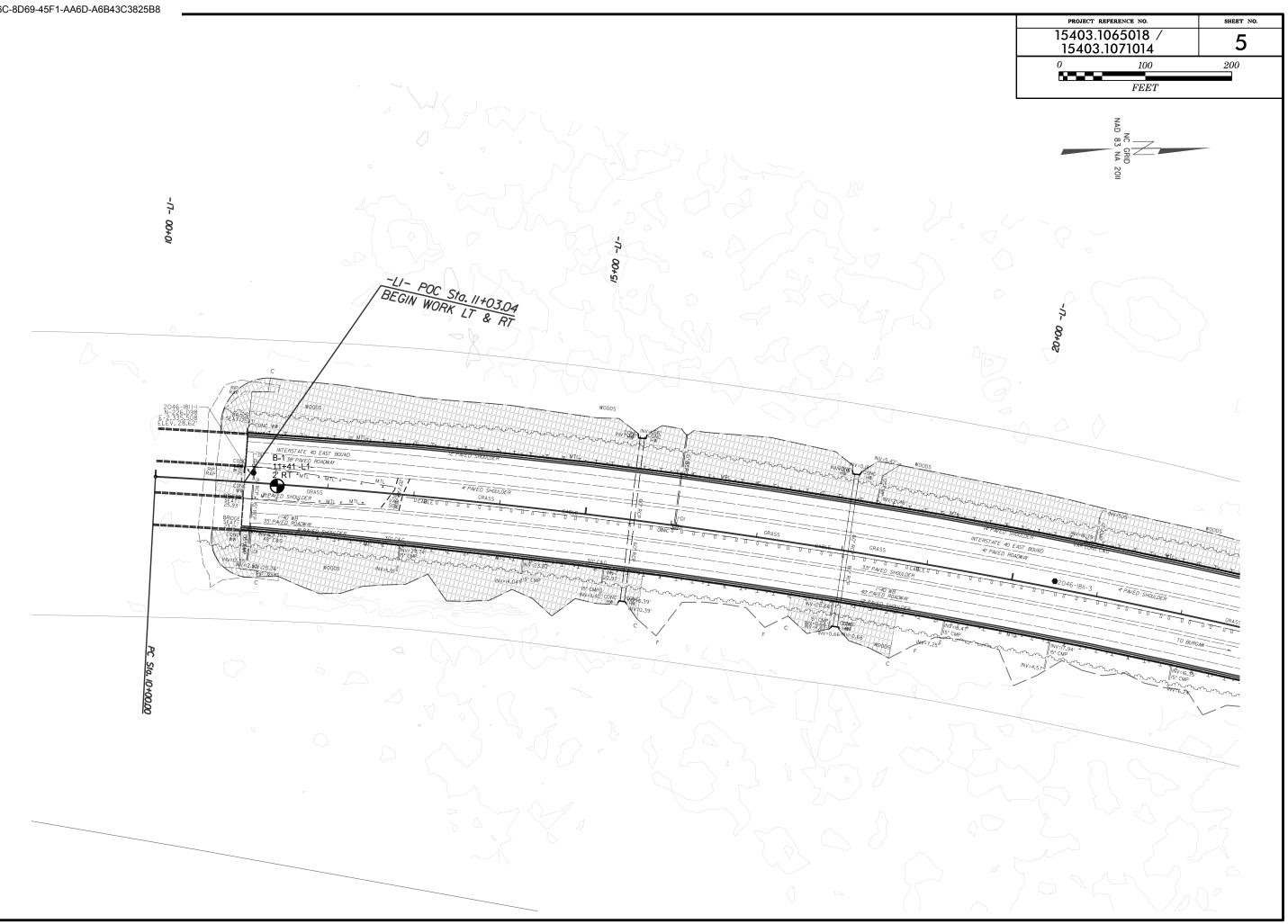
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	TERMS AND DEFINITIONS
TED. AN INFERRED D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
1 FOOT PER 60	ADUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
PT 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.
ROCK THAT NCLUDES GRANITE,	A <u>PTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
TAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
TE TESTED. TC. T MAY NOT YIELD	$\underline{\text{COLLUVIUM}}$ - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
I MAY NUT YIELD STONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
COATINGS IF OPEN. HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ROCK UP TO IAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
ER BLOWS. TS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
AY. ROCK HAS	<u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIG1NAL POSITION AND DISLODGED FROM PARENT MATERIAL.
TH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <u>PORMATION (FM)</u> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
LOSS OF STRENGTH WHEN STRUCK.	FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIGGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
ARE DISCERNIBLE OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
AT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
<u>VALUES < 100 BPF</u> (IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
RS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECHNETS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
NS REQUIRES	$\underline{SAPROLITE\ (SAP.)}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BLOWS REQUIRED	<u>SILL</u> - 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.
DEEP CAN BE DETACHED	$\underline{\rm SLICKENSIDE}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. D 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.
N FRAGMENTS INT. SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
. PIECES 1 INCH CHED READILY BY	STRATA ROCK DUALITY DESIGNATION (SROD) - A MEASURE OF ROCK DUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: GPS20462: N-224,923; E-2,335,507; ELEV. 39.69 FEET
4 FEET	2046-1811-1: N-226,098; E-2,335,508; ELEV. 28.62 FEET
1.5 - 4 FEET	ELEVATION: FEET
0.16 - 1.5 FEET 03 - 0.16 FEET	NOTES:
008 - 0.03 FEET < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
EAT, PRESSURE, ETC.	
Ξ.	
TEEL PROBE;	
PROBE;	
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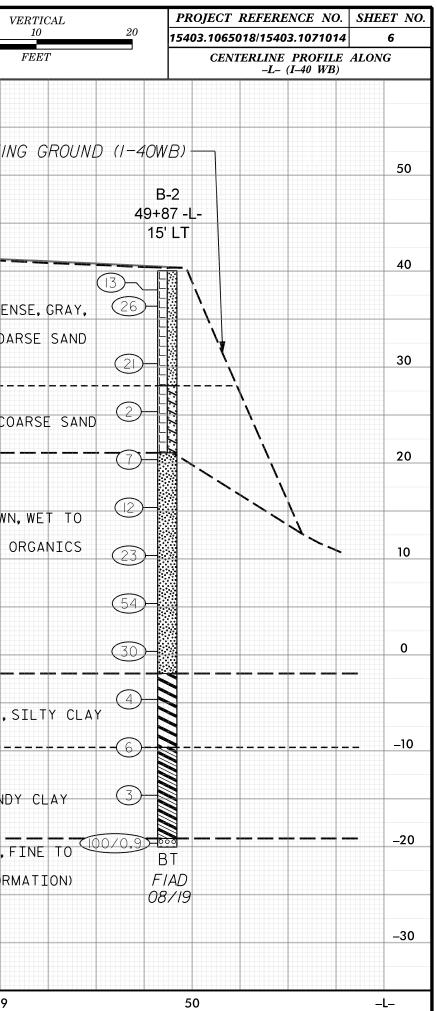


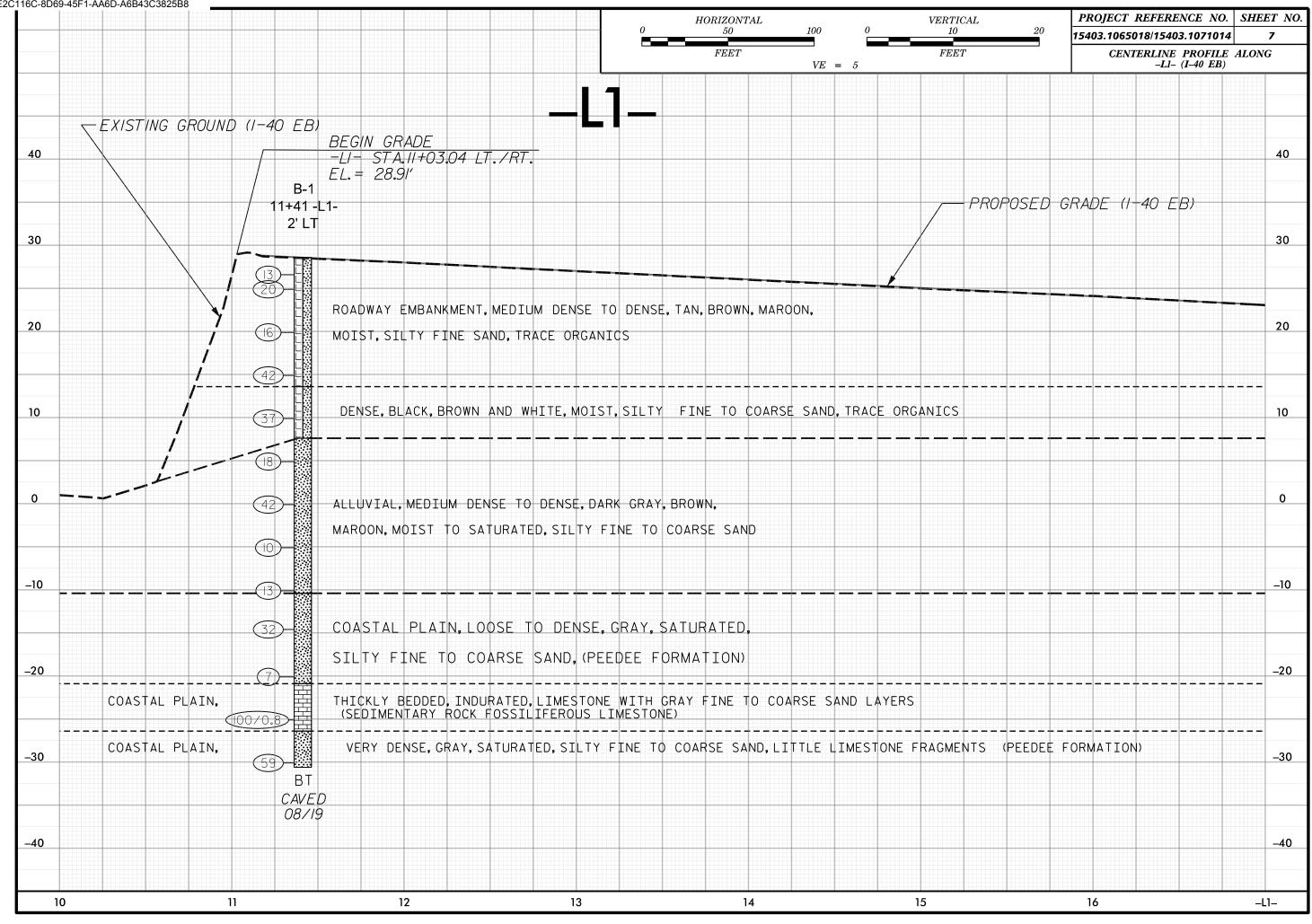
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					EXISTING
	PROP	OSED GRADE (I-40 WE	3)		
				ROADWAY EMBANKMENT	. MEDTUM DENSE
				BROWN, MOIST, SILTY	
			VERY LOOSE	, BLACK, GRAY, WET, CLAYEY	/ FINE TO COARS
	+				
			ALLUVI	AL,LOOSE TO VERY DENSE	, GRAY, BROWN, W
10			SATURATED,	SILTY, FINE TO COARSE S	SAND, TRACE ORG
0					
		UNDIV	IDED COASTAL PLAIN MED	IUN STIFF, ORANGE, GRAY,	TAN, MOIST, SIL
_10					
			SO	FT, TAN, GREEN-GRAY, MOIS	T,FINE SANDY (
_20			COASTAL PLAIN, VERY D	ENSE,LIGHT GRAY,WHITE,	SATURATED, FIN
			COARSE SAND, SOME LIME	STONE FRAGMENTS, (CASTL	E HAYNE FORMAT
-30					
44	45	46	47	48	49





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10/23/19

.GDT

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GPJ

C HC

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GEOTECHNICAL BORING REPORT DODEIOC

Consu	ılting Engir	neers & S	cientists	5				B	ORE L	.OG				
WBS	15403	.10650	18		Т	IP N/A		COUNT	Y NEW HA	NOVER			GEOLOGIST POWELL, S.H.	
SITE	DESCR	IPTION	I-40	STOR	M REF	PAIRS MILI	E MARKE	R 413 TO	415					GROUND WTR (ft)
BORI	NG NO.	B-2				TATION 4	19+87	0FFSET 15 ft LT				ALIGNMENT L	0 HR. N/A	
COLL		EV. 40).1 ft		Т	OTAL DEP	TH 60.1	ft	Northing 224,928				EASTING 2,335,503	24 HR. FIAD
DRILL	L RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 84% 02/15/2019 DRILL METHOD Mud Rotary							I Rotary HAMM	ER TYPE Automatic					
DRIL	LER TI	JRNAG	E, J.		S	TART DAT	E 08/22	/19	COMP. DA	TE 08/2	22/19			A
ELEV	DRIVE	DEPTH	BLC	w co	JNT		BLOW	S PER FOO	Г	SAMP.	▼/	L		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	мо	O I G	SOIL AND ROCK DES	DEPTH (ft)
45		Ļ												
	-	ł												
40	-	+											40.1 GROUND SURF.	ACE 0.0
40	39.1	1.0											ROADWAY EMBAN	KMENT
	37.4	2.7	5 12	6 14	7	· ·•13·					M	L	MEDIUM DENSE, GRAY, BF SILTY FINE TO COAR	
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	-	L.						· · · · ·				L		
	31.4	8.7	10	10	11		/ :::					L		
30	-	F					21				M	L		10.0
	- 26.4	13.7						· · · · ·					VERY LOOSE, BLACK, O	
25		- 13.7	1	WOH	2	• <u>•</u> 2					w		CLAYEY FINE TO COA	RSE SAND
	-	L.						· · · · ·						
	21.4	18.7	2	2	5	<u> </u>							.21.1	<u>19</u> .0
20	-	ŧ			0						W	-	LOOSE TO VERY DEN	SE, GRAY,
	- 16.4	23.7				: <u>†</u> ::						_	BROWN, WET TO SATUR FINE TO COARSE SAN	RATED, SILTY ID, TRACE
15	- 10.4		4	6	6	12					w	Ŀ	ORGANICS	
	-					\ . \.								
	11.4	28.7	9	11	12							Ē		
10	-	F	5		12		23				W	Ŀ		
	-													
5	6.3	33.7	13	20	34			54			Sat.	Ŀ		
	-	L						/						
_	1.3	38.7	9	11	19							Ē		
0	-	F			15						Sat.	-		
	-	40.7				[:		· · · · ·				\mathbf{N}	UNDIVIDED COASTA	
-5	-3.7	43.7	2	2	2	 4					м	N	MEDIUN STIFF, ORANGE MOIST, SILTY C	, GRAY, TAN, LAY
	-	Ļ						· · · · ·						
10	-8.7	48.7	2	2	4	:::							-9.7	49.7
-10	-	ŧ			-						M		SOFT, TAN, GREEN-GRAY	, MOIST, FINE
	-13.7	F 5 7							.				SANDT CLAT	
-15	- 13./	- 00./	1	2	1	↓	· · ·				м			
	-	ŧ				 			· · · · ·					
00	-18.7	58.7	39	42	58/0.4	· · · · · · · ·	 _ <u></u>	· · · · ·	· · · · · ·				-19.2 -20.1 COASTAL PLA	<u>59.2</u>
-20		<u> </u>		72	55/0.4				100/0.9	u	Sat.	000	VERY DENSE, LIGHT GF	RAY, WHITE,
	-	ł											SATURATED, FINE TO CO SOME LIMESTONE FR	DARSE SAND, AGMENTS
	-	ŧ											(CASTLE HAYNE FOR Boring Terminated at Eleva	,
	-	ŧ											SAND (CASTLE HAYNE F	FORMATION)
	-	ł												
		ŧ												
	-	ł												
	-	ł										-		



BORING NO. B-1

27.6 - 1.0

2.7

7.7

- 12.7

- 22.7

27.7

32.7

- 37.7

47.7

70 30/0.3

29 30

29

-13.6 + 42.2

-24.1 _ 52.7

-29.1 57.7

25.9

20.9

15.9

5.9

0.9

-4.1

-9.1

-19.1

10.9 17.7

30

25

20

15

10

5

-5

-10

-15

0/23

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2 DWY -20

GFO C

ç -25

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HANOV

-30

WBS 15403.1071014 TIP N/A COUNTY STE DESCRIPTION I-40 STORM REPAIRS MILE MARKER 413 TO 4 STATION 11+41 COLLAR ELEV. 28.6 ft TOTAL DEPTH 59.2 ft DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 84% 02/15/2019 DRILLER TURNAGE, J. **START DATE** 08/21/19 ELEV DRIVE (ft) DEPTH (ft) (ft) BLOW COUNT BLOWS PER FOOT 0.5ft 0.5ft 0.5ft 25 50 0 6 13 9 9 11 · · · · 9 15 20 22 16 21 6 8 10 11 16 26 . 5 5 . 5 8 5 ••••13* 14 11 18 · · · · · 4 3

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SHEET 8 OF 8

GEOTECHNICAL BORING REPORT BORE LOG

OUNT	(GEOLOGIS	F POWELL	S.H.		
13 TO 4	15							GROUN	ID WTR (ft)
	OFFSET	2 ft LT			ALIGNMEN	T L1		0 HR.	N/A
	NORTHING	226,1	26		EASTING	2,335,523		24 HR.	Caved
19		DRILL	/ETHOD) Mu	Id Rotary		HAMME	ER TYPE	Automatic
	COMP. DA	TE 08/	21/19			VATER DEP	TH N/A	4	
R FOOT		SAMP.		L					
	75 100	NO.	мо	O G	S ELEV. (ft)	SOIL AND ROC	CK DESC	RIPTION	DEPTH (ft)
				Ŭ					DEFITIN
					- 28.6	GROUNE	SURF/	ACE	0.0
 			м		-	ROADWAY E EDIUM DENSE			J
			м	Ľ.	- BRO	WN AND MAF	ROON, N	10IST, SI	LTY
					-	INE SAND, IT		KGANICE	,
				L	-				
			м	L	-				
 				Ŀ	-				
					-				
	+ • • • • •		м	L	-				
· · · ·				L.	- <u>13.6</u> DEN	SE, BLACK, B	ROWN		TE, <u>15.0</u>
· · · ·				Ŀ		T, SILTY FINI TRACE (E TO CC	DARSE SA	
	+		м	F.	-				
					- 7.6				
					- MF	DIUM DENSE	UVIAL TO DEI	NSE DAR	ак Т
	+ • • • •		м		- GRA	Y, BROWN AI	ND MAR	OON, MC	DIST
					-	O SATURATE COAR	D, SILT SE SANI		
					-				
	+ • • • • •		м		-				
					-				
			.		-				
	· · · ·		W		-				
					-				
					-				
			Sat.			COAST	AL PLA	N	39.0
						E TO DENSE	GRAY,	SATURA	
			Sat.		-	SILTY FINE TO (PEEDEE F			
					-				
· · · ·					-				
			Sat.		-				
	+		000.		-20.9	COAST		<u></u> -	<u> </u>
· · · ·				╞┰┾╏		HICKLY BEDD	ED , IND	URATED	
	100/010		Sat.	H	COAF	MESTONE WI	YERS (S	EDIMENT	ARY
·	100/0.8	[<u>26.4</u> ROO	COAST	ROUS L		<u>NE) 55.0</u>
·					VE	RY DENSE, G	RAY, SA	TURATE	D,
			Sat.		- SILT` 	Y FINE TO CC LIMESTONE			TLE 59.2
-						(PEEDEE F	ORMAT	TION)	
						g Terminated STAL PLAIN S	ILTY SA	ND (PEE	
					_		(ATION)		
					-	CAVED DF	RY @ 16	.7 FT	
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