NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATE PROJECT NO. SHEET NO. TOTAL SHEETS
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DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

				,	SOIL AND RO	CK LEGEND, TERM	s, symbols,	AND ABBREV	IATIONS		
SOIL DESCRIPTION GRADATION							ROCK DESCRIPTION				TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO	BE THE UNCONSOLIDATED, SEM	41-CONSOLIDATED OR WEA	THERED EARTH MATERIALS	WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO			HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.				ALLUYIUM (ALLUY.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRAT	TED WITH A CONTINUOUS FLIGH CORDING TO STANDARD PENETF	IT POWER AUGER, AND WHI	ICH YIELDS LESS THAN	POORLY GRADED) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.			SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE				ADUIFER - A WATER BEARING FORMATION OR STRATA.
	D ON THE AASHTO SYSTEM AN			ANGULARITY OF GRAINS			OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:				ARGILLACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS.
AS MINERALOGICAL COMPI	OSITION, ANGULARITY, STRUCTUR	RE, PLASTICITY, ETC. EXAM	1PLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBROUNDED, OR ROUNDED.			MEATHERE			N VALUES > 100 BLOWS	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
VERY STEFF, GRAY SULT CAN, MOST WITH MITERBEDOED FINE SAMO LARES, MENU PLASTIC, 4-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION					MINERALOGICAL COMPOSITION			ROCK (WR) FIRST TO COARGE CRAIN ICHIEUS AND METAMORPHIC BOCK THAT			ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
					MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS			CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,			GROUND SURFACE.
CLASS. (495%	SS. (95% PASSING *200) (95% PASSING *200)		WHENEVER THEY ARE CONSIDE	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.			ONEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED, ROCK TYPE			CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.	
GROUP A-1 CLASS. A-1-6 A-1-6	A-3 A-2 A-2-4 A-2-5 A-2-6 A-2-1			SLIGHTLY COMPRES	COMPRESSIBILITY	LESS THAN 30	ROCK (NCR)		ROCK THAT WOULD YEILD SPT REFU LLITE, SLATE, SANDSTONE, ETC.	ISAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL DOGGOOGGO				MODERATELY COMPI	RESSIBLE LIQUID LIMIT		COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN	SEDIMENTS CEMENTED INTO ROCK.		CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
% PASSING	5000050000:::::		THE CONTRESS.	PERCENTAGE OF MATERIAL			SHELL BEDS, E	TC.	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT		
* 10 50 MX * 40 30 MX50 MX	E. M.		GRANULAR CLAY PE		GRANULAR SILT- CLAY SOILS SOILS	OTHER MATERIAL			EATHERING		ROCKS OR CUTS MASSIVE ROCK.
	10 MX 35 MX35 MX35 MX35 MX	X36 MN 36 MN 36 MN 36 M	1 00.00 5005	TRACE OF ORGANIC MATTER	2 - 3% 3 - 5% TR	ACE 1 - 10%		RESH, CRYSTALS BRIGHT, FEW . R IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING		DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUID LIMIT	48 MX41 MN 48 MX41 MN	40 MX 41 MN 40 MX 41 M	N SOILS WITH	LITTLE ORGANIC MATTER MODERATELY ORGANIC		TTLE 10 - 20% ME 20 - 35%			INED, SOME JOINTS MAY SHOW THIN	CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDEX 6 MX	N.P. 18 MX 18 MX 11 MN 11 MN		- LITTLE OIL HIG			CHLY 35% AND ABOVE		ILS ON A BROKEN SPECIMEN FI RYSTALLINE NATURE.	ACE SHINE BRIGHTLY. ROCK RINGS L	JNUER HAMMER BLUWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 8	0 0 4 MX	8 MX 12 MX 16 MX No N	AMOUNTS OF SOIL	:	GROUND WATER				INED AND DISCOLORATION EXTENDS		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. OF MAJOR GRAVEL AND	FINE SILTY OR CLAYEY SAND GRAVEL AND SAND	SILTY CLAYEY SOILS SOILS	ORGANIC MATTER		LEVEL IN BORE HOLE IMMEDIATELY AFTER	DRILLING.			D. CRYSTALLINE ROCKS RING UNDER		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GEN. RATING	SARD SINTER INTO SINTE	00.20	 	— — — — — — — — — — — — — — — — — — —	WATER LEVEL AFTER 24 HOURS.				W DISCOLORATION AND WEATHERING		FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AS A EXCELLENT TO GOOD FAIR TO POOR POOR POOR			FAIR TO POOR UNSU	ABLE PERCHE	√PW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA 2. 2. 2. 2. 3. 3. 4. 4. 4. 4. 4. 4. 4. 4			(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRE			-PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
SUBGRADE	P.I. OF A-7-5 ≤ L.L 30	:P.I. OF A-7-6 > L.		── OM SPRING	OR SEEPAGE		1	RESH ROCK. CK EYCEPT OHAPTZ DISCOLORE	ED OR STAINED, IN GRANITOID ROCK	CS ALL FELDSPARS DIEL	THE STREAM.
		OR DENSENESS	3		MISCELLANEOUS SYMBOLS	S	SEVERE AND DIS	SCOLORED AND A MAJORITY SH	HOW KAOLINIZATION, ROCK SHOWS S LOGIST'S PICK, ROCK GIVES "CLUNK"	EVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE	COMPACTNESS OR P	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGT	ROADWAY EMBAN		NG SAMPLE		TED. WOULD YIELD SPT REFUSA		SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	CONSISTENCY	(N-VALUE)	(TONS/FT ²)	WITH SOIL DESC		DESIGNATIONS			RED OR STAINED.ROCK FABRIC CLEAR RANITOID ROCKS ALL FELDSPARS AF		
GENERALLY GRANULAR	VERY LOOSE LOOSE	<4 4 TO 10		SOIL SYMBOL	AUGER BORING	S- BULK SAMPLE	EXTENT	. SOME FRAGMENTS OF STRON	G ROCK USUALLY REMAIN.	RE KHULINIZED TO SUME	ITS LATERAL EXTENT.
MATERIAL	MEDIUM DENSE DENSE	10 TO 30 30 TO 50	N/A	ARTIFICIAL FILL ROADWAY EMBAN		SS- SPLIT SPOON SAMPLE		TED, YIELDS SPT N VALUES >	<i>100 BPF</i> ED OR STAINED. ROCK FABRIC ELEM	ENTE ADE DISCEDNIOLE DUT	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
(NON-COHESIVE)	VERY DENSE	>50		MLJ INFERRED SOIL	Y	ST- SHELBY TUBE	(V. SEV.) THE MA	SS IS EFFECTIVELY REDUCED	TO SOIL STATUS, WITH ONLY FRAGE	MENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
GENERALLY	VERY SOFT SOFT	<2 2 TD 4	<0.25 0.25 TO 0.5	DITEITS INFERRED ROCK	MONITORING WE	SAMPLE RS- ROCK SAMPLE			.e of rock weathered to a degr Bric remain. <i>IF Tested. Yields</i>		PERCHEO WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY	MEDIUM STIFF STIFF	4 TO 8 8 TO 15	0.5 TO 1		△ INSTALLATION	RT- RECOMPACTED			NOT DISCERNIBLE, OR DISCERNIBLE		RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL (COHESIVE)	VERY STIFF	15 TO 30	1 TO 2 2 TO 4	TTTTT ALLUVIAL SOIL	SLOPE INDICATI	TOTANTAL CANDIE		RED CONCENTRATIONS. QUARTZ N EXAMPLE.	MAY BE PRESENT AS DIKES OR ST	TRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND
HARD 330 >4 TEXTURE OR GRAIN SIZE				25/925 DIP/DIP DIRECTION OF INSTALLATION CBR - CBR SAMPLE ROCK STRUCTURES			ROCK HARDNESS				EXPRESSED AS A PERCENTAGE.
				- SOUNDING ROD	SPT N-VALUE			VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES			SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STO. SIEVE SIZE 4 10 40 50 200 270 DPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053			- Sounding hos	GET ST. INC. USAL			SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED			SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND	
	BBLE GRAVEL	COARSE FIN	un SILI LLF	AR - AUGER REF		UREMETER TEST	TO D€	TACH HAND SPECIMEN.	ICK. GOUGES OR GROOVES TO 0.25		RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
(BLOR.) (COB.) (GR.) (CSE. SD.) (F. SD.) (SL.) (CL.) GRAIN MM 305 75 2.0 0.25 0.05 0.005			CL CLAY	BT - BORING TERMINATED SD SAND, SANDY CL CLAY SL SILT, SILTY CPT - CONE PENETRATION TEST SLI - SLIGHTLY			ATED BY HARD BLOW OF A GE EDERATE BLOWS.	OLOGISTS PICK. HAND SPECIMENS C	CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF	
SIZE IN 12' 3' SOIL MOISTURE - CORRELATION OF TERMS				CSE COARSE TCR - TRICONE REFUSAL			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				A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE S		CTUDE		OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST A - VIDIT WEIGHT 7 - DRY UNIT WEIGHT			POINT OF A GEOLOGISTS PICK.				A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.
(ATTERBERG LIMIT			R FIELD MOISTURE DESCRIP	F FINE	W - MOISTUR		FROM	CHIPS TO SEVERAL INCHES IN	I SIZE BY MODERATE BLOWS OF A I		STRATA CORE RECOVERY ISREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	- SATURAT		LIQUID: VERY WET. USUALLY LOW THE GROUND WATER TA	FOSS FOSSILIF		SHEAR TEST	1	S CAN BE BROKEN BY FINGER F CARVED WITH KNIFF, CAN RE	E EXCAVATED READILY WITH POINT	OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
רר ד רוסחום	LIMIT (SAT.)	FROM BEL	LOW THE GROUND WHIEN TH	FRAGS FRAGME MED MEDIUM	FRAGS FRAGMENTS		SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.				TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC RANGE <	- WET -		D REQUIRES DRYING TO		UIPMENT USED ON SUBJECT I	PROJECT		IRE SPACING	BEDD:	ING	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(01)	C LIMIT	ATTAIN U	PTIMUM MOISTURE		ADVANCING TOOLS:	HAMMER TYPE:	IERM	SPACING	TERM	THICKNESS	BENCH MARK: NCDOT Traverse Station Rebor & Cap Stamped 'BL-3'
OPTIMUM	4 MOISTURE - MOIST	- (M) SOLID; A	T OR NEAR OPTIMUM MOIST			AUTOMATIC MANUAL	VERY WIDE WIDE	MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED THICKLY BEDDED	> 4 FEET 1.5 - 4 FEET	Located at Station 16+86.39, 18.41 feet Right of -L
	AGE LIMIT			MOBILE 8- <u>57</u>	DRAG BITS 2-15/16*		MODERATELY CLOS	SE 1 TO 3 FEET	THINLY BEDDED VERY THINLY BEDDED	0.16 - 1.5 FEET 0.03 - 0.16 FEET	ELEVATION: 156.18'
	- DRY -		ADDITIONAL WATER TO	BK-51	6° CONTINUOUS FLIGHT AUGER	CORE SIZE:	CLOSE VERY CLOSE	0.16 TO 1 FEET LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	NOTES:
<u> </u>					8' HOLLOW AUGERS			IN	THINLY LAMINATED DURATION	< 0.008 FEET	
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH				CME-45	CME-45 HARD FACED FINGER BITS		FOR SEDIMENTARY ROO		NING OF THE MATERIAL BY CEMENT	TING, HEAT, PRESSURE, ETC.	
NONPLASTIC	9-5		VERY LOW	CME-750	TUNGCARBIDE INSERTS		FRIABLE		IG WITH FINGER FREES NUMEROUS O		
LOW PLASTICITY MED. PLASTICITY	6-15 16-25	5	SLIGHT MEDIUM		CASING W/ ADVANCER	HAND TOOLS:			BLOW BY HAMMER DISINTEGRATES		(· ·
HIGH PLASTICITY		R MORE	HIGH	PORTABLE HOIST	TRICONE 2-7/8 STEEL TEETH	POST HOLE DIGGER	MODERATEL		CAN BE SEPARATED FROM SAMPLE EASILY WHEN HIT WITH HAMMER.	WITH STEEL PROBE;	
	C(OLOR		OTHER	TRICONE TUNGCARB.	HAND AUGER SOUNDING ROD	INDURATED	GRAINS	ARE DIFFICULT TO SEPARATE WITH	H STEEL PROBE:	
	INCLUDE COLOR OR COLOR			m'	CORE BIT	VANE SHEAR TEST		DIFFIC	ULT TO BREAK WITH HAMMER.		
MODIFIERS SUCH A	S LIGHT, DARK, STREAKED, E	TC. ARE USED TO DESC	CRIBE APPEARANCE.	OTHER	OTHER 3-1/4" H.S.A.	OTHER	EXTREMELY		HAMMER BLOWS REQUIRED TO BREA E BREAKS ACROSS GRAINS.	K SAMPLE;	
											REVISED 09/15/00