NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS										
	SOIL DESCRIPTION		GRADATION			ROCK DESCRIPTION				TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED 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.			ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.	
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL			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			AQUIFER - A WATER BEARING FORMATION OR STRATA.	
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH			ANGULARITY OF GRAINS			OF WEATHERED ROCK, ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:			TO THE MESENTED DI A ZONE	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY SULY CLAY, MONST WITH INTERGEDOED FINE SAND LIVERS, MONUT PLASTIC, A-7-6			THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBROUNDED, OR ROUNDED.			WEATHERED ROCK (WR) PER FOOT.			N VALUES > 100 DLOVS	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION			TO ME OF ME			M #HEGES > TAM BEGMS	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL	
GENERAL GRANULAR MATER		ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUAR	RTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE		CRYSTALLINE ROCK (CR)	FINE TO COARS	SE GRAIN IGNEOUS AND METAMORPH SPT REFUSAL IF TESTED. ROCK TYP		AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (\$35% PASSING #2	(\$5% PASSING #200) (\$5% PASSING #200)		WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN			CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 CLASS. A-1-a A-1-b A-2-4 A	A-2 A-4 A-5 A-6 A- A-2-5 A-2-6 A-2-7 A-7-	5 A-2 A-6 A-7	SLIGHTLY COMPRESSI	COMPRESSIBILITY	T LEGG TIME 22	NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY R	ROCK THAT WOULD YEILD SPT REFU		COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	A-7-5 A-2-5 A-2-7		MODERATELY COMPRE MODERAT	ESSIBLE LIQUID LIMIT		COASTAL PLAIN	COASTAL PLAIN	LLITE, SLATE, SANDSTONE, ETC. N SEDIMENTS CEMENTED INTO ROCK,	, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
% PASSING			HIGHLY COMPRESSIBL	PERCENTAGE OF MATERIA	IT GREATER THAN 50	SEDIMENTARY ROCK (CP)	SPT REFUSAL. I	ROCK TYPE INCLUDES LIMESTONE, S	SANDSTONE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
* 10 50 MX		GRANULAR SILT- MUCK,	ORGANIC MATERIAL	GRANULAR SILT- CLAY	OTHER MATERIAL	- <u></u> W		WEATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
# 40 30 MX 50 MX 51 MN # 200 15 MX 25 MX 10 MX 35 MX 31	35 MX35 MX35 MX36 MN36 MN36 MN36 MN36 N	SOILS COTIC PEAT	TRACE OF ORGANIC MATTER	SOILS SOILS 2 - 3% 3 - 5% TR	RACE 1 - 10%			JOINTS MAY SHOW SLIGHT STAINING	IG. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LEQUED LEMET 40 MX/4	41 MN 40 MX41 MN 40 MX 41 MN 40 MX 41 M	N SOILS WITH	LITTLE ORGANIC MATTER MODERATELY ORGANIC	3 - 5% 5 - 12% LI	ITTLE 10 - 20%	f	IF CRYSTALLINE. ENERALLY ERESH JOINTS STAIL	NINED, SOME JOINTS MAY SHOW THIN	I CLAY COATINGS IE ODEN	HORIZONTAL.
	10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MI	IN LITTLE OR HIGHLY	HIGHLY ORGANIC		OME 20 - 35% IGHLY 35% AND ABOVE	(V. SLI.) CRYSTALS	_S ON A BROKEN SPECIMEN FA	FACE SHINE BRIGHTLY, ROCK RINGS U	UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0	4 MX 8 MX 12 MX 16 MX No 1	MX MODERATE ORGANIC SOILS		GROUND WATER		1	RYSTALLINE NATURE. ENERALLY FRESH JOINTS STAII	NINED AND DISCOLORATION EXTENDS	INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
	TY OR CLAYEY SILTY CLAYEY	ORGANIC MATTER	i .	EVEL IN BORE HOLE IMMEDIATELY AFTER	R DRILLING.	(SLI.) 1 INCH. 0	OPEN JOINTS MAY CONTAIN CL	CLAY, IN GRANITOID ROCKS SOME OC D. CRYSTALLINE ROCKS RING UNDER	CCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MATERIALS SAND SAND ORAN	VEL AND SAND SOILS SOILS	- I A TEN	_	ATER LEVEL AFTER 24 HOURS.		i e		W DISCOLORATION AND WEATHERING		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GENL RATING AS A EXCELLENT TO G	GOOD FAIR TO POOR	FAIR TO POOR UNSUITABLE	extstyle ext			(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			SHOW CLAY, ROCK HAS	PARENT MATERIAL.
SUBCRADE PUR Pur			SPRING OR SEEPAGE			WITH FRESH ROCK.			STRENOTH HS CUMPHRED	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
	NSISTENCY OR DENSENESS			MISCELLANEOUS SYMBOL	S			ED OR STAINED. IN GRANITOID ROCK HOW KAOLINIZATION. ROCK SHOWS SI		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
COMPACT	THESE OF STANDARD	RANGE OF UNCONFINED	ROADWAY EMBANKM	- COT 1797		(MOD. SEV.) AND CAN	BE EXCAVATED WITH A GEOL	LOGIST'S PICK. ROCK GIVES "CLUNK"		THE FIELD.
	ISTENCY PENETRATION RESISTENCE (N-VALUE)	(TONS/FT2)	WITH SOIL DESCRI	PTION OF BUT TEST BORT	RING SAMPLE DESIGNATIONS		<u>ED, WOULD YIELD SPT REFUSA</u>	<u>al</u> Dred or Stained.Rock Fabric Clea	TAD AND EXTREME BUT BERLIGER	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
I GENERALLY VERY L			SOIL SYMBOL	AUGER BORING	S- BULK SAMPLE	(SEV.) IN STREM	NGTH TO STRONG SOIL. IN GR	RANITOID ROCKS ALL FELDSPARS AF	RE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
	M DENSE 10 TO 30	N/A	ARTIFICIAL FILL O	OTHER THAN	SS- SPLIT SPOON		SOME FRAGMENTS OF STRONG FEO. YIELDS SPT N VALUES > 1			LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENS			ROADWAY EMBANKM		SAMPLE	VERY SEVERE ALL ROCK	CK EXCEPT QUARTZ DISCOLORE	ED OR STAINED, ROCK FABRIC ELEM	MENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
VERY S		<0.25	INFERRED SOIL BO	OUNDARIES MONITORING WE	ST- SHELBY TUBE SAMPLE	(V. SEV.) THE MASS	S IS EFFECTIVELY REDUCED T NG. SAPROLITE IS AN EXAMPLE	TO SOIL STATUS, WITH ONLY FRAGM LE OF ROCK WEATHERED TO A DEGR	MENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SOFT	T 2 TO 4 M STIFF 4 TO 8	Ø.25 TO Ø.5	SINSING INFERRED ROCK LI		RS- ROCK SAMPLE	VESTIGES	S OF THE ORIGINAL ROCK FAF	ABRIC REMAIN. IF TESTED. YIELDS	SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIF	FF 8 TO 15	0.5 TO 1 1 TO 2	ALLUVIAL SOIL BOUNDARY FIEZUMETER INSTALLATION RT- RECOMPACTED			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			RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.	
(COHESIVE) VERY S		2 TO 4	25/025 DIP/DIP DIRECTION	SLOPE INDICAT			EXAMPLE.	THE DE FREDERI HS DIRES ON ST	THINDERS. SAPRULITE 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
TEXTUDE OF COATS STATE				CBR - CBR SAMPLE	ROCK HARDNESS			EXPRESSED AS A PERCENTAGE.		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270			SPT N-VALUE SPT N-VALUE O - SOUNDING ROD OFFI CRET REFLICATION			TELL THE STATE OF STATE OF STATE OF THE STAT			SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.	
OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053		ABBREVIATIONS			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		
BOULDER COBBLE C	GRAVEL COARSE FIN						ACH HAND SPECIMEN.	CK ONE! WITH DIFFICULTY, HARD IS	HINNER DECMS REGOLIKED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
(BLDR.) (COB.) (GR.) (CSE. SD.) (F, SD.) (SL.) (CL.)			AR - AUGER REFUSAL PMT - PRESSUREMETER TEST BT - BORING TERMINATED SD SAND, SANDY			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 GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED				SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
GRAIN MM 305 75 2.0 0.25 0.05 0.005			CL CLAY SL SILTY CPT - CONE PENETRATION TEST SLI SLIGHTLY			BY MODERATE BLOWS.			CAN BE DETACHED	SLIP PLANE.
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 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE			STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH	
SOIL MOISTURE - CORRELATION OF TERMS DMT - DILATOMET SOIL MOISTURE SCALE FIELD MOISTURE CAUSE FOR STEED MOISTURE DPT - DYNAMIC P				ENETRATION TEST / - UNII W	POINT OF A GEOLOGISTS PICK.			BI HHRU DLUWS OF THE	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.	
(ATTERBERG LIMITS)	DESCRIPTION GUIDE FO	R FIELD MOISTURE DESCRIPTION	e - VOID RATIO F FINE	√d - DRY UI W - MOISTUR				Y BY KNIFE OR PICK, CAN BE EXCA N SIZE BY MODERATE BLOWS OF A F		STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
		LIQUID; VERY WET, USUALLY	FOSS FOSSILIFE	ROUS V VERY		PIECES	CAN BE BROKEN BY FINGER F	PRESSURE.	FICK FOLIAT. SMMLE, INTIV	UF STRATUM AND EXPRESSED AS A PERCENTAGE,
(SAT.) FROM BELOW THE GROUND WATER TABLE			FRAC FRACTURED VST - VANE SHEAR TEST FRAGS FRAGMENTS				VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY			STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED
PLASTIC T	SEMISOLI	ID; REQUIRES DRYING TO	MED MEDIUM			FINGERN	NAIL.	NEW BI FINGER FRESSURE, CHN BE	SCRATCHED READILY BY	BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE (PI) PLASTIC LIMIT		OPTIMUM MOISTURE	EQUI	IPMENT USED ON SUBJECT	PROJECT		RE SPACING	BEDD1		TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLL Treasite circi			DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	TERM VERY WIDE	SPACING MORE THAN 10 FEET	TERM VERY THICKLY BEDDED	THICKNESS > 4 FEET	BENCH MARK: R.R. SPIKE IN BASE OF 30" PINE
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT	- MOIST - (M) SOLID; A	AT OR NEAR OPTIMUM MOISTURE	MOBILE B-47	CLAY BITS	AUTOMATIC MANUAL	WIDE	3 TO 10 FEET	THICKLY BEDDED THINLY BEDDED	1.5 - 4 FEET 0.16 - 1.5 FEET	45 FEET RT. OF -L- STA. 12+85 ELEVATION: 4.69 FEET
SE SHRINKHOE LIMIT	REQUIRES	S ADDITIONAL WATER TO	7 🚍	6° CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CLOSE CLOSE	E 1 TO 3 FEET Ø.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	
		OPTIMUM MOISTURE	CME-45C	8' HOLLOW AUGERS		VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED THINLY LAMINATED	0.008 - 0.03 FEET < 0.008 FEET	NOTES:
	PLASTICITY		CME~45B	HARD FACED FINGER BITS			INDURATION			
	PLASTICITY INDEX (PI)	DRY STRENGTH	CITE 43B	TUNGCARBIDE INSERTS		FOR SEDIMENTARY ROCK	S, INDURATION IS THE HARDEN	ENING OF THE MATERIAL BY CEMENT	TING, HEAT, PRESSURE, ETC.	
NONPLASTIC OW PLASTICITY	0-5 6-15	VERY LOW SLIGHT	CME-550	CASING W/ ADVANCER		FRIABLE		IG WITH FINGER FREES NUMEROUS G E BLOW BY HAMMER DISINTEGRATES		
ED. PLASTICITY	16-25	MEDIUM	PORTABLE HOIST	TRICONE 2 15/16 STEEL TEETH	HAND TOOLS: POST HOLE DIGGER			CAN BE SEPARATED FROM SAMPLE		
AIGH PLASTICITY	26 OR MORE	HIGH	1	TRICONE TUNG,-CARB.	HAND AUGER	MODERATELY		EASILY WHEN HIT WITH HAMMER.	. WITH STEEL PRODE;	
	COLOR		OTHER	CORE BIT	SOUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH	TH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. OTHER OTHER OTHER								CULT TO BREAK WITH HAMMER.	N/ ONUBLE	
FIGURIERS SUCH HS LIGHT, DAN	STICHICED, CTC, HIE USED TO DESC	AUDE HEFEHNHINGE.		UI UINEK	OTHER	EXTREMELY II		HAMMER BLOWS REQUIRED TO BREA E BREAKS ACROSS GRAINS.	AK SAMPLE;	

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