NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATE PROJECT NO. | SHEET NO. | TOTAL

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DIVISION OF HIGHWAYS

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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND. TERMS, SYMBOLS, AND ABBREVIATIONS SOIL DESCRIPTION ROCK DESCRIPTION TERMS AND DEFINITIONS 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 PORCEASED AND CASED). 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. SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED FARTH MATERIALS 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 1206, ASTM D-1586). SOIL SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER FOLIAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. AQUIFER - A WATER BEARING FORMATION OR STRATA. GAP-GRADED: INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: ANGULARITY OF GRAINS CONSISTENCY, COLOR, TEXTURE, MOISTURE, AGSHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS: RGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS WEATHERED ROCK (WR) HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, FTC. SUBANGULAR, SUBROUNDED, OR ROUNDED. VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 PER FOOT. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL MINERALOGICAL COMPOSITION SOIL LEGEND AND AASHTO CLASSIFICATION AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS GROUND SURFACE GENERAL GRANIII AR MATERIAI S SILT-CLAY MATERIALS WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ORGANIC MATERIALS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. GNEISS, GABBRO, SCHIST, ETC. (\$5% PASSING *200) >85% PASSING *200) CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. CLASS. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN NON-CRYSTALLINE A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE ROCK (NCR) 4-2-44-2-54-2-64-2-7 A-3 A-6, A-7 CLASS. 4-1-a 4-1-b SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELI LIQUID LIMIT LESS THAN 30 COASTAL PLAIN SEDIMENTARY ROCK LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50 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. SYMBOL SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED HIGHLY COMPRESSIBLE SHELL BEDS, ETC PERCENTAGE OF MATERIAL PASSIN DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT SILT-WEATHERING * 10 SRANUL A MUCK. GRANULAR SILT- CLA CLAY ROCKS OR CUTS MASSIVE ROCK. ORGANIC MATERIAL OTHER MATERIAL PEAT SOILS SOILS SOILS ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER SOILS FRESH DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE 115 MX 25 MX 100 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 * 200 TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% HAMMER IF CRYSTALLINE. ITTLE ORGANIC MATTER 5 - 12% LITTLE 10 - 20% TOURN LIMIT 40 MX41 MN 40 MX41 MN 40 MX 41 MN 40 MX 41 M ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, MODERATELY ORGANIC 5 - 10% 12 - 20% DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF 6 MX PLASTIC INDEX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN HIGHLY ORGANIC (V. SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF >10% >20% HE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. LITTLE OR HIGHLY 35% AND ABOVE HIGHL' A CRYSTALLINE NATURE. GROUP INDEX 0 0 4 MX 8 MX 12 MX 16 MX No MX FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE Ø GROUND WATER ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO SLIGH: USUAL TYPES STONE FRAGS. FINE AMOUNTS OF SOILS SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE ∇ SILTY OR CLAYEY WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELISPAR SILTY CLAYEY OF MAJOR GRAVEL AND CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. MATTER GRAVEL AND SAND SOILS SOILS **Y**___ STATIC WATER LEVEL AFTER 24 HOURS. MATERIALS SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN MODERATE FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM **∇**PW 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 ARENT MATERIAL. FAIR TO PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA POOR EXCELLENT TO GOOD AS A FAIR TO POOR LINSUITARI F POOR FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY OM-WITH FRESH ROCK. SPRING OR SEEPAGE P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30 MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL CONSISTENCY OR DENSENESS MISCELLANEOUS SYMBOLS FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN 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. RANGE OF STANDARD COMPACTNESS OR ROADWAY EMRANKMENT PRIMARY SOIL TYPE PENETRATION RESISTENCE COMPRESSIVE STRENGTH PT DMT TEST BORING SAMPLE IF TESTED. WOULD YIELD SPT REFUSAL JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. CONSISTENCY (TONS/FT2) WITH SOIL DESCRIPTION (N-VALUE) ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO \oplus AUGER BORING GENERALLY S- BULK SAMPLE ITS LATERAL EXTENT. LOOSE 4 TO 10 EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. GRANIII AR MEDIUM DENSE N/A LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. IF TESTED, YIELDS SPT N VALUES > 100 BPF ARTIFICIAL FILL OTHER THAN 10 TO 30 SS- SPLIT SPOON MATERIAL CORE BORING DENSE 30 TO 50 MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT SAMPLE (NON-COHESIVE) VERY DENSE >50 ST- SHELBY TUBE THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. (V. SEV.) INFERRED SOIL BOUNDARIES VERY SOFT SAMPLE REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN V** <0.25 MONITORING WELL VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF SOFT 2 TO 4 GENERALLY 0.25 TO 0.5 コルミルニ INFERRED ROCK LINE RS- ROCK SAMPLE PIEZOMETER MEDIUM STIFE 4 TO 8 Ø.5 TO 1 Δ ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. COMPLETE INSTALLATION 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 EXPRESSED AS A PERCENTAGE. 8 TO 15 RT- RECOMPACTED MATERIAL. ALLUVIAL SOIL BOUNDARY SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS VERY STIFF 15 TO 30 TRIAXIAL SAMPLE SLOPE INDICATOR \bigcirc DIP/DIP DIRECTION OF INSTALLATION CBR - CBR SAMPLE ROCK HARDNESS TEXTURE OR GRAIN SIZ - SPT N-VALUE SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES - SOUNDING ROD J.S. STD. SIEVE SIZE 40 60 REF- SPT REFUSAL SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND 4.76 0.42 OPENING (MM) 0.25 0.075 CAN BE SCRATCHED BY KNIFF OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED HARD **ABBREVIATIONS** RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS COARSE FINE CORRL F GRAVEL SILT BOULDER AR - AUGER REFUSAL PMT - PRESSUREMETER TEST MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE (COB.) (SL.) SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. (BLDR.) (GR.) (CL.) BT - BORING TERMINATED (CSE, SD.) SD. - SAND, SANDY HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED SL. - SILT. SILTY 2.0 0.25 0.05 0.005 CPT - CONE PENETRATION TEST CSE. - COARSE SLI. - SLIGHTLY TANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF SIZE IN. 12° CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. MEDIUM TCR - TRICONE REFUSAL 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 LESS THAN 0.1 FOOT PENETRATION CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE SOIL MOIS URE - CORRELAT ION OF TERMS DMT - DILATOMETER TEST 7 - UNIT WEIGHT DPT - DYNAMIC PENETRATION TEST POINT OF A GEOLOGISTS PICK. SOIL MOISTURE SCALE FIELD MOISTURE 74 - DRY UNIT WEIGHT GUIDE FOR FIELD MOISTURE DESCRIPTION CAN BE GROVED OR COLIGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN ERACMENTS VOID RATIO SOFT DESCRIPTION (ATTERBERG LIMITS) STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. F. - FINE W - MOISTURE CONTENT FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN FOSS. - FOSSILIFFROUS PIECES CAN BE BROKEN BY FINGER PRESSURE. V. - VERY CATHRATER LISUALLY LIQUID, VERY WET LISUALLY STRATA ROCK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED
BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. FRAC. - FRACTURED VST - VANE SHEAR TEST CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH FROM BELOW THE GROUND WATER TABLE (SAT.) FRAGS. - FRAGMENTS LIQUID LIMIT SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY MED. - MEDIUM LASTIC SEMISOLID: REQUIRES DRYING TO RANGE TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER - WET - (W EQUIPMENT USED ON SUBJECT PROJECT FRACTURE SPACING ATTAIN OPTIMUM MOISTURE (PI) PLASTIC LIMIT TFRM THICKNESS TERM SPACING BENCH MARKS DRILL UNITS: ADVANCING TOOLS: VERY THICKLY BEDDED > 4 FFET VERY WIDE MORE THAN 10 FEET - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE AUTOMATIC MANUAL OPTIMUM MOISTURE THICKLY BEDDED CLAY BITS 3 TO 10 FEET **ELEVATION:** MOBILE B-THINLY BEDDED 0.16 - 1.5 FEET SHRINKAGE LIMIT MODERATELY CLOSE 1 TO 3 FEET VERY THINLY BEDDED 6° CONTINUOUS FLIGHT AUGER 0.16 TO 1 FEET REQUIRES ADDITIONAL WATER TO CORE SIZE: NOTES: THICKLY LAMINATED 0.008 - 0.03 FFFT - DRY - (D) BK-51 VERY CLOSE LESS THAN 0.16 FEET ATTAIN OPTIMUM MOISTURE HINLY LAMINATED 8 HOLLOW AUGERS -B___ INDURATION PLASTICITY HARD FACED FINGER BITS CME-45 ___ -N ___ FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. PLASTICITY INDEX (PI) DRY STRENGTH TUNG.-CARBIDE INSERTS _ -H_ RUBBING WITH FINGER FREES NUMEROUS GRAINS; NONPLASTIC VERY LOW ____ CME-550 0-5 FRIABLE CASING W/ ADVANCER OW PLASTICITY SLIGHT GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. HAND TOOLS: MED. PLASTICITY 16-25 PORTABLE HOIST TRICONE ___ *STEEL TEETH POST HOLE DIGGER GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; MODERATELY INDURATED HIGH PLASTICIT 26 OR MORE натн BREAKS EASILY WHEN HIT WITH HAMMER TRICONE HAND AUGER * TUNG,-CARB, COLOR OTHER INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBES SOUNDING ROD CORE BIT DIFFICULT TO BREAK WITH HAMMER. DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YEL-BRN. BLUE-GRAY) VANE SHEAR TEST OTHER OTHER_ MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED OTHER SAMPLE BREAKS ACROSS GRAINS. REVISED 09/15/00