NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ID	STATE PROJECT N	10. SHEET	NO.	TOTAL	SHEETS	
-3205	32930.1.1	2	2		4	

BRIDGE NO.30 OVER SPRING CREEK ØN N.C.209 WITH APPROACHES AND DETOUR

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION ROCK DESCRIPTION TERMS AND DEFINITIONS 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. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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 ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. OIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS HICH CAN BE PENETRATED WITH A CONTINUOUS ELICHT POWER ALICER AND WHICH YIELDS LESS THAN AQUIFER - A WATER BEARING FORMATION OR STRATA. WAILT CHIESE FEREINHEE WITH CONTINUOUS FLUID FORCE HOURS, HIND WILLD LECUS LESS THAN 1808 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1566). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLI 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 A ZOI ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. OF WEATHERED BOCK ANGULARITY OF GRAINS CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS: ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, S MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR. WEATHERED ROCK (WR) OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE SLATE FTC. NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS SUBANGULAR, SUBROUNDED, OR ROUNDED VERY STIFF, GRAY SUTY CLAY, MOIST WITH INTERBEDOED FINE SAND LAYERS, HIGHLY PLASTIC, A-T-6 ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL MINERALOGICAL COMPOSITION SOIL LEGEND AND AASHTO CLASSIFICATION FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT AT WHICH IS IS ENCOUNTERED BUT WHICH DOES NOT NECESSABILY RISE TO OR ABOVE THE CRYSTALLINE ROCK (CR) MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS GROUND SURFACE. GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS YOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ORGANIC MATERIALS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN CLASS (\$5% PASSING *200 85% PASSING *200) CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 NON-CRYSTALLINE ROCK (NCR) GROUP A-1 A-3 COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED, ROCK TYPE A-6, A-SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50 INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD CLASS. Δ-1-a Δ-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 F SLOPE. 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 NTAGE SHELL BEDS, ETC PASSIN OF MATERIAL SILT-DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT WEATHERING # 10 MUCK. GRANIII AR SILT- CLA CLAY ORGANIC MATERIAL ROCKS OR CUTS MASSIVE ROCK. OTHER MATERIAL SOILS SOILS SOILS SOILS ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER 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 35 MX 36 MN 36 M # 200 BACE OF ORGANIC MATTER 2 - 3% TRACE 1 - 10% IORIZONTAL . LITTLE ORGANIC MATTER 3 - 5% 5 - 12% ITTLE 10 - 20% 40 MX|41 MN |40 MX|41 MN |40 MX|41 MN |40 MX|41 MI TOURS I DUST ROCK GENERALLY FRESH. JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN VERY SLIGHT MODERATELY ORGANIC 5 - 10% 12 - 201 DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF LASTIC INDEX 6 MY N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN V. SLIJ CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF HIGHLY ORGANIC LITTLE OR HIGHLY >10% >20% HIGHLY 35% AND ABOVE THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH OF A CRYSTALLINE NATURE. MODERATE GROUP INDEX ø USUAL TYPES STONE FRAGS. FINE GRAVEL AND SAND Ø a 4 MX | 8 MX | 12 MX | 16 MX | No MX GROUND WATER FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE ROCK GENERALLY ERESH JOINTS STAINED AND DISCOLORATION EXTENDS INTO BOCK UP TO AMOUNTS OF SI TONT SOILS SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE SILTY OR CLAYEY CLAYEY WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING SLIJ INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR STI TY FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. GRAVEL AND SAND SOILS SOILS MATTER lacktriangleCRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING LINDER HAMMER BLOWS. STATIC WATER LEVEL AFTER 24 HOURS. 1ATERIALS MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND VEATHERING FEECTS. IN FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM GEN. RATINO **∇**PW GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS FAIR TO PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA COOM ARENT MATERIAL EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITARI DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED POOR SUBGRAD LOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY ONL-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 DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN RANGE OF UNCONFINED RANGE OF STANDARD MOD, SEV. AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK. COMPACTNESS OR ROADWAY EMBANKMEN DET DAT TEST BORING PRIMARY SOIL TYPE ENETRATION RESISTENCE COMPRESSIVE STRENGTH JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. WITH SOIL DESCRIPTION DESIGNATIONS ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED ROCK FARRIC CLEAR AND EVIDENT BUT REDUCED LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO VERY LOOSE \oplus IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME AUGER BORING SEV. GENERALLY SOIL SYMBOL S- BULK SAMPLE TS LATERAL EXTENT. 1.00SF 4 TO 10 GRANULAR EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. MEDIUM DENSE LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. 10 TO 30 ARTIFICIAL FILL OTHER THAN IF TESTED. YIELDS SPT N VALUES > 100 BPF SS- SPLIT SPOON MATERIAL CORE BORING 30 TO 50 ROADWAY EMBANKMENTS MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN (NON-COHESIVE FRY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT VERY DENSE 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 $\bigcirc^{n_{1}}$ SAMPLE REMAINING, SAPROLITE IS AN EXAMPLE OF BOOK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN MONITORING WELL 2 TO 4 VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF FERVENING IMPERVIOUS STRATUM. 0.25 TO 0.5 INFERRED ROCK LINE RS- ROCK SAMPLE MEDIUM STIFF PIEZOMETER 4 TO 8 SILT-CLAY Δ COMPLETE 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. INSTALLATION STIFF RT- RECOMPACTED 1 TO 2 ALLIVIAL SOFE BOUNDARY VERY STIFF SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ROCK QUALITY DESIGNATION (R.Q.Q.) - 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 15 TO 30 (COHESIVE) 2 TO 4 TRIAYIAL SAMPLE SLOPE INDICATOR ALSO AN EXAMPLE. 530 \bigcirc INSTALLATION CBR - CBR SAMPLE ROCK HARDNESS EXPRESSED AS A PERCENTAGE. ROCK STRUCTURES TEXTURE OR GRAIN SIZ SPT N-VALUE \bigcirc SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SOUNDING ROD U.S. STD. SIEVE SIZE 270 0.053 REF SPT REFUSAL PARENT ROCK. SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. 4.76 OPENING (MM) 2.0 0.42 0.25 0.075 SILL - AN INTRUSIVE BODY OF IGNEOUS BOCK OF APPROXIMATELY LINEGRM THICKNESS AND ABBREVIATIONS CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL COARSE FINE TO DETACH HAND SPECIMEN. BOLIL DEB CORRI F GRAVEI CH T TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS AR - AUGER REFUSAL PMT - PRESSUREMETER TEST CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE (COB.) (GR.) (BLDR.) (SL.) (CL.) SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR (CSE, SD.) RT - BORING TERMINATED SD. - SAND, SANDY HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED SL. - SILT, SILTY SLI. - SLIGHTLY GRAIN MM 305 SIZE IN 12" 0.25 0.05 0.005 BY MODERATE BLOWS. CPT - CONE PENETRATION TEST STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B,P,F,) OF MEDIUN CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TCR - TRICONE REFUSAL 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE SOIL MOISTURE - CORRELATION OF TERMS HARD DMT - DILATOMETER TEST γ - UNIT WEIGHT A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION POINT OF A GEOLOGISTS PICK. DPT - DYNAMIC PENETRATION TEST SOIL MOISTURE SCALE FIELD MOISTURE $\gamma_{\rm d}$ - DRY UNIT WEIGHT GUIDE FOR FIELD MOISTURE DESCRIPTION VOID RATIO SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS (ATTERRERG LIMITS) DESCRIPTION STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. W - MOISTURE CONTENT F. - FINE FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN FOSS. - FOSSILIFEROUS PIECES CAN BE BROKEN BY FINGER PRESSURE. - SATURATED 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 4 INCHES DIVIDED BY THE VST - VANE SHEAR TEST FRAC. - FRACTURED 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 OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY OTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. MED. - MEDIUM LASTIC FINGERNAII SEMISOLID: REQUIRES DRYING TO RANGE - WET - (W) TOPSOIL (T.S.) - SURFACE SOILS LISUALLY CONTAINING ORGANIC MATTER EQUIPMENT USED ON SUBJECT PROJECT FRACTURE SPACING ATTAIN OPTIMUM MOISTURE PLASTIC LIMIT THICKNESS **TERM** TERM SPACING BM #60 RR SPIKE IN 24 POPLAR 102.96 LT HAMMER TYPE: BENCH MARK: DRILL UNITES ADVANCING TOOLS VERY THICKLY BEDDED MORE THAN 10 FEET > 4 FEET VERY WIDE OF BL STATION 9+30.22 - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE X AUTOMATIC MANUAL OPTIMUM MOISTURE THICKLY BEDDED 1.5 - 4 FEFT OM CLAY BITS WIDE 3 TO 10 FEET MOBILE B-ELEVATION 2429-916 SHRINKAGE LIMIT MODERATELY CLOSE VERY THINLY BEDDED 0.03 - 0.16 FEET 6 CONTINUOUS FLIGHT AUGER REQUIRES ADDITIONAL WATER TO CORE SIZE: CLOSE 0.16 TO 1 FEET NOTES: THICKLY LAMINATED 0.008 - 0.03 FEET - DRY - (D) BK-51 ALSO RR SPIKE IN 19" POPLAR 96.26 RT LESS THAN 0.16 FEET ATTAIN OPTIMUM MOISTURE 8° HOLLOW AUGERS ☐-8<u></u>___ THINLY LAMINATED < 0.008 FEET OF -L- STATION 16+33.6 PLASTICITY HARD FACED FINGER BITS NDURATION X-N XWL ELEVATION 2428,921 FOR SEDIMENTARY ROCKS INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING HEAT PRESSURE FIC. PLASTICITY INDEX (PD DRY STRENGTH TUNG.-CARBIDE INSERTS П-н_ NONPLASTIC VERY LOW RUBBING WITH FINGER FREES NUMEROUS GRAINS: 0-5 FRIABLE CASING W/ ADVANCER LOW PLASTICITY SLIGHT GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. HAND TOOLS MED, PLASTICITY 16-25 MEDIUM PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: HIGH PLASTICITY MODERATELY INDURATED 26 OR MORE HIGH BREAKS EASILY WHEN HIT WITH HAMMER. TRICONE HAND AUGER * TUNG.-CARR. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: INDURATED SOLINDING ROD CORE BIT DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YEL-BRN. BLUE-GRAY) DIFFICULT TO BREAK WITH HAMMER. OTHER VANE SHEAR TEST MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. OTHER SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; EXTREMELY INDURATED OTHER SAMPLE BREAKS ACROSS GRAINS.