

REFERENCE: R-2707C

PROJECT: 34497

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | R-2707C | 1 | 20 |

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STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CLEVELAND
PROJECT DESCRIPTION US 74 SHELBY BYPASS FROM
EAST OF NC 226 TO EAST OF NC 150

SITE DESCRIPTION MSE RETAINING WALLS AT
DUAL BRIDGES NO. 472 AND 473 ON -L- (US 74)
OVER -YIIEV2- (NC 180) AND -YI3- (CSX RR)

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 1919 T07-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES 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 SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL 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 OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE 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 GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION 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 NECESSARY 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 CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
1. 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.

| | |
|----------------------|--------------------------|
| NCDOT PERSONNEL | ECS PERSONNEL |
| <u>J.K. STICKNEY</u> | <u>GEOLOGIC</u> |
| <u>C.L. SMITH</u> | <u>C. BUKOVITZ, E.I.</u> |
| <u>E. BEVERLY</u> | <u>M. BREWER, P.E.</u> |
| | <u>J. FRAZIER</u> |
| | <u>J. BRADSHAW, E.I.</u> |
| | <u>A. ROTH</u> |

INVESTIGATED BY ECS CAROLINAS, LLP
DRAWN BY M. BREWER, P.E.
CHECKED BY M. WALKO, P.E.
SUBMITTED BY ECS CAROLINAS, LLP
DATE SEPTEMBER 2016



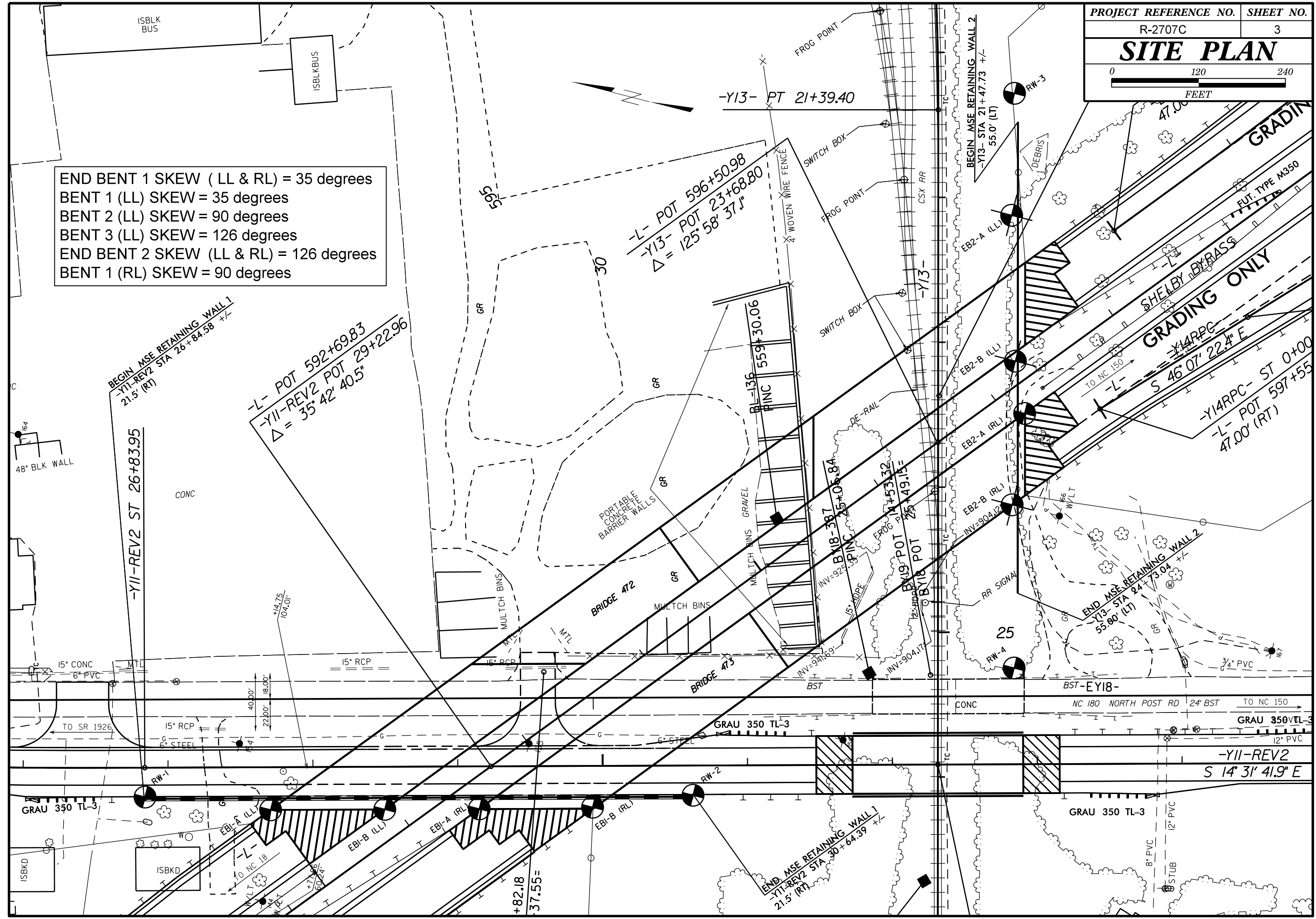
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D. Matthew Brewer
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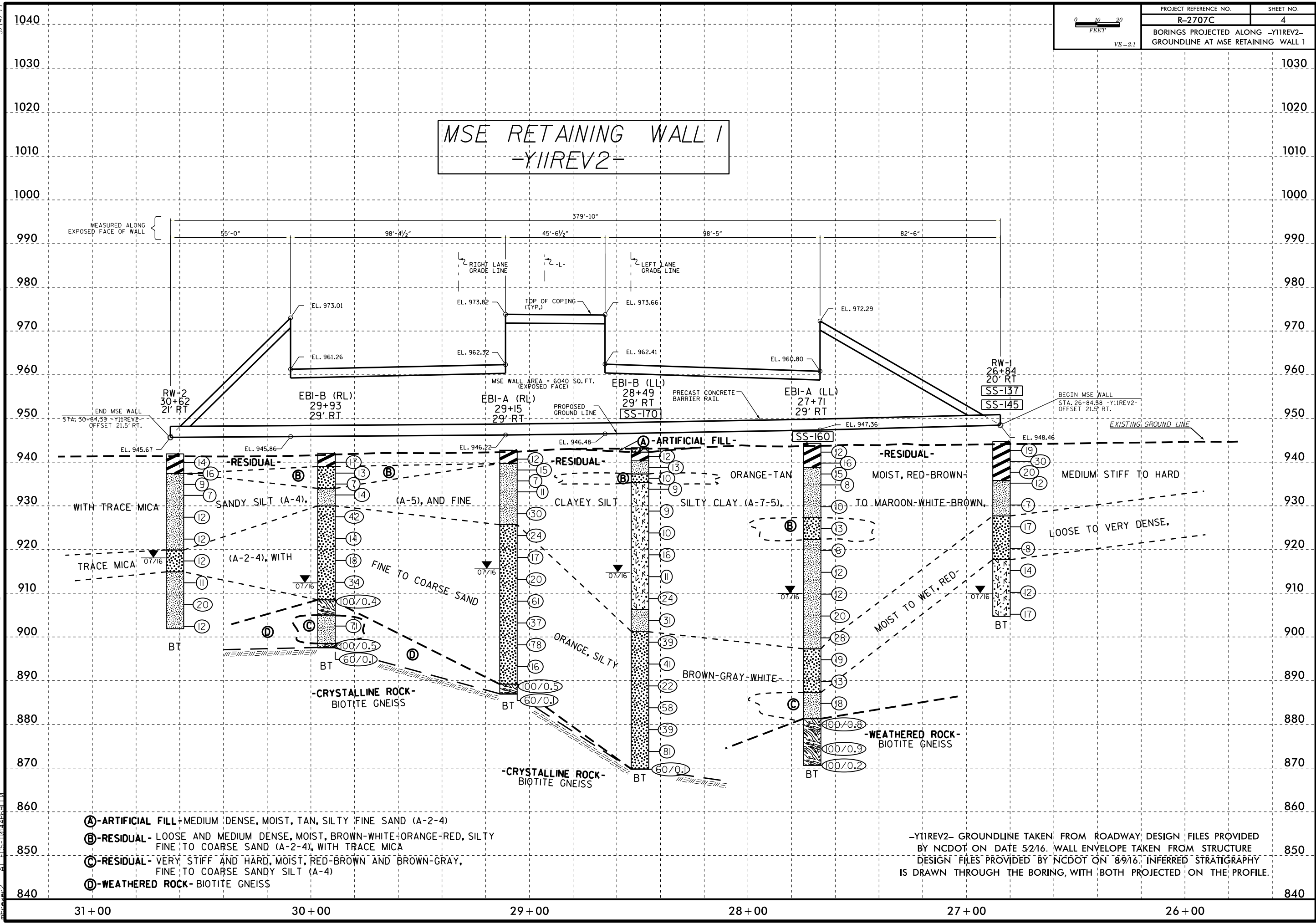
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

| SOIL DESCRIPTION | | | | | | | | | | GRADATION | | | | | ROCK DESCRIPTION | | | | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|---|--|--|--|--|
| SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 | | | | | | | | | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. 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. | | | | | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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 IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP) | | | | | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. 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. ARTESIAN - 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. 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. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - 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. 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 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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 TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | | | | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | ANGULARITY OF GRAINS | | | | | WEATHERING | | | | | | | | | | | | | | | | | | | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | | | | | | | | | | THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | | | | | FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. | | | | | | | | | | | | | | | | | | | |
| MINERALOGICAL COMPOSITION | | | | | | | | | | COMPRESSION | | | | | PERCENTAGE OF MATERIAL | | | | | | | | | | | | | | | | | | | |
| MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | | | | | | | SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | | | | | ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE | | | | | | | | | | | | | | | | | | | |
| GROUND WATER | | | | | | | | | | MISCELLANEOUS SYMBOLS | | | | | ROCK HARDNESS | | | | | | | | | | | | | | | | | | | |
| EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE | | | | | | | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY | | | | | DIP & DIP DIRECTION OF ROCK STRUCTURES SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION | | | | | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL. | | | | | | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | | | | | | | | | RECOMMENDATION SYMBOLS | | | | | ABBREVIATIONS | | | | | FRACTURE SPACING | | | | | BEDDING | | | | | | | | | |
| U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 | | | | | | | | | | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | | | AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAG. - FRAGMENTS HI. - HIGHLY | | | | | VST - VANE SHEAR TEST WEA. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO | | | | | VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET | | | | | VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | | | | | | | | ABBREVIATIONS | | | | | FRACTURE SPACING | | | | | BEDDING | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILTY, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY | | | | | VST - VANE SHEAR TEST WEA. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO | | | | | VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET | | | | | VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET | | | | | | | | | |
| PLASTICITY | | | | | | | | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | | FRACTURE SPACING | | | | | BEDDING | | | | | | | | | | | | | | |
| NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC | | | | | | | | | | DRILL UNITS: CME-45C CME-55 CME-550X VANE SHEAR TEST PORTABLE HOIST DIEDRICH D-50 DIEDRICH D-120 | | | | | ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 6" HOLLOW AUGERS 8" HOLLOW AUGERS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG-CARB. CORE BIT | | | | | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -H -N XWL HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST | | | | | VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET | | | | | VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET | | | | |
| COLOR | | | | | | | | | | INDURATION | | | | | FRACTURE SPACING | | | | | BEDDING | | | | | | | | | | | | | | |
| DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | | | | | | | | | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET | | | | | VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET | | | | | | | | | | | | | | |
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END BENT 1 SKEW (LL & RL) = 35 degrees
 BENT 1 (LL) SKEW = 35 degrees
 BENT 2 (LL) SKEW = 90 degrees
 BENT 3 (LL) SKEW = 126 degrees
 END BENT 2 SKEW (LL & RL) = 126 degrees
 BENT 1 (RL) SKEW = 90 degrees



MSE RETAINING WALL 1 -YIIREV2-

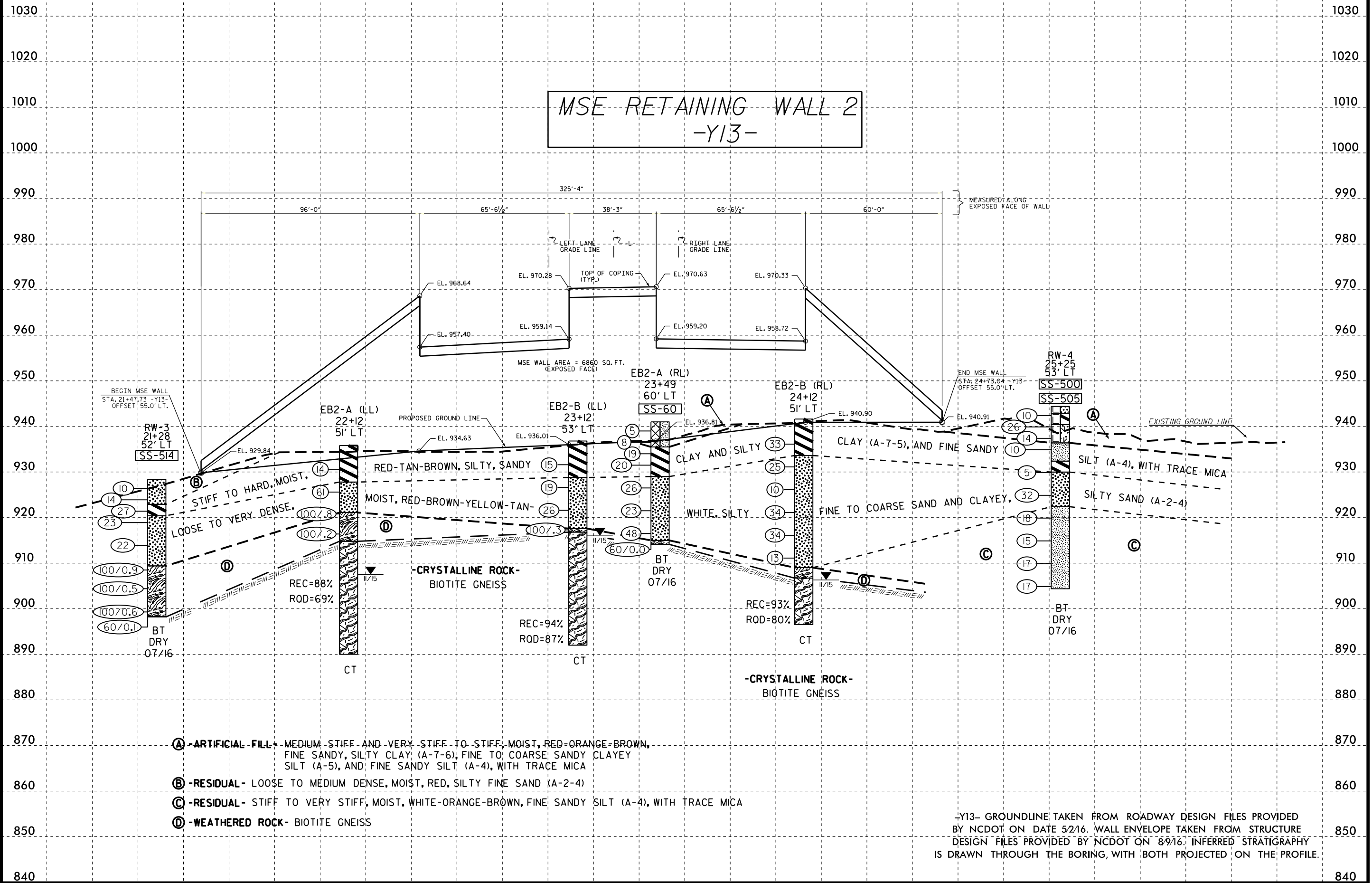


- Ⓐ -ARTIFICIAL FILL- MEDIUM DENSE, MOIST, TAN, SILTY FINE SAND (A-2-4)
- Ⓑ -RESIDUAL- LOOSE AND MEDIUM DENSE, MOIST, BROWN-WHITE-ORANGE-RED, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA
- Ⓒ -RESIDUAL- VERY STIFF AND HARD, MOIST, RED-BROWN AND BROWN-GRAY, FINE TO COARSE SANDY SILT (A-4)
- Ⓓ -WEATHERED ROCK- BIOTITE GNEISS

-YIIREV2- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. WALL ENVELOPE TAKEN FROM STRUCTURE DESIGN FILES PROVIDED BY NCDOT ON 8/9/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

07-SEP-2016 10:02 PROJECTS\11000-11999\11700\11717-A - R-2707C - Site 6 Dual Bridges - MSE Wall\CAADD_GEO\TECH\Site\Sub\2707c_Geo_BRDG472&472_RWAL_PFI_4.dgn
 5/14/99
 11700-11999-11717-A - R-2707C - Site 6 Dual Bridges - MSE Wall\CAADD_GEO\TECH\Site\Sub\2707c_Geo_BRDG472&472_RWAL_PFI_4.dgn

MSE RETAINING WALL 2 -Y13-



- (A) -ARTIFICIAL FILL-** MEDIUM STIFF AND VERY STIFF TO STIFF, MOIST, RED-ORANGE-BROWN, FINE SANDY, SILTY CLAY; (A-7-6); FINE TO COARSE, SANDY CLAYEY SILT (A-5), AND FINE SANDY SILT (A-4), WITH TRACE MICA
- (B) -RESIDUAL-** LOOSE TO MEDIUM DENSE, MOIST, RED, SILTY FINE SAND (A-2-4)
- (C) -RESIDUAL-** STIFF TO VERY STIFF, MOIST, WHITE-ORANGE-BROWN, FINE SANDY SILT (A-4), WITH TRACE MICA
- (D) -WEATHERED ROCK-** BIOTITE GNEISS

-Y13- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 5/2/16. WALL ENVELOPE TAKEN FROM STRUCTURE DESIGN FILES PROVIDED BY NCDOT ON 8/9/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

5/14/99
 07-SEP-2016 10:06
 I:\26EOTECH\02-PROJECTS\1000-1199\11700\11717-A - R-2707C - Site 6 Dual Bridges - MSE Wall\CADD\GEO\TECH\Site\Sub\Y-2707c_Geo_BRD0472&472.RWAL_PFI_5.dgn

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|---------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Site 6: End Bent 1 MSE Wall on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. RW-1 | | STATION 26+84 | | OFFSET 20 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | | |
| COLLAR ELEV. 944.7 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 579,836 | | EASTING 1,255,785 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/13/16 | | COMP. DATE 07/13/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG | SOIL AND ROCK DESCRIPTION | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | ELEV. (ft) | DEPTH (ft) | | |
| 945 | | | | | | | | | | | | | | | 944.7 | 0.0 | GROUND SURFACE |
| | 943.7 | 1.0 | 5 | 8 | 11 | | | | | | | | | | | | RESIDUAL Very Stiff, Red, Fine Sandy, Silty CLAY (A-7-5(28)) |
| 940 | 941.2 | 3.5 | 12 | 14 | 16 | | | | | | | SS-137 | 22% | | | | |
| | 938.7 | 6.0 | 6 | 9 | 11 | | | | | | | | | | | | |
| 935 | 936.2 | 8.5 | 6 | 6 | 6 | | | | | | | | | | 935.8 | 8.9 | Stiff to Medium Stiff, Red-Brown, Fine Sandy SILT (A-4) |
| | 931.2 | 13.5 | 10 | 3 | 4 | | | | | | | | | | | | |
| 930 | 926.2 | 18.5 | 3 | 7 | 10 | | | | | | | | | | 927.7 | 17.0 | Medium Dense to Loose, Red-Brown, Silty Fine To Coarse SAND (A-2-4), with trace mica |
| 925 | 921.2 | 23.5 | 4 | 4 | 4 | | | | | | | | | | | | |
| 920 | 916.2 | 28.5 | 8 | 8 | 6 | | | | | | | | | | 917.7 | 27.0 | Stiff to Very Stiff, Red-Brown-White, Fine To Coarse Sandy, Clayey SILT (A-5(5)), with trace mica |
| 915 | 911.2 | 33.5 | 4 | 4 | 8 | | | | | | | | | | | | |
| 910 | 906.2 | 38.5 | 5 | 6 | 11 | | | | | | | SS-145 | 40% | | | | |
| 905 | | | | | | | | | | | | | | | 904.7 | 40.0 | Boring Terminated at Elevation 904.7 ft In Residual SILT (A-5) |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|---------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB1-A (LL) | | STATION 27+71 | | OFFSET 29 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | | |
| COLLAR ELEV. 944.3 ft | | TOTAL DEPTH 73.7 ft | | NORTHING 579,750 | | EASTING 1,255,798 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/13/16 | | COMP. DATE 07/13/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG | SOIL AND ROCK DESCRIPTION | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | ELEV. (ft) | DEPTH (ft) | | |
| 945 | | | | | | | | | | | | | | | 944.3 | 0.0 | GROUND SURFACE |
| | 943.3 | 1.0 | 5 | 5 | 7 | | | | | | | | | | | | RESIDUAL Stiff to Very Stiff, Red-Brown, Silty CLAY (A-7-5) |
| 940 | 940.8 | 3.5 | 6 | 7 | 9 | | | | | | | | | | | | |
| | 938.3 | 6.0 | 3 | 5 | 10 | | | | | | | | | | 938.8 | 5.5 | Stiff to Medium Stiff, Red-Brown, Fine Sandy SILT (A-4) |
| 935 | 935.8 | 8.5 | 3 | 3 | 5 | | | | | | | | | | | | |
| | 930.8 | 13.5 | 4 | 5 | 5 | | | | | | | | | | | | |
| 930 | 925.8 | 18.5 | 5 | 5 | 8 | | | | | | | | | | 927.3 | 17.0 | Medium Dense, Brown-White, Silty Fine to Coarse SAND (A-2-4), with trace mica |
| 925 | 920.8 | 23.5 | 3 | 3 | 3 | | | | | | | | | | 922.3 | 22.0 | Medium Stiff to Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica |
| 920 | 915.8 | 28.5 | 8 | 6 | 6 | | | | | | | | | | | | |
| 915 | 910.8 | 33.5 | 3 | 5 | 7 | | | | | | | | | | | | |
| 910 | 905.8 | 38.5 | 6 | 8 | 12 | | | | | | | | | | | | |
| 905 | 900.8 | 43.5 | 8 | 11 | 17 | | | | | | | | | | | | |
| 900 | 895.8 | 48.5 | 23 | 9 | 10 | | | | | | | | | | 897.3 | 47.0 | Medium Dense, Red-Brown, Silty Fine to Coarse SAND (A-2-4) |
| 895 | 890.8 | 53.5 | 6 | 4 | 9 | | | | | | | | | | | | |
| 890 | 885.8 | 58.5 | 5 | 6 | 12 | | | | | | | | | | 887.3 | 57.0 | Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4(0)), with little clay. |
| 885 | 880.8 | 63.5 | 48 | 52/0.3 | | | | | | | | | | | 881.3 | 63.0 | WEATHERED ROCK Gray-White (BIOTITE GNEISS) |
| 880 | 875.8 | 68.5 | 25 | 26 | 74/0.4 | | | | | | | | | | | | |
| 875 | 870.8 | 73.5 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | 870.6 | 73.7 | Boring Terminated at Elevation 870.6 ft In Weathered Rock (BIOTITE GNEISS) |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT_GDT 8/10/16

1) Approximately 0.3 ft. of topsoil was encountered at the ground surface.

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|---|-----------------|---------------------|------------|--------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|-----|--|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B (LL) | | STATION 28+49 | | OFFSET 29 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | |
| COLLAR ELEV. 943.4 ft | | TOTAL DEPTH 73.6 ft | | NORTHING 579,674 | | EASTING 1,255,818 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/14/16 | | COMP. DATE 07/14/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 945 | | | | | | | | | | | | | | | | |
| | 942.4 | 1.0 | 4 | 5 | 7 | 12 | | | | | | | | 943.4 | 0.0 | GROUND SURFACE |
| | | | | | | | | | | | | | | 942.4 | 1.0 | ARTIFICIAL FILL |
| 940 | 939.9 | 3.5 | 6 | 6 | 7 | | | | | | | | | 940.4 | 3.0 | Medium Dense, Tan, Silty Fine SAND (A-2-4) |
| | | | | | | | | | | | | | | 940.4 | 3.0 | RESIDUAL |
| | 937.4 | 6.0 | 4 | 4 | 6 | | | | | | | | | 937.4 | 6.0 | Stiff, Red-Brown, Fine Sandy, Silty CLAY (A-7-5) |
| 935 | 934.9 | 8.5 | 2 | 4 | 5 | | | | | | | | | 935.4 | 8.0 | Stiff, Red-Orange, Fine Sandy SILT (A-4), with trace mica |
| | | | | | | | | | | | | | | 935.4 | 8.0 | Loose, White-Orange-Red, Silty Fine to Coarse SAND (A-2-4), with trace mica |
| | | | | | | | | | | | | | | | | Stiff to Very Stiff, Maroon-White-Brown to Orange-Red-Tan, Fine to Coarse Sandy, Clayey SILT (A-5(5)), with trace mica |
| 930 | 929.9 | 13.5 | 4 | 3 | 6 | | | | | | | | | | | |
| 925 | 924.9 | 18.5 | 4 | 4 | 6 | | | | | | | | | | | |
| 920 | 919.9 | 23.5 | 3 | 6 | 10 | | | | | | | | | | | |
| 915 | 914.9 | 28.5 | 4 | 4 | 7 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 910 | 909.9 | 33.5 | 14 | 12 | 12 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 905 | 904.9 | 38.5 | 7 | 13 | 18 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 900 | 899.9 | 43.5 | 39 | 17 | 22 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 895 | 894.9 | 48.5 | 9 | 14 | 27 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 890 | 889.9 | 53.5 | 10 | 7 | 15 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 885 | 884.9 | 58.5 | 12 | 22 | 36 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 880 | 879.9 | 63.5 | 12 | 14 | 25 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 875 | 874.9 | 68.5 | 32 | 41 | 40 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 870 | 869.9 | 73.5 | 60/0.1 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|---|-----------------|---------------------|------------|--------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|--|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B (LL) | | STATION 28+49 | | OFFSET 29 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | |
| COLLAR ELEV. 943.4 ft | | TOTAL DEPTH 73.6 ft | | NORTHING 579,674 | | EASTING 1,255,818 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/14/16 | | COMP. DATE 07/14/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 865 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT.GDT 8/10/16

SS-170 37%

869.9 73.5
869.8 73.6
CRYSTALLINE ROCK (BIOTITE GNEISS)
Boring Terminated with Standard Penetration Test Refusal at Elevation 869.8

Match Line

ft In Crystalline Rock (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|--|------------|----------------|-----|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A (RL) | | STATION 29+15 | | OFFSET 19 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | |
| COLLAR ELEV. 942.7 ft | | TOTAL DEPTH 55.8 ft | | NORTHING 579,611 | | EASTING 1,255,834 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/14/16 | | COMP. DATE 07/14/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 945 | | | | | | | | | | | | | | 942.7 | GROUND SURFACE | 0.0 |
| 940 | 941.7 | 1.0 | 4 | 5 | 7 | 12 | | | | | | M | RESIDUAL Stiff, Red, Silty CLAY (A-7-5) | 939.7 | 3.0 | |
| | 939.2 | 3.5 | 6 | 7 | 8 | 15 | | | | | | M | Medium Stiff to Very Stiff, Red-Brown, Fine Sandy SILT (A-4) | | | |
| | 936.7 | 6.0 | 4 | 3 | 4 | 7 | | | | | | M | | | | |
| 935 | 934.2 | 8.5 | 9 | 5 | 6 | 11 | | | | | | M | | | | |
| 930 | 929.2 | 13.5 | 4 | 11 | 19 | 30 | | | | | | M | | | | |
| 925 | 924.2 | 18.5 | 10 | 13 | 11 | 24 | | | | | | M | Medium Dense to Very Dense, Red-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with little to some gravel-sized rock fragments | 925.7 | 17.0 | |
| 920 | 919.2 | 23.5 | 9 | 6 | 11 | 17 | | | | | | M | | | | |
| 915 | 914.2 | 28.5 | 14 | 13 | 7 | 20 | | | | | | M | | | | |
| 910 | 909.2 | 33.5 | 8 | 31 | 30 | 61 | | | | | | M | | | | |
| 905 | 904.2 | 38.5 | 52 | 22 | 15 | 37 | | | | | | M | | | | |
| 900 | 899.2 | 43.5 | 21 | 61 | 17 | 78 | | | | | | M | | | | |
| 895 | 894.2 | 48.5 | 7 | 6 | 10 | 16 | | | | | | M | | | | |
| 890 | 889.2 | 53.5 | 100/0.5 | | | | | | | | | | | 889.2 | 53.5 | |
| | 887.0 | 55.7 | 60/0.1 | | | | | | | | | | | 887.0 | 55.7 | |
| | | | | | | | | | | | | | | 886.9 | 55.8 | |
| WEATHERED ROCK Gray-Brown (BIOTITE GNEISS) | | | | | | | | | | | | | | | | |
| CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 886.9 ft In Crystalline Rock (BIOTITE GNEISS) | | | | | | | | | | | | | | | | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|--|------------|----------------|-----|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B (RL) | | STATION 29+93 | | OFFSET 29 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | | |
| COLLAR ELEV. 942.0 ft | | TOTAL DEPTH 44.5 ft | | NORTHING 579,674 | | EASTING 1,255,818 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/14/16 | | COMP. DATE 07/14/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 945 | | | | | | | | | | | | | | 942.0 | GROUND SURFACE | 0.0 |
| 940 | 941.0 | 1.0 | 4 | 7 | 10 | 17 | | | | | | M | RESIDUAL Very Stiff, Red, Silty CLAY (A-7-5) | 939.0 | 3.0 | |
| | 938.5 | 3.5 | 7 | 7 | 6 | 13 | | | | | | M | Medium Dense to Loose, Red-White-Brown, Silty Fine to Coarse SAND (A-2-4) | | | |
| | 936.0 | 6.0 | 5 | 4 | 3 | 7 | | | | | | M | | | | |
| 935 | 933.5 | 8.5 | 3 | 3 | 11 | 14 | | | | | | M | Stiff, Red-Brown, Fine Sandy SILT (A-4) | 934.0 | 8.0 | |
| 930 | 928.5 | 13.5 | 16 | 23 | 19 | 42 | | | | | | M | Medium Dense to Dense, Red-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace gravel sized rock fragments | 930.0 | 12.0 | |
| 925 | 923.5 | 18.5 | 4 | 6 | 8 | 14 | | | | | | M | | | | |
| 920 | 918.5 | 23.5 | 6 | 7 | 11 | 18 | | | | | | M | | | | |
| 915 | 913.5 | 28.5 | 8 | 18 | 16 | 34 | | | | | | M | | | | |
| 910 | 908.5 | 33.5 | 100/0.4 | | | | | | | | | M | | 908.5 | 33.5 | |
| 905 | 903.5 | 38.5 | 66 | 14 | 57 | 71 | | | | | | M | WEATHERED ROCK Brown-Gray (BIOTITE GNEISS) | 905.0 | 37.0 | |
| 900 | 898.5 | 43.5 | | | | | | | | | | | RESIDUAL Hard, Brown-Gray, Fine Sandy SILT (A-4), with trace gravel sized rock fragments | 898.5 | 43.5 | |
| | 897.6 | 44.4 | 100/0.5 | | | | | | | | | | | 897.6 | 44.4 | |
| | | | 60/0.1 | | | | | | | | | | | 897.5 | 44.5 | |
| WEATHERED ROCK Brown-Gray (BIOTITE GNEISS) | | | | | | | | | | | | | | | | |
| CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 897.5 ft In Crystalline Rock (BIOTITE GNEISS) | | | | | | | | | | | | | | | | |
| 1) Approximately 0.3 ft. of topsoil was encountered at the ground surface. | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT_GDT 8/10/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | |
|--|-----------------|---------------------|------------|--------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|------|
| SITE DESCRIPTION Site 6: End Bent 1 MSE Wall on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. RW-2 | | STATION 30+62 | | OFFSET 21 ft RT | | ALIGNMENT -Y11REV2- | | | | | | | | | |
| COLLAR ELEV. 941.9 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 579,470 | | EASTING 1,255,880 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/14/16 | | COMP. DATE 07/14/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 945 | | | | | | | | | | | | | | | |
| | 940.9 | 1.0 | 5 | 6 | 8 | | | | | | | | | 941.9 | 0.0 |
| 940 | 938.4 | 3.5 | 5 | 7 | 9 | | | | | | | | M | RESIDUAL Stiff to Very Stiff, Red, Silty CLAY (A-7-5) | |
| | 935.9 | 6.0 | 4 | 4 | 5 | | | | | | | | M | | |
| 935 | 933.4 | 8.5 | 5 | 3 | 4 | | | | | | | | M | Medium Stiff to Very Stiff, Red-Brown, Fine Sandy SILT (A-4) | |
| | 928.4 | 13.5 | 4 | 7 | 5 | | | | | | | | M | | |
| 930 | 923.4 | 18.5 | 5 | 5 | 7 | | | | | | | | M | | |
| | 918.4 | 23.5 | 6 | 6 | 6 | | | | | | | | M | Medium Dense, Red-Brown, Silty Fine SAND (A-2-4) | 22.0 |
| 925 | 913.4 | 28.5 | 6 | 4 | 7 | | | | | | | | M | Stiff to Very Stiff, Red-Brown, Fine Sandy SILT (A-4), with trace mica | 27.0 |
| | 908.4 | 33.5 | 6 | 10 | 10 | | | | | | | | M | | |
| 920 | 903.4 | 38.5 | 5 | 5 | 7 | | | | | | | | M | | |
| | | | | | | | | | | | | | | 901.9 | 40.0 |
| Boring Terminated at Elevation 901.9 ft In Residual SILT (A-4) | | | | | | | | | | | | | | | |
| 1) Approximately 0.3 ft. of topsoil was encountered at the ground surface. | | | | | | | | | | | | | | | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | |
|---|-----------------|---------------------|------------|--------------------------|--------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|---|------|
| SITE DESCRIPTION Site 6: End Bent 2 MSE Wall on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. RW-3 | | STATION 21+28 | | OFFSET 52 ft LT | | ALIGNMENT -Y13- | | | | | | | | | |
| COLLAR ELEV. 928.4 ft | | TOTAL DEPTH 30.2 ft | | NORTHING 579,375 | | EASTING 1,256,404 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/11/16 | | COMP. DATE 07/11/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 930 | | | | | | | | | | | | | | | |
| | 927.4 | 1.0 | 2 | 3 | 7 | | | | | | | | M | GROUND SURFACE | 0.0 |
| 925 | 924.9 | 3.5 | 10 | 8 | 6 | | | | | | | | M | RESIDUAL Loose to Medium Dense, Red, Silty Fine SAND (A-2-4) | |
| | 922.4 | 6.0 | 8 | 12 | 15 | | | | | | | | M | Very Stiff, Red, Fine Sandy, Silty CLAY (A-7-5) | 5.5 |
| 920 | 919.9 | 8.5 | 10 | 13 | 10 | | | | | | | | M | Medium Dense, Red-Yellow, Silty Fine SAND (A-2-4) | 8.0 |
| | 914.9 | 13.5 | 35 | 11 | 11 | | | | | | | | M | | |
| 915 | 909.9 | 18.5 | 36 | 34 | 66/0.4 | | | | | | | | M | | |
| | 904.9 | 23.5 | 100/0.5 | | | | | | | | | | | 909.4 | 19.0 |
| 910 | 900.9 | 28.5 | | | | | | | | | | | | | |
| | 899.9 | 28.5 | 34 | 66/0.1 | | | | | | | | | | 900.9 | |
| 905 | 898.3 | 30.1 | | | | | | | | | | | | 898.3 | 30.1 |
| | | | | | | | | | | | | | | 898.2 | 30.2 |
| WEATHERED ROCK Brown-Orange (BIOTITE GNEISS) | | | | | | | | | | | | | | | |
| CRYSTALLINE ROCK (BIOTITE GNEISS) | | | | | | | | | | | | | | | |
| Boring Terminated with Standard Penetration Test Refusal at Elevation 898.2 ft In Crystalline Rock (BIOTITE GNEISS) | | | | | | | | | | | | | | | |
| 1) Approximately 0.1 ft. of topsoil was encountered at the ground surface. | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT_GDT 8/10/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST Stickney, J. K. | | | | | | | | | | | |
|---|-----------------|---------------------|------------|--------------------------------|-------|---------------------------|-----------------|----|----|-------|-----------|-----|-----|---------------------------|------------|---|--|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB2-A (LL) | | STATION 22+12 | | OFFSET 51 ft LT | | ALIGNMENT -Y13- | | | | | | | | | | | |
| COLLAR ELEV. 935.8 ft | | TOTAL DEPTH 45.8 ft | | NORTHING 579,355 | | EASTING 1,256,322 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | | | DRILL METHOD NW Casing w/ Core | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER Smith, C.L. | | START DATE 11/12/15 | | COMP. DATE 11/12/15 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | ELEV. (ft) | DEPTH (ft) | | |
| 940 | | | | | | | | | | | | | | | | | |
| 935 | | | | | | | | | | | | | | | 935.8 | GROUND SURFACE 0.0 | |
| 930 | 931.6 | 4.2 | 3 | 6 | 8 | 14 | | | | | | | M | | 927.8 | RESIDUAL RED-TAN-BROWN STIFF MOIST SILTY SANDY CLAY (A-7) 8.0 | |
| 925 | 926.6 | 9.2 | 67 | 30 | 31 | 61 | | | | | | | M | | 921.1 | RESIDUAL TAN-BROWN-WHITE HARD MOIST CLAYEY SILTY SAND (A-2) 14.7 | |
| 920 | 921.6 | 14.2 | 25 | 75/3 | | | | | | 100/8 | | | | | 914.8 | WEATHERED ROCK SEVERELY WEATHERED BIOTITE GNEISS 21.0 | |
| 915 | 916.6 | 19.2 | 100/2 | | | | | | | 100/2 | | | | | | 21.0 | CRYSTALLINE ROCK BROWN-GRAY-WHITE BANDED BIOTITE GNEISS |
| 910 | | | | | | | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | | | |
| 900 | | | | | | | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | | | |
| 890 | | | | | | | | | | | | | | | 890.0 | Boring Terminated at Elevation 890.0 ft In Crystalline Rock (Biotite Gneiss) 45.8 | |

NCDOT BORE DOUBLE R2707C_BORELOGS.BY_NCDOT.GPJ NC_DOT.GDT 8/10/16

GEOTECHNICAL BORING REPORT

CORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST Stickney, J. K. | | | | | |
|---|---------------|---------------------|----------|--------------------------------|-------------|---------------------------|-----------------|------------|-------|---|------------|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. EB2-A (LL) | | STATION 22+12 | | OFFSET 51 ft LT | | ALIGNMENT -Y13- | | | | | |
| COLLAR ELEV. 935.8 ft | | TOTAL DEPTH 45.8 ft | | NORTHING 579,355 | | EASTING 1,256,322 | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | | | DRILL METHOD NW Casing w/ Core | | HAMMER TYPE Automatic | | | | | |
| DRILLER Smith, C.L. | | START DATE 11/12/15 | | COMP. DATE 11/12/15 | | SURFACE WATER DEPTH N/A | | | | | |
| CORE SIZE NW | | TOTAL RUN 23.8 ft | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | L O G | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (ft) % | RQD (ft) % | REC. (ft) % | RQD (ft) % | | | |
| 914.8 | 914.8 | 21.0 | 3.8 | | (2.7) 71% | (0.0) 0% | (21.8) 88% | (17.2) 69% | | Begin Coring @ 21.0 ft | 21.0 |
| | 911.0 | 24.8 | 5.0 | 1:18/1.0 | (4.4) 88% | (3.1) 62% | | | | CRYSTALLINE ROCK BROWN-GRAY-WHITE BANDED, SEVERELY WEATHERED TO FRESH, MODERATELY HARD TO HARD BIOTITE GNEISS WITH VERY CLOSE TO WIDE FRACTURE SPACING R1=12, R2=17, R3=15, R4=20, R5=7, RMR=71 ROCK TYPE E | |
| 910 | | | | | | | | | | | |
| | 906.0 | 29.8 | 5.0 | 1:26/1.0 | (5.0) 100% | (4.4) 88% | | | | | |
| 905 | | | | | | | | | | | |
| | 901.0 | 34.8 | 5.0 | 1:42/1.0 | (4.8) 96% | (4.8) 96% | | | | | |
| | 896.0 | 39.8 | 5.0 | 1:48/1.0 | (4.9) 98% | (4.9) 98% | | | | | |
| 895 | | | | | | | | | | | |
| | 891.0 | 44.8 | | | | | | | | | |
| 890 | | | | | | | | | | Boring Terminated at Elevation 890.0 ft In Crystalline Rock (Biotite Gneiss) | 45.8 |

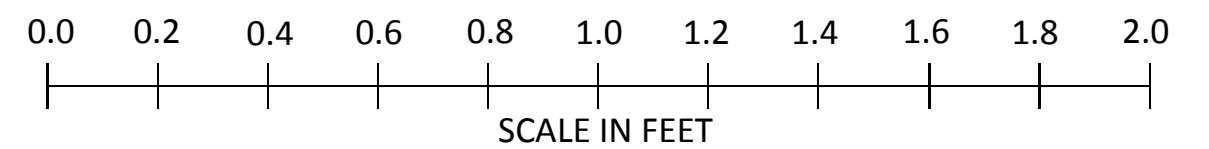
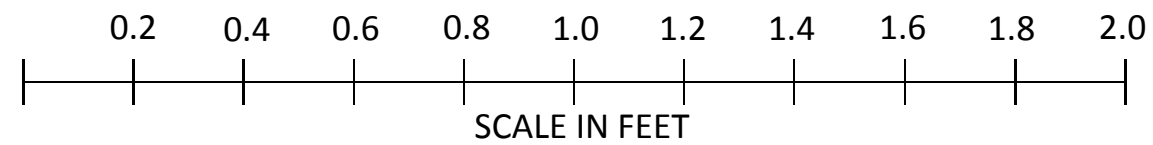
NCDOT CORE DOUBLE R2707C_BORELOGS_BY_NCDOT.GPJ NC_DOT.GDT 8/10/16



MSE Retaining Wall 2 (-Y13-)
WBS - 34497.1.2 TIP No. - R-2707C
ECS Carolinas Project No. 08:11717-A

Rock Core Photographs: Boring - EB2-A (LL) — Station: 22+12 Offset: 51' LT

*Core Photos Provided By NCDOT



GEOTECHNICAL BORING REPORT

BORE LOG

| | | | |
|---|---------------------|--------------------------------|---------------------------|
| WBS 34497.1.2 | TIP R-2707C | COUNTY CLEVELAND | GEOLOGIST Stickney, J. K. |
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | GROUND WTR (ft) |
| BORING NO. EB2-B (LL) | STATION 23+12 | OFFSET 53 ft LT | ALIGNMENT -Y13- |
| COLLAR ELEV. 936.8 ft | TOTAL DEPTH 44.8 ft | NORTHING 579,329 | EASTING 1,256,226 |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | DRILL METHOD NW Casing w/ Core | HAMMER TYPE Automatic |
| DRILLER Smith, C.L. | START DATE 11/10/15 | COMP. DATE 11/10/15 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|--|--------------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 940 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 936.8 | 0.0 |
| | | | | | | | | | | | | | | RESIDUAL RED-BROWN STIFF MOIST SILTY SANDY CLAY (A-7) WITH SOME MICA | |
| 935 | | | | | | | | | | | | | | | |
| | 932.6 | 4.2 | | 2 | 5 | 10 | | | | | | | M | 928.8 | 8.0 |
| 930 | | | | | | | | | | | | | | | |
| | 927.6 | 9.2 | | 7 | 9 | 10 | | | | | | | M | RESIDUAL RED-TAN-YELLOW VERY STIFF MOIST CLAYEY SILTY SAND (A-2) | |
| 925 | | | | | | | | | | | | | | | |
| | 922.6 | 14.2 | | 2 | 7 | 19 | | | | | | | M | | |
| 920 | | | | | | | | | | | | | | | |
| | 917.6 | 19.2 | | | | 100/3 | | | | | | | M | 917.6 916.8 | 19.2 20.0 |
| 915 | | | | | | | | | | | | | | WEATHERED ROCK SEVERELY WEATHERED BIOTITE GNEISS | |
| | | | | | | | | | | | | | | CRYSTALLINE ROCK WHITE-BLACK-BROWN BANDED BIOTITE GNEISS WITH ZONES OF GRANITE | |
| 910 | | | | | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | |
| 900 | | | | | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 892.0 | 44.8 |
| | | | | | | | | | | | | | | Boring Terminated at Elevation 892.0 ft In Crystalline Rock (Biotite Gneiss) | |

NCDOT BORE DOUBLE R2707C_BORELOGS_BY_NCDOT.GPJ NC_DOT.GDT 8/10/16

GEOTECHNICAL BORING REPORT CORE LOG

| | | | |
|---|---------------------|--------------------------------|---------------------------|
| WBS 34497.1.2 | TIP R-2707C | COUNTY CLEVELAND | GEOLOGIST Stickney, J. K. |
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | GROUND WTR (ft) |
| BORING NO. EB2-B (LL) | STATION 23+12 | OFFSET 53 ft LT | ALIGNMENT -Y13- |
| COLLAR ELEV. 936.8 ft | TOTAL DEPTH 44.8 ft | NORTHING 579,329 | EASTING 1,256,226 |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | DRILL METHOD NW Casing w/ Core | HAMMER TYPE Automatic |
| DRILLER Smith, C.L. | START DATE 11/10/15 | COMP. DATE 11/10/15 | SURFACE WATER DEPTH N/A |
| CORE SIZE NW | | TOTAL RUN 24.8 ft | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
|-----------|---------------|------------|----------|---------------------|---------------|---------------|-----------|---------------|---------------|-------|--|--|
| | | | | | REC. (ft) % | RQD (ft) % | | REC. (ft) % | RQD (ft) % | | | |
| 916.8 | | | | | | | | | | | Begin Coring @ 20.0 ft | |
| 915 | 916.8 | 20.0 | 4.8 | 1:48/1.0 | (4.6) 96% | (3.2) 67% | | (23.4) 94% | (21.6) 87% | 916.8 | 20.0 | |
| | 912.0 | 24.8 | | | | | | | | | WHITE-BLACK-BROWN BANDED, SLIGHTLY WEATHERED TO FRESH, HARD BIOTITE GNEISS WITH ZONES OF GRANITE, AND VERY CLOSE TO WIDE FRACTURE SPACING R1=15, R2=17, R3=20, R4=20, R5=7, RMR=79 ROCK TYPE E | |
| 910 | | | 5.0 | 1:43/1.0 | (5.0) 100% | (5.0) 100% | | | | | | |
| | 907.0 | 29.8 | | | | | | | | | | |
| 905 | | | 5.0 | 2:00/1.0 | (5.0) 100% | (5.0) 100% | | | | | | |
| | 902.0 | 34.8 | | | | | | | | | | |
| 900 | | | 5.0 | 1:51/1.0 | (4.6) 92% | (4.6) 92% | | | | | | |
| | 897.0 | 39.8 | | | | | | | | | | |
| 895 | | | 5.0 | 1:55/1.0 | (4.2) 84% | (3.8) 76% | | | | | | |
| | 892.0 | 44.8 | | | | | | | | 892.0 | 44.8 | Boring Terminated at Elevation 892.0 ft In Crystalline Rock (Biotite Gneiss) |

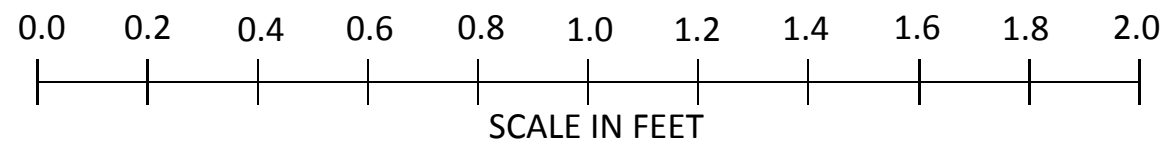
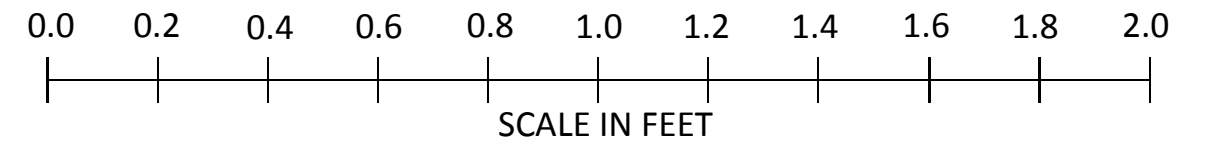
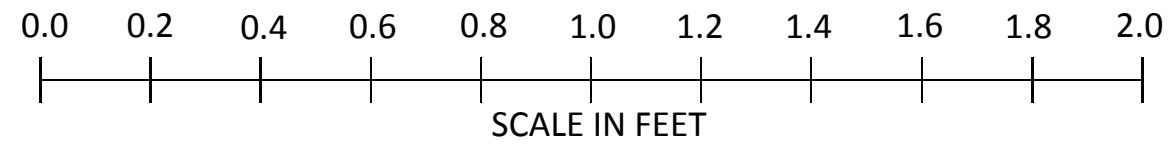
NCDOT CORE DOUBLE R2707C_BORELOGS_BY_NCDOT.GPJ NC_DOT.GDT 8/10/16



MSE Retaining Wall 2 (-Y13-)
WBS - 34497.1.2 TIP No. - R-2707C
ECS Carolinas Project No. 08:11717-A

Rock Core Photographs: Boring - EB2-B (LL) — Station: 23+12 Offset: 53' LT

*Core Photos Provided By NCDOT



GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|----------------|--|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. EB2-A (RL) | | STATION 23+49 | | OFFSET 60 ft LT | | ALIGNMENT -Y13- | | | | | | | | | |
| COLLAR ELEV. 941.0 ft | | TOTAL DEPTH 26.9 ft | | NORTHING 579,313 | | EASTING 1,256,192 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | | DRILL METHOD H.S. Augers | | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER J. Messick | | START DATE 07/11/16 | | COMP. DATE 07/11/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 945 | | | | | | | | | | | | | | | |
| 940 | 940.0 | 1.0 | 2 | 3 | 2 | | | | | | | | | 941.0 | GROUND SURFACE 0.0 |
| | 937.5 | 3.5 | 4 | 4 | 4 | | | | | | | | | | ARTIFICIAL FILL Medium Stiff, Red, Fine Sandy SILT (A-4), with trace gravel |
| 935 | 935.0 | 6.0 | 6 | 7 | 12 | | | | | | | | | 935.5 | RESIDUAL Very Stiff, Red, Silty CLAY (A-7-5(25)) 5.5 |
| | 932.5 | 8.5 | 7 | 9 | 11 | | | | | | | | | | |
| 930 | 927.5 | 13.5 | 10 | 12 | 14 | | | | | | | | | 929.0 | 12.0 Medium Dense to Dense, Red-Brown-White, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments |
| 925 | 922.5 | 18.5 | 7 | 12 | 11 | | | | | | | | | | |
| 920 | 917.5 | 23.5 | 10 | 18 | 30 | | | | | | | | | | |
| 915 | 914.1 | 26.9 | | | | | | | | | | | | 915.0 914.1 | 26.0 26.9 WEATHERED ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 914.1 ft On Crystalline Rock (BIOTITE GNEISS) 1) Approximately 0.2 ft. of topsoil was encountered at the ground surface. |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST Stickney, J. K. | | | | | | | | | |
|---|-----------------|---------------------|------------------------------------|---------------------|-------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|-------|--|
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. EB2-B (RL) | | STATION 24+12 | | OFFSET 51 ft LT | | ALIGNMENT -Y13- | | | | | | | | | |
| COLLAR ELEV. 941.6 ft | | TOTAL DEPTH 45.1 ft | | NORTHING 579,305 | | EASTING 1,256,129 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | | DRILL METHOD NW Casing w/ Advancer | | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER Smith, C.L. | | START DATE 11/04/15 | | COMP. DATE 11/04/15 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 945 | | | | | | | | | | | | | | | |
| 940 | | | | | | | | | | | | | | 941.6 | GROUND SURFACE 0.0 |
| | 937.1 | 4.5 | 7 | 14 | 19 | | | | | | | | | | RESIDUAL RED-BROWN HARD MOIST SILTY SANDY CLAY (A-7) |
| 935 | 935.0 | 6.0 | 6 | 7 | 12 | | | | | | | | | 933.6 | 8.0 RESIDUAL RED-BROWN LOOSE TO DENSE MOIST CLAYEY SILTY SAND (A-2) WITH SOME MICA |
| | 932.1 | 9.5 | 5 | 11 | 14 | | | | | | | | | | |
| 930 | 927.1 | 14.5 | 3 | 4 | 6 | | | | | | | | | | |
| 925 | 922.1 | 19.5 | 5 | 7 | 27 | | | | | | | | | | |
| 920 | 917.1 | 24.5 | 14 | 17 | 17 | | | | | | | | | | |
| 915 | 912.1 | 29.5 | 16 | 6 | 7 | | | | | | | | | | |
| 910 | | | | | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | |
| 900 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 909.0 | 32.6 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK (BIOTITE GNEISS) |
| | | | | | | | | | | | | | | 906.7 | 34.9 CRYSTALLINE ROCK GRAY-BLACK-WHITE BIOTITE GNEISS |
| | | | | | | | | | | | | | | 896.5 | 45.1 Boring Terminated at Elevation 896.5 ft In Crystalline Rock (Biotite Gneiss) |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT.GDT 8/10/16

GEOTECHNICAL BORING REPORT CORE LOG

| | | | |
|---|---------------------|------------------------------------|---------------------------|
| WBS 34497.1.2 | TIP R-2707C | COUNTY CLEVELAND | GEOLOGIST Stickney, J. K. |
| SITE DESCRIPTION Site 6: Dual Bridges on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | GROUND WTR (ft) |
| BORING NO. EB2-B (RL) | STATION 24+12 | OFFSET 51 ft LT | ALIGNMENT -Y13- |
| COLLAR ELEV. 941.6 ft | TOTAL DEPTH 45.1 ft | NORTHING 579,305 | EASTING 1,256,129 |
| DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014 | | DRILL METHOD NW Casing w/ Advancer | HAMMER TYPE Automatic |
| DRILLER Smith, C.L. | START DATE 11/04/15 | COMP. DATE 11/04/15 | SURFACE WATER DEPTH N/A |

| CORE SIZE NW | | | | TOTAL RUN 10.2 ft | | | | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
|--|---------------|------------|----------|---------------------|-----------------|----------------|-----------|--------------------|-------------------|-----|-------------------------|------------|
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | | | |
| 906.7 | | | | | | | | | | | | |
| | 906.7 | 34.9 | 0.2 | | (0.2) | (0.0) | | (9.5) | (8.2) | | 906.7 | 34.9 |
| 905 | 906.5 | 35.1 | 5.0 | | 100% | 0% | | 93% | 80% | | | |
| | 901.5 | 40.1 | | | (4.9) | (3.8) | | | | | | |
| 900 | | | 5.0 | | 98% | 76% | | | | | | |
| | 896.5 | 45.1 | | | (4.4) | (4.4) | | | | | 896.5 | 45.1 |
| Boring Terminated at Elevation 896.5 ft In Crystalline Rock (Biotite Gneiss) | | | | | | | | | | | | |

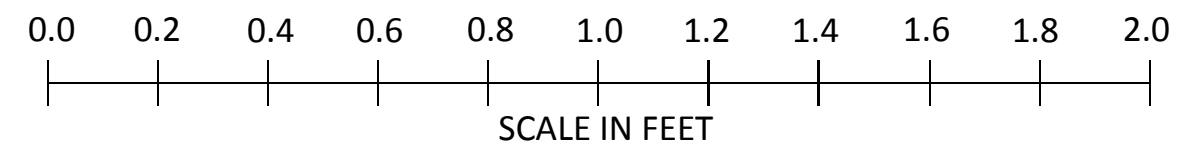
NCDOT CORE DOUBLE R2707C_BORELOGS_BY_NCDOT.GPJ NC_DOT.GDT 8/10/16



MSE Retaining Wall 2 (-Y13-)
WBS - 34497.1.2 TIP No. - R-2707C
ECS Carolinas Project No. 08:11717-A

Rock Core Photographs: Boring - EB2-B (RL) — Station: 24+12 Offset: 51' LT

*Core Photos Provided By NCDOT



GEOTECHNICAL BORING REPORT

BORE LOG

| | | | |
|--|---------------------|--------------------------|-------------------------|
| WBS 34497.1.2 | TIP R-2707C | COUNTY CLEVELAND | GEOLOGIST M. Brewer |
| SITE DESCRIPTION Site 6: End Bent 2 MSE Wall on -L- (US 74) over -Y11REV2- (NC 180) & -Y13- (CSX RR) | | | GROUND WTR (ft) |
| BORING NO. RW-4 | STATION 25+25 | OFFSET 53 ft LT | ALIGNMENT -Y13- |
| COLLAR ELEV. 944.4 ft | TOTAL DEPTH 40.0 ft | NORTHING 579,277 | EASTING 1,256,020 |
| DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D50 87% 11/07/2015 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. Messick | START DATE 07/11/16 | COMP. DATE 07/11/16 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | | | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|------------|--|------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | ELEV. (ft) | DEPTH (ft) | | |
| 945 | | | | | | | | | | | | | | | 944.4 | GROUND SURFACE | 0.0 |
| | 943.4 | 1.0 | 4 | 5 | 5 | | | | | | | | | | 942.9 | ROADWAY EMBANKMENT | 1.5 |
| | 940.9 | 3.5 | 8 | 11 | 15 | | | | | | | | | | 940.4 | Loose, Tan-Brown, Silty Fine SAND (A-2-4), with trace roots | 4.0 |
| 940 | 938.4 | 6.0 | 5 | 7 | 7 | | | | | | | | | | 936.4 | Very Stiff, Red-Orange-Brown, Fine Sandy, Silty CLAY (A-7-6(11)) | 8.0 |
| | 935.9 | 8.5 | 4 | 5 | 5 | | | | | | | | | | | RESIDUAL | |
| 935 | 930.9 | 13.5 | 4 | 2 | 3 | | | | | | | | | | 932.4 | Stiff, Red-Brown-White, Fine Sandy SILT (A-4), with trace mica | 12.0 |
| | 925.9 | 18.5 | 15 | 19 | 13 | | | | | | | | | | 930.0 | Medium Stiff, Tan-Brown-Orange, Fine Sandy, Silty, CLAY (A-7-6(11)), with trace mica | 14.4 |
| 930 | 920.9 | 23.5 | 8 | 8 | 10 | | | | | | | | | | 922.4 | Loose to Dense, White-Orange-Brown, Silty Fine To Coarse SAND (A-2-4), with trace gravel-sized rock fragments and trace mica | 22.0 |
| | 915.9 | 28.5 | 5 | 7 | 8 | | | | | | | | | | | | |
| 925 | 910.9 | 33.5 | 11 | 8 | 9 | | | | | | | | | | | | |
| | 905.9 | 38.5 | 4 | 5 | 12 | | | | | | | | | | | | |
| 920 | | | | | | | | | | | | | | | | | |
| 915 | | | | | | | | | | | | | | | | | |
| 910 | | | | | | | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | 904.4 | Boring Terminated at Elevation 904.4 ft In Residual SILT (A-4) | 40.0 |

NCDOT BORE DOUBLE R-2707C_GEO_DUALBRIDGES_BORELOGS.GPJ NC_DOT.GDT 8/10/16

SOIL TEST RESULTS

| BORING NO. | SAMPLE NO. | OFFSET | STATION -Y11REV2- | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
|------------|------------|--------|-------------------|----------------|---------------|------|------|-------------|---------|------|------|--------------------|------|------|------------|-----------|
| | | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| EB1-A (LL) | SS-160 | 29' RT | 27+71 | 58.5 - 60.0' | A-4(0) | 34 | 6 | 26.2 | 37.7 | 26.5 | 9.7 | 99.0 | 83.0 | 45.0 | 27.9 | - |
| EB1-B (LL) | SS-170 | 29' RT | 28+49 | 28.5 - 30.0' | A-5(5) | 48 | 8 | 16.3 | 33.4 | 41.1 | 9.2 | 99.0 | 91.0 | 59.0 | 36.7 | - |
| RW-1 | SS-137 | 20' RT | 26+84 | 3.5 - 5.0' | A-7-5(28) | 69 | 33 | 9.5 | 19.4 | 13.3 | 57.8 | 100.0 | 95.0 | 75.0 | 21.8 | - |
| RW-1 | SS-145 | 20' RT | 26+84 | 33.5 - 35.0' | A-5(5) | 43 | 9 | 21.2 | 22.4 | 41.5 | 14.9 | 99.0 | 86.0 | 62.0 | 40.1 | - |
| BORING NO. | SAMPLE NO. | OFFSET | STATION -Y13- | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
| | | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| EB2-A (RL) | SS-60 | 60' LT | 23+49 | 6.0 - 7.5' | A-7-5(25) | 68 | 29 | 10.5 | 18.2 | 13.1 | 58.3 | 99.0 | 93.0 | 75.0 | 25.7 | - |
| RW-3 | SS-514 | 52' LT | 21+28 | 6.0 - 7.5' | A-7-5(30) | 72 | 33 | 8.2 | 17.2 | 14.3 | 60.3 | 99.0 | 94.0 | 78.0 | 23.4 | - |
| RW-4 | SS-500 | 53' LT | 25+25 | 1.5 - 2.5' | A-7-6(15) | 48 | 24 | 11.9 | 24.3 | 11.8 | 51.9 | 98.0 | 92.0 | 67.0 | 18.0 | - |
| RW-4 | SS-505 | 53' LT | 25+25 | 13.5 - 14.4' | A-7-6(11) | 45 | 16 | 10.9 | 23.8 | 24.6 | 40.6 | 98.0 | 93.0 | 70.0 | 26.5 | - |

LAB TECHNICIAN: AMANDA R. ROTH

NCDOT CERTIFICATION NO. 112-09-1003

SIGNATURE:  _____

REFERENCE: R-2707C

PROJECT: 34497

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | R-2707C | 1 | 12 |

CONTENTS

| SHEET NO. | DESCRIPTION |
|-----------|-------------------------|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4-5 | PROFILES |
| 6-II | BORE LOGS |
| 12 | LABORATORY TEST RESULTS |

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CLEVELAND
PROJECT DESCRIPTION US 74 SHELBY BYPASS FROM
EAST OF NC 226 TO EAST OF NC 150

SITE DESCRIPTION MSE RETAINING WALLS AT
DUAL BRIDGES NO. 474 AND 475 ON -L- (US 74)
OVER -Y14- (NC 150)

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 1919 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES 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 SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL 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 OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE 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 GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION 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 NECESSARY 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 CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
- 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.
 - 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

HPC

C. BUKOVITZ

M. BREWER

INVESTIGATED BY ECS CAROLINAS, LLP

DRAWN BY M. BREWER, P.E.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS CAROLINAS, LLP

DATE SEPTEMBER 2016



DocuSigned by:
D. Matthew Brewer

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10/4/2016

SIGNATURE

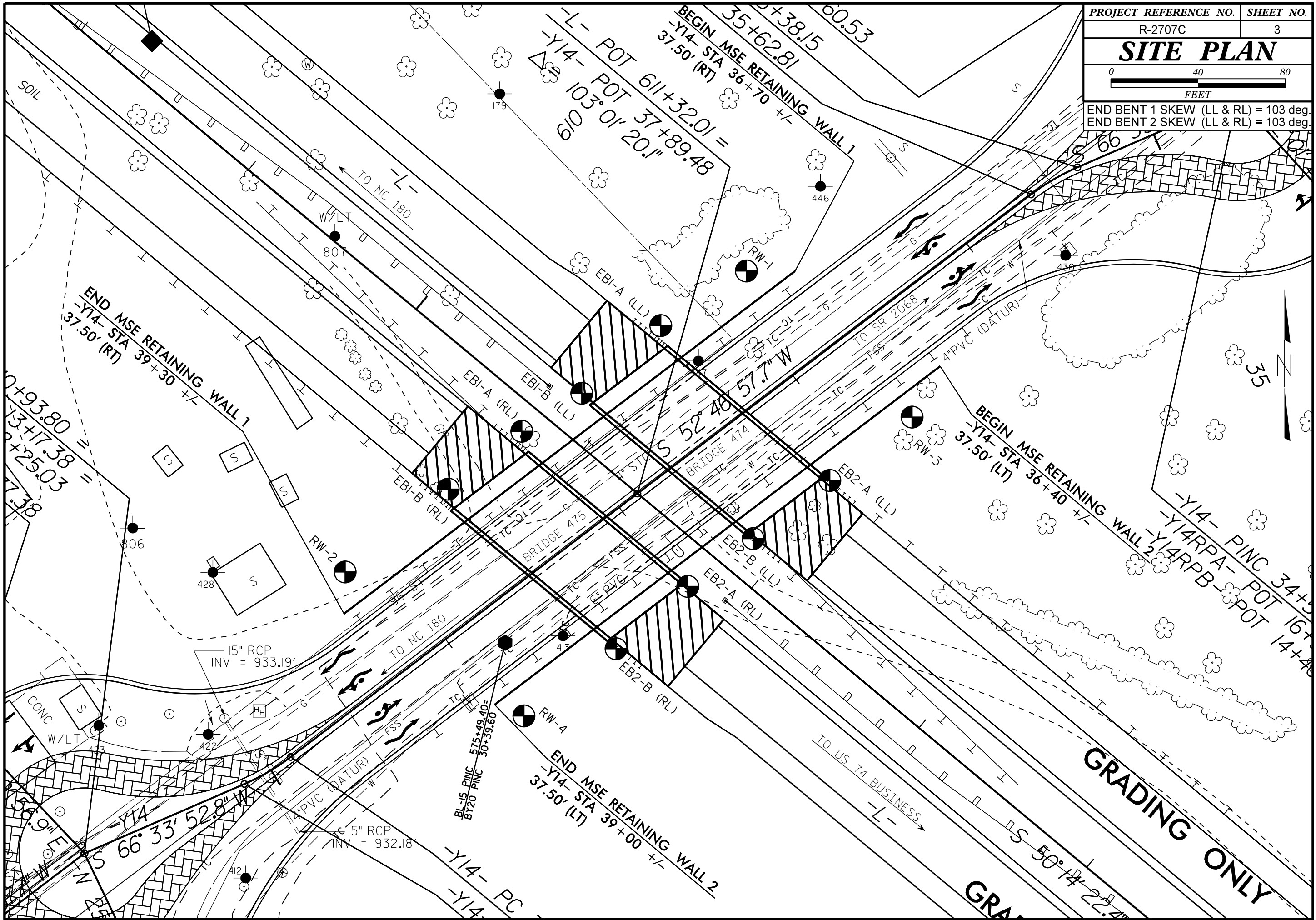
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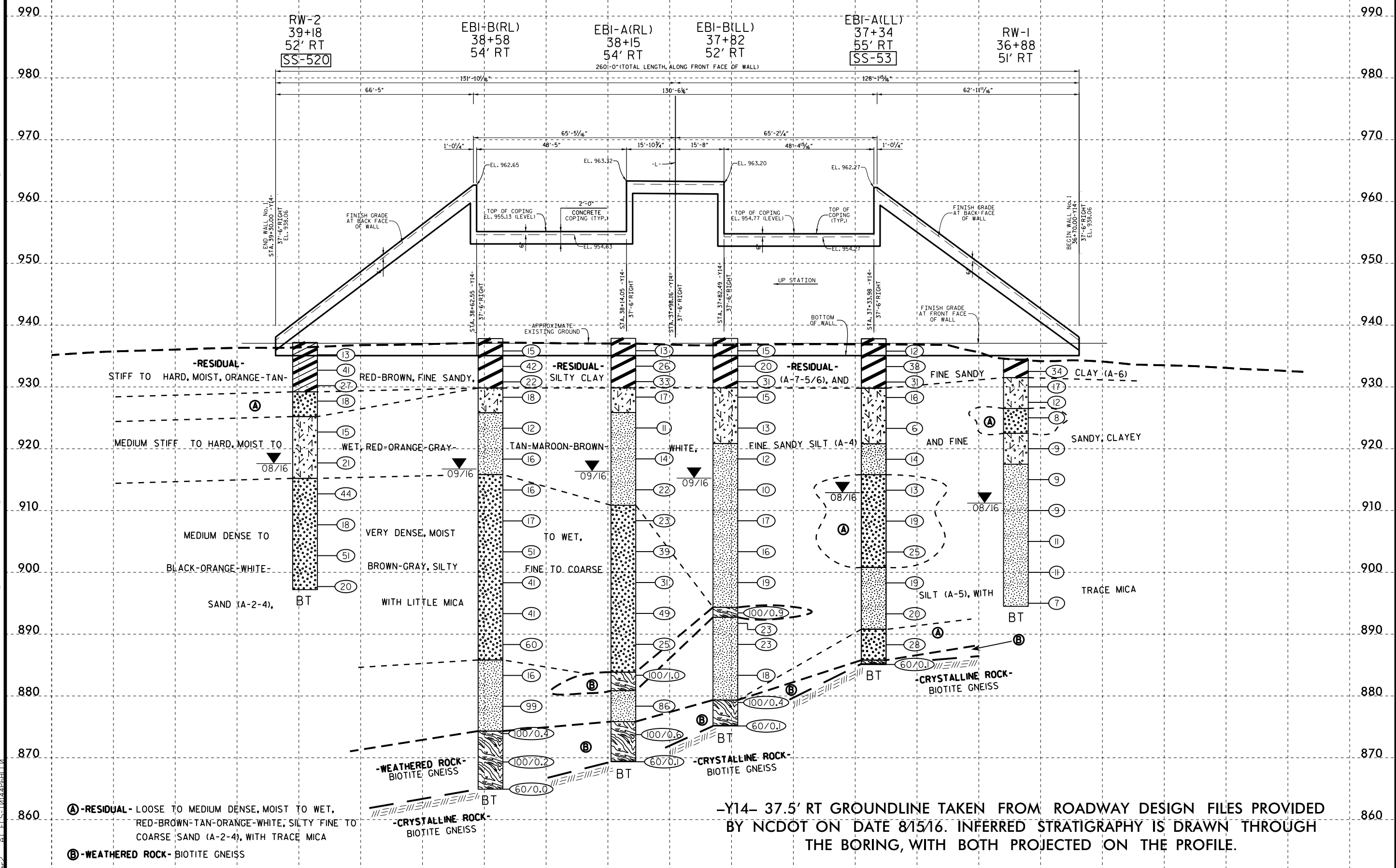
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

| SOIL DESCRIPTION | | | | | | | | | | GRADATION | | | | | | | | | | ROCK DESCRIPTION | | | | | | | | | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i> | | | | | | | | | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. 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. | | | | | | | | | | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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 IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: | | | | | | | | | | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. 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. ARTESIAN - 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. 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. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - 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. 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 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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 TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | | | | | | | | | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | ANGULARITY OF GRAINS | | | | | | | | | | WEATHERED ROCK (WR) | | | | | | | | | | NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. | | | | | | | | | | | | | | | | | | | |
| MINERALOGICAL COMPOSITION | | | | | | | | | | CRYSTALLINE ROCK (CR) | | | | | | | | | | FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. | | | | | | | | | | NON-CRYSTALLINE ROCK (NCR) | | | | | | | | | | FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. | | | | | | | | | |
| COMPRESSION | | | | | | | | | | COASTAL PLAIN SEDIMENTARY ROCK (CP) | | | | | | | | | | COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. | | | | | | | | | | WEATHERING | | | | | | | | | | | | | | | | | | | |
| PERCENTAGE OF MATERIAL | | | | | | | | | | FRESH | | | | | | | | | | ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. | | | | | | | | | | VERY SLIGHT (V SLI) | | | | | | | | | | ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. | | | | | | | | | |
| GROUND WATER | | | | | | | | | | SLIGHT (SLI) | | | | | | | | | | ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. | | | | | | | | | | MODERATE (MOD.) | | | | | | | | | | SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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 WITH FRESH ROCK. | | | | | | | | | |
| MISCELLANEOUS SYMBOLS | | | | | | | | | | MODERATELY SEVERE (MOD. SEV.) | | | | | | | | | | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 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. IF TESTED, WOULD YIELD SPT REFUSAL | | | | | | | | | | SEVERE (SEV.) | | | | | | | | | | ALL ROCK 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 EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF | | | | | | | | | |
| RECOMMENDATION SYMBOLS | | | | | | | | | | VERY SEVERE (V SEV.) | | | | | | | | | | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF | | | | | | | | | | 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 ALSO AN EXAMPLE. | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | | | | | | | | | ROCK HARDNESS | | | | | | | | | | VERY HARD | | | | | | | | | | CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. | | | | | | | | | | | | | | | | | | | |
| CONSISTENCY OR DENSENESS | | | | | | | | | | HARD | | | | | | | | | | CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. | | | | | | | | | | MODERATELY HARD | | | | | | | | | | CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. | | | | | | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | | | | | | | | MEDIUM HARD | | | | | | | | | | CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. | | | | | | | | | | SOFT | | | | | | | | | | CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. | | | | | | | | | |
| PLASTICITY | | | | | | | | | | VERY SOFT | | | | | | | | | | CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL. | | | | | | | | | | FRACTURE SPACING | | | | | | | | | | BEDDING | | | | | | | | | |
| EQUIPMENT USED ON SUBJECT PROJECT | | | | | | | | | | VERY CLOSE | | | | | | | | | | MORE THAN 10 FEET | | | | | | | | | | VERY THICKLY BEDDED | | | | | | | | | | 4 FEET | | | | | | | | | |
| PLASTICITY | | | | | | | | | | MODERATELY CLOSE | | | | | | | | | | 3 TO 10 FEET | | | | | | | | | | THICKLY BEDDED | | | | | | | | | | 1.5 - 4 FEET | | | | | | | | | |
| COLOR | | | | | | | | | | CLOSE | | | | | | | | | | 1 TO 3 FEET | | | | | | | | | | THINLY BEDDED | | | | | | | | | | 0.16 - 1.5 FEET | | | | | | | | | |
| INDURATION | | | | | | | | | | VERY CLOSE | | | | | | | | | | LESS THAN 0.16 FEET | | | | | | | | | | VERY THINLY BEDDED | | | | | | | | | | 0.03 - 0.16 FEET | | | | | | | | | |
| INDURATION | | | | | | | | | | INDURATED | | | | | | | | | | DIFFICULT TO BREAK WITH HAMMER. | | | | | | | | | | THICKLY LAMINATED | | | | | | | | | | 0.008 - 0.03 FEET | | | | | | | | | |
| INDURATION | | | | | | | | | | EXTREMELY INDURATED | | | | | | | | | | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | | | | | | THINLY LAMINATED | | | | | | | | | | < 0.008 FEET | | | | | | | | | |
| INDURATION | | | | | | | | | | INDURATED | | | | | | | | | | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. | | | | | | | | | | INDURATED | | | | | | | | | | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. | | | | | | | | | |
| INDURATION | | | | | | | | | | EXTREMELY INDURATED | | | | | | | | | | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | | | | | | EXTREMELY INDURATED | | | | | | | | | | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. | | | | | | | | | |
| INDURATION | | | | | | | | | | EXTREMELY INDURATED | | | | | | | | | | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | | | | | | EXTREMELY INDURATED | | | | | | | | | | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | | | | | |

END BENT 1 SKEW (LL & RL) = 103 deg.
 END BENT 2 SKEW (LL & RL) = 103 deg.



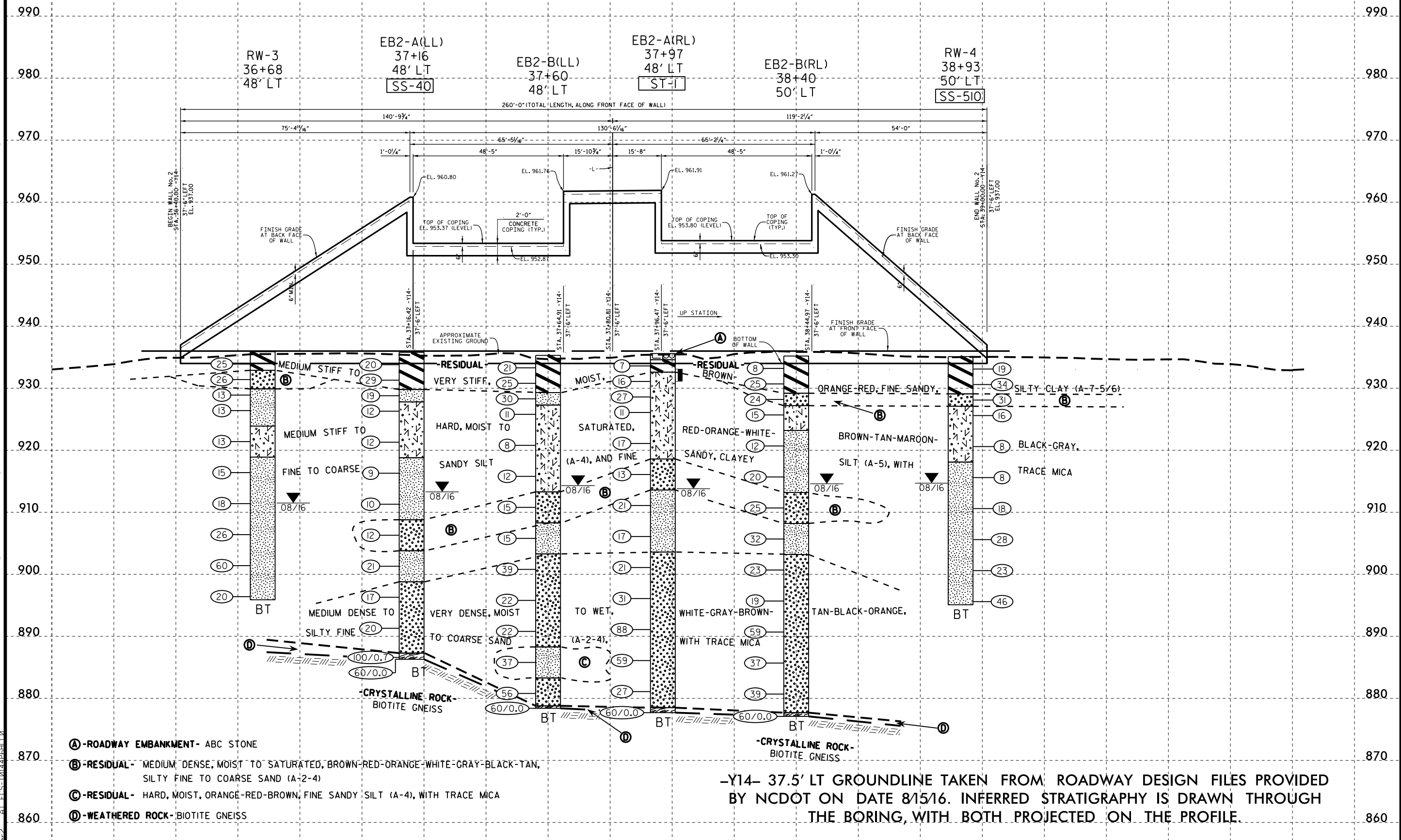
MSE RETAINING WALL 1 -Y14-



-Y14- 37.5' RT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 8/15/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

20-SEP-2016 13:55 PROJECTS\11000-11999\11800\11816-A - R-2707C - Retaining Wall for dual Bridges 474 & 475\CADD\GEO\TECH\Site&Sub\R2707C_GEO_BRD06474&475_RWAL_PFI_4.dgn
 5/14/99

MSE RETAINING WALL 2
-Y14-



- Ⓐ -ROADWAY EMBANKMENT- ABC STONE
- Ⓑ -RESIDUAL- MEDIUM DENSE, MOIST TO SATURATED, BROWN-RED-ORANGE-WHITE-GRAY-BLACK-TAN, SILTY FINE TO COARSE SAND (A-2-4)
- Ⓒ -RESIDUAL- HARD, MOIST, ORANGE-RED-BROWN, FINE SANDY SILT (A-4), WITH TRACE MICA
- Ⓓ -WEATHERED ROCK-BIOTITE GNEISS

-Y14- 37.5' LT GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 8/15/16. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

28-SEP-2016 2:19 PM C:\PROJECTS\11000-11999\11800\11816-A - R-2707C - Retaining Wall for dual Bridges 474 & 475\CADD\GEO\TECH\Site&Sub\R2707C_GEO_BRD06474&475_RWAL_PFI_5.dgn
 5/14/99

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|---------|-------|---------------------------|------------|---|
| SITE DESCRIPTION MSE Wall at Dual Bridge No. 474 and Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. RW-2 | | STATION 39+18 | | OFFSET 52 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 937.2 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 578,383 | | EASTING 1,257,162 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/30/16 | | COMP. DATE 08/30/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG G | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | 937.2 |
| | | | | | | | | | | | | | | | | GROUND SURFACE |
| 935 | 936.2 | 1.0 | 5 | 5 | 8 | | | | | | | | | | | RESIDUAL |
| | 933.7 | 3.5 | 10 | 13 | 28 | | | | | | | | | | | Stiff to Hard, Tan-Orange-Red, Fine Sandy CLAY (A-6(6)). |
| 930 | 931.2 | 6.0 | 6 | 11 | 16 | | | | | | | | | | | |
| | 928.7 | 8.5 | 7 | 7 | 11 | | | | | | | | | | | 8.0 |
| | | | | | | | | | | | | | | | | Medium Dense, Red-Orange-Gray, Silty Fine to Coarse SAND (A-2-4), with trace mica. |
| 925 | 923.7 | 13.5 | 4 | 7 | 8 | | | | | | | | | | | 12.0 |
| | | | | | | | | | | | | | | | | Stiff to Very Stiff, Orange-Gray-Red, Fine Sandy, Clayey SILT (A-5), with trace mica. |
| 920 | 918.7 | 18.5 | 5 | 9 | 12 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 22.0 |
| 915 | 913.7 | 23.5 | 9 | 22 | 22 | | | | | | | | | | | Medium Dense to Very Dense, Brown-Black-Orange-White, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel sized rock fragments. |
| 910 | 908.7 | 28.5 | 4 | 8 | 10 | | | | | | | | | | | |
| 905 | 903.7 | 33.5 | 16 | 24 | 27 | | | | | | | | | | | |
| 900 | 898.7 | 38.5 | 7 | 10 | 10 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 40.0 |
| | | | | | | | | | | | | | | | | Boring Terminated at Elevation 897.2 ft IN RESIDUAL SILTY SAND (A-2-4) |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|---------|-------|---------------------------|------------|---|
| SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B(RL) | | STATION 38+58 | | OFFSET 54 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 937.8 ft | | TOTAL DEPTH 72.9 ft | | NORTHING 578,421 | | EASTING 1,257,209 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/31/16 | | COMP. DATE 08/31/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG G | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | 937.8 |
| | | | | | | | | | | | | | | | | GROUND SURFACE |
| 935 | 936.8 | 1.0 | 6 | 7 | 8 | | | | | | | | | | | RESIDUAL |
| | 934.3 | 3.5 | 14 | 20 | 22 | | | | | | | | | | | Stiff, Red-Brown-Tan, Fine Sandy, Silty CLAY (A-7-5). |
| 930 | 931.8 | 6.0 | 8 | 11 | 11 | | | | | | | | | | | |
| | 929.3 | 8.5 | 7 | 8 | 10 | | | | | | | | | | | 8.0 |
| | | | | | | | | | | | | | | | | Very Stiff, Red-Orange, Fine Sandy, Clayey SILT (A-5), with trace mica. |
| 925 | 924.3 | 13.5 | 5 | 6 | 6 | | | | | | | | | | | 12.0 |
| | | | | | | | | | | | | | | | | Stiff to Very Stiff, Red-Gray-Orange-Brown, Fine Sandy SILT (A-4), with trace mica. |
| 920 | 919.3 | 18.5 | 5 | 7 | 9 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 22.0 |
| 915 | 914.3 | 23.5 | 7 | 9 | 7 | | | | | | | | | | | Medium Dense to Very Dense, Orange-White-Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with little mica. |
| 910 | 909.3 | 28.5 | 6 | 8 | 9 | | | | | | | | | | | |
| 905 | 904.3 | 33.5 | 13 | 18 | 33 | | | | | | | | | | | |
| 900 | 899.3 | 38.5 | 4 | 13 | 28 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 895 | 894.3 | 43.5 | 11 | 16 | 25 | | | | | | | | | | | |
| 890 | 889.3 | 48.5 | 11 | 22 | 38 | | | | | | | | | | | |
| 885 | 884.3 | 53.5 | 8 | 7 | 9 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 52.0 |
| 880 | 879.3 | 58.5 | 8 | 41 | 58 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 875 | 874.3 | 63.5 | 100/0.4 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 870 | 869.5 | 68.3 | 100/0.2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 865 | 864.9 | 72.9 | 60/0.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 72.9 |
| | | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 864.9 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS) |

NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT.GDT 9/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|-------|----------------|-----|
| SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB1-A(RL) | | STATION 38+15 | | OFFSET 54 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | | |
| COLLAR ELEV. 937.9 ft | | TOTAL DEPTH 68.5 ft | | NORTHING 578,447 | | EASTING 1,257,243 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/31/16 | | COMP. DATE 08/31/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 940 | | | | | | | | | | | | | | | 937.9 | GROUND SURFACE | 0.0 |
| | 936.9 | 1.0 | 6 | 7 | 6 | | | | | | | | | | | | |
| 935 | 934.4 | 3.5 | 7 | 11 | 15 | | | | | | | | | | | | |
| | 931.9 | 6.0 | 10 | 15 | 18 | | | | | | | | | | | | |
| 930 | 929.4 | 8.5 | 6 | 8 | 9 | | | | | | | | | | | | |
| | 924.4 | 13.5 | 5 | 4 | 7 | | | | | | | | | | | | |
| 925 | 924.4 | 13.5 | 5 | 4 | 7 | | | | | | | | | | | | |
| 920 | 919.4 | 18.5 | 5 | 6 | 8 | | | | | | | | | | | | |
| | 914.4 | 23.5 | 6 | 8 | 14 | | | | | | | | | | | | |
| 915 | 914.4 | 23.5 | 6 | 8 | 14 | | | | | | | | | | | | |
| 910 | 909.4 | 28.5 | 7 | 11 | 12 | | | | | | | | | | | | |
| | 904.4 | 33.5 | 13 | 16 | 23 | | | | | | | | | | | | |
| 905 | 904.4 | 33.5 | 13 | 16 | 23 | | | | | | | | | | | | |
| 900 | 899.4 | 38.5 | 11 | 11 | 20 | | | | | | | | | | | | |
| | 894.4 | 43.5 | 11 | 20 | 29 | | | | | | | | | | | | |
| 895 | 894.4 | 43.5 | 11 | 20 | 29 | | | | | | | | | | | | |
| 890 | 889.4 | 48.5 | 30 | 15 | 10 | | | | | | | | | | | | |
| | 884.4 | 53.5 | 7 | 10 | 90/0.5 | | | | | | | | | | | | |
| 885 | 884.4 | 53.5 | 7 | 10 | 90/0.5 | | | | | | | | | | | | |
| 880 | 879.4 | 58.5 | 27 | 39 | 47 | | | | | | | | | | | | |
| | 874.4 | 63.5 | 69 | 31/0.1 | | | | | | | | | | | | | |
| 875 | 874.4 | 63.5 | 69 | 31/0.1 | | | | | | | | | | | | | |
| 870 | 869.5 | 68.4 | 60/0.1 | | | | | | | | | | | | | | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST C. Bukovitz | | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|-------|----------------|-----|
| SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. EB1-B(LL) | | STATION 37+82 | | OFFSET 52 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | | |
| COLLAR ELEV. 937.9 ft | | TOTAL DEPTH 62.7 ft | | NORTHING 578,465 | | EASTING 1,257,271 | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/31/16 | | COMP. DATE 08/31/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 940 | | | | | | | | | | | | | | | 937.9 | GROUND SURFACE | 0.0 |
| | 936.9 | 1.0 | 4 | 6 | 9 | | | | | | | | | | | | |
| 935 | 934.4 | 3.5 | 7 | 9 | 11 | | | | | | | | | | | | |
| | 931.9 | 6.0 | 9 | 13 | 18 | | | | | | | | | | | | |
| 930 | 929.4 | 8.5 | 6 | 7 | 8 | | | | | | | | | | | | |
| | 924.4 | 13.5 | 4 | 5 | 8 | | | | | | | | | | | | |
| 925 | 924.4 | 13.5 | 4 | 5 | 8 | | | | | | | | | | | | |
| 920 | 919.4 | 18.5 | 6 | 6 | 6 | | | | | | | | | | | | |
| | 914.4 | 23.5 | 4 | 6 | 4 | | | | | | | | | | | | |
| 915 | 914.4 | 23.5 | 4 | 6 | 4 | | | | | | | | | | | | |
| 910 | 909.4 | 28.5 | 8 | 10 | 7 | | | | | | | | | | | | |
| | 904.4 | 33.5 | 4 | 7 | 9 | | | | | | | | | | | | |
| 905 | 904.4 | 33.5 | 4 | 7 | 9 | | | | | | | | | | | | |
| 900 | 899.4 | 38.5 | 7 | 8 | 11 | | | | | | | | | | | | |
| | 894.4 | 43.5 | 38 | 62/0.4 | | | | | | | | | | | | | |
| 895 | 892.8 | 45.1 | 18 | 15 | 8 | | | | | | | | | | | | |
| 890 | 889.4 | 48.5 | 12 | 11 | 12 | | | | | | | | | | | | |
| | 884.4 | 53.5 | 4 | 6 | 12 | | | | | | | | | | | | |
| 885 | 884.4 | 53.5 | 4 | 6 | 12 | | | | | | | | | | | | |
| 880 | 879.4 | 58.5 | 100/0.4 | | | | | | | | | | | | | | |
| | 875.3 | 62.6 | 60/0.1 | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT.GDT 9/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|-----|---------------------------|------------|---|
| SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A(LL) | | STATION 37+34 | | OFFSET 55 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 937.8 ft | | TOTAL DEPTH 52.7 ft | | NORTHING 578,496 | | EASTING 1,257,307 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/30/16 | | COMP. DATE 08/30/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | |
| | 936.8 | 1.0 | 5 | 6 | 6 | | | | | | | | | | 937.8 | GROUND SURFACE |
| 935 | 934.3 | 3.5 | 7 | 14 | 24 | | | | | | | | | | | RESIDUAL Stiff to Hard, Tan-Red-Orange, Fine Sandy, Silty CLAY (A-7-6(10)). |
| | 931.8 | 6.0 | 7 | 13 | 18 | | | | | | | | | | | |
| 930 | 929.3 | 8.5 | 5 | 8 | 8 | | | | | | | | | | | Very Stiff to Medium Stiff, Red-Orange-Gray-Maroon, Fine Sandy, Clayey SILT (A-5), with trace mica. |
| | 924.3 | 13.5 | 3 | 3 | 3 | | | | | | | | | | | |
| 925 | 919.3 | 18.5 | 3 | 7 | 7 | | | | | | | | | | | Stiff, Tan-Orange, Fine Sandy SILT (A-4), with trace mica. |
| 920 | 914.3 | 23.5 | 4 | 6 | 7 | | | | | | | | | | | Medium Dense, Brown-Tan-Orange-White, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments and mica. |
| 915 | 909.3 | 28.5 | 4 | 9 | 10 | | | | | | | | | | | |
| 910 | 904.3 | 33.5 | 7 | 10 | 15 | | | | | | | | | | | |
| 905 | 899.3 | 38.5 | 7 | 7 | 12 | | | | | | | | | | | Very Stiff, Orange-Tan, Fine Sandy SILT (A-4), with trace mica. |
| 900 | 894.3 | 43.5 | 4 | 9 | 11 | | | | | | | | | | | |
| 895 | 889.3 | 48.5 | 8 | 10 | 18 | | | | | | | | | | | Medium Dense, White-Brown-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica. |
| 890 | 885.2 | 52.6 | | | | | | | | | | | | | | WEATHERED ROCK (BIOTITE GNEISS) CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 885.1 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS) |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|-----|---------------------------|------------|---|
| SITE DESCRIPTION MSE Wall at Dual Bridge No. 474 and Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. RW-1 | | STATION 36+88 | | OFFSET 51 ft RT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 934.5 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 578,521 | | EASTING 1,257,346 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/30/16 | | COMP. DATE 08/30/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 935 | | | | | | | | | | | | | | | | |
| | 933.5 | 1.0 | 9 | 15 | 19 | | | | | | | | | | 934.5 | GROUND SURFACE |
| 930 | 931.0 | 3.5 | 6 | 7 | 10 | | | | | | | | | | | RESIDUAL Hard, Red-Orange, Fine Sandy, Silty CLAY (A-7-5), with trace mica. |
| | 928.5 | 6.0 | 4 | 6 | 6 | | | | | | | | | | | Very Stiff to Stiff, Red-Orange, Fine Sandy, Clayey SILT (A-5), with trace mica. |
| 925 | 926.0 | 8.5 | 4 | 3 | 5 | | | | | | | | | | | Loose, Red-Brown-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica. |
| | 921.0 | 13.5 | 3 | 4 | 5 | | | | | | | | | | | Stiff, Red-Brown-Orange, Fine to Coarse Sandy, Clayey SILT (A-5). |
| 920 | 916.0 | 18.5 | 3 | 4 | 5 | | | | | | | | | | | Stiff to Medium Stiff, Red-Brown-Orange-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica and clay. |
| 915 | 911.0 | 23.5 | 3 | 4 | 5 | | | | | | | | | | | |
| 910 | 906.0 | 28.5 | 5 | 5 | 6 | | | | | | | | | | | |
| 905 | 901.0 | 33.5 | 3 | 4 | 7 | | | | | | | | | | | |
| 900 | 896.0 | 38.5 | 3 | 3 | 4 | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | | Boring Terminated at Elevation 894.5 ft IN RESIDUAL SANDY SILT (A-4) |

NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT.GDT 9/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION MSE Wall at Dual Bridge No. 474 and Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. RW-3 | | STATION 36+68 | | OFFSET 48 ft LT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 935.9 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 578,454 | | EASTING 1,257,422 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/29/16 | | COMP. DATE 08/29/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | |
| 935 | 934.9 | 1.0 | 8 | 10 | 15 | | | | | | | | | 935.9 | GROUND SURFACE | 0.0 |
| | 932.4 | 3.5 | 8 | 15 | 11 | | | | | | | | | 932.9 | RESIDUAL Very Stiff, Red-Orange, Silty, Fine Sandy CLAY (A-7-5), with trace mica. | 3.0 |
| 930 | 929.9 | 6.0 | 5 | 5 | 8 | | | | | | | | | 929.9 | Medium Dense, Brown-Red-White, Silty Fine to Coarse, SAND (A-2-4), with trace mica. | 6.0 |
| | 927.4 | 8.5 | 8 | 6 | 7 | | | | | | | | | 927.9 | Stiff, Red-Orange-White, Fine to Coarse Sandy SILT (A-4), with trace mica. | 8.0 |
| 925 | | | | | | | | | | | | | | 923.9 | Stiff, Brown-Orange, Fine Sandy, Clayey SILT (A-5). | 12.0 |
| | 922.4 | 13.5 | 4 | 6 | 7 | | | | | | | | | 918.9 | Stiff to Hard, Brown-Orange-White-Black-Tan-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel sized rock fragments. | 17.0 |
| 920 | | | | | | | | | | | | | | | | |
| | 917.4 | 18.5 | 7 | 9 | 6 | | | | | | | | | | | |
| 915 | | | | | | | | | | | | | | | | |
| | 912.4 | 23.5 | 5 | 9 | 9 | | | | | | | | | | | |
| 910 | | | | | | | | | | | | | | | | |
| | 907.4 | 28.5 | 6 | 9 | 17 | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | | |
| | 902.4 | 33.5 | 15 | 25 | 35 | | | | | | | | | | | |
| 900 | | | | | | | | | | | | | | | | |
| | 897.4 | 38.5 | 6 | 8 | 12 | | | | | | | | | 895.9 | Boring Terminated at Elevation 895.9 ft IN RESIDUAL SANDY SILT (A-4) | 40.0 |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A(LL) | | STATION 37+16 | | OFFSET 48 ft LT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 935.8 ft | | TOTAL DEPTH 49.5 ft | | NORTHING 578,425 | | EASTING 1,257,384 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/30/16 | | COMP. DATE 08/30/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | |
| 935 | 934.8 | 1.0 | 5 | 8 | 12 | | | | | | | | | 935.8 | GROUND SURFACE | 0.0 |
| | 932.3 | 3.5 | 10 | 12 | 17 | | | | | | | | | 929.8 | RESIDUAL Very Stiff, Brown-Orange, Fine Sandy, Silty CLAY (A-7-6 (10)). | 6.0 |
| 930 | 929.8 | 6.0 | 6 | 9 | 10 | | | | | | | | | 929.8 | Very Stiff, Red-Brown-Orange, Fine Sandy SILT (A-4). | 6.0 |
| | 927.3 | 8.5 | 5 | 6 | 6 | | | | | | | | | 927.8 | Stiff, Orange-Brown-Tan, Fine Sandy, Clayey SILT (A-5), with trace mica. | 8.0 |
| 925 | | | | | | | | | | | | | | | | |
| | 922.3 | 13.5 | 3 | 5 | 7 | | | | | | | | | | | |
| 920 | | | | | | | | | | | | | | | | |
| | 917.3 | 18.5 | 5 | 4 | 5 | | | | | | | | | 918.8 | Stiff, Orange-White-Gray-Red, Fine to Coarse Sandy SILT (A-4), with trace mica. | 17.0 |
| 915 | | | | | | | | | | | | | | | | |
| | 912.3 | 23.5 | 5 | 5 | 5 | | | | | | | | | | | |
| 910 | | | | | | | | | | | | | | | | |
| | 907.3 | 28.5 | 4 | 6 | 6 | | | | | | | | | 908.8 | Medium Dense, Tan-White-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica. | 27.0 |
| 905 | | | | | | | | | | | | | | 903.8 | Very Stiff, Gray-Orange-Red, Fine Sandy SILT (A-4), with trace mica. | 32.0 |
| | 902.3 | 33.5 | 5 | 9 | 12 | | | | | | | | | 898.8 | Medium Dense, White-Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments and trace mica. | 37.0 |
| 900 | | | | | | | | | | | | | | | | |
| | 897.3 | 38.5 | 5 | 5 | 12 | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | | |
| | 892.3 | 43.5 | 7 | 10 | 10 | | | | | | | | | | | |
| 890 | | | | | | | | | | | | | | | | |
| | 887.3 | 48.5 | 10 | 90/0.2 | | | | | | | | | | 887.3 | WEATHERED ROCK (BIOTITE GNEISS). | 48.5 |
| | 886.3 | 49.5 | 60/0.0 | | | | | | | | | | | 886.3 | Boring Terminated with Standard Penetration Test Refusal at Elevation 886.3 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS) | 49.5 |

NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT_GDT 9/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|---------|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A(RL) | | STATION 37+97 | | OFFSET 48 ft LT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 935.6 ft | | TOTAL DEPTH 57.9 ft | | NORTHING 578,376 | | EASTING 1,257,319 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/29/16 | | COMP. DATE 08/29/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | |
| 935 | 934.6 | 1.0 | 4 | 3 | 4 | | | | | | | | | 935.6 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | 934.6 | ROADWAY EMBANKMENT ABC Stone (1.0') | 1.0 |
| | | | | | | | | | | | | | | 932.6 | RESIDUAL Medium Stiff to Very Stiff, Red-Orange, Fine Sandy, Silty CLAY (A-7-5). | 3.0 |
| 930 | 929.6 | 6.0 | 11 | 12 | 15 | | | | | | | | | | | |
| | 927.1 | 8.5 | 6 | 6 | 5 | | | | | | | | | | | |
| 925 | | | | | | | | | | | | | | | | |
| | 922.1 | 13.5 | 4 | 9 | 8 | | | | | | | | | | | |
| 920 | | | | | | | | | | | | | | | | |
| | 917.1 | 18.5 | 4 | 5 | 8 | | | | | | | | | 918.6 | Medium Dense, Brown-Orange, Silty Fine SAND (A-2-4), with trace mica. | 17.0 |
| 915 | | | | | | | | | | | | | | | | |
| | 912.1 | 23.5 | 6 | 11 | 10 | | | | | | | | | 913.6 | Very Stiff, Brown-Orange-Gray, Fine Sandy SILT (A-4), with trace mica. | 22.0 |
| 910 | | | | | | | | | | | | | | | | |
| | 907.1 | 28.5 | 6 | 8 | 9 | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | | |
| | 902.1 | 33.5 | 6 | 11 | 10 | | | | | | | | | 903.6 | Medium Dense to Very Dense, Gray-White-Orange-Black-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel sized rock fragments. | 32.0 |
| 900 | | | | | | | | | | | | | | | | |
| | 897.1 | 38.5 | 7 | 14 | 17 | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | | |
| | 892.1 | 43.5 | 10 | 29 | 59 | | | | | | | | | | | |
| 890 | | | | | | | | | | | | | | | | |
| | 887.1 | 48.5 | 7 | 20 | 39 | | | | | | | | | | | |
| 885 | | | | | | | | | | | | | | | | |
| | 882.1 | 53.5 | 12 | 13 | 14 | | | | | | | | | | | |
| 880 | | | | | | | | | | | | | | | | |
| | 877.7 | 57.9 | 60/0.0 | | | | | | | | | | | 878.5 | WEATHERED ROCK (BIOTITE GNEISS). | 57.1 |
| | | | | | | | | | | | | | | 877.7 | | 57.9 |
| | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 877.7 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS) | |
| | | | | | | | | | | | | | | | Other Samples: ST-1 (2.5 - 4.5) | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | | |
|--|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|---------|---------------------------|------------|--|------|
| SITE DESCRIPTION Bridge No. 474 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-B(LL) | | STATION 37+60 | | OFFSET 48 ft LT | | ALIGNMENT -Y14- | | | | | | | | | | |
| COLLAR ELEV. 935.3 ft | | TOTAL DEPTH 56.9 ft | | NORTHING 578,398 | | EASTING 1,257,349 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/30/16 | | COMP. DATE 08/30/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 940 | | | | | | | | | | | | | | | | |
| 935 | 934.3 | 1.0 | 8 | 10 | 11 | | | | | | | | | 935.3 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | | | |
| | 931.8 | 3.5 | 10 | 11 | 14 | | | | | | | | | | | |
| 930 | | | | | | | | | | | | | | | | |
| | 929.3 | 6.0 | 7 | 15 | 15 | | | | | | | | | | | |
| | 926.8 | 8.5 | 4 | 4 | 7 | | | | | | | | | | | |
| 925 | | | | | | | | | | | | | | | | |
| | 921.8 | 13.5 | 2 | 3 | 5 | | | | | | | | | | | |
| 920 | | | | | | | | | | | | | | | | |
| | 916.8 | 18.5 | 5 | 6 | 6 | | | | | | | | | | | |
| 915 | | | | | | | | | | | | | | | | |
| | 911.8 | 23.5 | 5 | 4 | 11 | | | | | | | | | | | |
| 910 | | | | | | | | | | | | | | | | |
| | 906.8 | 28.5 | 8 | 7 | 8 | | | | | | | | | | | |
| 905 | | | | | | | | | | | | | | | | |
| | 901.8 | 33.5 | 8 | 19 | 20 | | | | | | | | | | | |
| 900 | | | | | | | | | | | | | | | | |
| | 896.8 | 38.5 | 12 | 7 | 15 | | | | | | | | | | | |
| 895 | | | | | | | | | | | | | | | | |
| | 891.8 | 43.5 | 6 | 10 | 12 | | | | | | | | | | | |
| 890 | | | | | | | | | | | | | | | | |
| | 886.8 | 48.5 | 10 | 14 | 23 | | | | | | | | | | | |
| 885 | | | | | | | | | | | | | | | | |
| | 881.8 | 53.5 | 12 | 31 | 25 | | | | | | | | | | | |
| 880 | | | | | | | | | | | | | | | | |
| | 878.4 | 56.9 | 60/0.0 | | | | | | | | | | | 878.8 | WEATHERED ROCK (BIOTITE GNEISS). | 56.5 |
| | | | | | | | | | | | | | | 878.4 | | 56.9 |
| | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 878.4 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS) | |

NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT.GDT 9/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|
| SITE DESCRIPTION Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. EB2-B(RL) | | STATION 38+40 | | OFFSET 50 ft LT | | ALIGNMENT -Y14- | | | | | | | | | |
| COLLAR ELEV. 935.2 ft | | TOTAL DEPTH 58.1 ft | | NORTHING 578,348 | | EASTING 1,257,286 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/29/16 | | COMP. DATE 08/29/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 940 | | | | | | | | | | | | | | | |
| 935 | 934.2 | 1.0 | 2 | 3 | 5 | | | | | | | | | 935.2 | 0.0 |
| | 931.7 | 3.5 | 8 | 10 | 15 | | | | | | | | | | |
| 930 | 929.2 | 6.0 | 8 | 11 | 13 | | | | | | | | | 929.2 | 6.0 |
| | 926.7 | 8.5 | 6 | 6 | 9 | | | | | | | | | 927.2 | 8.0 |
| 925 | 921.7 | 13.5 | 4 | 6 | 6 | | | | | | | | | 923.2 | 12.0 |
| 920 | 916.7 | 18.5 | 4 | 5 | 15 | | | | | | | | | 913.2 | 22.0 |
| 915 | 911.7 | 23.5 | 12 | 14 | 11 | | | | | | | | | 908.2 | 27.0 |
| 910 | 906.7 | 28.5 | 11 | 15 | 17 | | | | | | | | | 903.2 | 32.0 |
| 905 | 901.7 | 33.5 | 11 | 12 | 11 | | | | | | | | | | |
| 900 | 896.7 | 38.5 | 8 | 11 | 8 | | | | | | | | | | |
| 895 | 891.7 | 43.5 | 8 | 14 | 45 | | | | | | | | | | |
| 890 | 886.7 | 48.5 | 19 | 20 | 17 | | | | | | | | | | |
| 885 | 881.7 | 53.5 | 13 | 15 | 24 | | | | | | | | | | |
| 880 | 877.1 | 58.1 | | | | | | | | | | | | 877.7 | 57.5 |
| | | 60/0.0 | | | | | | | | | | | | 877.1 | 58.1 |
| WEATHERED ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 877.1 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS) | | | | | | | | | | | | | | | |

| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST M. Brewer | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|
| SITE DESCRIPTION MSE Wall at Dual Bridge No. 474 and Bridge No. 475 on -L- (US 74) over -Y14- (NC 150) | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. RW-4 | | STATION 38+93 | | OFFSET 50 ft LT | | ALIGNMENT -Y14- | | | | | | | | | |
| COLLAR ELEV. 935.1 ft | | TOTAL DEPTH 40.0 ft | | NORTHING 578,317 | | EASTING 1,257,244 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Cain | | START DATE 08/29/16 | | COMP. DATE 08/29/16 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 940 | | | | | | | | | | | | | | | |
| 935 | 934.1 | 1.0 | 6 | 9 | 10 | | | | | | | | | 935.1 | 0.0 |
| | 931.6 | 3.5 | 15 | 16 | 18 | | | | | | | | | | |
| 930 | 929.1 | 6.0 | 10 | 15 | 16 | | | | | | | | | 929.1 | 6.0 |
| | 926.6 | 8.5 | 5 | 7 | 9 | | | | | | | | | 927.1 | 8.0 |
| 925 | 921.6 | 13.5 | 4 | 2 | 6 | | | | | | | | | 918.1 | 17.0 |
| 920 | 916.6 | 18.5 | 4 | 4 | 4 | | | | | | | | | | |
| 915 | 911.6 | 23.5 | 7 | 7 | 11 | | | | | | | | | | |
| 910 | 906.6 | 28.5 | 9 | 9 | 19 | | | | | | | | | | |
| 905 | 901.6 | 33.5 | 5 | 7 | 16 | | | | | | | | | | |
| 900 | 896.6 | 38.5 | 7 | 19 | 27 | | | | | | | | | | |
| Boring Terminated at Elevation 895.1 ft IN RESIDUAL SANDY SILT (A-4) | | | | | | | | | | | | | | | |

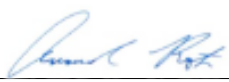
NCDOT BORE DOUBLE R2707C_GEO_BRDG474&475_RWAL_BORINGLOGS.GPJ_NC_DOT_GDT 9/28/16

SOIL TEST RESULTS

| BORING NO. | SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
|------------|------------|--------|---------|----------------|---------------|------|------|-------------|---------|------|------|--------------------|------|------|------------|-----------|
| | | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| EB1-A (LL) | SS-53 | 55' RT | 37+34 | 3.5 - 5.0' | A-7-6 (10) | 46 | 20 | 19.5 | 25.7 | 10.9 | 44.0 | 99.0 | 89.0 | 58.0 | 17.2 | - |
| EB2-A (LL) | SS-40 | 48' LT | 37+16 | 1.0 - 2.5' | A-7-6 (26) | 56 | 32 | 11.1 | 12.2 | 15.0 | 61.7 | 99.0 | 92.0 | 78.0 | 25.9 | - |
| EB2-A (RL) | ST-1 | 48' LT | 37+97 | 3.0 - 3.5' | A-5 (5) | 44 | 8 | 18.9 | 24.3 | 14.6 | 42.1 | 100.0 | 90.0 | 60.0 | 22.6 | - |
| RW-2 | SS-520 | 52' RT | 39+18 | 1.0 - 2.5' | A-6 (6) | 36 | 17 | 19.7 | 30.0 | 13.1 | 37.3 | 100.0 | 90.0 | 55.0 | 13.5 | - |
| RW-4 | SS-510 | 50' LT | 38+93 | 1.0 - 2.5' | A-7-6 (16) | 54 | 27 | 16.4 | 23.8 | 8.9 | 50.9 | 100.0 | 92.0 | 63.0 | 21.4 | - |

LAB TECHNICIAN: AMANDA R. ROTH

NCDOT CERTIFICATION NO. 112-09-1003

SIGNATURE:  _____

REFERENCE: R-2707C

PROJECT: 34497

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CLEVELAND
PROJECT DESCRIPTION US 74 (SHELBY BYP) FROM
WEST OF NC 226 TO WEST OF NC 150

SITE DESCRIPTION CULVERT ON US 74 AT
-L- STA. 553+27 OVER HICKORY CREEK

CONTENTS

| <u>SHEET NO.</u> | <u>DESCRIPTION</u> |
|------------------|------------------------------|
| 1 | TITLE SHEET |
| 2 | LEGEND (SOIL & ROCK) |
| 3 | SITE PLAN |
| 4-5 | BORE LOG(S) & CORE REPORT(S) |

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | R-2707C | 1 | 5 |

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 1919 TOT-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES 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 SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

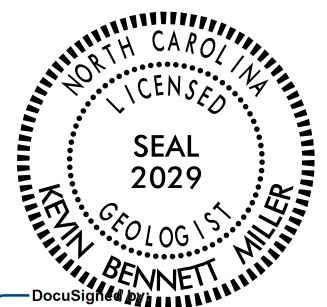
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 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

R. W. TODD
M. L. SMITH

INVESTIGATED BY C. B. LITTLE
DRAWN BY K. B. MILLER
CHECKED BY J. E. BEVERLY
SUBMITTED BY K. B. MILLER
DATE JANUARY 2017



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1/20/2017

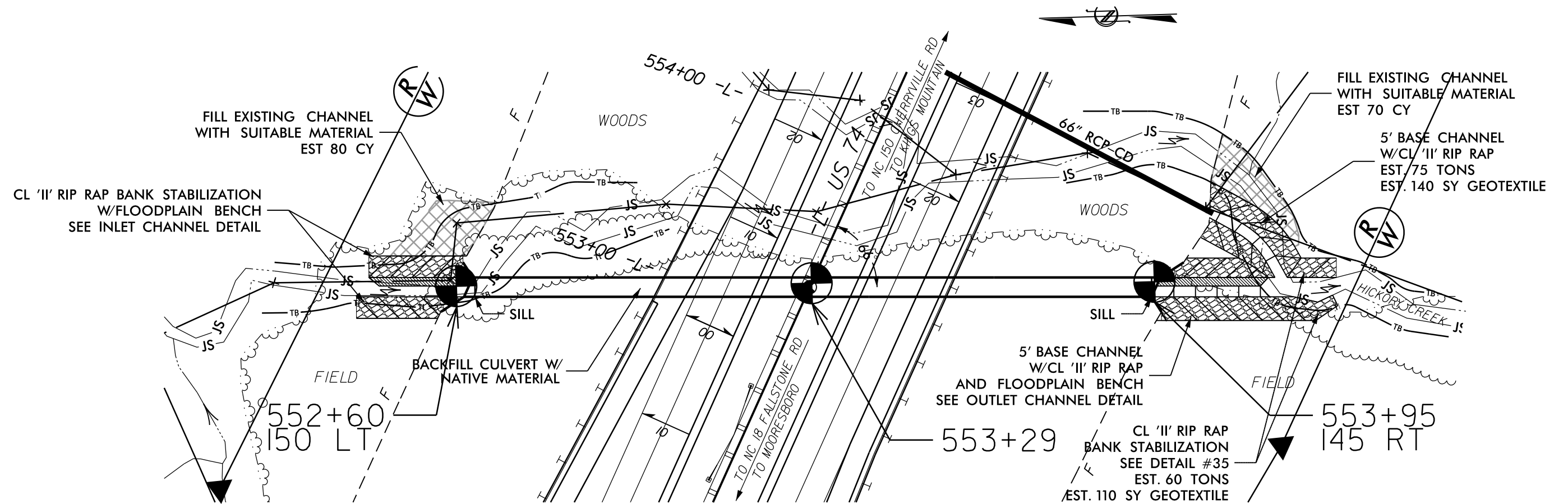
SIGNATURE DATE

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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 | | | | | | | | | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p> | | | | | | | | | | <p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. 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.</p> | | | | | | | | | | <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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 IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> | | | | | | | | | | <p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. 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. ARTESIAN - 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF 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. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. 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. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - 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. 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 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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 TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-7-5</td> <td>A-7-6</td> <td>A-3</td> <td>A-6, A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td>A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td colspan="5"></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td colspan="2">-</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="5">HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="2">0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="3">CLAYEY SOILS</td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="4">UNSUITABLE</td> <td colspan="5"></td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">MISCELLANEOUS SYMBOLS</p> <table border="1"> <tbody> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> <td></td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>MONITORING WELL</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">RECOMMENDATION SYMBOLS</p> <table border="1"> <tbody> <tr> <td></td> <td>UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">ROCK HARDNESS</p> <table border="1"> <tbody> <tr> <td>VERY HARD</td> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. 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CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CSE, SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">ABBREVIATIONS</p> <table border="1"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>W - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>W_d - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * STEEL TEETH</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">INDURATION</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">BENCH MARK:</p> <table border="1"> <thead> <tr> <th>ELEVATION:</th> <th>FEET</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> </td> <td colspan="10"> <p align="center">NOTES:</p> <p>ELEVATIONS EXTRACTED FROM TIN FILE</p> </td> <td colspan="10"></td> </tr> </tbody> </table> | | | | | | | | | | GENERAL CLASS. | GRANULAR MATERIALS (≤ 35% PASSING #200) | | | | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | | | | ORGANIC MATERIALS | | | | | A-1 | A-3 | A-2 | A-4 | A-5 | A-6 | A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | GROUP CLASS. | A-1-a | A-1-b | A-2-4 | A-2-5 | A-2-6 | A-2-7 | A-7-5 | A-7-6 | A-3 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | SYMBOL | | | | | | | | | | | | | | | | | % PASSING #10 #40 #200 | 50 MX 30 MX 15 MX | 50 MX 25 MX 10 MX | 51 MN 35 MX 35 MX | 35 MX 35 MX 35 MX | 35 MX 35 MX 35 MX | 36 MN 36 MN 36 MN | 36 MN 36 MN 36 MN | 36 MN 36 MN 36 MN | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT | | | | | | MATERIAL PASSING #40 LL PI | - | | 40 MX 10 MX | 41 MN 10 MX | 40 MX 11 MN | 41 MN 11 MN | 40 MX 11 MN | 41 MN 11 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | | | | | HIGHLY ORGANIC SOILS | | | | | GROUP INDEX | 0 | | 0 | 0 | 4 MX | 8 MX | 12 MX | 16 MX | NO MX | | | | | | | | | | | USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. GRAVEL, AND SAND | | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | | | SILTY SOILS | | CLAYEY SOILS | | | | | | | | | | | | | GEN. 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VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> | | | | | | | | | | AR - AUGER REFUSAL | MED. - MEDIUM | VST - VANE SHEAR TEST | BT - BORING TERMINATED | MICA - MICACEOUS | WEA. - WEATHERED | CL. - CLAY | MOD. - MODERATELY | W - UNIT WEIGHT | CPT - CONE PENETRATION TEST | NP - NON PLASTIC | W _d - DRY UNIT WEIGHT | CSE. - COARSE | ORG. - ORGANIC | | DMT - DILATOMETER TEST | PMT - PRESSUREMETER TEST | | DPT - DYNAMIC PENETRATION TEST | SAP. - SAPROLITIC | | e - VOID RATIO | SD. - SAND, SANDY | | F - FINE | SL. - SILT, SILTY | | FOSS. - FOSSILIFEROUS | SLI. - SLIGHTLY | | FRAC. - FRACTURED, FRACTURES | TCR - 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MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> | | | | | | | | | | <p align="center">NOTES:</p> <p>ELEVATIONS EXTRACTED FROM TIN FILE</p> | | | | | | | | | | | | | | | | | | | |
| GENERAL CLASS. | GRANULAR MATERIALS (≤ 35% PASSING #200) | | | | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | | | | ORGANIC MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A-1 | A-3 | A-2 | A-4 | A-5 | A-6 | A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GROUP CLASS. | A-1-a | A-1-b | A-2-4 | A-2-5 | A-2-6 | A-2-7 | A-7-5 | A-7-6 | A-3 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | A-1, A-2 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SYMBOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| % PASSING #10 #40 #200 | 50 MX 30 MX 15 MX | 50 MX 25 MX 10 MX | 51 MN 35 MX 35 MX | 35 MX 35 MX 35 MX | 35 MX 35 MX 35 MX | 36 MN 36 MN 36 MN | 36 MN 36 MN 36 MN | 36 MN 36 MN 36 MN | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MATERIAL PASSING #40 LL PI | - | | 40 MX 10 MX | 41 MN 10 MX | 40 MX 11 MN | 41 MN 11 MN | 40 MX 11 MN | 41 MN 11 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | | | | | HIGHLY ORGANIC SOILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GROUP INDEX | 0 | | 0 | 0 | 4 MX | 8 MX | 12 MX | 16 MX | NO MX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. GRAVEL, AND SAND | | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | | | SILTY SOILS | | CLAYEY SOILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GEN. RATING AS SUBGRADE | EXCELLENT TO GOOD | | | | | FAIR TO POOR | | | | | FAIR TO POOR | POOR | UNSUITABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table> | | | | | | | | | | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | < 4 4 TO 10 10 TO 30 30 TO 50 > 50 | N/A | GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | < 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30 | < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 | <p align="center">MISCELLANEOUS SYMBOLS</p> <table border="1"> <tbody> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> <td></td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>MONITORING WELL</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION | | DIP & DIP DIRECTION OF ROCK STRUCTURES | | SLOPE INDICATOR INSTALLATION | | SOIL SYMBOL | | TEST BORING | | CONE PENETROMETER TEST | | ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT | | AUGER BORING | | SOUNDING ROD | | INFERRED SOIL BOUNDARY | | CORE BORING | | TEST BORING WITH CORE | | INFERRED ROCK LINE | | MONITORING WELL | | SPT N-VALUE | | ALLUVIAL SOIL BOUNDARY | | PIEZOMETER INSTALLATION | | | <p align="center">RECOMMENDATION SYMBOLS</p> <table border="1"> <tbody> <tr> <td></td> <td>UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | | UNDERCUT | | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | SHALLOW UNDERCUT | | | | | <p align="center">ROCK HARDNESS</p> <table border="1"> <tbody> <tr> <td>VERY HARD</td> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. 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| <p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CSE, SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | U.S. STD. SIEVE SIZE OPENING (MM) | 4 | 10 | 40 | 60 | 200 | 270 | | 4.76 | 2.00 | 0.42 | 0.25 | 0.075 | 0.053 | BOULDER (BLDR.) | | | | | | | COBBLE (COB.) | | | | | | | GRAVEL (GR.) | | | | | | | COARSE SAND (CSE, SD.) | | | | | | | FINE SAND (F SD.) | | | | | | | SILT (SL.) | | | | | | | CLAY (CL.) | | | | | | | <p align="center">ABBREVIATIONS</p> <table border="1"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>W - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>W_d - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> | | | | | | | | | | AR - AUGER REFUSAL | MED. - MEDIUM | VST - VANE SHEAR TEST | BT - BORING TERMINATED | MICA - MICACEOUS | WEA. - WEATHERED | CL. - CLAY | MOD. - MODERATELY | W - UNIT WEIGHT | CPT - CONE PENETRATION TEST | NP - NON PLASTIC | W _d - DRY UNIT WEIGHT | CSE. - COARSE | ORG. - ORGANIC | | DMT - DILATOMETER TEST | PMT - PRESSUREMETER TEST | | DPT - DYNAMIC PENETRATION TEST | SAP. - SAPROLITIC | | e - VOID RATIO | SD. - SAND, SANDY | | F - FINE | SL. - SILT, SILTY | | FOSS. - FOSSILIFEROUS | SLI. - SLIGHTLY | | FRAC. - FRACTURED, FRACTURES | TCR - TRICONE REFUSAL | | FRAGS. - FRAGMENTS | w - MOISTURE CONTENT | | HI. - HIGHLY | V - VERY | | <p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> | | | | | | | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| CPT - CONE PENETRATION TEST | NP - NON PLASTIC | W _d - DRY UNIT WEIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CSE. - COARSE | ORG. - ORGANIC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DMT - DILATOMETER TEST | PMT - PRESSUREMETER TEST | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| e - VOID RATIO | SD. - SAND, SANDY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F - FINE | SL. - SILT, SILTY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FOSS. - FOSSILIFEROUS | SLI. - SLIGHTLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRAC. - FRACTURED, FRACTURES | TCR - TRICONE REFUSAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| HI. - HIGHLY | V - VERY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> | | | | | | | | | | NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | SLIGHTLY PLASTIC | 0-5 | VERY LOW | MODERATELY PLASTIC | 6-15 | SLIGHT | HIGHLY PLASTIC | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * STEEL TEETH</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | DRILL UNITS: | ADVANCING TOOLS: | HAMMER TYPE: | <input type="checkbox"/> CME-45C | <input type="checkbox"/> CLAY BITS | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL | <input type="checkbox"/> CME-55 | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | CORE SIZE: | <input type="checkbox"/> CME-550 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B <input type="checkbox"/> -H | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> HARD FACED FINGER BITS | <input type="checkbox"/> -N | <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | HAND TOOLS: | <input type="checkbox"/> | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | <input type="checkbox"/> POST HOLE DIGGER | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ * STEEL TEETH | <input type="checkbox"/> HAND AUGER | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ * TUNG-CARB. | <input type="checkbox"/> SOUNDING ROD | <input type="checkbox"/> | <input type="checkbox"/> CORE BIT | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> | | | <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> | | | | | | | | | | TERM | SPACING | VERY WIDE | MORE THAN 10 FEET | WIDE | 3 TO 10 FEET | MODERATELY CLOSE | 1 TO 3 FEET | CLOSE | 0.16 TO 1 FOOT | VERY CLOSE | LESS THAN 0.16 FEET | <p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> | | | | | | | | | | TERM | THICKNESS | VERY THICKLY BEDDED | 4 FEET | THICKLY BEDDED | 1.5 - 4 FEET | THINLY BEDDED | 0.16 - 1.5 FEET | VERY THINLY BEDDED | 0.03 - 0.16 FEET | THICKLY LAMINATED | 0.008 - 0.03 FEET | THINLY LAMINATED | < 0.008 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SLIGHTLY PLASTIC | 0-5 | VERY LOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY PLASTIC | 6-15 | SLIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| VERY WIDE | MORE THAN 10 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| FRIABLE | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY INDURATED | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INDURATED | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EXTREMELY INDURATED | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ELEVATION: | FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> | | | | | | | | | | <p align="center">NOTES:</p> <p>ELEVATIONS EXTRACTED FROM TIN FILE</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

SITE PLAN



| WBS 34497.1.2 | | TIP R-2707C | | COUNTY CLEVELAND | | GEOLOGIST Todd, R. W. | | | | | | | | |
|---|-----------------|---------------------|------------|--------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|--|
| SITE DESCRIPTION CULVERT ON US 74 AT -L- STA. 553+27 OVER HICKORY CREEK | | | | | | | GROUND WTR (ft) | | | | | | | |
| BORING NO. L_553+95R | | STATION 553+95 | | OFFSET 145 ft RT | | ALIGNMENT -L- | | | | | | | | |
| COLLAR ELEV. 868.6 ft | | TOTAL DEPTH 16.2 ft | | NORTHING 581,775 | | EASTING 1,252,693 | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE CME-550 | | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | |
| DRILLER Smith, M. L. | | START DATE 02/09/06 | | COMP. DATE 02/09/06 | | SURFACE WATER DEPTH N/A | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | |
| 870 | 868.6 | 0.0 | | | | | | | | | | | | 868.6 GROUND SURFACE 0.0 |
| 865 | 863.9 | 4.7 | 1 | 2 | 2 | 4 | | | | | | | | 865.6 ALLUVIAL BROWN, SOFT, MOIST, SANDY SILT 3.0 |
| 860 | 858.9 | 9.7 | WOH | WOH | WOH | 0 | | | | | | | | RESIDUAL BROWNISH GRAY, V. LOOSE TO LOOSE, WET TO SAT., V. MICACEOUS, SILTY SAND |
| 855 | 853.9 | 14.7 | 2 | 2 | 2 | 4 | | | | | | | | |
| | | | 2 | 3 | 2 | 5 | | | | | | | | 852.4 Boring Terminated at Elevation 852.4 ft in Residual Silty Sandy 16.2 |