

REFERENCE: BR-0127

PROJECT: 67127

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY Yadkin
SITE DESCRIPTION Bridge No. 189 on SR 1325
(Mountain View Church Rd.) over UT to South Deep Creek

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| 8 | SITE PHOTOGRAPHS) |

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | BR-0127 | 1 | 8 |

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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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PERSONNEL

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C.L. Smith

B.E. Foster

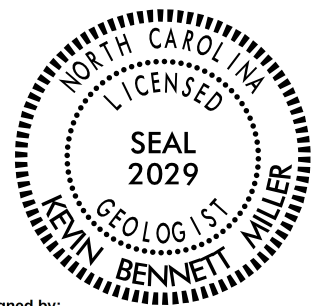
INVESTIGATED BY J.K. Stickney

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CHECKED BY J.E. Beverly

SUBMITTED BY K.B. Miller

DATE December 2019



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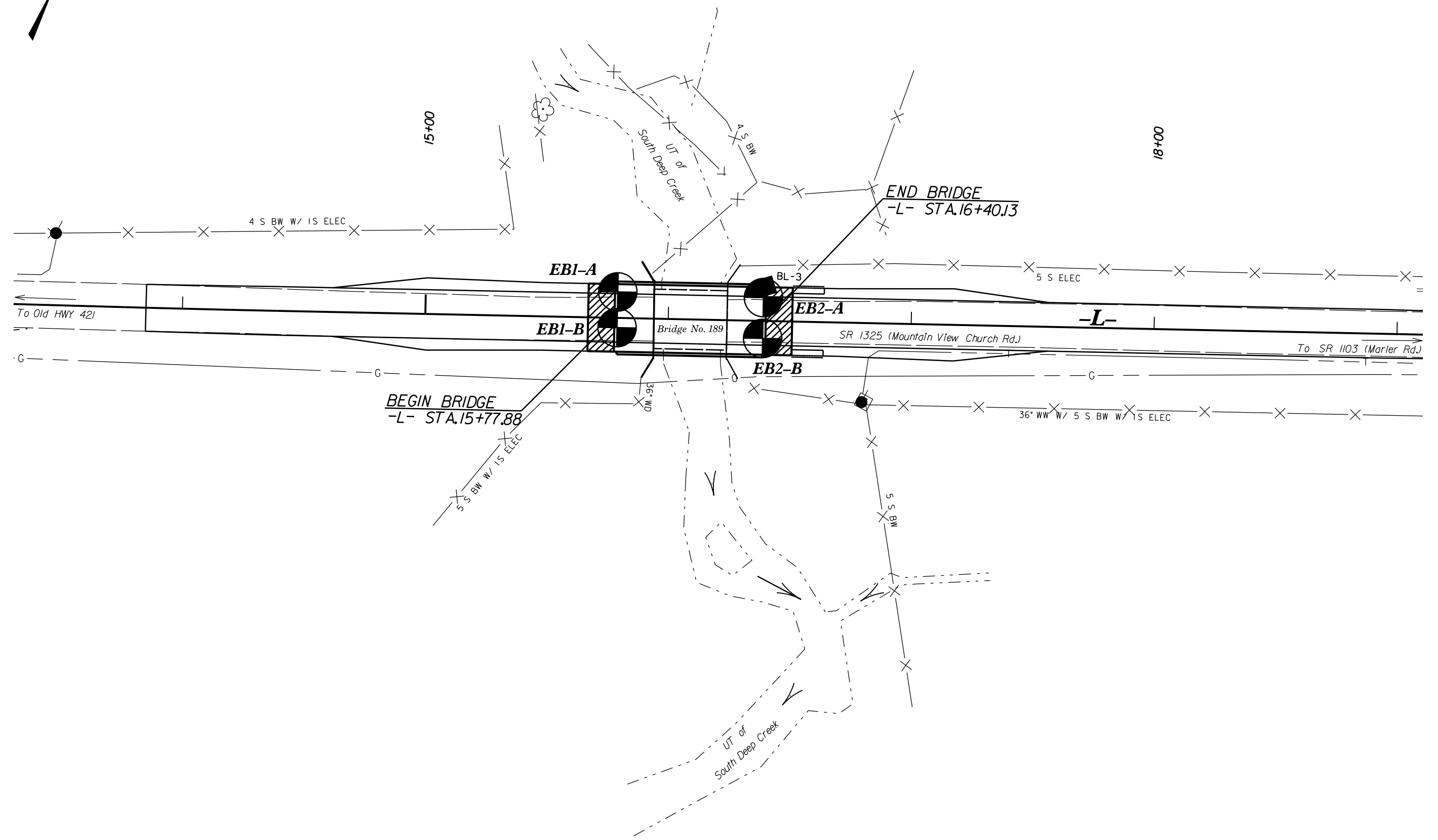
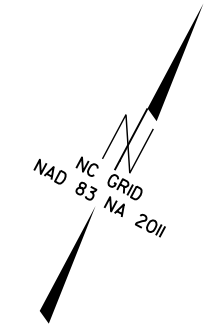
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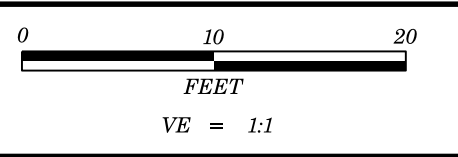
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

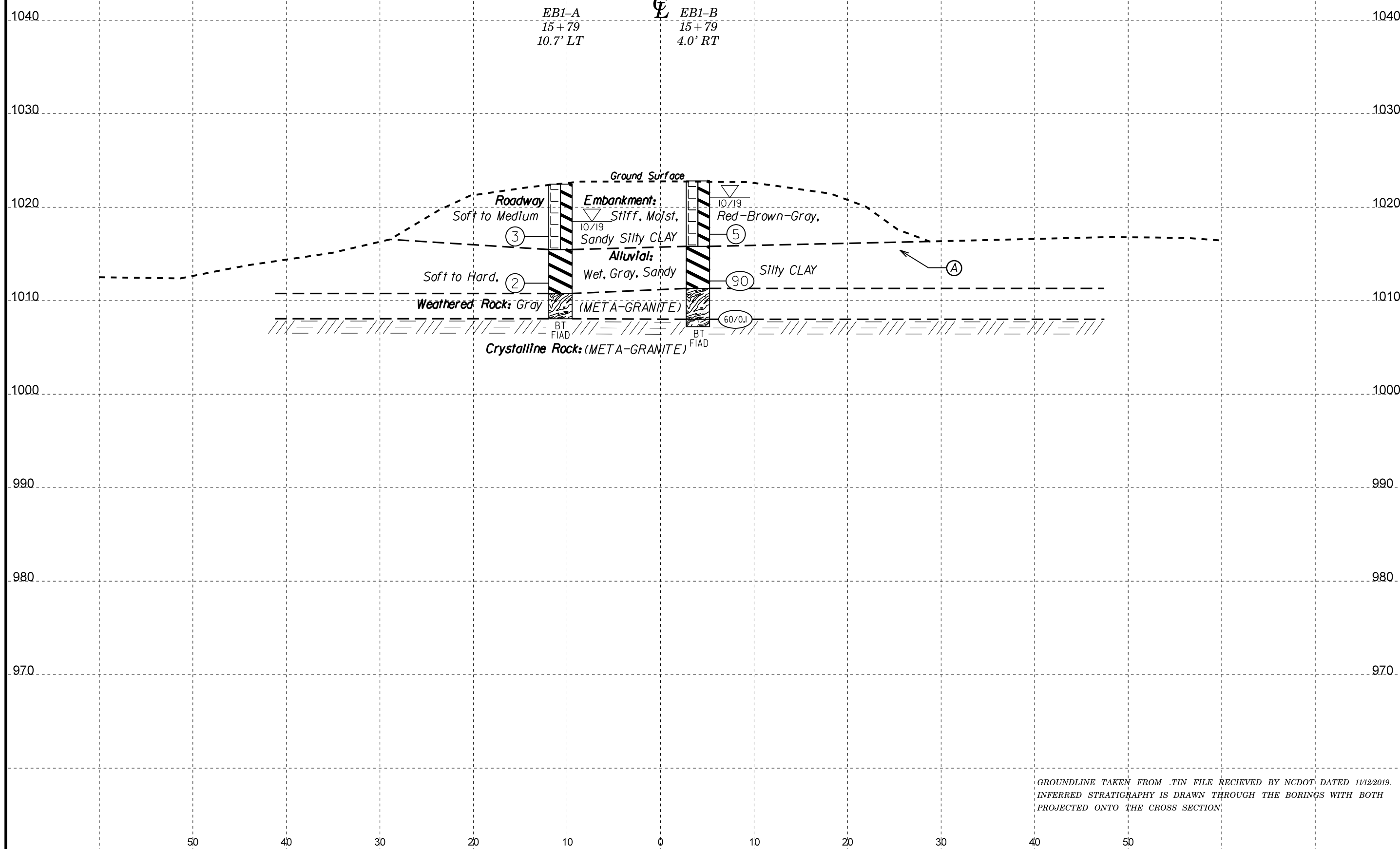
| SOIL DESCRIPTION | GRADATION | ROCK DESCRIPTION | TERMS AND DEFINITIONS |
|--|---|---|--|
| SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD 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 60 BLOWS 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 DISLODGED 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 INTRODUCED 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 IN 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 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 (SRQD) - 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 THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | WEATHERING FRESH VERY SLIGHT (V SLI.) SLIGHT (SLI.) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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 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 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 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. | |
| GROUP CLASS. A-1, A-1-b, A-3, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7 | COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| SYMBOL | PERCENTAGE OF MATERIAL | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| % PASSING #10 #40 #200 | GROUND WATER | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| MATERIAL PASSING #40 LL PL | WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| GROUP INDEX | MISCELLANEOUS SYMBOLS | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| USUAL TYPES OF MAJOR MATERIALS | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| GEN. RATING AS SUBGRADE | DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL TEST BORING WITH CORE SOUNDING ROD SPT N-VALUE | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| PI OF A-7-5 SUBGROUP IS <= LL - 30, PI OF A-7-6 SUBGROUP IS > LL - 30 | RECOMMENDATION SYMBOLS | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| CONSISTENCY OR DENSENESS | UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| PRIMARY SOIL TYPE | ABBREVIATIONS | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| COMPACTNESS OR CONSISTENCY | 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 FRAGS. - FRAGMENTS HL - HIGHLY | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLL. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | VST - VANE SHEAR TEST WEA. - WEATHERED % - UNIT WEIGHT % - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS SS - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| TEXTURE OR GRAIN SIZE | EQUIPMENT USED ON SUBJECT PROJECT | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| U.S. STD. SIEVE SIZE OPENING (MM) | DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST CME-550X | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.) | ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG.-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG.-CARB. CORE BIT | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| SOIL MOISTURE - CORRELATION OF TERMS | ROCK HARDNESS | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| FIELD MOISTURE DESCRIPTION | CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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. 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 FINGERNAIL. | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| GUIDE FOR FIELD MOISTURE DESCRIPTION | FRACTURE SPACING | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| - SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D) | TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.15 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER 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 | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | BEDDING | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| PLASTICITY | INDURATION | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| PLASTICITY INDEX (PI) | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| DRY STRENGTH | | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| NON PLASTIC 0-5 SLIGHTLY PLASTIC 6-15 MODERATELY PLASTIC 16-25 HIGHLY PLASTIC 26 OR MORE | | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| COLOR | | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |
| DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10% | |

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| BR-0127 | 3 |
| SITE PLAN | |
| FEET | |
| SKEW = 90° | |

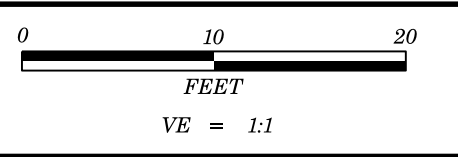




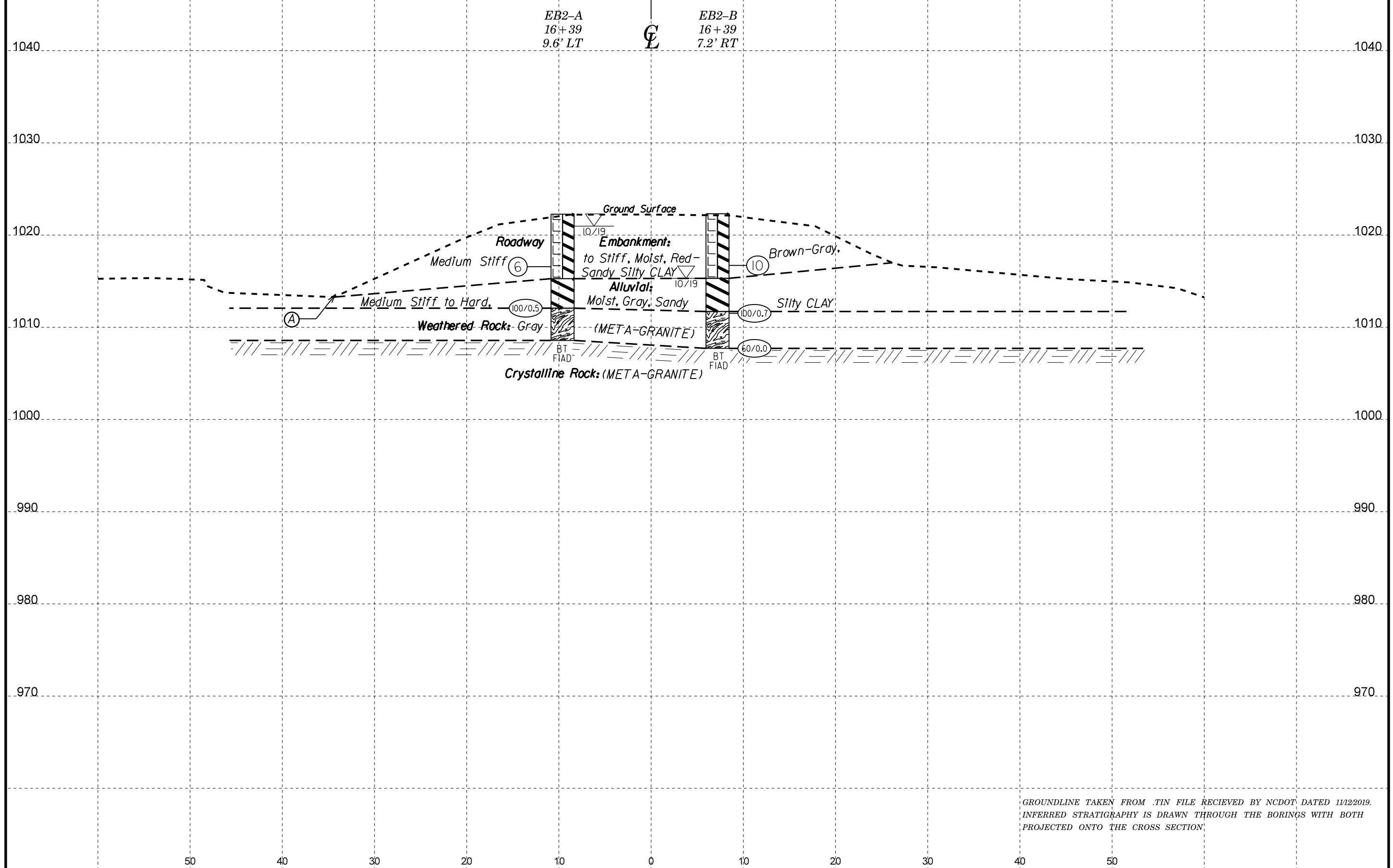
| | |
|---|------------------|
| PROJECT REFERENCE NO. | SHEET NO. |
| BR-0127 | 4 |
| CROSS SECTION THROUGH END BENT 1 | |
| AT -L- STATION 15+77.88 | |
| SKEW=90° | |



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 11/22/2019.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION



| | |
|---|------------------|
| PROJECT REFERENCE NO. | SHEET NO. |
| BR-0127 | 5 |
| CROSS SECTION THROUGH END BENT 2 | |
| AT -L- STATION 16+40.13 | |
| SKEW=90° | |



EB2-A
16+39
9.6' LT

CL

EB2-B
16+39
7.2' RT

1040

1040

1030

1030

1020

1020

1010

1010

1000

1000

990

990

980

980

970

970

50 40 30 20 10 0 10 20 30 40 50

GROUNDLINE TAKEN FROM .TIN FILE RECIEVED BY NCDOT DATED 11/22/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 67127.1.1 | | TIP BR-0127 | | COUNTY YADKIN | | GEOLOGIST Stickney, J. K. | | | | | | | | | | |
|---|-----------------|---------------------|------------|-------------------------------|-------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 189 on SR 1325 (Mountain View Church Rd.) over UT to South Deep Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A | | STATION 15+79 | | OFFSET 11 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 1,022.5 ft | | TOTAL DEPTH 14.4 ft | | NORTHING 877,591 | | EASTING 1,467,935 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFC0070 CME-550X 81% 06/04/2018 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER Smith, C. L. | | START DATE 10/24/19 | | COMP. DATE 10/24/19 | | 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 | | | | | | |
| 1025 | | | | | | | | | | | | | | 1,022.5 | GROUND SURFACE | 0.0 |
| 1020 | 1,017.9 | 4.6 | 2 | 1 | 2 | | | | | | | | M | 1,015.5 | ROADWAY EMBANKMENT Red-Brown-Gray, Sandy Silty CLAY | |
| 1015 | 1,012.9 | 9.6 | WOH | WOH | 2 | | | | | | | | W | 1,010.8 | ALLUVIAL Gray, Sandy Silty CLAY | 7.0 |
| 1010 | | | | | | | | | | | | | | 1,008.1 | WEATHERED ROCK Gray (META-GRANITE) | 11.7 |
| | | | | | | | | | | | | | | 1,008.1 | Boring Terminated with Casing Advancer Refusal at Elevation 1,008.1 ft on Crystalline Rock (META-GRANITE) | 14.4 |

| WBS 67127.1.1 | | TIP BR-0127 | | COUNTY YADKIN | | GEOLOGIST Stickney, J. K. | | | | | | | | | | |
|---|-----------------|---------------------|------------|-------------------------------|-------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 189 on SR 1325 (Mountain View Church Rd.) over UT to South Deep Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B | | STATION 15+79 | | OFFSET 4 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 1,022.8 ft | | TOTAL DEPTH 15.6 ft | | NORTHING 877,578 | | EASTING 1,467,942 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFC0070 CME-550X 81% 06/04/2018 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER Smith, C. L. | | START DATE 10/24/19 | | COMP. DATE 10/24/19 | | 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 | | | | | | |
| 1025 | | | | | | | | | | | | | | 1,022.8 | GROUND SURFACE | 0.0 |
| 1020 | 1,018.1 | 4.7 | 1 | 2 | 3 | | | | | | | | M | 1,015.8 | ROADWAY EMBANKMENT Red-Brown-Gray, Sandy Silty CLAY | |
| 1015 | 1,013.1 | 9.7 | WOH | WOH | 90 | | | | | | | | W | 1,011.3 | ALLUVIAL Gray, Sandy Silty CLAY | 7.0 |
| 1010 | 1,008.1 | 14.7 | | | | | | | | | | | | 1,008.0 | WEATHERED ROCK Gray (META-GRANITE) | 11.5 |
| | | | | | | | | | | | | | | 1,007.2 | CRYSTALLINE ROCK (META-GRANITE) | 14.8 |
| | | | | | | | | | | | | | | 1,007.2 | Boring Terminated with Casing Advancer Refusal at Elevation 1,007.2 ft in Crystalline Rock (META-GRANITE) | 15.6 |

NCDOT BORE DOUBLE BR-0127_GEO_BH_BRDG0189.GPJ NC_DOT.GDT 12/10/19

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 67127.1.1 | | TIP BR-0127 | | COUNTY YADKIN | | GEOLOGIST Stickney, J. K. | | | | | | | | | | |
|---|-----------------|---------------------|------------|-------------------------------|-------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Bridge No. 189 on SR 1325 (Mountain View Church Rd.) over UT to South Deep Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A | | STATION 16+39 | | OFFSET 10 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 1,022.3 ft | | TOTAL DEPTH 13.7 ft | | NORTHING 877,617 | | EASTING 1,467,989 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFC0070 CME-550X 81% 06/04/2018 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER Smith, C. L. | | START DATE 10/24/19 | | COMP. DATE 10/24/19 | | 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 | | | | | | |
| 1025 | | | | | | | | | | | | | | 1,022.3 | 0.0 | GROUND SURFACE |
| 1020 | | | | | | | | | | | | | | 1,015.3 | 7.0 | ROADWAY EMBANKMENT Red-Brown-Gray, Sandy Silty CLAY |
| 1015 | 1,017.6 | 4.7 | 2 | 2 | 4 | | | | | | | | | 1,012.1 | 10.2 | ALLUVIAL Gray, Sandy Silty CLAY |
| 1010 | 1,012.6 | 9.7 | 100/0.5 | | | | | | | | | | | 1,008.6 | 13.7 | WEATHERED ROCK Gray (META-GRANITE) |
| | | | | | | | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 1,008.6 ft on Crystalline Rock (META-GRANITE) |

| WBS 67127.1.1 | | TIP BR-0127 | | COUNTY YADKIN | | GEOLOGIST Stickney, J. K. | | | | | | | | | | |
|---|-----------------|---------------------|------------|-------------------------------|--------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|--|
| SITE DESCRIPTION Bridge No. 189 on SR 1325 (Mountain View Church Rd.) over UT to South Deep Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-B | | STATION 16+39 | | OFFSET 7 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 1,022.3 ft | | TOTAL DEPTH 14.6 ft | | NORTHING 877,602 | | EASTING 1,467,997 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE HFC0070 CME-550X 81% 06/04/2018 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER Smith, C. L. | | START DATE 10/24/19 | | COMP. DATE 10/24/19 | | 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 | | | | | | |
| 1025 | | | | | | | | | | | | | | 1,022.3 | 0.0 | GROUND SURFACE |
| 1020 | | | | | | | | | | | | | | 1,015.3 | 7.0 | ROADWAY EMBANKMENT Red-Brown-Gray, Sandy Silty CLAY |
| 1015 | 1,017.7 | 4.6 | 2 | 4 | 6 | | | | | | | | | 1,011.7 | 10.6 | ALLUVIAL Gray, Sandy Silty CLAY |
| 1010 | 1,012.7 | 9.6 | 2 | 1 | 99/0.2 | | | | | | | | | 1,007.7 | 14.6 | WEATHERED ROCK Gray (META-GRANITE) |
| | | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 1,007.7 ft on Crystalline Rock (META-GRANITE) |

NCDOT BORE DOUBLE BR-0127_GEO_BH_BRDG0189.GPJ NC_DOT.GDT 12/10/19

Bridge No. 189 on SR 1325 (Mountain View Church Rd.) over UT to South Deep Creek

SITE PHOTOGRAPHS



Photograph No. 1: Looking at End Bent 2 toward End Bent 1



Photograph No. 2: Looking Upstream