

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | 40241.1.1 (B-4963) | 1 | 11 |

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 40241.1.1 (B-4963) F.A. PROJ. BRZ-2361(1)
COUNTY Rockingham
PROJECT DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek

CONTENTS

| SHEET | DESCRIPTION |
|-------|---|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4-5 | CROSS SECTIONS |
| 6-10 | BORE/CORE REPORTS W/EBI-A CORE PHOTOGRAPH |
| 11 | SITE PHOTOGRAPHS |

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 (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PERSONNEL

A. MAY

J. BARE

J. GENTRY

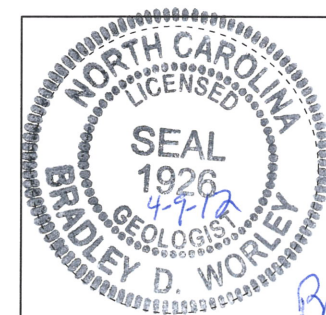
D. DEWEY

INVESTIGATED BY B. WORLEY

CHECKED BY D. DEWEY

SUBMITTED BY Summit, PLLC

DATE APRIL, 2012



Bradley D. Worley

PROJECT: 40241.1.1 ID: B-4963

DRAWN BY: B. WORLEY and M. BRANDON

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

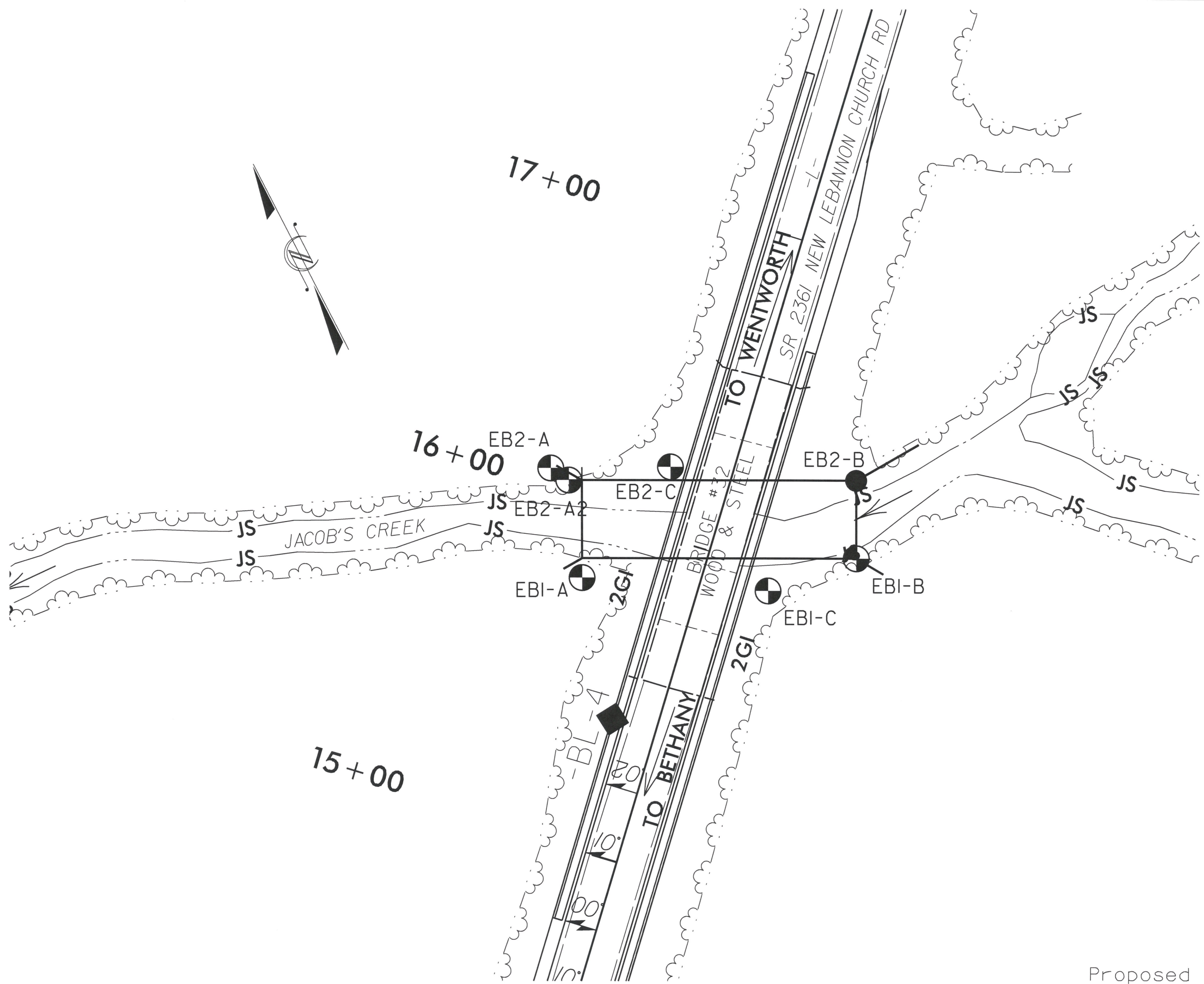
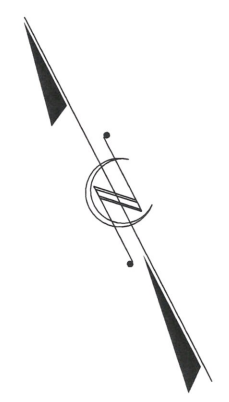
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

| | |
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| PROJECT REFERENCE NO. 40241.II (B-4963) | SHEET NO. 2 |
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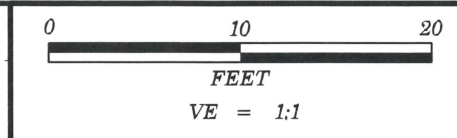
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | GRADATION | ROCK DESCRIPTION | TERMS AND DEFINITIONS |
|--|---|--|--|
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i> | WELL-GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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) - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. 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. COASTAL PLAIN SEDIMENTARY ROCK (CPS) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. | 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, 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 (MDT.) - 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 (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 | MINERALOGICAL COMPOSITION | WEATHERING | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | 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. 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. 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, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS 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. | |
| 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 | COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 | | |
| SYMBOL | PERCENTAGE OF MATERIAL | | |
| % PASSING #10, #40, #200 | 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 | | |
| LIQUID LIMIT PLASTIC INDEX | GROUND WATER | | |
| GROUP INDEX | 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 | | |
| USUAL TYPES OF MAJOR MATERIALS | MISCELLANEOUS SYMBOLS | | |
| GEN. RATING AS A SUBGRADE | 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 OPT DMT VST PMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD | |
| PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 | | | |
| CONSISTENCY OR DENSENESS | | | |
| 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 | | | |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD | | | |
| TEXTURE OR GRAIN SIZE | ABBREVIATIONS | ROCK HARDNESS | |
| U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270 | AR - AUGER REFUSAL 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 | 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, 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. 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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED 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. | |
| BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) | WEA. - WEATHERED W - UNIT WEIGHT W _s - DRY UNIT WEIGHT | | |
| GRAIN SIZE MM 305, 75, 2.0, 0.25, 0.05, 0.005 | S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO | | |
| SOIL MOISTURE - CORRELATION OF TERMS | EQUIPMENT USED ON SUBJECT PROJECT | FRACTURE SPACING | BEDDING |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | DRILL UNITS: MOBILE B-51, BK-51, CME-45C, CME-550, PORTABLE HOIST, CME-450 | TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET | 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 |
| LL - LIQUID LIMIT (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 6" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE *STEEL TEETH, TRICONE *TUNG.-CARB., CORE BIT | HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: -B, -N 02, -H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST | INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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. |
| PLASTICITY | | | |
| NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY | | | |
| COLOR | | | |
| 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. | | | |
| | | | NOTES: *Soilsamples were visually classified in the field. |

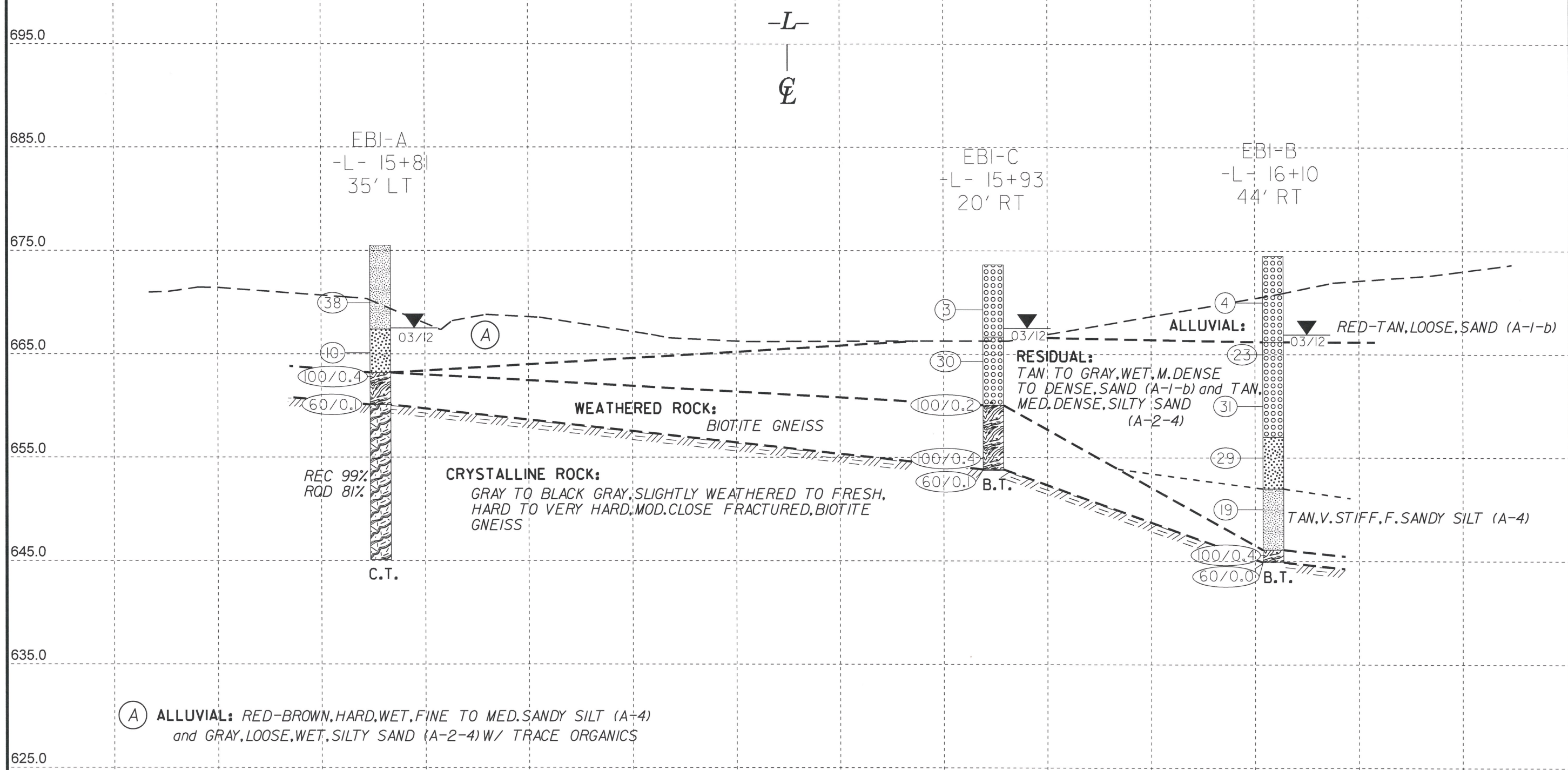


Proposed Skew = 73°



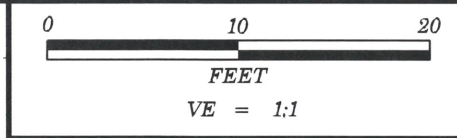
| PROJECT REFERENCE NO. | SHEET |
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| 40241.1.1 (B-4963) | 4 |

SOUTH CULVERT FOOTING
Cross Section



•Cross section cut from the project tin file (b4963 is tin.tin) along proposed skew.

•Inferred stratigraphy is drawn through the borings and projected onto the cross section.



| PROJECT REFERENCE NO. | SHEET |
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| NORTH CULVERT FOOTING | |
| <i>Cross Section</i> | |

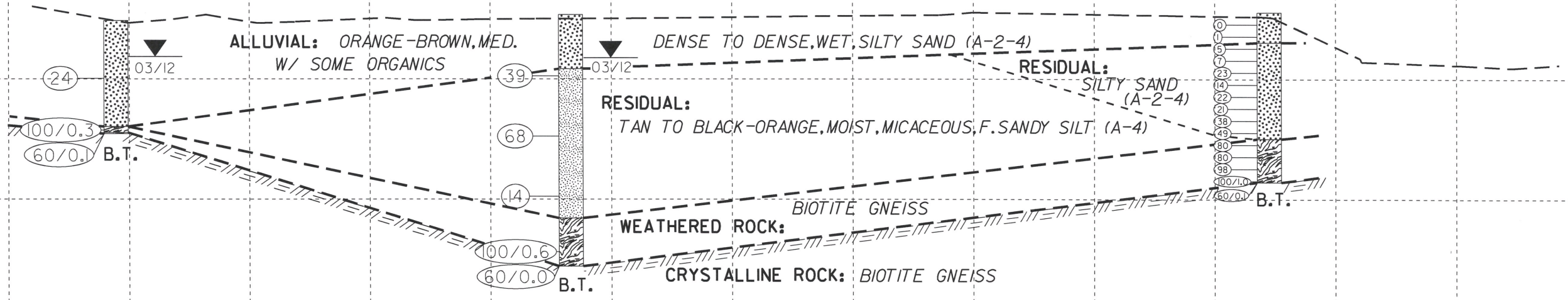
695.0
685.0
675.0
665.0
655.0
645.0
635.0
625.0
615.0

-L-
|
E

EB2-A
-L- 16+10
54' LT

EB2-C
-L- 16+21
18' LT

EB2-B
-L- 16+33
37' RT
(Sounding Rod)



•Cross section cut from the project tin file (b4963 is tin.tin) along proposed skew.
•Inferred stratigraphy is drawn through the borings and projected onto the cross section.

| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | | | | | |
|---|-----------------|-------------------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|-----|---------------------------|------------|--|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A | | STATION 15+81 | | OFFSET 35 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 675.5 ft | | TOTAL DEPTH 30.4 ft | | NORTHING 945,545 | | EASTING 1,753,913 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 82% 07/22/2011 | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/06/12 | | COMP. DATE 03/06/12 | | 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 | | | | | | |
| 680 | | | | | | | | | | | | | | | | |
| 675 | | | | | | | | | | | | | | | | |
| 670 | 671.1 | 4.4 | 7 | 25 | 13 | | | | | | | | | | | |
| 665 | 666.1 | 9.4 | WOH | 1 | 9 | | | | | | | | | | | |
| 660 | 663.2 | 12.3 | 100/0.4 | | | | | | | | | | | | | |
| 655 | 660.2 | 15.3 | 60/0.1 | | | | | | | | | | | | | |
| 650 | | | | | | | | | | | | | | | | |

| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | |
|---|---------------|-------------------------------------|----------|--|----------|-------------------------|-----------------|----------|---------|-----|--|------------|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. EB1-A | | STATION 15+81 | | OFFSET 35 ft LT | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. 675.5 ft | | TOTAL DEPTH 30.4 ft | | NORTHING 945,545 | | EASTING 1,753,913 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 82% 07/22/2011 | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/06/12 | | COMP. DATE 03/06/12 | | SURFACE WATER DEPTH N/A | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (%) | RQD (%) | | REC. (%) | RQD (%) | | | |
| 660.1 | 660.1 | 15.4 | 5.0 | 6:32/1.0 3:15/1.0 2:41/1.0 2:33/1.0 2:54/1.0 | (5.0) | (3.0) | | (14.8) | (12.2) | | Begin Coring @ 15.4 ft | 15.4 |
| 655 | 655.1 | 20.4 | 5.0 | 2:54/1.0 2:49/1.0 2:54/1.0 2:44/1.0 3:25/1.0 | (5.0) | (4.7) | | | | | Gray-black to gray, slightly weathered to fresh, hard to very hard, mod. close fractured, biotite gneiss | 15.4 |
| 650 | 650.1 | 25.4 | 5.0 | 2:31/1.0 2:26/1.0 2:13/1.0 2:32/1.0 2:27/1.0 | (4.8) | (4.5) | | | | | | 15.4 |
| | 645.1 | 30.4 | | | | | | | | | Boring Terminated at Elevation 645.1 ft In Crystalline Rock (biotite gneiss) | 30.4 |

CORE PHOTOGRAPH

EB1-A

BOXES 1 & 2: 15.4 - 30.4 FEET



| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | | | | | |
|---|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-C | | STATION 15+94 | | OFFSET 21 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 673.9 ft | | TOTAL DEPTH 19.9 ft | | NORTHING 945,516 | | EASTING 1,753,962 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 82% 07/22/2011 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/05/12 | | COMP. DATE 03/05/12 | | 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 | | | | | | |
| 675 | | | | | | | | | | | | | | 673.9 | GROUND SURFACE | 0.0 |
| 670 | 670.3 | 3.6 | 1 | 1 | 2 | | | | | | | | | 666.9 | ALLUVIAL Tan, very loose, fine to med. SAND (A-1-b) w/ trace mica | 7.0 |
| 665 | 665.3 | 8.6 | 20 | 23 | 7 | | | | | | | | | 660.3 | RESIDUAL Orange-tan, med. dense, fine to coarse SAND (A-1-b) w/ trace mica and rock fragments | 13.6 |
| 660 | 660.3 | 13.6 | 100/0.2 | | | | | | | | | | | 654.1 | WEATHERED ROCK WR (biotite gneiss) | 19.8 |
| 655 | 655.3 | 18.6 | 100/0.4 | | | | | | | | | | | 654.0 | CRYSTALLINE ROCK CR (biotite gneiss) | 19.9 |
| | 654.1 | 19.8 | 60/0.1 | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 654.0 ft On Crystalline Rock (biotite gneiss) | |

NCDOT BORE SINGLE_B4963_GEO_BRD0032_GINT.GPJ_NC_DOT.GDT_4/9/12

| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | | | | | |
|---|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B | | STATION 16+11 | | OFFSET 44 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 674.4 ft | | TOTAL DEPTH 29.6 ft | | NORTHING 945,513 | | EASTING 1,753,990 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 82% 07/22/2011 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/06/12 | | COMP. DATE 03/06/12 | | 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 | | | | | | |
| 675 | | | | | | | | | | | | | | 674.4 | GROUND SURFACE | 0.0 |
| 670 | 670.9 | 3.5 | 1 | 2 | 2 | | | | | | | | | 666.1 | ALLUVIAL Tan-red, loose, fine to med. SAND (A-1-b), with trace silt and mica | 8.3 |
| 665 | 665.9 | 8.5 | 21 | 17 | 6 | | | | | | | | | 656.9 | RESIDUAL Tan to tan-gray, med. dense to dense, fine to coarse SAND (A-1-b) | 17.5 |
| 660 | 660.9 | 13.5 | 12 | 16 | 15 | | | | | | | | | 651.9 | Tan, med. dense, micaceous, fine to med. SILTY SAND (A-2-4) | 22.5 |
| 655 | 655.9 | 18.5 | 16 | 14 | 15 | | | | | | | | | 646.0 | Tan, very stiff, fine SANDY SILT (A-4), with trace mica | 28.4 |
| 650 | 650.9 | 23.5 | 4 | 7 | 12 | | | | | | | | | 644.8 | WEATHERED ROCK WR (biotite gneiss) | 29.6 |
| 645 | 645.9 | 28.5 | 100/0.4 | | | | | | | | | | | | CRYSTALLINE ROCK CR (biotite gneiss) | |
| | 644.8 | 29.6 | 60/0.0 | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 644.8 ft On Crystalline Rock (biotite gneiss) | |

NCDOT BORE SINGLE_B4963_GEO_BRD0032_GINT.GPJ_NC_DOT.GDT_4/9/12

| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | | | | | |
|---|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|---------|---------------------------|------------|---|-----|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A | | STATION 16+11 | | OFFSET 54 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 669.9 ft | | TOTAL DEPTH 9.4 ft | | NORTHING 945,580 | | EASTING 1,753,919 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 82% 07/22/2011 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/06/12 | | COMP. DATE 03/06/12 | | 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 | | | | | | |
| 670 | | | | | | | | | | | | | | 669.9 | GROUND SURFACE | 0.0 |
| | 666.1 | 3.8 | | | | | | | | | | | | | ALLUVIAL Orange-gray, med. dense, SILTY fine to med. SAND (A-2-4) w/ rock fragments | |
| 665 | | | 1 | 13 | 11 | | | | | | | | | | | |
| | 661.1 | 8.8 | | | | | | | | | | | | 661.1 | | 8.8 |
| | 660.6 | 9.3 | | | | | | | | | | | | 660.6 | | 9.3 |
| | | | 100/0.3 | | | | | | | | | | | 660.5 | | 9.4 |
| | | | 60/0.1 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | WEATHERED ROCK WR (biotite gneiss) | |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK CR (biotite gneiss) | |
| | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 660.6 ft On Crystalline Rock (biotite gneiss) | |

NCDOT BORE SINGLE B4963 GEO_BRDG0032_GINT.GPJ NC_DOT.GDT 4/9/12

| WBS 40241.1.1 | | TIP B-4963 | | COUNTY ROCKINGHAM | | GEOLOGIST A.May | | | | | | | | | | |
|---|-----------------|--------------------------|------------|-----------------------|-------|-------------------------|-----------------|----|----|-----|-----------|---------|---------------------------|------------|---|-----|
| SITE DESCRIPTION Bridge No. 32 on SR 2361 over Little Jacob's Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A2 | | STATION 16+09 | | OFFSET 48 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 669.8 ft | | TOTAL DEPTH 8.3 ft | | NORTHING 945,574 | | EASTING 1,753,923 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 82% 07/22/2011 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER J. Bare | | START DATE 03/06/12 | | COMP. DATE 03/06/12 | | 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 | | | | | | |
| 670 | | | | | | | | | | | | | | 669.8 | GROUND SURFACE | 0.0 |
| | 666.1 | 3.7 | | | | | | | | | | | | | ALLUVIAL Red-brown, loose, SILTY fine to med. SAND (A-2-4) w/ trace organics and rock fragments | |
| 665 | | | 6 | 6 | 4 | | | | | | | | | | | |
| | 661.5 | 8.3 | | | | | | | | | | | | 661.5 | | 8.3 |
| | | | 60/0.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | WEATHERED ROCK WR (biotite gneiss) | |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK CR (biotite gneiss) | |
| | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 661.5 ft On Crystalline Rock (biotite gneiss) | |

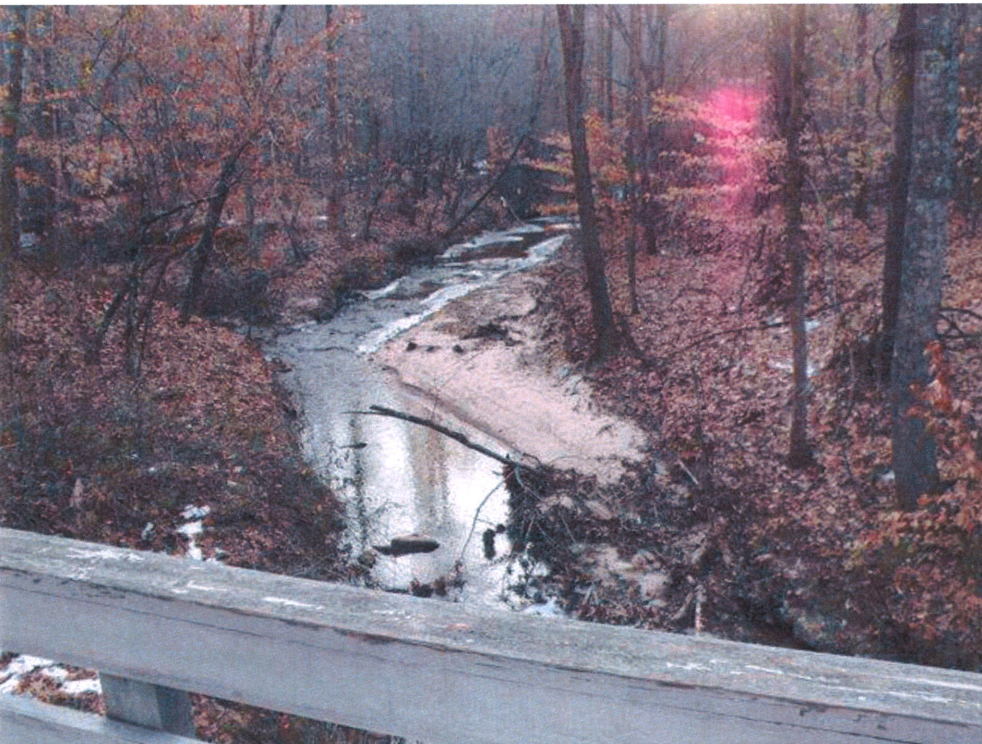
NCDOT BORE SINGLE B4963 GEO_BRDG0032_GINT.GPJ NC_DOT.GDT 4/9/12



Looking east at existing structure



Looking west at existing structure



View looking upstream



View looking downstream