

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33680.1.1	1	18

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33680.1.1 (B-4400) F.A. PROJ. BRZ-1122(4)
 COUNTY ALAMANCE
 PROJECT DESCRIPTION BRIDGE NO. 160 ON SR 1122 (EULISS RD.)
OVER SOUTH PRONG OF STINKING QUARTER CREEK

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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) 707-5850. 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.

PROJECT: 33680.1.1 ID: B-4400

PERSONNEL

J. Howard

D. White

O. Smith

INVESTIGATED BY AMEC E&I, Inc.

CHECKED BY J. Shane Johnson

SUBMITTED BY B. Deobald

DATE 4/09/2012

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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.

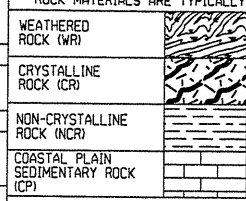
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33680.LI
SHEET NO. 2

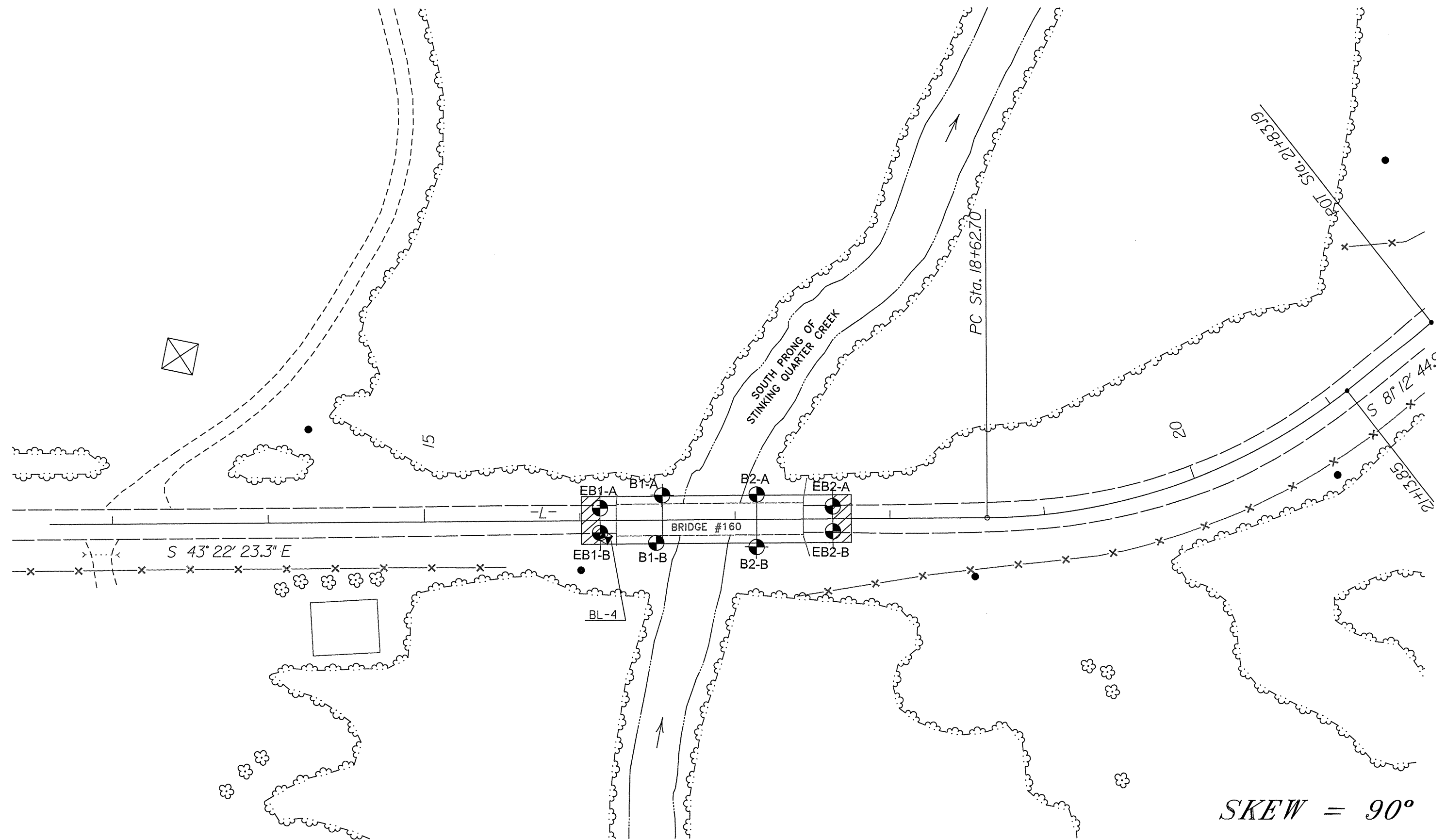
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

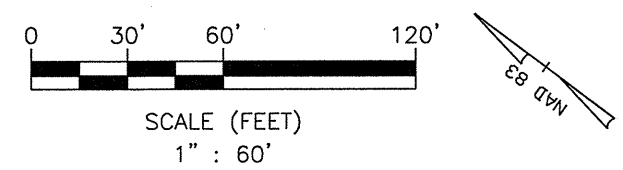
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS							
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION 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, HIGHLY 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:  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. 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.		ALLUVIUM (ALLOUV.) - 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 DISLOOED 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.							
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS							
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 SL.) 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 (SL.) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF.</i> 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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF.</i> 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.		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		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. 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 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 HARD 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.		PERCENTAGE OF MATERIAL 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		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. 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 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 HARD 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.	
COMPACTNESS OR CONSISTENCY		GROUND WATER		MISCELLANEOUS SYMBOLS		ROCK HARDNESS							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		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		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 SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD		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. 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 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 HARD 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		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		ROCK HARDNESS							
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270		AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL - CLAY CL. - CLAY CL. - CLAY CPT - CONE PENETRATION TEST NP - NON PLASTIC 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 SLL. - SLIGHTLY FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS. - FRAGMENTS w - MOISTURE CONTENT HL. - HIGHLY V - VERY		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-55 LC PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/8" STEEL TEETH TRICONE TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		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. 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 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 HARD 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.							
SOIL MOISTURE - CORRELATION OF TERMS		SOIL MOISTURE - CORRELATION OF TERMS		FRACATURE SPACING		ROCK HARDNESS							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		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. 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 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 HARD 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.							
PLASTICITY		PLASTICITY		INDURATION		ROCK HARDNESS							
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		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.		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. 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 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 HARD 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.							
COLOR		COLOR		INDURATION		ROCK HARDNESS							
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		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.		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. 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 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 HARD 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.							

BENCH MARK: BL-4, N 81192 E 1848721
ELEVATION: 541.98 FT.

NOTES:
BENCHMARK
F.I.A.D. - FILLED IMMEDIATELY AFTER DRILLING
CT - CORING TERMINATED

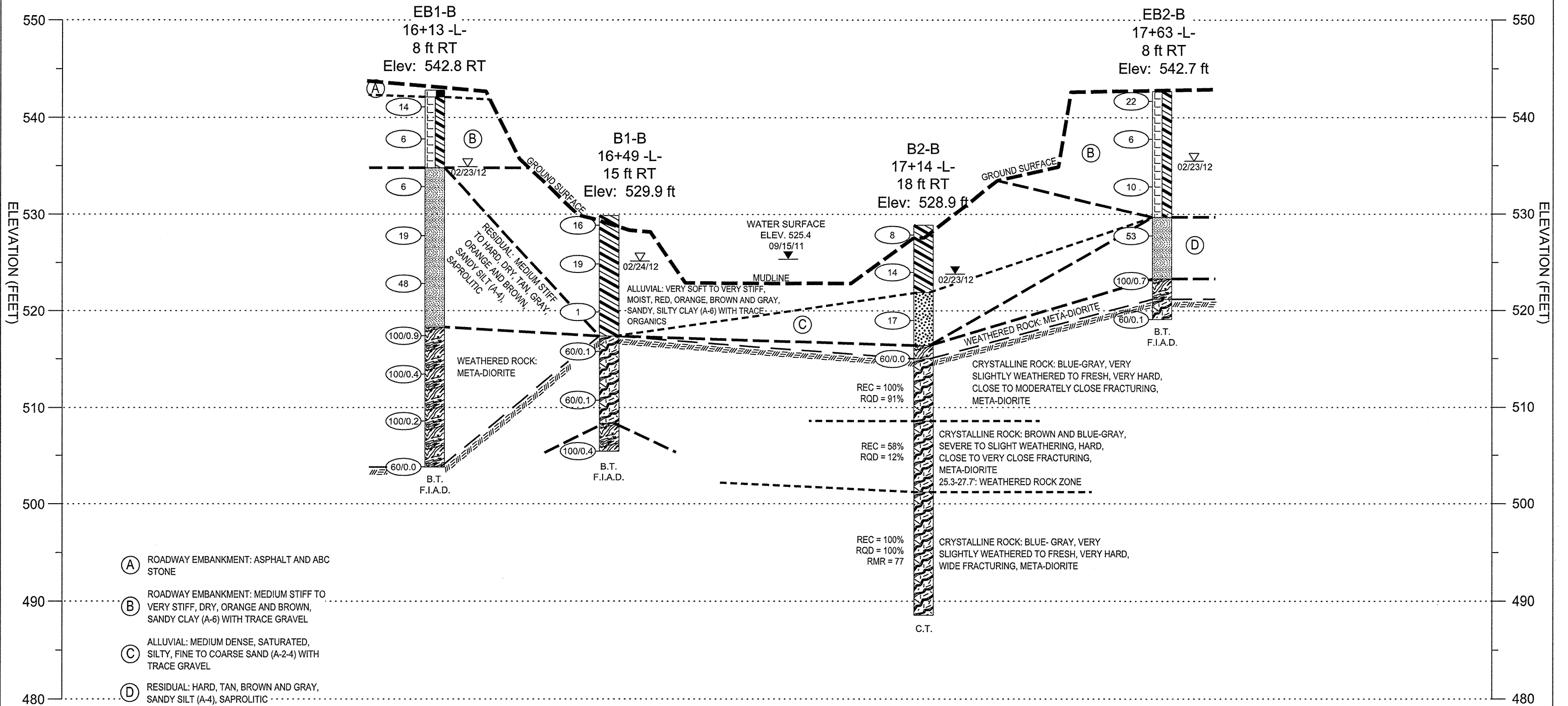


SKEW = 90°



BORING LOCATION PLAN
 BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER
 SOUTH PRONG OF STINKING QUARTER CREEK
 NCDOT PROJECT NO. 33680.1.1 (B-4400)
 F.A. NO. BRZ-1122(4)
 ALAMANCE COUNTY, NORTH CAROLINA

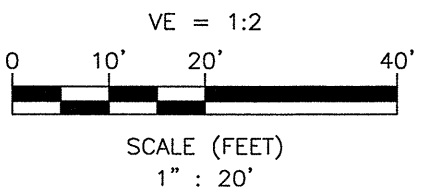
AMEC ENVIRONMENT AND INFRASTRUCTURE, INC. DURHAM, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 04/09/2012
	DFT CHECK:	W.B.D.	JOB : 6468-12-1054
	ENG CHECK:	J.S.J.	DWG: 1



- (A) ROADWAY EMBANKMENT: ASPHALT AND ABC STONE
- (B) ROADWAY EMBANKMENT: MEDIUM STIFF TO VERY STIFF, DRY, ORANGE AND BROWN, SANDY CLAY (A-6) WITH TRACE GRAVEL
- (C) ALLUVIAL: MEDIUM DENSE, SATURATED, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
- (D) RESIDUAL: HARD, TAN, BROWN AND GRAY, SANDY SILT (A-4), SAPROLITIC

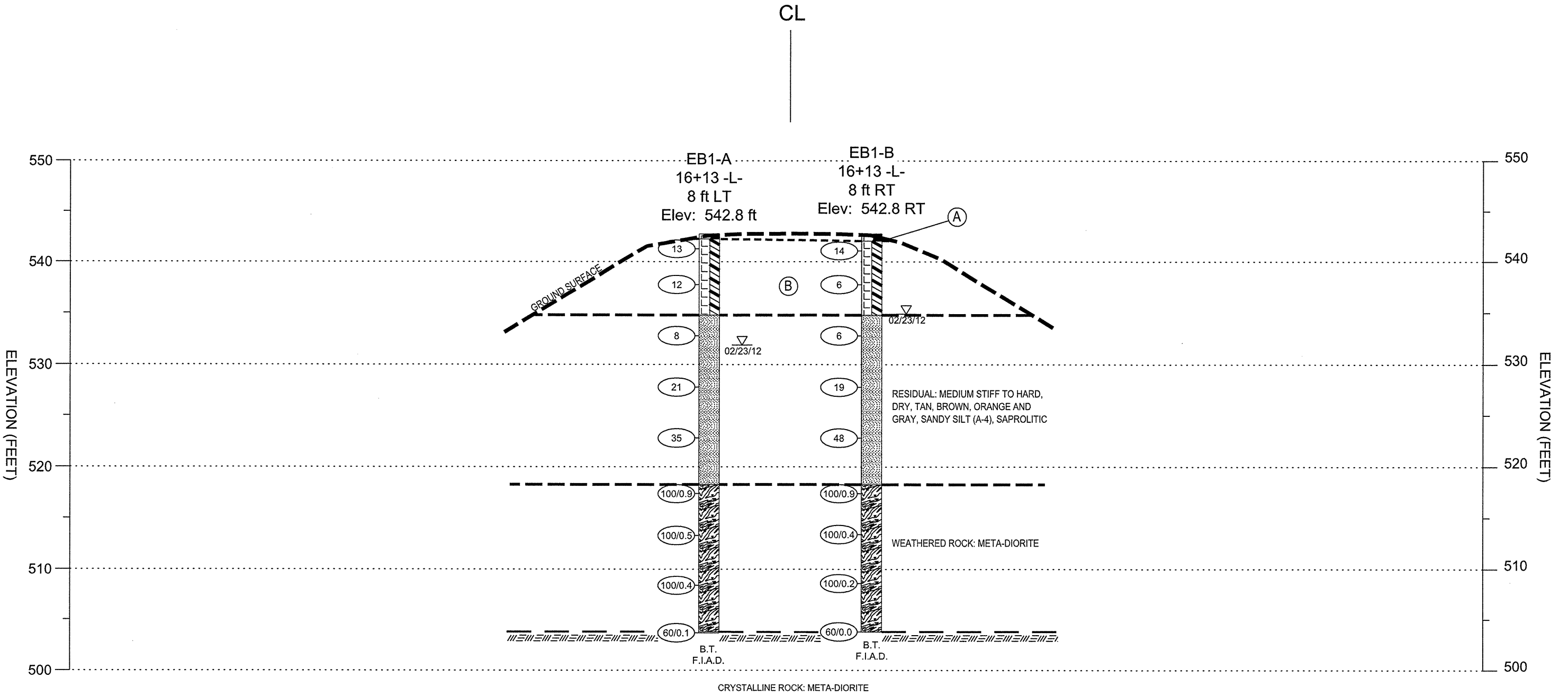
- GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS RECEIVED BY AMEC 1/31/2012.

- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.



PROFILE ALONG CENTERLINE
BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER
SOUTH PRONG OF STINKING QUARTER CREEK
NCDOT PROJECT NO. 33680.1.1 (B-4400)
F.A. NO. BRZ-1122(4)
ALAMANCE COUNTY, NORTH CAROLINA

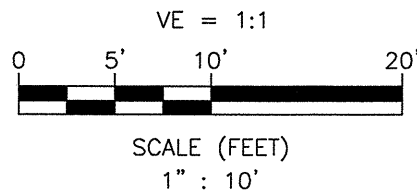
AMEC ENVIRONMENT AND INFRASTRUCTURE, INC. DURHAM, NORTH CAROLINA			
DRAWN:	R.R.	DATE:	04/09/2012
DFT CHECK:	W.B.D.	JOB :	6468-12-1054
ENG CHECK:	J.S.J.	DWG:	2



- (A) ROADWAY EMBANKMENT: ASPHALT AND ABC STONE
- (B) ROADWAY EMBANKMENT: MEDIUM STIFF TO STIFF, DRY, ORANGE AND BROWN, SANDY CLAY (A-6) WITH TRACE GRAVEL

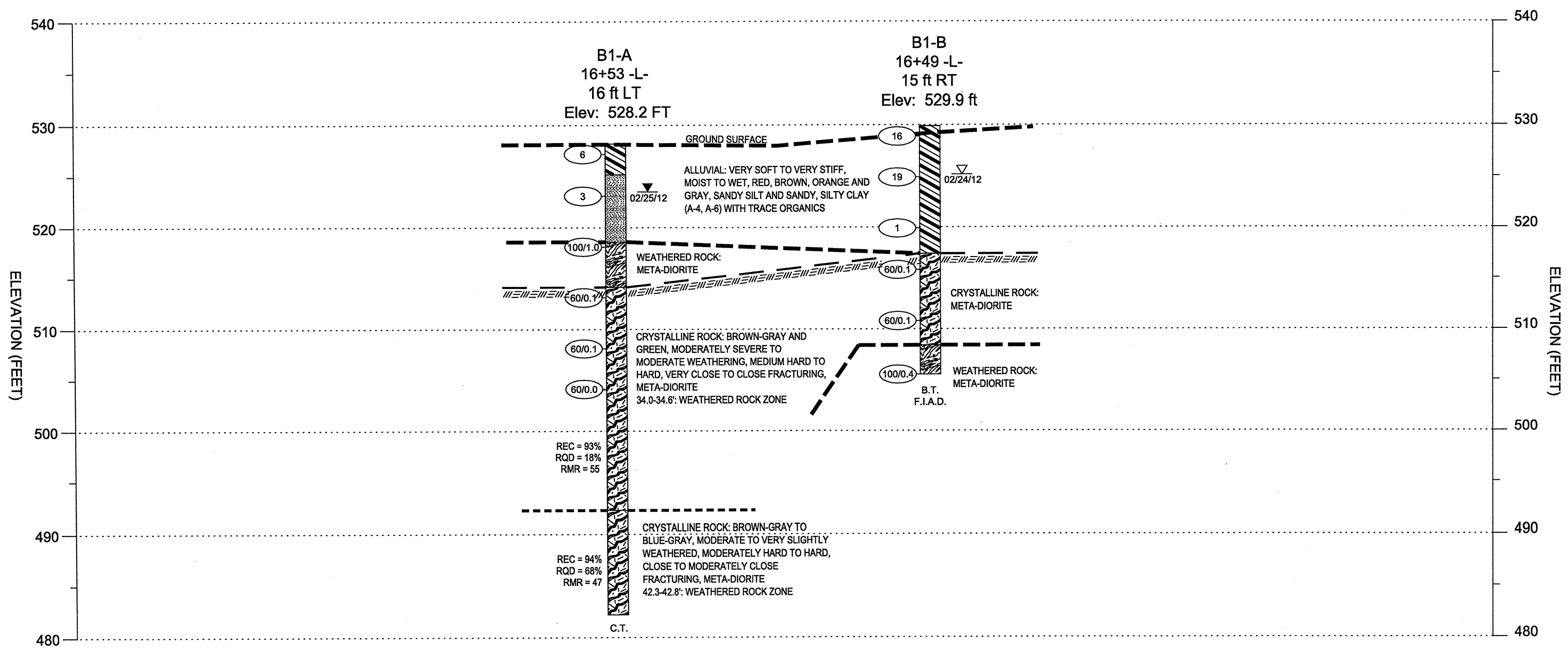
- GROUNDLINE CROSS SECTION SURVEYED BY AMEC ALONG THE LOCATION OF END BENT 1 ON 2/24/12.

- INFERRED STRATIGRAPHY IS DRAWN AT THE CROSS SECTION WITH BORINGS PROJECTED ONTO THE CROSS SECTION.



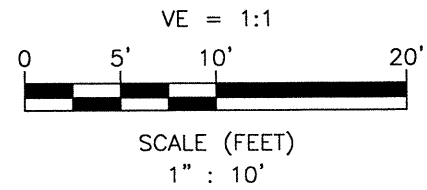
CROSS SECTION ALONG END BENT 1 BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER SOUTH PRONG OF STINKING QUARTER CREEK NCDOT PROJECT NO. 33680.1.1 (B-4400) F.A. NO. BRZ-1122(4) ALAMANCE COUNTY, NORTH CAROLINA			
AMEC ENVIRONMENT AND INFRASTRUCTURE, INC. DURHAM, NORTH CAROLINA			
REVISIONS	DRAWN: R.R.	DATE: 04/09/2012	
	DFT CHECK: W.B.D.	JOB : 6468-12-1054	
	ENG CHECK: J.S.J.	DWG: 3	

CL
|



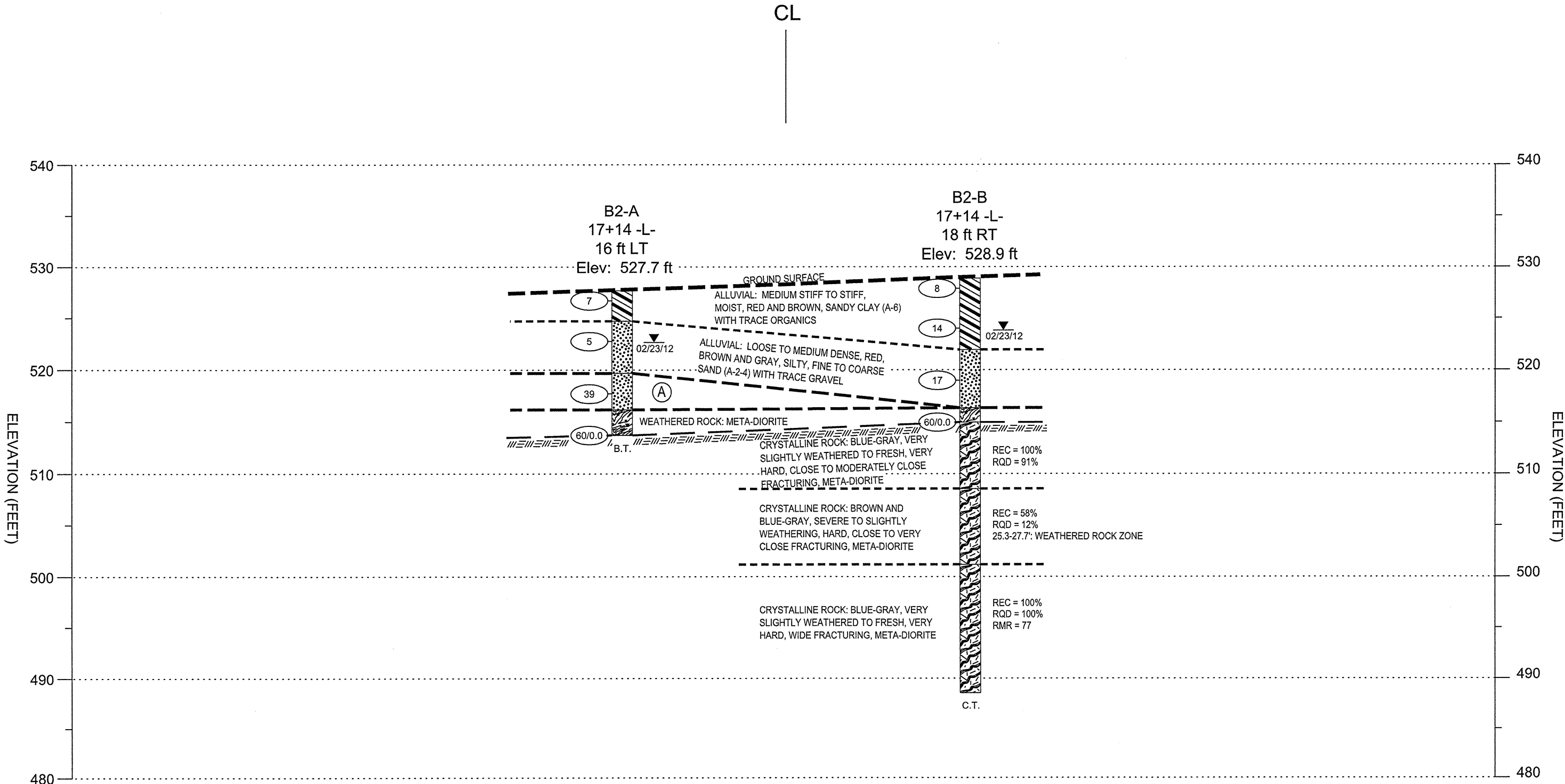
- GROUNDLINE CROSS SECTION SURVEYED BY AMEC ALONG THE LOCATION OF BENT 1 ON 2/24/12.

- INFERRED STRATIGRAPHY IS DRAWN AT THE CROSS SECTION WITH BORINGS PROJECTED ONTO THE CROSS SECTION.



CROSS SECTION ALONG BENT 1
 BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER
 SOUTH PRONG OF STINKING QUARTER CREEK
 NCDOT PROJECT NO. 33680.1.1 (B-4400)
 F.A. NO. BRZ-1122(4)
 ALAMANCE COUNTY, NORTH CAROLINA

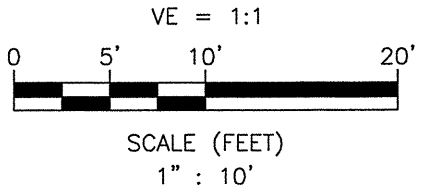
AMEC ENVIRONMENT AND INFRASTRUCTURE, INC. DURHAM, NORTH CAROLINA			
DRAWN:	R.R.	DATE:	04/09/2012
DFT CHECK:	W.B.D.	JOB :	6468-12-1054
ENG CHECK:	J.S.J.	DWG:	4



(A) RESIDUAL: DENSE, WET, GRAY AND TAN, SILTY, FINE TO COARSE SAND (A-2-4), SAPROLITIC

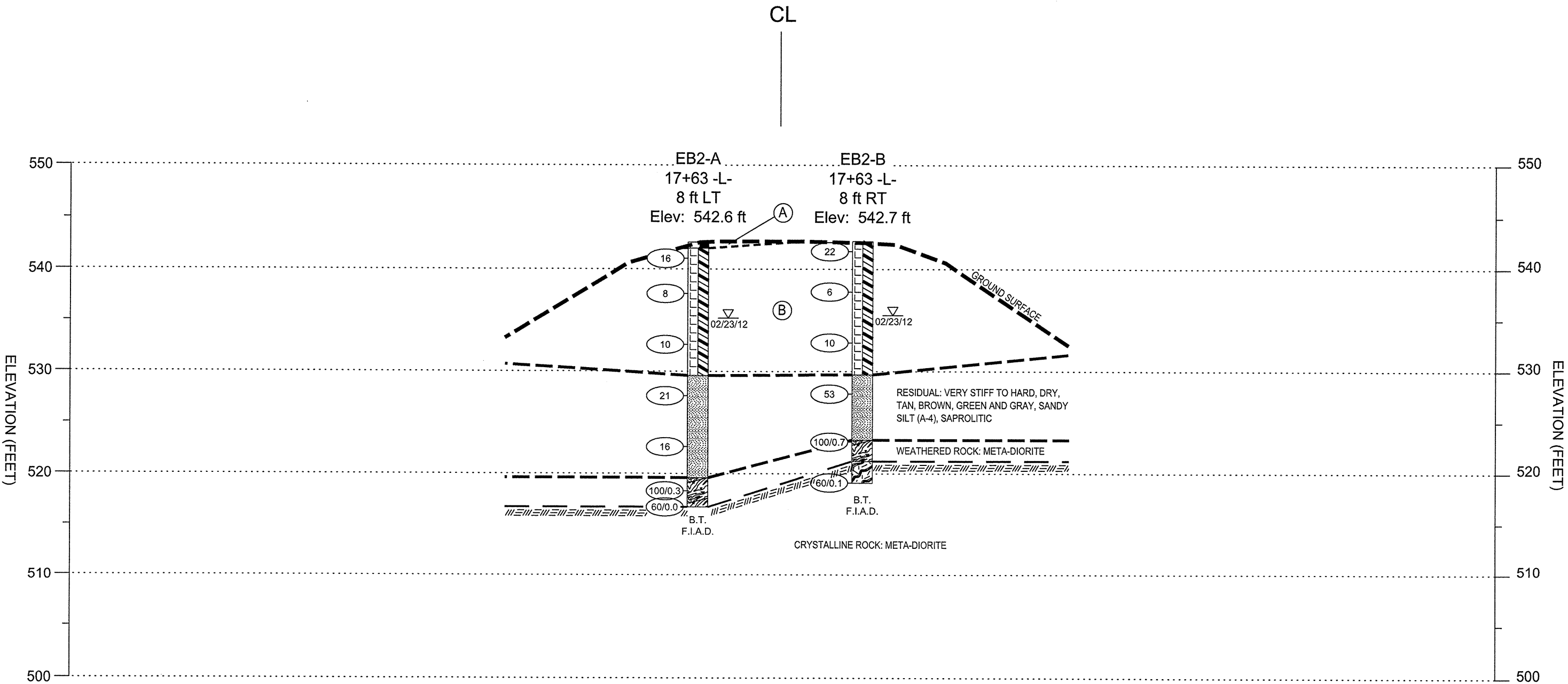
- GROUNDLINE CROSS SECTION SURVEYED BY AMEC ALONG THE LOCATION OF BENT 2 ON 2/24/12.

- INFERRED STRATIGRAPHY IS DRAWN AT THE CROSS SECTION WITH BORINGS PROJECTED ONTO THE CROSS SECTION.



CROSS SECTION ALONG BENT 2
BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER
SOUTH PRONG OF STINKING QUARTER CREEK
NCDOT PROJECT NO. 33680.1.1 (B-4400)
F.A. NO. BRZ-1122(4)
ALAMANCE COUNTY, NORTH CAROLINA

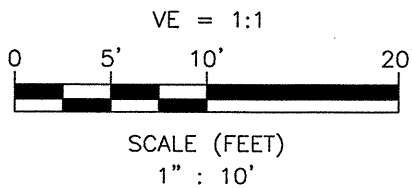
AMEC ENVIRONMENT AND INFRASTRUCTURE, INC. DURHAM, NORTH CAROLINA		
DRAWN:	R.R.	DATE: 04/09/2012
DFT CHECK:	W.B.D.	JOB : 6468-12-1054
ENG CHECK:	J.S.J.	DWG: 5



- (A) ROADWAY EMBANKMENT: ASPHALT AND ABC STONE
- (B) ROADWAY EMBANKMENT: MEDIUM STIFF TO VERY STIFF, DRY TO MOIST, RED, BROWN AND ORANGE, SANDY CLAY (A-6) WITH TRACE GRAVEL

- GROUNDLINE CROSS SECTION SURVEYED BY AMEC ALONG THE LOCATION OF END BENT 2 ON 2/24/12.

- INFERRED STRATIGRAPHY IS DRAWN AT THE CROSS SECTION WITH BORINGS PROJECTED ONTO THE CROSS SECTION.



CROSS SECTION ALONG END BENT 2
BRIDGE NO. 160 ON SR 1122 (EULISS RD.) OVER
SOUTH PRONG OF STINKING QUARTER CREEK
NCDOT PROJECT NO. 33680.1.1 (B-4400)
F.A. NO. BRZ-1122(4)
ALAMANCE COUNTY, NORTH CAROLINA

AMEC ENVIRONMENT AND INFRASTRUCTURE, INC.
DURHAM, NORTH CAROLINA

DRAWN:	R.R.	DATE:	04/09/2012
DFT CHECK:	W.B.D.	JOB :	6468-12-1054
ENG CHECK:	J.S.J.	DWG:	6

WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.										
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 16+13		OFFSET 8 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 542.8 ft		TOTAL DEPTH 39.1 ft		NORTHING 811,208		EASTING 1,848,732										
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic												
DRILLER White, D. A.		START DATE 02/23/12		COMP. DATE 02/23/12		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						
545																
	542.3	0.5	13	8	5											542.8
540																542.3
	538.8	4.0	4	5	7											534.8
535																534.8
	533.8	9.0	3	4	4											518.3
530																518.3
	528.8	14.0	5	9	12											503.8
525																503.7
	523.8	19.0	8	15	20											503.7
520																503.7
	518.8	24.0	19	39	61/0.4											503.7
515																503.7
	513.8	29.0	100/0.5													503.7
510																503.7
	508.8	34.0	100/0.4													503.7
505																503.7
	503.8	39.0	60/0.1													503.7

NCDOT BORE SINGLE B4400_GEO_BRDG0160_GINT.GPJ NC_DOT.GDT 4/5/12

WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.										
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 16+13		OFFSET 8 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 542.8 ft		TOTAL DEPTH 39.0 ft		NORTHING 811,197		EASTING 1,848,721										
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic												
DRILLER White, D. A.		START DATE 02/23/12		COMP. DATE 02/23/12		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						
545																
	542.1	0.7	12	8	6											542.8
540																542.1
	538.8	4.0	2	2	4											534.8
535																534.8
	533.8	9.0	2	3	3											518.3
530																518.3
	528.8	14.0	4	8	11											503.8
525																503.7
	523.8	19.0	19	22	26											503.7
520																503.7
	518.8	24.0	25	45	55/0.4											503.7
515																503.7
	513.8	29.0	100/0.4													503.7
510																503.7
	508.8	34.0	100/0.2													503.7
505																503.7
	503.8	39.0	60/0.0													503.7

NCDOT BORE SINGLE B4400_GEO_BRDG0160_GINT.GPJ NC_DOT.GDT 4/5/12

WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.											
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek						GROUND WTR (ft)											
BORING NO. B1-A		STATION 16+53		OFFSET 16 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 528.2 ft		TOTAL DEPTH 46.0 ft		NORTHING 811,184		EASTING 1,848,766											
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic		0 HR. 3.8											
DRILLER White, D. A.		START DATE 02/24/12		COMP. DATE 02/24/12		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							
530															528.2	GROUND SURFACE	0.0
	528.2	0.0	2	3	3								M				
525															525.2	ALLUVIAL Red and brown, sandy, silty CLAY (A-6)	3.0
	524.1	4.1	2	2	1								W				
520																	
	519.1	9.1	2	21	79												
515															518.6	WEATHERED ROCK META-DIORITE	9.6
	514.1	14.1	60/0.1														
510															514.1	CRYSTALLINE ROCK META-DIORITE	14.1
	509.1	19.1	60/0.1														
505																	
	504.1	24.1	60/0.0														
500																	
495																	
490															492.2	CRYSTALLINE ROCK META-DIORITE	36.0
													RS-1				
485																	
															482.2	Boring Terminated at Elevation 482.2 ft in Crystalline Rock: META-DIORITE	46.0

NCDOT BORE SINGLE B4400_GEO_BRD0160_GINT.GPJ NC_DOT.GDT 4/5/12

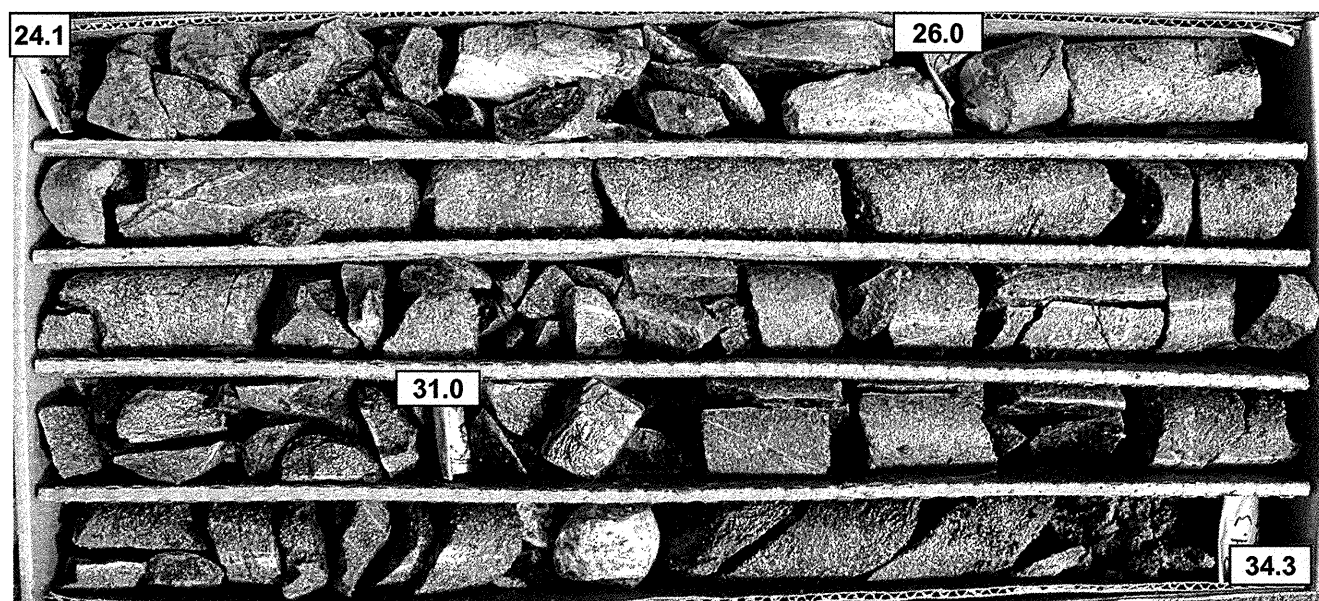
WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.						
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek						GROUND WTR (ft)						
BORING NO. B1-A		STATION 16+53		OFFSET 16 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 528.2 ft		TOTAL DEPTH 46.0 ft		NORTHING 811,184		EASTING 1,848,766						
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic		0 HR. 3.8						
DRILLER White, D. A.		START DATE 02/24/12		COMP. DATE 02/24/12		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 (%)			
504.1												
	504.1	24.1	1.9	N=60/0.0 2:45 3:00/0.9	(1.4) 74%	(0.0) 0%		(11.1) 93%	(2.1) 18%			Begin Coring @ 24.1 ft CRYSTALLINE ROCK <i>(continued)</i>
500												
	502.2	26.0	5.0	2:00 2:00 3:45 3:00 5:00	(5.0) 100%	(1.5) 30%						Brown-gray and green, moderately severe to moderate weathering, medium hard to hard, very close to close fracturing, META-DIORITE (rock highly broken, most joint orientations not discernible) 4 joints at 45° 3 joints at 90°
495												
	497.2	31.0	5.0	2:45 2:30 2:30 3:00 2:30	(4.7) 94%	(0.6) 12%						34.0-34.6ft: Weathered rock zone
490												
	492.2	36.0	5.0	2:30 2:45 3:00 3:00 2:45	(4.8) 96%	(4.1) 82%	RS-1	(9.4) 94%	(6.8) 68%			CRYSTALLINE ROCK Brown-gray to blue-gray, moderate to very slightly weathered, moderately hard to hard, close to moderately close fracturing, META-DIORITE 3 joints at 20° 2 joints at 45° 4 joints at 70° 42.3-42.8ft: Weathered rock zone RS-1: RMR = 55 RS-2: RMR = 47
485												
	487.2	41.0	5.0	2:45 2:45 3:00 3:15 3:15	(4.6) 92%	(2.7) 54%	RS-2					42.3-42.8ft: Weathered rock zone
482.2												Boring Terminated at Elevation 482.2 ft in Crystalline Rock: META-DIORITE

NCDOT CORE SINGLE B4400_GEO_BRD0160_GINT.GPJ NC_DOT.GDT 4/5/12

CORE PHOTOGRAPHS

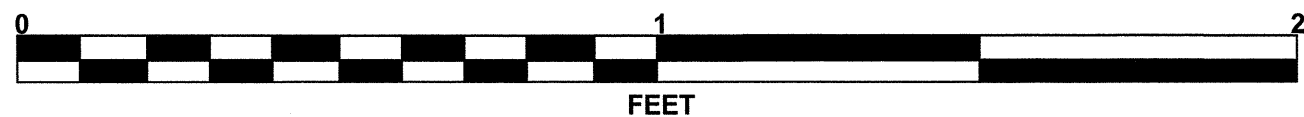
B1-A

BOX 1: 24.1 - 34.3 FEET



B1-A

BOXES 2 & 3: 34.3 - 46.0 FEET



WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.										
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek						GROUND WTR (ft)										
BORING NO. B1-B		STATION 16+49		OFFSET 15 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 529.9 ft		TOTAL DEPTH 24.4 ft		NORTHING 811,166		EASTING 1,848,741										
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic												
DRILLER White, D. A.		START DATE 02/24/12		COMP. DATE 02/24/12		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						
530	529.9	0.0	4	6	10									529.9	GROUND SURFACE	0.0
525	525.9	4.0	WOH	7	12									517.4	ALLUVIAL Red, orange and gray, sandy, silty CLAY (A-6)	12.5
520	520.9	9.0	WOH	1	WOH									517.4	12.5ft: Bit chatter CRYSTALLINE ROCK META-DIORITE	12.5
515	515.9	14.0	60/0.1											508.4	WEATHERED ROCK META-DIORITE	21.5
510	510.9	19.0	60/0.1											505.5	Boring Terminated at Elevation 505.5 ft in Weathered Rock: META-DIORITE	24.4
	505.9	24.0	100/0.4													

NCDOT BORE SINGLE B4400_GEO_BRD0160_GINT.GPJ NC_DOT.GDT 4/5/12

WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.										
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek						GROUND WTR (ft)										
BORING NO. B2-A		STATION 17+14		OFFSET 16 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 527.7 ft		TOTAL DEPTH 14.0 ft		NORTHING 811,140		EASTING 1,848,808										
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic												
DRILLER White, D. A.		START DATE 02/22/12		COMP. DATE 02/22/12		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						
530	527.7	0.0	2	3	4									527.7	GROUND SURFACE	0.0
525	523.7	4.0	2	3	2									524.7	ALLUVIAL Red and brown, sandy CLAY (A-6) with trace organics	3.0
520	518.7	9.0	5	5	34									519.7	Red, brown and gray, silty, fine SAND (A-2-4)	8.0
515	513.7	14.0	60/0.0											516.2	RESIDUAL Gray and tan, silty, fine to coarse SAND (A-2-4), saprolitic 11.5ft: Bit chatter	11.5
														513.7	WEATHERED ROCK META-DIORITE	14.0
															Boring Terminated with Standard Penetration Test Refusal at Elevation 513.7 ft on Crystalline Rock: META-DIORITE	

NCDOT BORE SINGLE B4400_GEO_BRD0160_GINT.GPJ NC_DOT.GDT 4/5/12

WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.										
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek							GROUND WTR (ft)									
BORING NO. B2-B		STATION 17+14		OFFSET 18 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 528.9 ft		TOTAL DEPTH 40.3 ft		NORTHING 811,117		EASTING 1,848,783										
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic												
DRILLER White, D. A.		START DATE 02/22/12		COMP. DATE 02/22/12		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		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
530	528.9	0.0	3	4	4											528.9 GROUND SURFACE
525	525.0	3.9	4	8	6											525.0 ALLUVIAL Red and brown, sandy CLAY (A-6) with trace organics
520	520.0	8.9	2	4	13											520.0 Gray, silty, fine to coarse SAND (A-2-4) with trace gravel
515	515.0	13.9	60/0.0													515.0 WEATHERED ROCK META-DIORITE
510																510.0 CRYSTALLINE ROCK META-DIORITE
505																505.0 META-DIORITE
500																500.0 META-DIORITE
495																495.0 META-DIORITE
490																490.0 Boring Terminated at Elevation 488.6 ft in Crystalline Rock: META-DIORITE

NCDOT BORE SINGLE_B4400_GEO_BRD0160_GINT.GPJ_NC_DOT.GDT_4/5/12

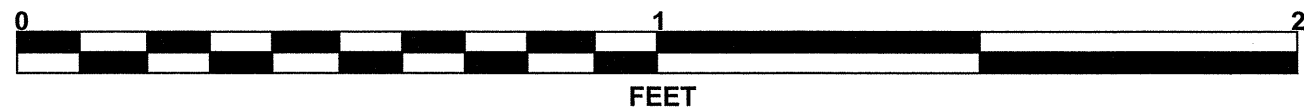
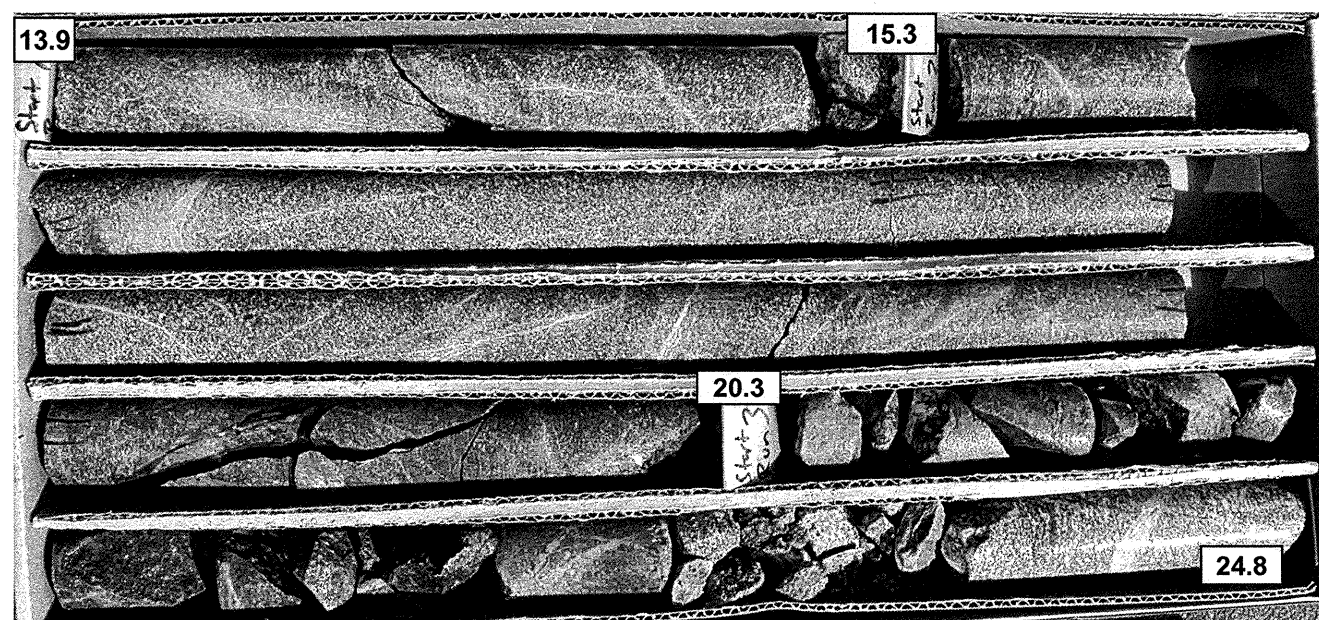
WBS 33680.1.1		TIP B-4400		COUNTY ALAMANCE		GEOLOGIST Howard, J. P.						
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek							GROUND WTR (ft)					
BORING NO. B2-B		STATION 17+14		OFFSET 18 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 528.9 ft		TOTAL DEPTH 40.3 ft		NORTHING 811,117		EASTING 1,848,783						
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER White, D. A.		START DATE 02/22/12		COMP. DATE 02/22/12		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	
					REC. (ft)	RQD (%)		REC. (ft)	RQD (%)		ELEV. (ft)	DEPTH (ft)
515	513.6	13.9	1.4	N=60/0.0 2:45 2:00/0.4	(1.4)	(1.2)		(6.4)	(5.8)		515.0 Begin Coring @ 13.9 ft CRYSTALLINE ROCK	
510	508.6	20.3	5.0	3:30 3:00 2:30 3:15	(5.0)	(4.6)		100%	91%		510.0 Blue-gray, very slightly weathered to fresh, very hard, close to moderately close fracturing, META-DIORITE 5 joints at 45° 1 joint at 85°	
505	503.6	25.3	5.0	3:15 3:00 3:30 7:15 5:00	(3.3)	(0.9)		(4.3)	(0.9)		505.0 Brown and blue-gray, severe to slight weathering, hard, close to very close fracturing, META-DIORITE (portions of rock highly broken, most joint orientations not discernible) 2 joints at 45° 24.4-25.3ft: Slightly to very slightly weathered 25.3-27.7ft: Weathered rock zone	
500	498.6	30.3	5.0	3:15 3:00 3:15 4:00 3:00	(3.5)	(2.6)		(12.6)	(12.6)		500.0 Blue-gray, very slightly weathered to fresh, very hard, wide fracturing, META-DIORITE 1 joint at 40°	
495	493.6	35.3	5.0	3:30 3:00 2:45 2:15	(5.0)	(5.0)	RS-3	100%	100%		495.0 RS-3: RMR = 77	
490	488.6	40.3	5.0	3:00 3:00 2:45 2:45	(5.0)	(5.0)		100%	100%		490.0 Boring Terminated at Elevation 488.6 ft in Crystalline Rock: META-DIORITE	

NCDOT BORE SINGLE_B4400_GEO_BRD0160_GINT.GPJ_NC_DOT.GDT_4/5/12

CORE PHOTOGRAPHS

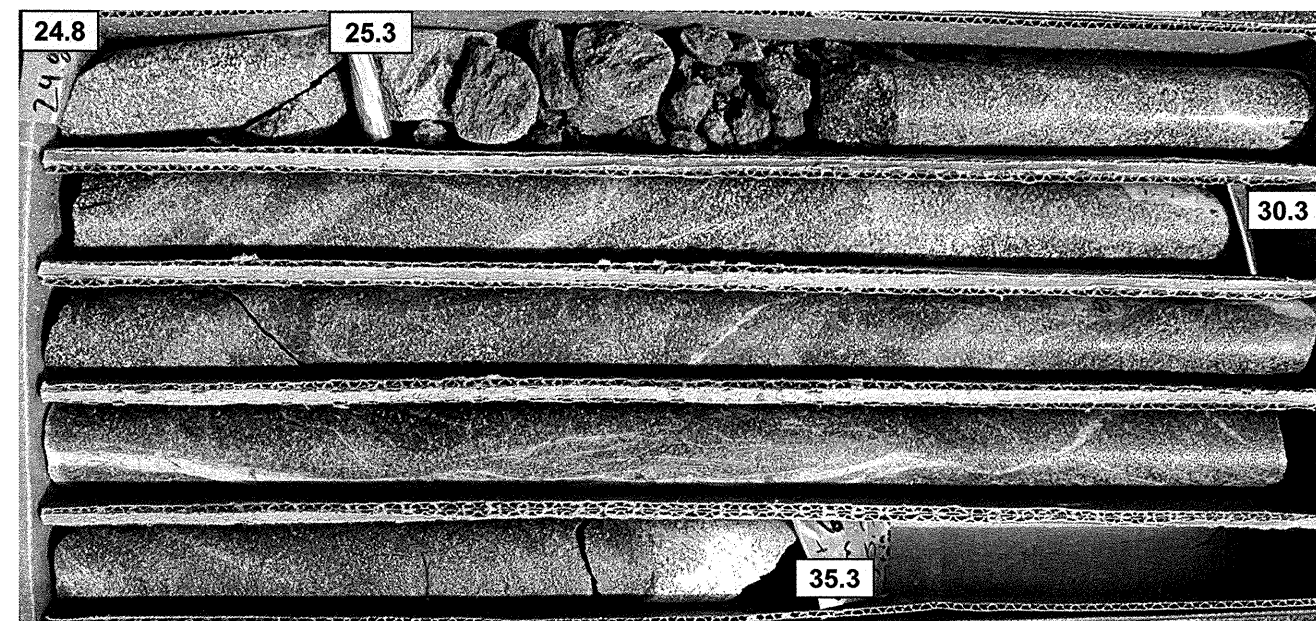
B2-B

BOX 1: 13.9 - 24.8 FEET



B2-B

BOXES 2 & 3: 24.8 - 40.3 FEET



NC DOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33680.1.1	TIP B-4400	COUNTY ALAMANCE	GEOLOGIST Howard, J. P.
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 17+63	OFFSET 8 ft LT	ALIGNMENT -L-
COLLAR ELEV. 542.6 ft	TOTAL DEPTH 25.9 ft	NORTHING 811,099	EASTING 1,848,836
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER White, D. A.	START DATE 02/23/12	COMP. DATE 02/23/12	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				
545													GROUND SURFACE	0.0
540	542.0	0.6	9	8	8							D	ROADWAY EMBANKMENT ASPHALT and ABC stone	0.6
	538.6	4.0	3	2	6							M	Orange, sandy CLAY (A-6) with trace gravel	
535	533.6	9.0	3	6	4							M		
530	528.6	14.0	4	7	14							D	RESIDUAL Tan, green and gray, sandy SILT (A-4), saprolitic	13.0
525	523.6	19.0	5	7	9							D		
520	518.6	24.0	100/0.3										WEATHERED ROCK META-DIORITE	23.0
	516.7	25.9	60/0.0										WEATHERED ROCK META-DIORITE	25.9
													Boring Terminated with Standard Penetration Test Refusal at Elevation 516.7 ft on Crystalline Rock: META-DIORITE	

WBS 33680.1.1	TIP B-4400	COUNTY ALAMANCE	GEOLOGIST Howard, J. P.
SITE DESCRIPTION Bridge No. 160 on SR 1122 (Euliss Rd.) over South Prong of Stinking Quarter Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+63	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. 542.7 ft	TOTAL DEPTH 23.6 ft	NORTHING 811,088	EASTING 1,848,824
DRILL RIG/HAMMER EFF./DATE MAC1145 CME-55LC 87% 10/29/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER White, D. A.	START DATE 02/23/12	COMP. DATE 02/23/12	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				
545													GROUND SURFACE	0.0
540	542.7	0.0	24	10	12							D	ROADWAY EMBANKMENT Red and brown, sandy CLAY (A-6) with trace gravel	0.0
	538.8	3.9	4	3	3							M		
535	533.8	8.9	3	5	5							M		
530	528.8	13.9	9	30	23							M	RESIDUAL Tan, brown and gray, sandy SILT (A-4), saprolitic	13.0
525	523.8	18.9	3	97/0.2									WEATHERED ROCK META-DIORITE	19.4
520	519.2	23.5	60/0.1										WEATHERED ROCK META-DIORITE	21.5
													CRYSTALLINE ROCK META-DIORITE	23.6
													Boring Terminated with Standard Penetration Test Refusal at Elevation 519.1 ft in Crystalline Rock: META-DIORITE	

NCDOT BORE DOUBLE B4400_GEO_BRD0160_GINT.GPJ NC_DOT.GDT 4/10/12

<i>ROCK TEST RESULTS</i>							
SAMPLE NO.	OFFSET	STATION	BORING NO.	DEPTH INTERVAL	UNIT WT. lbs/cf	UNCONFINED COMPRESSIVE STRENGTH KSI	ROCK MASS RATING
RS-1	16 LT	16+53	B1-A	36.1-37.3	177.3	2.13	55
RS-2	16 LT	16+53	B1-A	43.5-44.2	179.1	6.52	47
RS-3	18 RT	17+14	B2-B	35.3-36.6	184.4	25.8	77



Looking up station left of -L- from End Bent 1



Looking right to left along Bent 1



Looking up station right of -L- from End Bent 1



Looking left to right along Bent 2



Looking down station left of -L- from End Bent 2



Looking down station right of -L- from End Bent 2