

PKX

PROJECT: 49010.1.STR07TIB ID: C-4901C

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	C-4901C	1	41

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. C-4901C F.A. PROJ. _____
 COUNTY DAVIDSON
 PROJECT DESCRIPTION BRIDGE ON SR 2005 BETWEEN
SR 2123 AND SR 2014
 SITE DESCRIPTION TURNER RD (SR 2005) GRADE SEPARATION
OVER NORFOLK SOUTHERN RAILROAD
"BOWERS TO LAKE"

CAUTION NOTICE

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PERSONNEL

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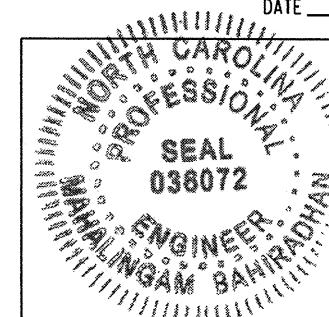
T. E. EVANS

INVESTIGATED BY T. E. EVANS

CHECKED BY M. BAHIRADHAN

SUBMITTED BY FALCON

DATE MAY 18, 2012



Signature
05/18/2012

DRAWN BY: J. R. HAMM / T. E. EVANS

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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. C-4901C	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, 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. 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 (CP) 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. FISSELE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOOD - 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS 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 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		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 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.	
COMPRESSIONIBILITY		PERCENTAGE OF MATERIAL		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.	
GROUND WATER		MISCELLANEOUS SYMBOLS		MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <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>	
CONSISTENCY OR DENSENESS		GROUND WATER		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.	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD		ROCK HARDNESS	
GENERAL GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	
GENERAL SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		ABBREVIATIONS		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.	
TEXTURE OR GRAIN SIZE		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		MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SLI - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY		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.	
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053		EQUIPMENT USED ON SUBJECT PROJECT		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.)		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-55 PORTABLE HOIST CME-850		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 3 * STEEL TEETH TRICONE * TUNG-CARB. CORE BIT		ROCK HARDNESS	
SOIL MOISTURE - CORRELATION OF TERMS		HAMMER TYPE: AUTOMATIC MANUAL		CORE SIZE: B N H		ROCK HARDNESS	
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		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.	
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		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.	
- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		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.	
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		PLASTICITY		INDURATION		INDURATION	
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		PLASTICITY INDEX (PI) DRY STRENGTH		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.	
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.		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.	



May 18, 2012

Mr. Len Hill, P.E.
AECOM
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607

Re: Structure Subsurface Investigation Report
TIP No.: C-4901C
WBS No.: 49010.1.STR07T1B
County: Davidson
Project Description: Bridge on SR 2005 between SR 2123 and SR 2014
Site Description: Turner Rd (SR 2005) Grade Separation over Norfolk Southern Railroad "Bowers to Lake"
Falcon Project No.: G11019.00

Dear Mr. Hill,

As authorized, Falcon Engineering, Inc. (Falcon) has completed the geotechnical subsurface investigation for the proposed Turner Road grade separation near Lexington in Davidson County, North Carolina. A site vicinity map is shown on Sheet 8. Our investigation was performed in general accordance with our proposal number F2011-051, dated March 25, 2011 and subsequent contract amendment for additional services. This report includes the results of our field and laboratory testing, geotechnical recommendations for foundations, site and boring location plans, profiles and cross sections showing subsurface conditions, boring and core logs, and rock core photographs.

PROJECT DESCRIPTION

The existing at-grade crossing between the Norfolk Southern Railroad "Bowers to Lake" and Turner Road (SR 2005) will be replaced with a new bridge structure in the same vicinity. Recommendations for the realigned approach roadway are provided under a separate cover. We understand modifications of the existing rail corridor will also be completed under a separate scope by others. The new bridge structure will be located east of the existing crossing, and an existing bridge structure over Hamby Creek. The new structure will traverse both features with a total of 6 spans (7 bents). The proposed structure will be approximately 544-foot-long and 37-foot-wide. The End Bents will be supported by two rows of piles; one vertical and one battered. Interior Bents will be supported by 54-inch diameter drilled shaft foundations. Due to the orientation of the rail corridor relative to Hamby Creek, there are two unique bent arrangements for the structure, with different skew angles and foundation orientations. A detailed summary of the bent and foundation arrangements is provided in the table below.

Table 1: Summary of Proposed Foundation System

Bent	Station	Total Number of Piles/Shaffs	Foundation Type and Size	Pile/Shaff Spacing (Center to Center)	Top of Drilled Shaft Elevation (feet, NAVD)	Bottom of Cap Elevation (feet, NAVD)
End Bent 1	20+71.90	6 vertical 6 battered	HP12x53 Steel Piles	8'-0"	N/A	688.0*
Bent 1	21+35.40	2	54-inch diameter Drilled Shafts	24'-0"	663.0	688.7
Bent 2	22+47.90	2	54-inch diameter Drilled Shafts	24'-0"	649.0	687.8
Bent 3	22+90.40	3	54-inch diameter Drilled Shafts	16'-3"	647.0	687.8
Bent 4	24+15.40	3	54-inch diameter Drilled Shafts	16'-3"	643.0	685.6
Bent 5	25+15.40	3	54-inch diameter Drilled Shafts	16'-3"	646.0	683.3
End Bent 2	25+15.40	8 vertical 8 battered	HP12x53 Steel Piles	6'-10"	N/A	683.0*

* Elevation assumed by Falcon based on drawings provided by AECOM.

Loads for driven pile and drilled shaft foundations at each bent were provided by AECOM. The provided loads are attached to this report in Appendix A.

Fills on the order of 30 feet in height are proposed at both approaches. Slopes at the end bents are proposed at 2 Horizontal (H) to 1 Vertical (V). The end bent 1 slope will be protected by 4" concrete slope protection. The end bent 2 slope will be protected by class II rip-rap with filter fabric.



SITE DESCRIPTION/GEOLOGY

The existing alignment of Turner Road trends generally north/south leading up to either side of the at-grade crossing. Approaching the site from the south, Turner Road turns west, crosses Hamby Creek, turns back to cross the railroad, then resumes its northward trajectory. The proposed alignment will instead follow a relatively straight northward trajectory, to the east of the existing alignment. On the south side of Hamby Creek, a rolling pasture occupies the location of the proposed alignment. A previous roadway embankment, appearing to be up to 15 feet high, is present along the proposed approach and end bent 2 slope. Underground utilities including a water line and natural gas line approximately parallel this embankment. This pasture extends all the way to the banks of Hamby Creek with the exception of a small wooded area in the vicinity of bent 5.

On the north side of Hamby Creek, the area between the creek and railroad is steeply sloped, heavily wooded, and contains isolated depressed areas which appear to hold water for a significant portion of the year. Bents 2 and 3 are located within this area. Bent 1 is located north of the existing railroad tracks. This area is relatively clear adjacent to the existing rail corridor. End bent 1 is located within a wooded area. In addition, an existing overhead power and natural gas easement traverses the proposed approach fills near end bent 1.

Immediately east of the proposed grade separation, an existing rail bridge carries the railroad over Hamby Creek. The structure consists of a concrete arch bridge, with 2 approximately 50-foot arch spans crossing Hamby Creek. We understand a geotechnical investigation has been conducted by others to assess the need for replacing or expanding this structure to accommodate the planned rail corridor improvements.

According to the **Geologic Map of North Carolina** (1985), the proposed site is located within the Charlotte Belt region of the Western Piedmont of North Carolina. Specifically, bedrock at the site is noted to consist of metamorphosed granitic rock (**CZg**), consisting of megacrystic, well foliated rocks which locally contain hornblende.

FIELD EVALUATION PROCEDURE

Evaluation of the subsurface conditions for the project consisted of drilling fourteen (14) Standard Penetration Test (SPT) borings. Two (2) borings were drilled near each bent location. An additional boring was drilled within the end bent 2 approach slope. Rock coring was performed in the nine (9) interior bent borings in order to verify the presence, quality, and composition of rock and to assist in the design of drilled shaft foundations. Borings were performed using a CME-55 all-terrain-vehicle (ATV) mounted drill rig, or a CME-850, rubber-tracked vehicle mounted drill rig equipped with 2 1/4-inch inside diameter hollow-stem augers, mud rotary drilling equipment, an automatic hammer, and NQ2 sized, wire-line type diamond-impregnated rock coring equipment. SPT borings and soil/rock core sampling were performed in general accordance with the American Association of State Highway Transportation Officials (AASHTO T-206 and T-225).

Soil and rock core samples were obtained from the borings and visually classified in the field before being placed in moisture-proof containers and transported to our laboratory. Groundwater measurement readings were taken within each borehole with a weighted 100-foot measuring tape from a reference location at the top of each boring. Readings were recorded immediately

after boring termination, and again after a waiting period of at least 24 hours before being backfilled.

SUBSURFACE AND GROUNDWATER CONDITIONS

Based on the results of our borings, subsurface conditions generally consist of residual soil, underlain by weathered rock (WR) and crystalline rock (CR) materials north of Hamby Creek. South of Hamby Creek, a relatively wide, deep alluvial plain is present above residual soil materials. Some fills were encountered at the site as well, particularly in the vicinity of end bent 2 where a previous roadway embankment is present. Isolated fills were encountered in other locations as well.

Topsoil and rootmat was encountered in the majority of the borings and ranged in thickness from approximately 2 to 8 inches. Artificial Fill and Roadway Embankment soils encountered consisted of very loose to medium dense silty sands (A-2-4) to medium stiff to stiff silts and clays with varying amounts of sands (A-4, A-6, A-7-5) with trace organics, gravel, and debris. Alluvial materials were encountered south of Hamby Creek only, extending beyond end bent 2. Alluvial materials encountered consisted of very loose to loose, sands, gravels, and silty sands (A-1-b, A-2-4, A-3) frequently interlayered with very soft to stiff silts and clays (A-4, A-6, A-7). Weathered rock (WR) and crystalline rock (CR) materials were penetrated beneath residual soils, consisting of metamorphosed granitic rock. Thickness of WR generally increased with distance from Hamby Creek up to approximately 7 feet. WR was not encountered in some borings. CR was cored from interior bent borings to varying depths in accordance with NCDOT drilled shaft criteria. Cored materials consisted of severely weathered to fresh, medium hard to very hard, very closely to moderately closely fractured, metamorphosed granitic rock. This material grades between gneiss and schist, with megacrystic felsic compositional bands up to a few feet thick.

Groundwater measurements were obtained immediately after boring termination. The measured groundwater ranged in elevation from approximately 641 to 648 feet, NAVD. Based on the Bridge Scour Report (BSR) provided to us by AECOM, the normal water surface elevation in Hamby Creek is approximately 640 feet, NAVD.

LABORATORY TESTING

Representative split-spoon and bulk samples were selected from soil test borings to verify visual field classifications and determine soil index properties. A total of twelve (12) samples were analyzed in our laboratory for natural moisture content, grain size analysis, and Atterberg limits. Additionally, six (6) representative rock core samples were subjected to unconfined compressive strength testing. The results of these laboratory tests can be found on Sheet 39 of this report. All testing was performed in accordance with the following American Society for Testing and Materials (ASTM) and AASHTO procedures:

- AASHTO T-88 (as modified by NCDOT) "Particle Size Analysis of Soil"
- AASHTO T-89 (as modified by NCDOT) "Determining the Liquid Limits of Soil"
- AASHTO T-90 "Determining the Plastic Limit and Plasticity of Soils"
- AASHTO T-265 "Laboratory Determination of Moisture Content of Soils"
- ASTM D-2938-86 "Standard Test Method for Unconfined Compressive Strength of Intact Rock"



FOUNDATION RECOMMENDATIONS

The foundation recommendations presented below are based on the service and strength limit state loads, plans, hydraulic report and profiles provided by AECOM.

Pile cap elevations at the end bents were not provided, therefore they were assumed at elevations 688 and 683 feet, NAVD, at end bents 1 and 2, respectively. New fills on the order of 30 feet are proposed at both end bents. We have assumed that approach fills will be placed prior to driving end bent piles. Due to the presence of compressible fine-grained alluvial soil layers and buried organics at the end bent 2 approach, we recommend a waiting period of one month be included in the schedule for the majority of the settlements to be completed. We also recommend a waiting period of one month at the end bent 1 approach. In addition, we assume all end bent piles will be driven after the waiting period is completed at both approaches.

End piles will be driven to weathered rock. A resistance factor of 0.6 was used when estimating the required driving resistance. In addition to a single row of vertical piles, we understand a second row of end bent piles will be battered to provide resistance against lateral forces. The number of vertical and battered piles at each end bent will be same. Therefore, vertical end bent piles are not anticipated to carry lateral forces or moments. End bent piles are not otherwise designed to resist lateral forces. Based on the provided plans, we understand piles will be battered at a 3H:12V slope. We understand the maximum tension and compression loads provided by AECOM accounts for battered piles, and lateral forces will not subject the battered piles to loads exceeding those provided. Please refer to Sheet 6 for pile foundation recommendations and plan notes. Pile pay item quantities are presented on Sheet 7.

Required drilled shaft axial capacity will be achieved by a combination of side friction and end bearing in WR and CR. Drilled shafts will require embedment into competent rock materials to achieve lateral capacity and shaft fixity. Lateral load analyses for the provided loads were performed using LPILE v5.0 using the service limit state and strength limit state loads provided by AECOM for each bent. LPILE v5.0 performs lateral analyses by applying lateral forces and moments at the top of the shaft in two dimensions. Based on our LPILE analysis, the maximum deflection at the top of the shafts under the service limit state loads varied between 0.06 and 0.34 inches. The maximum deflection at the top of the shafts under strength limit state loads varied between 0.11 and 0.80 inches. Please refer to Sheet 6 for drilled pier foundation recommendations and plan notes. Drilled pier pay item quantities are presented on Sheet 7.

All drilled shaft foundations should be inspected in accordance with the NCDOT *Drilled Pier Inspection Manual*. We understand this will be the responsibility of others. However, Falcon can provide geotechnical design support during construction if requested in order to ensure compliance with the design.

Based on the preliminary general drawing provided to us by AECOM, end bent slopes are proposed at 2H:1V with concrete slope protection and class II rip-rap with filter fabric slope protection at end bents 1 and 2, respectively. Approach embankment fills shall be placed in accordance with NCDOT Standard Specifications for Roads and Structures (NCDOT Specifications).

New fills will be placed over top of the existing gas and water pipes at the end bent approaches. During our field investigation, we observed monuments and temporary markings which indicated

the water line follows an alignment differing from that shown on the project drawings provided to us. Based on the end bent boring data, we anticipate approximately 1 to 2 inches and 4 to 6 inches of settlement at the original ground surface in the vicinity of the gas main locations (shown on the plans) at end bents 1 and 2, respectively. Depending on the depth, exact location, installation and backfill procedures used to install the natural gas and water pipes, anticipated settlement of the surrounding soils may exceed these estimates. We recommend the owner(s) of these utilities be consulted to determine if measures need to be taken prior to construction.

CLOSURE

If any of the project information contained in this report is incorrect or has changed, please inform Falcon so that we may amend the contents of this report as appropriate.

Recommendations and evaluations provided by Falcon are based on the information provided by AECOM. Modifications of our recommendations and evaluations may be required if there are changes to the design or location of the structure or roadway. Recommendations in this report are based on data obtained from soil borings. The nature and extent of variations between borings may not become evident until construction.

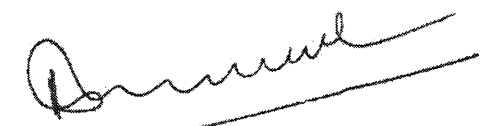
Our professional services for this project have been performed in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made. Falcon appreciates the opportunity to have provided you with geotechnical engineering services for this project. If you have any questions regarding this report, please contact our office.

Sincerely,

FALCON ENGINEERING, INC.



Jeremy R. Hamm, EI
Geotechnical Designer



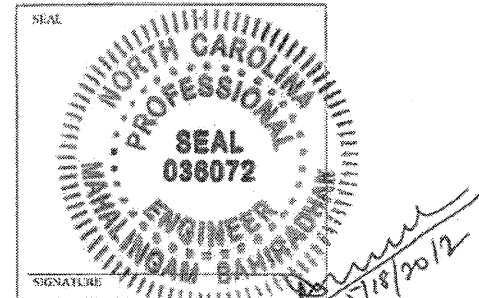
Mahalingam Bahiradhan (Bahi), PE
Senior Geotechnical Project Manager



FOUNDATION RECOMMENDATIONS

WBS # 49010.1.STR07T1B DESCRIPTION Turner Road (SR 2005) Grade Separation over
 T.I.P. NO. C-4901C Norfolk Southern Railroad "Bowers to Lake"
 COUNTY Davidson
 STATION 20+71 to 26+16-L-

	INITIALS	DATE
DESIGN	MB	05/18/12
CHECK	CN	05/18/12
APPROVAL		



	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	-L- 20+71.90	Cap on HP12x53 Steel Piles	106 tons/pile	Bottom of Cap El. = 688 ± ft Length of Pile = 45 ft Number of Vertical Piles = 6 Number of Battered Piles = 6 Pile Spacing = 8 feet 0 inches
BENT 1	-L- 21+35.40	54-inch Diameter Drilled Piers	556 tons/pier	Bottom of Cap El. = 688.7 ft Point of Fixity El. = 636.0 ft. Tip El. No Higher Than = 627.0 ft. Number of Drilled Piers = 2 Pier Spacing = 24 feet 0 inches
BENT 2	-L- 22+47.90	54-inch Diameter Drilled Piers	528 tons/pier	Bottom of Cap El. = 687.8 ft Point of Fixity El.(Lt. Pier) = 630.0 ft. Tip El. No Higher Than (Lt. Pier) = 621.0 ft. Point of Fixity El.(Rt. Pier) = 637.0 ft. Tip El. No Higher Than (Rt. Pier) = 628.0 ft. Number of Drilled Piers = 2 Pier Spacing = 24 feet 0 inches
BENT 3	-L- 22+90.40	54-inch Diameter Drilled Piers	411 tons/pier	Bottom of Cap El. = 687.8 ft Point of Fixity El.(Lt. & Ct. Piers) = 629.0 ft. Tip El. No Higher Than (Lt. & Ct. Piers) = 620.0 ft. Point of Fixity El.(Rt. Pier) = 637.0 ft. Tip El. No Higher Than (Rt. Pier) = 628.0 ft. Number of Drilled Piers = 3 Pier Spacing = 16 feet 3 inches
BENT 4	-L- 24+15.40	54-inch Diameter Drilled Piers	492 tons/pier	Bottom of Cap El. = 685.6 ft Point of Fixity El. = 624.0 ft. Tip El. No Higher Than = 615.0 ft. Number of Drilled Piers = 3 Pier Spacing = 16 feet 3 inches
BENT 5	-L- 25+15.40	54-inch Diameter Drilled Piers	441 tons/pier	Bottom of Cap El. = 683.3 ft Point of Fixity El. = 618.0 ft. Tip El. No Higher Than = 609.0 ft. Number of Drilled Piers = 3 Pier Spacing = 16 feet 3 inches
END BENT 2	-L- 26+15.40	Cap on HP12x53 Steel Piles	115 tons/pile	Bottom of Cap El. = 683 ± ft Length of Pile = 60 ft Number of Vertical Piles = 8 Number of Battered Piles = 8 Pile Spacing = 6 feet 10 inches

TIP # C-4901C

County Davidson

FOUNDATION RECOMMENDATION NOTES ON PLANS

- Piles at End Bent 1 are designed for a factored resistance of 106 Tons per pile.
- Drive piles at End Bent 1 to a required driving resistance of 177 Tons per pile.
- Piles at End Bent 2 are designed for a factored resistance of 115 Tons per pile.
- Drive piles at End Bent 2 to a required driving resistance of 192 Tons per pile.
- Testing piles with PDA during driving, restriking and redriving may be required. Engineer will determine the need for PDA testing. For PDA testing, see Section 450 of the Standard Specifications.
- For Piles, See Section 450 of the Standard Specification.
- Drilled piers at Bent No. 1 are designed for a factored resistance of 556 Tons per pier. Check field conditions for the required tip resistance of 50 TSF.
- Install drilled piers at Bent No. 1 that extend to an elevation no higher than 627.0 ft, satisfy the required tip resistance and have a penetration of at least 10 feet into rock as defined by article 411-1 of the Standard Specifications.
- Permanent steel casing may be required for drilled piers at Bent No. 1. If required, do not extend permanent casings below elevation 636 feet without prior approval from the engineer.
- Drilled piers at Bent No. 2 are designed for a factored resistance of 528 Tons per pier. Check field conditions for the required tip resistance of 50 TSF.
- Install left drilled pier at Bent No. 2 that extends to an elevation no higher than 621.0 ft, satisfies the required tip resistance, and has a penetration of at least 12 feet into rock as defined by article 411-1 of the Standard Specifications.
- Install right drilled pier at Bent No. 2 that extends to an elevation no higher than 628.0 ft, satisfies the required tip resistance, and has a penetration of at least 11 feet into rock as defined by article 411-1 of the Standard Specifications.
- Permanent steel casings may be required for drilled piers at Bent No. 2. If required, do not extend permanent casings below elevation 639 feet without prior approval from the engineer.
- Drilled piers at Bent No. 3 are designed for a factored resistance of 411 Tons per pier. Check field conditions for the required tip resistance of 50 TSF.
- Install left and center drilled piers at Bent No. 3 that extend to an elevation no higher than 620.0 ft, satisfy the required tip resistance, and have a penetration of at least 13 feet into rock as defined by article 411-1 of the Standard Specifications.
- Install right drilled pier at Bent No. 3 that extends to an elevation no higher than 628.0 ft, satisfies the required tip resistance, and has a penetration of at least 11 feet into rock as defined by article 411-1 of the Standard Specifications.
- Permanent steel casings may be required for drilled piers at Bent No. 3. If required, do not extend permanent casings below elevation 639 feet without prior approval from the engineer.
- Drilled piers at Bent No. 4 are designed for a factored resistance of 492 Tons per pier. Check field conditions for the required tip resistance of 50 TSF.
- Install drilled piers at Bent No. 4 that extend to an elevation no higher than 615.0 ft, satisfy the required tip resistance and have a penetration of at least 11 feet into rock as defined by article 411-1 of the Standard Specifications.
- Permanent steel casings may be required for drilled piers at Bent No. 4. If required, do not extend permanent casings below elevation 626 feet without prior approval from the engineer.
- Drilled piers at Bent No. 5 are designed for a factored resistance of 441 Tons per pier. Check field conditions for the required tip resistance of 50 TSF.
- Install drilled piers at Bent No. 5 that extend to an elevation no higher than 609.0 ft, satisfy the required tip resistance and have a have a penetration of at least 12 feet into rock as defined by article 411-1 of the Standard Specifications.
- Permanent steel casings may be required for drilled piers at Bent No. 5. If required, do not extend permanent casings below elevation 620 feet without prior approval from the engineer.
- SID inspections may be required for drilled piers. The Engineer will determine the need for SID inspections. For SID inspection, see Section 411 of the Standard Specifications.
- CSL tubes are required and CSL testing may be required for drilled piers. The Engineer will determine the need for CSL testing. For Crosshole Sonic Logging, see Section 411 of the Standard Specifications.
- For drilled piers, see Section 411 of the Standard Specifications.
- Scour critical elevation for Bent No. 2 is 648 feet, NAVD. Scour critical elevations are used to monitor possible scour problems during the life of the structure.
- Scour critical elevation for Bent No. 3 is 645 feet, NAVD. Scour critical elevations are used to monitor possible scour problems during the life of the structure.
- Scour critical elevation for Bent No. 4 is 640 feet, NAVD. Scour critical elevations are used to monitor possible scour problems during the life of the structure.

FOUNDATION RECOMMENDATION COMMENTS

- A waiting period of one month will be required for both end bent approach fills.
- End bent piles shall be driven after the waiting period is completed.
- End slopes of 2:1(H:V) are OK with slope protection.
- Maximum lateral deflections at the top of the interior bent columns under strength limit state loads ranged between 1.1 and 2.9 inches.
- Maximum lateral deflections at the top of the interior bent columns under service limit state loads ranged between 0.6 and 2.6 inches.
- Design scour elevation at Bent 1 was not provided and Bent 5 is protected from scour.
- Design scour elevation at Bent 2 is 649 feet.
- Design scour elevation at Bent 3 is 647 feet.
- Design scour elevation at Bent 4 is 641 feet.

DRILLED PIER PAY ITEM QUANTITIES

WBS ELEMENT 49010.1.STR07T1B DATE 3/27/2012
 TIP NO. C-4901C DESIGNED BY MB
 COUNTY Davidson CHECKED BY CN
 STATION 20+71 to 26+16-L-

DESCRIPTION Turner Road (SR 2005) Grade Separation over Norfolk Southern Railroad "Bowers to Lake"

NUMBER OF BENTS WITH DRILLED PIERS 5
 NUMBER OF DRILLED PIERS PER BENT 2 or 3
 NUMBER OF END BENTS WITH DRILLED PIERS _____
 NUMBER OF DRILLED PIERS PER END BENT _____

BENT # OR END BENT #	DRILLED PIER PAY ITEMS				
	PERMANENT STEEL CASING FOR 54" DIA. DRILLED PIER (yes/no/maybe)	54" DIA. DRILLED PIERS NOT IN SOIL (per linear ft/m)	SPT TESTING (per each)	SID INSPECTION* (per each)	CROSSHOLE SONIC LOGGING (per each)
Bent 1	Maybe	22			
Bent 2	Maybe	24			
Bent 3	Maybe	42			
Bent 4	Maybe	36			
Bent 5	Maybe	39			
TOTALS		163	0	1	5

* If SID inspections are required with a Note on Plans, show "SID Inspection" pay item per bent or end bent. If SID inspections may be required with a Note on Plans, show "SID Inspection" pay item as a total per structure only (do not show per bent or end bent).

Notes:
Blanks or "no" represent quantity of zero.

If permanent steel casing is required or may be required, Structure Design should calculate the pay item quantity, "Permanent Steel Casing for ___ Dia. Drilled Pier", as the difference between the top of drilled pier elevation or the top of permanent steel casing elevation (whichever is lower) and the elevation the permanent steel casing can not extend below as shown with a Note on Plans.

Structure Design should determine the pay item quantity, "___ Dia. Drilled Piers in Soil", based upon the total drilled pier length per bent or end bent minus the "___ Dia. Drilled Piers not in Soil" per bent or end bent shown in the table above.

Show "Crosshole Sonic Logging" pay item as a total only equal to the anticipated number of drilled piers to be CSL tested. Crosshole Sonic Logging (CSL) tests are required for most bridges with drilled piers. CSL tests and tubes may be omitted by not including the CSL provision in the Contract if, based on the subsurface conditions, there is a low risk of drilled pier construction problems.

PILE PAY ITEMS

(For 2012 Lettings and Later - Revised 4/18/11)

WBS ELEMENT 49010.1.STR07T1B DATE 3/27/2012
 TIP NO. C-4901C DESIGNED BY MB
 COUNTY Davidson CHECKED BY CN
 STATION 20+71 to 26+16-L-

DESCRIPTION Turner Road (SR 2005) Grade Separation over Norfolk Southern Railroad "Bowers to Lake"

NUMBER OF BENTS WITH PILES _____
 NUMBER OF PILES PER BENT _____
 NUMBER OF END BENTS WITH PILES _____
 NUMBER OF PILES PER END BENT _____

Only required for
"Predrilling for Piles" &
"Pile Excavation" Pay

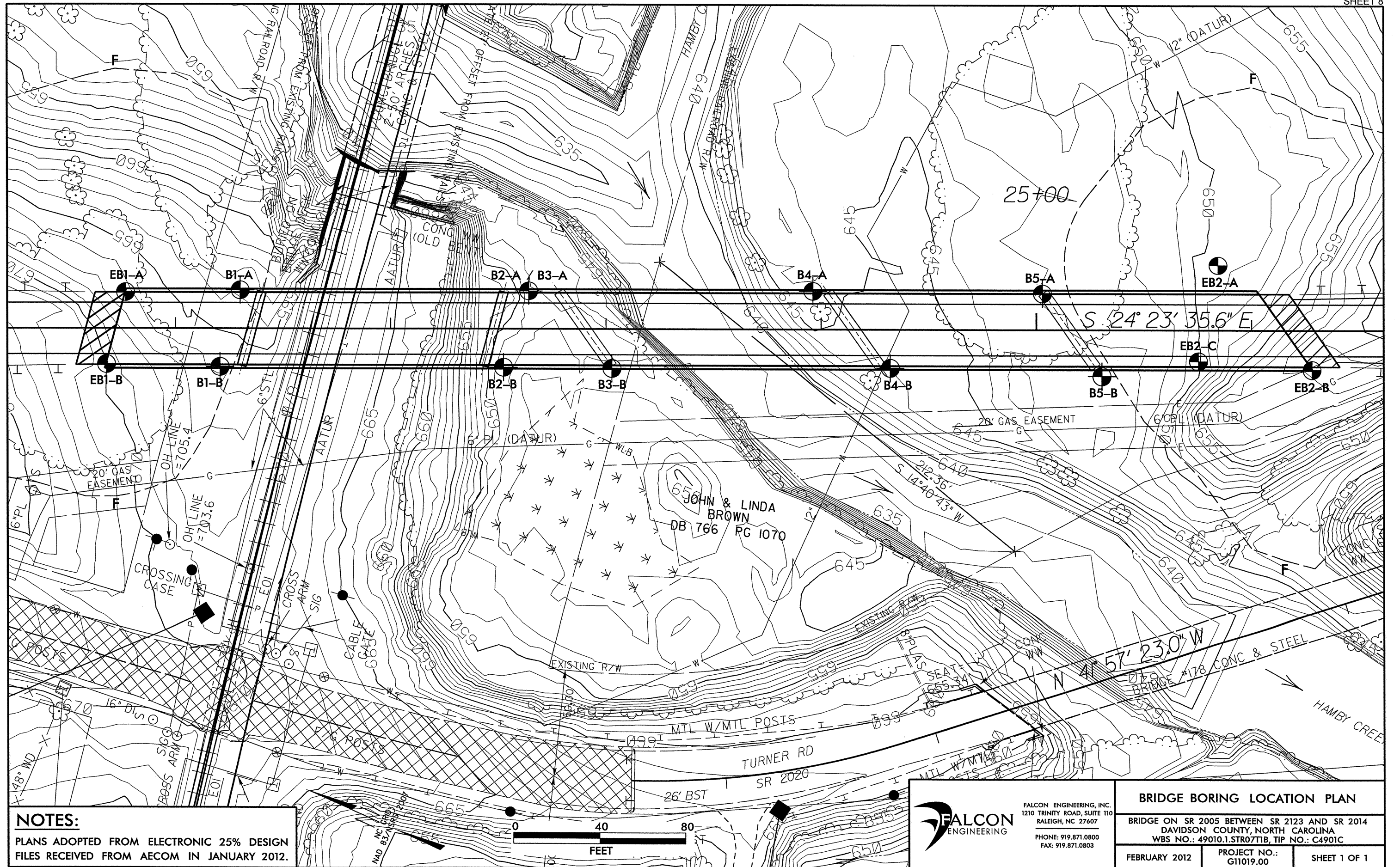
Bent # or End Bent #	PILE PAY ITEM QUANTITIES						PDA Testing (per each)
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft)		
					In Soil	Not In Soil	
End Bent 1	No						
End Bent 2	No						
TOTALS			0	0	0	0	1

Notes:
Blanks or "no" represent quantity of zero.

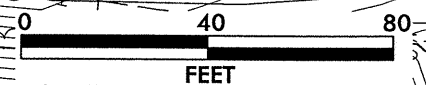
If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles.

If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles.

If PDA testing may be required, show quantities of "PDA Testing" on the substructure plans as totals only. If PDA testing is required, show quantities of "PDA Testing" on the substructure plans for each bent or end bent.

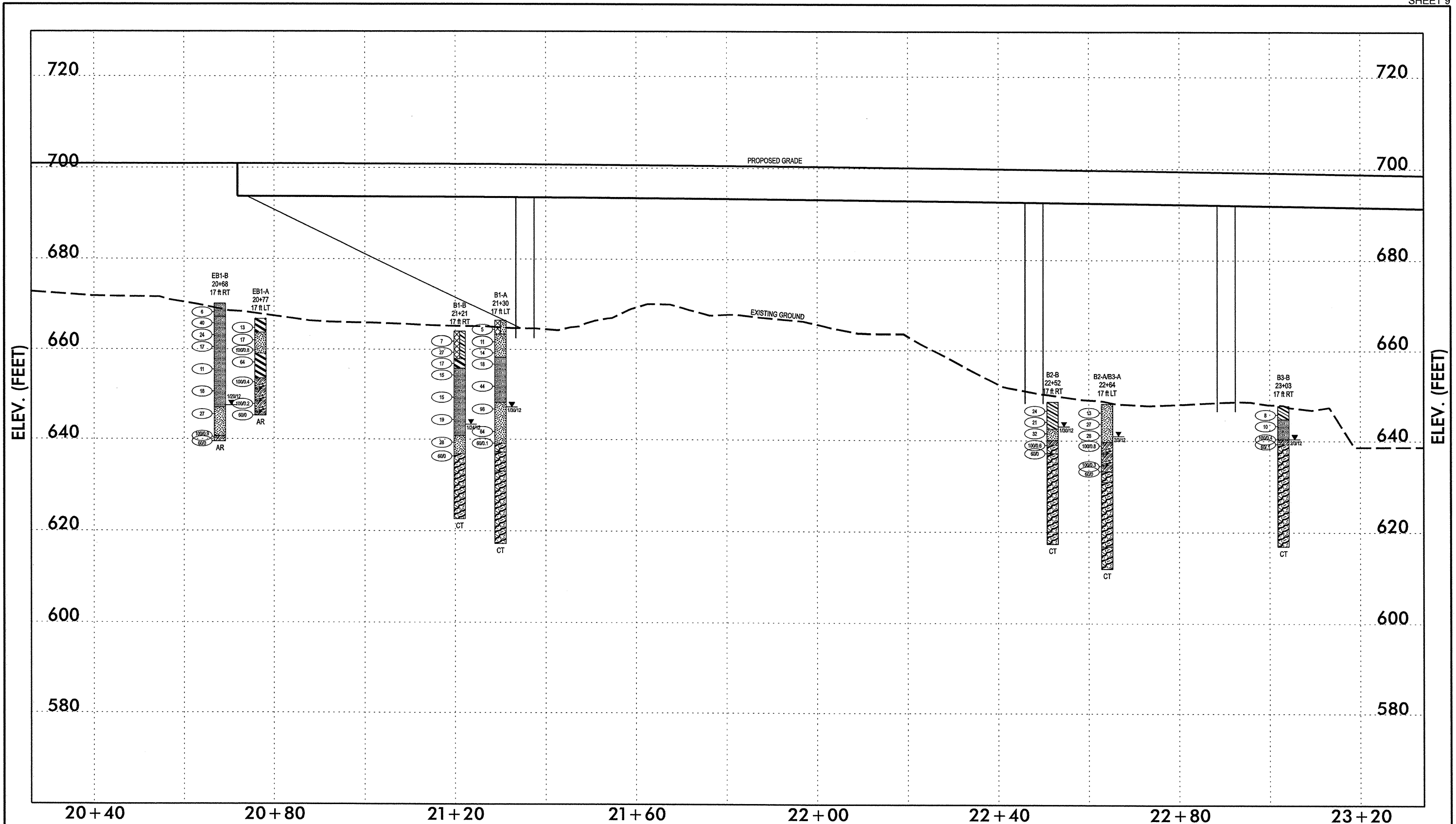


NOTES:
 PLANS ADOPTED FROM ELECTRONIC 25% DESIGN
 FILES RECEIVED FROM AECOM IN JANUARY 2012.



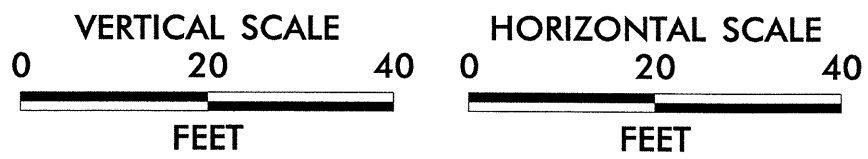
FALCON ENGINEERING, INC.
 1210 TRINITY ROAD, SUITE 110
 RALEIGH, NC 27607
 PHONE: 919.871.0800
 FAX: 919.871.0803

BRIDGE BORING LOCATION PLAN		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C4901C		
FEBRUARY 2012	PROJECT NO.: G11019.00	SHEET 1 OF 1



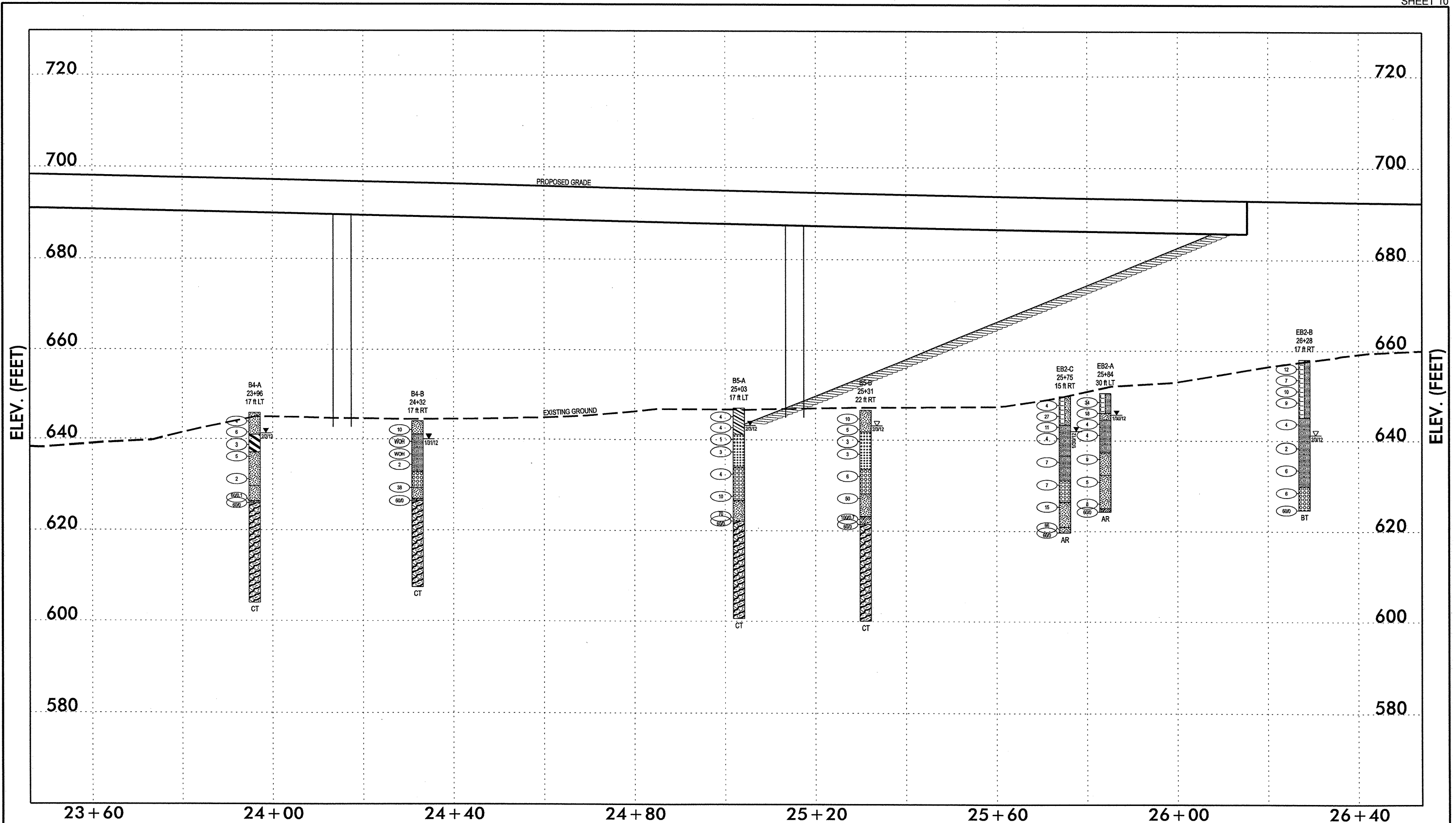
NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS INTERPOLATED FROM THE CROSS SECTIONS AT CENTERLINE WITH THE BORINGS PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



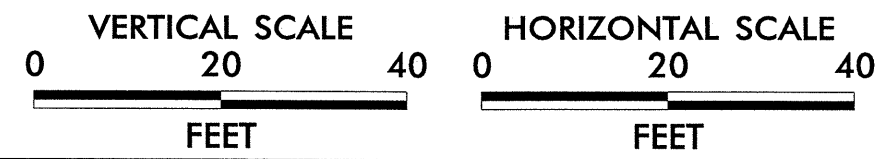
FALCON ENGINEERING
FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE PROFILE ALONG -L-		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 1014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 1 OF 2



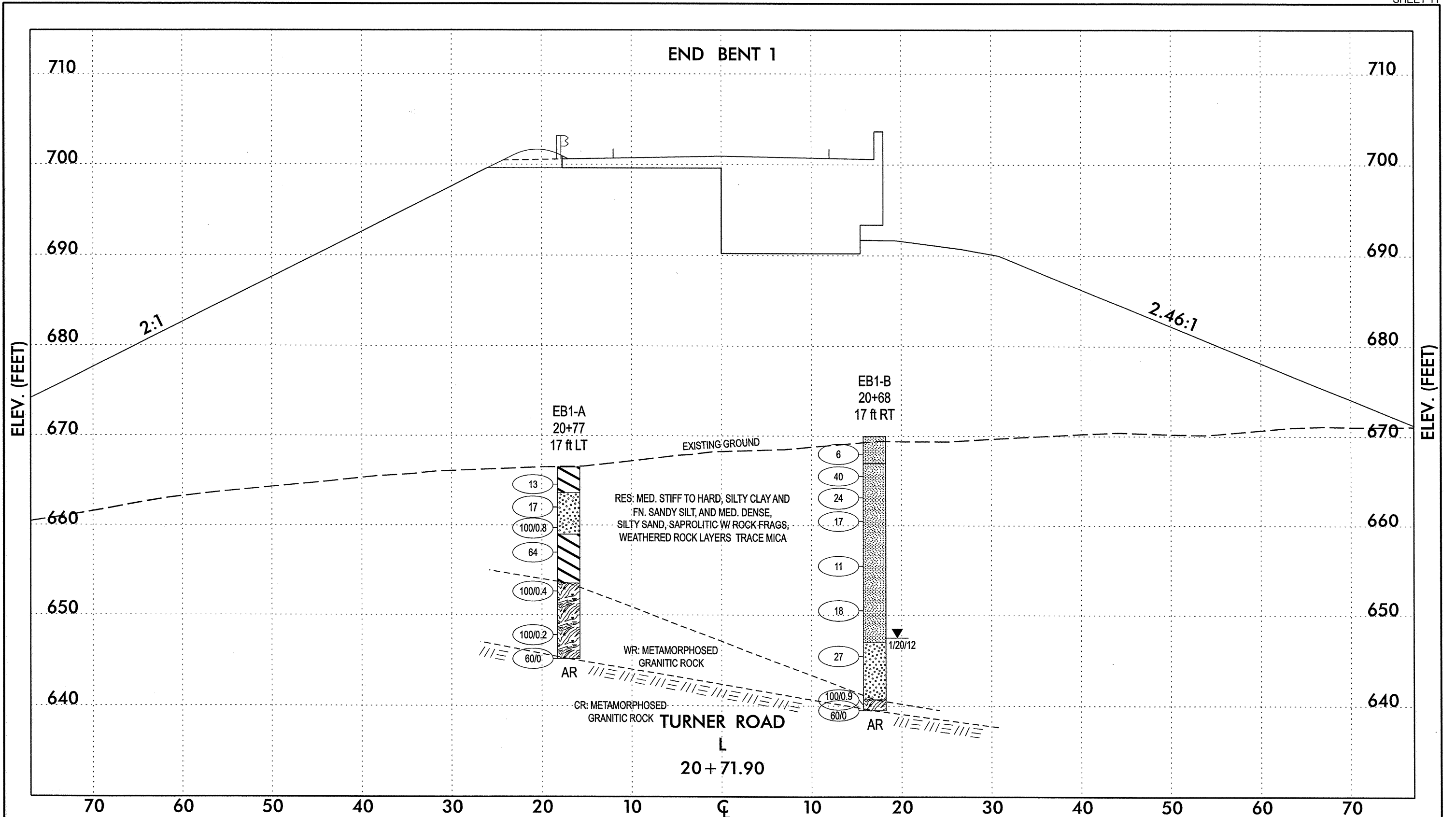
NOTES:

- GROUNDLINE PROFILE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



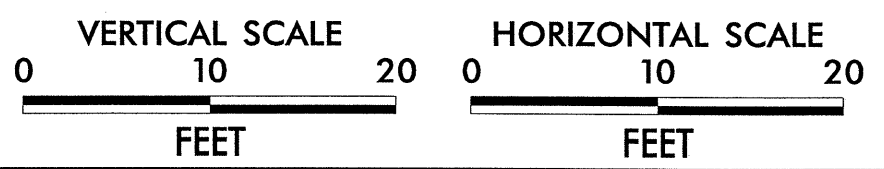
FALCON ENGINEERING
FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE PROFILE ALONG -L-		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 1014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 2 OF 2



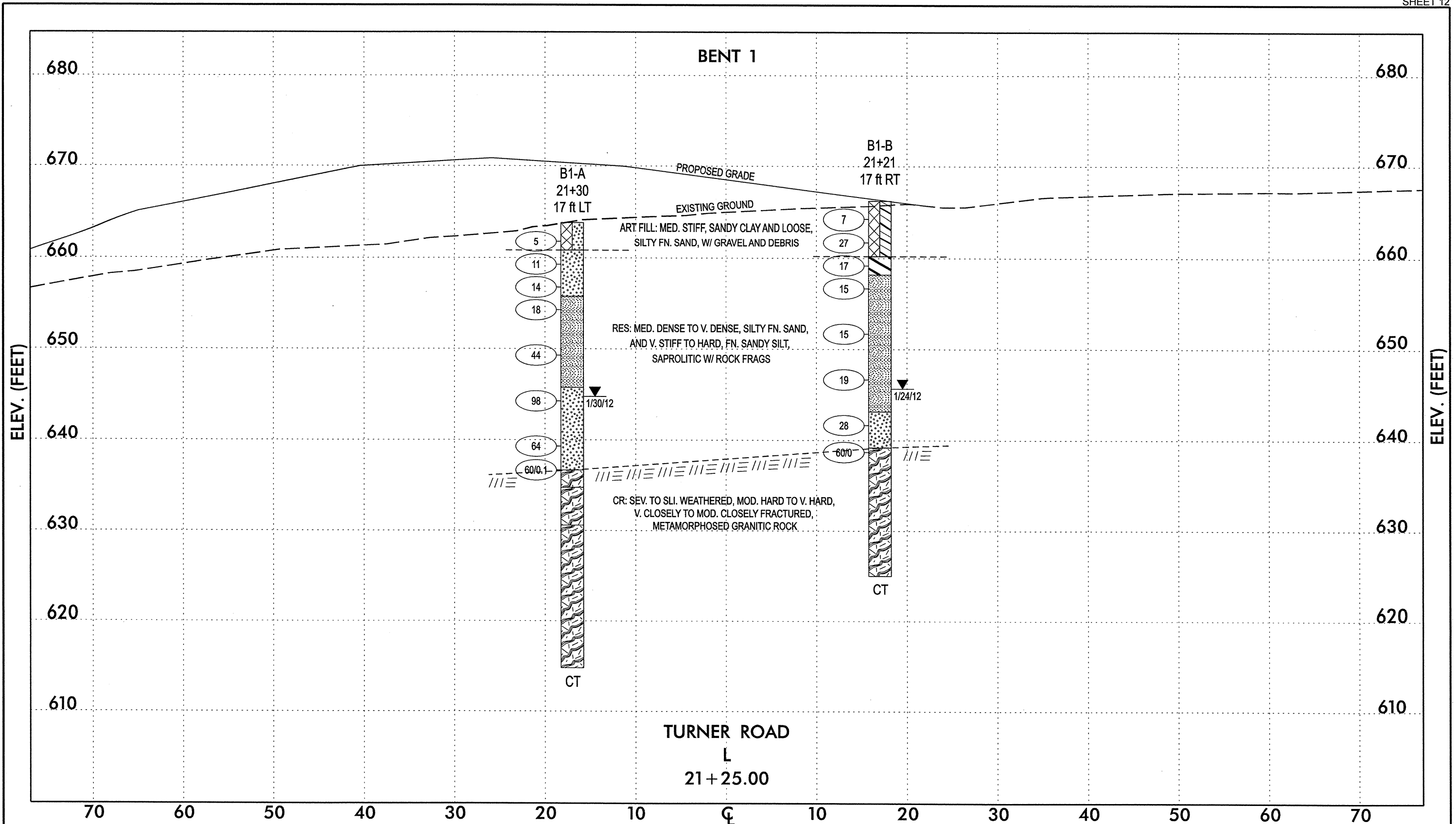
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- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



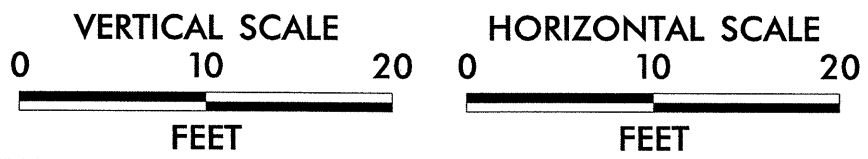
FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 1 OF 7



NOTES:

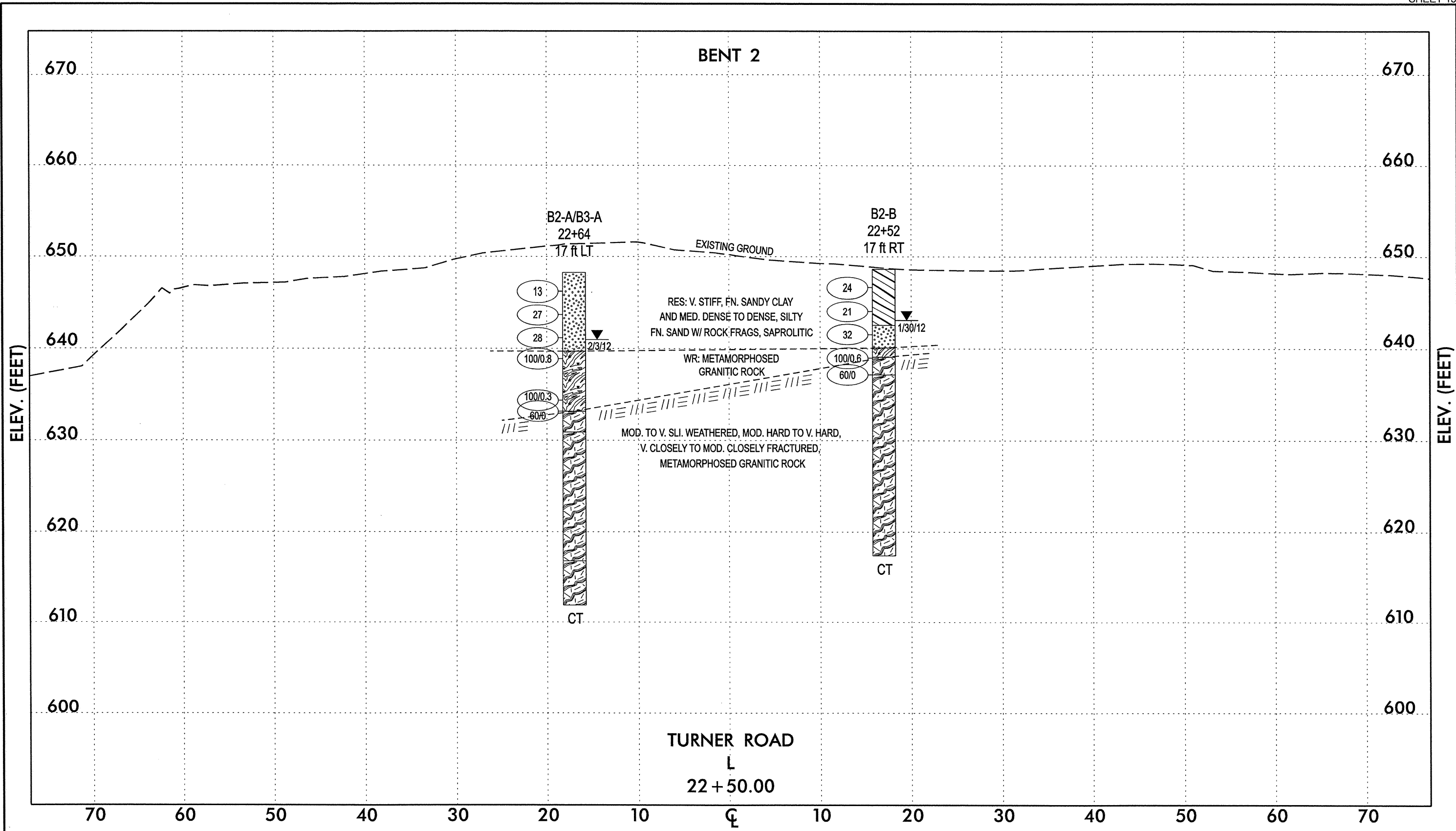
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- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



FALCON ENGINEERING

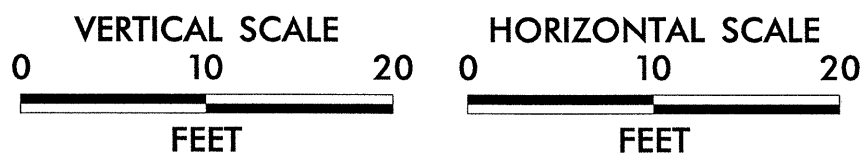
FALCON ENGINEERING, INC.
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RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 1014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 2 OF 7



NOTES:

- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES

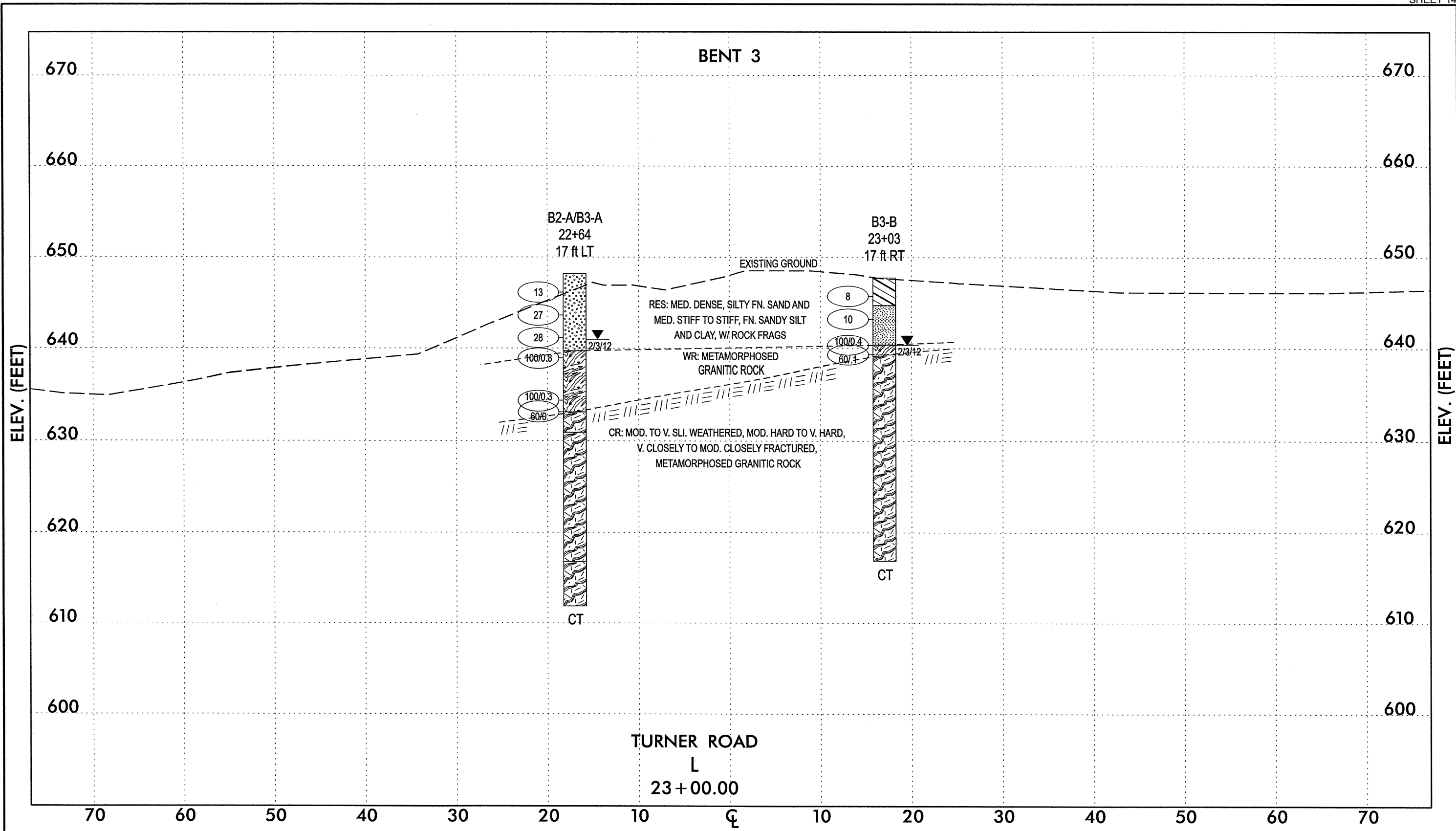


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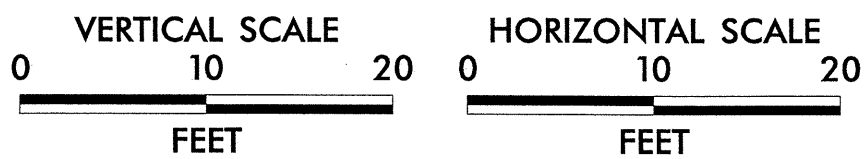
PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 3 OF 7



NOTES:

- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES

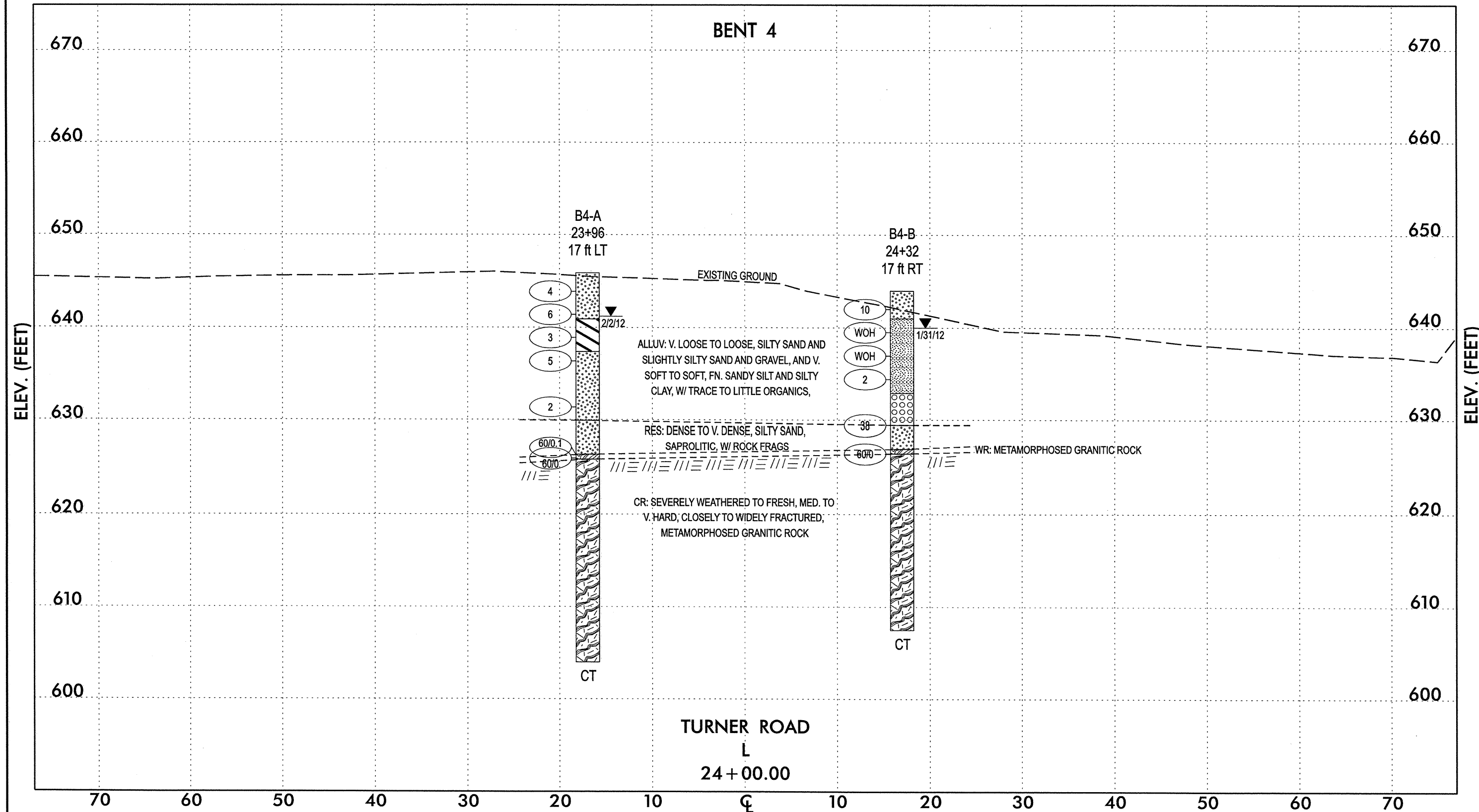


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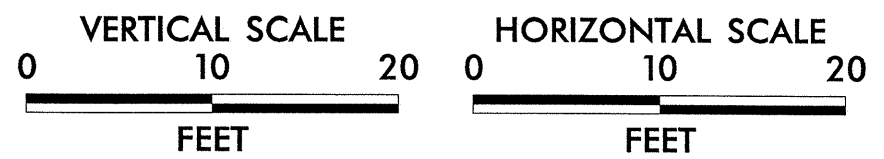
SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 1014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 4 OF 7

BENT 4



NOTES:

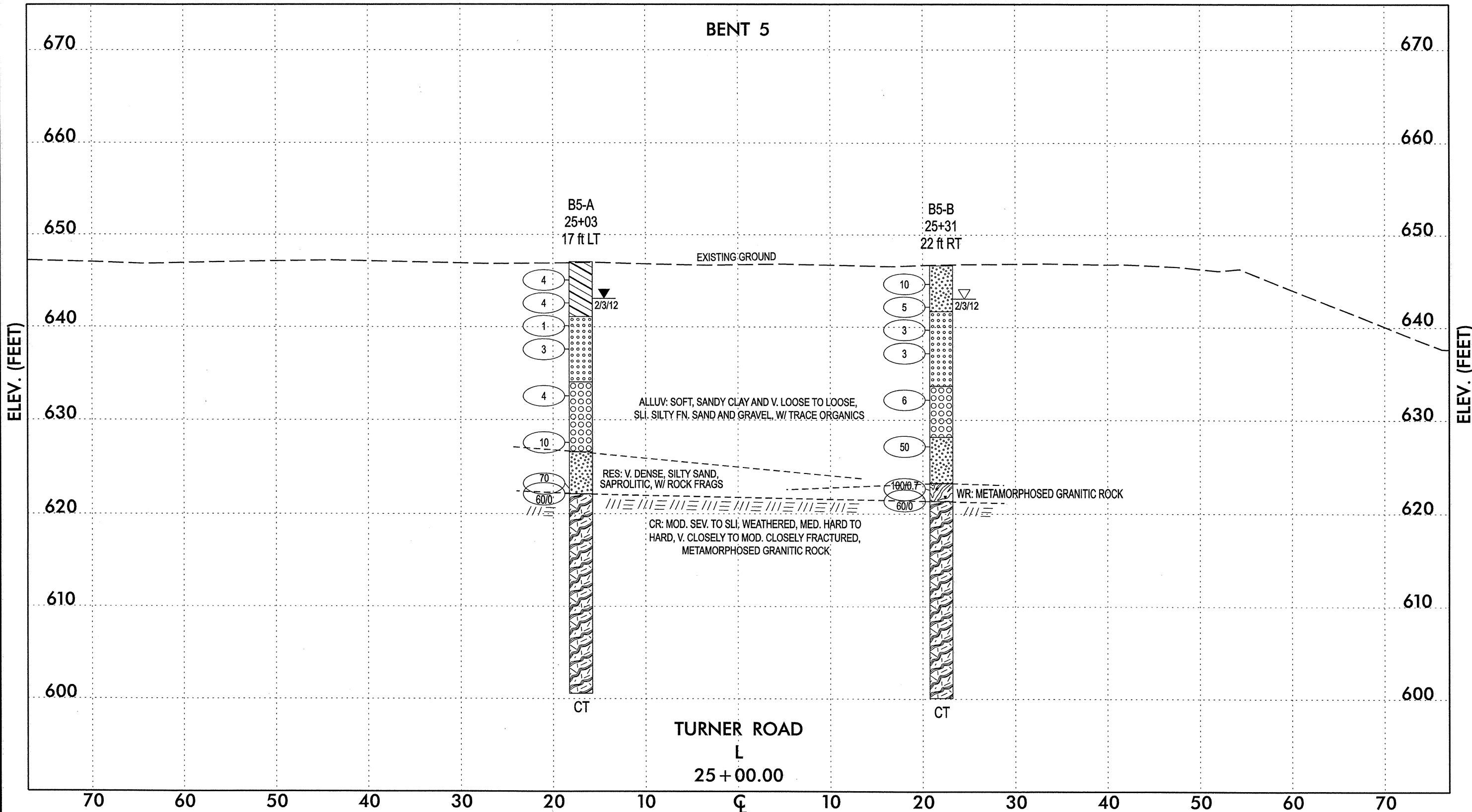
- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



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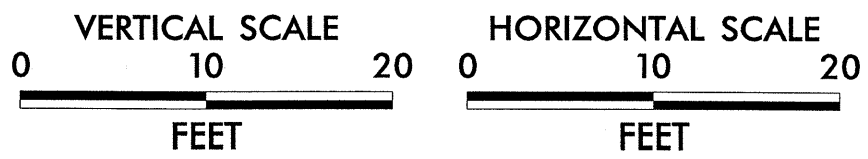
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SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 1014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 5 OF 7



NOTES:

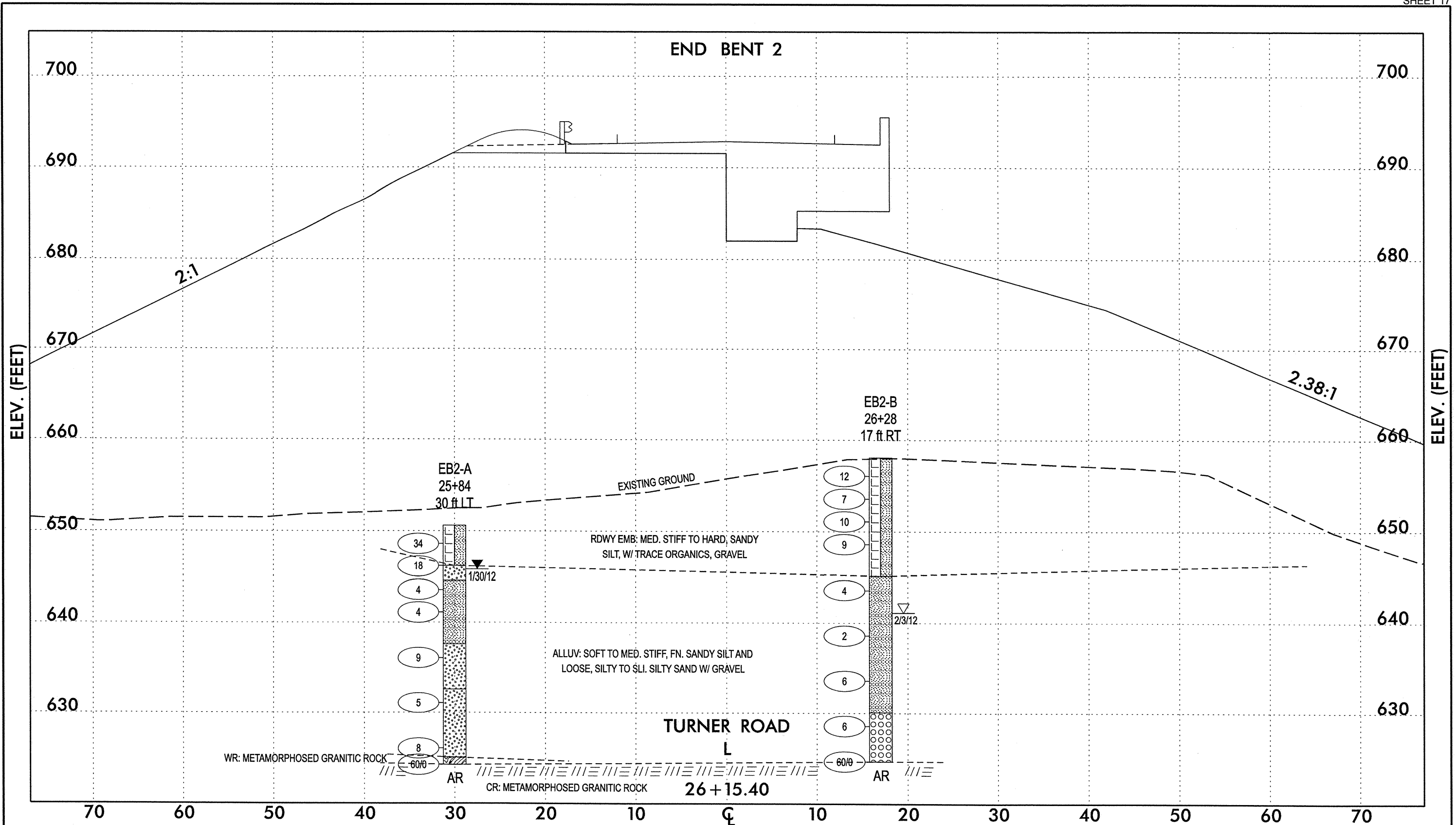
- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



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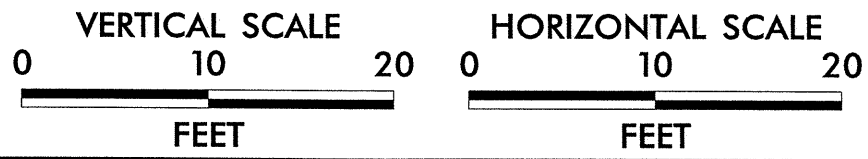
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SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 6 OF 7



NOTES:

- GROUNDLINE TAKEN FROM ELECTRONIC 25% DESIGN FILES PROVIDED BY AECOM IN JANUARY 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: VARIES



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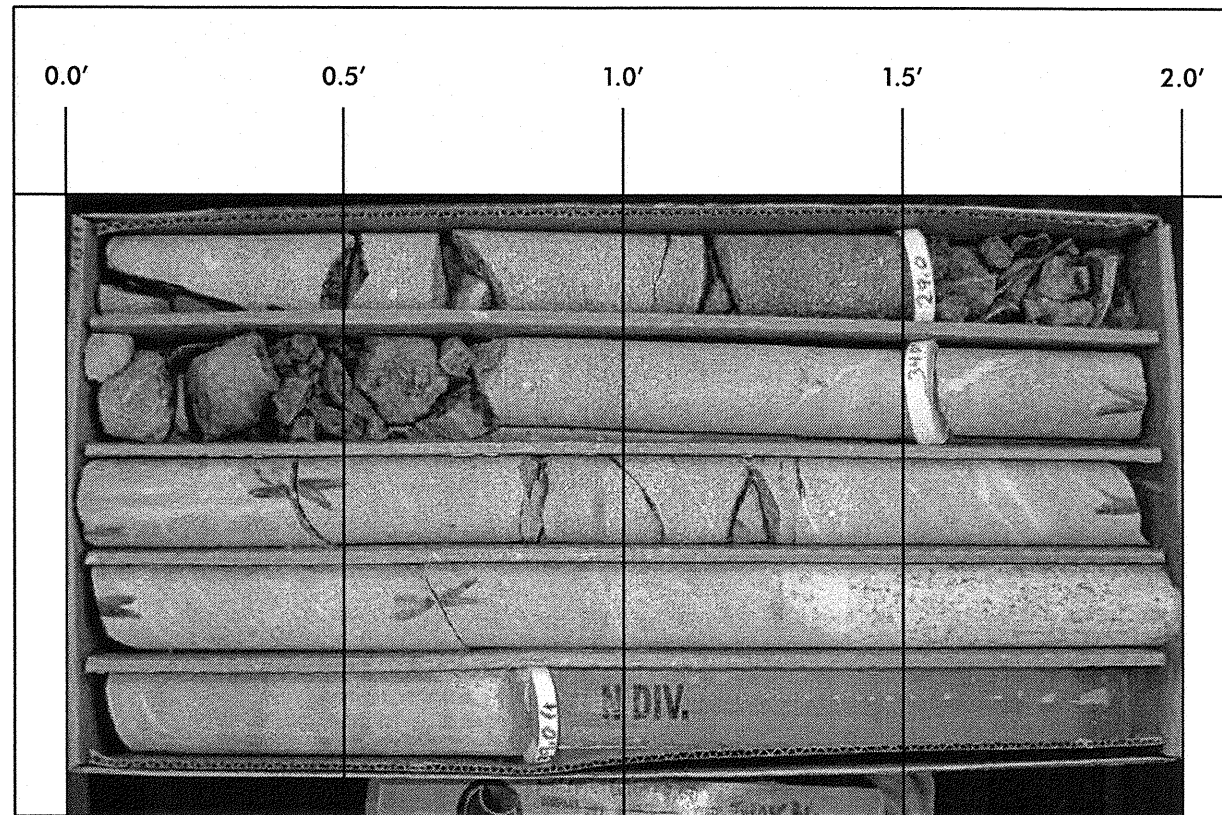
SUBSURFACE CROSS SECTIONS		
BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
MARCH 2012	PROJECT NO.: G11019.00	SHEET 7 OF 7

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS											
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)										
BORING NO. B1-A		STATION 21+30		OFFSET 17 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 663.8 ft		TOTAL DEPTH 49.0 ft		NORTHING 764,124		EASTING 1,646,364											
DRILL RIG/HAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER W. WHICHARD		START DATE 01/24/12		COMP. DATE 01/26/12		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							
665															663.8	GROUND SURFACE	0.0
	662.8	1.0	4	3	2								M		660.8	ARTIFICIAL FILL BROWN AND BLACK, LOOSE, SILTY FN. SAND (A-2-4) W/ DEBRIS	3.0
660	660.3	3.5	3	5	6								M		655.8	RESIDUAL BROWN TAN AND GRAY, MED. DENSE, SILTY FN. SAND (A-2-4) W/ SILT LAYERS AND ROCK FRAGS	8.0
	657.8	6.0	4	6	8								M				
655	655.3	8.5	7	8	10								W				
	650.3	13.5											W				
650			12	20	24								W				
	645.3	18.5	26	46	52								W				
645													W				
	640.3	23.5	31	27	37								W				
640																	
	636.8	27.0	60/0.1														
635																	
630																	
625													RS-1				
620																	
615																	

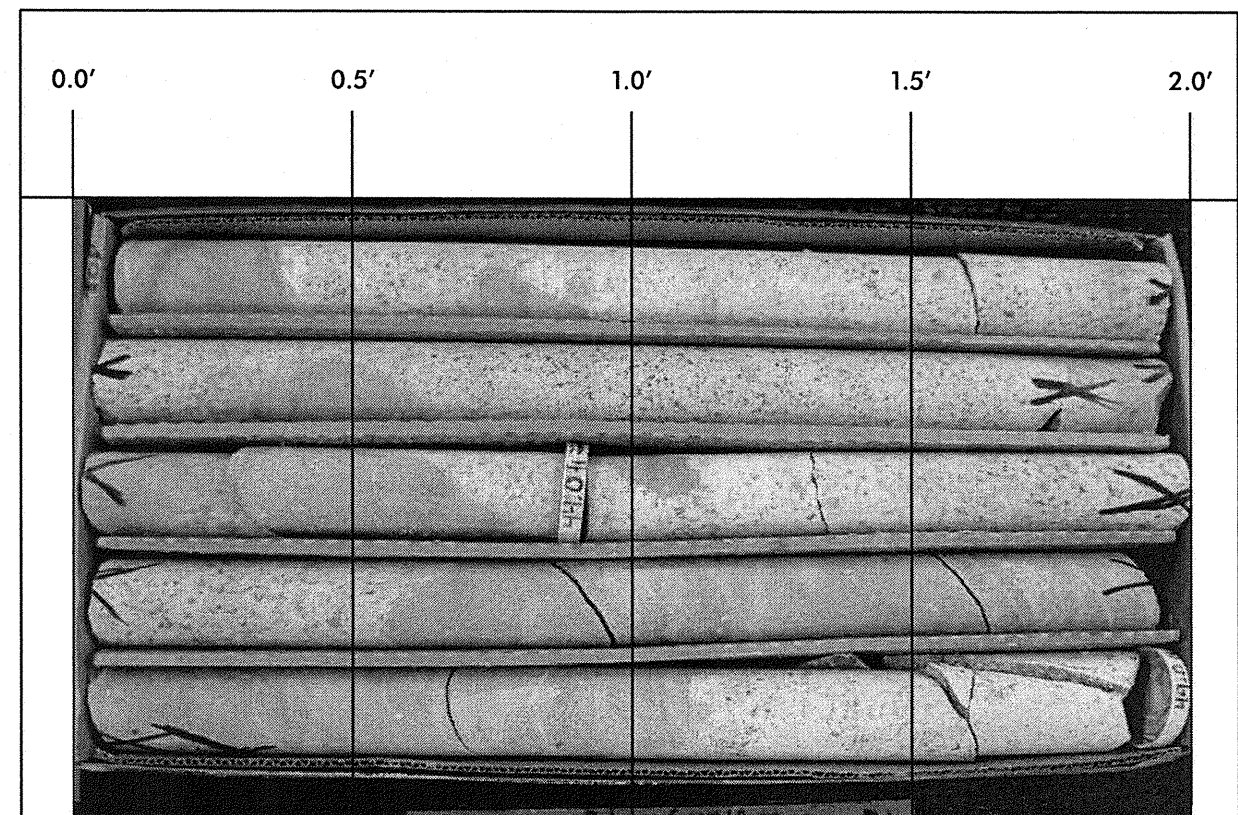
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS						
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)					
BORING NO. B1-A		STATION 21+30		OFFSET 17 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 663.8 ft		TOTAL DEPTH 49.0 ft		NORTHING 764,124		EASTING 1,646,364						
DRILL RIG/HAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. WHICHARD		START DATE 01/24/12		COMP. DATE 01/26/12		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. (%)	ROD (%)		REC. (%)	ROD (%)			
636.8												
	636.8	27.0	2.0	2:14/1.0	(1.5)	(0.3)		(1.5)	(0.3)		Begin Coring @ 27.0 ft	27.0
635	634.8	29.0	5.0	0:58/1.0	75%	15%		79%	16%		CRYSTALLINE ROCK BLUE-GRAY AND BROWN, MOD. WEATHERED, HARD, CLOSELY FRACTURED, METAMORPHOSED GRANITE	29.0
				1:00/1.0	(2.0)	(0.8)		(1.2)	(0.0)		CRYSTALLINE ROCK DK. GRAY, SEV. WEATHERED, HARD, V. CLOSE TO CLOSELY FRACTURED, METAMORPHOSED GRANITE	33.2
630	629.8	34.0	5.0	3:12/1.0	40%	16%		29%	0%		CRYSTALLINE ROCK BLUE-GRAY, SLI. WEATHERED, HARD TO V. HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE, W/ MEGACRYSTIC COMPOSITIONAL BANDS	33.2
				2:15/1.0								
				4:11/1.0								
				3:01/1.0	(5.0)	(4.8)		(15.7)	(15.2)			
				1:39/1.0	100%	96%		99%	96%			
625	624.8	39.0	5.0	1:47/1.0								
				1:52/1.0								
				2:08/1.0								
				2:19/1.0	(4.9)	(4.9)						
				2:54/1.0	98%	98%						
				3:04/1.0								
620	619.8	44.0	5.0	3:13/1.0								
				2:43/1.0								
				2:59/1.0	(5.0)	(4.7)						
				2:36/1.0	100%	94%						
				2:32/1.0								
				2:14/1.0								
615	614.8	49.0	5.0	1:59/1.0								

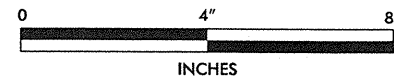
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12




BORING BI-A, BOX 1 OF 2, 27.0 FEET TO 39.0 FEET



BORING BI-A, BOX 2 OF 2, 39.0 FEET TO 49.0 FEET



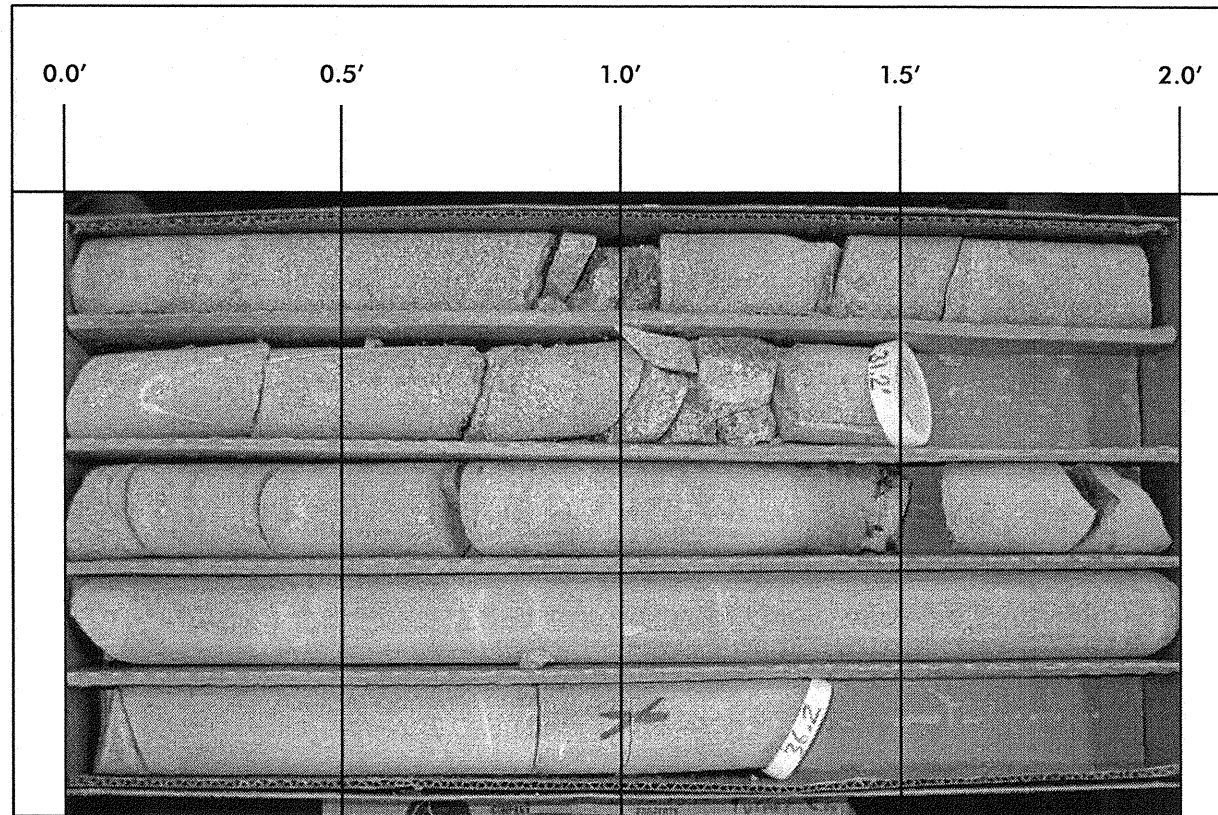
 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	ROCK CORE PHOTOGRAPHS	
	BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C	
	FEBRUARY 2012	PROJECT NO.: G11019.00

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS								
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)							
BORING NO. B1-B		STATION 21+21		OFFSET 17 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 666.2 ft		TOTAL DEPTH 41.2 ft		NORTHING 764,117		EASTING 1,646,328								
DRILL RIGHAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER R. TOOTHMAN		START DATE 01/23/12		COMP. DATE 01/23/12		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
670														
665	665.2	1.0	4	3	4							666.2 GROUND SURFACE	0.0	
660	662.7	3.5	7	15	12							ARTIFICIAL FILL RED-BROWN, MED. STIFF, SANDY CLAY (A-6) W/ GRAVEL		
655	660.2	6.0	6	7	10							RESIDUAL RED-BROWN AND TAN, V. STIFF, SILTY CLAY (A-7) W/ ROCK FRAGS	6.0	
650	657.7	8.5	5	7	8							RED-BROWN TAN AND BLACK, V. STIFF, FN. SANDY SILT (A-4) W/ ROCK FRAGS, SAPROLITIC	8.0	
645	652.7	13.5	5	6	9									
640	647.7	18.5	4	7	12									
635	642.7	23.5	9	14	14							GRAY BROWN AND WHITE, MED. DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC	23.0	
630	638.7	27.5										CRYSTALLINE ROCK BLUE-GRAY AND WHITE, MED. WEATHERED, MOD. HARD, V. CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE	27.0	
625													625.0 Boring Terminated at Elevation 625.0 ft	41.2

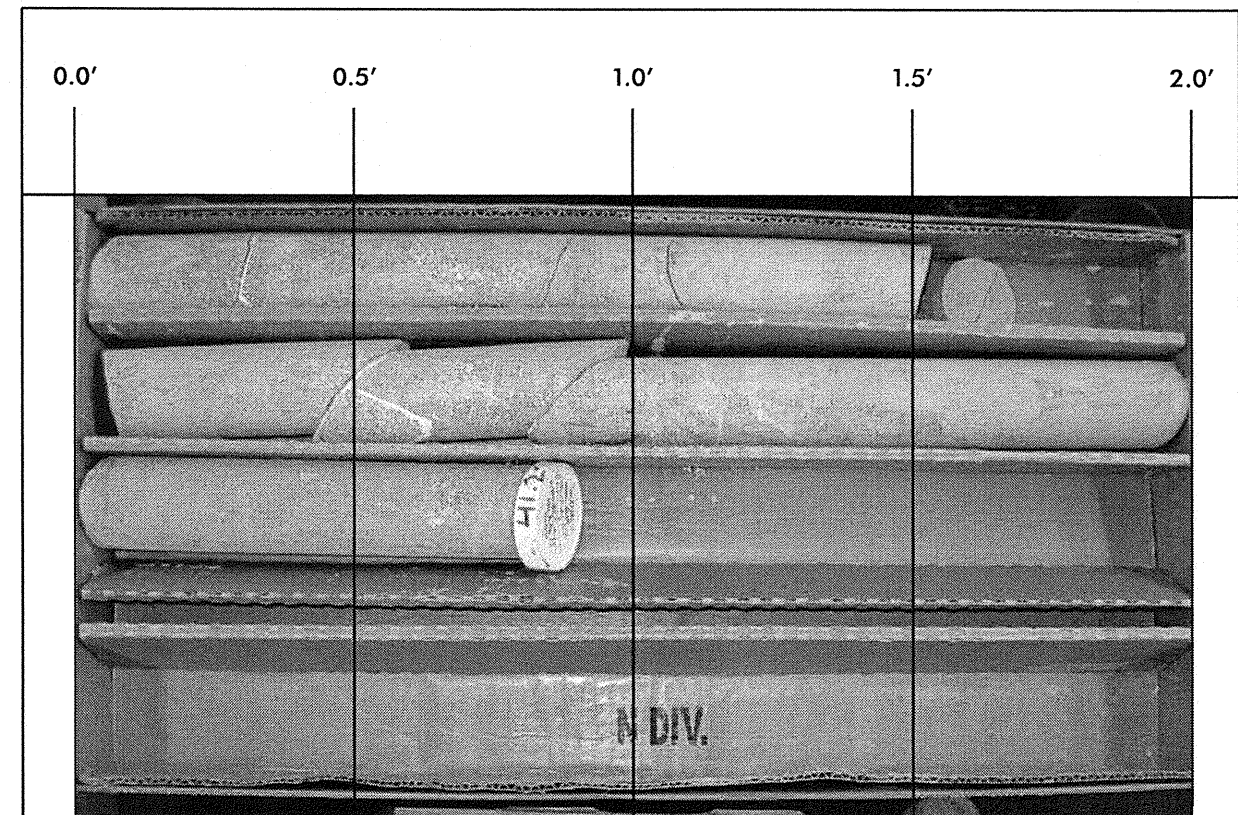
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS						
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)					
BORING NO. B1-B		STATION 21+21		OFFSET 17 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 666.2 ft		TOTAL DEPTH 41.2 ft		NORTHING 764,117		EASTING 1,646,328						
DRILL RIGHAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER R. TOOTHMAN		START DATE 01/23/12		COMP. DATE 01/23/12		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 (%)			
638.7											Begin Coring @ 27.5 ft	
635	638.7	27.5	3.7	3:28/1.0 10:22/1.0 3:30/1.0 2:08/0.8	(3.4) 92%	(1.6) 43%					CRYSTALLINE ROCK BLUE-GRAY AND WHITE, MED. WEATHERED, MOD. HARD, V. CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE <i>(continued)</i>	
630	635.0	31.2	5.0	4:58/1.0 3:26/1.0 4:07/1.0 3:41/1.0 3:41/1.0	(5.0) 100%	(3.9) 78%						
625	630.0	36.2	5.0	4:33/1.0 4:38/1.0 4:16/1.0 4:55/1.0 4:54/1.0	(4.3) 86%	(3.9) 78%						
	625.0	41.2									Boring Terminated at Elevation 625.0 ft	41.2

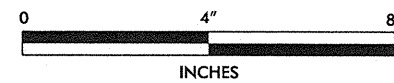
NCDOT CORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12




BORING B1-B, BOX 1 OF 2, 27.1 FEET TO 36.2 FEET



BORING B1-B BOX 2 OF 2, 36.2 FEET TO 41.2 FEET



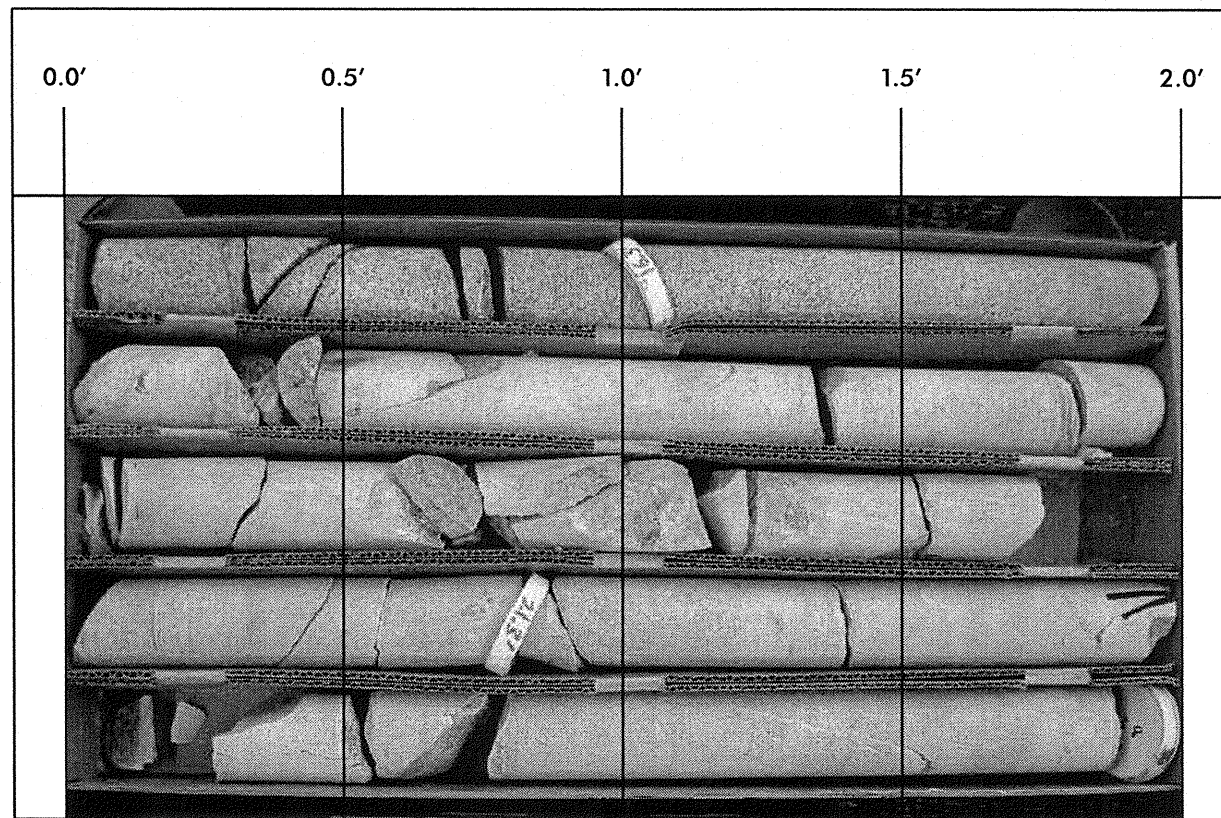
 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	ROCK CORE PHOTOGRAPHS	
	BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C	
	FEBRUARY 2012	PROJECT NO.: G11019.00

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS			
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)		
BORING NO. B2-A/B3-A		STATION 22+64		OFFSET 17 ft LT		ALIGNMENT -L-			
0 HR. 6.5		24 HR. 7.2		COLLAR ELEV. 648.2 ft		TOTAL DEPTH 36.3 ft			
NORTHING 764,001		EASTING 1,646,419		DRILL RIGHAMMER EFF./DATE TR10472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers			
HAMMER TYPE Automatic		DRILLER R. TOOTHMAN		START DATE 01/27/12		COMP. DATE 01/30/12			
SURFACE WATER DEPTH N/A		ELEV. (ft) <td colspan="2">DEPTH (ft) <td colspan="2">SOIL AND ROCK DESCRIPTION </td></td>		DEPTH (ft) <td colspan="2">SOIL AND ROCK DESCRIPTION </td>		SOIL AND ROCK DESCRIPTION			
BLOW COUNT		BLOWS PER FOOT				SAMP. NO.		LOG	
0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	MOI
648.2		GROUND SURFACE		0.0					
645		RESIDUAL TAN AND BROWN, MED. DENSE, SILTY FN. SAND (A-2-4) W/ ROCK FRAGS		13.0				D	
640		WEATHERED ROCK BROWN GRAY AND TAN, METAMORPHOSED GRANITE, W/ ROCK FRAGS		27.0				M	
635		WEATHERED ROCK BROWN GRAY AND TAN, METAMORPHOSED GRANITE, W/ ROCK FRAGS		30.0				W	
630		CRYSTALLINE ROCK BLUE-GRAY, MOD. WEATHERED, MOD HARD TO HARD, V. CLOSE TO CLOSELY FRACTURED, METAMORPHOSED GRANITE		31.3					
625		CRYSTALLINE ROCK GRAY AND WHITE, V. SLI. WEATHERED, V. HARD, CLOSELY FRACTURED, METAMORPHOSED GRANITE		31.4					
615		CRYSTALLINE ROCK BLUE-GRAY, V. SLI. WEATHERED, HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE		31.4					
611.9		Boring Terminated at Elevation 611.9 ft		36.3					

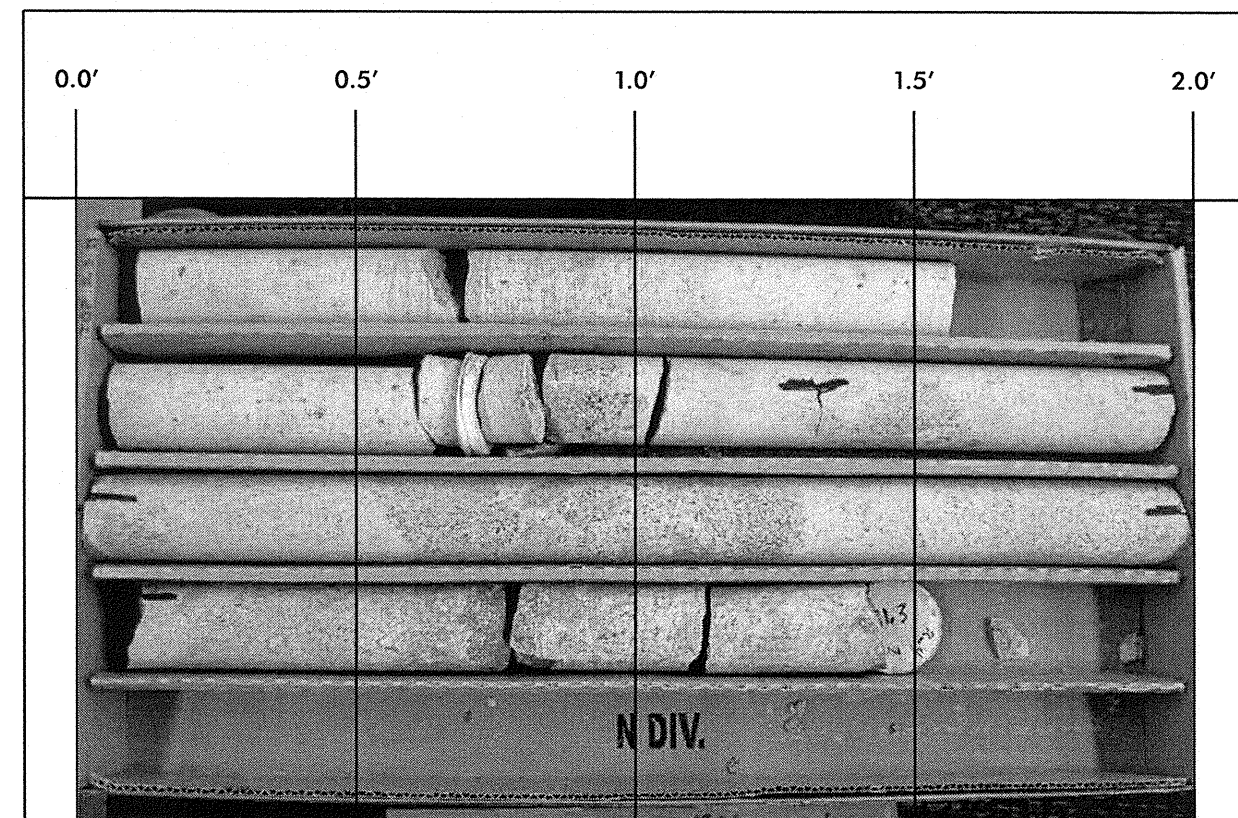
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS			
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)		
BORING NO. B2-A/B3-A		STATION 22+64		OFFSET 17 ft LT		ALIGNMENT -L-			
0 HR. 6.5		24 HR. 7.2		COLLAR ELEV. 648.2 ft		TOTAL DEPTH 36.3 ft			
NORTHING 764,001		EASTING 1,646,419		DRILL RIGHAMMER EFF./DATE TR10472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers			
HAMMER TYPE Automatic		DRILLER R. TOOTHMAN		START DATE 01/27/12		COMP. DATE 01/30/12			
SURFACE WATER DEPTH N/A		ELEV. (ft) <td colspan="2">DEPTH (ft) <td colspan="2">DESCRIPTION AND REMARKS </td></td>		DEPTH (ft) <td colspan="2">DESCRIPTION AND REMARKS </td>		DESCRIPTION AND REMARKS			
CORE SIZE NQ2		TOTAL RUN 21.3 ft				SAMP. NO.		LOG	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (%)	ROD (%)	STRATA REC. (%)	ROD (%)	ELEV. (ft)
633.2	633.2	15.0	1.3	3:46/0.3	(1.0)	(0.0)	(2.0)	(1.0)	633.2
630	631.9	16.3	5.0	8:18/1.0	77%	0%	87%	43%	630.9
				4:43/1.0	(4.9)	(2.0)	(12.2)	(9.3)	
				5:54/1.0	98%	40%	87%	66%	
				9:21/1.0					
				9:36/1.0					
				17:28/1.0					
625	626.9	21.3	5.0	14:54/1.0	(4.3)	(4.0)			
				15:54/1.0	86%	80%			
				8:26/1.0					
				19:10/1.0					
				26:22/1.0					
620	621.9	26.3	5.0	25:49/1.0	(4.9)	(4.3)			
				16:34/1.0	98%	86%			
				12:22/1.0					
				9:46/1.0					
				11:34/1.0					
615	616.9	31.3	5.0	8:24/1.0	(4.7)	(3.5)	(4.6)	(3.5)	616.8
				4:52/1.0	94%	70%	94%	71%	
				3:08/1.0					
				2:16/1.0					
				8:04/1.0					
	611.9	36.3							611.9
Boring Terminated at Elevation 611.9 ft									

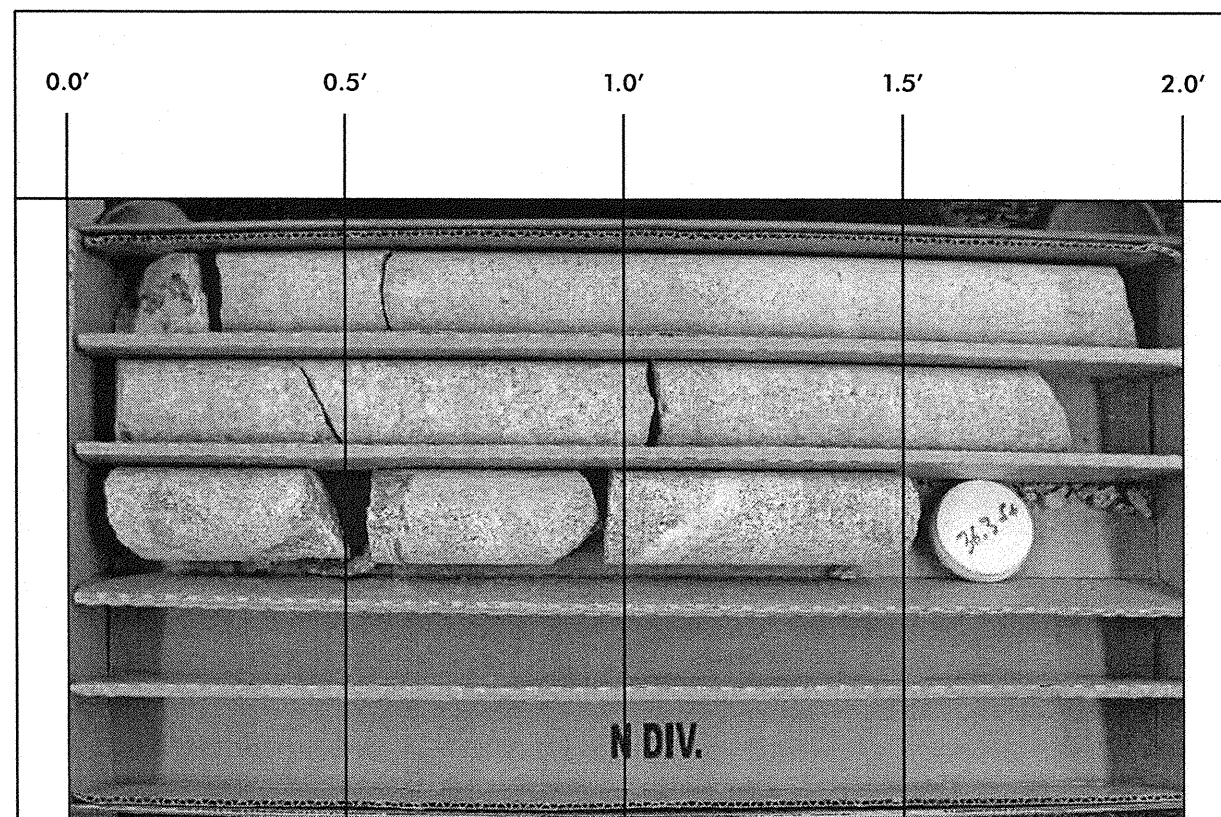
NCDOT CORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12



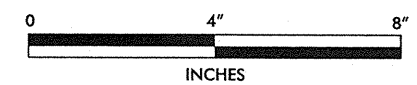
BORING B2-A / B3-A, BOX 1 OF 3, 15.0 FEET TO 23.8 FEET



BORING B2-A / B3-A , BOX 2 OF 3, 23.8 FEET TO 31.3 FEET



BORING B2-A / B3-A, BOX 3 OF 3, 31.3 FEET TO 36.3 FEET



FALCON ENGINEERING, INC.
 1210 TRINITY ROAD, SUITE 110
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ROCK CORE PHOTOGRAPHS

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
 DAVIDSON COUNTY, NORTH CAROLINA
 WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

FEBRUARY 2012

PROJECT NO.:
G11019.00

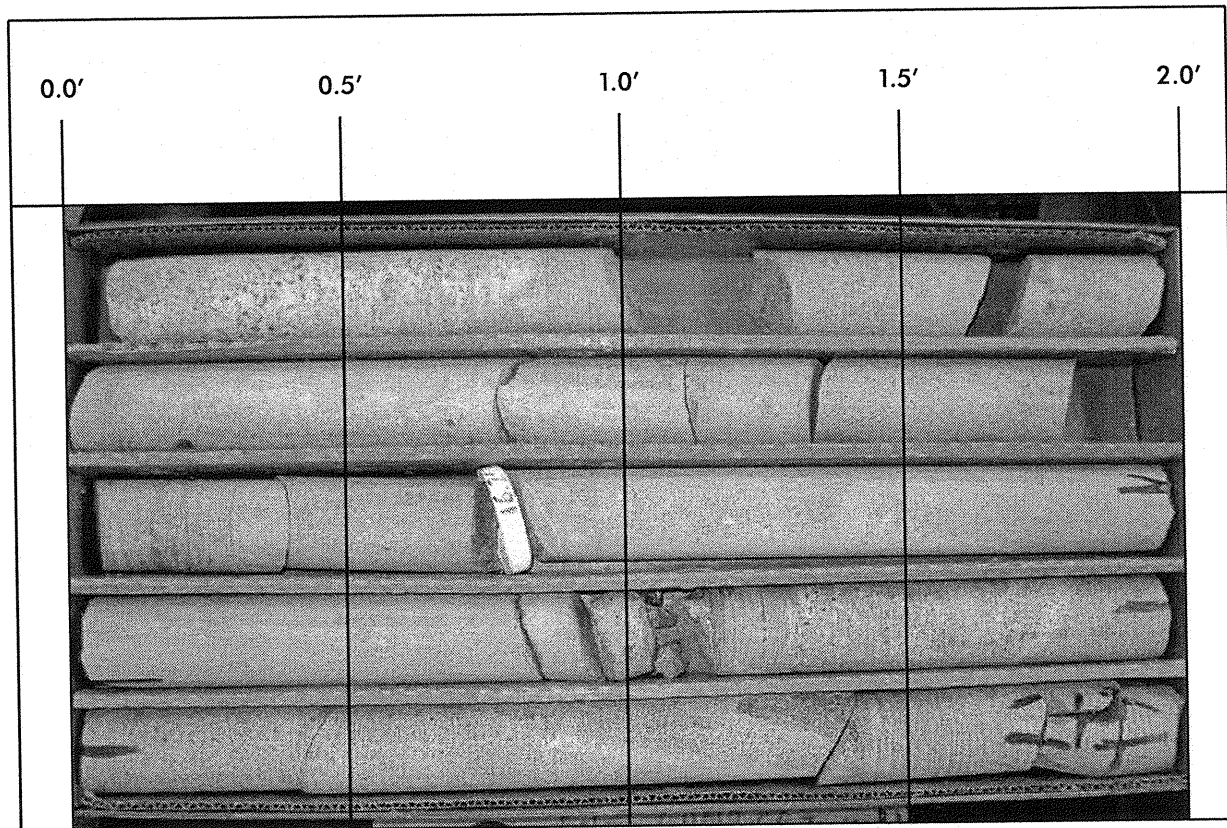
SHEET 2 OF 2

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS							
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014						GROUND WTR (ft)							
BORING NO. B2-B		STATION 22+52		OFFSET 17 ft RT		ALIGNMENT -L-							
COLLAR ELEV. 648.6 ft		TOTAL DEPTH 31.2 ft		NORTHING 763,997		EASTING 1,646,382							
DRILL RIGHAMMER EFF./DATE TRI0472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER R. TOOTHMAN		START DATE 01/25/12		COMP. DATE 01/27/12		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				
650												GROUND SURFACE	0.0
645	647.6	1.0	6	9	15						M	RESIDUAL TAN GRAY AND BROWN, V. STIFF, FN. SANDY CLAY (A-6) SAPROLITIC	
640	645.1	3.5	8	10	11						M		
	642.6	6.0	15	16	16						W		
	640.1	8.5	36	50	50/0.1						D	BLUE-GRAY BROWN AND TAN, DENSE, SILTY FN. SAND (A-2-4) W/ ROCK FRAGS, SAPROLITIC	8.5
	639.1												9.5
	637.2	11.4	60/0								RS-2	WEATHERED ROCK BLUE-GRAY AND BROWN, METAMORPHOSED GRANITE	11.4
635												CRYSTALLINE ROCK BLUE-GRAY AND BROWN, METAMORPHOSED GRANITE	
630												CRYSTALLINE ROCK BLUE-GRAY AND TAN, MOD. TO SLI. WEATHERED, MOD HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE, W/ LARGE AMOUNTS OF QUARTZ	
625													
620													
													617.4
Boring Terminated at Elevation 617.4 ft													

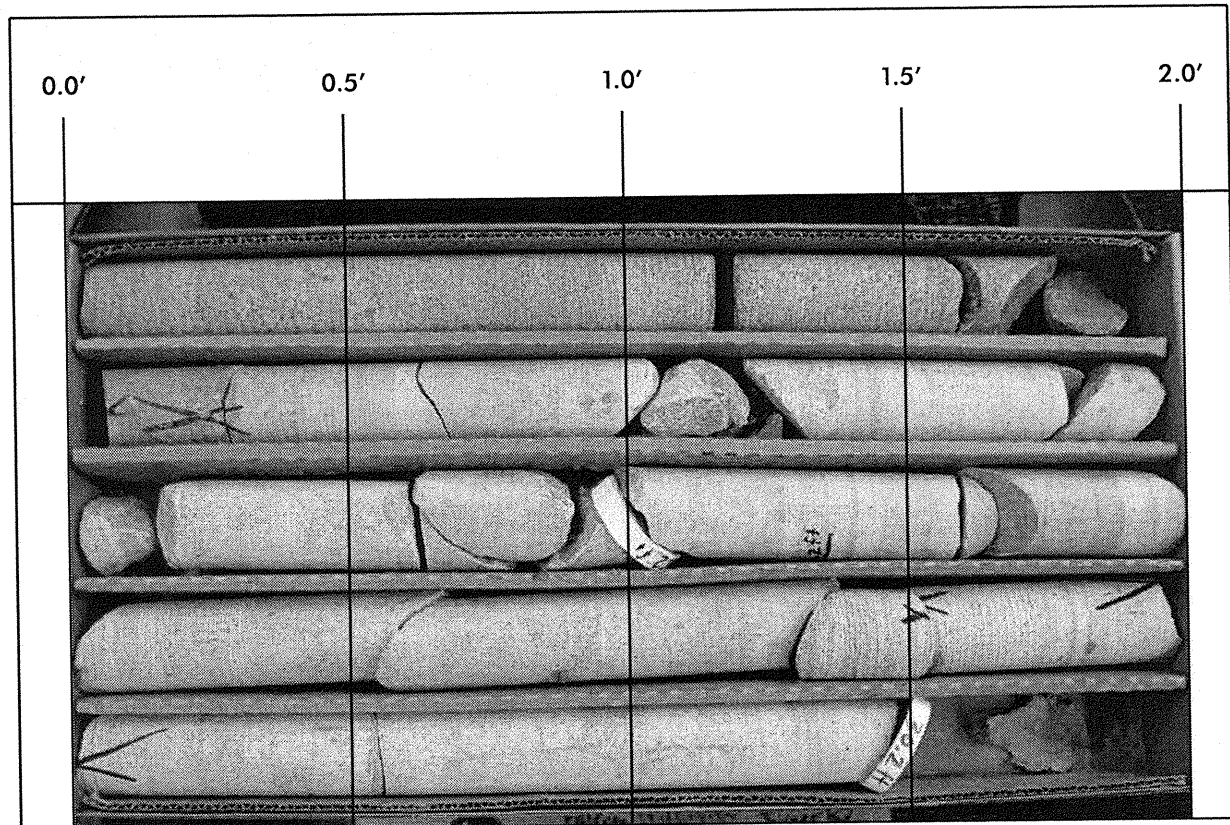
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS						
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014						GROUND WTR (ft)						
BORING NO. B2-B		STATION 22+52		OFFSET 17 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 648.6 ft		TOTAL DEPTH 31.2 ft		NORTHING 763,997		EASTING 1,646,382						
DRILL RIGHAMMER EFF./DATE TRI0472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER R. TOOTHMAN		START DATE 01/25/12		COMP. DATE 01/27/12		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. (ft) %	ROD (ft) %		REC. (ft) %	ROD (ft) %			
637.2											Begin Coring @ 11.4 ft	
635	637.2	11.4	4.8	2:55/1.0 8:02/1.0 8:27/1.0 9:01/1.0 9:42/0.8	(4.2) 88%	(3.6) 75%	RS-2	(18.8) 95%	(16.2) 82%		CRYSTALLINE ROCK BLUE-GRAY AND TAN, MOD. TO SLI. WEATHERED, MOD HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE, W/ LARGE AMOUNTS OF QUARTZ	11.4
630	632.4	16.2	5.0	7:42/1.0 9:54/1.0 10:18/1.0 11:21/1.0 19:00/1.0	(5.0) 100%	(4.8) 96%						
625	627.4	21.2	5.0	9:47/1.0 9:35/1.0 9:00/1.0 8:58/1.0 10:24/1.0	(4.6) 92%	(3.2) 64%						
620	622.4	26.2	5.0	40:00/1.0 57:44/1.0 3:00/1.0 7:24/1.0 14:00/1.0	(5.0) 100%	(4.6) 92%						
	617.4	31.2									Boring Terminated at Elevation 617.4 ft	31.2

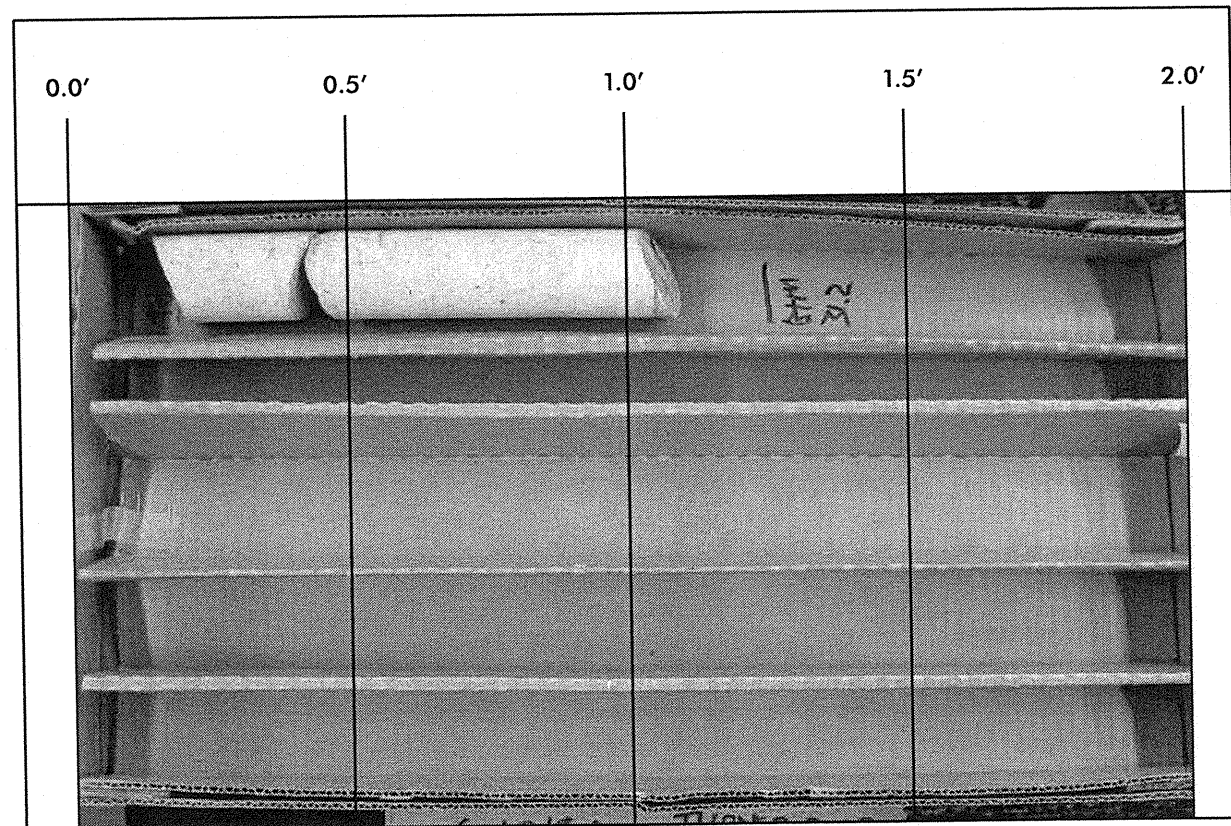
NCDOT CORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12



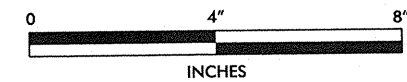
BORING B2-B, BOX 1 OF 3, 11.4 FEET TO 21.2 FEET



BORING B2-B, BOX 2 OF 3, 21.2 FEET TO 30.2 FEET.



BORING B2-B, BOX 3 OF 3, 30.2 FEET TO 31.2 FEET



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 1210 TRINITY ROAD, SUITE 110
 RALEIGH, NC 27607
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ROCK CORE PHOTOGRAPHS

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
 DAVIDSON COUNTY, NORTH CAROLINA
 WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

FEBRUARY 2012

PROJECT NO.:
 GT1019.00

SHEET 2 OF 2

WBS 49010.1.STR07T1B	TIP C-4901C	COUNTY DAVIDSON	GEOLOGIST T. EVANS
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014			GROUND WTR (ft)
BORING NO. B3-B	STATION 23+03	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 647.8 ft	TOTAL DEPTH 30.9 ft	NORTHING 763,951	EASTING 1,646,402
DRILL RIGHAMMER EFF./DATE TRI0472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER R. TOOTHMAN	START DATE 01/31/12	COMP. DATE 01/31/12	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				
650													
647.8												GROUND SURFACE	0.0
645	646.8	1.0	3	4	4						M	RESIDUAL GRAY AND BROWN, MED. STIFF, FN. SANDY CLAY (A-6)	3.0
	644.3	3.5	4	5	5						W	BROWN BLACK AND TAN, STIFF, FN. SANDY SILT (A-4) W/ ROCK FRAGS	7.4
640	641.8	6.0	4	5	100/0.4						M	WEATHERED ROCK BROWN AND TAN, METAMORPHOSED GRANITE	8.5
	639.3	8.5										CRYSTALLINE ROCK BLUE-GRAY AND TAN, MOD. TO SLI. WEATHERED, MOD. HARD TO HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE	
635													
630													
625													
620													

Boring Terminated at Elevation 616.9 ft												
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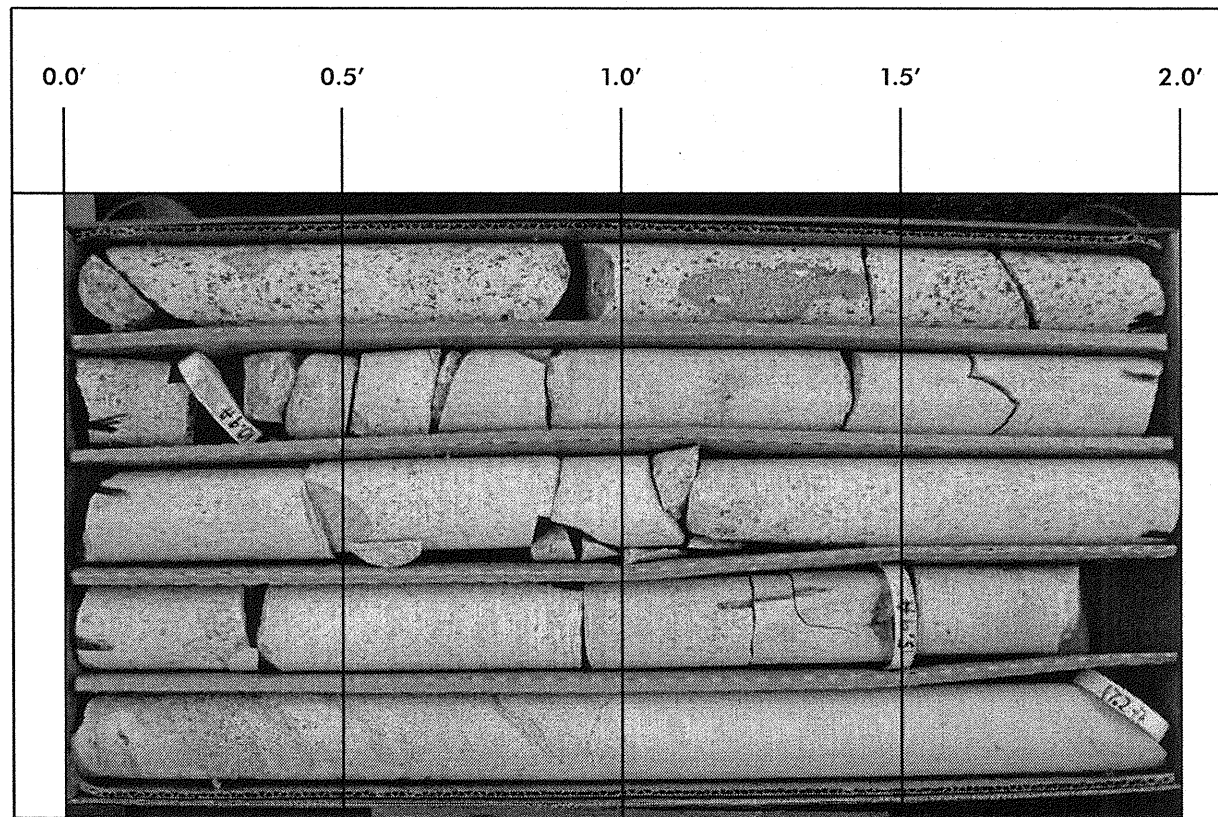
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ_NC_DOT.GDT_3/8/12

WBS 49010.1.STR07T1B	TIP C-4901C	COUNTY DAVIDSON	GEOLOGIST T. EVANS
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014			GROUND WTR (ft)
BORING NO. B3-B	STATION 23+03	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 647.8 ft	TOTAL DEPTH 30.9 ft	NORTHING 763,951	EASTING 1,646,402
DRILL RIGHAMMER EFF./DATE TRI0472 CME-850 67% 12/08/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER R. TOOTHMAN	START DATE 01/31/12	COMP. DATE 01/31/12	SURFACE WATER DEPTH N/A

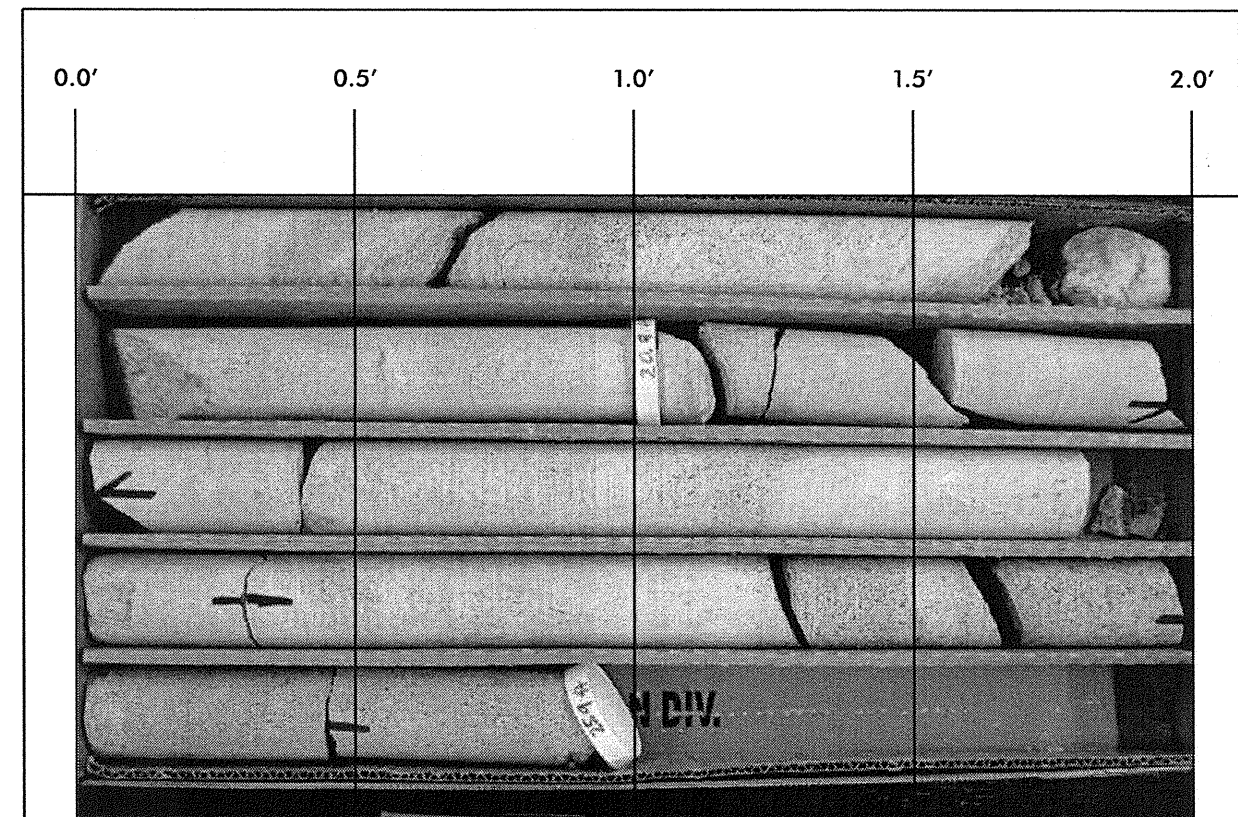
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
639.3												
639.3	639.3	8.5	2.4	3:25/1.0	(2.0)	(1.5)					Begin Coring @ 8.5 ft	8.5
635	636.9	10.9	5.0	3:42/1.0	83%	83%					CRYSTALLINE ROCK BLUE-GRAY AND TAN, MOD. TO SLI. WEATHERED, MOD. HARD TO HARD, CLOSE TO MOD. CLOSELY FRACTURED, METAMORPHOSED GRANITE	
				1:38/0.4	(5.0)	(4.0)						
				3:47/1.0								
				3:49/1.0								
				5:50/1.0								
				9:43/1.0								
				8:05/1.0								
630			5.0	4:12/1.0	(4.9)	(4.3)						
				4:48/1.0	98%	86%						
				3:38/1.0								
				3:24/1.0								
				6:31/1.0								
625			5.0	6:14/1.0	(5.0)	(4.7)						
				7:10/1.0	100%	94%						
				7:48/1.0								
				11:15/1.0								
				6:35/1.0								
620			5.0	6:03/1.0	(4.5)	(3.7)						
				4:00/1.0	90%	74%						
				3:38/1.0								
				7:11/1.0								
				5:12/1.0								

Boring Terminated at Elevation 616.9 ft												
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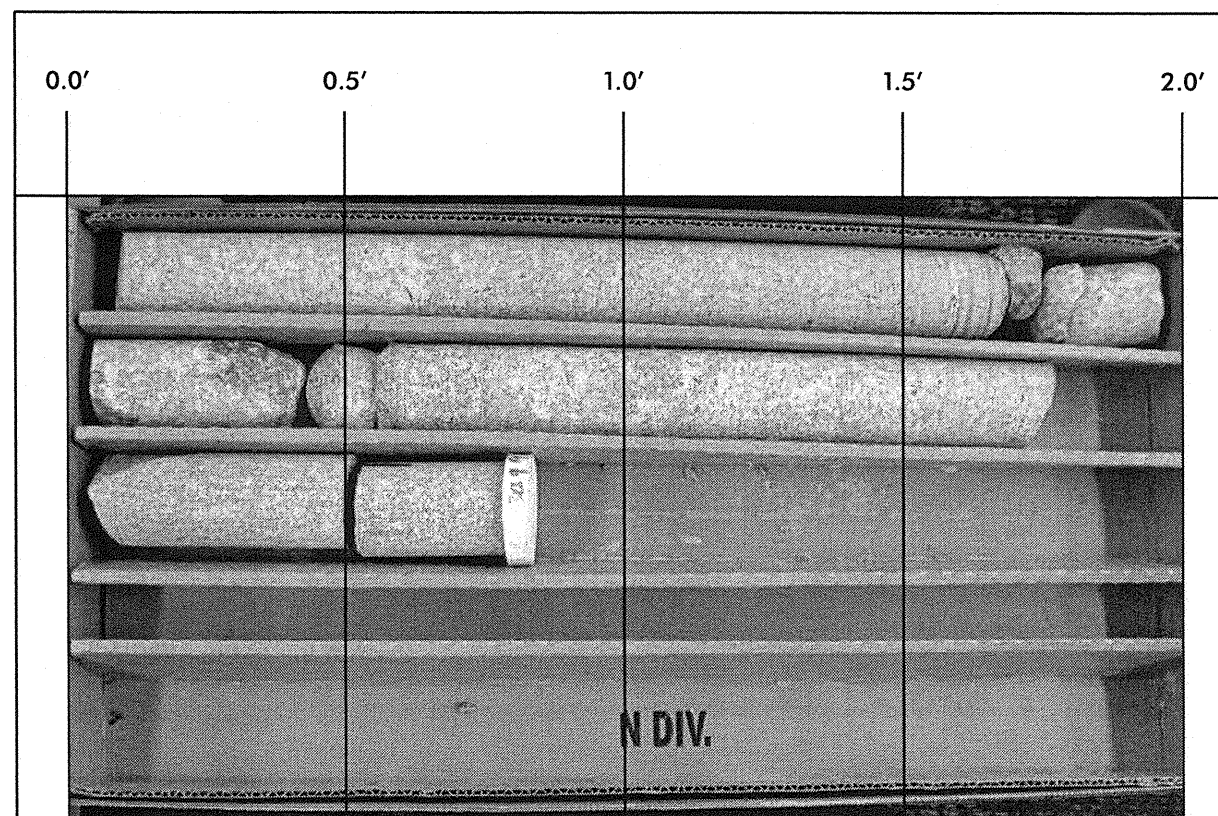
NCDOT CORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ_NC_DOT.GDT_3/8/12



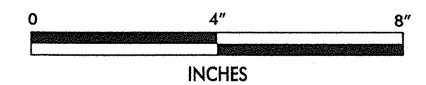
BORING B3-B, BOX 1 OF 3, 8.5 FEET TO 17.2 FEET




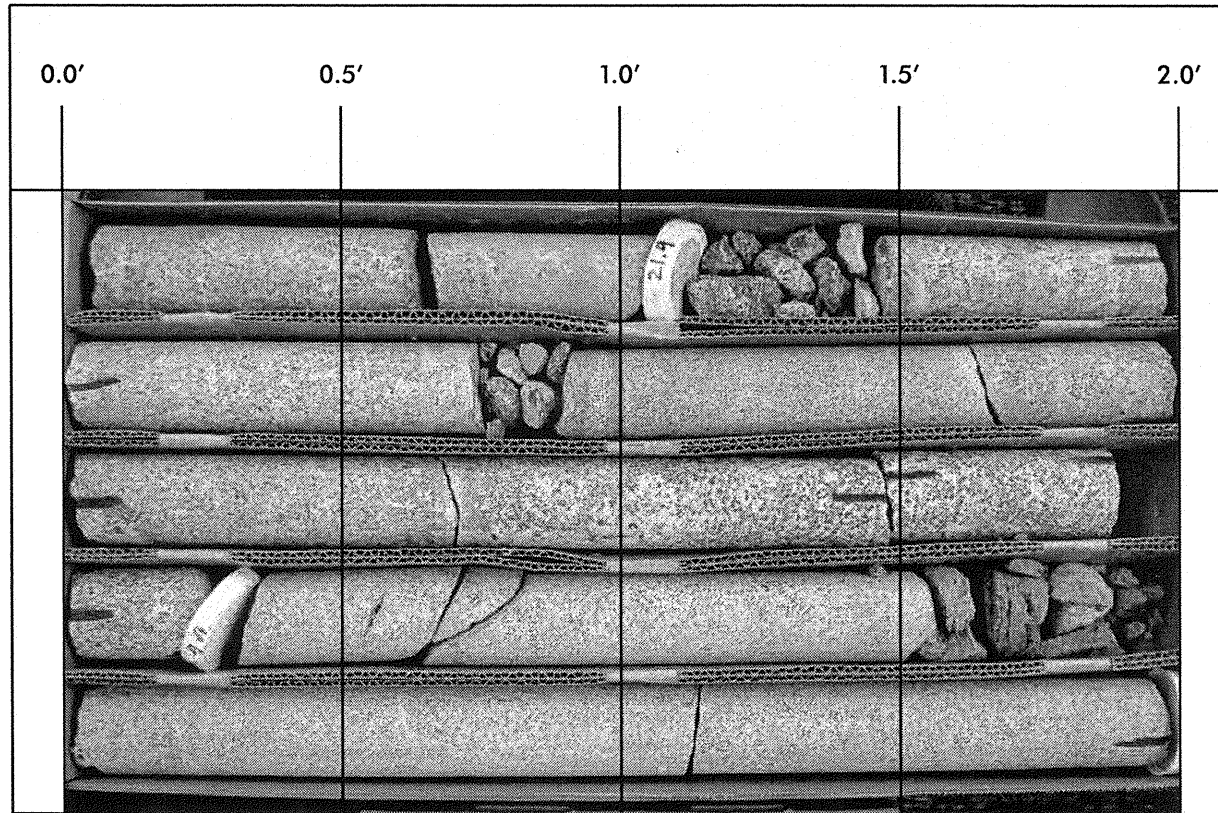
BORING B3-B, BOX 2 OF 3, 17.2 FEET TO 25.9 FEET



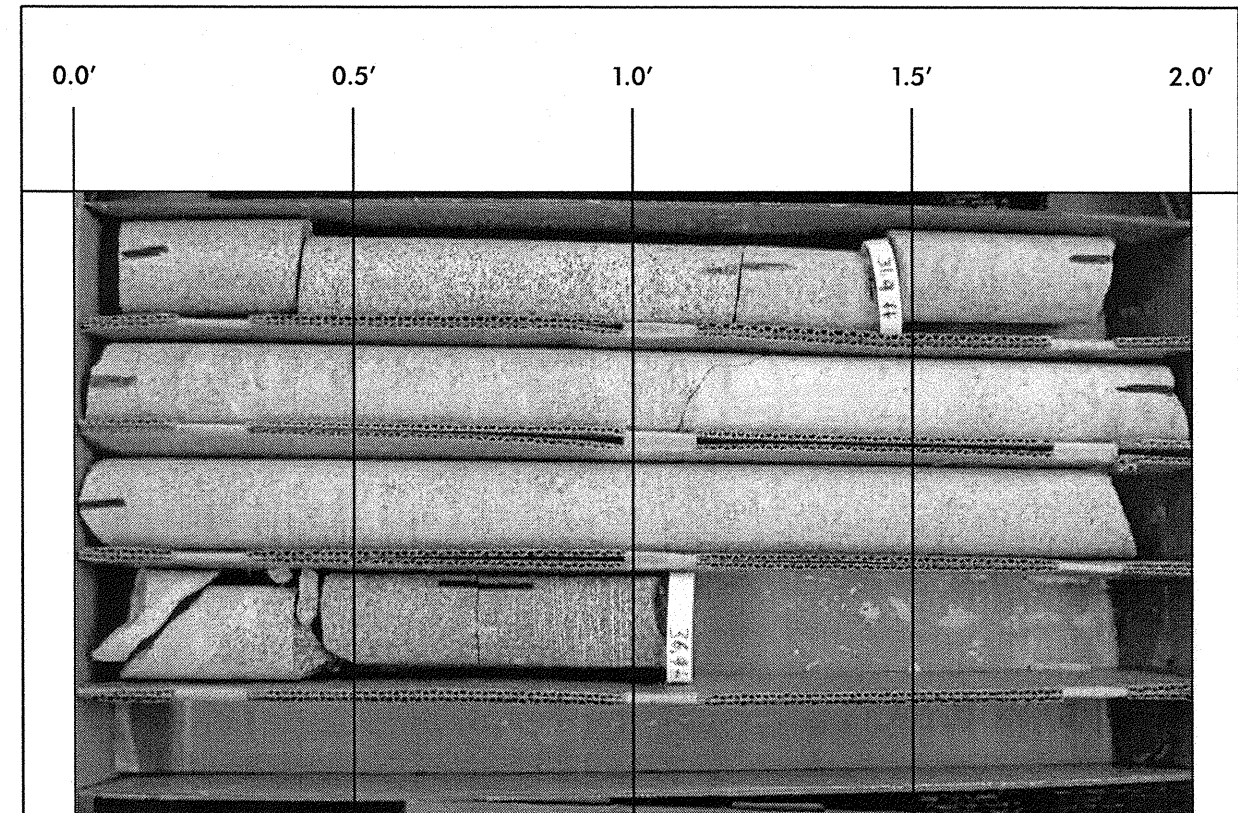
BORING B3-B, BOX 3 OF 3, 25.9 FEET TO 30.9 FEET



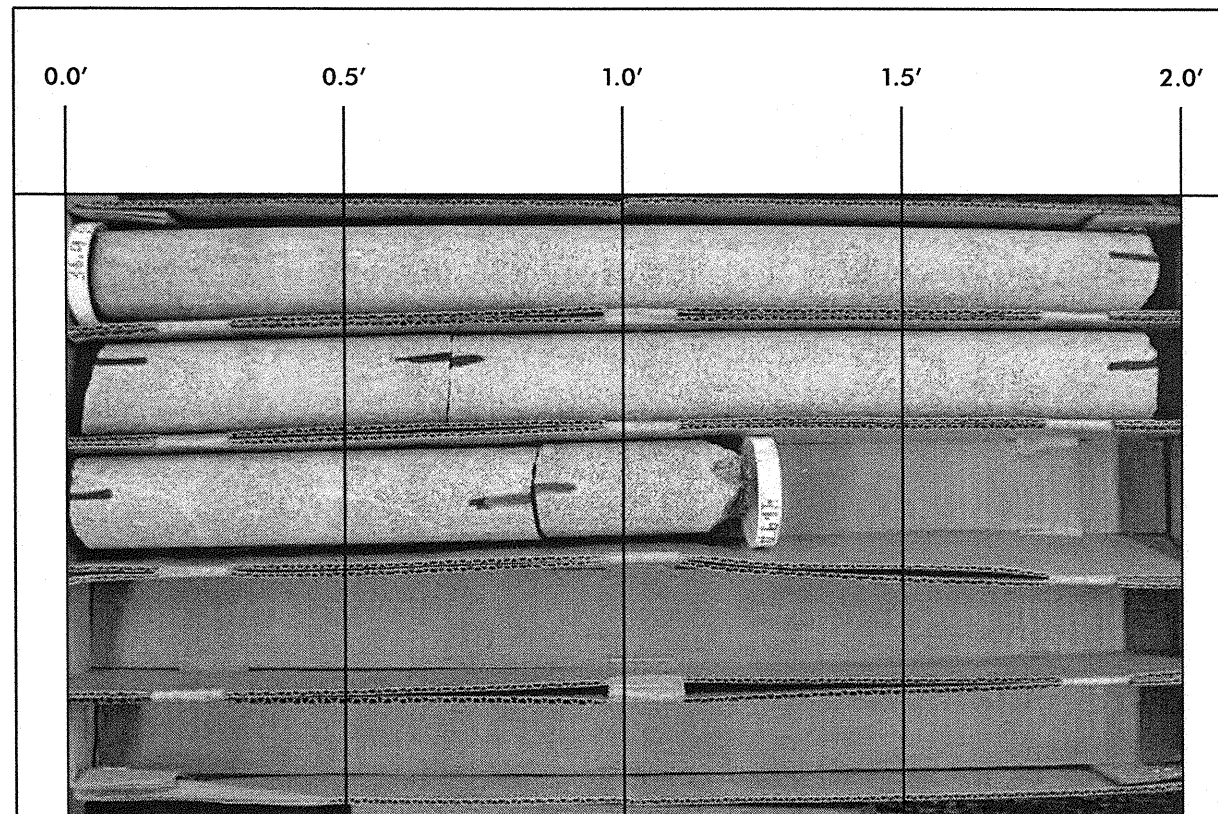
 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	ROCK CORE PHOTOGRAPHS	
	BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C	
	FEBRUARY 2012	PROJECT NO.: G11019.00



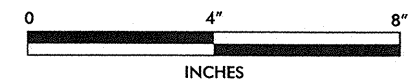
BORING B4-A, BOX 1 OF 3, 20.0 FEET TO 30.4 FEET



BORING B4-A, BOX 2 OF 3, 30.4 FEET TO 36.9 FEET



BORING B4-A, BOX 3 OF 3, 36.9 FEET TO 41.9 FEET



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ROCK CORE PHOTOGRAPHS

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
 DAVIDSON COUNTY, NORTH CAROLINA
 WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

FEBRUARY 2012

PROJECT NO.:
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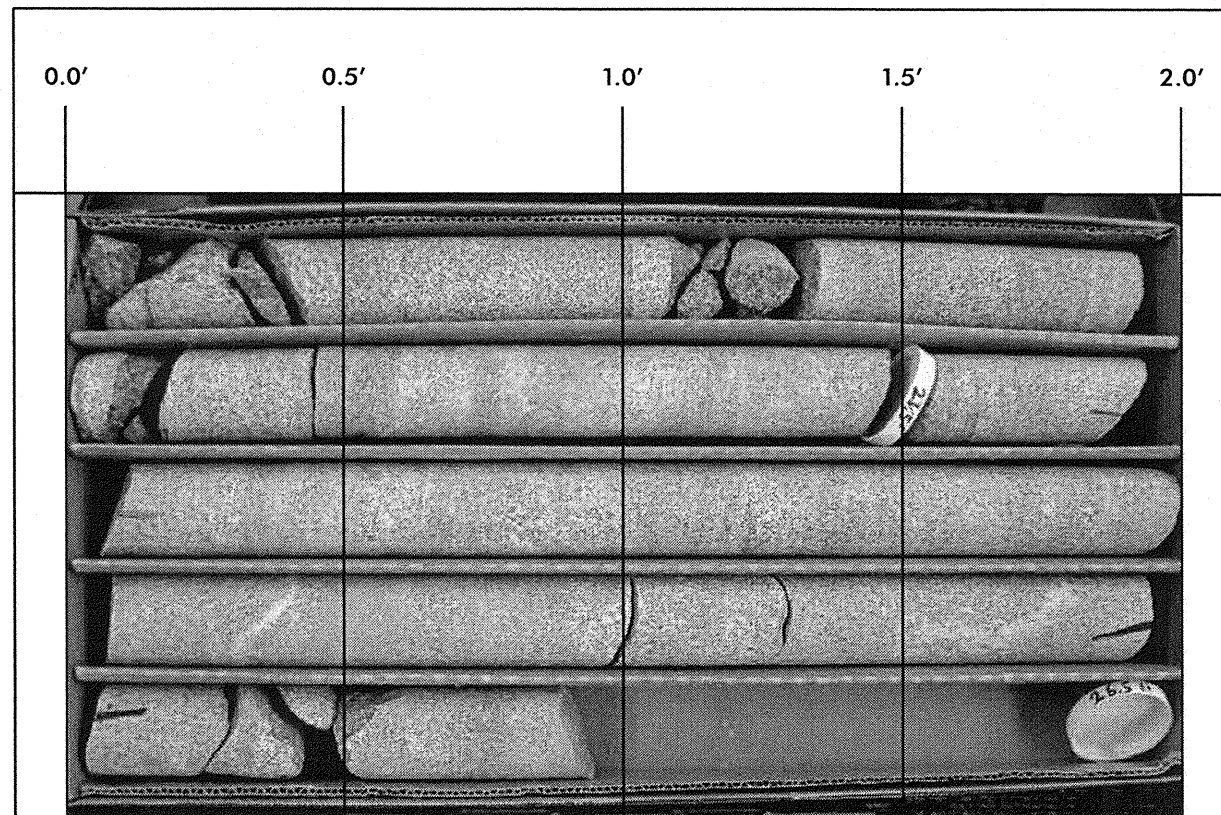
SHEET 2 OF 2

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS										
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)									
BORING NO. B4-B		STATION 24+32		OFFSET 17 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 644.0 ft		TOTAL DEPTH 36.3 ft		NORTHING 763,834		EASTING 1,646,456										
DRILL RIG/HAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER W. WHICHARD		START DATE 01/30/12		COMP. DATE 01/30/12		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						
645														644.0	GROUND SURFACE	0.0
	643.0	1.0												641.0	ALLUVIAL GRAY AND BROWN, LOOSE, SILTY SAND (A-2-4) W/ CLAY LAYERS	3.0
640	640.5	3.5	WOH	WOH	WOH									638.0	DK. GRAY, V. SOFT, FN. SANDY SILT (A-4) W/ LITTLE ORGANICS	
	638.0	6.0	WOH	WOH	WOH									635.5		
635	635.5	8.5	WOH	WOH	2									633.0	GRAY, SLI. SILTY SAND AND GRAVEL (A-1-b)	11.0
	630.5	13.5	2	2	36									629.5	RESIDUAL DK. GRAY, DENSE, SILTY FN. SAND (A-2-4)	14.5
630	626.5	17.5	60/0											627.0	WEATHERED ROCK DK. GRAY, METAMORPHOSED GRANITE	17.0
625														626.5	CRYSTALLINE ROCK BLUE-GRAY, SLI. TO FRESHLY WEATHERED, HARD TO V. HARD, CLOSE TO WIDELY FRACTURED, METAMORPHOSED GRANITE	17.5
620																
615																
610																
														607.5	Boring Terminated at Elevation 607.7 ft	36.5

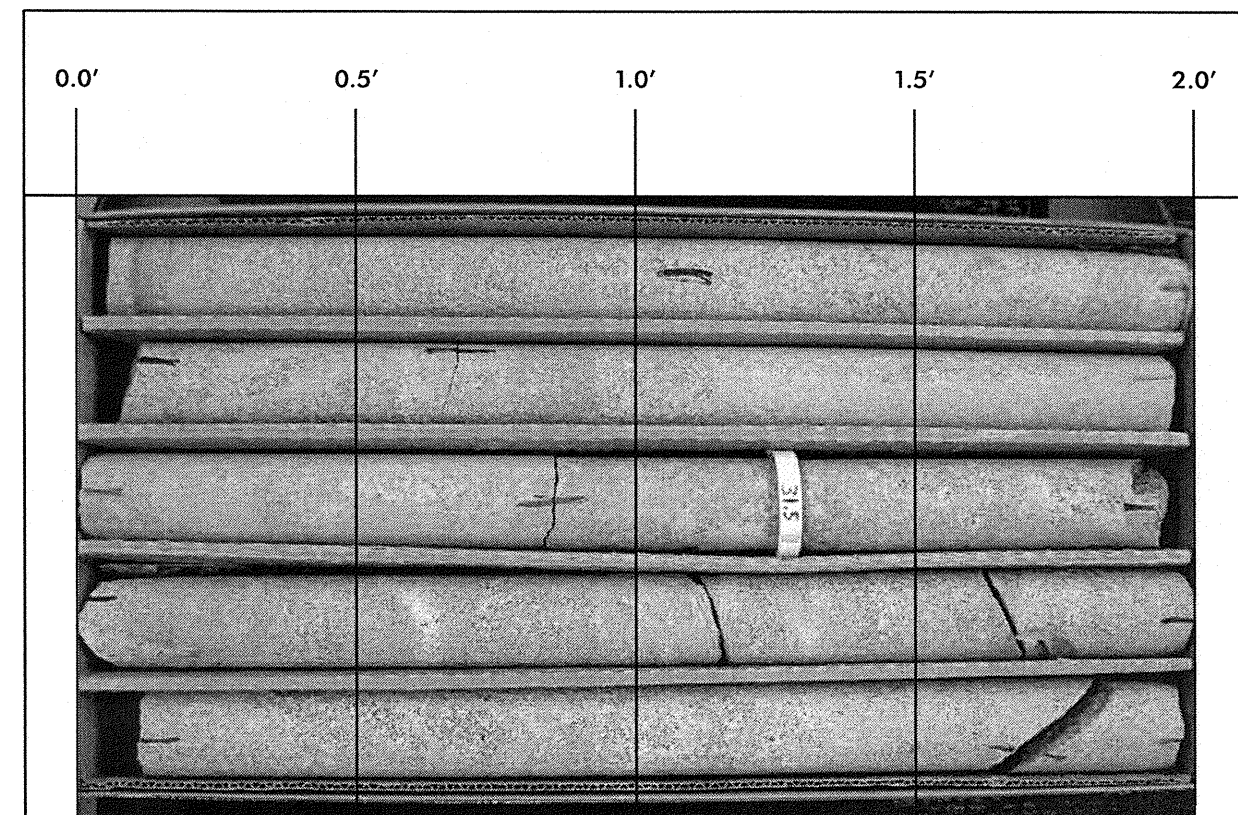
NCDOT BORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/9/12

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS						
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)					
BORING NO. B4-B		STATION 24+32		OFFSET 17 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 644.0 ft		TOTAL DEPTH 36.3 ft		NORTHING 763,834		EASTING 1,646,456						
DRILL RIG/HAMMER EFF./DATE TR19435 CME-55 93% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. WHICHARD		START DATE 01/30/12		COMP. DATE 01/30/12		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
626.5												
625	626.5	17.5	4.0	3:31/1.0 2:16/1.0 2:50/1.0 3:44/1.0	(3.3) 83%	(2.3) 58%					Begin Coring @ 17.5 ft	
	622.5	21.5									CRYSTALLINE ROCK	17.5
620			5.0	3:36/1.0 3:04/1.0 1:52/1.0 1:54/1.0 1:42/1.0	(5.0) 100%	(4.5) 90%					BLUE-GRAY, SLI. TO FRESHLY WEATHERED, HARD TO V. HARD, CLOSE TO WIDELY FRACTURED, METAMORPHOSED GRANITE	
	617.5	26.5					RS-5					
615			5.0	2:06/1.0 2:11/1.0 2:12/1.0 2:19/1.0 2:08/1.0	(5.0) 100%	(5.0) 100%						
	612.5	31.5										
610			5.0	2:18/1.0 1:54/1.0 2:00/1.0 2:01/1.0 1:52/1.0	(5.0) 100%	(5.0) 100%						
	607.5	36.5									Boring Terminated at Elevation 607.7 ft	36.5

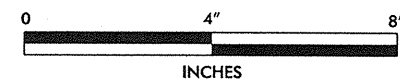
NCDOT CORE SINGLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/9/12



BORING B4-B, BOX 1 OF 2, 17.5 FEET TO 26.5 FEET



BORING B4-B, BOX 2 OF 2, 26.5 FEET TO 36.5 FEET

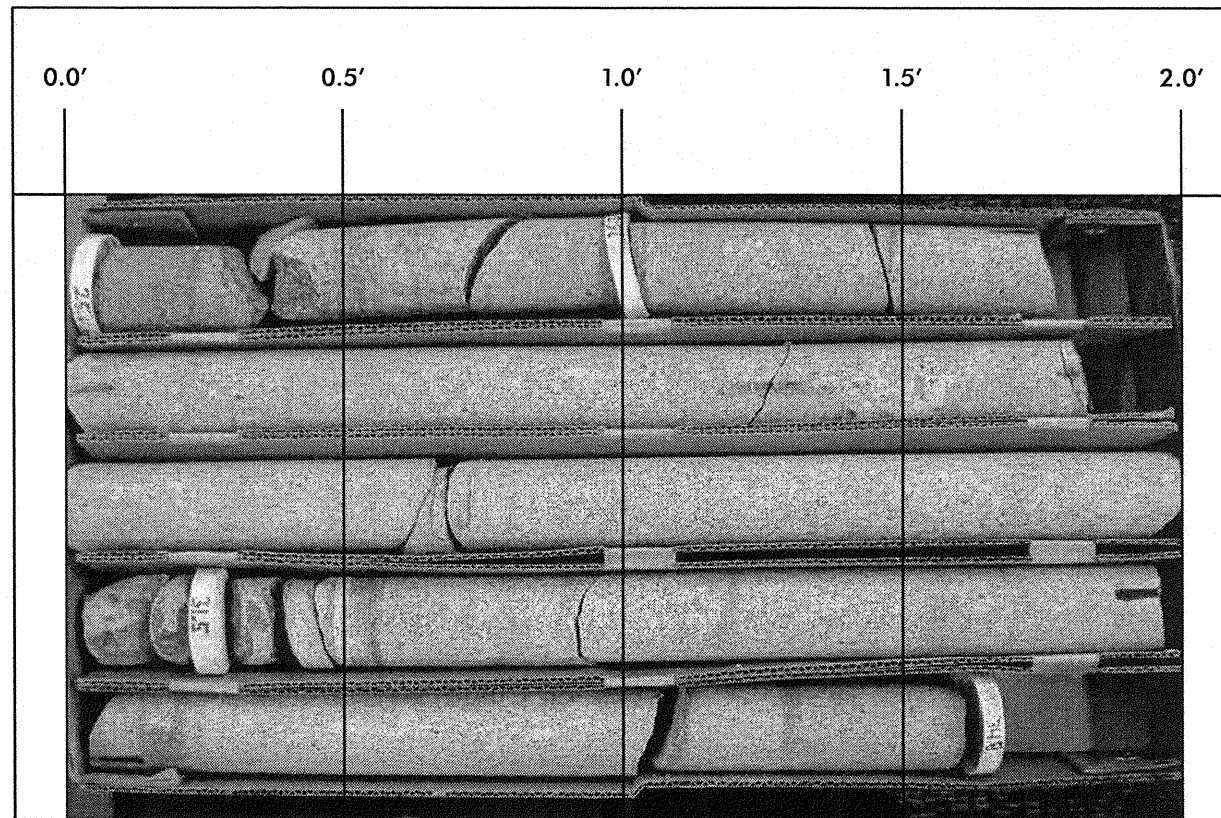


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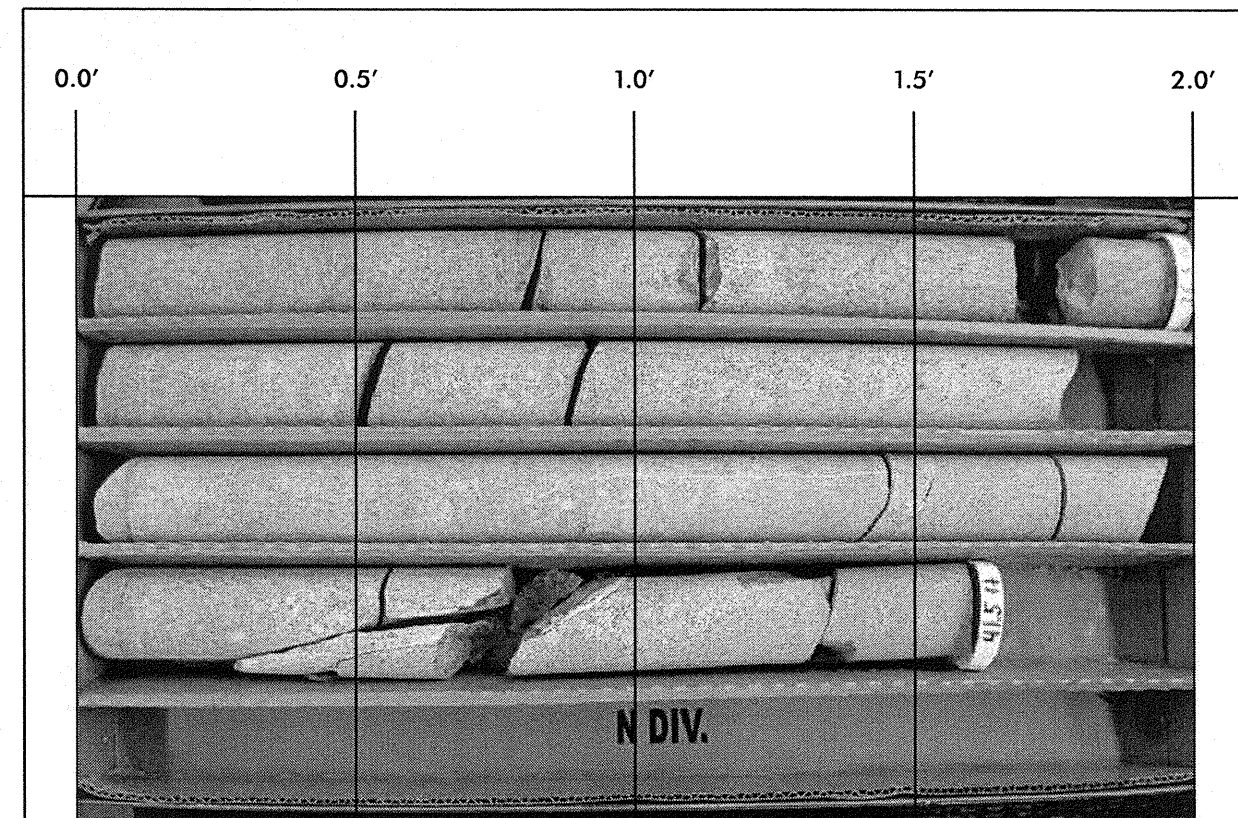
ROCK CORE PHOTOGRAPHS

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
 DAVIDSON COUNTY, NORTH CAROLINA
 WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

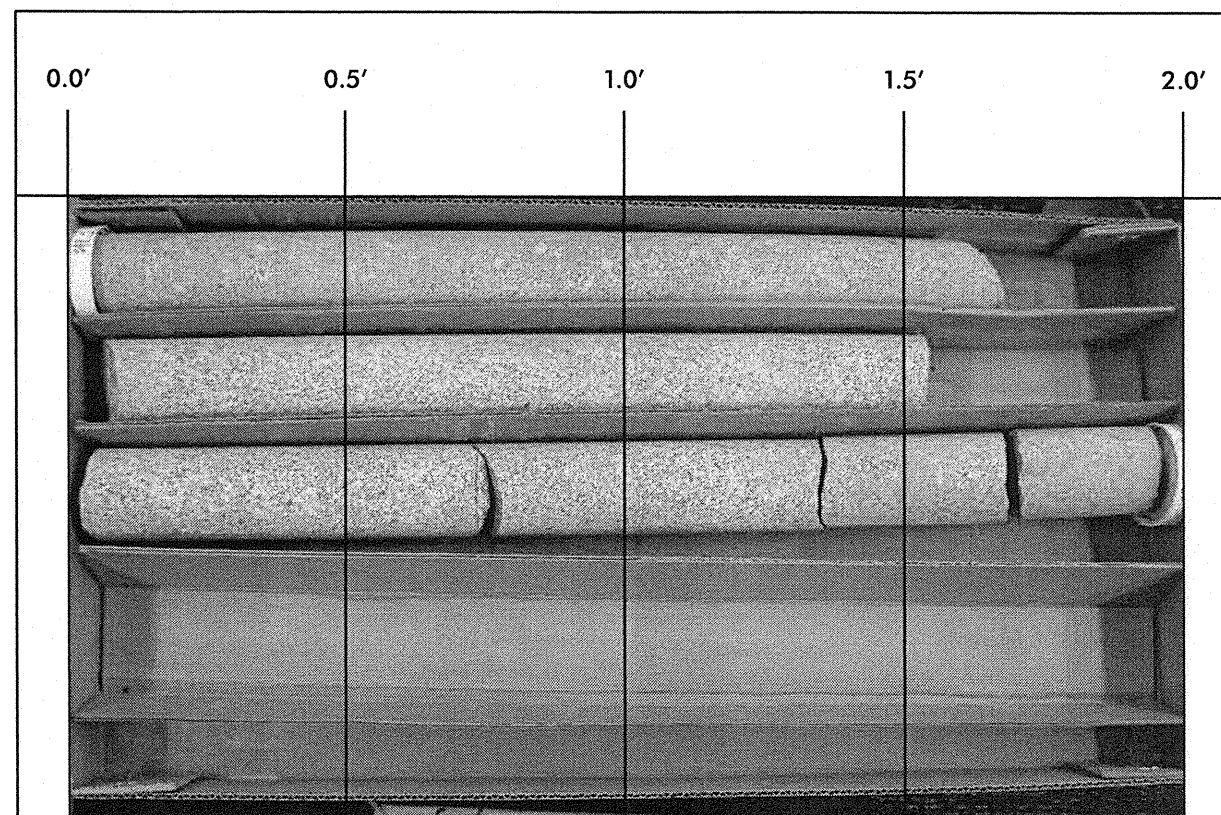
FEBRUARY 2012	PROJECT NO.: G11019.00	SHEET 2 OF 2
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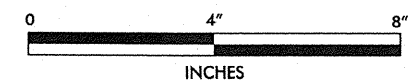
BORING B5-A, BOX 1 OF 3, 25.0 FEET TO 34.8 FEET



BORING B5-A, BOX 2 OF 3, 34.8 FEET TO 41.5 FEET



BORING B5-A, BOX 3 OF 3, 41.5 FEET TO 46.5 FEET



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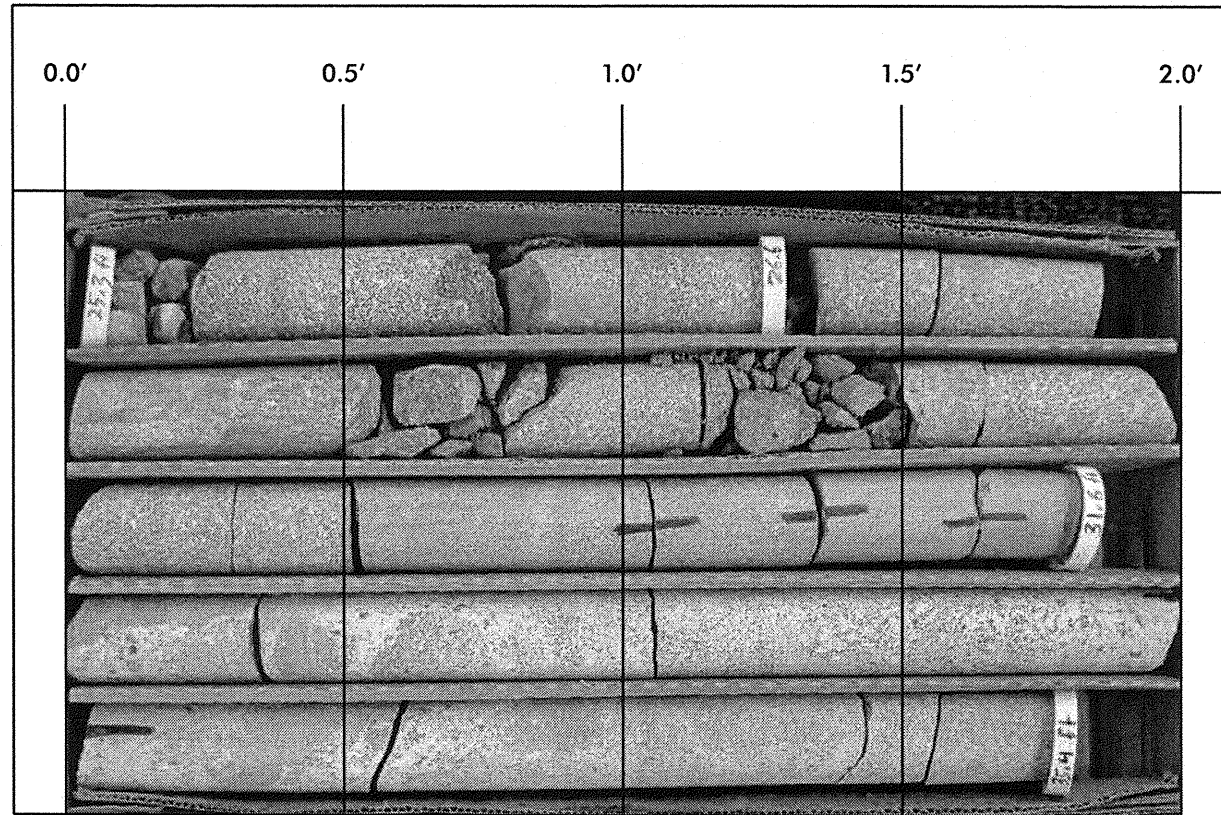
ROCK CORE PHOTOGRAPHS

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
 DAVIDSON COUNTY, NORTH CAROLINA
 WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

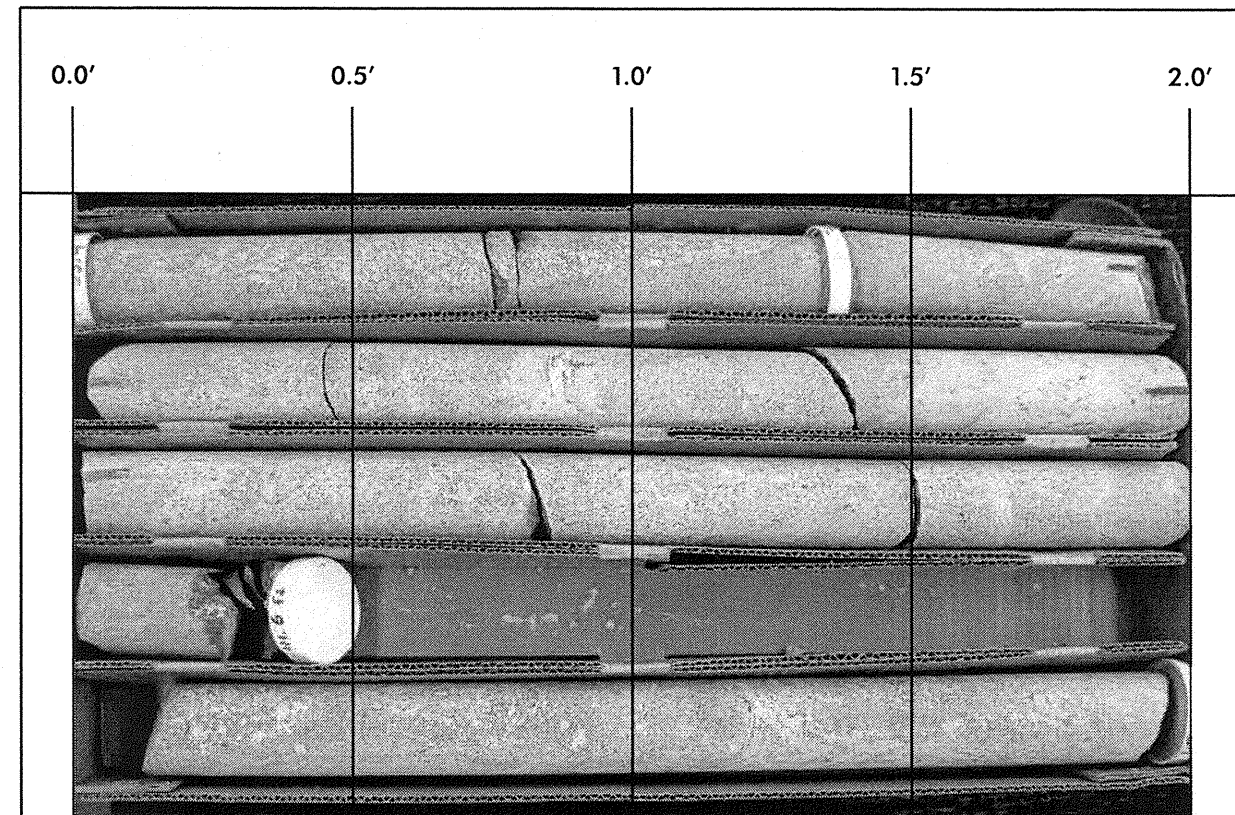
FEBRUARY 2012

PROJECT NO.:
G11019.00

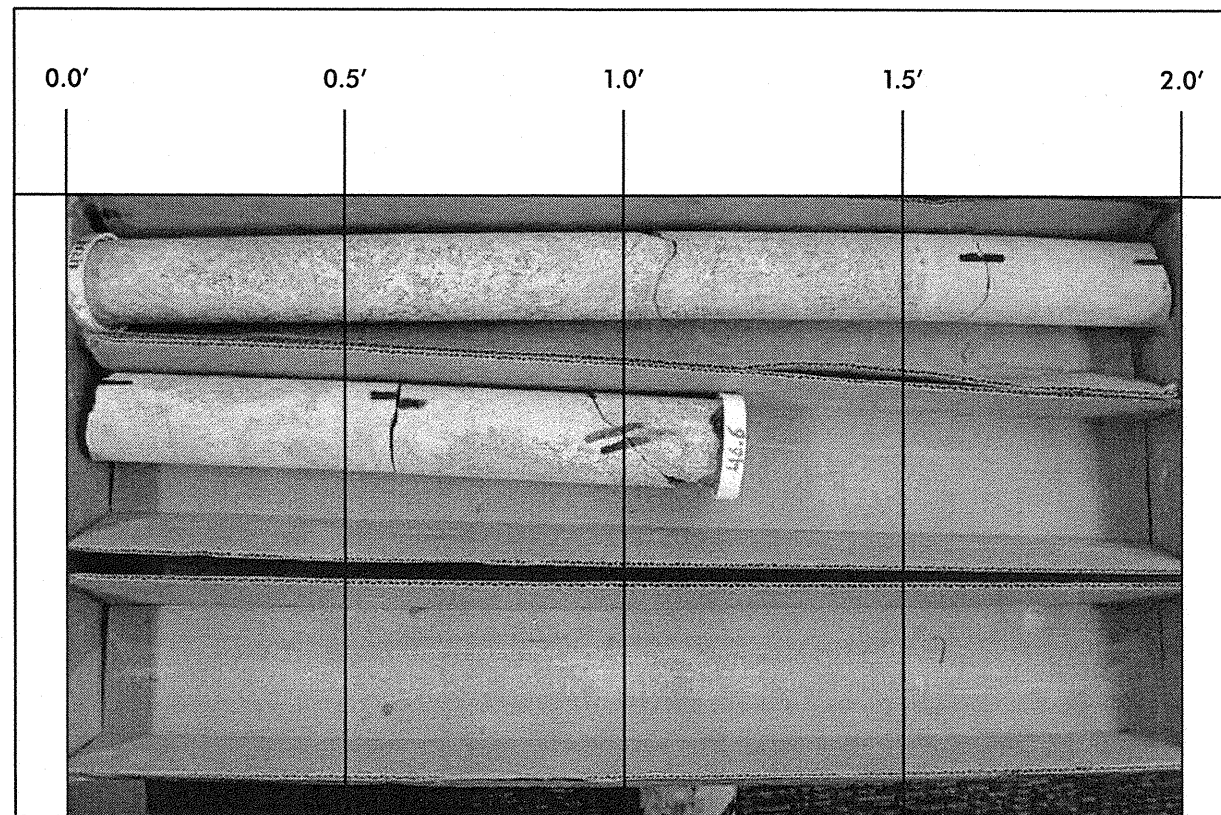
SHEET 2 OF 2



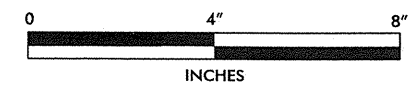
BORING , BOX OF , 25.3 FEET TO 35.4 FEET



BORING B5-B, BOX 2 OF 3, 35.4 FEET TO 43.4 FEET



BORING B5-B, BOX 3 OF 3, 43.4 FEET TO 46.6 FEET



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BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014
DAVIDSON COUNTY, NORTH CAROLINA
WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

FEBRUARY 2012

PROJECT NO.:
G11019.00

SHEET 2 OF 2



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS										
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)									
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	5.0									
EB2-A	25+84	30 ft LT	-L-			24 HR.	4.9									
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING													
650.6 ft	26.3 ft	763,715	1,646,563													
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. WHICHARD		START DATE 01/27/12	COMP. DATE 01/27/12	SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
655																
650	649.6	1.0	9	11	23									650.6	0.0	GROUND SURFACE
	647.1	3.5	19	8	10									646.1	4.5	ROADWAY EMBANKMENT GRAY BROWN AND TAN, HARD, FN. SANDY SILT (A-4) W/ GRAVEL
645	644.6	6.0	2	2	2									644.6	6.0	ALLUVIAL DK GRAY, MED. DENSE, SILTY FN. SAND (A-2-4) W/ TRACE ORGANICS DK GRAY, SOFT, FN. SANDY SILT (A-4)
640	642.1	8.5	1	2	2									637.6	13.0	DK GRAY AND BROWN, LOOSE, SILTY FN. SAND (A-2-4)
635	637.1	13.5	2	4	5									632.6	18.0	GRAY, LOOSE, SLI. SILTY SAND (A-2-4) W/ GRAVEL
630	632.1	18.5	WOH	2	3									625.1	25.5	WEATHERED ROCK NO SAMPLE RECOVERY Boring Terminated by Auger Refusal at Elevation 624.3 ft
625	627.1	23.5	4	4	4									624.3	26.3	
	624.3	26.3	60/0												60/0	

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS										
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)									
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	17.0									
EB2-B	26+28	17 ft RT	-L-			24 HR.	FIAD									
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING													
658.1 ft	33.4 ft	763,655	1,646,537													
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER R. TOOTHMAN		START DATE 02/03/12	COMP. DATE 02/03/12	SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
660																
	657.1	1.0	5	6	6									658.1	0.0	GROUND SURFACE
655	654.6	3.5	3	3	4											ROADWAY EMBANKMENT BROWN AND TAN, MED. STIFF TO STIFF, SANDY SILT (A-4) W/ TRACE ORGANICS, GRAVEL
650	652.1	6.0	6	5	5											
	649.6	8.5	3	4	5											
645	644.6	13.5	1	2	2									645.1	13.0	ALLUVIAL DK. GRAY AND BROWN, SOFT TO MED. STIFF, FN. SANDY SILT (A-4) W/ TRACE ORGANICS
640	639.6	18.5	WOH	WOH	2											
635	634.6	23.5	2	4	2											
630	629.6	28.5	3	3	3									630.1	28.0	GRAY, LOOSE, SILTY SAND (A-2-4) W/ GRAVEL
625	624.7	33.4	60/0											624.7	33.4	Boring Terminated by Auger Refusal at Elevation 624.7 ft

NCDOT BORE DOUBLE C-4108C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/9/12



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR07T1B		TIP C-4901C		COUNTY DAVIDSON		GEOLOGIST T. EVANS								
SITE DESCRIPTION BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014							GROUND WTR (ft)							
BORING NO. EB2-C		STATION 25+75		OFFSET 15 ft RT		ALIGNMENT -L-	0 HR. 8.7							
COLLAR ELEV. 649.9 ft		TOTAL DEPTH 30.2 ft		NORTHING 763,705		EASTING 1,646,518	24 HR. 8.0							
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. WHICHARD		START DATE 01/27/12		COMP. DATE 01/27/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
650														649.9 GROUND SURFACE 0.0
	648.9	1.0	2	3	1							M		ROADWAY EMBANKMENT
	646.4	3.5	2	6	21							M		GRAY BROWN AND TAN, V. LOOSE TO MED. DENSE, SILTY SAND (A-2-4) W/ GRAVEL
645	643.9	6.0	7	5	6									643.4 ALLUVIAL 6.5
	641.4	8.5	1	2	2							SS-11	22%	DK GRAY, STIFF TO SOFT, FN. SANDY SILT (A-4) W/ TRACE ORGANICS, GRAVEL
640	636.4	13.5	3	3	4									636.9 GRAY, MED. STIFF, FN. SANDY SILT (A-4) 13.0
635	631.4	18.5	3	3	4									631.4 GRAY, LOOSE, SLI. SILTY SAND AND GRAVEL (A-1-b) W/ TRACE ORGANICS 18.5
630	626.4	23.5	6	7	8							Sat.		626.4 GRAY, MED. DENSE, SILTY SAND (A-2-4) W/ GRAVEL 23.5
625	621.4	28.5	14	25	41									620.9 DK GRAY AND WHITE, V. DENSE, SILTY SAND (A-2-4) W/ ROCK FRAGS, SAPROLITIC 29.0
620	619.7	30.2	60/0									W		619.7 RESIDUAL 30.2
														DK GRAY AND WHITE, V. DENSE, SILTY SAND (A-2-4) W/ ROCK FRAGS, SAPROLITIC
														Boring Terminated by Auger Refusal at Elevation 619.7 ft

NCDOT BORE DOUBLE C-4109C TURNER RD GRADE SEPARATION.GPJ NC_DOT.GDT 3/8/12

FALCON

1210 TRINITY ROAD, SUITE 110, RALEIGH, NORTH CAROLINA 27607

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014

WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C

DAVIDSON COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G11019.00

BORING		SAMPLE	TOTAL SAMPLE			Atterberg Limit Test Results			Natural Moisture Content
AASHTO Classification			PERCENT PASSING						
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	LL	PL	PI	%
EB1-A		SS-1	99	85	63	49	24	25	24.5
A-7-6									
20+68	17 ft LT	1.0 - 2.5							
EB1-B		SS-2	97	80	53	22	16	6	13.8
A-4									
20+77	17 ft RT	1.0 - 2.5							
EB1-B		SS-3	99	88	58	41	NP	NP	24.6
A-4									
20+77	17 ft RT	13.5 - 15.0							
EB2-A		SS-4	91	68	36	20	NP	NP	8.3
A-4									
25+84	30 ft LT	1.0 - 2.0							
EB2-A		SS-5	100	96	44	19	NP	NP	21.5
A-4									
25+84	30 ft LT	8.5 - 10.0							
EB2-A		SS-6	100	97	33	20	NP	NP	22.5
A-2-4									
25+84	30 ft LT	13.5 - 15.0							
EB2-B		SS-7	95	78	40	25	NP	NP	16.9
A-4									
26+28	17 ft RT	3.5 - 5.0							
EB2-B		SS-8	100	100	92	32	23	9	30.1
A-4									
26+28	17 ft RT	13.5 - 15.0							
EB2-B		SS-9	100	98	48	20	NP	NP	20.5
A-4									
26+28	17 ft RT	18.5 - 20.0							
EB2-B		SS-10	100	99	87	28	21	7	27.2
A-4									
26+28	17 ft RT	23.5 - 25.0							
EB2-C		SS-11	100	99	50	16	NP	NP	21.9
A-4									
25+75	15 ft RT	8.5 - 10.0							
EB2-C		SS-12	100	100	41	20	NP	NP	23.2
A-4									
25+75	15 ft RT	13.5 - 15.0							

PROJECT ID NO.: C-4901C

F.A. NO.:

COUNTY: DAVIDSON

BRIDGE SR 2005 BETWEEN SR 2123 AND SR 2014

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (ft)	Diameter (ft)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Splitting Tensile Strength (PSI)
RS-1	B1-A	37.0 - 37.8	Metamorphosed Granitic Rock	(CZg)		4.20	1.98	177.8	9,928	1,226,730	-
RS-2	B2-B	11.6 - 12.2	Metamorphosed Granitic Rock	(CZg)		4.29	1.97	167.0	14,189	2,647,752	-
RS-3	B3-B	17.5 - 18.1	Metamorphosed Granitic Rock	(CZg)		3.97	1.99	168.8	4,883	1,140,524	-
RS-4	B4-A	25.4 - 26.4	Metamorphosed Granitic Rock	(CZg)		4.39	1.98	179.7	9,899	1,207,381	-
RS-5	B4-B	24.8 - 25.5	Metamorphosed Granitic Rock	(CZg)		4.38	1.98	178.6	25,845	3,899,053	-
RS-6	B5-A	29.5 - 30.2	Metamorphosed Granitic Rock	(CZg)		4.21	1.98	175.0	19,697	3,151,530	-



PHOTO 1: EXISTING AT-GRADE CROSSING, LOOKING
SOUTHWEST FROM BETWEEN END BENT 1 AND BENT 1



PHOTO 2: LOOKING DOWNSTATION ACROSS HAMBY CREEK FROM NEAR BENT 3.



	FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803			SITE PHOTOGRAPHS	
	BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07TIB, TIP NO.: C-4901C				
	FEBRUARY 2012	PROJECT NO.: G11019.00	SHEET 1 OF 2		



PHOTO 3: LOOKING NORTHEAST (LEFT) FROM NEAR BENT 4. EXISTING CONCRETE ARCH RAILROAD BRIDGE VISIBLE IN BACKGROUND



LOOKING WEST (RIGHT) FROM NEAR BENT 4. EXISTING PREVIOUS ROADWAY EMBANKMENT VISIBLE TO LEFT. EXISTING BRIDGE OVER HAMBY CREEK VISIBLE TO RIGHT IN BACKGROUND.

 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	SITE PHOTOGRAPHS		
	BRIDGE ON SR 2005 BETWEEN SR 2123 AND SR 2014 DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 49010.1.STR07T1B, TIP NO.: C-4901C		
	FEBRUARY 2012	PROJECT NO.: G11019.00	SHEET 2 OF 2