STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

GEOTECHNICAL ENGINEERING UNIT

CONTENTS

208D

TR091B

50000.

<u>SHEET</u>	<u>DESCRIPTION</u>	
1	TITLE SHEET	
2	LEGEND	_
3	BORING LOCATION PLAN	
4-5	SUBSURFACE PROFILES	
6-9	SUBSURFACE CROSS SECTIONS	
10-18	BORE LOGS, CORE REPORTS, AND CORE PHOTOGRAPHS	PR
19	SOIL AND ROCK LABORATORY TEST RESULTS	CC
20	SITE PHOTOGRAPHS	PR

STRUCTURE SUBSURFACE INVESTIGATION

SUBSUKI	ACE	INVESI	IGAI.	ION
PROJ. REFERENCE NO. COUNTY <u>CABARRU</u>		F.A	. PROJ	
PROJECT DESCRIPTION		I ROBERTA R BETWEEN SR		
SITE DESCRIPTION RO		D EXTENSION STALLINGS		
(S	R 1161) TO NO	C 49		



	STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
\	N.C.	P-5208D	1	20

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 BORNING LOOS, ROCK CORES, AND SOLI TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, COTOCHECK LEXINGERIAN UNIT AT 1991 392-0-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS. ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STANDARD THE STANDARD TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILTY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSTUME CONDITIONS INDICATED IN THE SUBSURFACE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATION. THESE WATER LEVELS OR SOIL MOISTUME CONDITIONS AND 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, ORD THE INTERPRETATIONS MADE, OR OPINION OF THE PRATEMENT 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 HUMBELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAM 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.

	C. V. NORVILLE
	J. R. HAMM
	T. E. EVANS

INVESTIGATED	BY T. EVANS /J. HAMM
CHECKED BY	C. V. NORVILLE
	FALCON ENG.
	DECEMBER, 2012
DATE	DECEMBER, 2012

PERSONNEL



PROJECT REFERENCE NO. SHEET NO. P-5208D 2

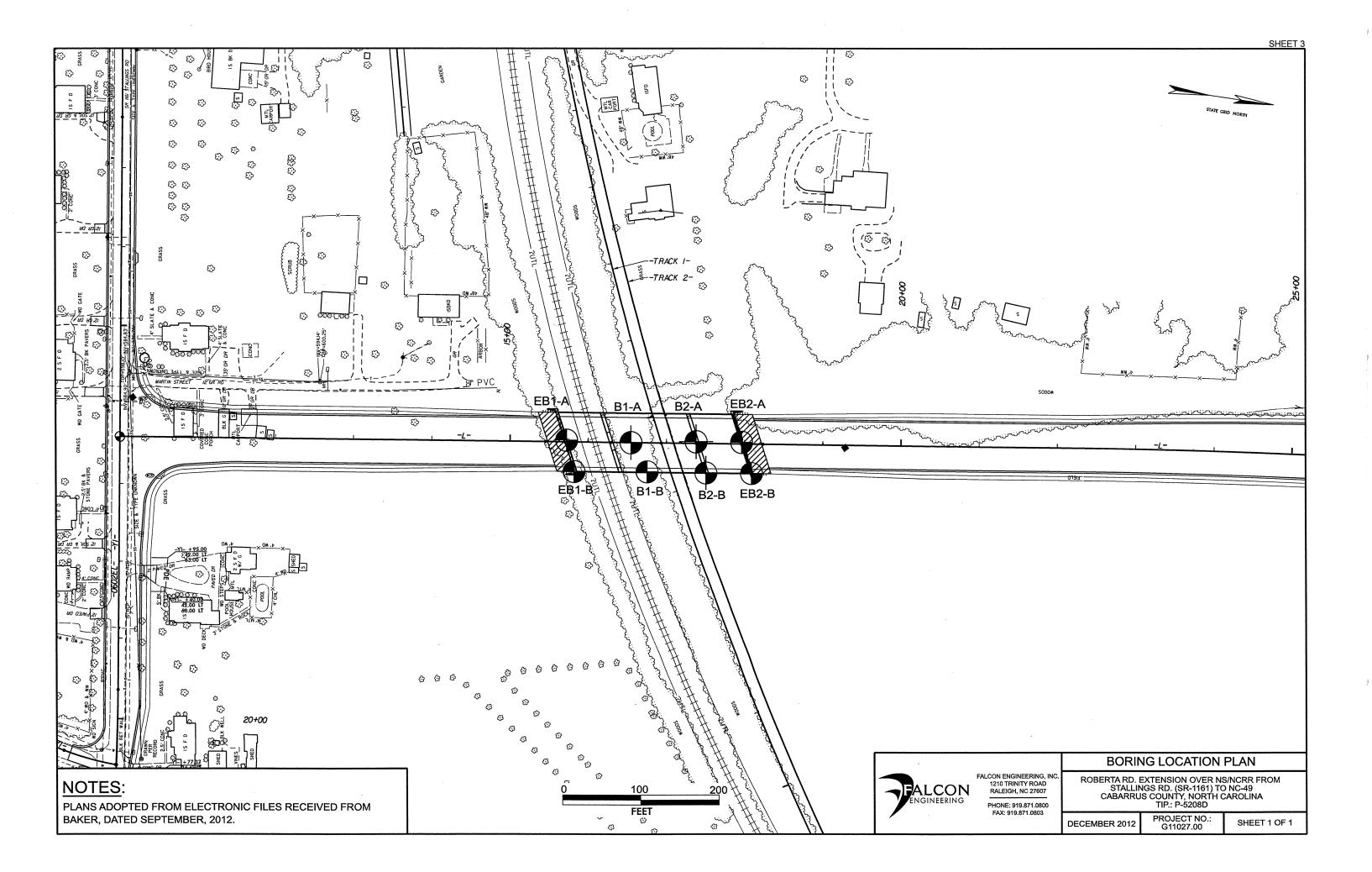
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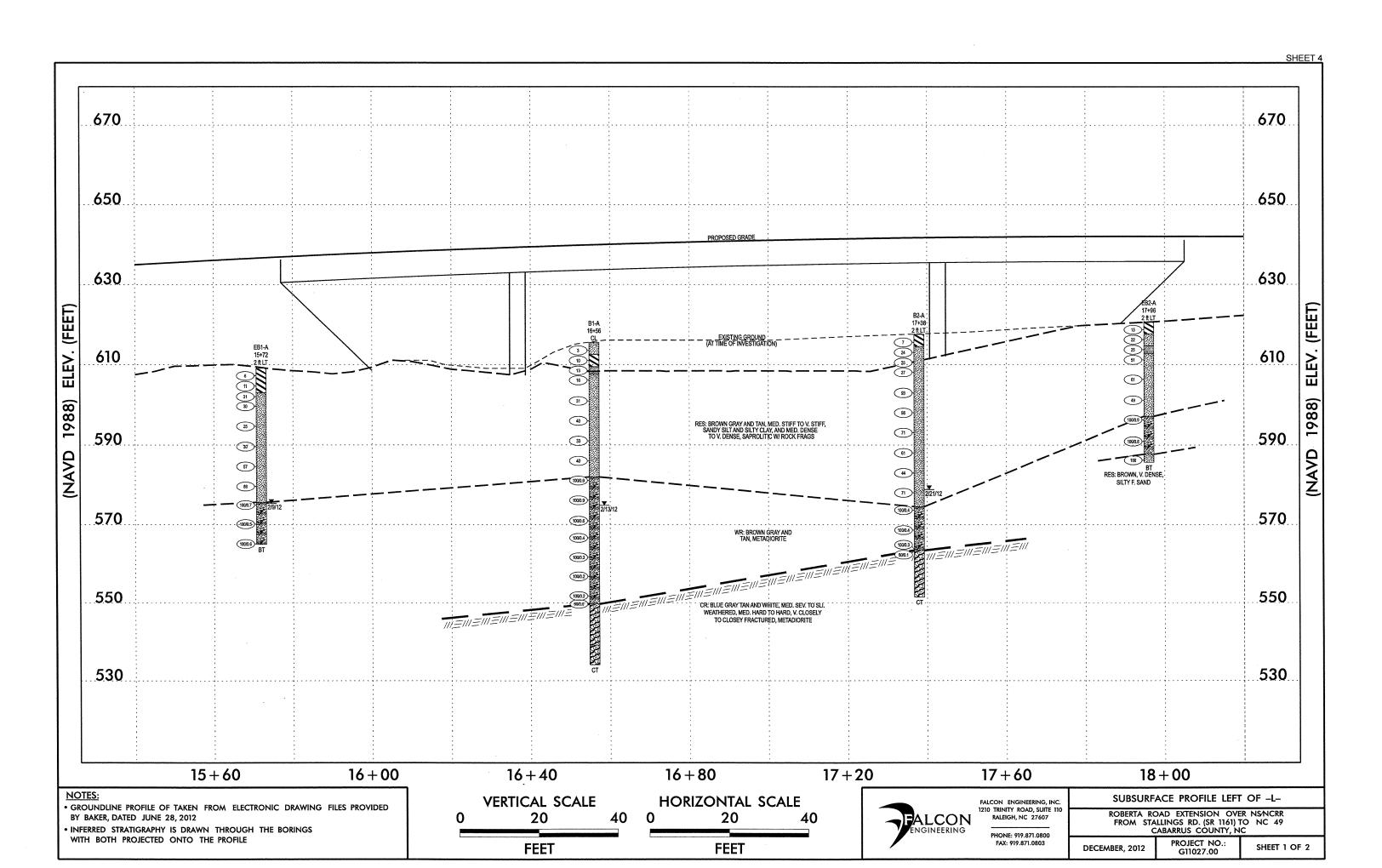
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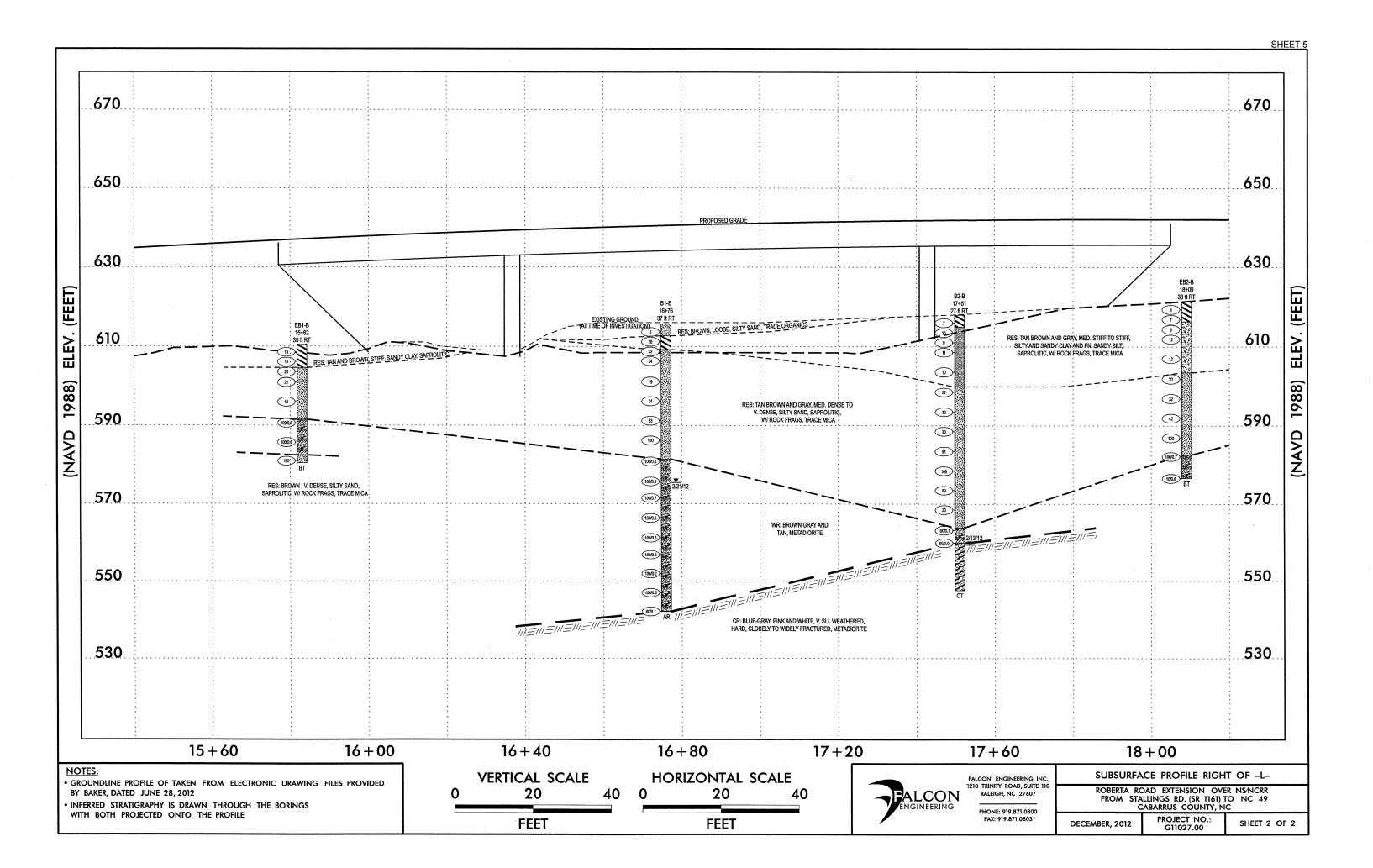
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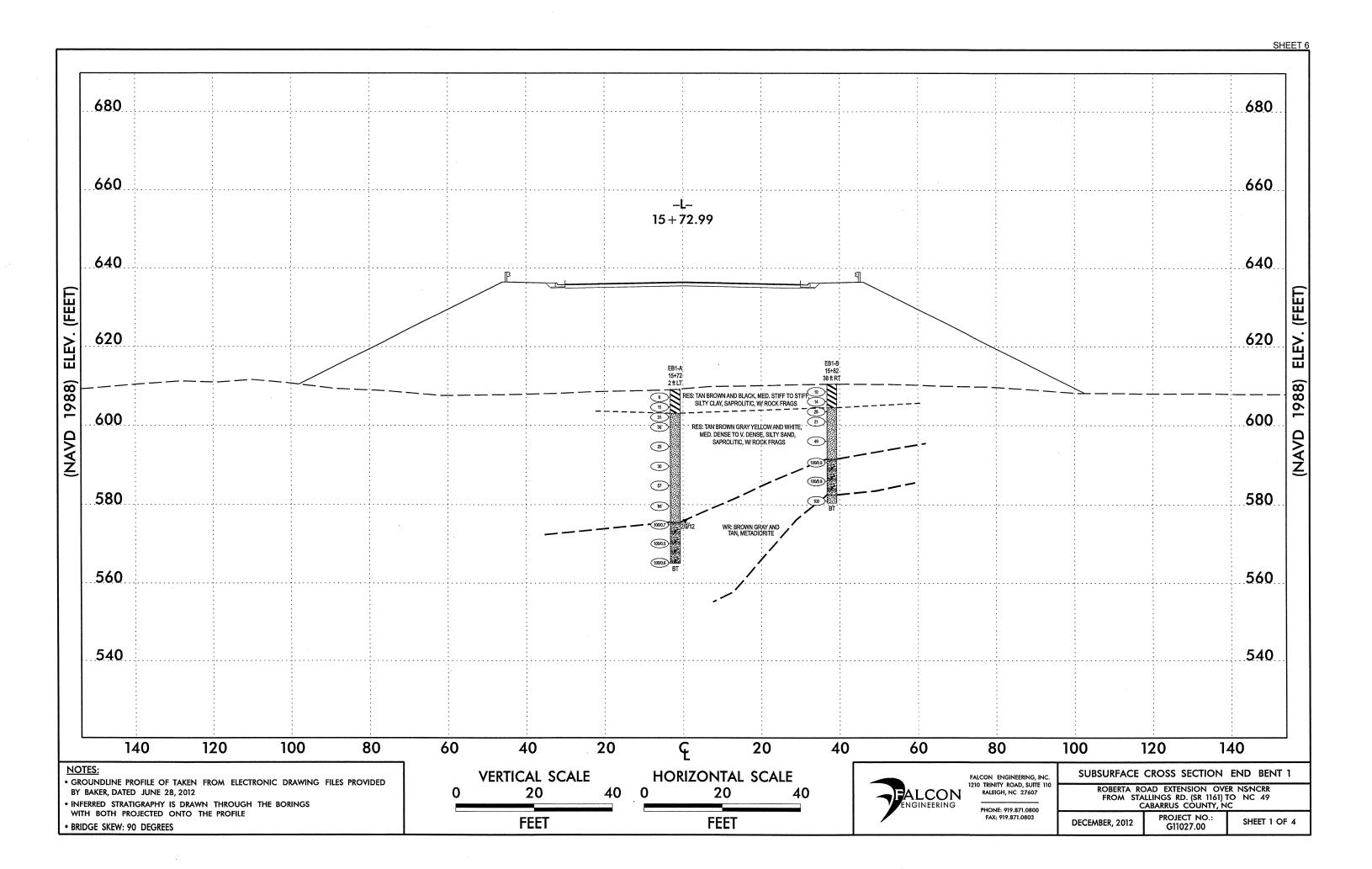
SUBSURFACE INVESTIGATION

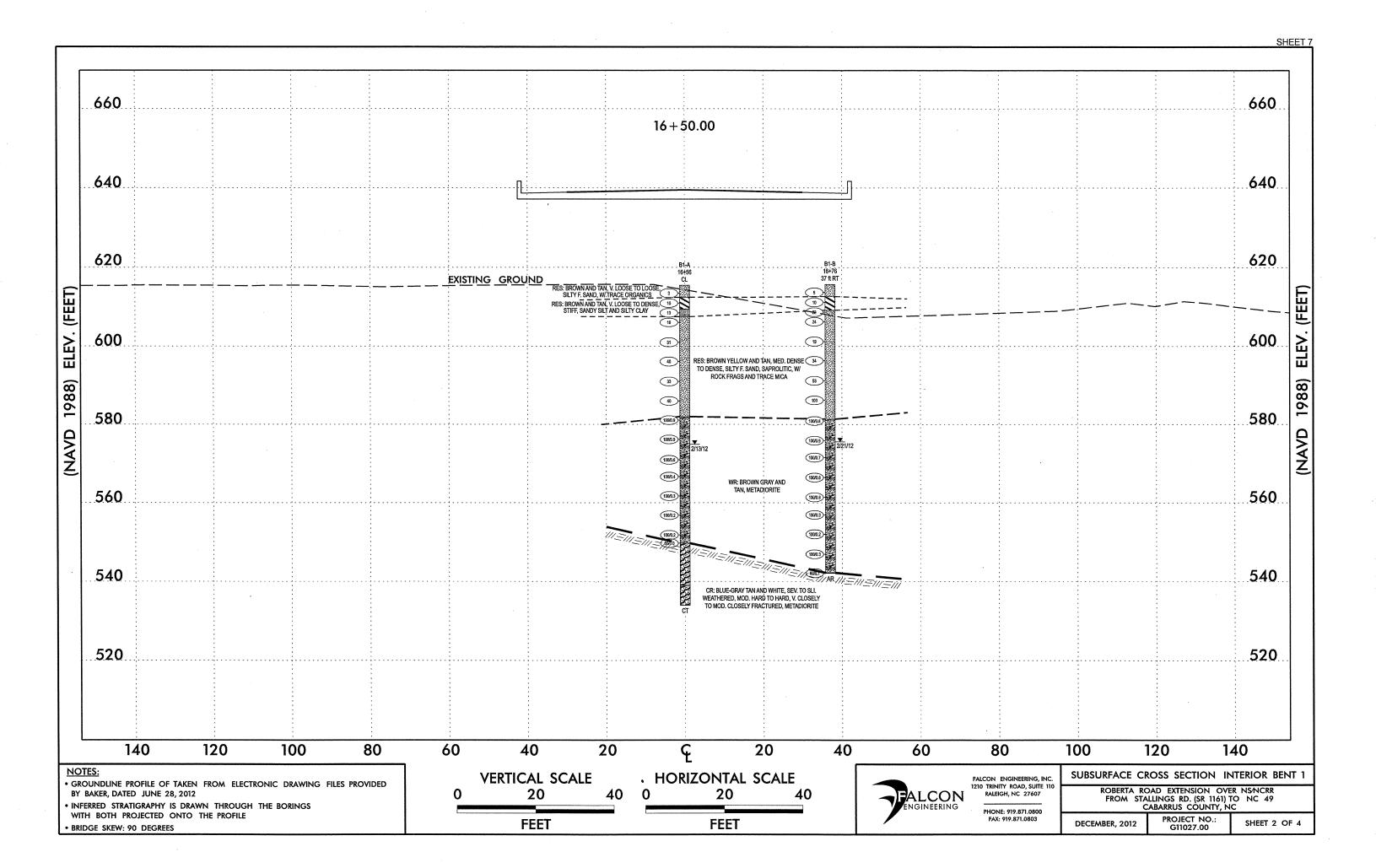
	SOIL AND ROCK LEGEND, TERMS	S, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 120 BLONS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AGASHIO 7208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AGASHIO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AGSHIO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	WELL CRADED INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. JUNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY CRADED) 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,	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 WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	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. ARGULLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
VERY STIFF, GRAY, SUTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED. MINIERAL OCICAL COMPOSITION	ROCK (WR) BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION GRANULAR MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WULLD YIELD SYT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAMEDUS (CALC.) SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SYT REFUSAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-7 A-3 A-6. A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EDUAL TO 31-59 HIGHLY COMPRESSIBLE LIQUID LIMIT OREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPI REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	OF SLOPE. <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
X PASSING SILT- MUCK.	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
- 40 30 MX 50 MX 51 MN - 200 15 MX 25 MX 18 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUID LIMIT 48 MX 41 MN SOILS WITH 18 MX 18 MX 11 MN 11 MN 18 MX 19 MX 11 MN 11	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI,) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	<u>DIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL AND CAND CRAFT SOILS OF MAJOR GRAVEL AND CAND COLORS SOILS OF MAJOR GRAVEL SOILS SOILS SOILS OF MAJOR GRAVEL SOILS SOILS SOILS SOILS OF MAJOR GRAVEL SOILS SOI	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS	SLIGHT 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.	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.
MATERIALS SANU GEN. RATING GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	STATIC WATER LEVEL AFTER 24 HOURS \[\sumsymbol{\text{PW}}\] PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE 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 HAWHER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
SUBGRADE FI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK. MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
CONSISTENCY OR DENSENESS COMPACTNESS OR RANGE OF STANDARD COMPRESSIVE STREAMS	MISCELLANEOUS SYMBOLS FI ROADWAY EMBANKMENT (RE) ST DOT THE TEST BORING TEST BORING	MODERATELY AND EXECUTED UNDER 2 INSTRUMENT SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (TONS/F12)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION ROADWAY EMBANKMENT (RE) WY CORE WY CORE	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE (4 COANILLO LOOSE 4 TO 10	SOIL SYMBOL AUGER BORING — SPT N-VALUE	(SEV.) IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GRANULAR COURT C	ARTIFICIAL FILL (AF) OTHER - CORE BORING (EF)— SPT REFUSAL THAN ROADWAY EMBANKMENT NFERRED SOIL BOUNDARY MWO MONITORING WELL	IF TESTED, YIELDS SPT N VALUES > 100 BPF VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT (V SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	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.
VERY SOFT C2 (0.25 CENERALLY SOFT 2 TO 4 0.25 TO 0.50 CENERALLY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 CENERALLY CENERAL	INFERRED SOIL BUONDARY INFERRED ROCK LINE A PIEZOMETER INSTALLATION	REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	SLOPE INDICATOR INSTALLATION 25/825 DIP & DIP DIRECTION OF	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	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
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	◆ 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. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
BOULDER	ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	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
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	CL CLAY MOD MODERATELY 7'- UNIT WEIGHT CPT - COMP PENETRATION TEST NP - NON PLASTIC 7 _d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	HARD EXCAVATED BY MARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE CHIEF FOR FIELD MOISTURE DESCRIPTION	ONT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK VOID RATIO SD SAND, SANDY SS - SPLIT SPOON SS - SPLIT SPOON	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	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.
- SATURATED - USUALLY LIQUID: VERY WET, USUALLY	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
LL LIQUID LIMIT (SAT.) FROM BELOW THE GROUND WATER TABLE PLASTIC SEMISOLID: REQUIRES DRYING TO	FRAGS FRAGMENTS # - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	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.
RANGE - WET - (W) ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: AUTOMATIC MANUAL MOBILE B-	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET THINKLY BEDDED 1.5 - 4 FEET THINKLY BEDDED 1.5 - 15 FEET	BENCH MARK: ELEVATION: FT.
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6* CONTINUOUS FLIGHT AUGER CORE SIZE: 8* HOLLOW AUGERSB_	MODERATELY CLOSE	NOTES: FIAD - FILLED-IN AFTER DRILLING
PLASTICITY	CME-45C HARD FACED FINGER BITS NO.02	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	TUNGCARBIDE INSERTS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	CME-550 CASING W/ ADVANCER HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; CENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE 211/6 * STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRIO055 CME-55 CORE BIT	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
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.	▼ TRI9435 CME-55	EXTREMELY INDURATED SHAPP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: SAMPLE BREAKS ACROSS GRAINS.	

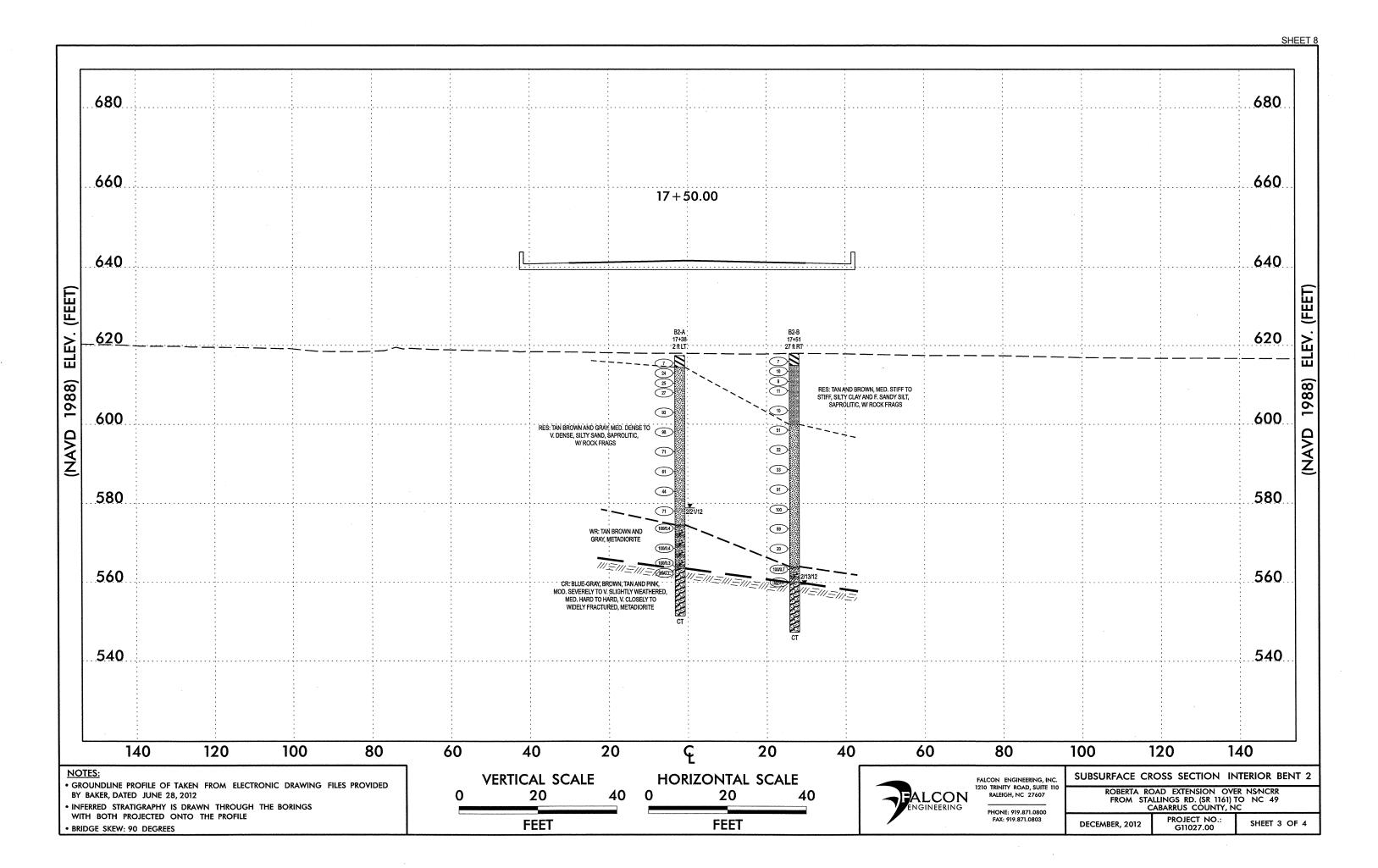


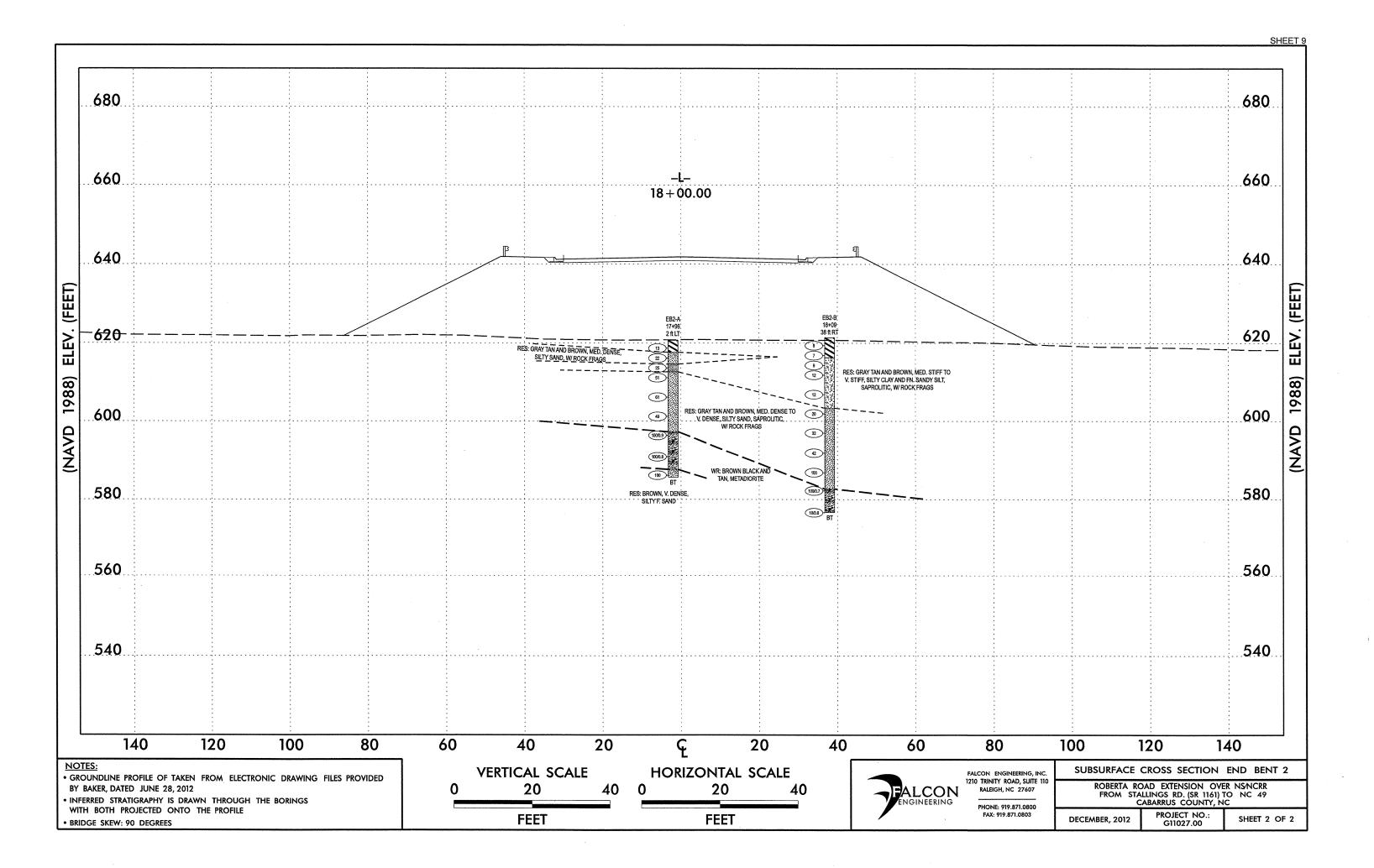












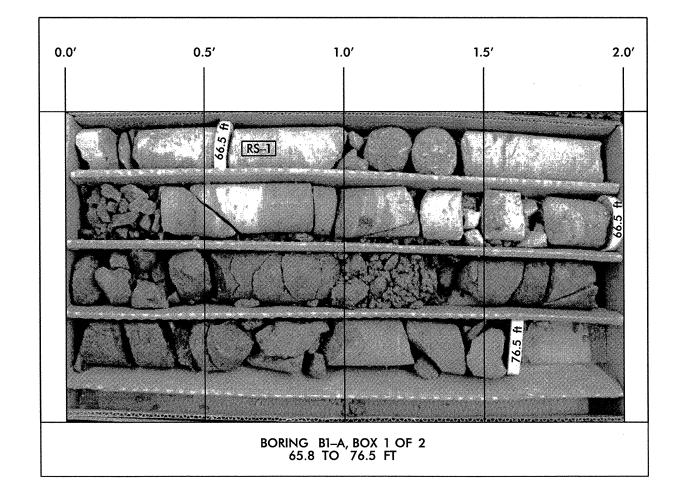
NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

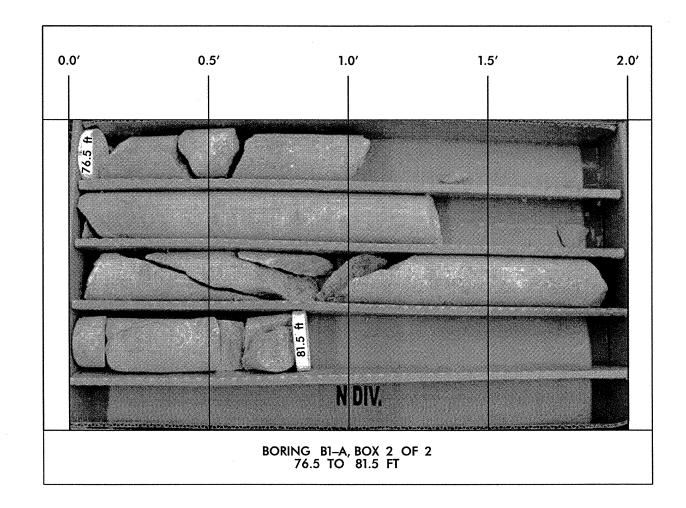
r		NTY CABARRUS	GEOLOGIST T EVANS	WRS 50000 1 STR09T1R	TIP P-5208D COU	NTV CARARRUS	GEOLOGIST T. EVANS
BORING NO. EB1-A	STATION 15+72	OFFSET 2 ft LT		BORING NO. EB1-B		OFFSET 38 ft RT	ALIGNMENT -L- 0 HR. CI @ 25.5
COLLAR ELEV. 609.1 ft	TOTAL DEPTH 44.1 ft	NORTHING 574,388	EASTING 1,508,508 24 HR. 33.8	COLLAR ELEV. 610.5 ft	TOTAL DEPTH 30.0 ft	NORTHING 574,403	EASTING 1,508,546 24 HR. Cl @ 25.3
DRILL RIG/HAMMER EFF./DATE T	TRI0055 CME-55 70% 12/08/2011	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE TR	RI0055 CME-55 70% 12/08/2011	DRILL METHOD	
COLLAR ELEV. 609.1 ft TOTAL DEPTH 44.1 ft NORTHING 574,388 EASTING 1,508,508 24 HR. 33.8 DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILLER R. TOOTHMAN START DATE 02/07/12 COMP. DATE 02/08/12 SURFACE WATER DEPTH N/A ELEV (ft) (ft) 0.5ft		COMP. DATE 02/08/12	SURFACE WATER DEPTH N/A				
(4)		75 (00)		(A) LLL (A)			C SOIL AND ROCK DESCRIPTION G
608.1 1.0 2 3		SS-19 35%	RESIDUAL	615			
603.1 + 6.0 3 5	6 . •11	м	STIFF, F. SANDY SILTY CLAY (A-7-5) W/	609.5 + 1.0 3 4	6 - •10	· · · · · · M	610.5 GROUND SURFACE: 6" TOPSOIL 0.1 RESIDUAL TAN AND BROWN, STIFF, SANDY CLAY
1 600 600.6 + 8.5 1	17		TAN BLACK AND VELLOW MED DENSE			SS-20 31%	(A-7-5) SAPROLITIC (A-7-5) SAPROLITIC 6.04.5
‡ _	1 1 7	:: :::: 📗 🔯	ROCK FRAGS	602.0 7 8.5 15 11	1		TAN BROWN AND WHITE, MED. DENSE TO DENSE, SILTY SAND (A-2-4)
595 353.0 = 13.3 6 12	13			+	17		L SAPROLITIC, W/ FAT CLAY LAYERS @ 6.5 FT, ROCK FRAGS.
590 590.6 + 18.5	17	<u>:: :::: </u> _D	<u> </u>				<u></u>
1 1 1 1			1				591.5 19.
303 13 18							WEATHERED ROCK BROWN GRAY AND TAN, METADIORITE, W/ROCK FRAGS.
580 580.6 24 33	53	—————————————————————————————————————	<u>}</u>	20 00		100/0.8 Y	
575 575 6 + 33.5			575.6 33.5				582.5 28. 580.5 RESIDUAL 30.
Ţ ⁵⁷ ^{43/0} .			WEATHERED BOOK			100=	BROWN GRAY AND TAN, V. DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/
570 570.6 = 38.5		100/0.5	W/ ROCK FRAGS			·	ROCK FRAGS. Boring Terminated at Elevation 580.5 ft IN
565 6 43 5			505.0				RES: SILTY SAND
75 25/0.	1	100/0.6	Boring Terminated at Elevation 565.0 ft IN				E
			- WR: WETADIORITE				
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1/10//			Ė l				Ę
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19. To 1. To							Ę
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¥I †	1 1		F	11 +			F



WBS	50000	.1.STR	09T1E	3	П	P P-5208D)	COUNT	Y CABAI	RRUS	***************************************		GEOLOGIST T. EVANS	
SITE	DESCRI	PTION	RO	BERTA	RD.	EXTENSIO	N OVER	NS/NCRF	RFROMS	TALLING	SS RD.	(SR 1	161) TO NC 49	GROUND WTR (ft)
BORII	NG NO.	B1-A			ST	TATION 16	i+56		OFFSET	CL		4. 7	ALIGNMENT -L-	0 HR. N/A
COLL	AR ELE	V. 61	5.5 ft		TO	OTAL DEPT	H 81.5 f	t	NORTHI	NG 574	,469		EASTING 1,508,498	24 HR. 40.7
DRILL	RIGHAN	IMER E	AQI. 7	TE TF	10055	CME-55 70%	12/08/201		L	DRILL	METHO	D Mu	d Rotary HAN	IMER TYPE Automatic
DRILL	ER R.	TOOT	HMAN	٧	ST	TART DATE	02/08/1	2	COMP. D	ATE 02	2/10/12		SURFACE WATER DEPTH	N/A
ELEV	DRIVE ELEV	DEPTH	BLC	W COL	ТИГ			PER FOOT		SAME	· V	L	SOIL AND ROCK DE	SCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5	50	75 10	NO.	MO	I G	ELEV. (ft)	DEPTH (ft)
620		-										<u> </u>	-	
615	1	-										lE	615.5 GROUND SURFACE:	12" TOPSOIL 0.0
010	614.5	-	2	2	1	3 : :	: : : :		1:::		W	W.E	RESIDUA 612.5 BROWN, V. LOOSE, SILT	L
610	612.0 609.5	•	2	5	5	- 10 -	::::	::::			w		W/ TRACE ORG	GANICS /
	607.0	-	4	5	8	13		: : : :	::::		W		607.5 BROWN AND IAN, STI	8.0
605	=	_	4	6	10	16	- : : :	: : : :			M		BROWN AND TAN, SA BROWN AND TAN, ME	
	602.0	13.5	10	14	17			: : : :			١,,		DENSE, SILTY F. S	AND (A-2-4)
600	- 1	-	10	"4	''		31 · ·	 : : : :	1 :::::		M		SAPROLITIC, W/RC	JUN FRAGS
595	597.0	18.5	12	17	23		40				М	E		
- 000	592.0	23.5					: /: :	1::::				E	-	
590	592.0		9	14	19	::::	-€33-	: : : :	::::		D	E	•	
	587.0	28.5					: \ : :	1::::				E		
585	4	-	12	16	24		• • • 40			41	M		-	
	582.0	33.5	37	63/0.4									582.0 WEATHERED	33.5 POCK
580	7	-	"	00.4				 	100/0	.e.			BROWN GRAY AND TAN	I, METADIORITE,
575	577.0	38.5	30	70/0.4					100/0	.9	V		W/ ROCK FR	AGS
	572.0	125						::::					-	
570		-	29	86	14/0.1		::::	: : : :	100/0	.6			_	
	567.0	48.5]										
565	1	-	100/0.4	1				 	100/0	4			_	
560	562.0	53.5	100/0.3					1::::	100/0	3				
560]		l		1::::		7			-	
555	557.0	58.5	100/0.2	4					: 100/0	.2			_	
	552.0	63.5				::::	::::	::::	: : : :				-	
550		65.8	100/0.2	1			: : : :	::::	100/0				_549.7	65.8
	-		60/0.0	1						RS-	1		CRYSTALLINE BLUE-GRAY TAN AND W	
545	-	-				 	 : : : :	 : : : :					TO SEV. WEATHERED, HARD, V. CLOSELY	
540	=												FRACTURED, MET	FADIORITE
U-4U	_	Ė				: : : :	::::	1:::	: : : :				-539.0 CRYSTALLINE	76.5 ROCK
535	-	Ė											BLUE-GRAY, SLI. WEAT	THERED, HARD,
		-	<u> </u>	 	 					7	+	1897	-534,0 CLOSELY TO MOD FRACTURED, MET	TADIORITE /
	-	Ē										1	Boring Terminated at Ele CR: METADIO	
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WBS	50000	1.STR	09T1E	3	TIP	P-520	I8D	C	TNUC	Y	ABARRUS GEOLOGIST T. EVANS	
SITE	DESCRI	PTION	RO	BERTA R	D. EX	TENS	ION OVE	R NS/	NCR	RFR	OM STALLINGS RD. (SR 1161) TO NC 49 GROUND WTR (ft)
BOR	ING NO.	B1-A			STAT	NOF	16+56			OF	FSET CL ALIGNMENT -L- 0 HR. N/	/A
COL	LAR ELE	V . 61	5.5 ft		TOT	AL DE	PTH 81.	5 ft		NC	RTHING 574,469	.7
DRILI	RIGIHAN	IMER EI	ADL T	TE TRIOC	55 CMI	E-55 70)% 12/08/2	2011			DRILL METHOD Mud Rotary HAMMER TYPE Automatic	
	LER R.		'AMA'	1			TE 02/0		***************************************	CC	MP. DATE 02/10/12 SURFACE WATER DEPTH N/A	_
COR	E SIZE	NQ2			TOTA		N 15.7 f	t STR	АТА	ļ		_
ELEV (ft)	ELEV	DEPTH (ft)	RUN (ft)	DRILL RATE	REC.	RQD (ft)	SAMP. NO.	REC.	RQD	0	DESCRIPTION AND REMARKS	
	(ft)	- (1.7	11-7	(Min/ft)	(11)	%		(ft)	(%)	G	ELEV. (ft) DEPTH	1 (ft)
549.7	\$48.6	65.8	0.7	2:39/0.7	(0.5)	(0.0)		(7.1)	(0.9)			35.8
545	544.0	:	5.0	5:49/1.0 3:37/1.0 4:26/1.0 3:11/1.0 7:22/1.0	(3.0) (60%	0% / (0.9) 18% /	RS-1	66%	8%		BLUE-GRAY TAN AND WHITE, MOD. SEV. TO SEV. WEATHERED, MOD. HARD TO HARD, V. CLOSELY TO CLOSELY FRACTURED, METADIORITE	
540	539.0	- 76.5	U.U	2:49/1.0 3:49/1.0	(3.6) 72%	(0.0) 0%						76.5
535	1		5.0	9:01/1.0 \3:53/1.0 \3:42/1.0	(4.6) 92%	(2.3) 46%	- - -	(4.6) 92%	(2.3) 46%		- CRYSTALLINE ROCK BLUE-GRAY, SLI. WEATHERED, HARD, CLOSELY TO MOD. CLOSELY	
	534.0	81.5		5:07/1.0 3:31/1.0 3:36/1.0	 					1	- 534.0 FRACTURED, METADIORITE 8 - Boring Terminated at Elevation 534.0 ft IN CR: METADIORITE	31.5
				3.417.0								





FALCON PHONE: 919.871.0800 FAX: 919.871.0803

FALCON ENGINEERING, INC. 1210 TRINITY ROAD RALEIGH, NC 27607

ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA TIP.: P-5208D

DECEMBER 2012

PROJECT NO.: G11027.00 SHEET 2 OF 2

ROCK CORE PHOTOS

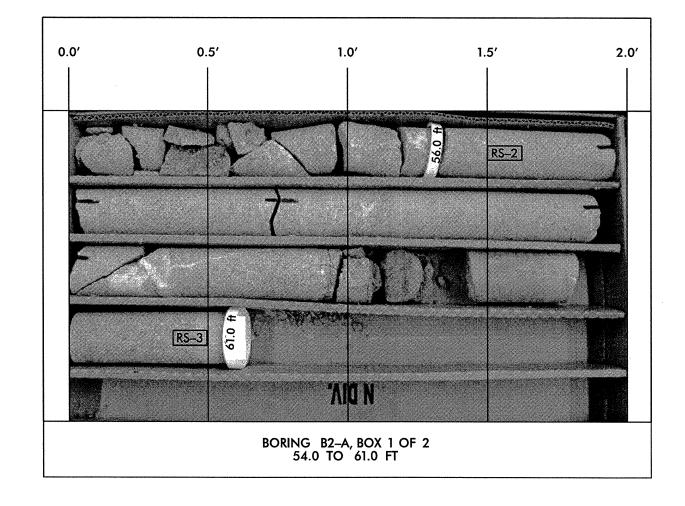
WBS 50000.1.STR09T1B TIP P-5208D COUNTY CABARRUS **GEOLOGIST** T. EVANS SITE DESCRIPTION ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR 1161) TO NC 49 GROUND WTR (ft) BORING NO. B1-B **STATION** 16+76 OFFSET 37 ft RT ALIGNMENT -L-0 HR. N/A COLLAR ELEV. 615.7 ft TOTAL DEPTH 73.6 ft **NORTHING** 574,495 **EASTING** 1,508,532 24 HR. 40.2 DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011 DRILL METHOD Mud Rotary HAMMER TYPE Automatic DRILLER R. TOOTHMAN **START DATE** 02/10/12 **COMP. DATE** 02/13/12 SURFACE WATER DEPTH N/A DRIVE SAMP. **BLOW COUNT BLOWS PER FOOT** DEPTH ELEV 0 SOIL AND ROCK DESCRIPTION (ft) (ft) 25 50 75 100 Moil G 0.5ft 0.5ft 0.5ft 0 NO. (ft) DEPTH (ft) GROUND SURFACE: 12" TOPSOIL 615.7 615 RESIDUAL
BROWN, LOOSE, SILTY SAND (A-2-4) W/
TRACE ORGANICS Μ М 610 609.7. TAN, STIFF, SILTY CLAY (A-7) М AN BROWN AND YELLOW, MED. DENSE 607.2 T 8.5 D TO V. DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS, TRACE MICA 605 D 600 19 D 595 D 590 D 38 585 52 48/0.3 580 WEATHERED ROCK _100/0.8 BROWN BLACK AND TAN, METADIORITE Y 50 50/0. 575 .100/0.9 47 53/0.2 100/0.7 570 35 65/0.3 100/0.8 565 46/0.3 100/0.8 560 557.2 + 58.5 100/0.3 555 552.2 + 63.5 100/0.2 547.2 + 68.5 100/0.3 CRYSTALLINE ROCK BLUE-GRAY, METADIORITE Boring Terminated at Elevation 542.1 ft ON CR: METADIORITE

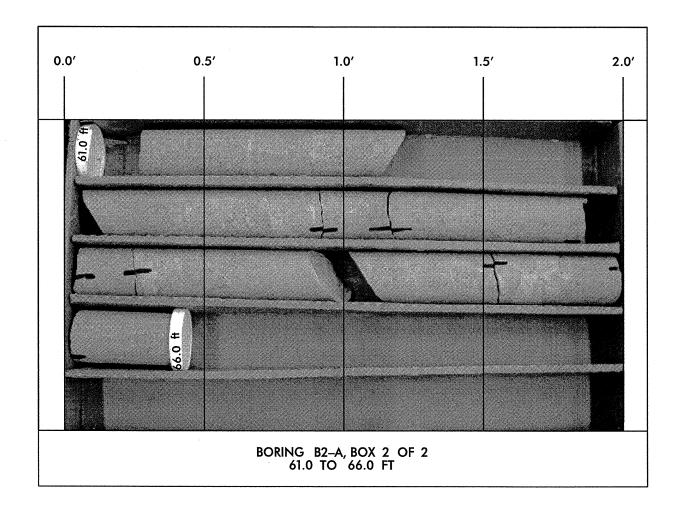


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	50000.1.STF				P P-5208D	L	Y CABARE			/05	GEOLOGIST T. EVANS	ODOLING TOTAL
			BEKI		EXTENSION OVER	NS/NCRI	T		KU.	(SR	<u> </u>	GROUND WTR (ft
	NG NO. B2-A				TATION 17+38		OFFSET				ALIGNMENT -L-	0 HR. N/A
	AR ELEV. 6		TC +		OTAL DEPTH 66.0 f		NORTHING			D **	LEASTING 1,508,485 HAMIN	24 HR. 38.7
							COURD DA	L		U M		MERTYPE Automatic
	DRIVE DEDT	T	OM CO		PI 02/10/1	PER FOOT	COMP. DA	SAMP.	13/12	1 L T	SURFACE WATER DEPTH N	I/A
ELEV (ft)	ELEV (ft)	0.5ft	0.5ft		i i	50	75 100	NO.	MOI	0	SOIL AND ROCK DES	CRIPTION DEPTH (
620											_	
615	616.5	3	3	4	1::::::::::::::::::::::::::::::::::::::	T:::	: : : : :		M		617.5 GROUND SURFACE: 3 RESIDUAL 614.5 BROWN AND TAN. MED.	
	614.0 3.5 611.5 6.0	7	9	15	24	:::			М		BROWN AND TAN, MED. CLAY (A-7) BROWN AND TAN, MED.	
610	609.0 7 8.5	9	10	17	25 •27				M W		DENSE, SILTY F. SAI SAPROLITIC, W/ROO	ND (A-2-4)
605	604.0 13.5	17	36	57			93		w		<u>-</u>	
600	599.0 18.5					:::					<u>-</u> -	,
595	594.0 ± 23.5	18	34	64		: : :	هررما	98	W		<u>-</u>	
590	‡	18	27	44		/	71		М		-	
585	589.0 28.5	18	24	37		61			D			
300	584.0 33.5	11	16	28	· · · · · · · · · · · · · · · · · · ·	4 : : :			D		- - -	
580	579.0 38.5	29	16	55			• • • • • • • • • • • • • • • • • • •		V		- - - -	
575	574.0 + 43.5	100/0.4				:::	100/0.4			777	574.5 WEATHERED R	43
570	569.0 48.5						- 100/0.4				TAN AND BROWN, ME	
565	‡	100/0.4	1				100/0.4					
560	\$64.9 \\ \frac{1}{52.5}	100/0.3 60/0.1					100/0.3	RS-2			- 563.5 CRYSTALLINE F - BLUE-GRAY, MOD. SEV.	
								RS-3			MED. HARD, V. CLOSELY FRACTURED, META	
555	<u>+</u>											66
	+										Boring Terminated at Eleve CR: METADION	ation 551.5 ft IN
	+										- - - -	
	1 1										- - -	
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	50000				L	P-520					ABARRUS	GEOLOGIST T. EVANS	
				BERTA R				ER N	S/NCRF		OM STALLINGS RD. (SR 11	l61) TO NC 49	GROUND WTR (ft)
 	ING NO.						17+38				FSET 2ftLT	ALIGNMENT -L-	0 HR. N/A
COLI	LAR ELE	V . 61	7.5 ft		TOT	AL DEI	PTH 66	.0 ft		NO	RTHING 574,551	EASTING 1,508,485	24 HR. 38.7
DRILL	RIGIHAN	AMER E	ADLA	TE TRI94	35 CM	E-55 93	3% 12/08/	2011		,	DRILL METHOD Mud	Rotary HAMM	ERTYPE Automatic
DRIL	LER W	. WHIC	HARI)	STAI	RT DA	TE 02/1	0/12		co	MP. DATE 02/13/12	SURFACE WATER DEPTH N	'A
COR	E SIZE	NQ2					N 12.0						
ELEV	ELEV	DEPTH		DRILL RATE	REC.	RQD (ff)	SAMP.	REC	RATA RQD	0	D	ESCRIPTION AND REMARKS	
(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(1)	(ft)	G	ELEV. (ft)		DEPTH (ft
563.5	563.5 <u>1</u>	- 54.0	2.0	2:22/4.0	(1.5)	(0.0)		/11 *	2) (0.1)	لارتجن	563.5	Begin Coring @ 54.0 ft CRYSTALLINE ROCK	54.0
560	561.5	- 56.0	5.0	2:22/1.0 3:57/1.0 2:41/1.0	75%	0%/	RS-2	93%	2) (9.1) 6 76%		 BLUE-GRAY, MOD. 	SEV. WEATHERED, MED. HARD, V. SELY FRACTURED, METADIORITE	CLOSELY TO
	556.5	61.0		2:41/1.0 2:53/1.0 2:47/1.0	(4.8) 96%	(4.2) 84%	50.0					SELT FRACTURED, METADIORITE	
555		-	5.0	2:16/1.0	(4.9) 98%	(4.9) 98%	RS-3	1					
	551.5	66.0		2:55/1.0 3:01/1.0 2:58/1.0 3:11/1.0 3:57/1.0				ļ		7	551.5	ted at Elevation 551.5 ft IN CR: META	66.0
	-	-		3:11/1.0 3:57/1.0					ŀ		Boiling remaina	ted at Elevation 551.5 It in Cr. IVIETA	DIORITE
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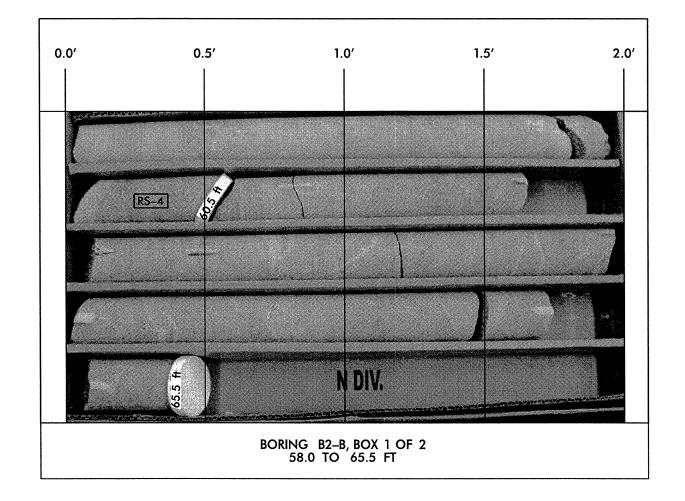
ROCK CORE PHOTOS

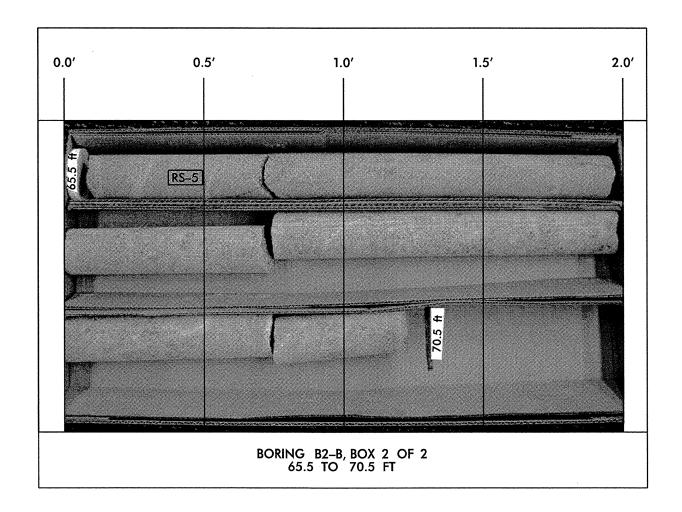


WBS	50000.	.1.STR	09T1E	3	TI	P P-5208D	COUNT	Y CABARR	US			GEOLOGIST T. EVANS				
SITE	DESCRI	PTION	RO	BERT/	RD.	EXTENSION OVER	NS/NCRF	RFROMSTA	ALLINGS	RD.	(SR 1	1161) TO NC 49	GROUND WTR (
BORI	NG NO.	B2-B			ST	TATION 17+51		OFFSET 2	27 ft RT			ALIGNMENT -L-	OHR. N			
COLL	AR ELE	V. 61	8.0 ft		TC	OTAL DEPTH 70.5 f	t	NORTHING	574,5	70		EASTING 1,508,522	24 HR. 58			
ORILL	RIG/HAM	IMER EI	FF.JDA	TE TF	RI9435 (CME-55 93% 12/08/201	1		DRILL N	IETHO	D Mu	ud Rotary HAMN	GROUND WTR 1 1,508,522 1 HAMMER TYPE Automat ATER DEPTH N/A DIL AND ROCK DESCRIPTION			
DRIL	LER W	. WHIC	HAR)	ST	ART DATE 02/08/1	2	COMP. DA	TE 02/	09/12		SURFACE WATER DEPTH N	/A			
LEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W COL 0.5ft	JNT 0.5ft	1	PER FOOT	75 100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DES	CRIPTION DEPTH			
3 2 0		-										- 618.0 GROUND SURFACE: 3	W TODOO!			
045	617.0	1.0	3	3	4	1; : : : : :	T	T	-	w		RESIDUAL	***************************************			
615	614.5	-	4	4	6	10 : : : : :	 			M			STIFF, SILTY			
310	612.0	6.0	3	4	5	9				М	I I					
	609.5	- 8.5 -	2	4	7	. ∳ 11	1::::			w		- (A-4) OAL NOETHOU	y 10.0 i 1			
305	604.5	- - 13.5				1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	::::					• •				
	1	-	3	5	5	10 : : : :				M		• • •				
300	599.5	- - 18.5	40	-00						_		600.0 TAN CRAY AND BROWN	V DENSE TO			
	1	-	10	22	29	رَ : : : : : : : 5	51 : :			D		MED. DENSE, SILTY F.	SAND (A-2-4)			
595	594.5	23.5	7	11	21	432	+	 • • • • 		D		SAPROLITIC, W/ ROC	K FRAGS.			
590	1		,		-1	32.	: : : :		ŀ							
330	589.5	- 28.5 -	8	14	19	: : : : : : : : : : : : : : : : : : : :	1::::			D		- : :				
85	584.5	23.6										_				
	304.5	- 33.3	19	33	58		::::	91		D		•				
80	579.5	- 38.5					: : : :	: : · \				<u>.</u>				
	1		35	65/0.5				100	'	D		•				
575	574.5	43.5	14	36	53		+	1 1		м						
- 70	1		14	30	55		يسند ا	89		101		•				
570	569.5	48.5	7	7	13	20				м		<u> </u>				
565	564.5	E										•				
	504.5	- 53.5	19	40	60/0.2			100/0.7			177	- 564.0 - WEATHERED R	OCK (
560	560.0	58.0					: : : :	60/0.0		V						
	1		60/0.0						RS-4			CRYSTALLINE F	ROCK			
555	=	Ė				 	1::::					 WEATHERED, HARD, C 	LOSELY TO			
	-	Ė							RS-5			. WIDELY FRACTURED, N	ETADIORITE			
550	-	F					+					<u>-</u> - 547.5	,			
		-					1	- 1 1				Boring Terminated at Eleva	ation 547.5 ft IN			
		F										- GR: IVIE FADIOF	MIE			
]	Ė									1 5	- - 				
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<u></u>		CO	RE B	OR	INC	i RE	PO	RT			
WBS	50000.1.STR	:.09T1	В	TIP	P-520	18D	C	OUNT	Υ (CABARRUS GEOLOGIST T. EVANS	
SITE	DESCRIPTION	RO	BERTA R	D. EX	TENS	ION OVE	RNS	NCRE	RFR	ROM STALLINGS RD. (SR 1161) TO NC 49 GROUND WTR	(ft)
BOR	ING NO. B2-B			STAT	TION	17+51			OF	FFSET 27 ft RT ALIGNMENT -L- 0 HR. N	V/A
	LAR ELEV. 61			L		PTH 70.			NO	ORTHING 574,570 EASTING 1,508,522 24 HR. 58	8.5
	L RIG/HAMMER E									DRILL METHOD Mud Rotary HAMMER TYPE Automati	fic
<u> </u>	LER W. WHIC	CHAR	D			TE 02/0			CO	OMP. DATE 02/09/12 SURFACE WATER DEPTH N/A	
	RESIZE NQ2	Γ	DRILL	1	AL RUI JN	N 12.5 f	t STR	ΔΤΔ			
(ft)	RUN ELEV (ft) (ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft)	SAMP. NO.	REC. (ft)	RQD (ft)	L 0 G	DESCRIPTION AND REMARKS	-H (ft)
560	560.0 58.0 557.5 = 60.5	2.5	3:03/1.0	(2.4)	(2.3)		(12.3)	(12.2)		Begin Coring @ 58.0 ft CRYSTALLINE ROCK	58.0
555	557.5 + 60.5	5.0	3:03/1.0 3:05/1.0 2:22/0.5 3:53/1.0 4:01/1.0 3:36/1.0 3:08/1.0 3:09/1.0	96% (4.9) 98% (5.0)	92% (4.9) 98% (5.0)	RS-4	98%	98%		BLUE-GRAY PINK AND WHITE, V. SLI. WEATHERED, HARD, CLOSELY TO WIDELY FRACTURED, METADIORITE	00.0
550	547.5 I 70.5		2:33/1.0	1000						547.5	70.5
	Ī		2:33/1.0 2:52/1.0 3:03/1.0 2:49/1.0 2:56/1.0						-	Boring Terminated at Elevation 547.5 ft IN CR: METADIORITE	7,010
	+++ ++++ ++++ ++++ ++++ ++++ ++++ ++++ ++++										







FALCON ENGINEERING, INC. 1210 TRINITY ROAD RALEIGH, NC 27607

PHONE: 919.871.0800 FAX: 919.871.0803

ROCK CORE PHOTOS

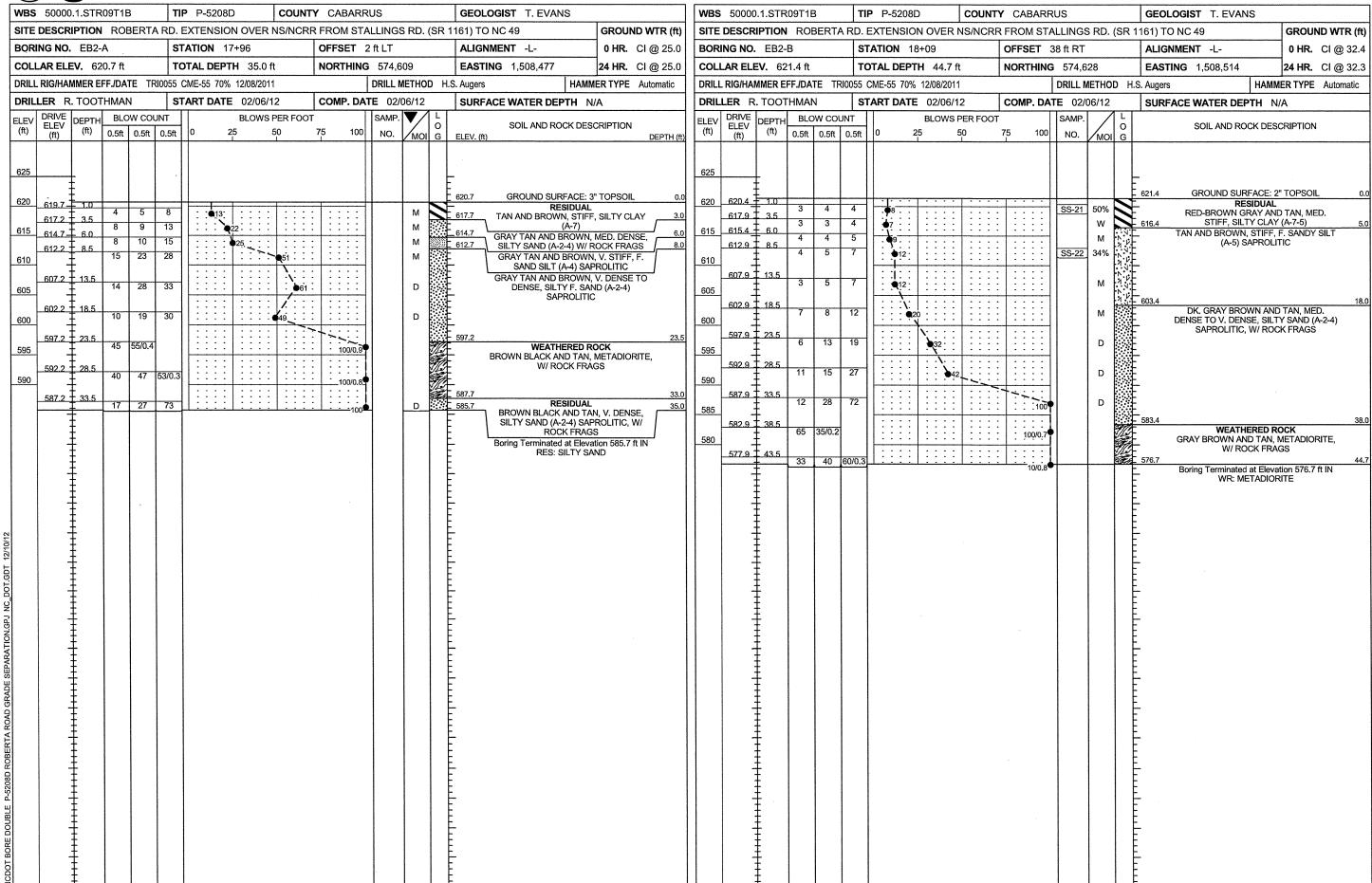
ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA TIP.: P-5208D

DECEMBER 2012

PROJECT NO.: G11027.00

SHEET 2 OF 2

NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT



FALCON

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS ROAD (SR 1161) TO NC 49

WBS NO.: 50000.1.STR09T1B, TIP NO.: P-5208D

CABARRUS COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G11027.00

LABORATORY	CHIMANADY	CHEET FOD	DOCK COD	E CAMDI EC
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ROBERTA ROAD EXTENSION OVER NS/NCRR FROM STALLINGS ROAD (SR 1161) TO NC 49

WBS NO.: 50000.1.STR09T1B, TIP NO.: P-5208D

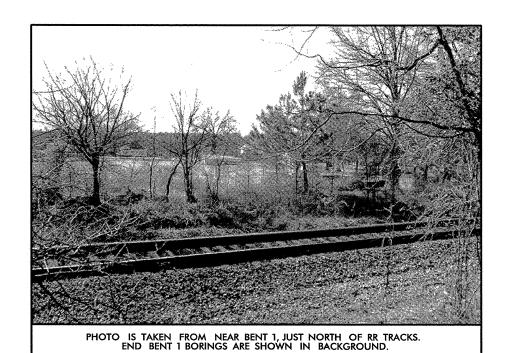
MECKLENBURG COUNTY, NORTH CAROLINA

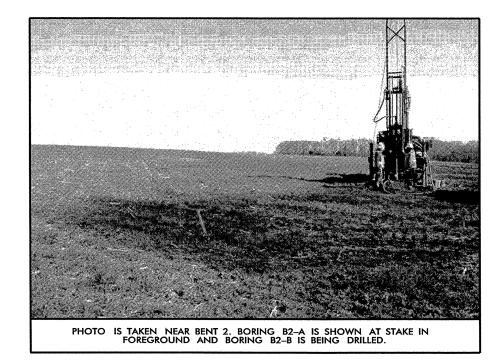
FALCON ENGINEERING, INC. PROJECT NO: G11027.00

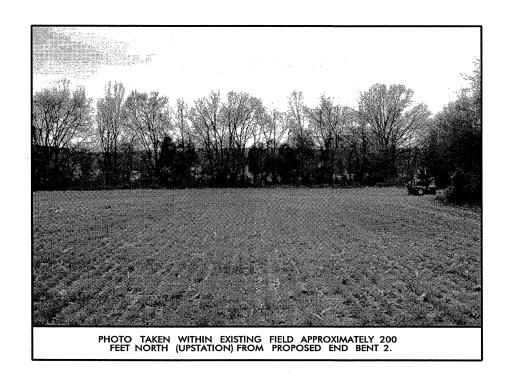
BORING SAMPLE TOTAL SAMPLE AASHTO Classification Percent Passing			Results Moisture		Natural Moisture Content	Sample	Boring	Depth (ft)	Rock Type	Geologic	Run	Length		Unit Weight	Unconfined Compressive	Young's Modulus	Splitting Tensile				
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	LL	PL	PI	%	No.	Domis		TOOK 17PO	Map Unit	RQD	(ft)	(ft)	(PCF)	Strength (PSI)	(PSI)	Strength (PSI)
EB1-A SS-19 A-7-5		98	88	73			33	34.5	RS-1	B1-A	67.5-69.0	Metadiorite	PzZm	18%	0.37	0.17	175.2	14,673	3,398,013	-	
					67	34															
15+72	2 ft. LT.	1.0 - 2.5												<u> </u>							
EB1-B SS-20 A-7-5																					
			98	86	61	56	30	26	31.4	RS-2	B2-A	56.1-56.8	Metadiorite	PzZm	84%	0.36	0.17	183.3	9,649	3,484,859	-
15+82	38 ft. RT.	3.5 - 5.0	<u></u>			<u> </u>									<u> </u>						
EB2-B SS-21 A-7-5		100 9		92 62 5		6 45	11	49.7	RS-3	B2-A	60.3-61.1	Metadiorite	PzZm 8		ľ	0.17	186.1	12,051	2,345,641	-	
			92		56									84%	0.36						
18+09	38 ft. RT.	1.0 - 2.5		<u> </u>						l							<u> </u>				
EB2		SS-22																			
A-5		99	90 6	66	48	38	10	34.1	RS-4	B2-B	60.0-60.5	Metadiorite	PzZm	98%	0.34	0.17	178.7	12,305	2,949,611	-	
18+09	38 ft. RT.	1.0 - 2.5															<u> </u>				
										RS-5	B2-B	65.5-66.2	Metadiorite	PzZm	100%	0.37	0.17	180.8	5,665	1,578,093	•













FALCON ENGINEERING, INC. 1210 TRINITY ROAD RALEIGH, NC 27607

PHONE: 919.871.0800 FAX: 919.871.0803 SITE PHOTOS

ROBERTA RD. EXTENSION OVER NS/NCRR FROM STALLINGS RD. (SR-1161) TO NC-49 CABARRUS COUNTY, NORTH CAROLINA TIP.: P-5208D

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SHEET 1 OF 1