

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	42608.1.JA9 (M-0423)	1	8

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 42608.1.JA9 F.A. PROJ. _____

COUNTY DAVIDSON

PROJECT DESCRIPTION ARRA BRIDGES - DIVISION 9

SITE DESCRIPTION BRIDGE NO. 349 ON SR 2099 OVER
PLUMMER'S CREEK

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SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
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PERSONNEL

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CHECKED BY M. ROBERTSON

SUBMITTED BY FALCON

DATE 4/16/2010

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

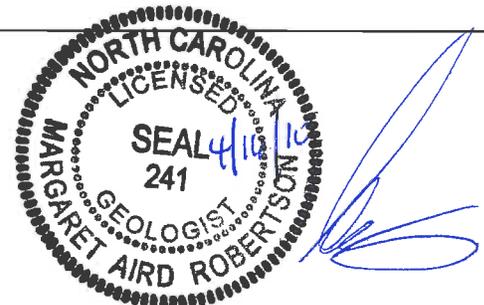
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

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

DRAWN BY: T. EVANS / J. HAMM



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

SOIL DESCRIPTION										GRADATION																													
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: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A7-6										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 <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .																													
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION																													
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.																								
GROUP CLASS.		A-1		A-3		A-2			A-4		A-5		A-6		A-7		A-1, A-2		A-4, A-5		ANGULARITY OF GRAINS																		
SYMBOL		A-1-a		A-1-b		A-2-4			A-2-5		A-2-6		A-2-7		A-4-8		A-7-5		A-3		A-6, A-7		COMPRESSIBILITY																
% PASSING		50 MX		50 MX		51 MN			35 MX		35 MX		35 MX		36 MN		36 MN		36 MN		36 MN		GRANULAR SOILS		SILT-CLAY SOILS		MUCK, PEAT												
LIQUID LIMIT PLASTIC INDEX		6 MX		NP		40 MX			41 MN		40 MX		41 MN		40 MX		41 MN		40 MX		41 MN		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS														
GROUP INDEX		0		0		0			4 MX		8 MX		12 MX		16 MX		No MX		No MX		No MX		No MX		PERCENTAGE OF MATERIAL														
USUAL TYPES OF MAJOR MATERIALS		STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		GROUND WATER												
GEN. RATING AS A SUBGRADE		EXCELLENT TO GOOD		EXCELLENT TO GOOD		EXCELLENT TO GOOD			FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		FAIR TO POOR		MISCELLANEOUS SYMBOLS										
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30									
CONSISTENCY OR DENSENESS										RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																													
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		TEST BORING											
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)		VERY LOOSE		<4		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		AUGER BORING											
GENERALLY SILT-CLAY MATERIAL (COHESIVE)		SOFT		2 TO 4		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		0.25 TO 0.50		CORE BORING									
MEDIUM STIFF		MEDIUM STIFF		4 TO 8		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		0.5 TO 1.0		MONITORING WELL									
STIFF		STIFF		8 TO 15		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		1 TO 2		PIEZOMETER INSTALLATION									
VERY STIFF		VERY STIFF		15 TO 30		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		2 TO 4		SLOPE INDICATOR INSTALLATION									
HARD		HARD		>30		>4		>4		>4		>4		>4		>4		>4		>4		>4		>4		>4		>4		CONE PENETROMETER TEST									
TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE									
U.S. STD. SIEVE SIZE OPENING (MM)		4		10		40		60		200		270		4.75		2.00		0.42		0.25		0.075		0.053		0.075		0.053		SOUNDING ROD									
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE, SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		CLAY (CL.)		ABBREVIATIONS									
GRAIN SIZE		305		75		2.0		0.25		0.05		0.005		0.005		0.005		0.005		0.005		0.005		0.005		0.005		0.005		AR - AUGER REFUSAL									
SOIL MOISTURE - CORRELATION OF TERMS		SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		MED. - MEDIUM									
LL		LIQUID LIMIT		- SATURATED - (SAT.)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		MICA - MICACEOUS									
PL		PLASTIC LIMIT		- WET - (W)		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		MOD. - MODERATELY									
OM		OPTIMUM MOISTURE SHRINKAGE LIMIT		- MOIST - (M)		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		SOLID; AT OR NEAR OPTIMUM MOISTURE		NP - NON PLASTIC									
SL		SHRINKAGE LIMIT		- DRY - (D)		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		ORG. - ORGANIC									
PLASTICITY										PLASTICITY										PLASTICITY										PLASTICITY									
NONPLASTIC		LOW PLASTICITY		MED. PLASTICITY		HIGH PLASTICITY		0-5		6-15		16-25		26 OR MORE		VERY LOW		SLIGHT		MEDIUM		HIGH		HIGH		HIGH		HIGH		PMT - PRESSUREMETER TEST									
COLOR										COLOR										COLOR										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.										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.										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.										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.									
DRILL UNITS:										ADVANCING TOOLS:										HAMMER TYPE:										CORE SIZE:									
<input type="checkbox"/> MOBILE B-__										<input type="checkbox"/> CLAY BITS										<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL										<input type="checkbox"/> -B-__									
<input type="checkbox"/> BK-51										<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER										<input type="checkbox"/> -N-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/> CME-45C										<input checked="" type="checkbox"/> 6" HOLLOW AUGERS										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/> CME-550X										<input type="checkbox"/> HARD FACED FINGER BITS										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/> PORTABLE HOIST										<input type="checkbox"/> TUNG.-CARBIDE INSERTS										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input checked="" type="checkbox"/> CME 55										<input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/>										<input type="checkbox"/> TRICONE __' STEEL TEETH										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/>										<input type="checkbox"/> TRICONE __' TUNG.-CARB.										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
<input type="checkbox"/>										<input type="checkbox"/> CORE BIT										<input type="checkbox"/> -H-__										<input type="checkbox"/> -H-__									
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

ROCK DESCRIPTION		TERMS AND DEFINITIONS
<p>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:</p>		<p>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 ROCK MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS 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.</p>
<p>WEATHERED ROCK (WR)</p> 	<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>	
<p>CRYSTALLINE ROCK (CR)</p> 	<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>	
<p>NON-CRYSTALLINE ROCK (NCR)</p> 	<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC.</p>	
<p>COASTAL PLAIN SEDIMENTARY ROCK (CPI)</p> 	<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>	
WEATHERING		
<p>FRESH</p>	<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>	
<p>VERY SLIGHT (V SLL.)</p>	<p>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.</p>	
<p>SLIGHT (SLL.)</p>	<p>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.</p>	
<p>MODERATE (MOD.)</p>	<p>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.</p>	
<p>MODERATELY SEVERE (MOD. SEV.)</p>	<p>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></p>	
<p>SEVERE (SEV.)</p>	<p>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></p>	
<p>VERY SEVERE (V SEV.)</p>	<p>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></p>	
<p>COMPLETE</p>	<p>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.</p>	
ROCK HARDNESS		
<p>VERY HARD</p>	<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p>	
<p>HARD</p>	<p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p>	
<p>MODERATELY HARD</p>	<p>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.</p>	
<p>MEDIUM HARD</p>	<p>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p>	
<p>SOFT</p>	<p>CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p>	
<p>VERY SOFT</p>	<p>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.</p>	
FRACTURE SPACING		BEDDING
<p>TERM</p>	<p>SPACING</p>	<p>TERM</p>
<p>VERY WIDE</p>	<p>MORE THAN 10 FEET</p>	<p>VERY THICKLY BEDDED</p>
<p>WIDE</p>	<p>3 TO 10 FEET</p>	<p>THICKLY BEDDED</p>
<p>MODERATELY CLOSE</p>	<p>1 TO 3 FEET</p>	<p>THINLY BEDDED</p>
<p>CLOSE</p>	<p>0.16 TO 1 FEET</p>	<p>VERY THINLY BEDDED</p>
<p>VERY CLOSE</p>	<p>LESS THAN 0.16 FEET</p>	<p>THICKLY LAMINATED</p>
		<p>THINLY LAMINATED</p>
		<p>< 0.008 FEET</p>
INDURATION		
<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>		
<p>FRIABLE</p>	<p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>	
<p>MODERATELY INDURATED</p>	<p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>	
<p>INDURATED</p>	<p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>	
<p>EXTREMELY INDURATED</p>	<p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>	
<p>BENCH MARK: CONTROL POINT "BL-2" NEAR NE CORNER OF EXISTING STRUCTURE (EB2-B)</p>		<p align="right">ELEVATION: 100.0 FT.</p>
<p>NOTES: -BENCHMARK ELEVATION IS ASSUMED TO BE 100.0'</p>		



NOTES:
PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED MARCH 2010.

 APPROXIMATE SPT BORING LOCATION.

BORING LOCATION PLAN	
BRIDGE NO. 349 ON 2099 OVER PLUMMER'S CREEK DAVIDSON COUNTY, NORTH CAROLINA WBS NO.: 42608.1.JA9, TIP NO.: M-0423 FALCON PROJECT NO.: G10004.00	
	FALCON ENGINEERING, INC. 2736 ROWLAND RD. RALEIGH, NC 27615 PHONE: 919.871.0800 FAX: 919.871.0803



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 42608.1.JA9	ID. M-0423	COUNTY DAVIDSON	GEOLOGIST T. EVANS
SITE DESCRIPTION BRIDGE NO. 349 ON SR 2099 OVER PLUMMER'S CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 94.9 ft	TOTAL DEPTH 6.1 ft	NORTHING 737,746	EASTING 1,684,648
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. HARRIS		START DATE 03/04/10	COMP. DATE 03/04/10
			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					ELEV. (ft)	DEPTH (ft)	
95														94.9	0.0	GROUND SURFACE	
	93.9	1.0	1	2	2												ALLUVIAL BROWN AND TAN, SOFT, CLAYEY SILT (A-4)
	91.4	3.5	1	1	2												ALLUVIAL BROWN, ORANGE AND TAN, MOTTLED, SOFT, SILTY CLAY (A-6)
90	88.9	6.0	100/0.1											88.9	6.0		NON-CRYSTALLINE ROCK BLUE-GRAY, SLATE
														88.8	6.1		Boring Terminated with Standard Penetration Test Refusal at Elevation 88.8 ft on NCR.
85																	
80																	
75																	
70																	
65																	
60																	
55																	
50																	

NCDOT BORE SINGLE 0298&000_GEO_BRDG0349_DAVID0349.GPJ NC_DOT.GDT 4/15/10



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 42608.1.JA9	ID. M-0423	COUNTY DAVIDSON	GEOLOGIST T. EVANS
SITE DESCRIPTION BRIDGE NO. 349 ON SR 2099 OVER PLUMMER'S CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION N/A	OFFSET N/A	ALIGNMENT -L-
COLLAR ELEV. 101.8 ft	TOTAL DEPTH 38.6 ft	NORTHING 737,715	EASTING 1,684,685
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER D. HARRIS	START DATE 03/04/10	COMP. DATE 03/04/10	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
105																
														101.8	0.0	GROUND SURFACE
	100.8	1.0	3	3	2								M	99.8	3.0	ROADWAY EMBANKMENT BROWN, ORANGE AND TAN, LOOSE, CLAYEY SILTY SAND (A-2-4), W/ ROOTS AND GRAVEL
100	98.3	3.5	2	1	3								M	96.3	5.5	ALLUVIAL RED-BROWN AND TAN, SOFT, SANDY SILT (A-4), W/ GRAVEL
	95.8	6.0	WOH	2	2								M			ALLUVIAL RED, BROWN AND TAN, MOTTLED, SOFT TO STIFF, SILTY CLAY (A-6)
95	93.3	8.5	WOH	1	2								M			
	88.3	13.5	1	5	8								M			
90																
	83.3	18.5	28	35	36								D	83.0	18.8	RESIDUAL BROWN AND TAN, V. DENSE, SLI. SILTY SAND (A-1-a), W/ ROCK FRAGS
85																
	78.3	23.5	18	22	26								D	78.3	23.5	RESIDUAL BROWN AND TAN, HARD, SANDY SILT (A-4), W/ ROCK FRAGS
80														75.6	26.0	WEATHERED ROCK GRAY AND BROWN, METAVOLCANIC ROCK
	73.3	28.5	100/0.4										D			
75																
	68.3	33.5	45	55/0.1									D			
70																
	63.3	38.5	60/0.1										D	63.3	38.5	NON-CRYSTALLINE ROCK GRAY AND BROWN, METAVOLCANIC ROCK
65														63.2	38.6	Boring Terminated with Standard Penetration Test Refusal at Elevation 63.2 ft on NCR.
60																

NCDOT BORE SINGLE 029&000_GEO_BRDG0349_DAVI0349.GPJ NC_DOT_GDT 4/15/10



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 42608.1.JA9	ID. M-0423	COUNTY DAVIDSON	GEOLOGIST T. EVANS
SITE DESCRIPTION BRIDGE NO. 349 ON SR 2099 OVER PLUMMER'S CREEK			GROUND WTR (ft) 0 HR. Dry 24 HR. 13.0
BORING NO. EB2-A	STATION N/A	OFFSET N/A		ALIGNMENT -L-
COLLAR ELEV. 100.1 ft	TOTAL DEPTH 20.9 ft	NORTHING 737,782	EASTING 1,684,711
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers		HAMMER TYPE Automatic
DRILLER D. HARRIS	START DATE 03/04/10	COMP. DATE 03/04/10	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				
105														
100													GROUND SURFACE	0.0
	99.1	1.0	1	1	1	.....	.....	.....	.....	.....		M	ROADWAY EMBANKMENT RED-BROWN, TAN AND GRAY, SOFT, SANDY SILT (A-4), W/ ROCK FRAGS	
	96.6	3.5	1	1	1	.....	.....	.....	.....	.....		M		
95	94.1	6.0	1	4	5	.....	.....	.....	.....	.....		D	ALLUVIAL BROWN AND TAN, STIFF, SANDY SILTY CLAY (A-6), W/ LITTLE ORGANICS	5.5
	91.6	8.5	3	4	4	.....	.....	.....	.....	.....		M		
90						.....	.....	.....	.....	.....
	86.6	13.5	35	65/0.3		.....	.....	.....	.....	.....		D	WEATHERED ROCK GRAY AND BROWN, SLATE	13.5
85						.....	.....	.....	.....	.....
	81.6	18.5				.....	.....	.....	.....	.....		D		
80						.....	.....	.....	.....	.....
	79.2	20.9				.....	.....	.....	.....	.....			Boring Terminated by Auger Refusal at Elevation 79.2 ft on NCR.	20.9
75														
70														
65														
60														

NCDOT BORE SINGLE 0298000_GEO_BRD00349_DAVID0349 GPJ NC_DOT_GDT 4/16/10

