



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208H	1	12

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

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PROJ. REFERENCE NO. P-5208H F.A. PROJ. \_\_\_\_\_  
COUNTY MECKLENBURG  
PROJECT DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75  
TO -Y1- STA. 44+05

SITE DESCRIPTION GRIER ROAD (SR 2976) GRADE SEPARATION  
FROM SOUTH OF ORR ROAD (SR 2426) TO  
OLD CONCORD ROAD (SR 2848)

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

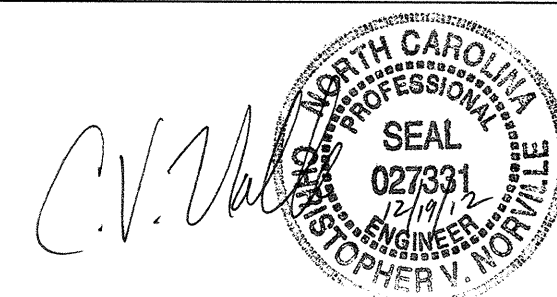
INVESTIGATED BY T. E. EVANS  
CHECKED BY C. V. NORVILLE  
SUBMITTED BY FALCON ENG.  
DATE DECEMBER, 2012

**PROJECT: 50000.1.STR13TIB ID: P-5208H**

DRAWN BY: J. R. HAMM

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

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

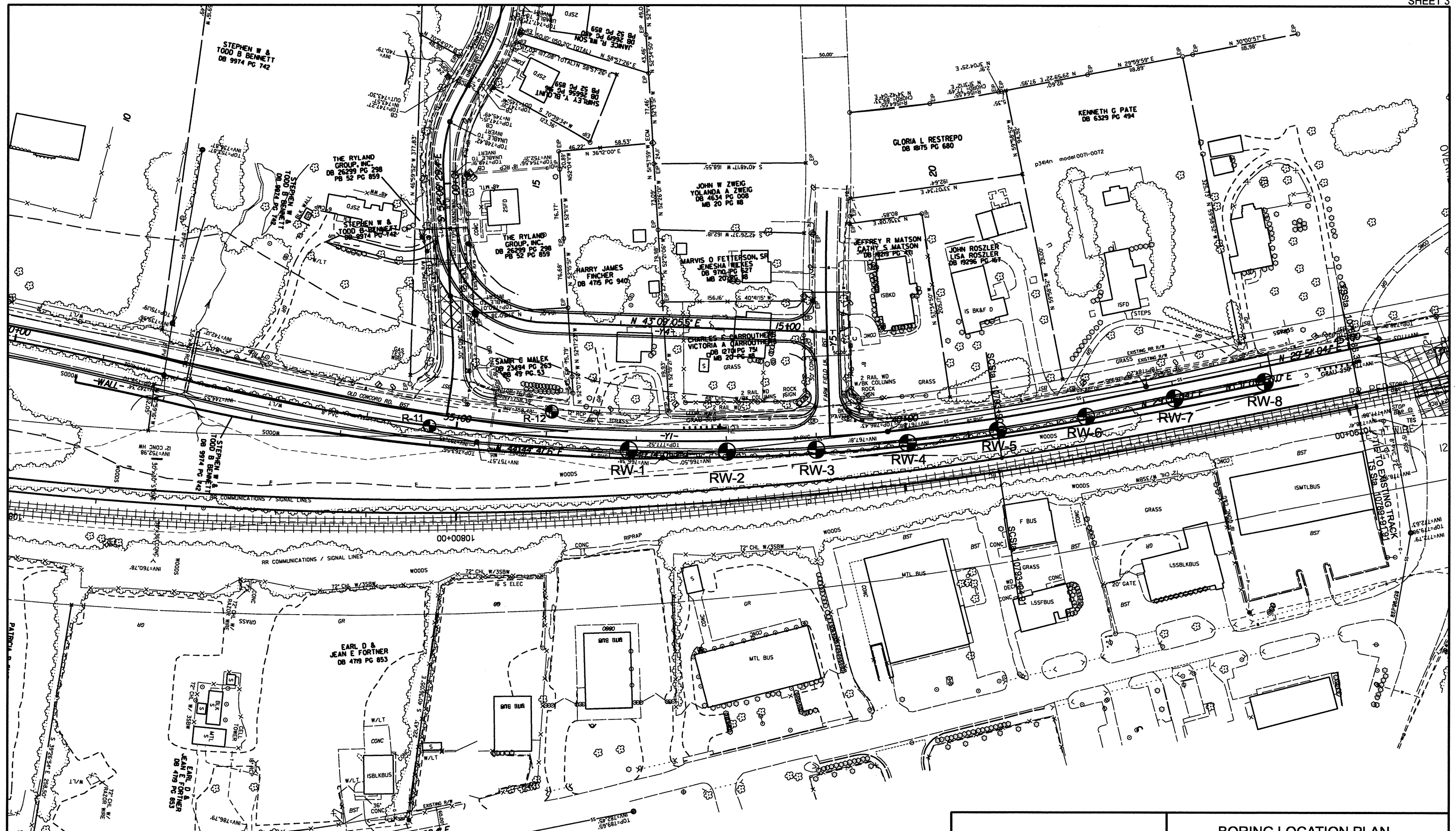


**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

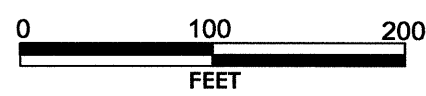
**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>		<b>MINERALOGICAL COMPOSITION</b>		<b>WEATHERING</b>							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 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.		<b>COMPRESSIBILITY</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		<b>WEATHERING</b> FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.			
<b>PERCENTAGE OF MATERIAL</b>		<b>GROUND WATER</b>		<b>ROCK HARDNESS</b>							
ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.							
<b>CONSISTENCY OR DENSENESS</b>		<b>MISCELLANEOUS SYMBOLS</b>		<b>ROCK HARDNESS</b>							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F <sup>2</sup> )		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD							
GENERALY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		N/A									
GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30		<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4							
<b>TEXTURE OR GRAIN SIZE</b>		<b>ABBREVIATIONS</b>		<b>ROCK HARDNESS</b>							
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		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 SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY		VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL RATIO CBR - CALIFORNIA BEARING RATIO							
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)		GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>FRACTURE SPACING</b>					
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-55 PORTABLE HOIST CME-55 (TRUCK) CME-55 (ATV)		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT		TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		<b>INDURATION</b> FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
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 - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				<b>BENCH MARK:</b> ELEVATION: FT. NOTES: FIAD - FILLED-IN AFTER DRILLING					
<b>PLASTICITY</b>											
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		PLASTICITY INDEX (PI) DRY STRENGTH 0-5 VERY LOW 6-15 SLIGHT 16-25 MEDIUM 26 OR MORE HIGH									
<b>COLOR</b>		DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.									



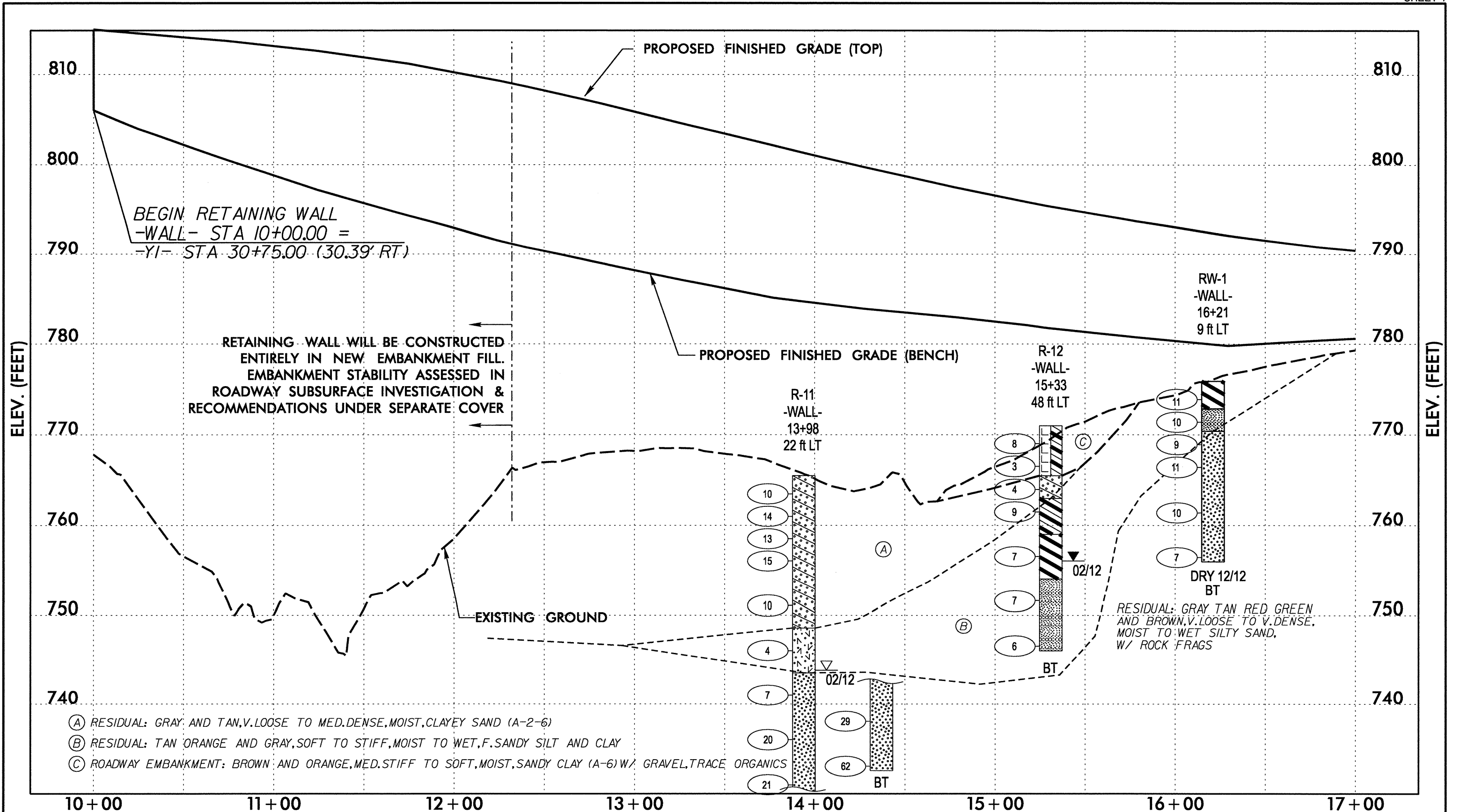
**NOTES:**  
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM  
 RK&K, DATED JULY 2012.



**FALCON**  
 ENGINEERING

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<b>BORING LOCATION PLAN</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H, WBS.: 50000.1.STR13T1B		
DEC. 2012	FALCON PROJECT NO.: G11026.01	SHEET 1 OF 1



**NOTES:**

- WALL ENVELOPE ADOPTED FROM ELECTRONIC DRAWINGS RECEIVED FROM RK&K IN DECEMBER 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.



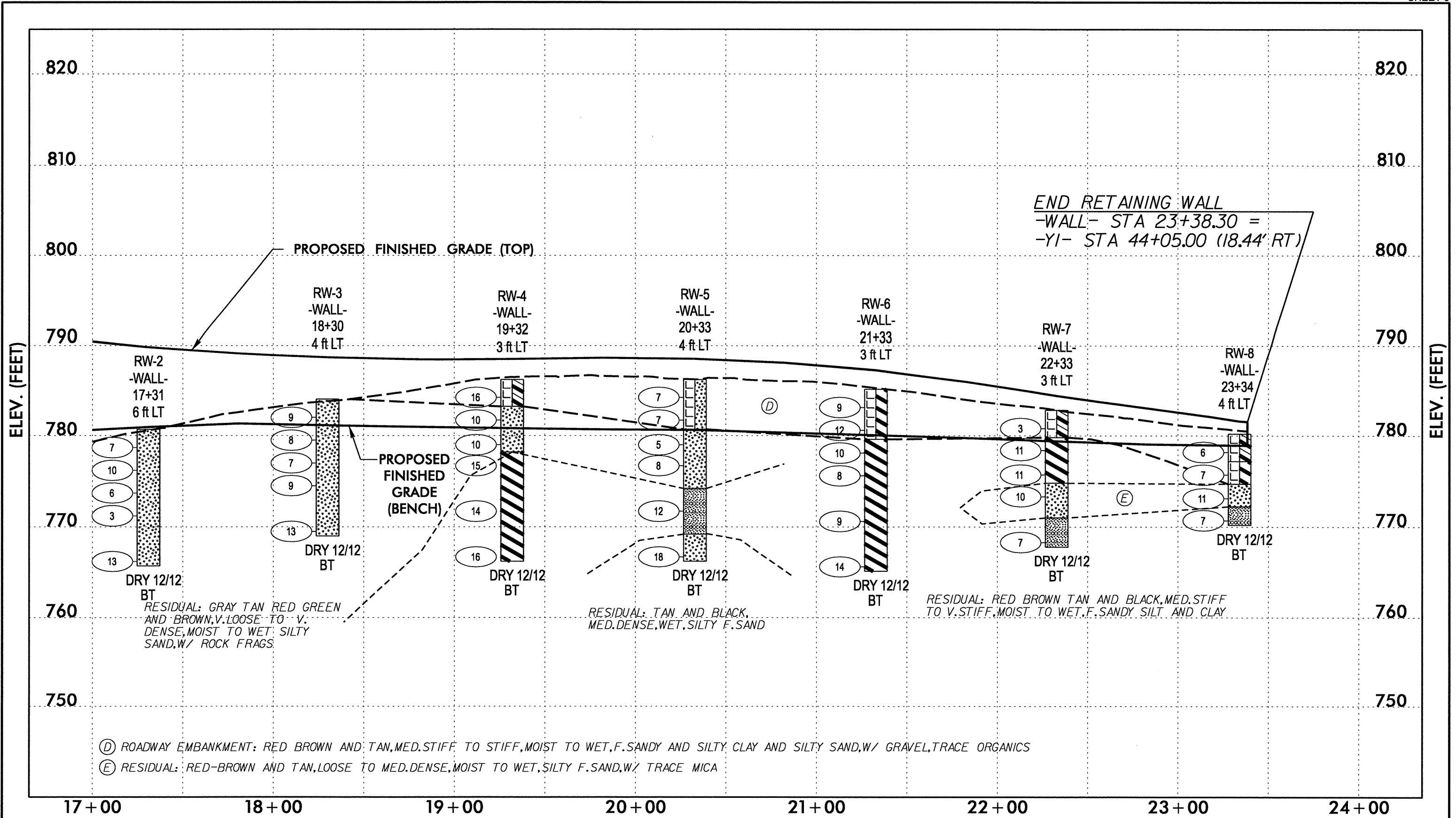
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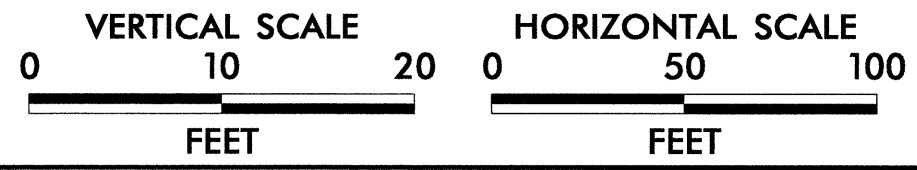
RETAINING WALL SUBSURFACE PROFILE		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H; WBS: 50000.1.STR13T1B		
DECEMBER 2012	FALCON PROJECT NO.: G11026.01	SHEET 1 OF 2





**NOTES:**

- WALL ENVELOPE ADOPTED FROM ELECTRONIC DRAWINGS RECEIVED FROM RK&K IN DECEMBER 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.



<p>FALCON ENGINEERING, INC.          1210 TRINITY ROAD, SUITE 110          RALEIGH, NC 27607          PHONE: 919.871.0800          FAX: 919.871.0803</p>	<b>RETAINING WALL SUBSURFACE PROFILE</b>	
	GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H; WBS: 50000.1.S1R13T1B	
	DECEMBER 2012	FALCON PROJECT NO.: G11026.01







**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS									
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)								
BORING NO. RW-3		STATION 18+30		OFFSET 4 ft LT		ALIGNMENT -WALL-									
COLLAR ELEV. 784.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 557,915		EASTING 1,480,129									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
785														784.0	0.0
	783.0	1.0	3	4	5							M			
780	780.5	3.5	3	4	4							M			
	778.0	6.0	4	3	4							M			
775	775.5	8.5	3	4	5							M			
770	770.5	13.5	6	6	7							W		769.0	15.0
Boring Terminated at Elevation 769.0 ft in Residual: Silty Sand															

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS									
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)								
BORING NO. RW-4		STATION 19+32		OFFSET 3 ft LT		ALIGNMENT -WALL-									
COLLAR ELEV. 786.2 ft		TOTAL DEPTH 20.0 ft		NORTHING 557,997		EASTING 1,480,190									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
790														786.2	0.0
	785.2	1.0	6	8	8							M			
785	782.7	3.5	5	4	6							M			
	780.0	6.2	4	5	5							M			
780	777.7	8.5	7	7	8							M			
775	772.7	13.5	5	6	8							SS-1	37%	778.2	8.0
770	767.7	18.5	5	7	9							W		766.2	20.0
Boring Terminated at Elevation 766.2 ft in Residual: F. Sandy Clay															

NCDOT BORE DOUBLE P-5208H GRIER ROAD RETAINING WALL.GPJ NC DOT GDT 12/18/12



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05			GROUND WTR (ft)
BORING NO. RW-5	STATION 20+33	OFFSET 4 ft LT	ALIGNMENT -WALL-
COLLAR ELEV. 786.2 ft	TOTAL DEPTH 20.0 ft	NORTHING 558,081	EASTING 1,480,246
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers
DRILLER W. WHICHARD			HAMMER TYPE Automatic
START DATE 12/11/12		COMP. DATE 12/11/12	
SURFACE WATER DEPTH N/A			

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
790																
785	785.2	1.0	3	2	5										786.2	GROUND SURFACE
	782.7	3.5	3	3	4										780.7	ROADWAY EMBANKMENT RED-BROWN AND TAN, SILTY SAND (A-2-4) W/ GRAVEL
780	780.0	6.2	3	2	3											RESIDUAL RED-BROWN AND TAN, SILTY SAND (A-2-4) W/ ROCK FRAGS.
	777.7	8.5	3	3	5											
775	772.7	13.5	4	5	7										774.2	RED-BROWN TAN AND BLACK, F. SANDY SILT (A-4) W/ ROCK FRAGS.
770	767.7	18.5	6	7	11										769.2	TAN AND BLACK, SILTY F. SAND (A-2-4)
															766.2	Boring Terminated at Elevation 766.2 ft in Residual: Silty F. Sand

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05			GROUND WTR (ft)
BORING NO. RW-6	STATION 21+33	OFFSET 3 ft LT	ALIGNMENT -WALL-
COLLAR ELEV. 785.1 ft	TOTAL DEPTH 20.0 ft	NORTHING 558,165	EASTING 1,480,299
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers
DRILLER W. WHICHARD			HAMMER TYPE Automatic
START DATE 12/11/12		COMP. DATE 12/11/12	
SURFACE WATER DEPTH N/A			

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
790																
785	784.1	1.0	3	4	5										785.1	GROUND SURFACE
	781.6	3.5	5	5	7										780.7	ROADWAY EMBANKMENT RED-BROWN, SILTY CLAY (A-7)
780	779.1	6.0	4	4	6										779.6	RESIDUAL RED-BROWN AND TAN, F. SANDY CLAY (A-7-5)
	776.6	8.5	3	3	5											
775	771.6	13.5	3	4	5											
770	766.6	18.5	5	5	9										765.1	Boring Terminated at Elevation 765.1 ft in Residual: F. Sandy Clay

NCDOT BORE DOUBLE P-5208H GRIER ROAD RETAINING WALL.GPJ NC\_DOT\_GDT\_12/18/12





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS										
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)									
BORING NO. RW-7		STATION 22+33		OFFSET 3 ft LT		ALIGNMENT -WALL-										
COLLAR ELEV. 782.8 ft		TOTAL DEPTH 15.0 ft		NORTHING 558,252		EASTING 1,480,348										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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						
785																
	781.8	1.0	3	1	2								W	GROUND SURFACE	0.0	
780	779.4	3.4	4	4	7								W	ROADWAY EMBANKMENT BROWN, SANDY CLAY (A-6) W/ TRACE ORGANICS	3.0	
	776.7	6.1	3	5	6							SS-3	32% W	RESIDUAL RED-BROWN AND TAN, F. SANDY CLAY (A-7-5)		
775	774.3	8.5	3	4	6								M	RED-BROWN AND TAN, SILTY F. SAND (A-2-4)	8.0	
			3	4	6								M	RED-BROWN AND TAN, F. SANDY SILT (A-4)	11.8	
770	769.3	13.5	2	3	4								W	RED-BROWN AND TAN, F. SANDY SILT (A-4)	15.0	
														Boring Terminated at Elevation 767.8 ft in Residual: F. Sandy Silt		

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS										
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)									
BORING NO. RW-8		STATION 23+34		OFFSET 4 ft LT		ALIGNMENT -WALL-										
COLLAR ELEV. 780.2 ft		TOTAL DEPTH 10.0 ft		NORTHING 558,340		EASTING 1,480,400										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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						
785																
														780.2	GROUND SURFACE	0.0
780	779.2	1.0	3	3	3								W	ROADWAY EMBANKMENT RED-BROWN AND TAN, SANDY CLAY (A-6) W/ GRAVEL	3.0	
	776.7	3.5	2	3	4							SS-4	40% W	ROADWAY EMBANKMENT RED-BROWN AND TAN, SILTY CLAY (A-7-5)	5.5	
775	774.1	6.1	4	5	6								W	RED-BROWN AND TAN, SILTY F. SAND (A-2-4)	8.0	
	771.7	8.5	2	3	4								M	RESIDUAL RED-BROWN AND TAN, F. SANDY SILT (A-4) W/ TRACE MICA	10.0	
														Boring Terminated at Elevation 770.2 ft in Residual: F. Sandy Silt		

FALCON

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

## AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05

WBS NO.: 50000.1.STR13T1B, TIP NO.: P-5208H

MECKLENBURG COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G11026.01

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	%
R-11		SS-14 *	96	64	44	43	34	9	30.7
A-5									
13+98	22 ft LT	18.5-20.0							
R-12		SS-15 *	88	61	40	36	19	17	18.1
A-6									
15+33	48 ft LT	3.5-5.0							
RW-4		SS-1	99	89	74	68	51	17	36.9
A-7-5									
19+32	3 ft LT	8.5-10.0							
RW-6		SS-2	100	94	88	69	45	24	33.6
A-7-5									
21+33	3 ft LT	6.0-7.5							
RW-7		SS-3	100	96	82	78	40	38	32.1
A-7-5									
22+33	3 ft LT	3.5-5.0							
RW-8		SS-4	100	95	89	90	35	55	39.5
A-7-5									
23+34	4 ft LT	3.5-5.0							

\* Samples SS-14 and SS-15 originally included in Roadway Subsurface Investigation and therefore are not numbered sequentially with samples from RW borings.



PHOTOGRAPH TAKEN FROM NEAR END OF  
RETAINING WALL LOOKING UPSTATION



PHOTOGRAPH TAKEN FROM NEAR END OF  
RETAINING WALL LOOKING DOWNSTATION



PHOTOGRAPH TAKEN FROM NEAR BORING,  
RW-5, LOOKING DOWNSTATION



PHOTOGRAPH TAKEN FROM NEAR BORING  
RW-7, LOOKING DOWNSTATION ALONG -Y1-



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

**SITE PHOTOGRAPHS**

GRIER ROAD GRADE SEPARATION  
MECKLENBURG COUNTY, NORTH CAROLINA  
TIP.: P-5208H, WBS.: 50000.1.STR13T1B

DEC. 2012

FALCON PROJECT  
NO.: G12026.01

SHEET 1 OF 1

PCN

PROJECT: 50000.1.STRI13TIB ID: P-5208H

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208H	1	17

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	BORING LOCATION PLAN
4-5	SUBSURFACE PROFILES
6-8	SUBSURFACE CROSS SECTIONS
9-14	BORE LOGS, CORE REPORTS, AND CORE PHOTOGRAPHS
15	SOIL AND ROCK LABORATORY TEST RESULTS
16-17	SITE PHOTOGRAPHS

STRUCTURE  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. P-5208H F.A. PROJ. NA  
COUNTY MECKLENBURG  
PROJECT DESCRIPTION BRIDGE ON SR 2976 BETWEEN  
SR 2426 AND SR 2848

SITE DESCRIPTION GRIER ROAD (SR 2976) GRADE SEPARATION  
FROM SOUTH OF ORR ROAD (SR 2426) TO  
OLD CONCORD ROAD (SR 2848)

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL  
C. V. NORVILLE

J. R. HAMM

T. E. EVANS

INVESTIGATED BY T. EVANS / J. HAMM

CHECKED BY C. V. NORVILLE

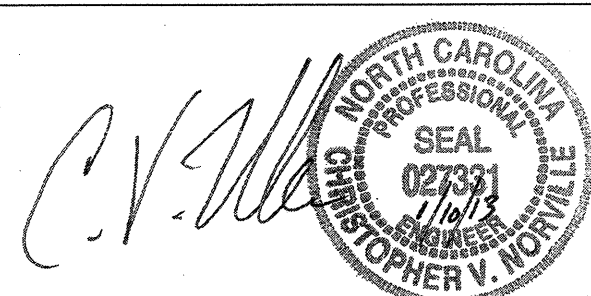
SUBMITTED BY FALCON ENG.

DATE JANUARY 2013

DRAWN BY: T. E. EVANS

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

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





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

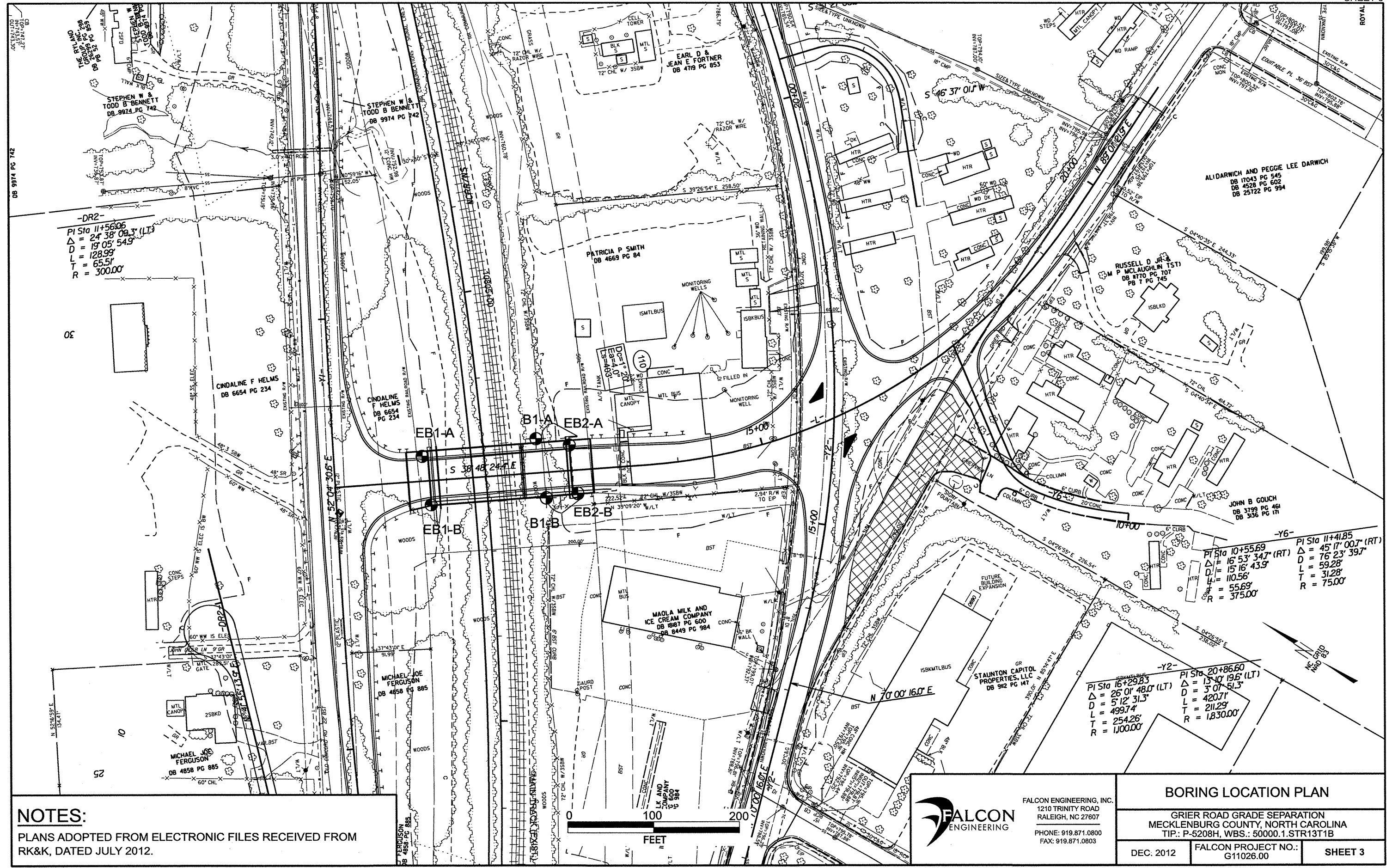
PROJECT REFERENCE NO. P-5208H
SHEET NO. 2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Main table containing various sections: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, FRACTURE SPACING, BEDDING, INDURATION, and BENCH MARK.

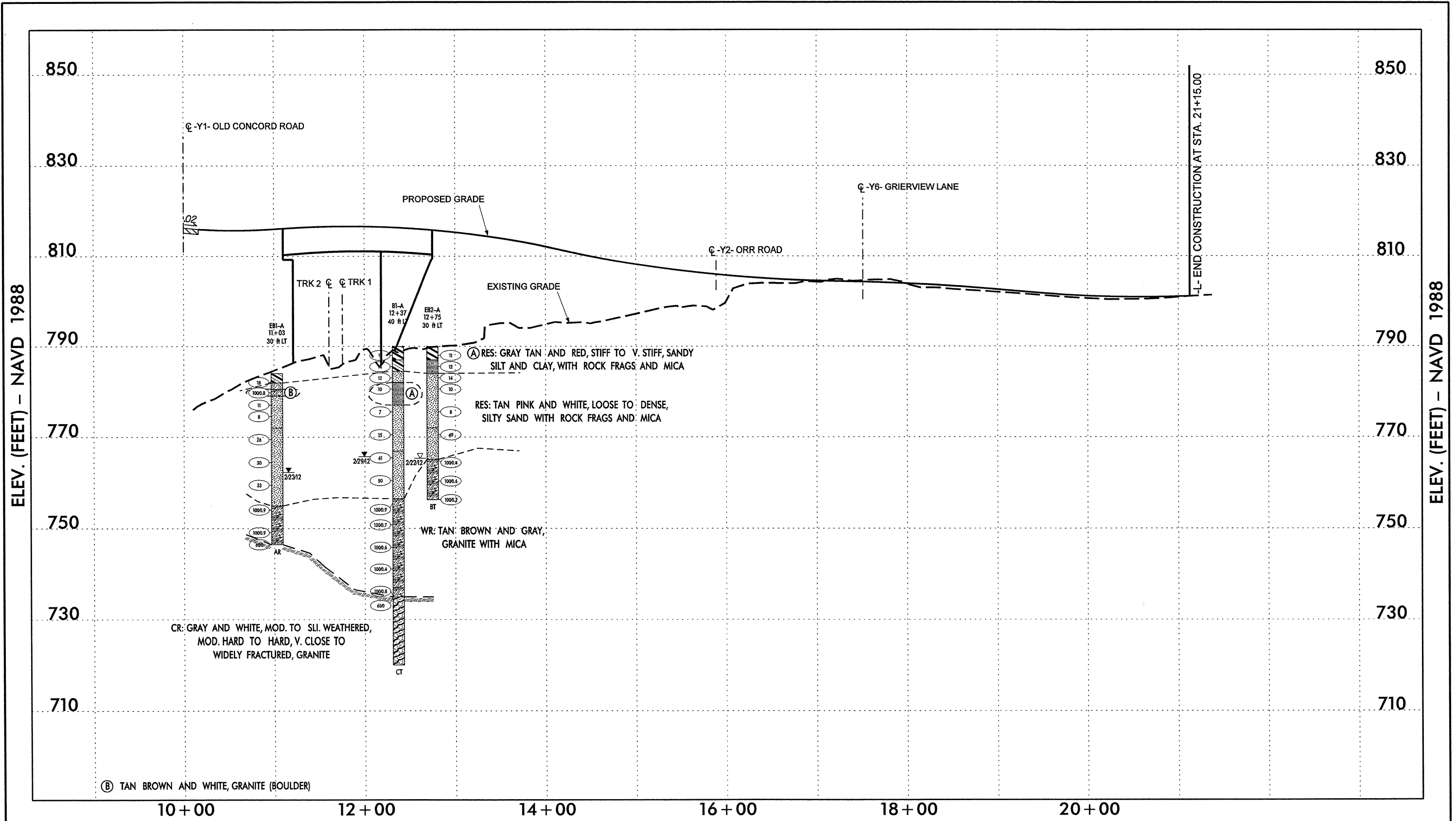




**NOTES:**  
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM  
 RK&K, DATED JULY 2012.

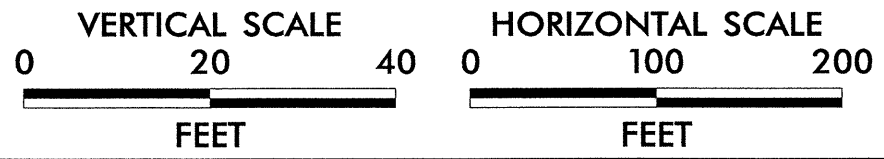
**FALCON ENGINEERING**  
 FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD  
 RALEIGH, NC 27607  
 PHONE: 919.871.0800  
 FAX: 919.871.0803

<b>BORING LOCATION PLAN</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-6208H, WBS.: 50000.1.STR13T1B		
DEC. 2012	FALCON PROJECT NO.: G11026.00	SHEET 3



**NOTES:**

- GROUNDLINE CROSS SECTIONS OF -L- ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K DATED JULY 12, 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90 DEGREES

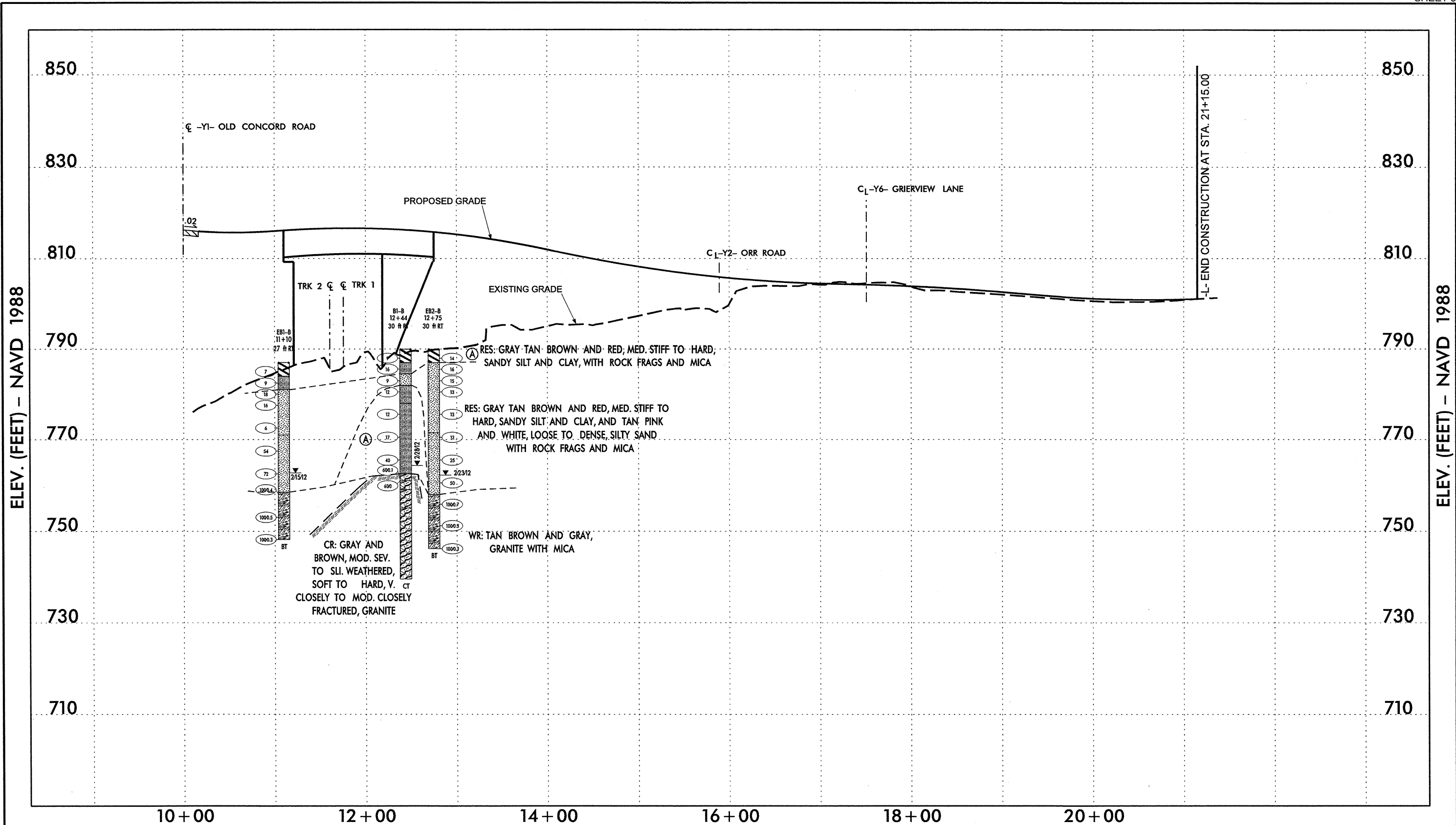


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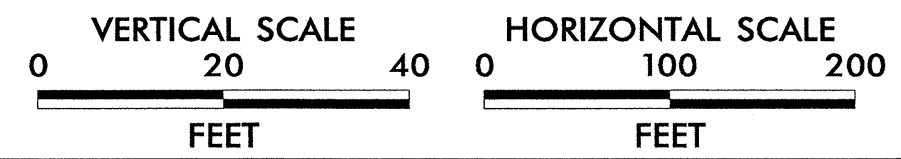
PHONE: 919.871.0800  
FAX: 919.871.0803

<b>SUBSURFACE PROFILE LEFT OF -L-</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.S1R13T1B		
JANUARY 2012	FALCON PROJECT NO.: G11026.00	SHEET 4



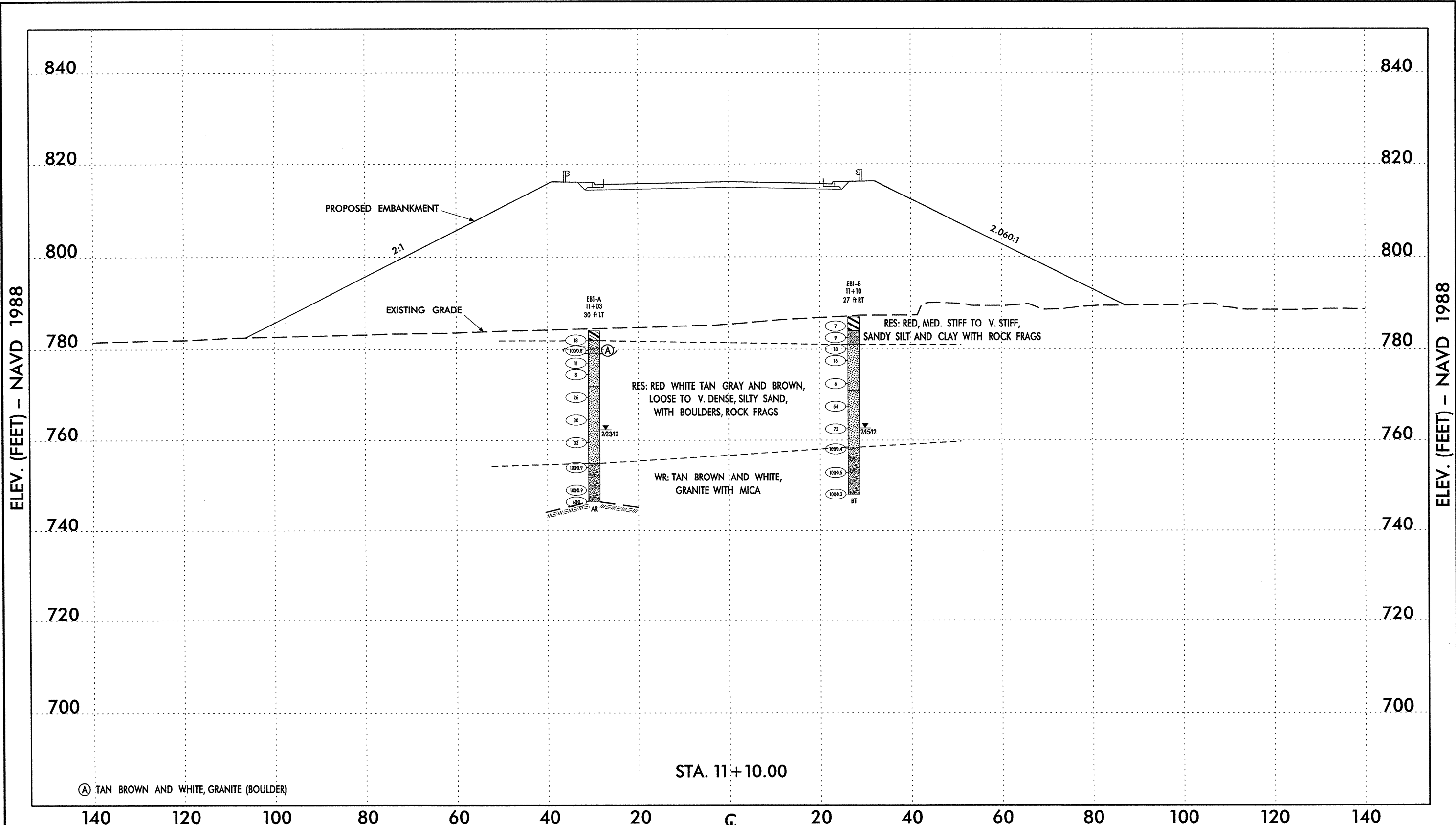
**NOTES:**

- GROUNDLINE CROSS SECTIONS OF -L- ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K DATED JULY 12, 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90 DEGREES



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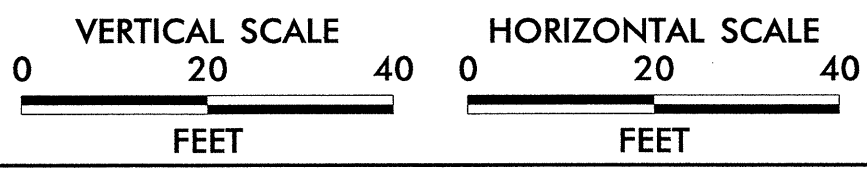
<b>SUBSURFACE PROFILE RIGHT OF -L-</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.STR13T1B		
JANUARY 2012	FALCON PROJECT NO.: G11026.00	SHEET 5



(A) TAN BROWN AND WHITE, GRANITE (BOULDER)

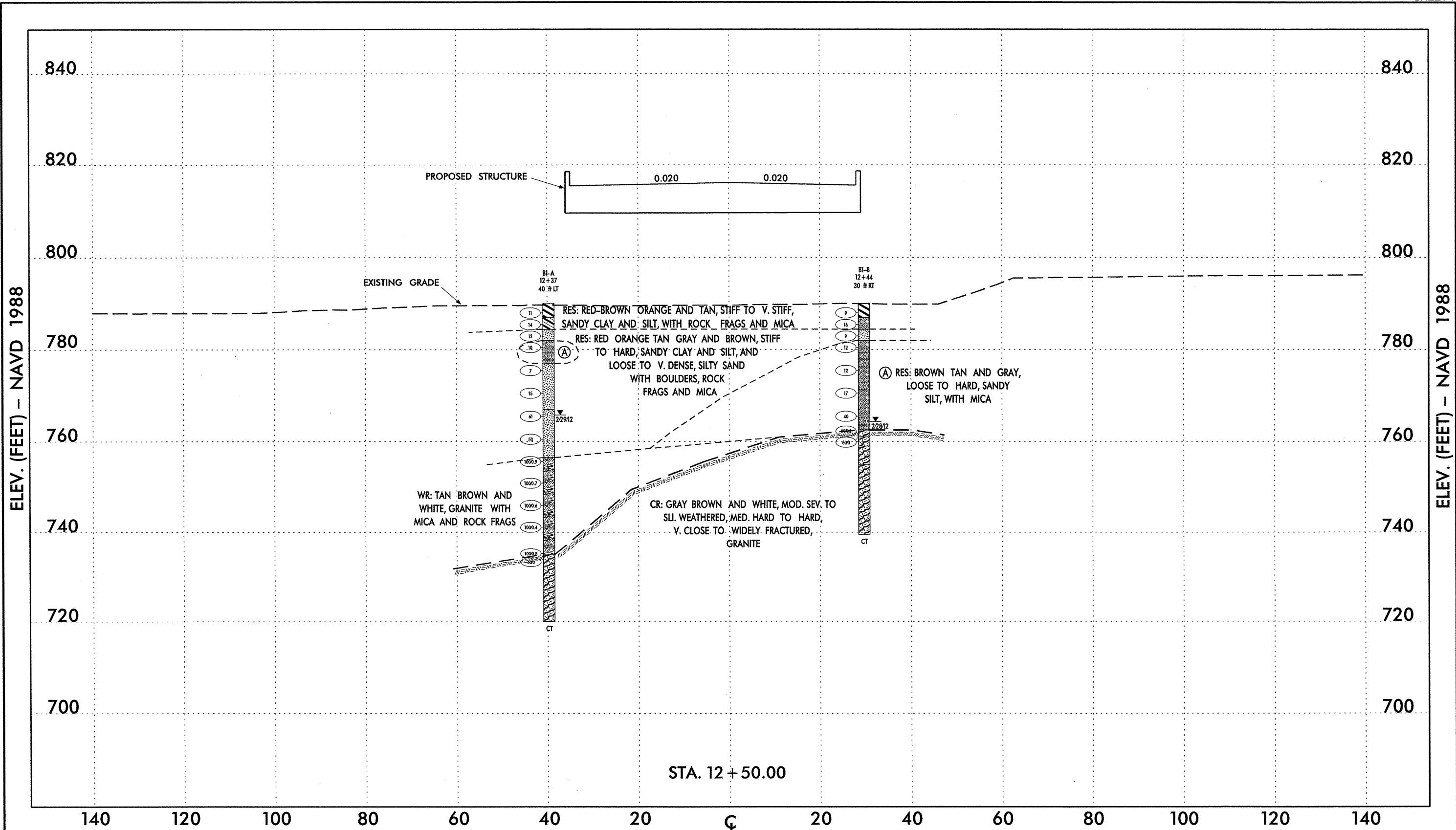
**NOTES:**

- GROUNDLINE CROSS SECTIONS OF -L- ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K DATED JULY 12, 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90 DEGREES



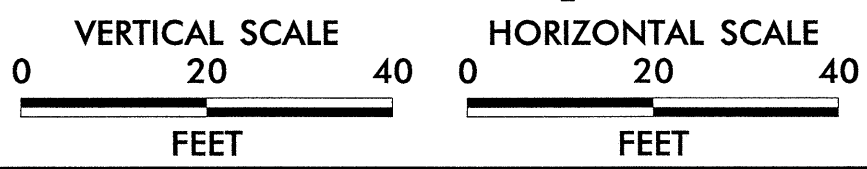
**FALCON ENGINEERING**  
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<b>SUBSURFACE CROSS SECTION END BENT 1</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.STRI3T1B		
JANUARY 2012	FALCON PROJECT NO.: G11026.00	SHEET 6



**NOTES:**

- GROUNDLINE CROSS SECTIONS OF -L- ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K DATED JULY 12, 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90 DEGREES

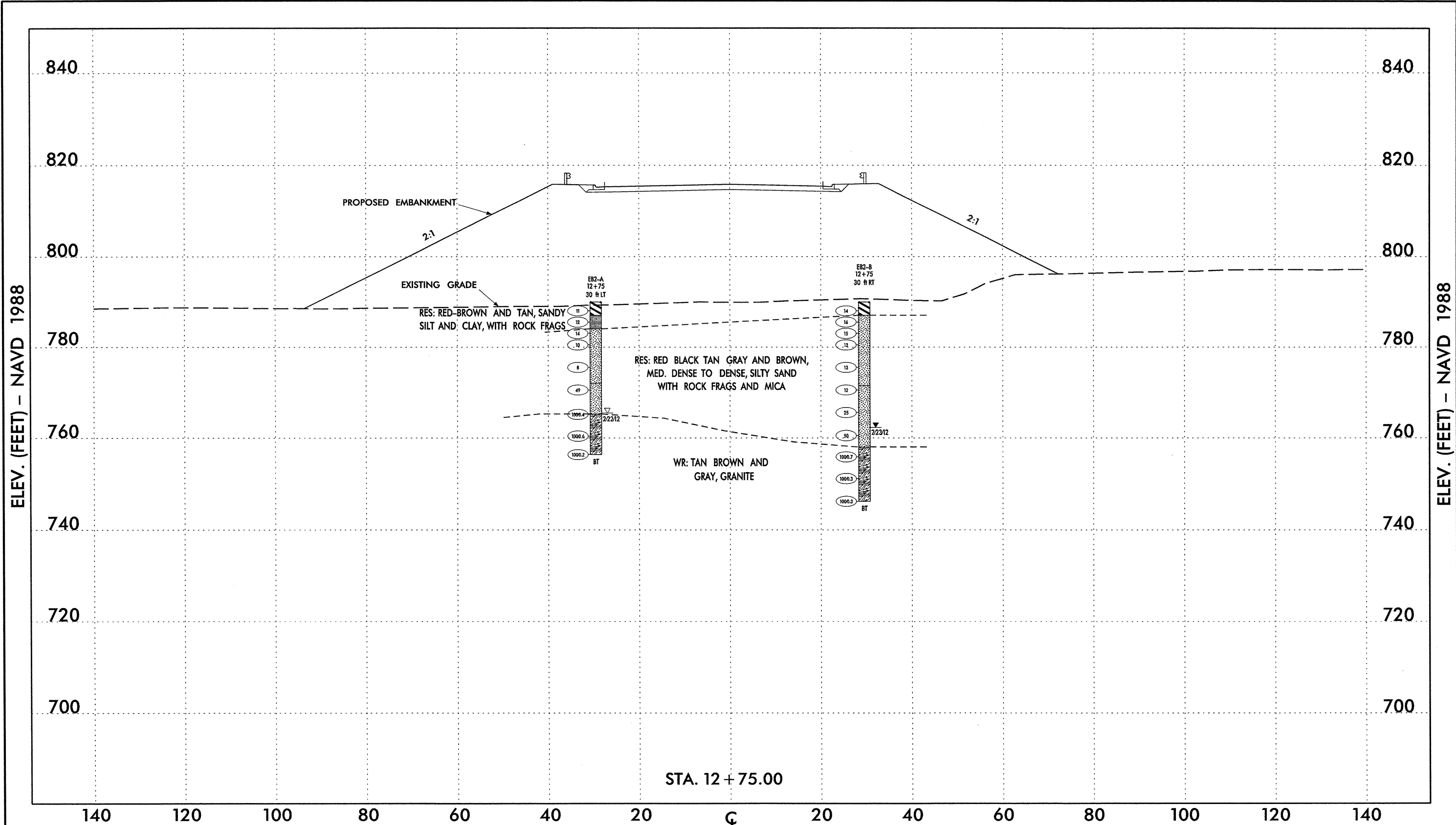


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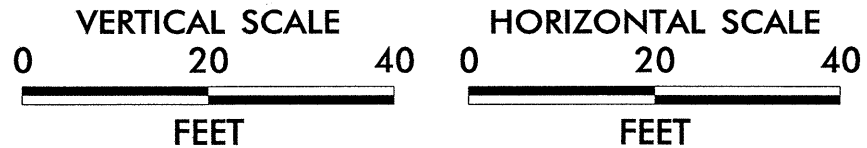
SUBSURFACE CROSS SECTION BENT 1		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.STR13T1B		
JANUARY 2012	FALCON PROJECT NO.: G11026.00	SHEET 7





**NOTES:**

- GROUNDLINE CROSS SECTIONS OF -L- ADOPTED FROM ELECTRONIC FILES RECEIVED FROM RK&K DATED JULY 12, 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90 DEGREES



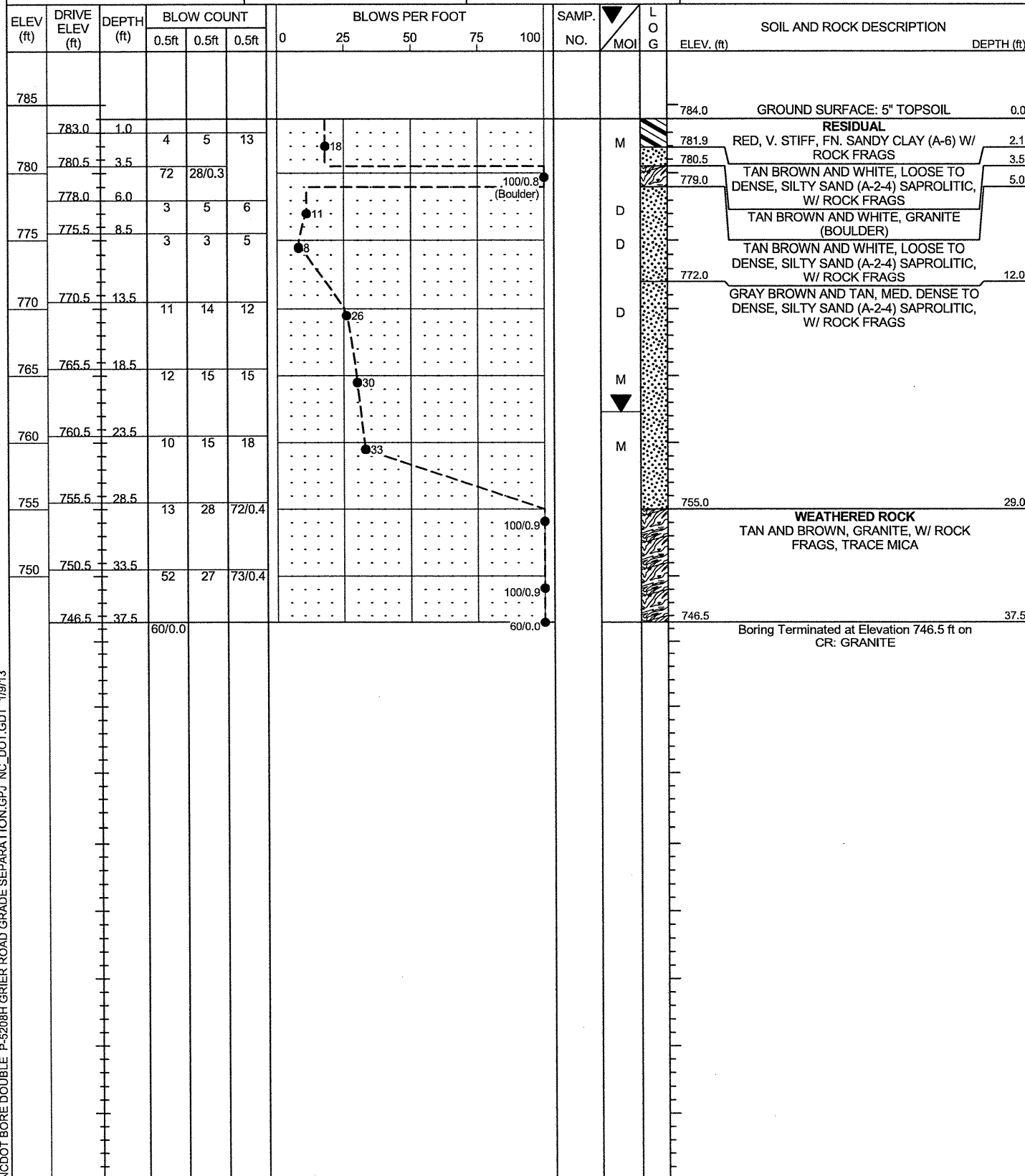
FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
RALEIGH, NC 27607  
PHONE: 919.871.0800  
FAX: 919.871.0803

SUBSURFACE CROSS SECTION END BENT 2		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.STR13T1B		
JANUARY 2012	FALCON PROJECT NO.: G11026.00	SHEET 8

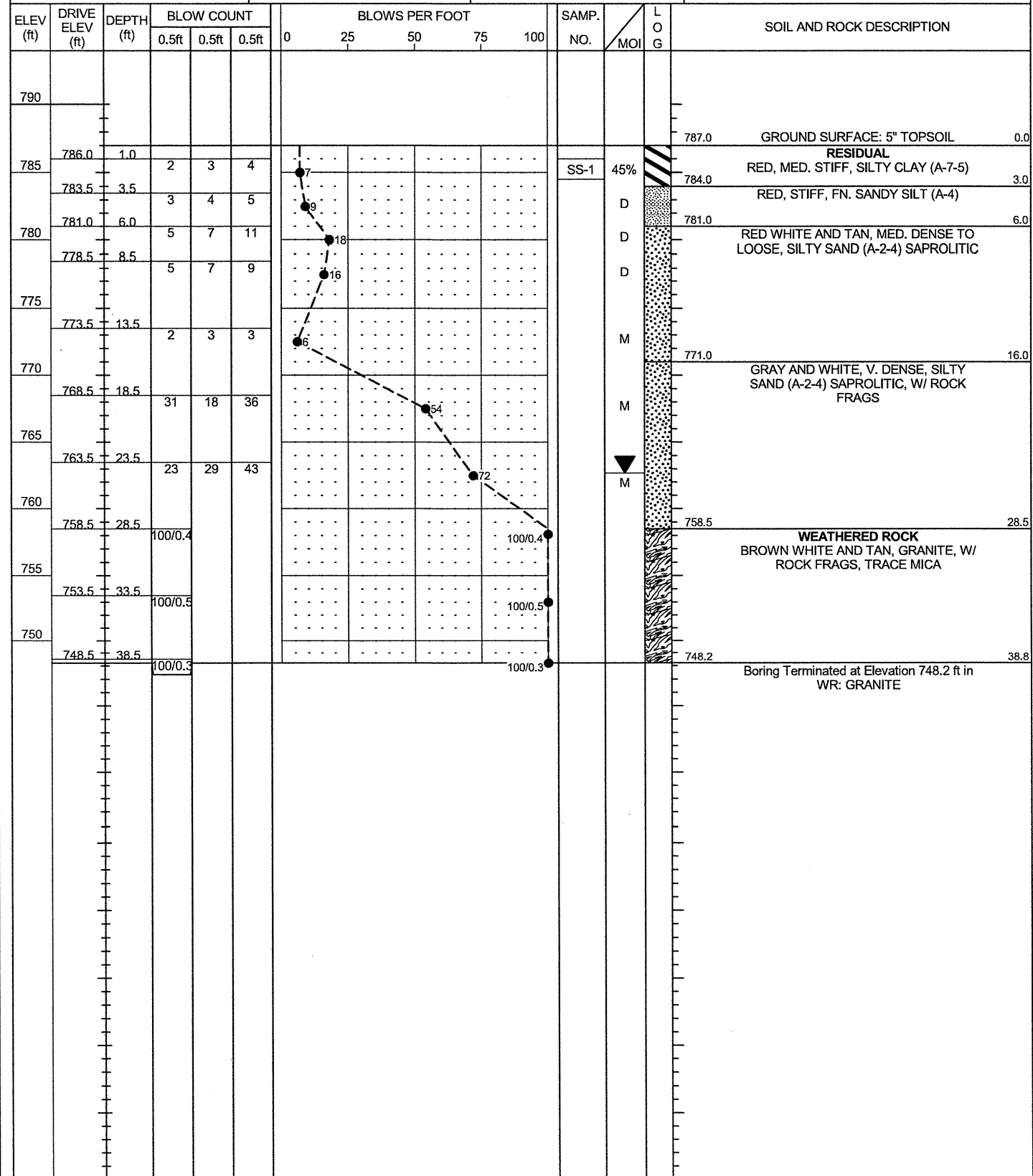


**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. EB1-A	STATION 11+03	OFFSET 30 ft LT	ALIGNMENT -L-
COLLAR ELEV. 784.0 ft	TOTAL DEPTH 37.5 ft	NORTHING 557,143	EASTING 1,479,388
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 02/14/12	COMP. DATE 02/14/12	SURFACE WATER DEPTH N/A



WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. EB1-B	STATION 11+10	OFFSET 27 ft RT	ALIGNMENT -L-
COLLAR ELEV. 787.0 ft	TOTAL DEPTH 38.8 ft	NORTHING 557,103	EASTING 1,479,347
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 02/14/12	COMP. DATE 02/14/12	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ\_NC\_DOT.GDT 1/18/13

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. B1-A	STATION 12+37	OFFSET 40 ft LT	ALIGNMENT -L-
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 70.0 ft	NORTHING 557,046	EASTING 1,479,480
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/24/12	COMP. DATE 02/28/12	SURFACE WATER DEPTH N/A

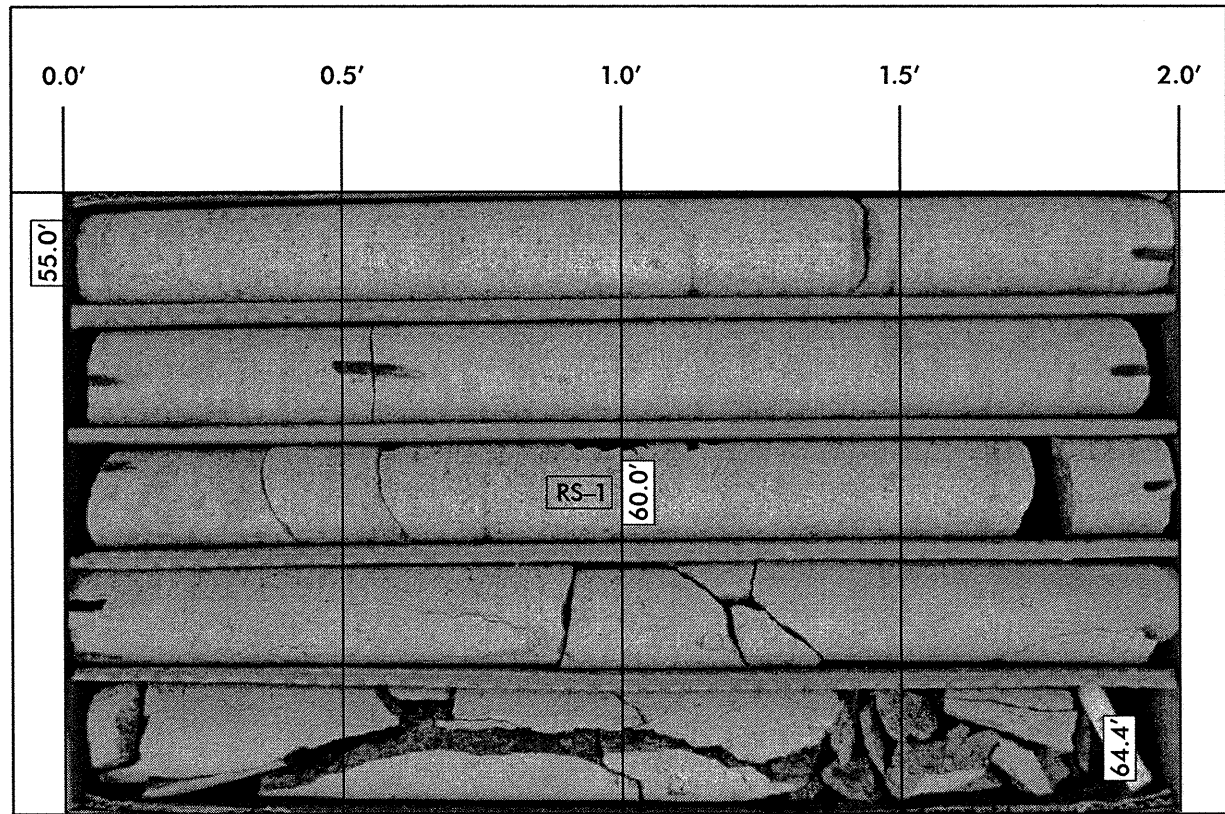
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
790													GROUND SURFACE	0.0
789.0	789.0	1.0	3	5	6							M	RESIDUAL RED-BROWN AND GRAY, STIFF, SILTY CLAY (A-7) W/ GRAVEL, ROCK FRAGS, TRACE MICA, ROOTS	3.0
786.5	786.5	3.5	3	6	8							M	RED-BROWN AND TAN, STIFF, FN. SANDY CLAY (A-6) W/ GRAVEL / ROCK FRAGS, TRACE MICA, ROOTS	5.5
784.0	784.0	6.0	4	5	7							M	BROWN TAN AND GRAY, MED. DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/ LITTLE MICA	8.0
781.5	781.5	8.5	3	4	6							M	BROWN TAN AND GRAY, STIFF, FN. SANDY SILT (A-4) SAPROLITIC, W/ MED. SAND LAYERS, LITTLE MICA	13.0
776.5	776.5	13.5	2	3	4							M	BROWN TAN AND GRAY, LOOSE TO MED. DENSE, SILTY FN. TO CSE. SAND (A-2-4) SAPROLITIC, W/ LITTLE TO TRACE MICA	23.0
771.5	771.5	18.5	4	7	8							W	TAN BLACK AND BROWN, V. DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS	33.5
766.5	766.5	23.5	10	21	40							D	WEATHERED ROCK BROWN GRAY AND TAN, GRANITE, W/ TRACE MICA, ROCK FRAGS	53.0
761.5	761.5	28.5	13	26	24							D	BROWN AND GRAY, MICA GRANITE	55.0
756.5	756.5	33.5	36	64/0.4								D	CRYSTALLINE ROCK GRAY AND WHITE, MOD. TO SLI. WEATHERED, MOD. HARD TO HARD, V. CLOSE TO WIDELY FRACTURED, GRANITE	70.0
751.5	751.5	38.5	43	57/0.2								D		
746.5	746.5	43.5	62	38/0.1										
741.5	741.5	48.5	100/0.4											
736.5	736.5	53.5	18	43	57/0.3							RS-1		
735.0	735.0	55.0	60/0.0									RS-2		
730														
725														
720														

NCDOT BORE SINGLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ NC\_DOT.GDT 12/8/12

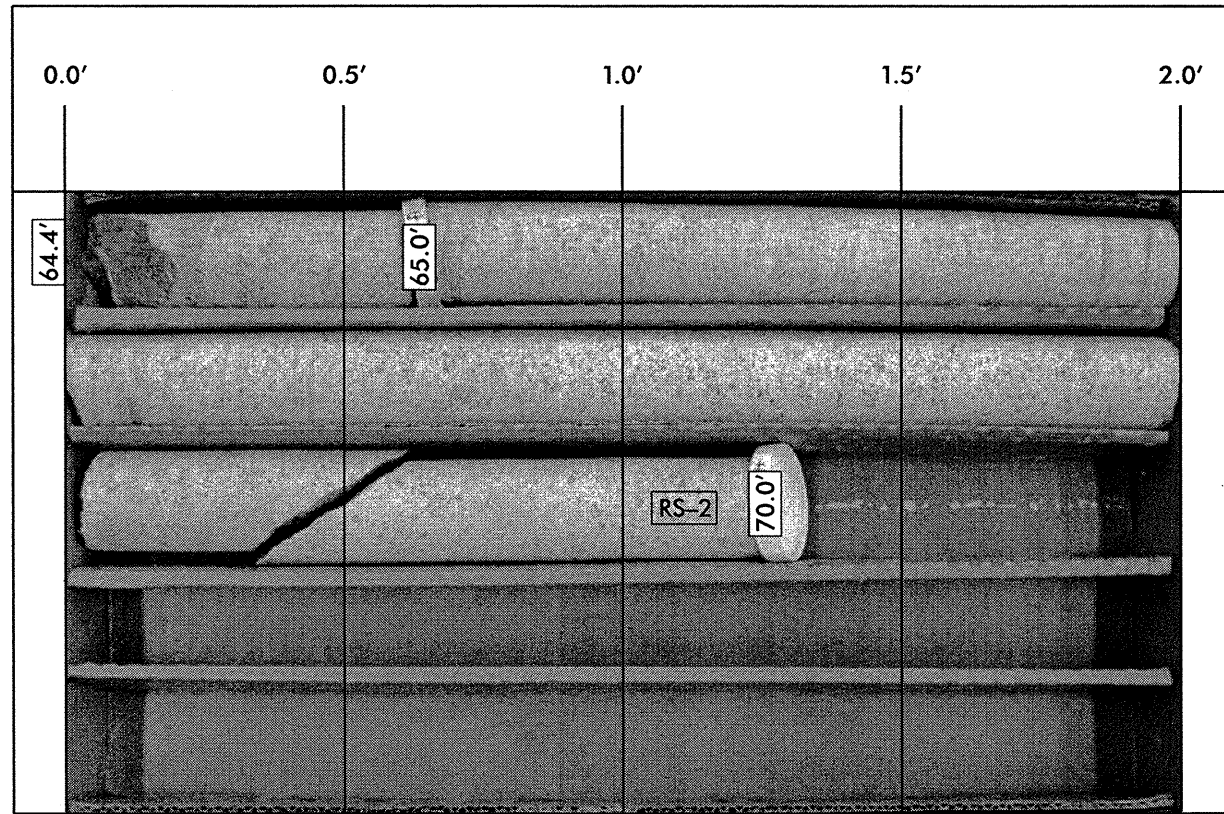
WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. B1-A	STATION 12+37	OFFSET 40 ft LT	ALIGNMENT -L-
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 70.0 ft	NORTHING 557,046	EASTING 1,479,480
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/24/12	COMP. DATE 02/28/12	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 (%)			
735	735.0	55.0	5.0	4:09/1.0 2:48/1.0 2:30/1.0 2:28/1.0 2:36/1.0	(5.0)	(4.8)		(14.8)	(12.2)		Begin Coring @ 55.0 ft	55.0
730	730.0	60.0	5.0	3:02/1.0 2:54/1.0 2:43/1.0 2:18/1.0 2:25/1.0	(5.0)	(2.8)	RS-1				GRAY AND WHITE, MOD. TO SLI. WEATHERED, MOD. HARD TO HARD, V. CLOSE TO WIDELY FRACTURED, GRANITE	
725	725.0	65.0	5.0	2:15/1.0 2:32/1.0 3:09/1.0 3:32/1.0	(4.8)	(4.6)						
720	720.0	70.0					RS-2				Boring Terminated at Elevation 720.0 ft in CR: GRANITE	70.0

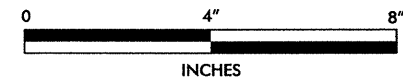
NCDOT CORE SINGLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ NC\_DOT.GDT 12/8/12




BORING BI-A, BOX 1 OF 2, 55.0 FT TO 64.4 FT



BORING BI-A, BOX 2 OF 2, 64.4 FT TO 70.0 FT



 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	<b>ROCK CORE PHOTOS – BORING BI-A</b>	
	GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H, WBS: 50000.1.STR13.TIB	
	JANUARY 2013	FALCON PROJECT NO.: G11026.00

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST J. HAMM
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. B1-B	STATION 12+44	OFFSET 30 ft RT	ALIGNMENT -L-
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 50.5 ft	NORTHING 556,997	EASTING 1,479,430
DRILL RIGHAMMER EFF./DATE TR10055 CME-55 70% 12/08/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/23/12	COMP. DATE 02/24/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
790													790.0 GROUND SURFACE: 5" TOPSOIL	0.0
	789.0	1.0	3	3	6							M	RESIDUAL TAN AND ORANGE, STIFF, SANDY CLAY (A-7)	3.0
	786.5	3.5	5	7	9							M	TAN, V. STIFF, SANDY SILT (A-4)	5.5
	784.0	6.0	3	4	5							M	TAN, LOOSE, SILTY SAND (A-2-4)	8.0
	781.5	8.5	3	5	7							M	TAN, STIFF, SANDY SILT (A-4)	12.0
	776.5	13.5	3	5	7							W	TAN, STIFF TO HARD, FN. SANDY SILT (A-4)	27.5
	771.5	18.5	3	7	10							W		29.0
	766.5	23.5	8	16	24							W		31.0
	761.5	28.5											CRYSTALLINE ROCK GRAY AND BROWN, GRANITE	35.0
	761.0	29.0	60/0.1									RS-3	CRYSTALLINE ROCK GRAY AND BROWN, SLI. WEATHERED TO MOD. SEV. WEATHERED, MED. TO MOD. HARD, V. CLOSE TO CLOSELY FRACTURED, GRANITE	50.5

Boring Terminated at Elevation 739.5 ft in CR: GRANITE

NOTE: 0 HR. GROUNDWATER NOT RECORDED DUE TO SLOW PERCOLATION OF WATER INTRODUCED TO BOREHOLE DURING ROCK CORING.

NCDOT BORE SINGLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ NC\_DOT.GDT 12/6/12

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**CORE BORING REPORT**

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST J. HAMM
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. B1-B	STATION 12+44	OFFSET 30 ft RT	ALIGNMENT -L-
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 50.5 ft	NORTHING 556,997	EASTING 1,479,430
DRILL RIGHAMMER EFF./DATE TR10055 CME-55 70% 12/08/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/23/12	COMP. DATE 02/24/12	SURFACE WATER DEPTH N/A

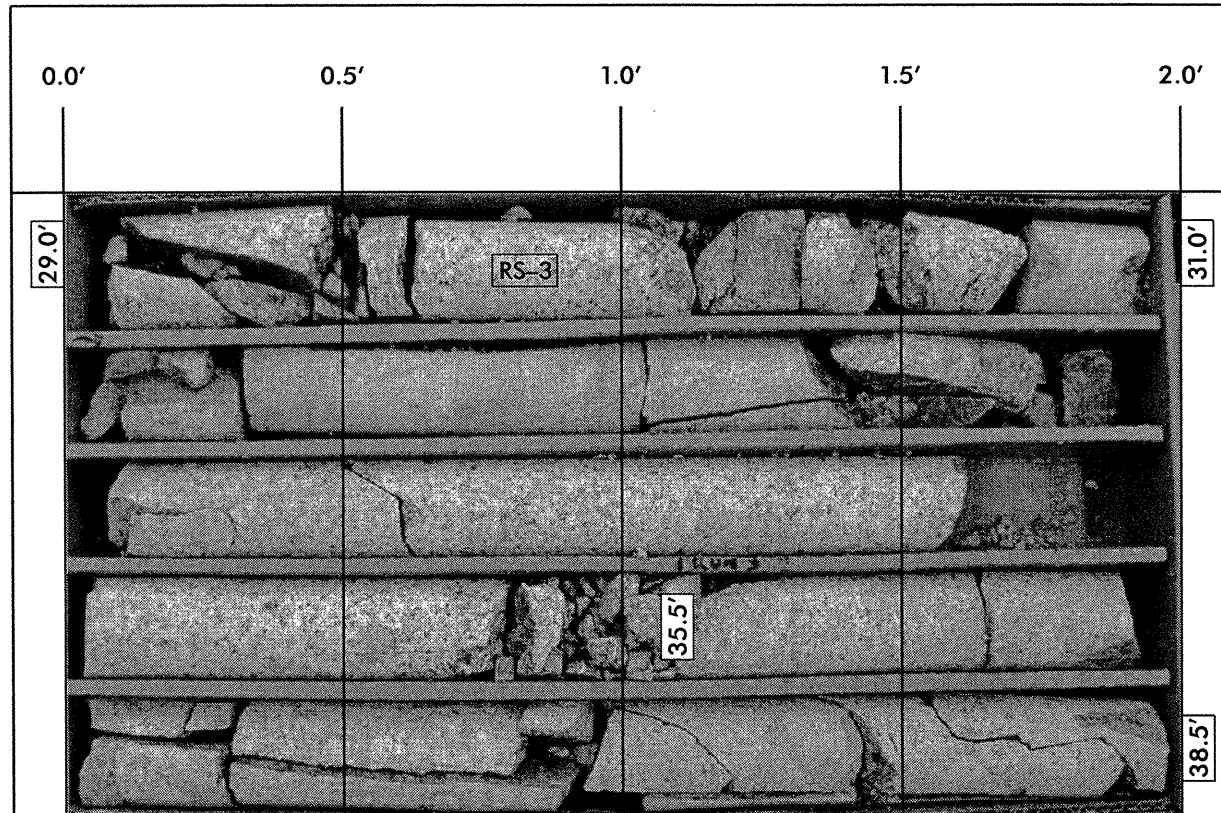
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
761											Begin Coring @ 29.0 ft	
760	761.0	29.0	2.0	2:30/1.0	(2.0)	(0.7)	RS-3	(2.0)	(0.7)		CRYSTALLINE ROCK	29.0
	759.0	31.0	4.5	4:00/1.0	100%	35%		100%	35%		GRAY AND BROWN, SLI. WEATHERED TO MOD. SEV. WEATHERED, MED. TO MOD. HARD, V. CLOSE TO CLOSELY FRACTURED, GRANITE	31.0
					(4.5)	(3.0)		(4.5)	(3.0)		GRAY AND BROWN, SLI. TO MOD. SEV. WEATHERED, SOFT TO MED. HARD, CLOSE TO MOD. CLOSELY FRACTURED, GRANITE	35.0
755	754.5	35.5	5.0	1:30/0.5	(4.7)	(1.0)		(15.0)	(7.7)		GRAY AND BROWN SLI. WEATHERED, MOD. HARD TO HARD, CLOSE TO MOD. CLOSELY FRACTURED, GRANITE	
					94%	20%		97%	50%			
750	749.5	40.5	5.0	1:43/1.0	(5.0)	(3.4)						
					100%	68%						
745	744.5	45.5	5.0	1:27/1.0	(5.0)	(3.3)	RS-4					
					100%	66%						
740	739.5	50.5		1:43/1.0							Boring Terminated at Elevation 739.5 ft in CR: GRANITE	50.5

Boring Terminated at Elevation 739.5 ft in CR: GRANITE

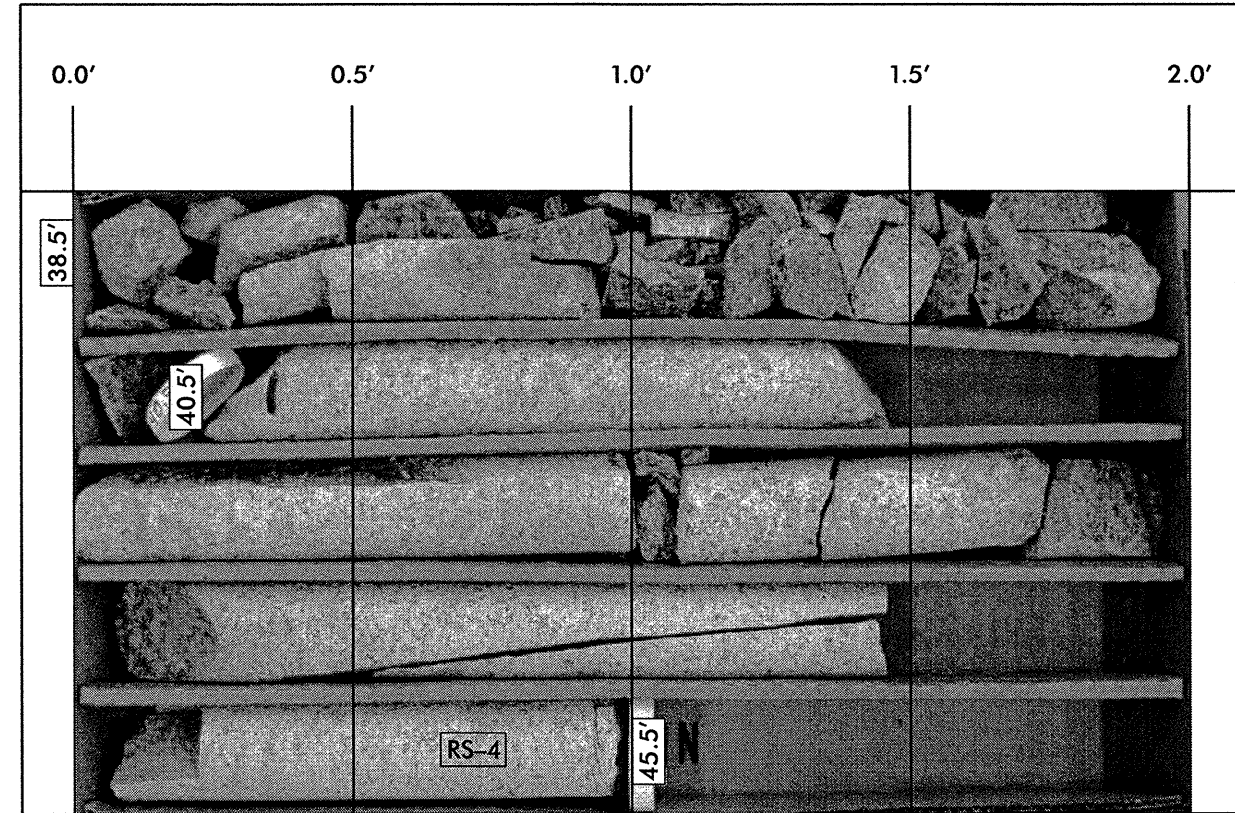
NOTE: 0 HR. GROUNDWATER NOT RECORDED DUE TO SLOW PERCOLATION OF WATER INTRODUCED TO BOREHOLE DURING ROCK CORING.

NCDOT CORE SINGLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ NC\_DOT.GDT 12/6/12

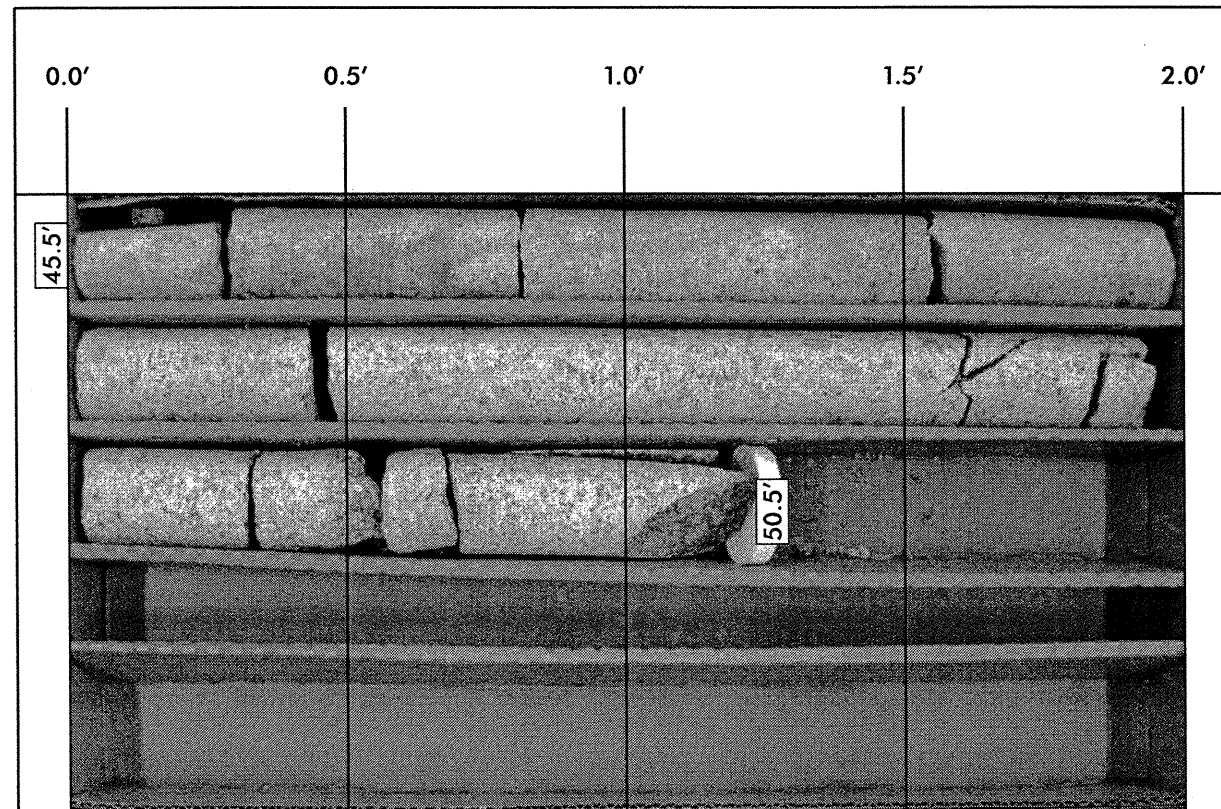




BORING B1-B, BOX 1 OF 3, 29.0 FT TO 38.5 FT




BORING B1-B, BOX 2 OF 3, 38.5 FT TO 45.5 FT



BORING B1-B, BOX 3 OF 3, 45.5 FT TO 50.5 FT



 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	<b>ROCK CORE PHOTOS – BORING B1-B</b>	
	GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H, WBS: 50000.1.STR13.T1B	
	JANUARY 2013	FALCON PROJECT NO.: G11026.00



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. EB2-A	STATION 12+75	OFFSET 30 ft LT	ALIGNMENT -L- 0 HR. 24.6
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 33.7 ft	NORTHING 557,010	EASTING 1,479,495 24 HR. 23.7 Caved
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/22/12	COMP. DATE 02/22/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
790															790.0	GROUND SURFACE: 6" TOPSOIL 0.0
	789.0	1.0	4	5	6											
	786.5	3.5	3	5	7										787.0	RESIDUAL BROWN AND TAN, STIFF, SILTY CLAY (A-7-5) W/ ROCK FRAGS 3.0
785	784.0	6.0	5	7	7										784.0	LT. BROWN, STIFF, FN. SANDY SILT (A-4) W/ ROOTS 6.0
	781.5	8.5	3	4	6											
780																
	776.5	13.5	4	3	5											
775																
	771.5	18.5	11	24	25										772.0	TAN AND BROWN, MED. DENSE TO LOOSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS, TRACE MICA 18.0
770																
	766.5	23.5	25	4	100/0.4										765.2	BROWN WHITE AND GRAY, DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS, TRACE MICA 24.8
765																
	761.5	28.5	13	76	24/0.1											
760																
	756.5	33.5	100/0.2												756.3	WEATHERED ROCK BROWN GRAY AND TAN, GRANITE 33.7
																Boring Terminated at Elevation 756.3 ft in WR: GRANITE

WBS 50000.1.STR13T1B	TIP P-5208H	COUNTY MECKLENBURG	GEOLOGIST T. EVANS
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION			GROUND WTR (ft)
BORING NO. EB2-B	STATION 12+75	OFFSET 30 ft RT	ALIGNMENT -L- 0 HR. 28.4
COLLAR ELEV. 790.0 ft	TOTAL DEPTH 43.8 ft	NORTHING 556,970	EASTING 1,479,455 24 HR. 27.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER W. WHICHARD	START DATE 02/22/12	COMP. DATE 02/22/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
790															790.0	GROUND SURFACE: 6" TOPSOIL 0.0
	789.0	1.0	4	6	8											
	786.5	3.5	4	7	9										787.0	RESIDUAL RED-BROWN AND TAN, STIFF, FN. SANDY CLAY (A-7-5) W/ ROCK FRAGS 3.0
785	784.0	6.0	5	7	8											
	781.5	8.5	4	6	7											
780																
	776.5	13.5	2	6	7											
775																
	771.5	18.5	2	4	8										771.5	TAN AND BROWN, MED. DENSE TO LOOSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS, TRACE MICA 18.5
770																
	766.5	23.5	6	10	15										765.2	BROWN WHITE AND GRAY, DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGS, TRACE MICA 24.8
765																
	761.5	28.5	8	16	34											
760																
	756.5	33.5	53	47/0.2											758.0	WEATHERED ROCK GRAY BROWN AND TAN, GRANITE, W/ TRACE MICA AND ROCK LAYERS 32.0
755																
	751.5	38.5	100/0.3													
750																
	746.5	43.5	100/0.3												746.2	WEATHERED ROCK GRAY BROWN AND TAN, GRANITE, W/ TRACE MICA AND ROCK LAYERS 43.8
																Boring Terminated at Elevation 746.2 ft in WR: GRANITE

NCDOT BORE DOUBLE P-5208H GRIER ROAD GRADE SEPARATION.GPJ NC\_DOT.GDT 12/6/12

FALCON

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

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

GRIER ROAD GRADE SEPARATION

GRIER ROAD GRADE SEPARATION

WBS NO.: 50000.1.STR13T1B, TIP NO.: P-5208H

WBS NO.: 50000.1.STR13T1B, TIP NO.: P-5208H

MECKLENBURG COUNTY, NORTH CAROLINA

MECKLENBURG COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G11026.00

FALCON ENGINEERING, INC. PROJECT NO: G11026.00

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-B		SS-1	100	100	91	75	50	25				45.4
A-7-5												
11+10	27' RT	1.0 - 2.5										
EB2-A		SS-2	100	96	87	84	39	45				39.0
A-7-5												
12+75	30' LT	1.0 - 2.5										
EB2-B		SS-3	95	68	54	50	32	18				20.9
A-7-5												
1275	30' RT	1.0 - 2.5										

Sample No.	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	59.2-60.5	Granite	PzZq	96%	0.36	0.17	169.1	23,121	3,991,182	-
RS-2	B1-A	69.0-70.0	Granite	PzZq	92%	0.37	0.16	168.5	9,975	2,572,312	-
RS-3	B1-B	29.5-30.0	Granite	PzZq	35%	0.33	0.16	166.7	10,647	1,572,528	-
RS-4	B1-B	44.5-45.5	Granite	PzZq	68%	0.38	0.16	167.9	12,662	1,985,792	-





PHOTO TAKEN FROM NEAR END BENT 1, LOOKING DOWNSTATION (ALONG -L-). BORING EB1-B IS SHOWN IN FOREGROUND.



PHOTO TAKEN FROM NEAR END BENT 2, LOOKING DOWNSTATION (ALONG -L-) TOWARD B1-A. AS SHOWN ABOVE, EXCAVATION WAS REQUIRED TO ACCESS BORINGS B1-A AND B1-B. BORING EB2-A IS SHOWN BY TRAFFIC CONE.



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

**SITE PHOTOS**

GRIER ROAD GRADE SEPARATION  
 MECKLENBURG COUNTY, NORTH CAROLINA  
 TIP: P-5208H, WBS: 50000.1.STR13.TIB

JANUARY 2013

FALCON PROJECT NO.:  
 G11026.00


SHEET 16



PHOTO TAKEN FROM NEAR END BENT 2, LOOKING DOWNSTATION (ALONG -L-). BORING B1-A IS SHOWN IN FOREGROUND.



PHOTO TAKEN FROM NEAR END BENT 1, LOOKING UPSTATION (ALONG -L-) TOWARD B1-A (LEFT) AND B1-B (RIGHT), BEYOND EXISTING RAIL LINE SHOWN ABOVE.

 <p>FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 RALEIGH, NC 27607 PHONE: 919.871.0800 FAX: 919.871.0803</p>	<b>SITE PHOTOS</b>	
	GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H, WBS: 50000.1.STR13.TIB	
	JANUARY 2013	FALCON PROJECT NO.: G11026.00



PROJECT: 50000.1.STR13T1B ID: P-5208H

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208H	1	12

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STRUCTURE  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. P-5208H F.A. PROJ. \_\_\_\_\_  
COUNTY MECKLENBURG  
PROJECT DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75  
TO -Y1- STA. 44+05

SITE DESCRIPTION GRIER ROAD (SR 2976) GRADE SEPARATION  
FROM SOUTH OF ORR ROAD (SR 2426) TO  
OLD CONCORD ROAD (SR 2848)

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

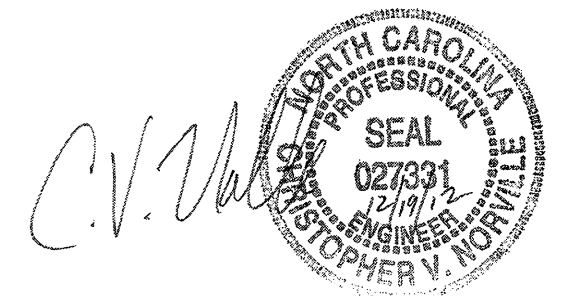
C. V. NORVILLE  
J. R. HAMM  
T. E. EVANS

INVESTIGATED BY T. E. EVANS  
CHECKED BY C. V. NORVILLE  
SUBMITTED BY FALCON ENG.  
DATE DECEMBER, 2012

DRAWN BY: J. R. HAMM

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

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



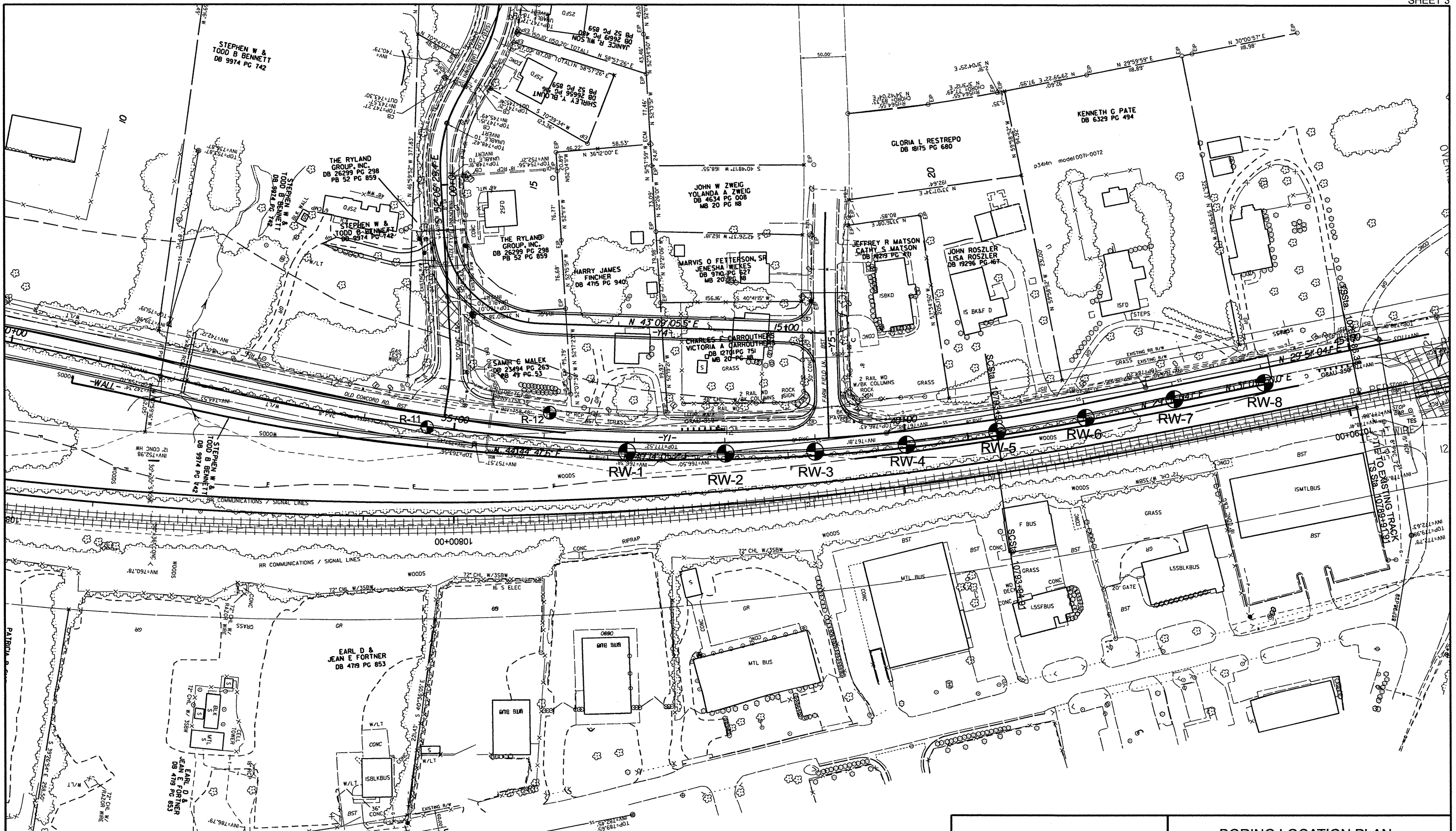
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

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

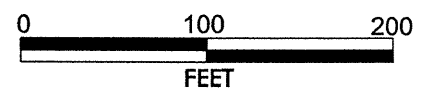
## SUBSURFACE INVESTIGATION

### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION			GRADATION			ROCK DESCRIPTION			TERMS AND DEFINITIONS																																																																											
<p>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></p>			<p>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.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>			<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><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (ROD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>Slickenside</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																											
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<p>GENERAL CLASS.</p> <table border="1" style="width: 100%; text-align: center; font-size: 8px;"> <tr> <td></td> <td colspan="4">GRANULAR MATERIALS (≤ 35% PASSING #200)</td> <td colspan="4">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</td> <td colspan="4">ORGANIC MATERIALS</td> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1</td> <td>A-3</td> <td colspan="2">A-2</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td colspan="2">○○○○○○○○○○</td> <td colspan="2">○○○○○○○○○○</td> <td colspan="2">○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> <td>○○○○○○○○○○</td> </tr> </table> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				GRANULAR MATERIALS (≤ 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS				GROUP CLASS.	A-1	A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL	○○○○○○○○○○		○○○○○○○○○○		○○○○○○○○○○		○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○	○○○○○○○○○○	<p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE      LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE      LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE      LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; text-align: center; font-size: 8px;"> <tr> <td></td> <td colspan="2">GRANULAR SOILS</td> <td colspan="2">SILT-CLAY SOILS</td> <td colspan="2">OTHER MATERIAL</td> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td colspan="4">TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td colspan="4">LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td colspan="4">SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt;10%</td> <td>&gt;20%</td> <td colspan="4">HIGHLY</td> </tr> </table>				GRANULAR SOILS		SILT-CLAY SOILS		OTHER MATERIAL		TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE				LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE				MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME				HIGHLY ORGANIC	>10%	>20%	HIGHLY				<p style="text-align: center;">WEATHERING</p> <p>FRESH      ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SLI.)      ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI.)      ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</p> <p>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></p> <p>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 &gt; 100 BPF</i></p> <p>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 &lt; 100 BPF</i></p> <p>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.</p>		
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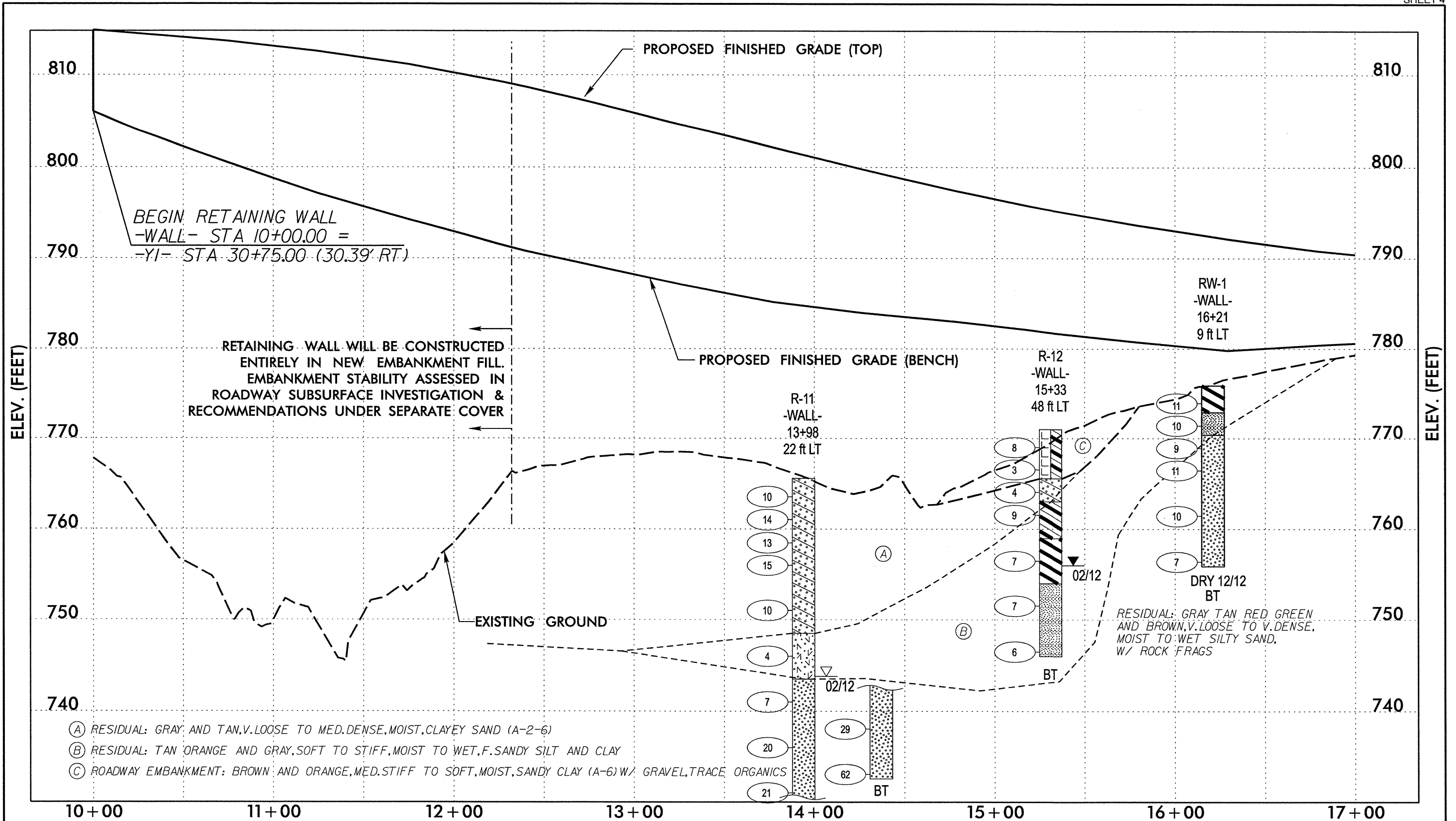


**NOTES:**  
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM  
 RK&K, DATED JULY 2012.



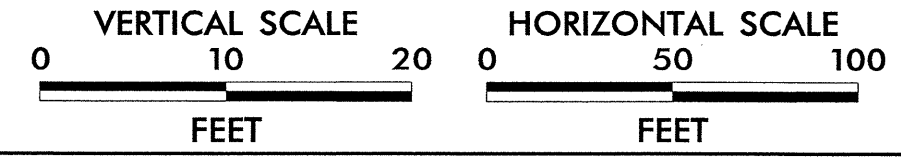
**FALCON ENGINEERING**  
 FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD  
 RALEIGH, NC 27607  
 PHONE: 919.871.0800  
 FAX: 919.871.0803

<b>BORING LOCATION PLAN</b>		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP.: P-5208H, WBS.: 50000.1.STR13T1B		
DEC. 2012	FALCON PROJECT NO.: G11026.01	SHEET 1 OF 1



**NOTES:**

- WALL ENVELOPE ADOPTED FROM ELECTRONIC DRAWINGS RECEIVED FROM RK&K IN DECEMBER 2012.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

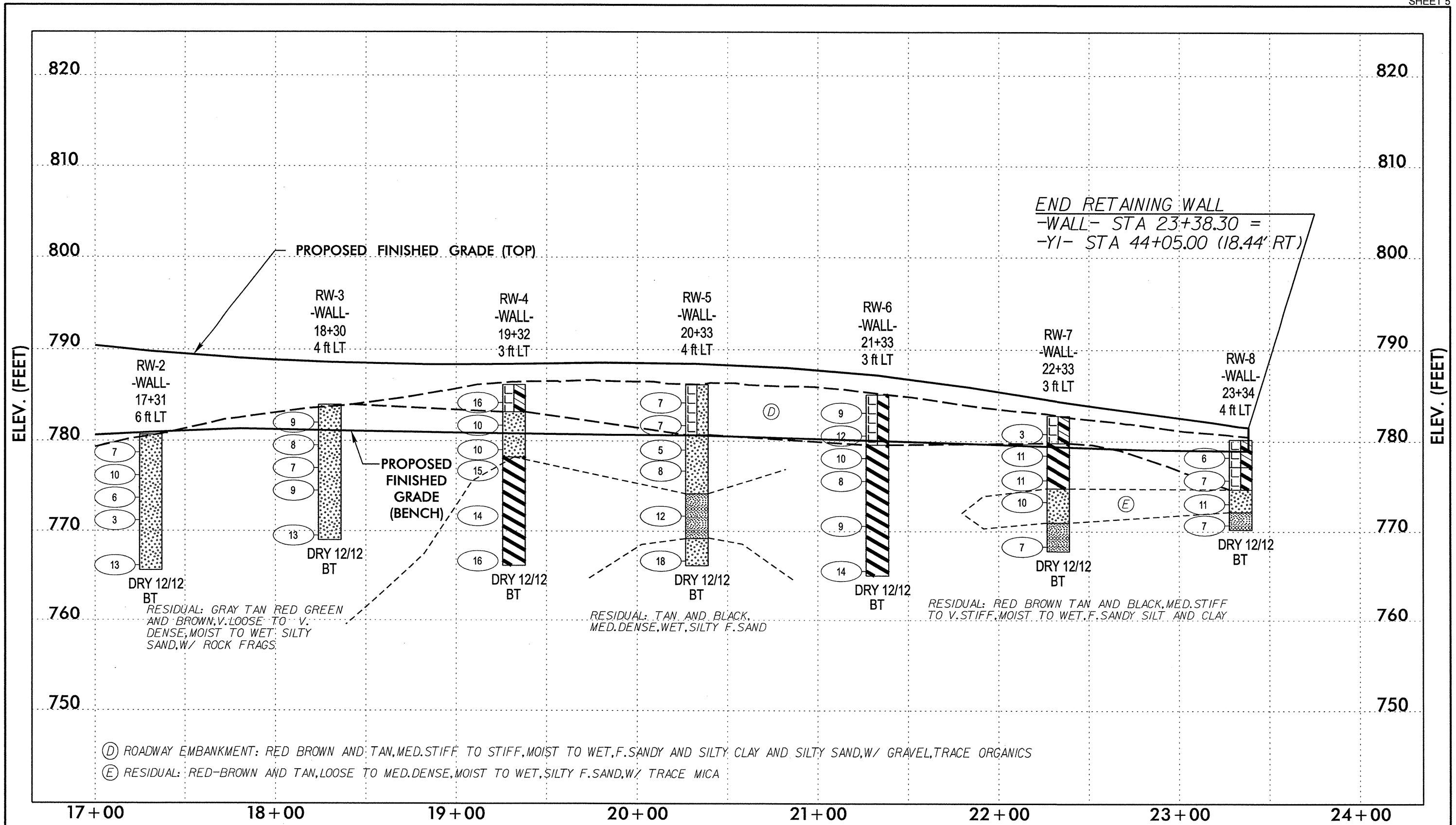


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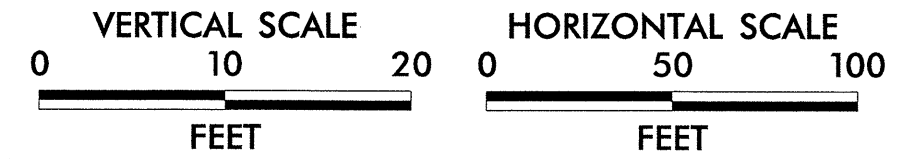
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RETAINING WALL SUBSURFACE PROFILE		
GRIER ROAD GRADE SEPARATION MECKLENBURG COUNTY, NORTH CAROLINA TIP: P-5208H; WBS: 50000.1.STR13T1B		
DECEMBER 2012	FALCON PROJECT NO.: G11026.01	SHEET 1 OF 2



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**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST J. HAMM							
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION							GROUND WTR (ft)						
BORING NO. R-11		STATION 13+98		OFFSET 22 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 765.5 ft		TOTAL DEPTH 45.0 ft		NORTHING 557,610		EASTING 149,827							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011							DRILL METHOD H.S. Augers						
DRILLER R. TOOTHMAN							HAMMER TYPE Automatic						
START DATE 02/17/12		COMP. DATE 02/17/12		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	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
770													
765	764.5	1.0	2	5	5								765.5 GROUND SURFACE 0.0
	762.0	3.5	3	5	9								RESIDUAL TAN, CLAYEY SAND (A-2-6)
760	759.5	6.0	4	6	7								
	757.0	8.5	4	6	9								
755													
	752.0	13.5	2	4	6								
750													
	747.0	18.5	1	2	2								748.5 TAN AND ORANGE, FN. SANDY SILT (A-5) SAPROLITIC, TRACE MICA 17.0
745													
	742.0	23.5	2	2	5								743.5 GRAY WHITE AND BLACK, SILTY SAND (A-2-4) SAPROLITIC, W/ TRACE MICA 22.0
740													
	737.0	28.5	4	9	11								
735													
	732.0	33.5	4	9	12								
730													
	727.0	38.5	6	14	15								
725													
	722.0	43.5	14	34	28								
													720.5 Boring Terminated at Elevation 720.5 ft in Residual: Silty Sand 45.0

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST J. HAMM							
SITE DESCRIPTION GRIER ROAD GRADE SEPARATION							GROUND WTR (ft)						
BORING NO. R-12		STATION 15+33		OFFSET 48 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 771.0 ft		TOTAL DEPTH 25.0 ft		NORTHING 557,736		EASTING 1,479,902							
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 93% 12/08/2011							DRILL METHOD H.S. Augers						
DRILLER W. WHICHARD							HAMMER TYPE Automatic						
START DATE 02/17/12		COMP. DATE 02/17/12		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	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
775													
770	770.0	1.0	4	4	4								771.0 GROUND SURFACE 0.0
	767.5	3.5	2	1	2								ROADWAY EMBANKMENT BROWN AND ORANGE, SANDY CLAY (A-6) W/ GRAVEL, TRACE ORGANICS
765	765.0	6.0	2	2	2								765.5 RESIDUAL GRAY AND TAN, CLAYEY SAND (A-2-6) 5.5
	762.5	8.5	2	4	5								763.0 TAN AND GRAY, SANDY CLAY (A-6) 8.0
760													
	757.5	13.5	2	3	4								759.0 ORANGE AND GRAY, SILTY CLAY (A-7) 12.0
755													
	752.5	18.5	2	3	4								754.0 GREEN AND BROWN, CLAYEY SILT (A-4) 17.0
750													
	747.5	23.5	1	3	3								746.0 Boring Terminated at Elevation 746.0 ft in Residual: Clayey Silt 25.0

NCDOT BORE DOUBLE P-5208H GRIER ROAD RETAINING WALL.GPJ NC\_DOT.GDT 12/18/12



WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS									
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)								
BORING NO. RW-3		STATION 18+30		OFFSET 4 ft LT		ALIGNMENT -WALL-									
COLLAR ELEV. 784.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 557,915		EASTING 1,480,129									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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					
785														784.0	GROUND SURFACE 0.0
	783.0	1.0	3	4	5								M		RESIDUAL RED AND TAN, SILTY SAND (A-2-4) W/ GRAVEL
780	780.5	3.5	3	4	4								M		
	778.0	6.0	4	3	4								M		
775	775.5	8.5	3	4	5								M		
	770.5	13.5	6	6	7								W		Boring Terminated at Elevation 769.0 ft in Residual: Silty Sand

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS									
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)								
BORING NO. RW-4		STATION 19+32		OFFSET 3 ft LT		ALIGNMENT -WALL-									
COLLAR ELEV. 786.2 ft		TOTAL DEPTH 20.0 ft		NORTHING 557,997		EASTING 1,480,190									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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					
790														786.2	GROUND SURFACE 0.0
	785.2	1.0	6	8	8								M		ROADWAY EMBANKMENT RED-BROWN AND TAN, F. SANDY CLAY (A-6) W/ ROCK FRAGS.
785	782.7	3.5	5	4	6								M		RESIDUAL RED-BROWN AND TAN, SILTY F. SAND (A-2-4) W/ ROCK FRAGS.
	780.0	6.2	4	5	5								M		
780	777.7	8.5	7	7	8								M		RED-BROWN TAN AND BLACK, F. SANDY CLAY (A-7-5) W/ ROCK FRAGS.
	772.7	13.5	5	6	8								SS-1	37%	
775	767.7	18.5	5	7	9								W		Boring Terminated at Elevation 766.2 ft in Residual: F. Sandy Clay



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS							
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)						
BORING NO. RW-5		STATION 20+33		OFFSET 4 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 786.2 ft		TOTAL DEPTH 20.0 ft		NORTHING 558,081		EASTING 1,480,246							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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				
790													
785	785.2	1.0	3	2	5								786.2
	782.7	3.5	3	3	4								
780	780.0	6.2	3	2	3								780.7
	777.7	8.5	3	3	5								
775													
	772.7	13.5	4	5	7								774.2
770													
	767.7	18.5	6	7	11								769.2
													766.2
Boring Terminated at Elevation 766.2 ft in Residual: Silty F. Sand													

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS							
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)						
BORING NO. RW-6		STATION 21+33		OFFSET 3 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 785.1 ft		TOTAL DEPTH 20.0 ft		NORTHING 558,165		EASTING 1,480,299							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		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				
790													
785	784.1	1.0	3	4	5								785.1
	781.6	3.5	5	5	7								
780	779.1	6.0	4	4	6								779.6
	776.6	8.5	3	3	5					SS-2	34%		
775													
	771.6	13.5	3	4	5								774.2
770													
	766.6	18.5	5	5	9								769.2
													766.2
Boring Terminated at Elevation 765.1 ft in Residual: F. Sandy Clay													

NCDOT BORE DOUBLE P-5208H GRIER ROAD RETAINING WALL.GPJ NC\_DOT.GDT 12/18/12

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS							
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)						
BORING NO. RW-7		STATION 22+33		OFFSET 3 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 782.8 ft		TOTAL DEPTH 15.0 ft		NORTHING 558,252		EASTING 1,480,348							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
785													782.8 GROUND SURFACE 0.0
780	781.8	1.0	3	1	2						W	ROADWAY EMBANKMENT BROWN, SANDY CLAY (A-6) W/ TRACE ORGANICS	3.0
	779.4	3.4	4	4	7						SS-3	RESIDUAL RED-BROWN AND TAN, F. SANDY CLAY (A-7-5)	
775	776.7	6.1	3	5	6						M	RED-BROWN AND TAN, SILTY F. SAND (A-2-4)	8.0
	774.3	8.5	3	4	6						M	RED-BROWN AND TAN, F. SANDY SILT (A-4)	11.8
770	769.3	13.5	2	3	4						W	RED-BROWN AND TAN, F. SANDY SILT (A-4)	15.0
Boring Terminated at Elevation 767.8 ft in Residual: F. Sandy Silt													

WBS 50000.1.STR13T1B		TIP P-5208H		COUNTY MECKLENBURG		GEOLOGIST T. EVANS							
SITE DESCRIPTION RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05							GROUND WTR (ft)						
BORING NO. RW-8		STATION 23+34		OFFSET 4 ft LT		ALIGNMENT -WALL-							
COLLAR ELEV. 780.2 ft		TOTAL DEPTH 10.0 ft		NORTHING 558,340		EASTING 1,480,400							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 70% 12/08/2011			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER W. WHICHARD		START DATE 12/11/12		COMP. DATE 12/11/12		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
785													780.2 GROUND SURFACE 0.0
780	779.2	1.0	3	3	3						W	ROADWAY EMBANKMENT RED-BROWN AND TAN, SANDY CLAY (A-6) W/ GRAVEL	3.0
	776.7	3.5	2	3	4						SS-4	40% ROADWAY EMBANKMENT RED-BROWN AND TAN, SILTY CLAY (A-7-5)	5.5
775	774.1	6.1	4	5	6						W	RESIDUAL RED-BROWN AND TAN, SILTY F. SAND (A-2-4) W/ TRACE MICA	8.0
	771.7	8.5	2	3	4						M	RED-BROWN AND TAN, F. SANDY SILT (A-4)	10.0
Boring Terminated at Elevation 770.2 ft in Residual: F. Sandy Silt													

NC DOT BORE DOUBLE P-5208H GRIER ROAD RETAINING WALL.GPJ NC\_DOT.GDT 12/18/12



FALCON

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

## AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

RETAINING WALL FROM -Y1- STA. 30+75 TO STA. 44+05

WBS NO.: 50000.1.STR13T1B, TIP NO.: P-5208H

MECKLENBURG COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G11026.01

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	%
R-11		SS-14 *	96	64	44	43	34	9	30.7
A-5									
13+98	22 ft LT	18.5-20.0							
R-12		SS-15 *	88	61	40	36	19	17	18.1
A-6									
15+33	48 ft LT	3.5-5.0							
RW-4		SS-1	99	89	74	68	51	17	36.9
A-7-5									
19+32	3 ft LT	8.5-10.0							
RW-6		SS-2	100	94	88	69	45	24	33.6
A-7-5									
21+33	3 ft LT	6.0-7.5							
RW-7		SS-3	100	96	82	78	40	38	32.1
A-7-5									
22+33	3 ft LT	3.5-5.0							
RW-8		SS-4	100	95	89	90	35	55	39.5
A-7-5									
23+34	4 ft LT	3.5-5.0							

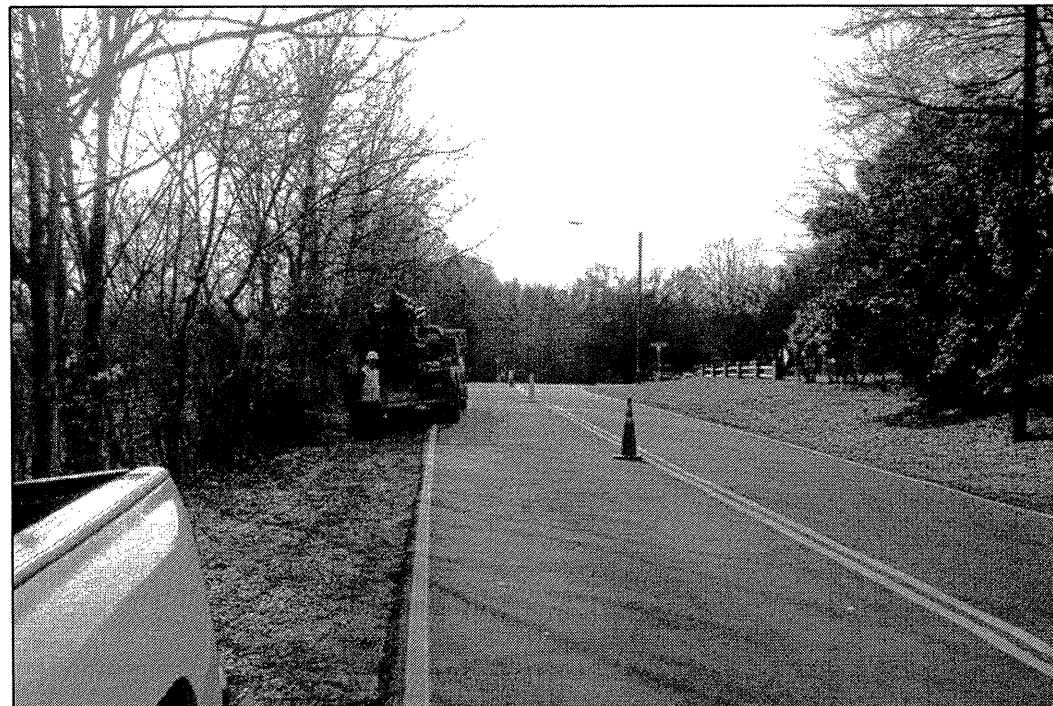
\* Samples SS-14 and SS-15 originally included in Roadway Subsurface Investigation and therefore are not numbered sequentially with samples from RW borings.



PHOTOGRAPH TAKEN FROM NEAR END OF  
RETAINING WALL LOOKING UPSTATION



PHOTOGRAPH TAKEN FROM NEAR END OF  
RETAINING WALL LOOKING DOWNSTATION



PHOTOGRAPH TAKEN FROM NEAR BORING,  
RW-5, LOOKING DOWNSTATION



PHOTOGRAPH TAKEN FROM NEAR BORING  
RW-7, LOOKING DOWNSTATION ALONG -YI-



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

**SITE PHOTOGRAPHS**

GRIER ROAD GRADE SEPARATION  
MECKLENBURG COUNTY, NORTH CAROLINA  
TIP: P-5208H, WBS.: 50000.1.STR13T1B

DEC. 2012

FALCON PROJECT  
NO.: G12026.01

SHEET 1 OF 1