

PROJECT: 33737.1.1 ID: B-4510

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33737.1.1 (B4510)	1	14

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**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33737.1.1 (B-4510) F.A. PROJ. BRSTP-2643(1)

COUNTY FORSYTH

PROJECT DESCRIPTION \_\_\_\_\_

REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643

(UNION CROSS RD/SALISBURY ST.)

SITE DESCRIPTION \_\_\_\_\_

REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643

(UNION CROSS RD/SALISBURY ST.)

**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

J. HAMM

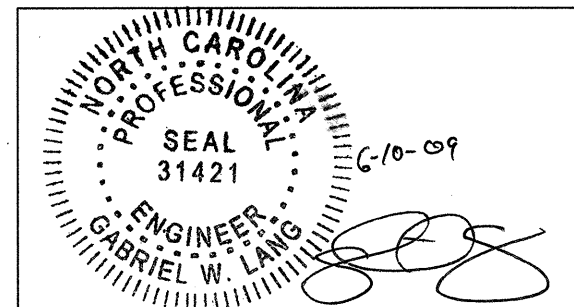
Structure Design

INVESTIGATED BY J. HAMM

CHECKED BY G. LANG

SUBMITTED BY -

DATE 6-10-2009



DRAWN BY: J. HAMM

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.

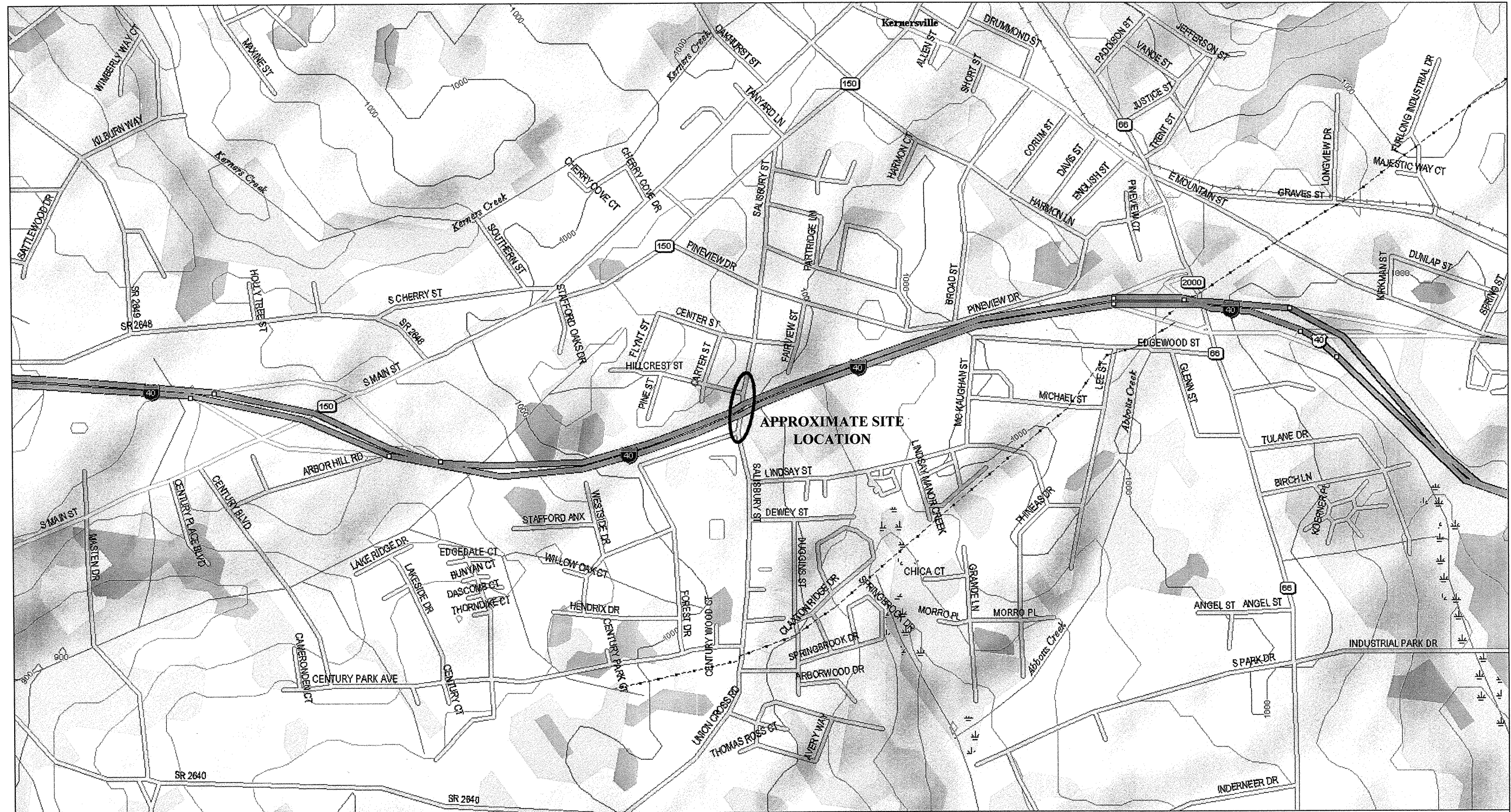
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

PROJECT REFERENCE NO. 33737.11(B-4510)	SHEET NO. 2
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**SUBSURFACE INVESTIGATION**

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

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS							
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - 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>COMPRESSION</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		<b>PERCENTAGE OF MATERIAL</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		<b>GROUND WATER</b> 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		<b>MISCELLANEOUS SYMBOLS</b> 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 SOUNDING ROD SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	
<b>CONSISTENCY OR DENSENESS</b>		<b>ABBREVIATIONS</b>		<b>ROCK HARDNESS</b>									
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		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 Wt - UNIT WEIGHT W <sub>d</sub> - DRY UNIT WEIGHT		VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE  VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD  4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053  BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GRV.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3  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  PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH  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.		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.  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  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.  DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> D-50  ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 3" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG-CARB. <input type="checkbox"/> CORE BIT  HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL  CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H  HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST							
<b>TEXTURE OR GRAIN SIZE</b>		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>FRACTURE SPACING</b>		<b>BEDDING</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				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		TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY 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>SOIL MOISTURE - CORRELATION OF TERMS</b>				<b>INDURATION</b>									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.									
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT													
<b>PLASTICITY</b>													
PLASTICITY INDEX (PI) DRY STRENGTH													
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 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.													



DeLORME

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★  
MN (0.0° W)

0 500 1000 ft  
Data Zoom 14-1

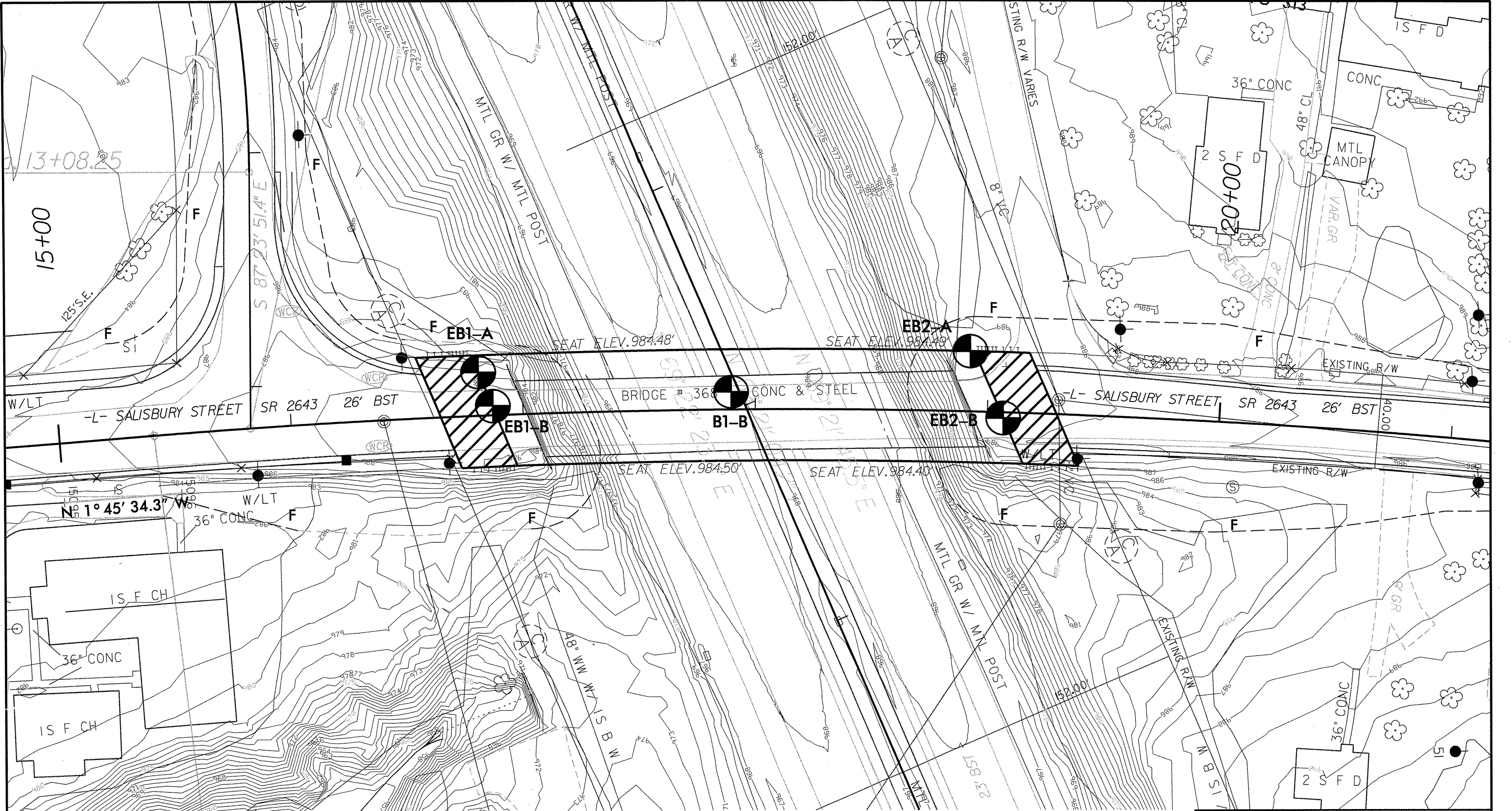
### SITE VICINITY MAP

**REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
FORSYTH COUNTY, NORTH CAROLINA  
TIP NO: B-4510, STATE PROJECT NO: 33737.1.1**

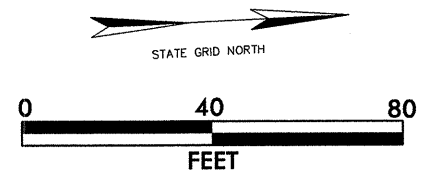


FALCON ENGINEERING, INC.  
2736 ROWLAND RD.  
RALEIGH, NC 27615  
PHONE (919) 871-0800  
FAX (919) 871-0803





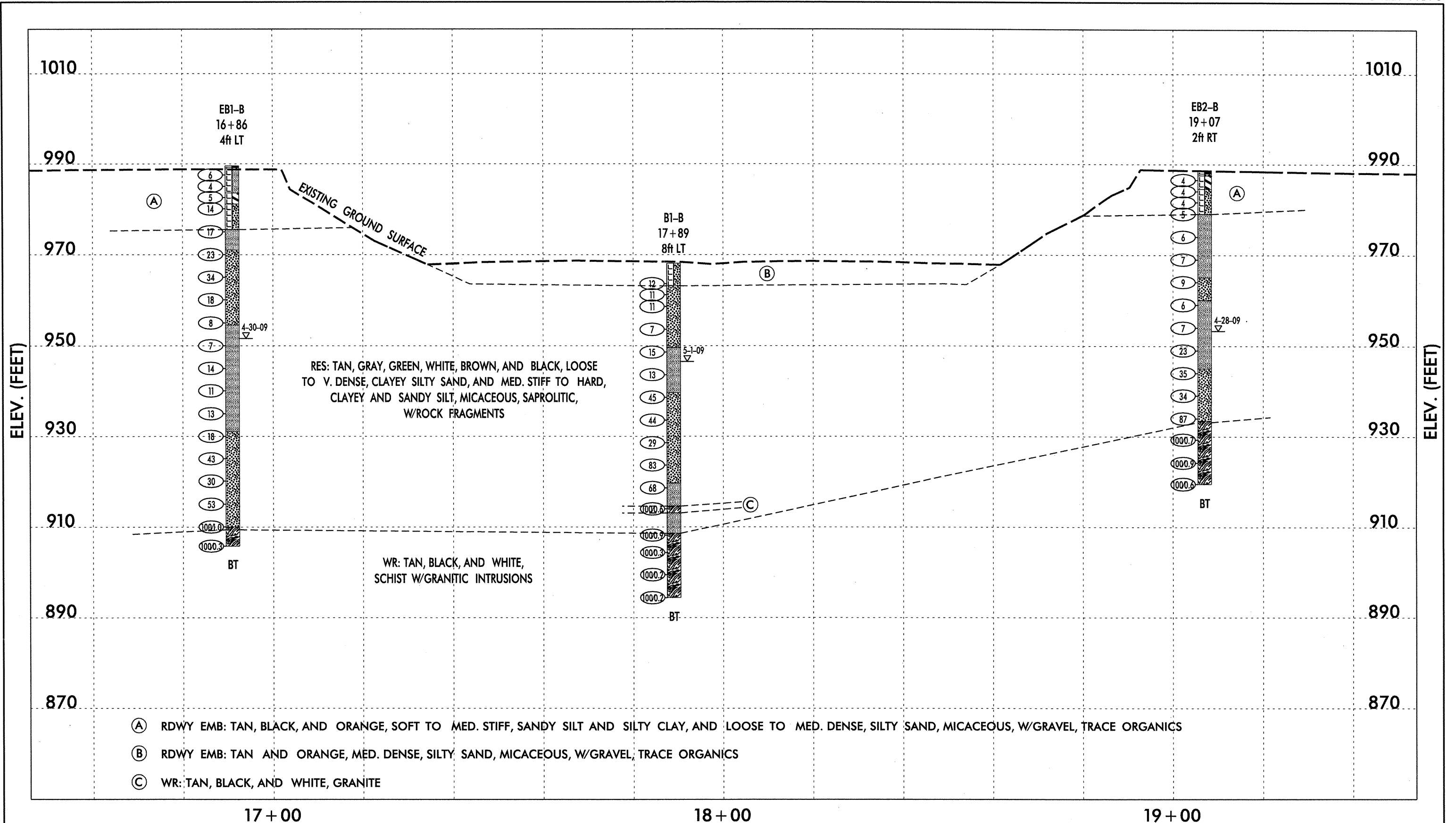
**NOTES:**  
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM  
 NCDOT, DATED APRIL 2009.  
 BRIDGE SKEW: 64 DEGREES



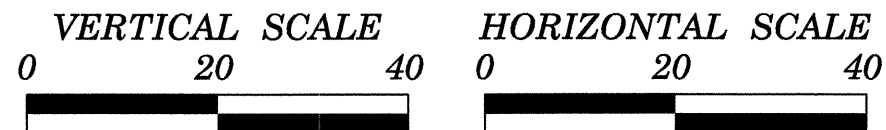
**BORING LOCATION PLAN**  
 REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
 FORSYTH COUNTY, NORTH CAROLINA  
 PROJECT NO.: 33737.1.1  
 TIP NO.: B-4510

**FALCON ENGINEERING**  
 FALCON ENGINEERING, INC.  
 2736 ROWLAND RD.  
 RALEIGH, NC 27615  
 PHONE: 919.871.0800  
 FAX: 919.871.0803





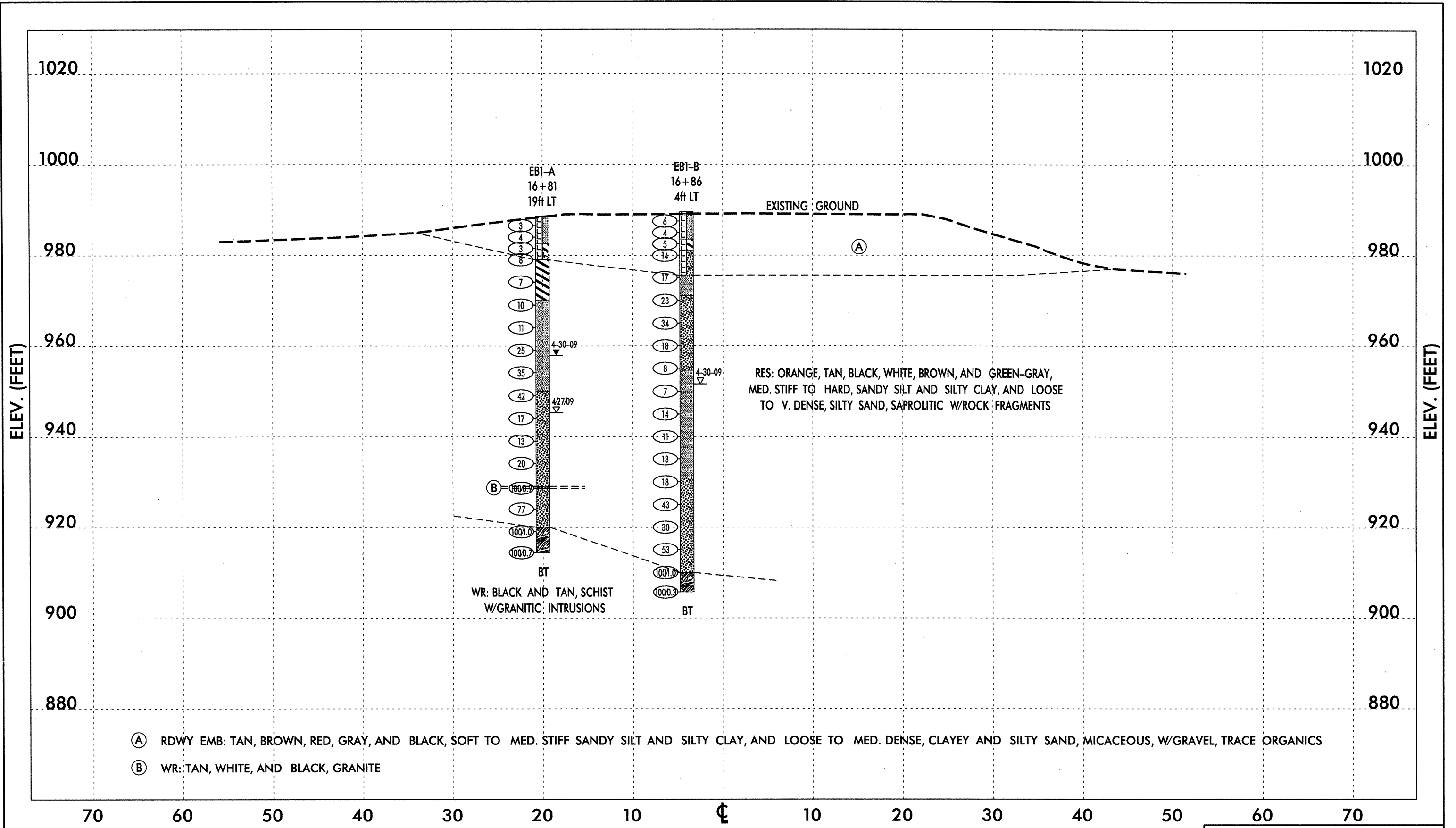
**NOTES:**  
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED APRIL, 2009  
 • BRIDGE SKEW: 64 DEGREES



**SUBSURFACE PROFILE ALONG -L-**

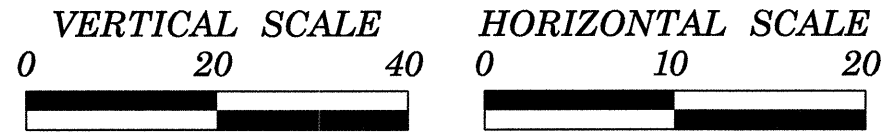
REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
 FORSYTH COUNTY, NORTH CAROLINA  
 PROJECT NO: 33737.1.1  
 TIP NO: B-4510

FALCON ENGINEERING, INC.  
 3724 SCHMIDT RD.  
 RALEIGH, NC 27603  
 PHONE: 919.877.2000  
 FAX: 919.877.2001



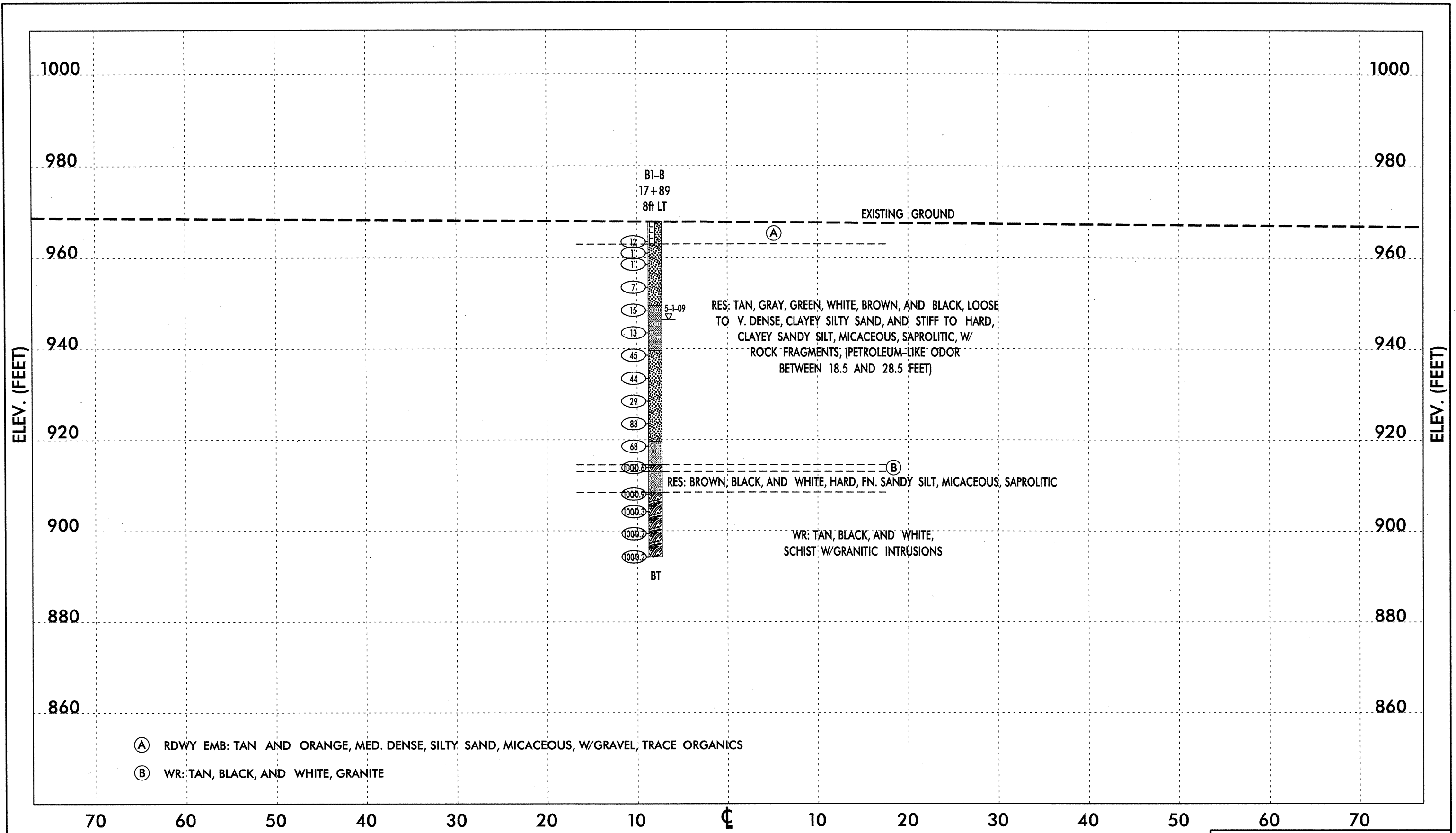
- (A) RDWY EMB: TAN, BROWN, RED, GRAY, AND BLACK, SOFT TO MED. STIFF SANDY SILT AND SILTY CLAY, AND LOOSE TO MED. DENSE, CLAYEY AND SILTY SAND, MICACEOUS, W/GRAVEL, TRACE ORGANICS
- (B) WR: TAN, WHITE, AND BLACK, GRANITE

**NOTES:**  
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED APRIL, 2009  
 • BRIDGE SKEW: 64 DEGREES



**CROSS SECTION END BENT 1**  
 REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
 FORSYTH COUNTY, NORTH CAROLINA  
 PROJECT NO: 33737.1.1  
 TIP NO: B-4510

**FALCON ENGINEERING**  
FALCON ENGINEERING, INC.  
 2728 SCHWAB RD.  
 ANDERSON, NC 29625  
 PHONE: 864.744.4444  
 FAX: 864.744.4444



**NOTES:**

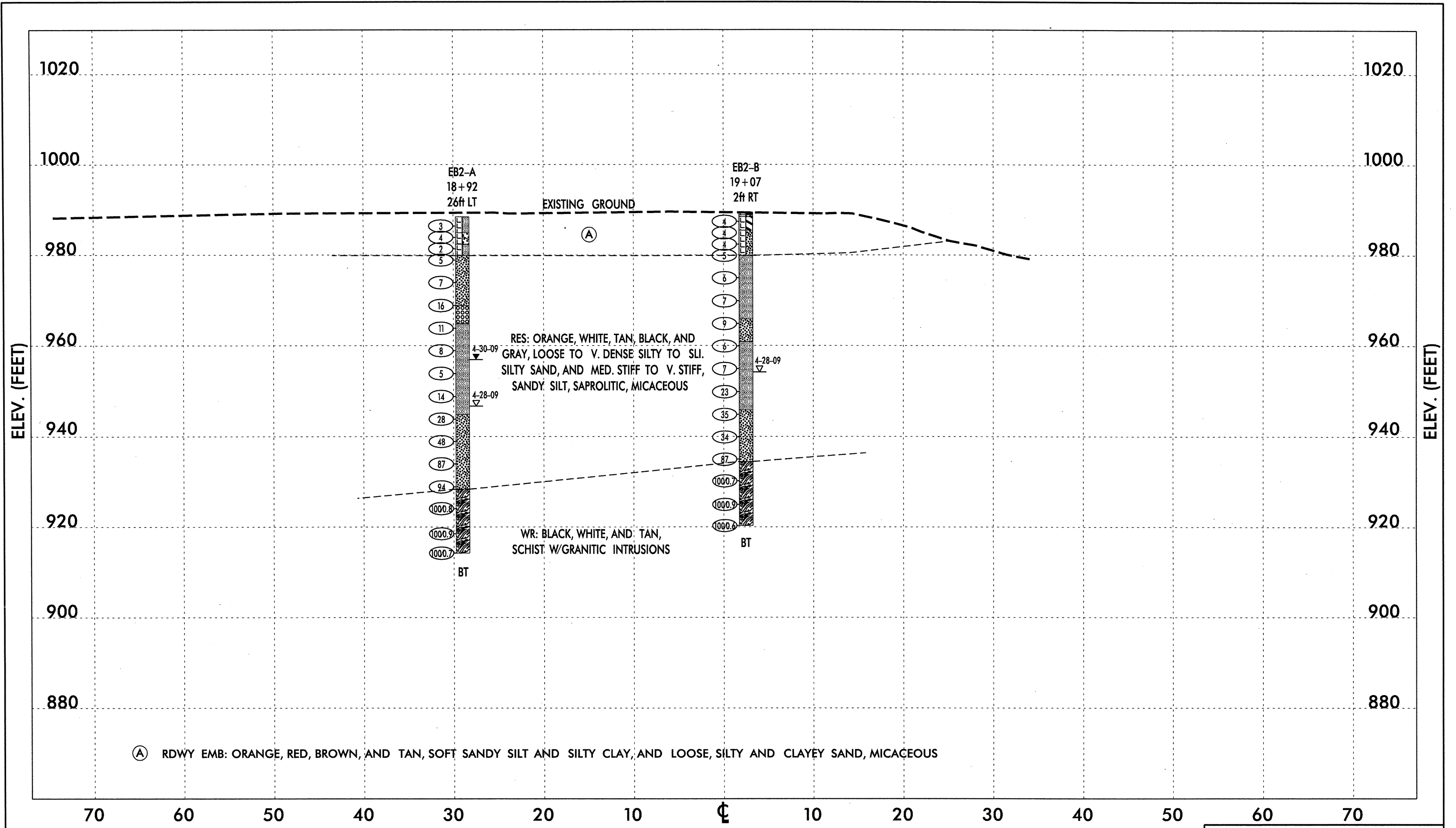
- PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED APRIL, 2009
- BRIDGE SKEW: 64 DEGREES

**CROSS SECTION BENT 1**

REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
 FORSYTH COUNTY, NORTH CAROLINA  
 PROJECT NO: 33737.1.1  
 TIP NO: B-4510

**FALCON ENGINEERING**  
FALCON ENGINEERING, P.C.  
 3708 SCHWAB RD.  
 ANDERSON, NC 29625  
 PHONE: 853.2222  
 FAX: 853.2222



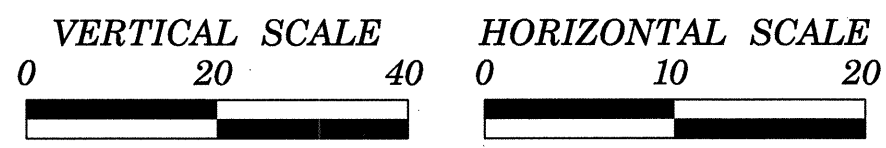


ELEV. (FEET)

ELEV. (FEET)

Ⓐ RDWY EMB: ORANGE, RED, BROWN, AND TAN, SOFT SANDY SILT AND SILTY CLAY, AND LOOSE, SILTY AND CLAYEY SAND, MICACEOUS

**NOTES:**  
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED APRIL, 2009  
 • BRIDGE SKEW: 64 DEGREES



**CROSS SECTION END BENT 2**  
 REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
 FORSYTH COUNTY, NORTH CAROLINA  
 PROJECT NO: 33737.1.1  
 TIP NO: B-4510

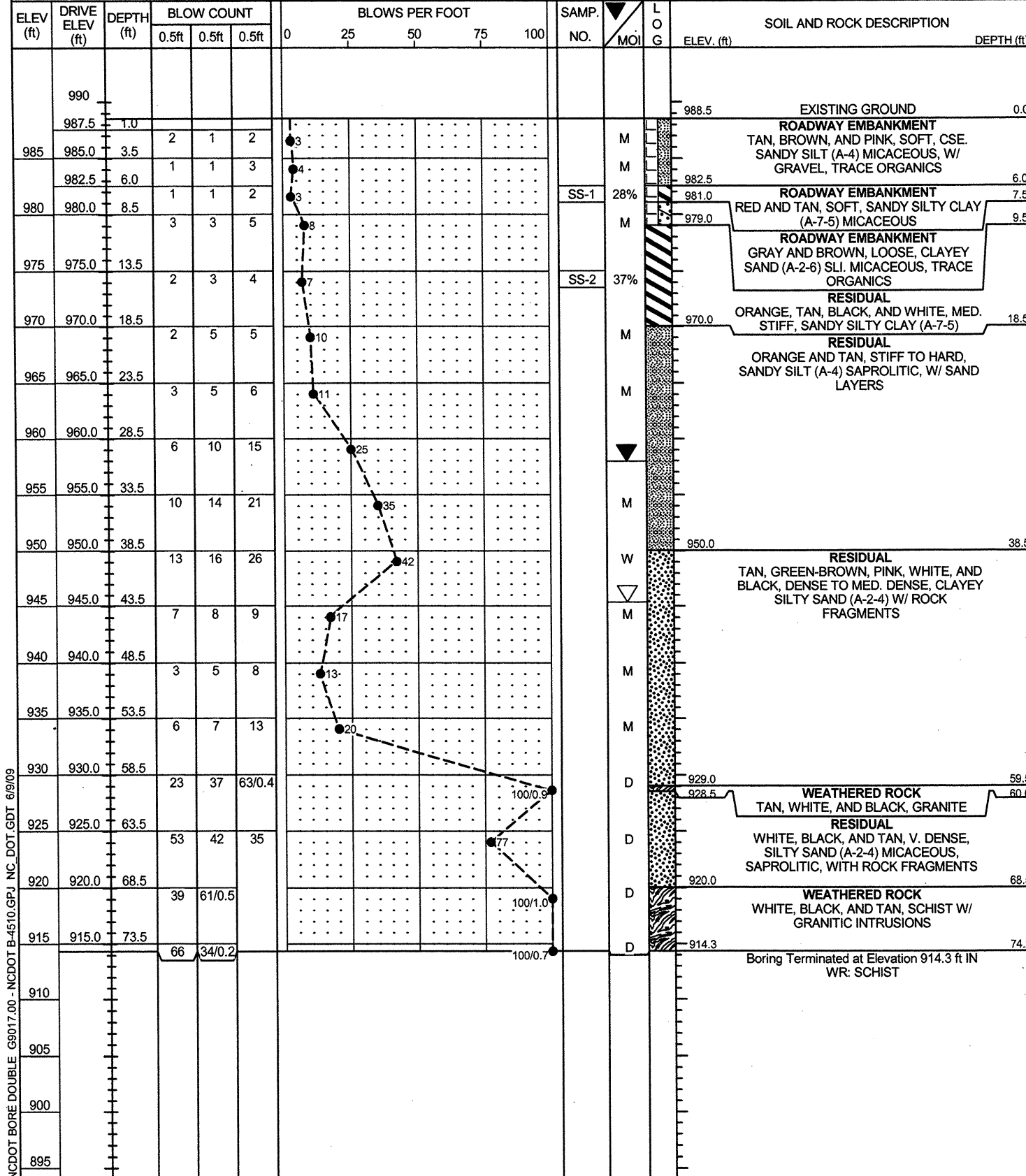
FALCON ENGINEERING, INC.  
 3708 KENNEDY BLVD.  
 RAYLEIGH, NC 27603  
 PHONE: 919.487.8800  
 FAX: 919.487.8801  
 WWW.FALCON-ENG.COM



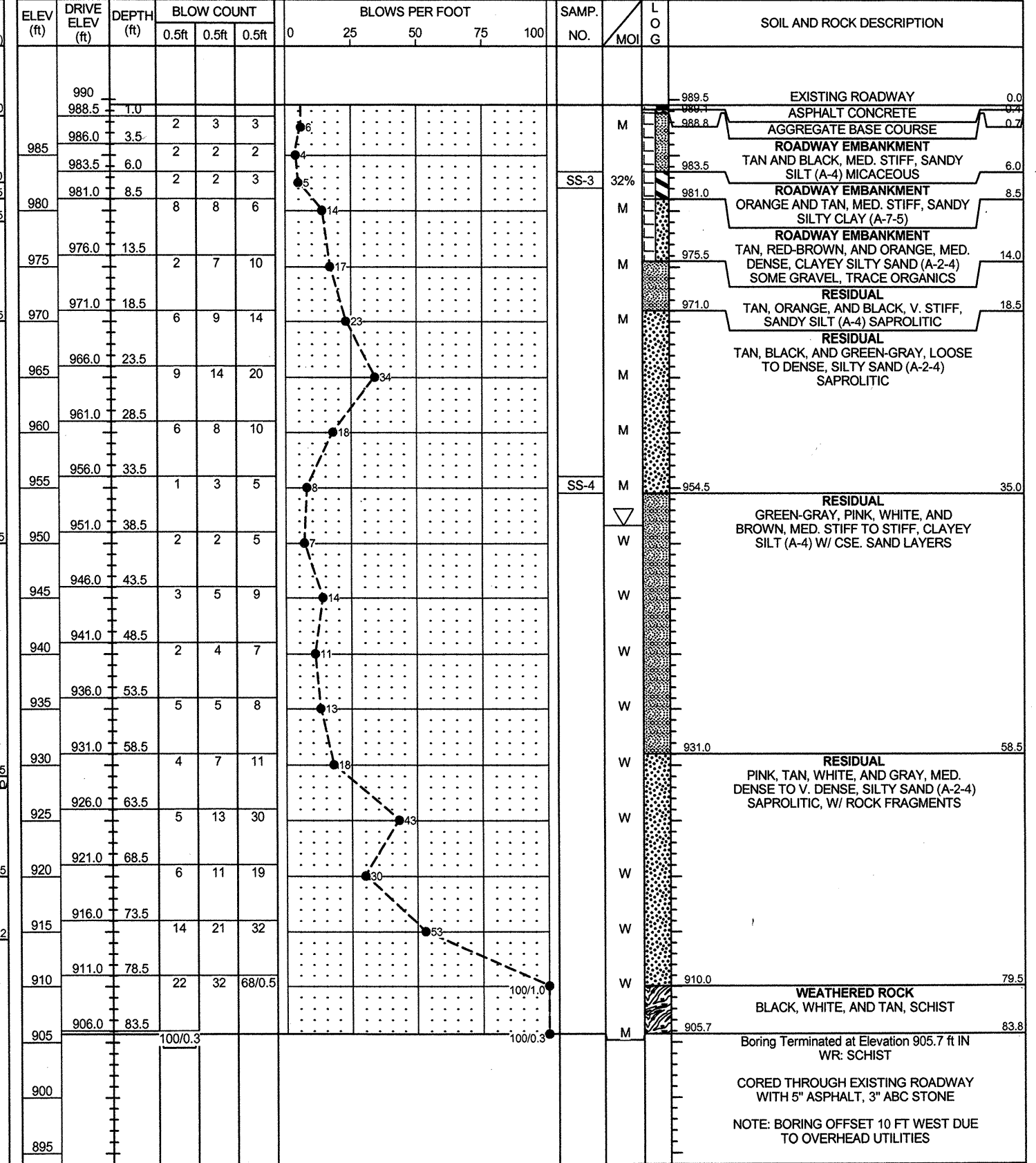
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 33737.1.1	ID. B-4510	COUNTY FORSYTH	GEOLOGIST J. HAMM
SITE DESCRIPTION REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643			GROUND WTR (ft)
BORING NO. EB1-A	STATION 16+81	OFFSET 19ft LT	ALIGNMENT L
COLLAR ELEV. 988.5 ft	TOTAL DEPTH 74.2 ft	NORTHING 1,408,426	EASTING 3,373,691
DRILL MACHINE D-50	DRILL METHOD HSA	HAMMER TYPE Automatic	
START DATE 04/27/09	COMP. DATE 04/27/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33737.1.1	ID. B-4510	COUNTY FORSYTH	GEOLOGIST J. HAMM
SITE DESCRIPTION REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+86	OFFSET 4ft LT	ALIGNMENT L
COLLAR ELEV. 989.5 ft	TOTAL DEPTH 83.8 ft	NORTHING 1,408,431	EASTING 3,373,706
DRILL MACHINE D-50	DRILL METHOD HSA	HAMMER TYPE Automatic	
START DATE 04/30/09	COMP. DATE 04/30/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE C9017.00 - NCDOT B-4510.GPJ, NC\_DOT\_GDT\_6/9/09



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 33737.1.1	ID. B-4510	COUNTY FORSYTH	GEOLOGIST J. HAMM
SITE DESCRIPTION REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643			GROUND WTR (ft)
BORING NO. B1-B	STATION 17+89	OFFSET 8ft LT	ALIGNMENT L
COLLAR ELEV. 968.1 ft	TOTAL DEPTH 73.7 ft	NORTHING 1,408,534	EASTING 3,373,705
DRILL MACHINE D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 05/01/09	COMP. DATE 05/01/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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				
	970												EXISTING GROUND	0.0
	964.6	3.5	4	8	4								ROADWAY EMBANKMENT TAN AND ORANGE, MED. DENSE, SILTY SAND (A-2-4) MICACEOUS, W/ GRAVEL, TRACE ORGANICS	5.0
	962.1	6.0	3	5	6								RESIDUAL TAN AND GRAY TO GREEN-GRAY, MED. DENSE TO LOOSE, CLAYEY SILTY CSE. SAND (A-2-4)	
	959.6	8.5	5	5	6									
	954.6	13.5	4	4	3									
	949.6	18.5	4	6	9								RESIDUAL GREEN-GRAY, TAN, AND WHITE TO DK GREEN, STIFF, CLAYEY SANDY SILT (A-4) W/ SAND LAYERS, PETROLEUM-LIKE ODOR	18.5
	944.6	23.5	5	4	9									
	939.6	28.5	13	19	26								RESIDUAL GREEN-GRAY, TAN, BROWN, BLACK, AND WHITE, MED. DENSE TO V. DENSE, SILTY CSE. SAND (A-2-4) SAPROLITIC, W/ ROCK FRAGMENTS	28.5
	934.6	33.5	13	20	24									
	929.6	38.5	10	11	18									
	924.6	43.5	23	37	46									
	919.6	48.5	12	19	49								RESIDUAL BROWN, WHITE, AND BLACK, HARD, SANDY SILT (A-4) MICACEOUS, W/ SAND LAYERS	48.5
	914.6	53.5	81	19/0.1									WEATHERED ROCK TAN, BLACK, AND WHITE, GRANITE	53.5
	909.6	58.5	17	37	63/0.4								RESIDUAL BROWN, BLACK, AND WHITE, HARD, FN. SANDY SILT (A-4) MICACEOUS, SAPROLITIC	59.5
	904.6	63.5											WEATHERED ROCK TAN, BLACK, AND WHITE, SCHIST W/ GRANITIC INTRUSIONS	
	899.6	68.5												
	894.6	73.5											Boring Terminated at Elevation 894.4 ft IN WR: SCHIST	73.7
													CORED THROUGH BRIDGE DECK WITH 1.5" ASPHALT, 7.5" REINFORCED CONCRETE	

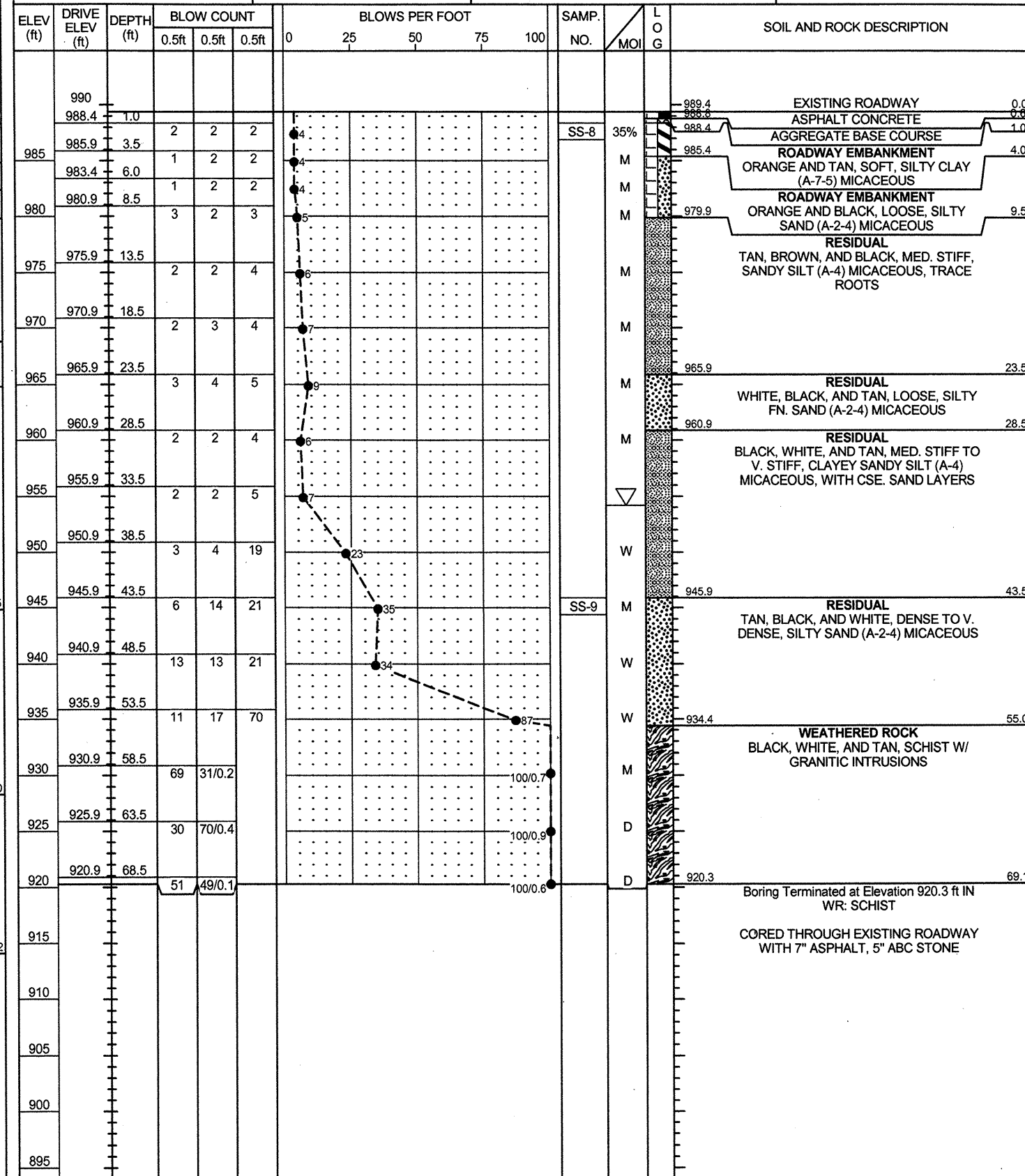
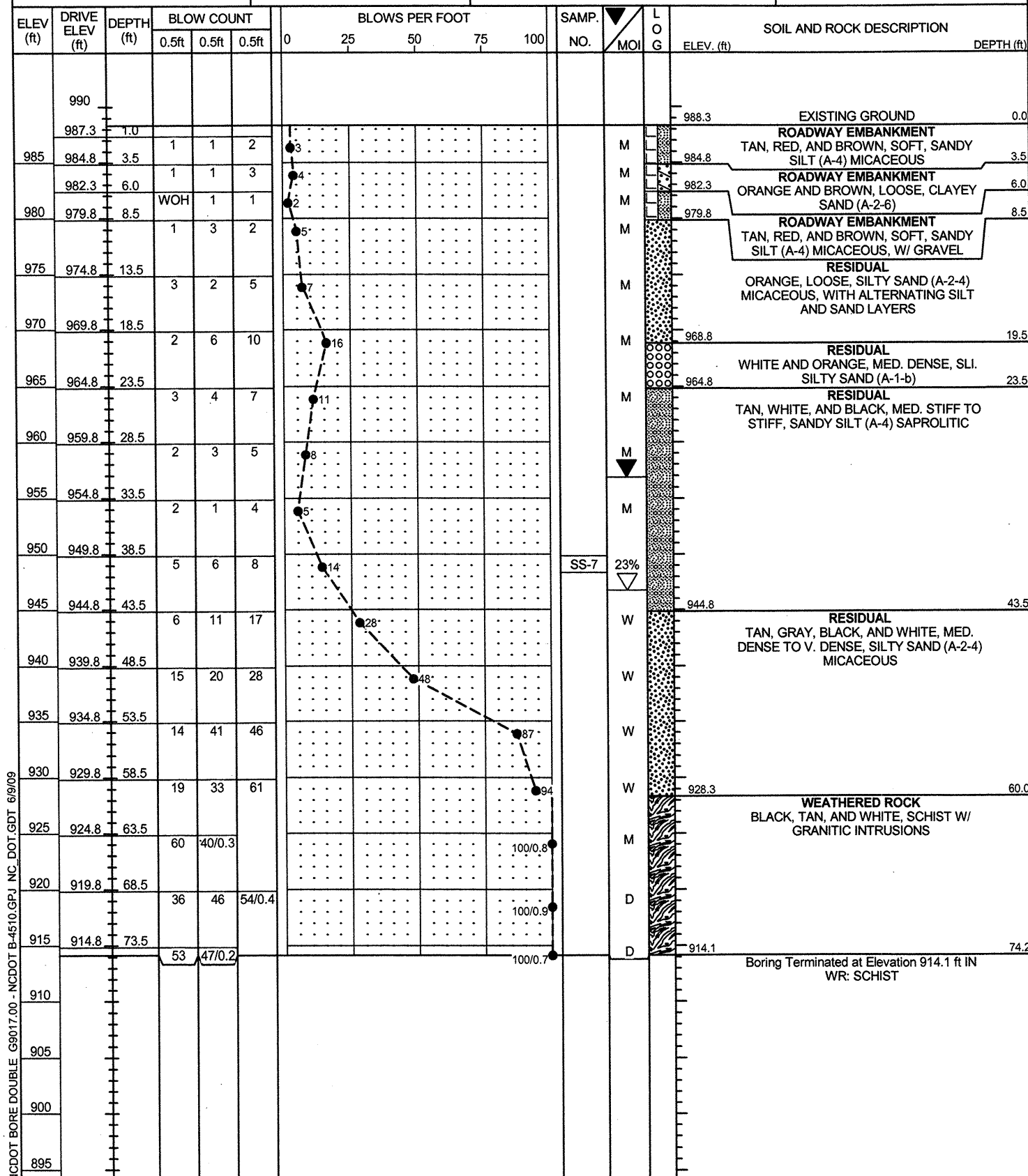
NCDOT BORE DOUBLE G9017.00 - NCDOT B-4510.GPJ NC\_DOT.GDT 6/9/09



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

Table with project details for Boring EB2-A: PROJECT NO. 33737.1.1, ID. B-4510, COUNTY FORSYTH, GEOLOGIST J. HAMM. SITE DESCRIPTION REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643. BORING NO. EB2-A, STATION 18+92, OFFSET 26ft LT, ALIGNMENT L. COLLAR ELEV. 988.3 ft, TOTAL DEPTH 74.2 ft, NORTHING 1,408,638, EASTING 3,373,692. DRILL MACHINE D-50, DRILL METHOD HSA, HAMMER TYPE Automatic. START DATE 04/27/09, COMP. DATE 04/28/09, SURFACE WATER DEPTH N/A, DEPTH TO ROCK N/A.

Table with project details for Boring EB2-B: PROJECT NO. 33737.1.1, ID. B-4510, COUNTY FORSYTH, GEOLOGIST J. HAMM. SITE DESCRIPTION REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643. BORING NO. EB2-B, STATION 19+07, OFFSET 2ft RT, ALIGNMENT L. COLLAR ELEV. 989.4 ft, TOTAL DEPTH 69.1 ft, NORTHING 1,408,651, EASTING 3,373,722. DRILL MACHINE D-50, DRILL METHOD HSA, HAMMER TYPE Automatic. START DATE 04/28/09, COMP. DATE 04/28/09, SURFACE WATER DEPTH N/A, DEPTH TO ROCK N/A.



NCDOT BORE DOUBLE G9017.00 - NCDOT B-4510.GPJ NC DOT.GDT 6/9/09

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 368 OVER I-40 BUS ON SR 2643

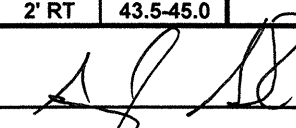
NCDOT Project No: 33737.1.1 - T.I.P. No: B-4510

FORSYTH COUNTY, NC

FALCON ENGINEERING, INC. PROJECT NO: G9017.00

BORING #			SAMPLE #			TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limit Test Results			MC
AASHTO Classification			PERCENT PASSING			PERCENT RETAINED										
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PL	PI	%			
EB1-A			SS-1													
A-7-5			98	78	51	30	22	17	31	51	30	21	27.5			
16+81	19' LT	6.0-7.5														
EB1-A			SS-2													
A-7-5			100	93	68	15	27	32	26	51	38	13	36.9			
16+81	19' LT	13.5-15.0														
EB1-B			SS-3													
A-7-5			99	87	57	24	23	17	36	55	35	20	32.3			
16+86	4' LT	6.0-7.5														
EB1-B			SS-4													
A-2-4			100	76	34	43	29	12	16	35	NP	NP	-			
16+86	4' LT	33.5-35.0														
B1-B			SS-5													
A-2-4			88	66	33	40	27	16	17	38	29	9	-			
17+89	8' LT	3.5-5.0														
B1-B			SS-6													
A-2-4			84	67	29	35	39	18	8	38	NP	NP	-			
17+89	8' LT	13.5-15.0														
EB2-A			SS-7													
A-4			100	78	36	39	33	19	9	26	NP	NP	22.9			
18+92	26' LT	38.5-40.0														
EB2-B			SS-8													
A-7-5			97	83	66	20	20	30	30	53	36	17	34.7			
19+07	2' RT	1.0-2.5														
EB2-B			SS-9													
A-2-4			100	87	31	33	43	15	9	36	NP	NP	-			
19+07	2' RT	43.5-45.0														

SIGNATURE



NCDOT NO.

105-03-0803

Notes:

- LL = Liquid limit
- PL = Plastic limit
- PI = Plasticity index = LL - PL



OVERVIEW OF EXISTING BRIDGE, LOOKING NORTH (UPSTATION) FROM END BENT 1.



LOOKING NORTH (UPSTATION) TOWARDS BENT 1 FROM TOE OF EXISTING END BENT 1 SLOPE.

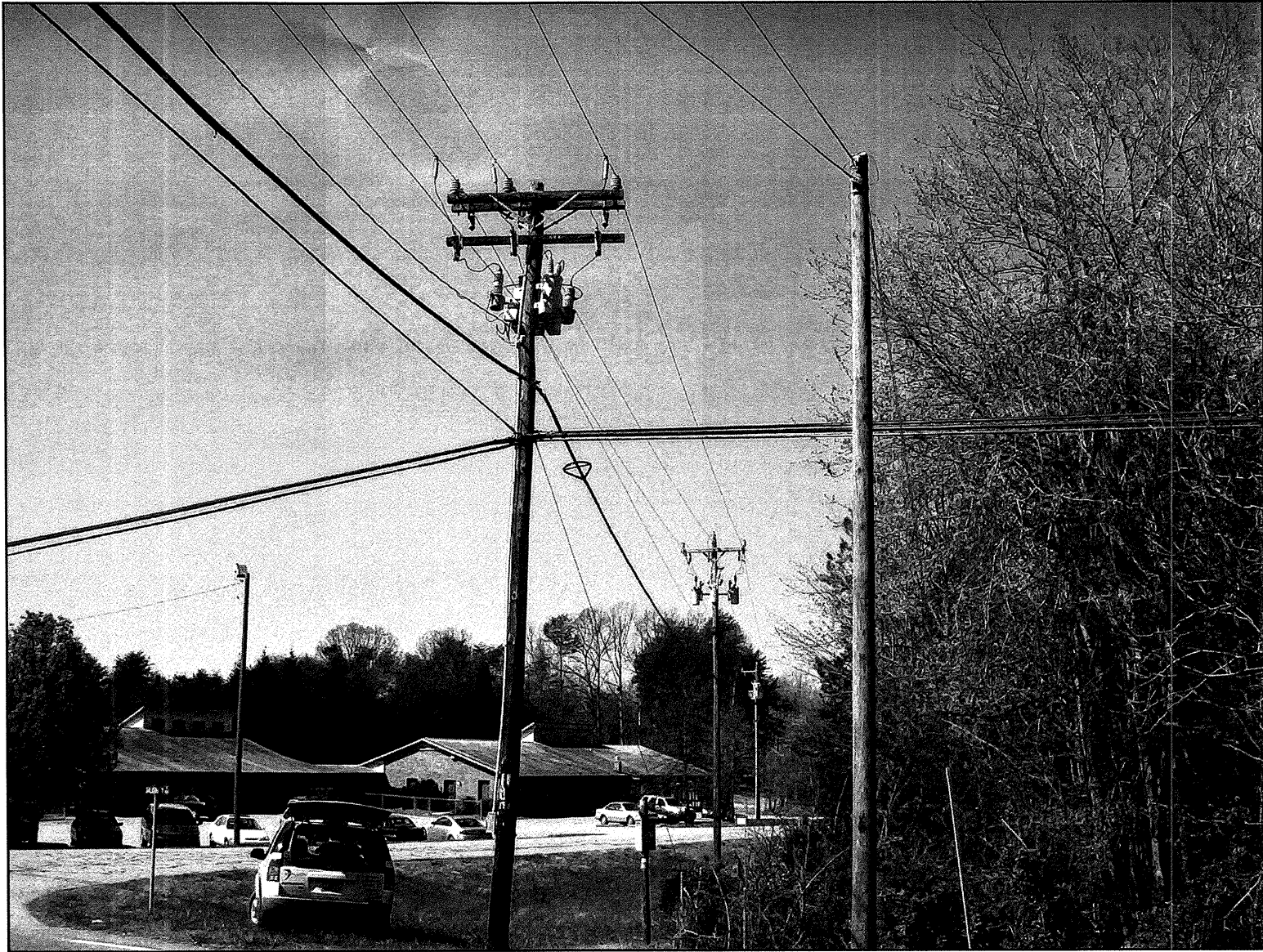
**SITE PHOTOGRAPHS**

**REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
FORSYTH COUNTY, NORTH CAROLINA  
TIP NO: B-4510, STATE PROJECT NO: 33737.1.1**



FALCON ENGINEERING, INC.  
2736 ROWLAND RD.  
RALEIGH, NC 27615  
PHONE (919) 871-0800  
FAX (919) 871-0803





LOOKING WEST (LT) ALONG END BENT 1.



LOOKING EAST (RT) ALONG END BENT 2.

**SITE PHOTOGRAPHS**

**REPLACE BRIDGE NO. 368 OVER I-40 BUS ON SR 2643  
FORSYTH COUNTY, NORTH CAROLINA  
TIP NO: B-4510, STATE PROJECT NO: 33737.1.1**



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