STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	41156.1.1 (R-5000)	1	22

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *41156.1.1* F.A. PROJ. _____

COUNTY *JACKSON*

PROJECT DESCRIPTION *NEW BRIDGE ON SR 1774 (EVANS ROAD) / NEW CONNECTOR ROAD OVER NC 107*

SITE DESCRIPTION *NEW CONNECTOR ROAD FROM NC 116 AND BONNIE LANE TO NC 107 AND EVANS ROAD*

PROJECT: _____

ID: R-5000

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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 RECOR ED 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.

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PERSONNEL

C. NORVILLE

M. BAHIRADHAN

J. HAMM

T. EVANS

INVESTIGATED BY *T. EVANS*

CHECKED BY *C. NORVILLE*

SUBMITTED BY *FALCON ENG.*

DATE *MARCH 21, 2012*

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MAHALINGAM BAHIRADHAN

03/21/2012

DRAWN BY: *T. EVANS / 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.

PROJECT REFERENCE NO.	SHEET NO.
41156.1.1 (R-5000)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6		
SYMBOL													
% PASSING #10	50 MX												
#40	30 MX	50 MX	51 MN										
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY OILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR			FAIR TO POOR	POOR		UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	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.

GRADATION

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.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / CPT / DMT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

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
HI. - 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_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- __
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-55
- [ ] __

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 3 " STEEL TEETH
- [ ] TRICONE __ " TUNG.-CARB.
- [ ] CORE BIT
- [X] 4" DRAG BIT

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B__
- [ ] -N 02
- [ ] -H__

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] __

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
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.
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.
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. *IF TESTED, WOULD YIELD SPT REFUSAL*
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. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
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. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
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.

ROCK HARDNESS

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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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.

TERMS AND DEFINITIONS

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 (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.

BENCH MARK:

ELEVATION: FT.

NOTES:
FIAD - FILLED-IN AFTER DRILLING

REVISED 09/23/09

March 21, 2011

Mr. Johnny Banks, P.E.
Mulkey Engineers and Consultants
6750 Tryon Road
Cary, North Carolina 27511

Re: **Structure Subsurface Investigation Report**

TIP No.: R-5000
WBS No.: 41156.1.1
County: Jackson
Description: New Connector Road from NC 116 and Bonnie Lane to NC 107 and SR 1774 (Evans Road)
New Bridge on SR 1774 (Evans Road) / New Connector Road Over NC 107
Falcon Project No.: G11024.00

Dear Mr. Banks,

As authorized, Falcon Engineering, Inc. (Falcon) has completed the geotechnical subsurface investigation for the proposed New Connector Road from NC 116 and Bonnie Lane to NC 107 and SR 1774 (Evans Road) in Jackson County, North Carolina. A site vicinity map is included on Sheet 8. Our investigation was performed in general accordance with our proposal number F2011-057, dated July 15th, 2011. This report includes the results of our field and laboratory testing, geotechnical recommendations for foundations, site and boring location plans, and profiles and cross sections showing subsurface conditions for the proposed bridge structure. Field and laboratory test results and geotechnical recommendations for roadway, culvert, and Mechanically Stabilized Earth (MSE) retaining walls construction are provided under separate covers.

PROJECT DESCRIPTION

The proposed new structure will be an approximately 195-foot-long, 36-foot-wide, two-span, three-bent bridge. This bridge will span over NC 107 at a skew angle of approximately 41° between Station 38+70 and Station 40+65. Finished grade elevations at the approaches will be approximately 2179 and 2173 feet at End Bent 1 and End Bent 2, respectively, with reference to North American Vertical Datum, 1988 (NAVD). The proposed bridge will be supported by a single row of vertical H-piles at the end bents and four footings on piles at the interior bents. A brief summary of the design data provided by Mulkey is given in the table below.

Bent	Station	Max. Factored Axial Load/Pile (Tons)	Max. Factored Lateral Load/Pile (Kips)	Total Number of Piles	Pile Type	Pile Spacing (Center to Center)	Bottom of Pile Cap / Footing Elevation (feet, NAVD)
End Bent 1	38+70.56	89	0.0	11	HP12X53	6 feet, 5 inches	2169.36
Bent 1 Exterior Columns	39+74.37	71	1.8†	10*	HP12X53	3 feet, 6 inches	2144.00
Bent 1 Interior Columns	39+74.37	58	1.6†	10*	HP12X53	3 feet, 6 inches	2144.00
End Bent 2	40+65.35	82	0.0	11	HP12X53	6 feet, 5 inches	2163.88

*-Interior bent columns are supported by four footings (one beneath each column). Each footing is supported by 5 piles (four piles at the corners and one pile at the center)

†-Lateral loads are applied in the longitudinal direction only. No design lateral loads in the transverse direction are given.

End bent piles are not designed to carry any lateral loads or moments. All H-piles will be placed such that their major axis is parallel to the bridge alignment.

Approach fills at the end bents will be retained by MSE walls . The heights of the MSE walls at End Bent 1 and End Bent 2 will be in the ranges of 18 to 21 feet and 16 to 19 feet, respectively. Side slopes at the bridge approaches are proposed at 2 Horizontal (H) to 1 Vertical (V). The MSE walls taper down at 2:1, following the approach fill slopes as they span outside of bridge footprint.

End bent piles must be designed to carry downdrag forces if they are driven prior to the construction of MSE walls. However, we understand that the MSE walls may be constructed around vertically placed corrugated metal pipes (CMP) large enough to accommodate the H-piles that are installed at the proposed pile locations for the end bents. Once the majority of the settlement has taken place at the approaches, the piles can be driven within these CMPs to avoid designing them for down drag forces. CMPs will likely be 24 inches in diameter to provide flexibility to the contractor when installing these piles. These CMPs shall be be filled with #57 stone or other materials approved by the engineer after pile driving is completed.

SITE DESCRIPTION/GEOLOGY

The site topography is characterized by large hills and mountains, typical of the Blue Ridge Belt of western North Carolina where the site is located. The proposed structure is to be placed near the intersection of NC 107 and Evans Road. Evans Road is a dead-end street which provides access for residents who live off of it. Two 24-inch diameter corrugated metal pipes facilitate storm water drainage beneath Evans Road and NC 107 in the vicinity of the proposed bridge crossing. Overhead power lines are also present at the intersection and will likely require relocation prior to construction. Just north of the intersection along the east side of NC 107, fill soils that consisted saw dust and various debris was encountered below grade. Local residents indicated that this area was previously occupied by a railroad track which no longer exists.

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The End Bent 1 approach embankment will be located near an existing gravel driveway benched into the slope of the mountain. This small roadway is used to access houses and facilities on the mountain. The gravel driveway is surrounded by large trees and steep slopes ranging in height approximately from 20 to 60 feet.

According to ***The Geologic Map of North Carolina*** (1985), the project site is located in the Blue Ridge Belt of Western North Carolina. Specifically, bedrock in the area is noted to consist of migmatitic Biotite Gneiss **(ZYbn)**, interlayered and gradational with biotite garnet gneiss and amphibolite.

FIELD EVALUATION PROCEDURE

Evaluation of the subsurface conditions for the proposed bridge consisted of drilling six (6) Standard Penetration Test (SPT) borings. Four (4) borings were drilled near the corners of the proposed structure for the end bents, and two (2) borings were drilled near the proposed interior bent location. In addition, roadway borings B-35 and B-37 were drilled along -RPB- and -L-, respectively, in close proximity to End Bent 2, and have been incorporated into this report. Rock coring was performed at the two interior bent borings in order to verify the presence, quality, and composition of rock. Borings were performed with a Central Mining Equipment CME-55 all-terrain-vehicle mounted drill-rig equipped with 2 ¼-inch inside diameter hollow-stem augers, mud rotary drilling equipment, an automatic hammer, and NQ2 sized, wire-line type diamond-impregnated rock coring equipment. SPT borings and soil/rock core sampling were performed in general accordance with the American Association of State Highway Transportation Officials (AASHTO T-206 and T-225). The borings were advanced to depths ranging from approximately 28 to 65 feet below existing grades.

Soil samples were obtained from the split-barrel sampler and visually classified in the field before being placed in moisture-proof containers and transported to our laboratory.

Groundwater depths were measured within each borehole with a weighted 100-foot measuring tape from the top of each boring. Groundwater depths were recorded immediately after boring termination and after a 24-hour waiting period. Some of the borings were filled-in immediately after drilling (FIAD) due to safety concerns.

SUBSURFACE AND GROUNDWATER CONDITIONS

Based on the results of our borings, subsurface conditions generally consist of roadway embankment / artificial fill, alluvial or residual soils at or near ground surface, underlain by weathered rock and crystalline rock.

Embankment fills consist of approximately 3 to 19 feet of medium very soft to stiff, fine sandy silt (A-4, A-5) and loose clayey fine sand (A-2-6) mixed with gravel, trace mica, extending down to elevation 2128.8 feet, NAVD. The fill soils with saw dust and various debris were only encountered on the east side of NC-107 and north of the bridge alignment. A detailed delineation and recommendations for mitigating the presence of this material are contained in the roadway and retaining wall reports.

Alluvial soils were present beneath fills, consisting of 6.5 feet of very loose silty fine sands (A-2-4) and very soft sandy silt (A-4), between elevations 2144.5 and 2138.0 feet, NAVD.

Residual soils were present at ground surface and beneath alluvial soils. Residual soils consist of up to 41 feet of medium stiff to stiff, fine sandy silt (A-4) and very loose to dense, silty fine sand (A-2-4).

Weathered rock was present beneath roadway embankment and residual soils and consisted of 3 to 9 feet of biotite gneiss. Auger refusal, indicating the presence of crystalline rock, was present at elevations between 2107.2 and 2129.2, NAVD. Crystalline rock was cored in the interior borings only. Approximately 12.5 to 20.0 feet of rock was penetrated in the interior bent borings, consisting of very severely weathered to very slightly weathered, soft to very hard, very closely to widely fractured biotite gneiss.

Groundwater measurements were obtained immediately after boring termination. The measured groundwater ranged in elevation from 2148.0 to 2140.3 feet, NAVD.

LABORATORY TESTING

Representative split-spoon samples were selected from soil test borings to verify visual field classifications and determine soil index properties. A total of five (5) samples were analyzed in our laboratory for natural moisture content, grain size analysis, and Atterberg limits. Additionally, four (4) representative rock core samples were subjected to unconfined compressive strength testing. The results of these laboratory tests can be found on Sheet 22 of this report.

All testing was performed in accordance with the following American Society for Testing and Materials (ASTM), NCDOT Modified and/or AASHTO procedures:

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

FOUNDATION RECOMMENDATIONS

The foundation recommendations presented below are based on the strength limit state.

All piles will be driven to weathered rock in order to obtain the required axial capacity. A resistance factor of 0.6 may be applied to evaluate the driving resistance of the piles, assuming they are driven to weathered rock/ rock at all bents.

The group axial and lateral capacities of the piles will be the sum of the individual capacities of the piles in a row. Please refer to Sheet 6 for detailed pile foundation recommendations and plan notes. Bearing pile pay item quantities are presented on Sheet 7.

Approach fill selection and placement should be in accordance with the current NCDOT Standard Specifications which include recommendations for placing fills on sloping ground. Settlement monitoring using survey hubs should be performed on approach fills at the pile locations. We recommend using at least two survey hubs at each approach. Piles should not be driven until the majority of the settlement has taken place. A waiting period of 30 days and 60 days shall be assumed for estimation purposes for End Bent 1 and End Bent 2, respectively. Settlements shall be measured at least once every 4 days within the first 20 days, and at least once every seven days after that. Settlement data should be provided to the engineer for

analysis. Pavement shall not be placed until the engineer has released the embankment from the waiting period.

MSE walls at both approaches will be constructed prior to driving piles. MSE wall recommendations will be provided under a separate cover.

CLOSURE

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

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

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

Sincerely,
FALCON ENGINEERING, INC.

Mahalingam Bahiradhan (Bahi), PE
Senior Geotechnical Project Manager

Christopher V. Norville, PE
Geotechnical Services Manager

FOUNDATION RECOMMENDATIONS

WBS # 41156.1.1

T.I.P. NO. R-5000

COUNTY Jackson

STATION 38+70 to 40+65

DESCRIPTION Bridge on New Connector Road

Over NC-107

	INITIALS	DATE
DESIGN	MB	03/21/12
CHECK	CVN	03/21/12
APPROVAL		

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MANALINGAM BAHIRATHAN

SIGNATURE 03/21/2012

	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	38+70.56	Cap on HP12x53 Steel Piles	89 tons/pile	Bottom of Cap El. = 2169.36 ft Length of Pile = 40 ft Number of Piles = 11 Pile Spacing = 6 feet 5 inches
BENT 1	39+74.37	Footings on HP12X53 Piles	71 tons/pile for Exterior Footings 58 tons/pile for Interior Footings	Bottom of Cap El. = 2144.0 ft Point of Fixity El. = 2127.0 ft Number of Pile/Footing = 5 Number of Footings = 4 Pile Spacing = 3 feet 6 inches
END BENT 2	40+65.35	Cap on HP12x53 Steel Piles	82 tons/pile	Bottom of Cap El. = 2163.88 ft Length of Pile = 45 ft Number of Piles = 11 Pile Spacing = 6 feet 5 inches

TIP # R-5000 County Jackson

FOUNDATION RECOMMENDATION NOTES ON PLANS

1. Piles at End Bent 1 are designed for a factored resistance of 89 Tons per pile.
2. Drive piles at End Bent 1 to a required driving resistance of 148 Tons per pile.
3. Piles at End Bent 2 are designed for a factored resistance of 82 Tons per pile.
4. Drive piles at End Bent 2 to a required driving resistance of 137 Tons per pile.
5. Piles of the exterior footings at Bent 1 are designed for a factored resistance of 71 Tons per pile.
6. Drive piles of exterior footings at Bent 1 to a required driving resistance of 118 Tons per pile.
7. Piles of the interior footings at Bent 1 are designed for a factored resistance of 58 Tons per pile.
8. Drive piles of interior footings at Bent 1 to a required driving resistance of 97 Tons per pile.
9. Steel H pile points are required for H piles at all bents. For steel pile points, see Section 450 of the Standard Specification.
10. For Piles, See Section 450 of the Standard Specification.
11. Undercut is required for the construction of End Bent 2. Coordinate shoring installation with undercut and excavation operations. The anticipated excavation elevation adjacent to NC-107 is 2138 feet, NAVD. The ground surface normal to the face of shoring is anticipated to be 6(H):1(V) or flatter.
12. Construct MSE Wall at End Bent 1 before installing foundations for End Bent 1.
13. Construct MSE Wall at End Bent 2 before installing foundations for End Bent 2.
14. Settlement monitoring using survey hubs is required at End Bent 1 and End Bent 2.
15. Observe a one month waiting period after constructing the approach fill above the MSE retaining wall to finished grade before begining the end bent construction at End Bent 1.
16. Observe a two month waiting period after constructing the approach fill above the MSE retaining wall to finished grade before begining the end bent construction at End Bent 2.

FOUNDATION RECOMMENDATION COMMENTS

1. A 24-inch diameter corrugated metal pipe (CMP) shall be installed vertically at each of the pile locations at the end bents while MSE walls are constructed.
2. End Bent piles should be driven after the majority of the settlements of the approach fills have been completed.
3. CMPs shall be filled with #57 stone or materials approved by the engineer after pile driving is completed.
4. Settlement measurements should be taken once in every four days within the first 20 days and once every seven days after that.

BEARING PILE PAY ITEM QUANTITIES

WBS ELEMENT: 41156.1.1
TIP NO.: R-5000
COUNTY: Jackson
STATION: 38+70 to 40+65

DATE: 12/9/2011
DESIGNED BY: MB
CHECKED BY: CVN

DESCRIPTION: Bridge on New Connector Road Over NC-107

NUMBER OF BENTS WITH PILES: 0
NUMBER OF PILES PER BENT: 0
NUMBER OF END BENTS WITH PILES: 0
NUMBER OF PILES PER END BENT: 0

Only required for "Pile Excavation" Pay Items.

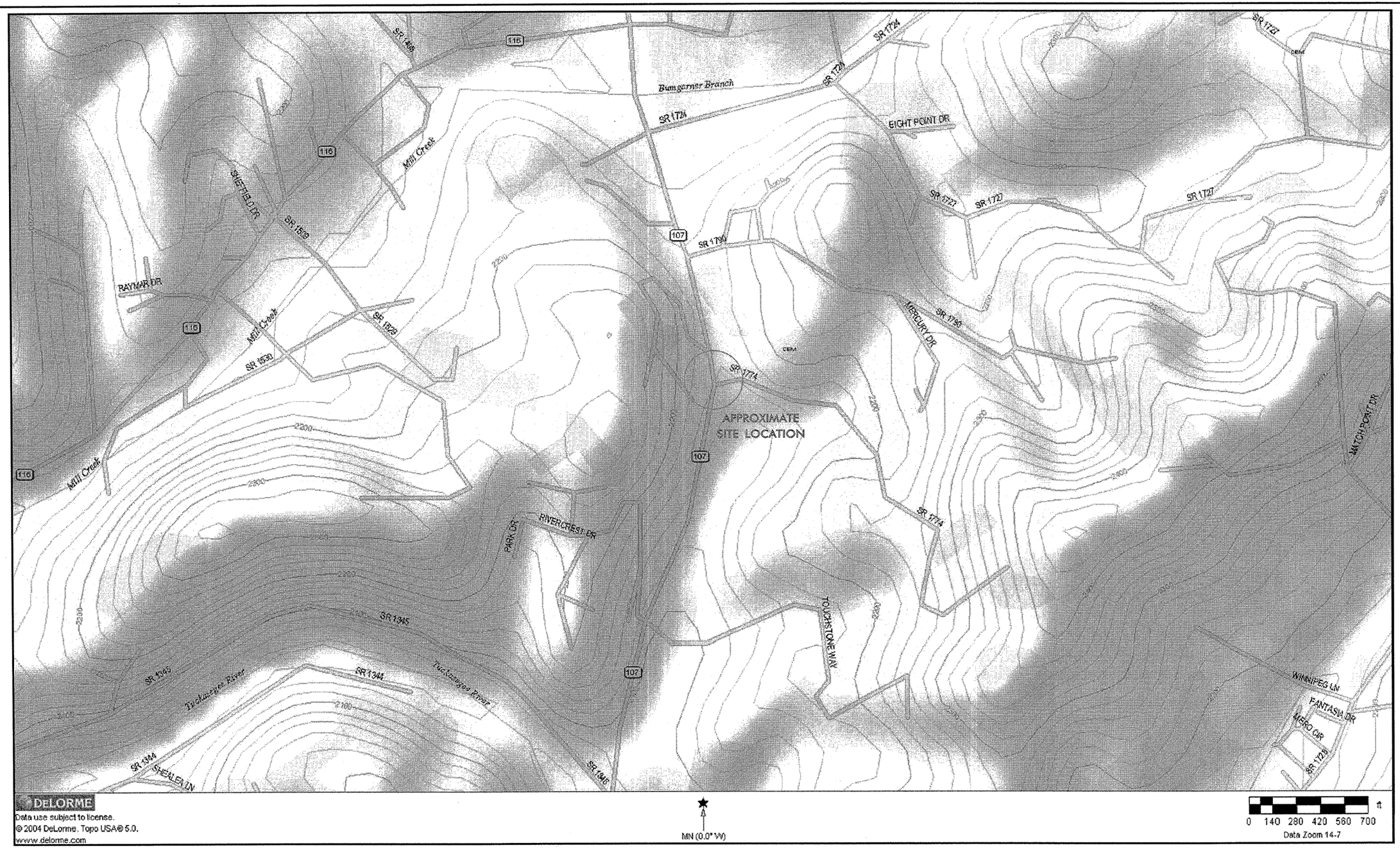
	BEARING PILE PAY ITEMS						
				PILE EXCAVATION (per linear ft/m)			
BENT # OR END BENT #	PIPE PILE PLATES (yes/no/maybe)	STEEL PILE POINTS (yes/no)	PILE REDRIVES (per each)	IN SOIL	NOT IN SOIL	PDA TESTING* (per each)	PDA ASSISTANCE* (per each)
End Bent 1		yes					
End Bent 2		yes					
Bent 1		yes					
TOTALS			0	0	0	0	0

* If PDA testing is required at a specific bent or end bent with a Note on Plans, show "PDA Testing" and "PDA Assistance" pay items per that specific bent or end bent. If PDA testing may be required or is required for multiple bents or end bents with a Note on Plans, show "PDA Testing" and "PDA Assistance" pay items as a total per structure only (do not show per bent or end bent).

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

If pipe pile plates are required or may be required, Structure Design should determine the pay item quantity, "Pipe Pile Plates" equal to the number of pipe piles per bent or end bent.

If pile points are required, Structure Design should determine the pay item quantity, "Steel Pile Points" equal to the number of steel piles per bent or end bent.



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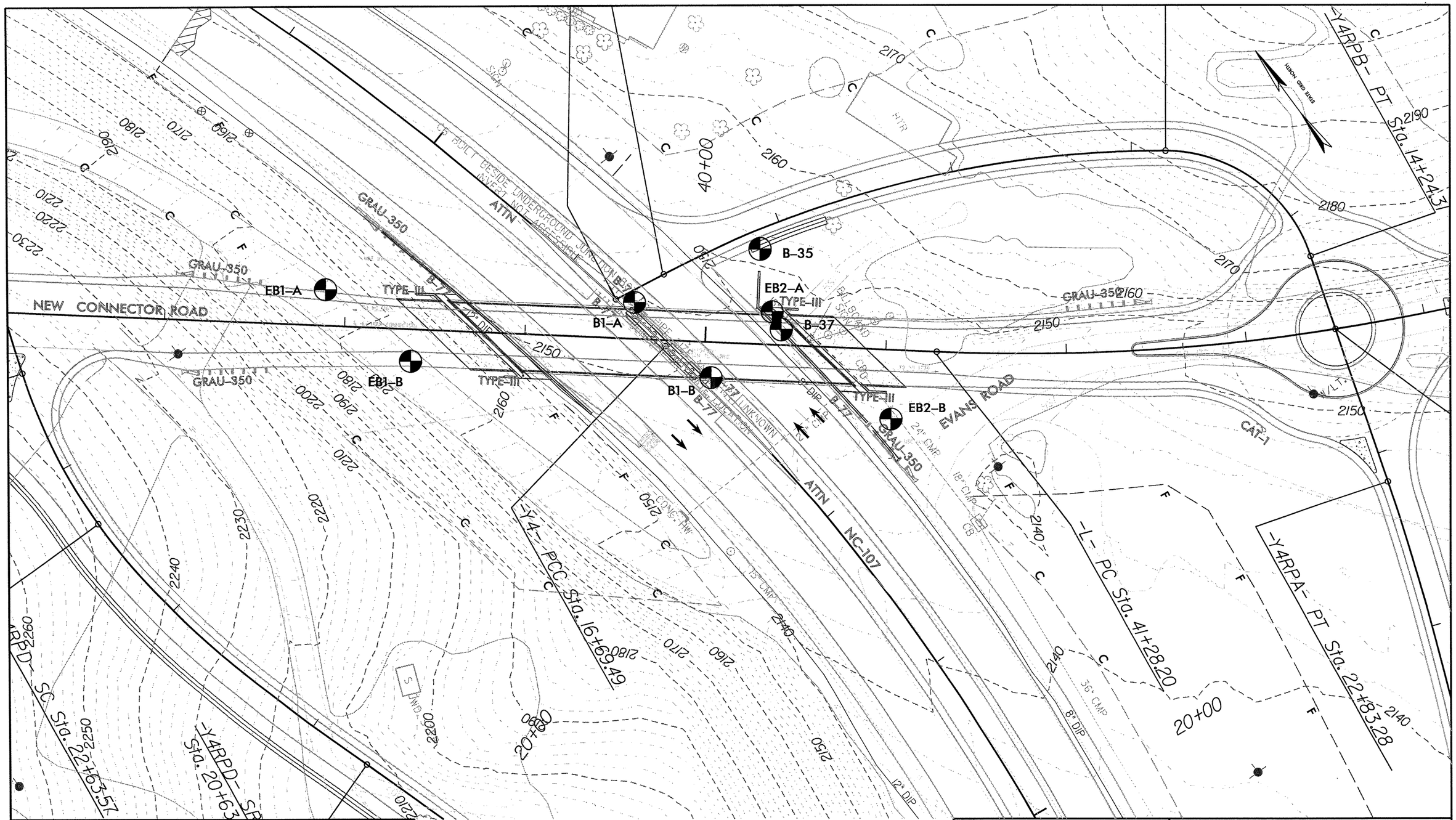
SITE VICINITY MAP

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

OCTOBER, 2011	PROJECT NO.: G11024.00	SHEET 1 OF 1



NOTES:

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM MULKEY ENGINEERS AND CONSULTANTS, DATED OCTOBER 2011.

APPROXIMATE SPT BORING LOCATION.

0 50 100
FEET

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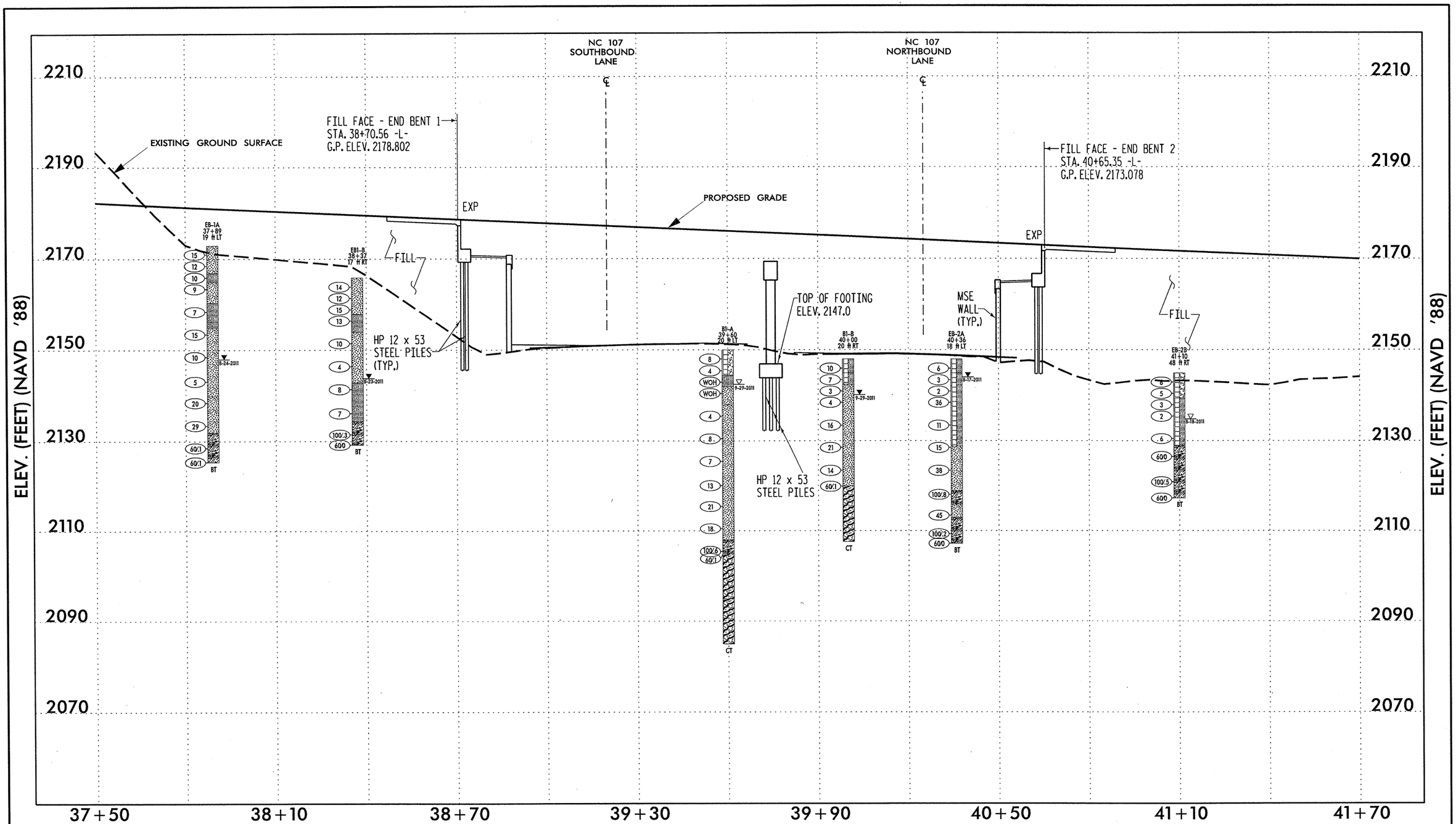
BORING LOCATION PLAN

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

DECEMBER 6, 2011	FALCON PROJECT NO.: G11024.00	SHEET 1 OF 1



NOTES:

- GROUNDLINE ADOPTED FROM ELECTRONIC FILES RECIEVED FROM MULKEY ENGINEERS & CONSULTANTS IN NOVEMBER 2011.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

VERTICAL SCALE
0 20 40
FEET

HORIZONTAL SCALE
0 30 60
FEET

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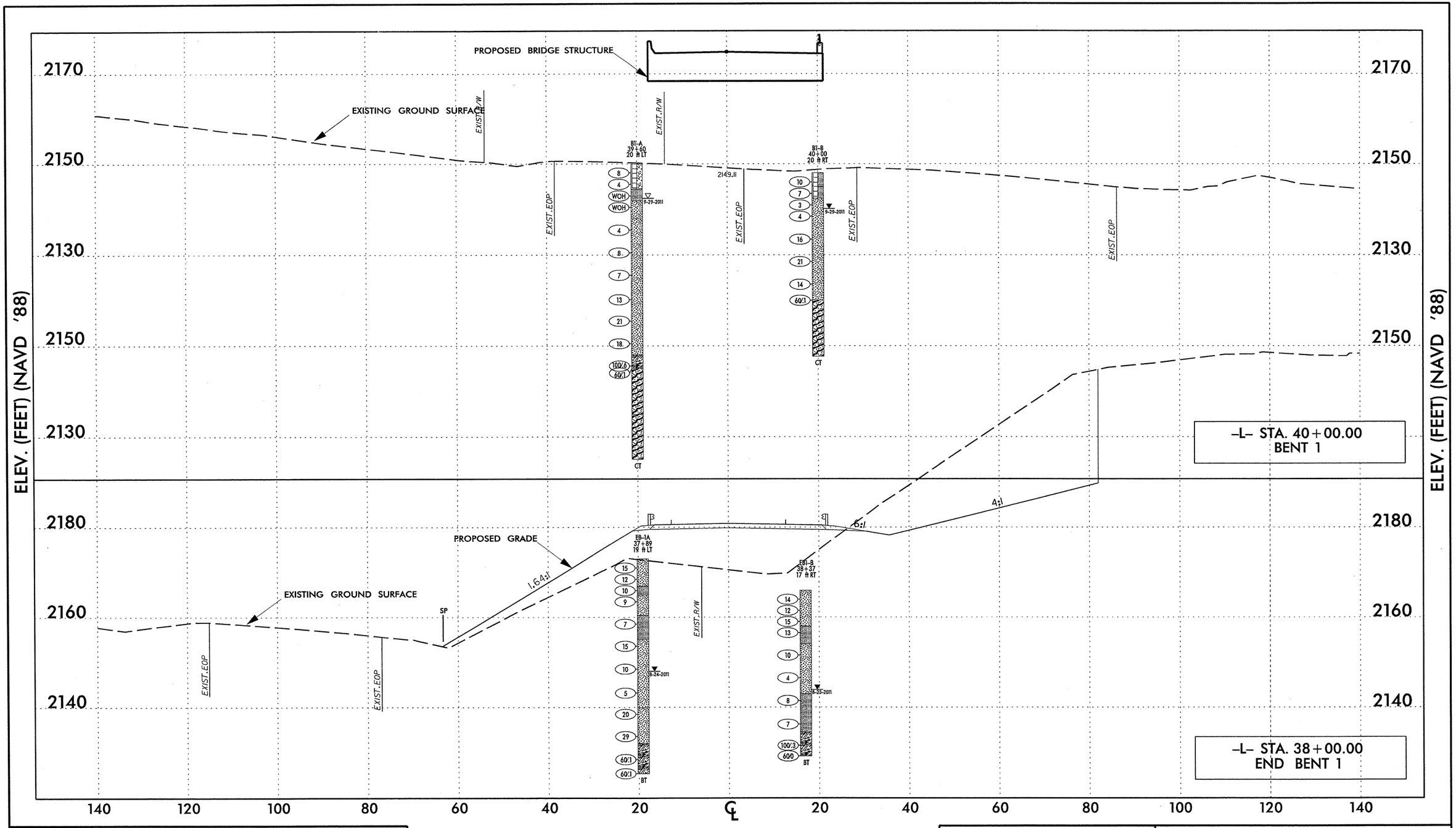
BRIDGE SUBSURFACE PROFILE ALONG -L-

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

DECEMBER 9, 2011	FALCON PROJECT NO.: G11024.00	SHEET 1 OF 1



NOTES:

- GROUNDLINE ADOPTED FROM ELECTRONIC FILES RECIEVED FROM MULKEY ENGINEERS & CONSULTANTS IN OCTOBER 2011.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

VERTICAL SCALE
0 20 40
FEET

HORIZONTAL SCALE
0 20 40
FEET

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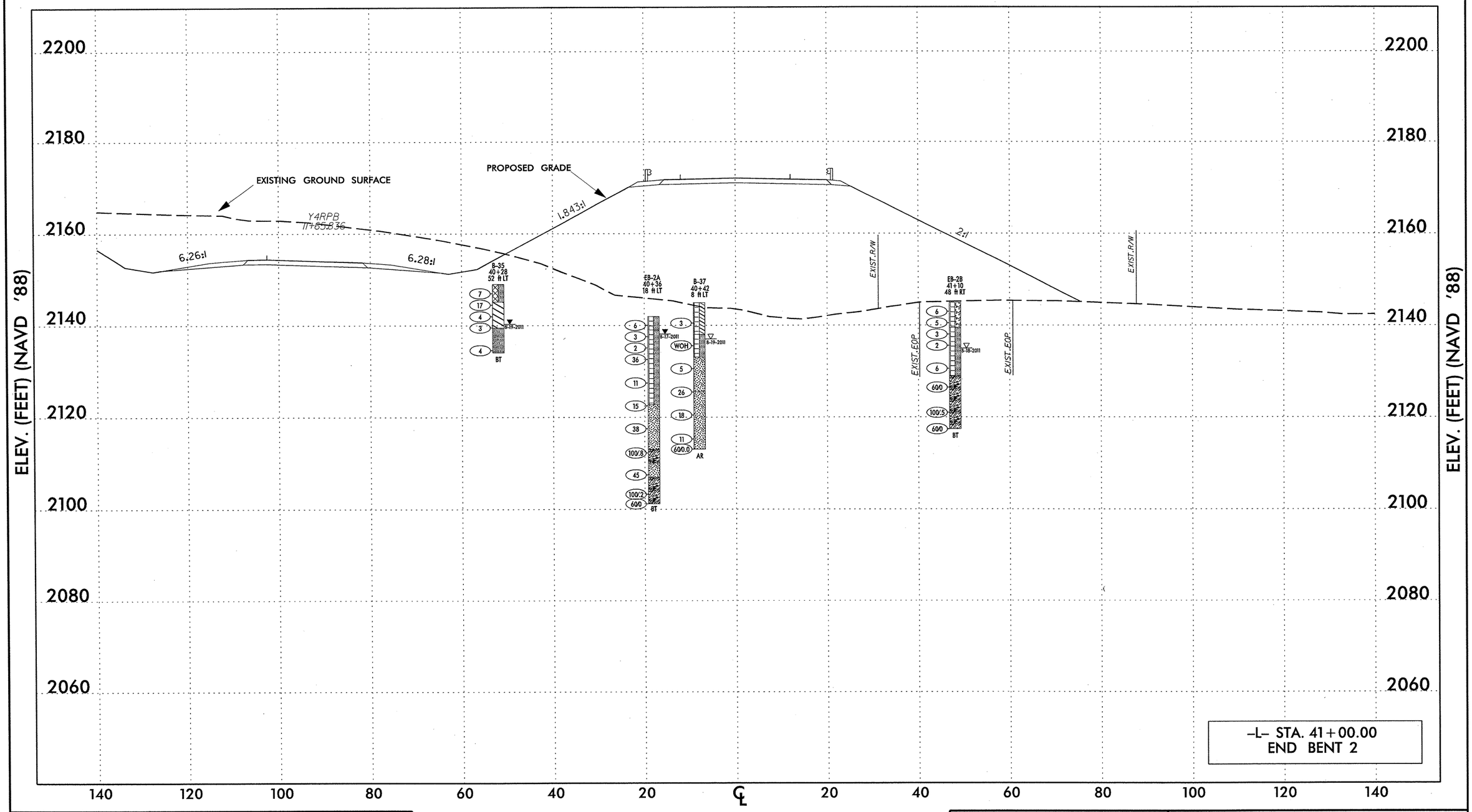
SUBSURFACE CROSS SECTIONS – END BENT 1 & BENT 1

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

DECEMBER 7, 2011 | FALCON PROJECT NO.: G11024.00 | SHEET 1 OF 2



NOTES:

- GROUNDLINE ADOPTED FROM ELECTRONIC FILES RECIEVED FROM MULKEY ENGINEERS & CONSULTANTS IN OCTOBER 2011.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

VERTICAL SCALE
0 20 40
FEET

HORIZONTAL SCALE
0 20 40
FEET

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SUBSURFACE CROSS SECTION – END BENT 2

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

DECEMBER 7, 2011 | FALCON PROJECT NO.: G11024.00 | SHEET 2 OF 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. EB-1A	**STATION** 37+89	**OFFSET** 19 ft LT	**ALIGNMENT** -L-	**0 HR.** 28.2
COLLAR ELEV. 2,173.0 ft	**TOTAL DEPTH** 47.6 ft	**NORTHING** 608,152	**EASTING** 748,109	**24 HR.** 25.0
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/23/11	**COMP. DATE** 08/23/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2175	2,173.0	0.0								GROUND SURFACE: 5" TOPSOIL	0.0
	2,172.0	1.0	6	7	8	15		D		**RESIDUAL** RED-BROWN WHITE BLACK AND TAN, MED. DENSE, SILTY FN. SAND (A-2-4) W/ QUARTZ GRAVEL, TRACE MICA	
2170	2,169.5	3.5	5	6	6	12		D			
	2,167.0	6.0	4	5	5	10		D			
2165	2,164.5	8.5	5	4	5	9		D		**RESIDUAL** RED-BROWN BLACK AND TAN, STIFF, FN. SANDY SILT (A-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2160	2,159.5	13.5	3	4	3	7		M		**RESIDUAL** BROWN BLACK AND TAN, LOOSE, SILTY SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2155	2,154.5	18.5	6	7	8	15		W		**RESIDUAL** BROWN BLACK AND TAN, MED. STIFF, FN. SANDY SILT (A-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2150	2,149.5	23.5	4	4	6	10		W			
2145	2,144.2	28.8	2	2	3	5		Sat.		**RESIDUAL** BROWN BLACK AND TAN, MED. DENSE TO LOOSE, SILTY SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2140	2,139.5	33.5	5	8	12	20		W		**RESIDUAL** RED-BROWN GRAY BLACK AND TAN, MED. DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2135	2,134.5	38.5	10	14	15	29		W			
2130	2,129.5	43.5	60/.1			60/.1				**WEATHERED ROCK** BLUE-GRAY WHITE AND DK. BROWN, BIOTITE GNEISS, W/ TRACE MICA, ROCK LAYERS	
2125	2,125.5	47.5	60/.1			60/.1				Boring Terminated BY AUGER REFUSAL at Elevation 2,125.4 ft IN WR: BIOTITE GNEISS	

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. EB-1B	**STATION** 38+37	**OFFSET** 17 ft RT	**ALIGNMENT** -L-	**0 HR.** 23.6
COLLAR ELEV. 2,166.0 ft	**TOTAL DEPTH** 36.8 ft	**NORTHING** 608,093	**EASTING** 748,123	**24 HR.** 22.1
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/22/11	**COMP. DATE** 08/22/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
2175	2,166.0	0.0								GROUND SURFACE: 5" TOPSOIL/GRAVEL	0.0
2170	2,165.0	1.0	5	7	7	14		D		**RESIDUAL** BROWN BLACK AND TAN, MED. DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA	
2165	2,162.5	3.5	8	6	6	12		M			
2160	2,160.0	6.0	5	6	9	15		M			
	2,157.5	8.5	4	6	7	13		M			
2155	2,152.5	13.5	3	5	5	10		W		**RESIDUAL** RED-BROWN WHITE AND BLACK, STIFF, FN. SANDY SILT (A-4) SAPROLITIC, W/ TRACE MICA	
2150	2,147.5	18.5	2	2	2	4		W		**RESIDUAL** RED-BROWN GRAY BLACK AND TAN, LOOSE TO V. LOOSE, SILTY FN. SAND (A-2-4)	
2145	2,142.5	23.5	3	3	5	8		W			
2140	2,137.2	28.8	3	3	4	7		W		**RESIDUAL** RED-BROWN AND GRAY, MED. STIFF, FN. SANDY SILT (A-4) SAPROLITIC, W/ GRAVEL, LITTLE MICA	
2135	2,132.5	33.5	100/.3			100/.3					
2130	2,129.2	36.8	60/0			60/0				**WEATHERED ROCK** WHITE BROWN BLACK AND TAN, BIOTITE GNEISS, W/ TRACE MICA	
2125										Boring Terminated BY AUGER REFUSAL at Elevation 2,129.2 ft IN WR: BIOTITE GNEISS	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 39+60	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.5
COLLAR ELEV. 2,150.0 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 608,044	**EASTING** 748,242	**24 HR.** FIAD
DRILL MACHINE CME-55 ATV	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 09/28/11	**COMP. DATE** 09/29/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2155										
2150										2,150.0 GROUND SURFACE: 2" TOPSOIL 0.0
	2,149.0	1.0	3	4	4	8		M		**ROADWAY EMBANKMENT** RED-BROWN AND BLACK, MED. STIFF, FN. SANDY SILT (A-5) W/ GRAVEL, TRACE MICA, TRACE ORGANICS
2145	2,146.5	3.5	2	2	2	4	SS-24	38%		2,144.5 5.5
	2,144.0	6.0	WOH	WOH	WOH	0		W		**ALLUVIAL** GRAY AND TAN, V. SOFT, FN. SANDY SILT (A-4) 2,142.0 8.0
2140	2,141.5	8.5	WOH	WOH	WOH	0		Sat.		2,138.0 12.0
	2,136.5	13.5	2	2	2	4		W		**ALLUVIAL** DK. GRAY, V. LOOSE, SILTY FN. SAND (A-2-4) W/ WOOD, GRAVEL, TRACE MICA
2135										**RESIDUAL** GRAY BLACK AND TAN, V. LOOSE TO MED. DENSE, SILTY FN.-CSE. SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA
2130	2,131.5	18.5	2	3	5	8		W		
	2,126.5	23.5	3	3	4	7		W		
2125										
2120	2,121.2	28.8	3	5	8	13		W		
	2,116.5	33.5	9	10	11	21		W		
2115										
2110	2,111.5	38.5	9	8	10	18		W		2,108.0 42.0
	2,106.5	43.5								**WEATHERED ROCK** RED-BROWN AND GRAY, BIOTITE GNEISS, W/ TRACE MICA 2,105.0 45.0
2105	2,105.5	44.5	53	47/.1		100/.6				**CRYSTALLINE ROCK** RED BROWN GRAY AND BLACK, SEV. TO V. SEV. WEATHERED, SOFT TO MOD. HARD, V. CLOSE TO CLOSELY FRACTURED, BIOTITE GNEISS, W/ TRACE MICA 2,095.0 55.0
			60/.1			60/.1				**CRYSTALLINE ROCK** BLUE-GRAY RED AND WHITE, V. SLI. WEATHERED, V. HARD,MOD. CLOSELY FRACTURED, BIOTITE GNEISS 2,085.0 65.0
2100										Boring Terminated at Elevation 2,085.0 ft IN CR: BIOTITE GNEISS
2095										
2090										
2085										
2080										
2075										
2070										
2065										
2060										
2055										
2050										
2045										
2040										

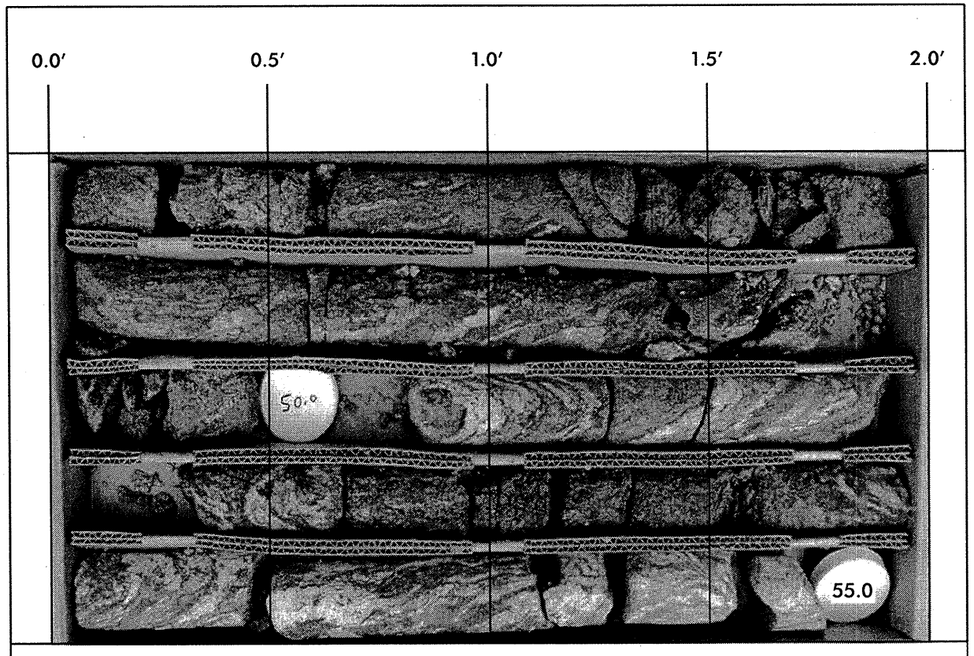
NCDOT BORE SINGLE G11024.00 R-5000 JACKSON COUNTY.GPJ NC_DOT.GDT 10/28/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

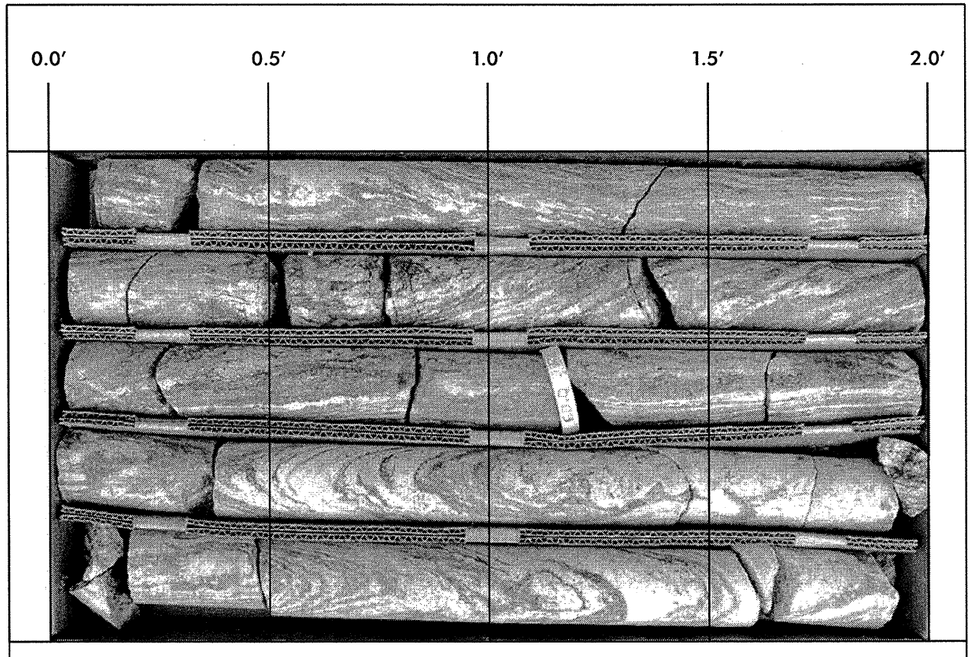
PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 39+60	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.5
COLLAR ELEV. 2,150.0 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 608,044	**EASTING** 748,242	**24 HR.** FIAD
DRILL MACHINE CME-55 ATV	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 09/28/11	**COMP. DATE** 09/29/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 20.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2150											ELEV. (ft) DEPTH (ft)
2105											Begin Coring @ 45.0 ft
	2,105.0	45.0	5.0	1:45/1.0	(4.2)	(1.9)		(8.8)	(4.1)		2,105.0 **CRYSTALLINE ROCK** 45.0
2100	2,100.0	50.0		1:33/1.0	84%	38%		88%	41%		RED BROWN GRAY AND BLACK, SEV. TO V. SEV. WEATHERED, SOFT TO MOD. HARD, V. CLOSE TO CLOSELY FRACTURED, BIOTITE GNEISS, W/ TRACE MICA
				1:40/1.0							
				1:42/1.0							
			5.0	2:02/1.0	(4.6)	(2.2)					
2095	2,095.0	55.0		1:42/1.0	92%	44%					2,095.0 55.0
				1:53/1.0							
				1:13/1.0							
			5.0	1:58/1.0	(5.0)	(4.1)		(10.0)	(8.8)		**CRYSTALLINE ROCK**
2090	2,090.0	60.0		1:55/1.0	100%	82%		100%	88%		BLUE-GRAY RED AND WHITE, V. SLI. WEATHERED, V. HARD,MOD. CLOSELY FRACTURED, BIOTITE GNEISS
				2:30/1.0							
				2:55/1.0							
			5.0	2:35/1.0	(5.0)	(4.7)					NOTE: CORE-BIT SWITCHED @ 61.0 ft DUE TO EXCESSIVE WEARING ON EQUIPTMENT.
2085	2,085.0	65.0		3:30/1.0	100%	94%					2,085.0 65.0
				4:05/1.0							
				3:04/1.0							Boring Terminated at Elevation 2,085.0 ft IN CR: BIOTITE GNEISS
				6:38/1.0							
2080				7:36/1.0							
				4:30/1.0							
				3:27/1.0							
2075											
2070											
2065											
2060											
2055											
2050											
2045											
2040											
2035											
2030											
2025											
2020											
2015											
2010											
2005											
2000											
1995											

NCDOT CORE SINGLE G11024.00 R-5000 JACKSON COUNTY.GPJ NC_DOT.GDT 10/28/11



BORING B1–A, BOX 1 OF 2, 45.0 FEET TO 55.0 FEET.



BORING B1–A, BOX 2 OF 2, 55.0 FEET TO 65.0 FEET.

0 4″ 8″
INCHES

FALCON ENGINEERING

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

PHONE: 919.871.0800
FAX: 919.871.0803

ROCK CORE PHOTOGRAPHS

NEW CONNECTOR ROAD FROM NC–116 AND
BONNIE LANE TO NC–107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R–5000

OCTOBER, 2011	PROJECT NO.: G11024.00	SHEET 3 OF 3

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 40+00	**OFFSET** 20 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 2,148.0 ft	**TOTAL DEPTH** 40.4 ft	**NORTHING** 607,986	**EASTING** 748,251	**24 HR.** 7.8
DRILL MACHINE CME-55 ATV	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 09/27/11	**COMP. DATE** 09/28/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2155										
2150										2,148.0 GROUND SURFACE: 3" TOPSOIL 0.0
2145	2,147.0	1.0	5	5	5	10	SS-25	22% M		**ROADWAY EMBANKMENT**
	2,144.5	3.5	2	4	3	7				2,145.0 BROWN AND TAN, STIFF, FN. SANDY SILT (A-4) W/ GRAVEL, TRACE MICA 3.0
	2,142.0	6.0	1	1	2	3		W		2,142.5 **ROADWAY EMBANKMENT** 5.5
2140	2,139.5	8.5	1	2	2	4		W		BROWN AND TAN, MED. STIFF, FN. SANDY SILT (A-4) W/ TRACE MICA
2135	2,134.5	13.5	7	7	9	16		W		**RESIDUAL** BROWN GRAY BLACK AND TAN, V. LOOSE TO MED. DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ GRAVEL, TRACE MICA
2130	2,129.5	18.5	6	9	12	21		W		
2125	2,124.5	23.5	6	7	7	14	SS-26	24%		
2120	2,120.1	27.9	60/.1			60/.1				2,120.1 27.9
2115										**CRYSTALLINE ROCK** RED BLUE-GRAY AND WHITE, V. SLI. WEATHERED, HARD TO V. HARD, MOD. CLOSELY TO WIDELY FRACTURED, BIOTITE GNEISS, TRACE MICA
2110										2,107.6 40.4
2105										Boring Terminated at Elevation 2,107.6 ft IN CR: BIOTITE GNEISS
2100										
2095										
2090										
2085										
2080										
2075										
2070										
2065										
2060										
2055										
2050										
2045										
2040										

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 40+00	**OFFSET** 20 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 2,148.0 ft	**TOTAL DEPTH** 40.4 ft	**NORTHING** 607,986	**EASTING** 748,251	**24 HR.** 7.8
DRILL MACHINE CME-55 ATV	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 09/27/11	**COMP. DATE** 09/28/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 12.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2125											Begin Coring @ 27.9 ft
	2,120.1	27.9	2.5	1:48/0.5	(2.5) 100%	(2.5) 100%		(12.5) 100%	(11.3) 90%		2,120.1 **CRYSTALLINE ROCK** 27.9
	2,117.6	30.4	5.0	3:00/1.0 2:48/1.0							RED BLUE-GRAY AND WHITE, V. SLI. WEATHERED, HARD TO V. HARD, MOD. CLOSELY TO WIDELY FRACTURED, BIOTITE GNEISS, TRACE MICA
2115				3:00/1.0	(5.0) 100%	(5.0) 100%					
	2,112.6	35.4		2:55/1.0 3:15/1.0							
2110			5.0	3:11/1.0	(5.0) 100%	(3.8) 76%					
	2,107.6	40.4		3:09/1.0 2:55/1.0 1:56/1.0 2:37/1.0 3:00/1.0 2:27/1.0							2,107.6 40.4 Boring Terminated at Elevation 2,107.6 ft IN CR: BIOTITE GNEISS
2105											
2100											
2095											
2090											
2085											
2080											
2075											
2070											
2065											
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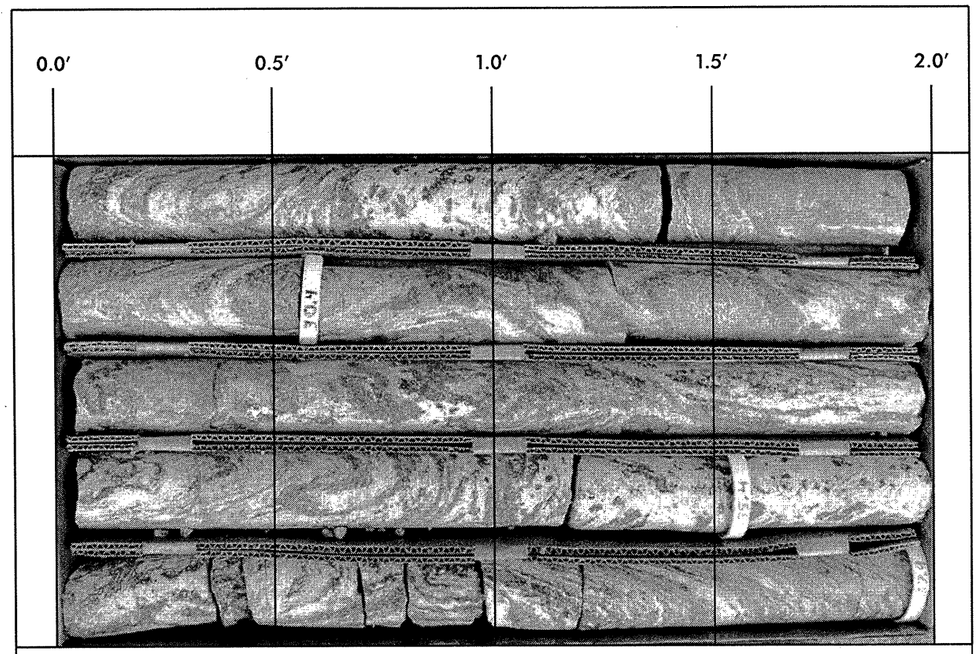
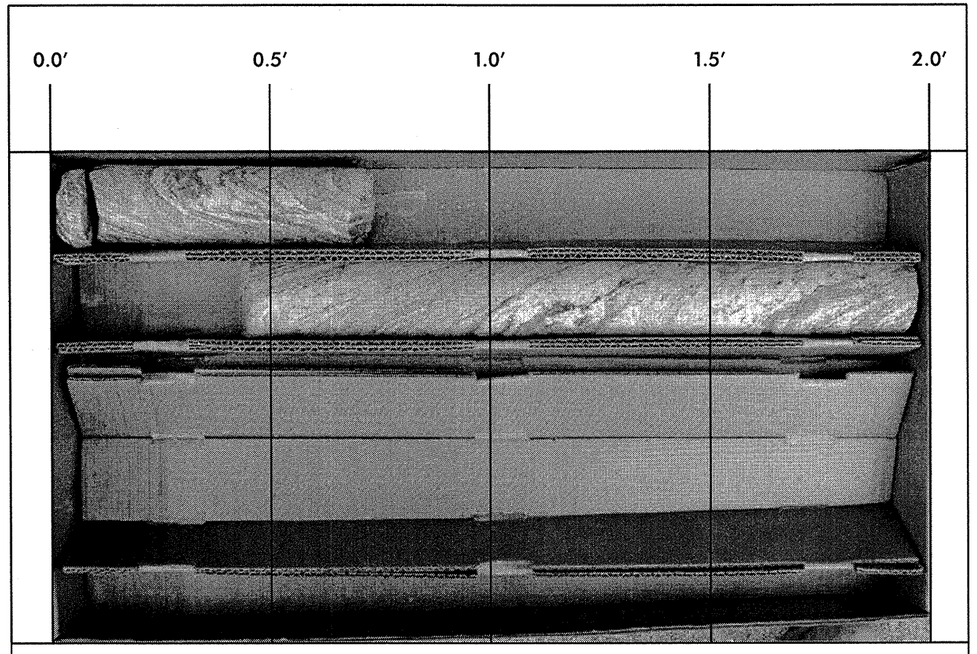
2035											
2030											
2025											
2020											
2015											



BORING B1–B, BOX 1 OF 2, 27.9 FEET TO 37.9 FEET.



BORING B1–B, BOX 2 OF 2, 37.9 FEET TO 40.4 FEET.

0 4″ 8″
INCHES

FALCON ENGINEERING

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

PHONE: 919.871.0800
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ROCK CORE PHOTOGRAPHS

NEW CONNECTOR ROAD FROM NC–116 AND
BONNIE LANE TO NC–107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R–5000

OCTOBER, 2011	PROJECT NO.: G11024.00	SHEET 3 OF 3

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. EB-2A	**STATION** 40+36	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.2
COLLAR ELEV. 2,148.0 ft	**TOTAL DEPTH** 40.8 ft	**NORTHING** 607,995	**EASTING** 748,300	**24 HR.** 3.9
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/16/11	**COMP. DATE** 08/16/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										2,148.0 GROUND SURFACE: 2" TOPSOIL	0.0
	2,147.0	1.0						M		**ROADWAY EMBANKMENT**	
	2,144.5	3.5	2	2	4	6		W		2,145.0 RED-BROWN, MED. STIFF, SANDY SILT (A-4) W/ TRACE MICA	3.0
	2,142.0	6.0	1	2	1	3		W		**ROADWAY EMBANKMENT**	
	2,139.5	8.5	1	1	1	2		W		BLACK AND GRAY, V. SOFT TO STIFF, SANDY SILT (A-4) W/ WOOD, SAWDUST AND NEWSPAPER, HIGHLY ORGANIC	
			4	3	33	(WOOD) 36		W			
	2,134.5	13.5									
			3	6	5	11		Sat.			
	2,129.5	18.5								2,128.8	19.2
			5	7	8	15		W		**RESIDUAL** RED-BROWN WHITE AND TAN, MED. DENSE TO DENSE, SILTY FN. SAND (A-2-4) SAPROLITIC, W/ TRACE MICA	
	2,124.5	23.5									
			5	11	27	38		W			
	2,119.2	28.8								2,119.0	29.0
			30	47	53/.3	100/.8				**WEATHERED ROCK** GRAY ORANGE AND BROWN, BIOTITE GNEISS, W/ TRACE MICA	
	2,114.5	33.5								2,116.0	32.0
			10	12	33	45		W		**RESIDUAL** RED-BROWN DK. GRAY AND WHITE, DENSE, SILTY FN. SAND (A-2-4) W/ TRACE MICA	
	2,109.5	38.5								2,113.0	35.0
	2,107.2	40.8	100/.2			100/.2				**WEATHERED ROCK** RED GRAY AND WHITE, BIOTITE GNEISS, W/ TRACE MICA	
			60/0			60/0				2,107.2	40.8
										Boring Terminated BY AUGER REFUSAL at Elevation 2,107.2 ft IN WR: BIOTITE GNEISS	

PROJECT NO. G11024.00	**ID.** R-5000	**COUNTY** Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. EB-2B	**STATION** 41+10	**OFFSET** 48 ft RT	**ALIGNMENT** -L-	**0 HR.** 10.1
COLLAR ELEV. 2,145.0 ft	**TOTAL DEPTH** 27.6 ft	**NORTHING** 607,908	**EASTING** 748,317	**24 HR.** FIAD
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/17/11	**COMP. DATE** 08/17/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
										2,145.0 EX. PAVEMENT: 7" ASPHALT, 7" ABC	0.0
	2,144.0	1.0								**ROADWAY EMBANKMENT**	
	2,141.5	3.5	2	2	4	6		M		RED-BROWN BLACK AND GRAY, LOOSE, CLAYEY FN. SAND (A-2-6) W/ GRAVEL, TRACE MICA	
	2,139.0	6.0	3	3	2	5		W		2,139.5	5.5
	2,136.5	8.5	1	2	1	3		W		**ROADWAY EMBANKMENT**	
			1	1	1	2	SS-27	47%		RED-BROWN BLACK AND TAN, SOFT TO MED. STIFF, SANDY SILT (A-4) W/ GRAVEL AND ROCK FRAGS @ 15.0 ft, WOOD, HIGHLY ORGANIC, TRACE MICA	
	2,131.5	13.5								2,129.0	16.0
			4	3	3	6		W		**WEATHERED ROCK** BLACK RED-BROWN AND WHITE, BIOTITE GNEISS, W/ TRACE MICA	
	2,126.5	18.5	60/0			60/0					
	2,121.5	23.5	100/.5			100/.5					
	2,117.4	27.6	60/0			60/0				2,117.4	27.6
										Boring Terminated BY AUGER REFUSAL at Elevation 2,117.4 ft IN WR: BIOTITE GNEISS	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. G11024.00	**ID.** R-5000	**COUNT** Y Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B-35	**STATION** 10+85	**OFFSET** 10 ft RT	**ALIGNMENT** -RPB-	**0 HR.** 10.9
COLLAR ELEV. 2,151.0 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 608,026	**EASTING** 748,315	**24 HR.** 8.7
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/18/11	**COMP. DATE** 08/18/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2155											
2150	2,150.0	1.0	4	4	3	7 17		D		2,151.0 GROUND SURFACE: 3" TOPSOIL/ROOTMAT	0.0
	2,147.5	3.5								2,147.2 RED-BROWN, MED. STIFF, FN. SANDY SILT (A-4) W/ ROOTS, TRACE MICA	3.8
2145	2,145.0	6.0	5	9	8		SS-23	25%		**ALLUVIAL**	
	2,142.5	8.5	3	2	2	4		W		ORANGE TAN AND GRAY , V. STIFF TO SOFT, FN. SANDY CLAY (A-7-6) W/ ROOTS, TRACE MICA	9.5
2140			2	1	2	3		Sat.		2,141.5	
	2,137.5	13.5								**RESIDUAL**	
2135			2	2	2	4		W		2,136.0 GRAY RED AND BROWN, SOFT, FN. SANDY SILT (A-4) W/ TRACE TO LITTLE MICA	15.0
2130										Boring Terminated at Elevation 2,136.0 ft IN RES: SANDY SILT	
2125											
2120											
2115											
2110											
2105											
2100											
2095											
2090											
2085											
2080											
2075											
2070											
2065											
2060											
2055											
2050											
2045											
2040											
2035											

PROJECT NO. G11024.00	**ID.** R-5000	**COUNT** Y Jackson	**GEOLOGIST** T. Evans	
SITE DESCRIPTION New Connector Road from NC 116 and Bonnie Lane to NC 107 at SR 1774 (Evans Road)				**GROUND WTR (ft)**
BORING NO. B-37	**STATION** 40+42	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 2,148.0 ft	**TOTAL DEPTH** 32.0 ft	**NORTHING** 607,984	**EASTING** 748,298	**24 HR.** FIAD
DRILL MACHINE CME-55 ATV	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER W. Whichard	**START DATE** 08/19/11	**COMP. DATE** 08/19/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
2150											
	2,148.0									2,148.0 EX. PAVEMENT: 7" ASPHALT, 24" ABC	0.0
2145	2,144.5	3.5	2	1	2	3		M		**ROADWAY EMBANKMENT** GRAY BROWN AND BLACK, SOFT, FN. SANDY CLAY (A-6)	
	2,141.0									2,141.0	7.0
2140	2,139.5	8.5	WOH	WOH	WOH	0		W		**ROADWAY EMBANKMENT** DK. GRAY AND BLACK, V. SOFT, FN. SANDY SILT (A-4) W/ SAWDUST AND WOOD CHUNKS, LITTLE TO SOME ORGANICS	
	2,136.0									2,136.0	12.0
2135	2,134.5	13.5	1	2	3	5		W		**RESIDUAL** WHITE AND GRAY, LOOSE, SILTY FN. SAND (A-2-4) SAPROLITIC, TRACE MICA	
	2,128.7									2,128.7	19.3
2130	2,129.5	18.5	6	11	15	26		M		**RESIDUAL** BLUE-GRAY PINK AND TAN, MED. DENSE, SILTY SAND (A-2-4) SAPROLITIC, W/ QUARTZ GRAVEL, TRACE MICA	
2125	2,124.5	23.5	6	6	12	18		M			
2120	2,119.2	28.8	6	5	6	11		M			
2115	2,116.0	32.0	60/0			60/0		M		2,116.0	32.0
2110										Boring Terminated BY AUGER REFUSAL at Elevation 2,116.0 ft IN WR: BIOTITE GNEISS	
2105											
2100											
2095											
2090											
2085											
2080											
2075											
2070											
2065											
2060											
2055											
2050											
2045											
2040											
2035											
2030											

FALCON 1210 TRINITY ROAD, SUITE 110, RALEIGH NC, 27607

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

NEW CONNECTOR ROAD FROM NC 116 AND BONNIE LANE
TO NC 107 AND EVANS ROAD

PROJECT NO.: 41156.1.1, TIP NO.: R-5000

JACKSON COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO.: G11024.00

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	%
B1-A		SS-24	98	83	46	45	35	20	38.0
A-5									
39+60	20' LT	3.5-5.0							
B1-B		SS-25	95	82	50	38	28	10	22.2
A-4									
40+00	20' RT	1.0-2.5							
B1-B		SS-26	96	74	27	27	NP	NP	24.0
A-2-4									
40+00	20' RT	23.5-25.0							
EB2-B		SS-X	91	80	41	35	27	8	47.1
A-4									
41+10	48' RT	8.5-10.0							
B-35		SS-23	97	91	65	49	28	21	25.0
A-7-6									
10+85	10' RT	3.5 - 5.0							

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

NEW CONNECTOR ROAD FROM NC 116 AND BONNIE LANE
TO NC 107 AND EVANS ROAD
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

JACKSON COUNTY, NORTH CAROLINA
FALCON ENGINEERING, INC. PROJECT NO.: G11024.00

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (ft)	Diameter (ft)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Failure Mode
RS-3	B1-A	53.8-54.4'	BIOTITE GNEISS	ZYbn	44%	0.37	0.16	170.7	929	150,927	
RS-4	B1-A	58.3-58.9'	BIOTITE GNEISS	ZYbn	82%	0.36	0.16	181.6	11,169	1,436,499	
RS-5	B1-B	29.8-30.4	BIOTITE GNEISS	ZYbn	100%	0.36	0.17	182.2	12,742	1,657,607	
RS-6	B1-B	38-38.7	BIOTITE GNEISS	ZYbn	76%	0.35	0.17	172.6	9,214	1,255,217	

PHOTO TAKEN ALONG END BENT 1 LOOKING RIGHT.

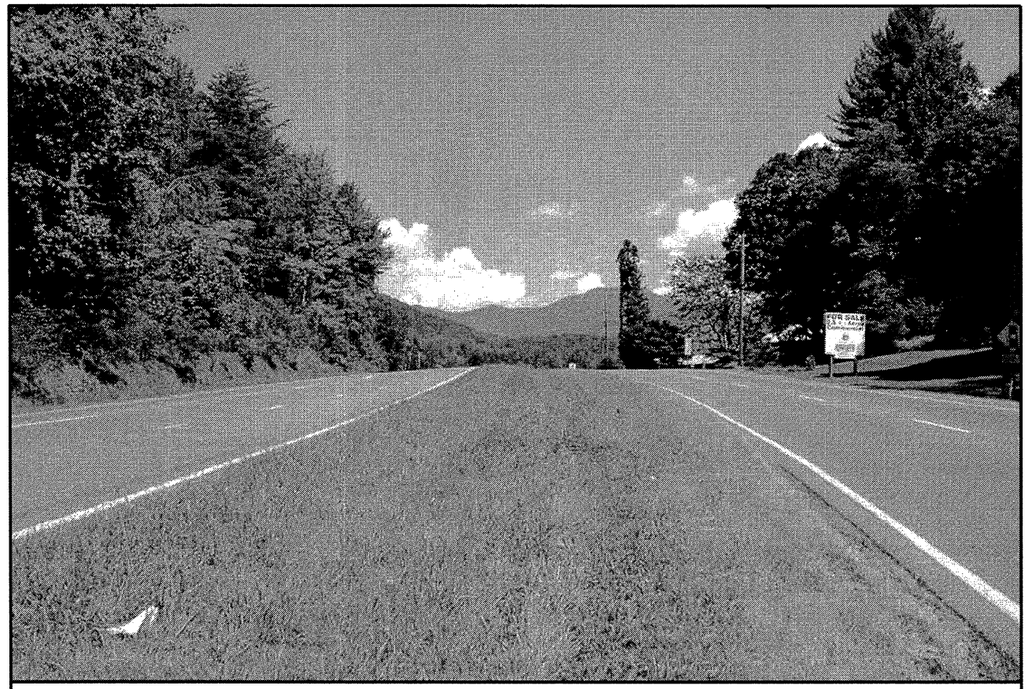

PHOTO TAKEN ALONG INTERIOR BENT LOOKING LEFT.

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SITE PHOTOGRAPHS

NEW CONNECTOR ROAD FROM NC-116 AND BONNIE LANE TO NC-107 AND EVANS ROAD
JACKSON COUNTY, NORTH CAROLINA
PROJECT NO.: 41156.1.1, TIP NO.: R-5000

OCTOBER, 2011	PROJECT NO.: G11024.00	SHEET 1 OF 2

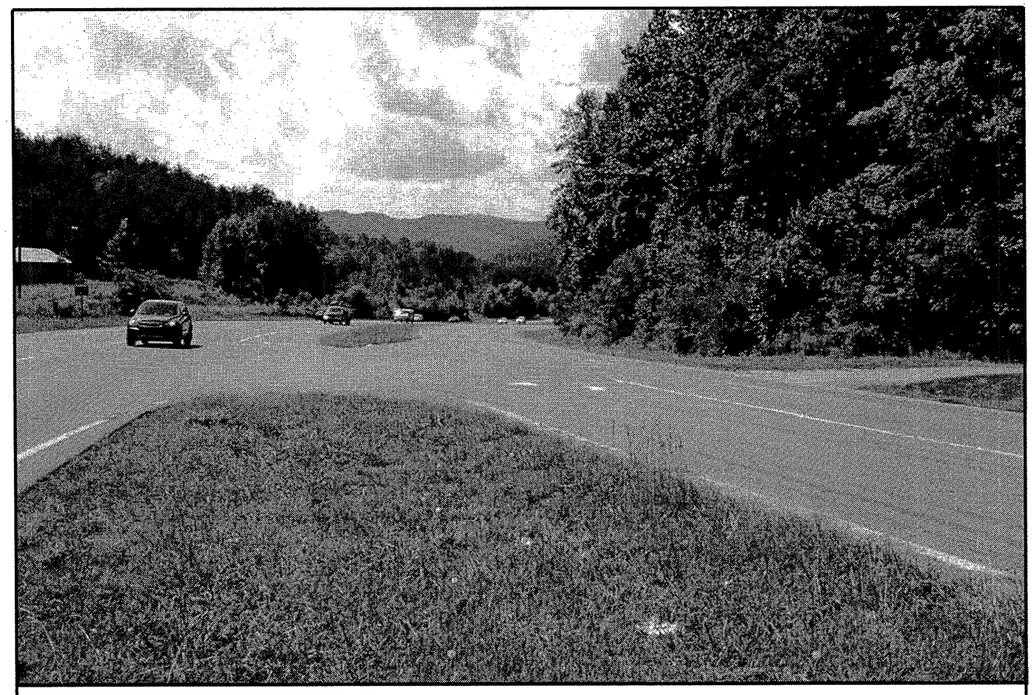

PHOTO TAKEN ALONG INTERIOR BENT LOOKING RIGHT.

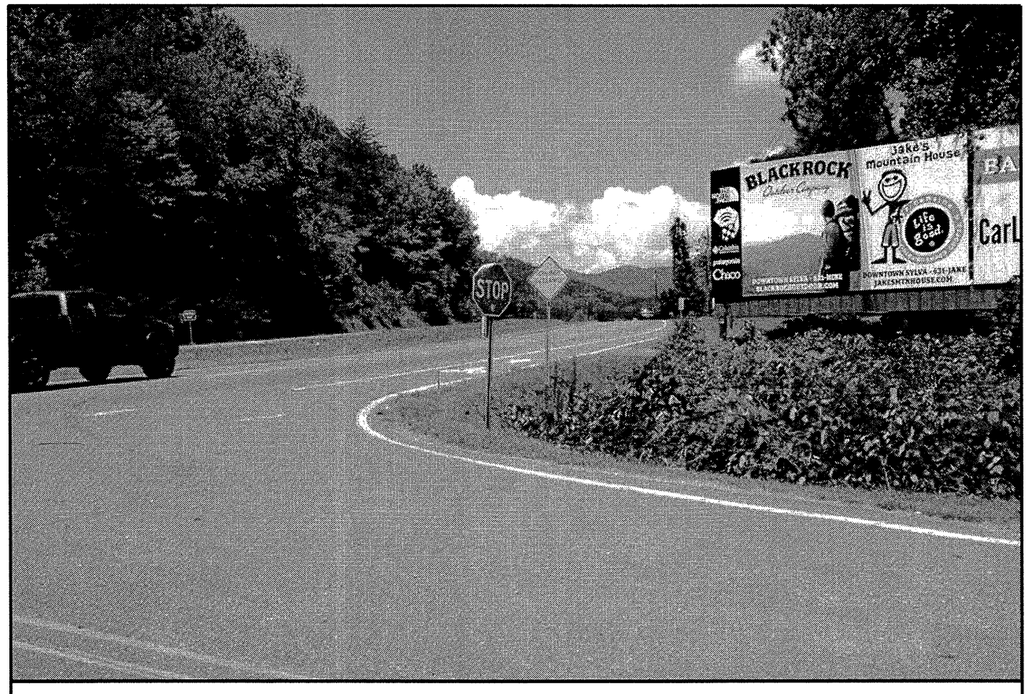

PHOTO TAKEN ALONG END BENT 2 LOOKING RIGHT.

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OCTOBER, 2011	PROJECT NO.: G11024.00	SHEET 2 OF 2