STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4665	1	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33825.1.1	BRZ-1304(8)	P.E.	
		CONST.	

PROJECT: 33825.1.1 ID: B-4665

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33825.1.1 I.D. NO. B-4665

F.A. PROJECT BRZ-1304(8)

COUNTY WARREN

PROJECT DESCRIPTION BRIDGE NO. 36 ON SR 1304(COLE FRAM RD.) OVER HAWTREE CREEK

SITE DESCRIPTION

CONTENTS:

DRAWN BY: DRK

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

INVESTIGATED BY D GOODNIGHT — PERSONNEL D KITCHEN

CHECKED BY J VINSON — W WHICHARD

SUBMITTED BY P WEAVER — R BRANSFORD

DATE 11/7/06 — A HAYES

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 LICENSED SEAL 1500 GEOLOGIST PAUL M WEAVER

11/7/06

SEAL

SIGNATURE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4665	33825.1.1	2	21

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 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		N.P.	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 SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
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 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	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	2.0	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, YEL-BRN, 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 ARE 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 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 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 SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 - DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT DPT DMT PMT VST - TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF - SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CI. - CAVE IN
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
C.T. - CORING TERMINATED
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
NM - NOT MEASURED
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- 57
- [ ] BK-51
- [ ] CME-45
- [x] CME-55
- [ ] PORTABLE HOIST
- [ ] OTHER CME 850
- [ ] OTHER ACKER MARK II

ADVANCING TOOLS:
- [ ] CLAY BITS
- [x] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [ ] TRICONE 3⅜" TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER ____

HAMMER TYPE:
- [ ] AUTOMATIC [x] MANUAL

CORE SIZE:
- [ ] -B-____
- [ ] -N- 0
- [ ] -H- 0

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
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 ROCKS 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 WHICH 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 IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 ON OR B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - 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 (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #601: -L- STA. 16+17.15, 35.68' LT. RR SPIKE IN 14" SWEET GUM TREE

ELEVATION: 206.64'

NOTES:

REVISED 09/15/00

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SUBMITTED TO: North Carolina Department of Transportation
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

ATTENTION: Mr. Njoroge W. Wainaina, P.E.
State Geotechnical Engineer

SUBMITTED BY: Trigon Engineering Consultants, Inc.
Post Office Box 18846
Greensboro, North Carolina 27419-8846
Trigon Project No. 071-06-034

DATE: November 8, 2006

STATE PROJECT: 33825.1.1

TIP : B-4665

FEDERAL PROJECT: BRZ-1304(8)

COUNTY: Warren

DESCRIPTION: Bridge No. 36 on SR 1304 (Cole Farm Road)
Over Hawtree Creek

SUBJECT: Geotechnical Report of Structure Subsurface Investigation

Thank you for our success.

TABLE OF CONTENTS

Geotechnical Report

Appendix (issued under separate cover)

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STATE PROJECT: 33825.1.1

TIP : B-4665

FEDERAL PROJECT: BRZ-1304(8)

COUNTY: Warren

DESCRIPTION: Bridge No. 36 on SR 1304 (Cole Farm Road)
Over Hawtree Creek

SUBJECT: Geotechnical Report of Structure Subsurface Investigation

Trigon Engineering Consultants, Inc. has completed the authorized geotechnical investigation for the above referenced project in Warren County, North Carolina. The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations and to provide general construction considerations based on the subsurface conditions.

1.0 SITE DESCRIPTION

The project site is located in the northern portion of Warren County northwest of the town of Wise and north of the town of Macon at the approximate location shown on the Site Vicinity Map (Drawing No. 1) attached behind this report. The site and project description of the proposed project is "Bridge No. 36 on SR 1304 (Cole Farm Road) over Hawtree Creek". Topographically, the site slopes moderately down

towards Hawtree Creek with relatively steep slopes down to the creek from the existing roadway embankment. The floodplain at the location of the existing bridge appears to be approximately 300 feet wide. The topography of the general site vicinity consists of gently rolling hills.

At the time of this investigation, a three-span bridge (existing Bridge No. 36) was present at the site of the proposed bridge. The existing bridge consists of a timber deck supported by timber piles. The existing bridge is approximately 67 feet in length and approximately 18 feet in width.

The water surface elevation surveyed by Trigon on October 18, 2006 was ±202 feet. According to the Bridge Survey and Hydraulic Report, the 10-year floodwater surface elevation is ±208 feet, the 50-year floodwater surface elevation is ±210 feet, the 100-year flood elevation is ±211 feet, and the 500-year flood elevation is ±215 feet.

2.0 PROJECT DESCRIPTION

Proposed for construction is a new, single-span structure to replace the existing Bridge No. 36 on Cole Farm Road over Hawtree Creek. The proposed bridge will be a replacement-in-place of the existing bridge. Information for the proposed bridge structure was obtained from the Preliminary General Drawing and the Bridge Survey & Hydraulic Design Report provided to Trigon by the NCDOT. The proposed bridge will be 85 feet in length and approximately 30 feet in width (out to out) with a skew angle of 91°57'22" at End Bent-1 and a skew angle of 98°02'38" at End Bent-2.

The proposed grade along the centerline of the proposed bridge on -L- will remain essentially unchanged from the existing grade. However, a total of approximately 95 cubic yards of excavation is proposed between the old and new abutments at End Bent-1, and a total of approximately 50 cubic yards of excavation is proposed between the old and new abutments at End Bent-2. This excavation will involve both horizontal and vertical excavation, with vertical excavation extending to between approximately 7 and 8 feet below the existing top-of-soil at the -L- centerline. Slopes on the order of 1.5(H):1(V) are proposed for the new embankment slopes.

The Preliminary General Drawing and Bridge Survey & Hydraulic Design Report are in English units with feet as the primary unit of length.

3.0 SCOPE OF INVESTIGATION

3.1 FIELD TESTING

The as-drilled locations for the soil test borings were located by personnel from Trigon using the existing bridge for reference. Elevations at the as-drilled boring locations, along the existing ground surface at the bent locations, and along the right side of the proposed structure were surveyed by personnel from Trigon using the "BM #601" benchmark elevation (Elevation 206.64 feet) established by an NCDOT survey crew as a reference point.

Trigon's subsurface investigation for the proposed bridge was conducted between October 16 and 18, 2006. This exploration consisted of four soil test borings with two borings at each proposed end bent location. The borings were drilled using an ATV-mounted CME-55 drilling machine equipped with a 140-pound manual hammer, and they were advanced utilizing 0.5-foot (O.D.) continuous-flight hollow-stem auger techniques.

Boring EB1-A was offset approximately 7 feet left of the proposed location due to a steep slope and buried water line at the proposed location. As-drilled soil test boring locations are shown on the Boring Identification Diagram (Drawing No. 2, Sheet No. 9) following this report, and boring logs are also included following this report.

Standard Penetration Tests were performed in the soil and weathered rock materials in the soil test borings in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil and weathered rock samples were recovered for visual classification and potential laboratory testing. In addition, one undisturbed (Shelby Tube) sample of representative material within the area of hydraulic scour was collected for potential Erosion Function Apparatus testing by the NCDOT.

3.2 LABORATORY TESTING

Laboratory soil testing was performed on eight representative split-barrel samples and two grab samples (one stream bank material sample and one stream bed material sample) to aid in the assessment of AASHTO soil classification and to provide data for evaluation of engineering properties. The laboratory testing on the samples consisted of Natural Moisture Content, Atterberg Limit, and grain size analysis with hydrometer. Laboratory tests were performed in general accordance with AASHTO and NCDOT specifications. The results of the soil laboratory tests are included on Sheet No. 15 located behind this report.

3.3 SITE GEOLOGY

The site of the proposed project is located in the Raleigh Belt of the Piedmont Physiographic province. Raleigh Belt rocks are generally comprised of metamorphosed sedimentary and volcanic rocks, with the metamorphism relatively high in grade and late Paleozoic in age. Numerous dikes and volcanic intrusives are present within the rocks of the Raleigh Belt.

According to the 1985 Geologic Map of North Carolina, the site is located near the juncture of an area generally consisting of Mica Schist and an area generally consisting of granitic rock. No rock coring was performed for this project. However, our examination of the weathered rock encountered within our test borings indicates that the rock at the site consist of mica schist with abundant granitic rock intrusions. The overlying residual soils at the site are the product of the physical and chemical weathering of the underlying crystalline rock.

3.4 FOUNDATION MATERIALS

The generalized subsurface conditions indicated by the borings are described below. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. The Boring Identification Diagram and boring logs are located behind this report. Representative subsurface cross-sections at each bent location and a subsurface profile along the proposed structure are also included behind this report. The subsurface properties for the project site are described below.

Foundation materials encountered included roadway embankment fill, alluvial soils, residual soils, weathered rock, and crystalline rock.

Roadway embankment fill was encountered beginning at the existing ground surface at Boring EB1-B and at the End Bent-2 borings. Roadway embankment fill was not encountered at Boring EB1-A. The fill extends to a depth of ±8 feet (Elevation ±202 feet) at Boring EB1-B, and to depths ranging from ±7 feet to ±8 feet (Elevations ±201 feet to ±202 feet) at the End Bent-2 borings. The roadway embankment fill encountered generally consists of soft to medium stiff, clayey, coarse to fine sandy silt (A-4); and loose to medium dense, silty, coarse to fine sand (A-2-4) with a little gravel. Standard Penetration Resistance values of 3 to 19 blows per foot (bpf) were encountered within the roadway embankment fill.

Alluvial soil was encountered beginning at the existing ground surface at Boring EB1-A, and underlying the roadway embankment fill at the remaining borings. The alluvial soil extends to depths of ±15 feet to ±21 feet (Elevations ±191 feet to ±189 feet) at the End Bent-1 borings, and to depths of ±14 feet to ±17 feet (Elevation ±193 feet) at the End Bent-2 borings. The alluvium generally consists of soft, clayey, coarse to fine sandy silt (A-4); and very loose to dense, silty, fine to coarse sand (A-1-b, A-2-4, and A-3). Gravel is present in varying amounts within some of the alluvium. A little wood was present within the alluvium at Boring EB1-B. Standard Penetration Resistance values within the alluvial soil ranged from 3 to 36 bpf. However, the presence of gravel influenced the blow counts greater than 12 bpf.

Residual soil was encountered underlying the alluvial soil at Boring EB1-A. The alluvium was directly underlain by weathered rock in the remaining borings. The residual soil extends to a depth of ±16 feet (Elevation ±190 feet) at Boring EB1-A, and generally consists very dense, silty, coarse to fine sand (A-2-4). A Standard Penetration Resistance value of 63 bpf was recorded within the residuum.

Weathered rock was encountered underlying the alluvium at Borings EB1-B, EB2-A, and EB2-B, and underlying the residual soil at Boring EB1-A. The weathered rock generally consists of mica schist and granitic rock. The weathered rock was encountered between the following depths and elevations: 15.5 feet to the boring termination depth of 33.9 feet (Elevations 190.0 feet to 171.6 feet) at Boring EB1-A, 21.0 feet to 30.7 feet (Elevations 189.2 feet to 179.5 feet) at Boring EB1-B, 14.0 feet to 24.1 feet (Elevations 193.4 feet to 183.3 feet) at Boring EB2-B, and 16.8 feet to 24.8 feet (Elevations 193.2 feet to 185.2 feet) at Boring EB2-B. Boring EB1-A was terminated within weathered rock.

Crystalline rock was encountered underlying the weathered rock at Borings EB1-B, EB2-A, and EB2-B. Crystalline rock was not encountered within the depths explored at Boring EB1-A. The top of the crystalline rock was encountered at the following depths and elevations: 30.7 feet (Elevation 179.5 feet) at Boring EB1-B, 24.1 feet (Elevation 183.3 feet) at Boring EB2-A, and 24.8 feet (Elevation 185.2 feet) at Boring EB2-B. No crystalline rock coring was performed for this project.

3.5 GROUNDWATER

Groundwater was encountered at all of the borings drilled for this project at an elevation of ±201 feet. The water surface elevation of Hawtree Creek measured during the survey portion of our investigation on October 18, 2006 was ±202 feet. Fluctuation of groundwater and creek water surface levels can occur with seasonal and climatic variations. According to the Bridge Survey and Hydraulic Report, the 10-year floodwater surface elevation is ±208 feet, the 50-year floodwater surface elevation is ±210 feet, the 100-year flood elevation is ±211 feet, and the 500-year flood elevation is 215 feet.

4.0 CONSTRUCTION CONSIDERATIONS

Gravel is present within some of the alluvium encountered at the site. In addition, rip rap is present as scour protection against the existing abutment slopes and rip rap berms are present behind the interior bents. It could not be determined during this investigation how far into the stream channel rip rap is present, or if the existing interior piers have rip rap around their bases.

5.0 CLOSURE

The geotechnical investigation, analysis, and general construction considerations included in this report are based on the Bridge Survey & Hydraulic Design Reports, the Preliminary General Drawing, and the data obtained from our field and laboratory-testing program. If the proposed location and geometry, or finished grades are changed or are different from those outlined above, or if subsurface conditions are encountered during construction which differ from those indicated by our borings, we will require the opportunity to review these changed conditions and make any necessary modifications to the general conditions presented in this report.

Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Trigon Engineering Consultants, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

Respectfully submitted,

TRIGON ENGINEERING CONSULTANTS, INC.

Paul M. Weaver, P.G.
Registered North Carolina No. ~~1500~~ 1500

NORTH CAROLINA LICENSED SEAL GEOLOGIST PAUL M. WEAVER 11/27/06

Jeffrey R. Vinson, P.G.
Senior Project Manager

PMW/JRV:pmw

Attachments

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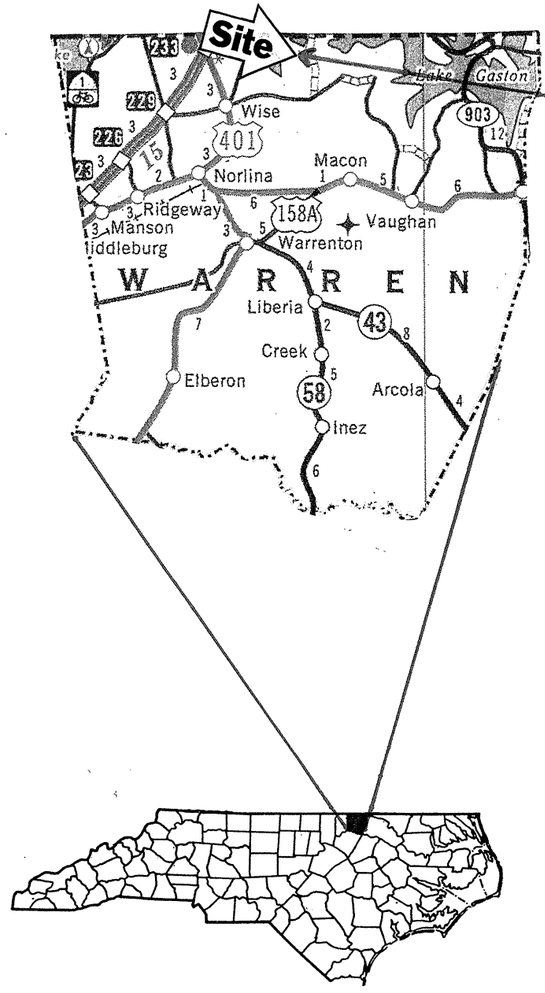
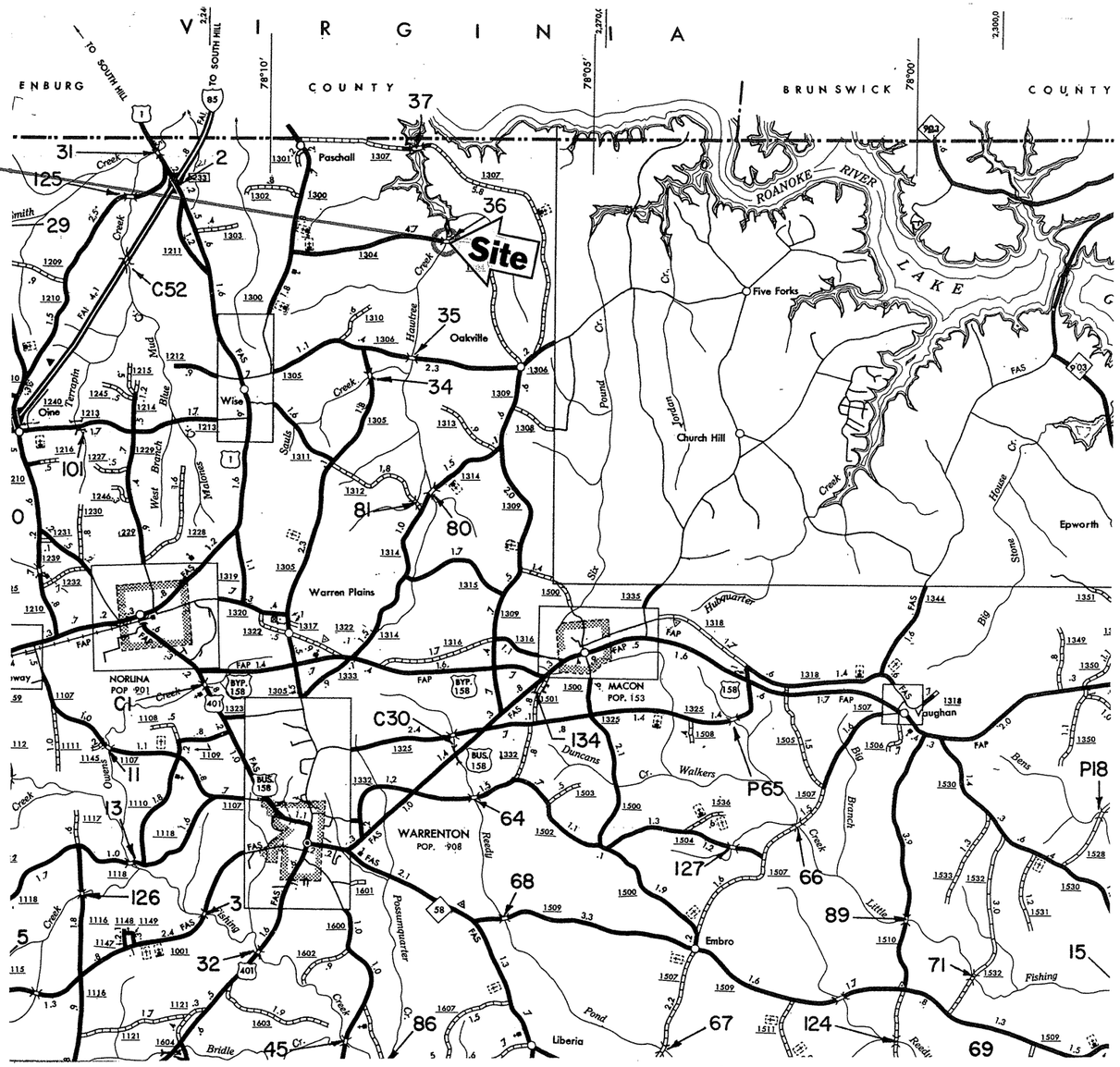
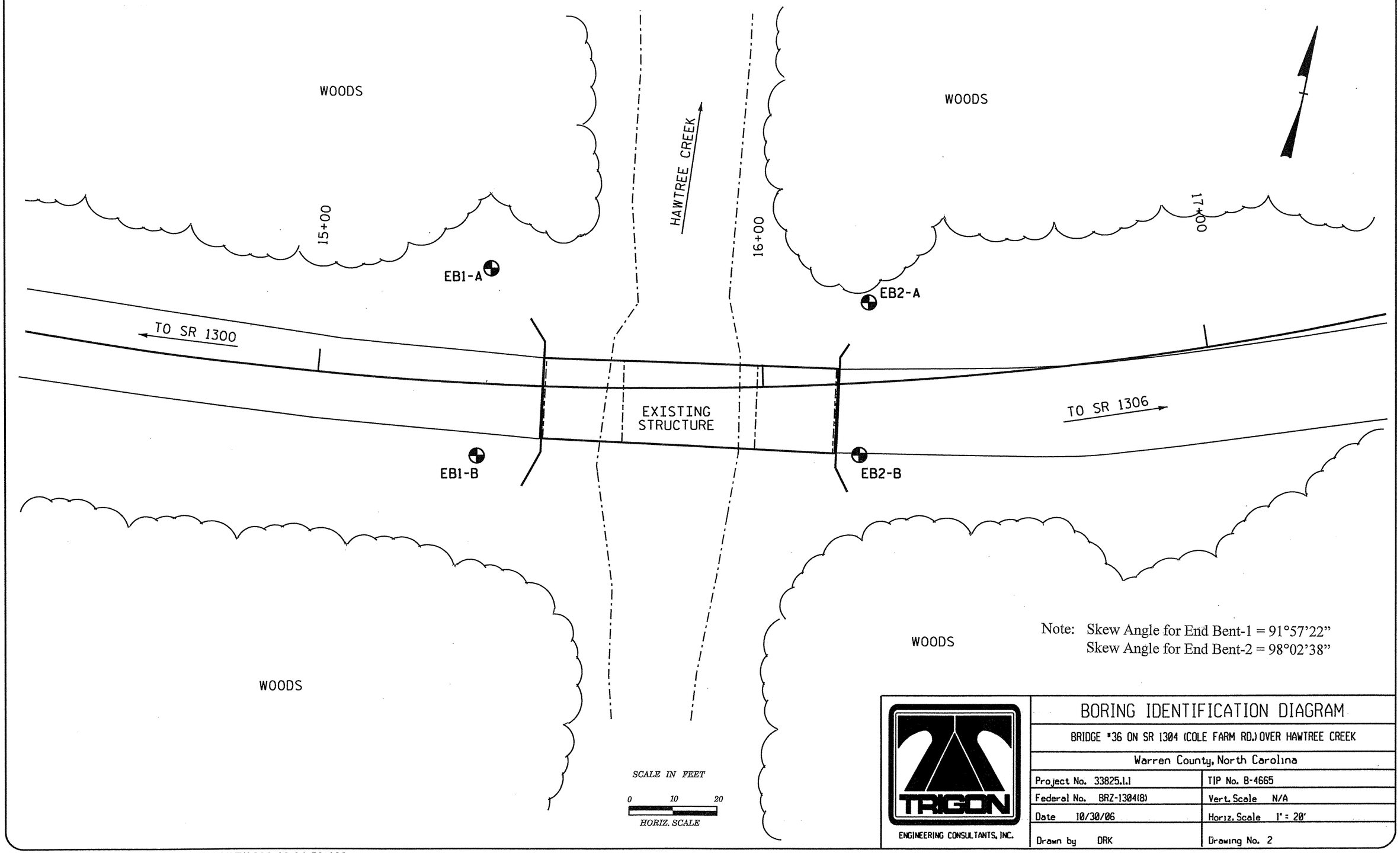




SCALE: Not to Scale	DATE: 10/19/06	STATE PROJECT NO. 33825.1.1	TIP NO.: B-4665
SITE VICINITY MAP Bridge No. 36 on SR 1304 (Cole Farm Road) over Hawtree Creek, Warren County, North Carolina			
		DRAWING NUMBER: 1	

Trigon Engineering Consultants, Inc.
Greensboro North Carolina



Note: Skew Angle for End Bent-1 = 91°57'22"
Skew Angle for End Bent-2 = 98°02'38"

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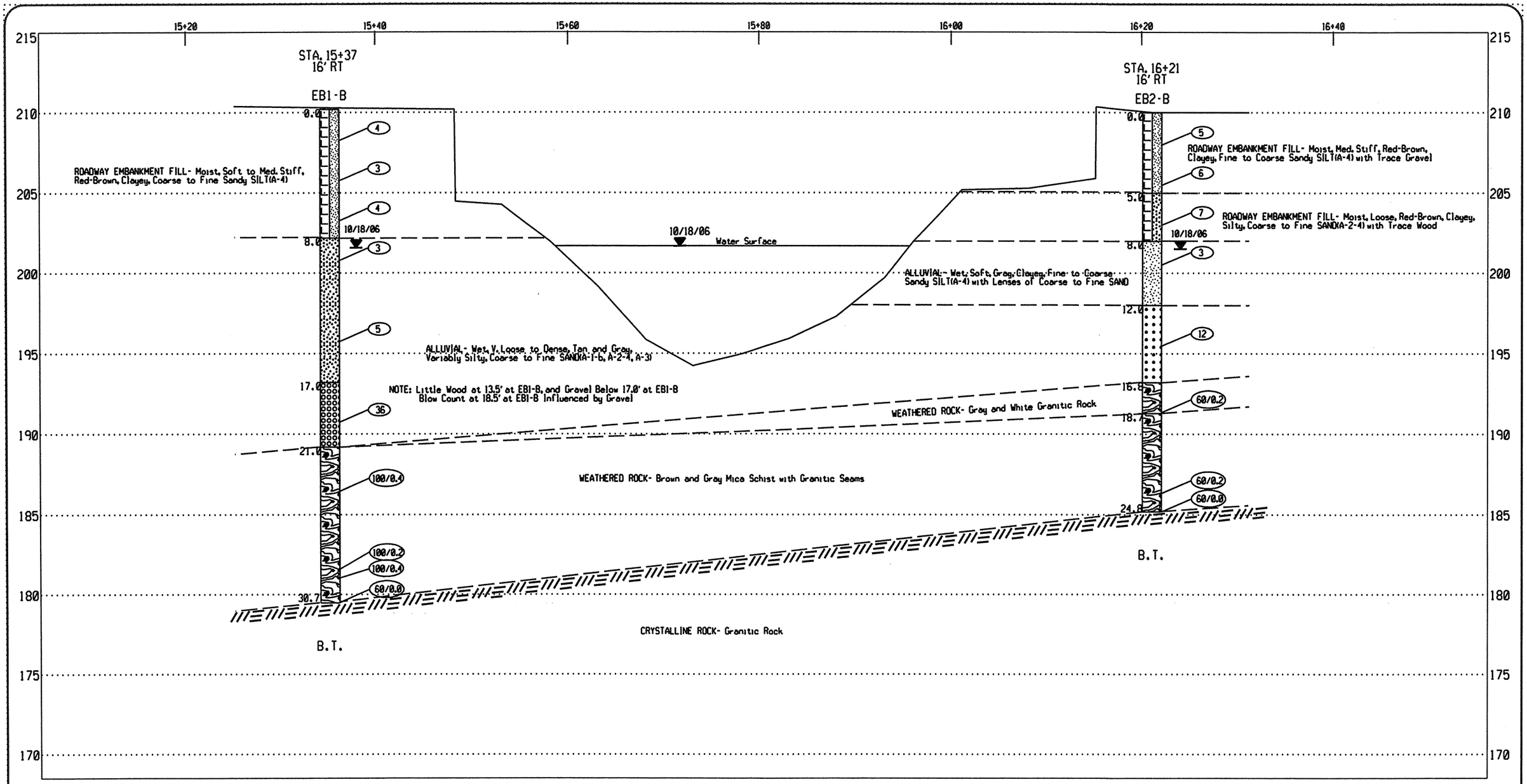
BORING IDENTIFICATION DIAGRAM

BRIDGE #36 ON SR 1304 (COLE FARM RD.) OVER HAWTREE CREEK

Warren County, North Carolina

Project No. 33825.1.1	TIP No. B-4665
Federal No. BRZ-1304(8)	Vert. Scale N/A
Date 10/30/06	Horiz. Scale 1" = 20'
Drawn by DRK	Drawing No. 2



SCALE IN FEET

0 3 6

VERT. SCALE

0 5 10

HORZ. SCALE

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PROFILE 16' RIGHT OF -L-

BRIDGE #36 ON SR 1304 (COLE FARM RD.) OVER HAWTREE CREEK

Warren County, North Carolina

Project No. 33825.1.1	TIP No. B-4665
Federal No. BRZ-1304(8)	Vert. Scale 1" = 6'
Date 10/30/06	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 3

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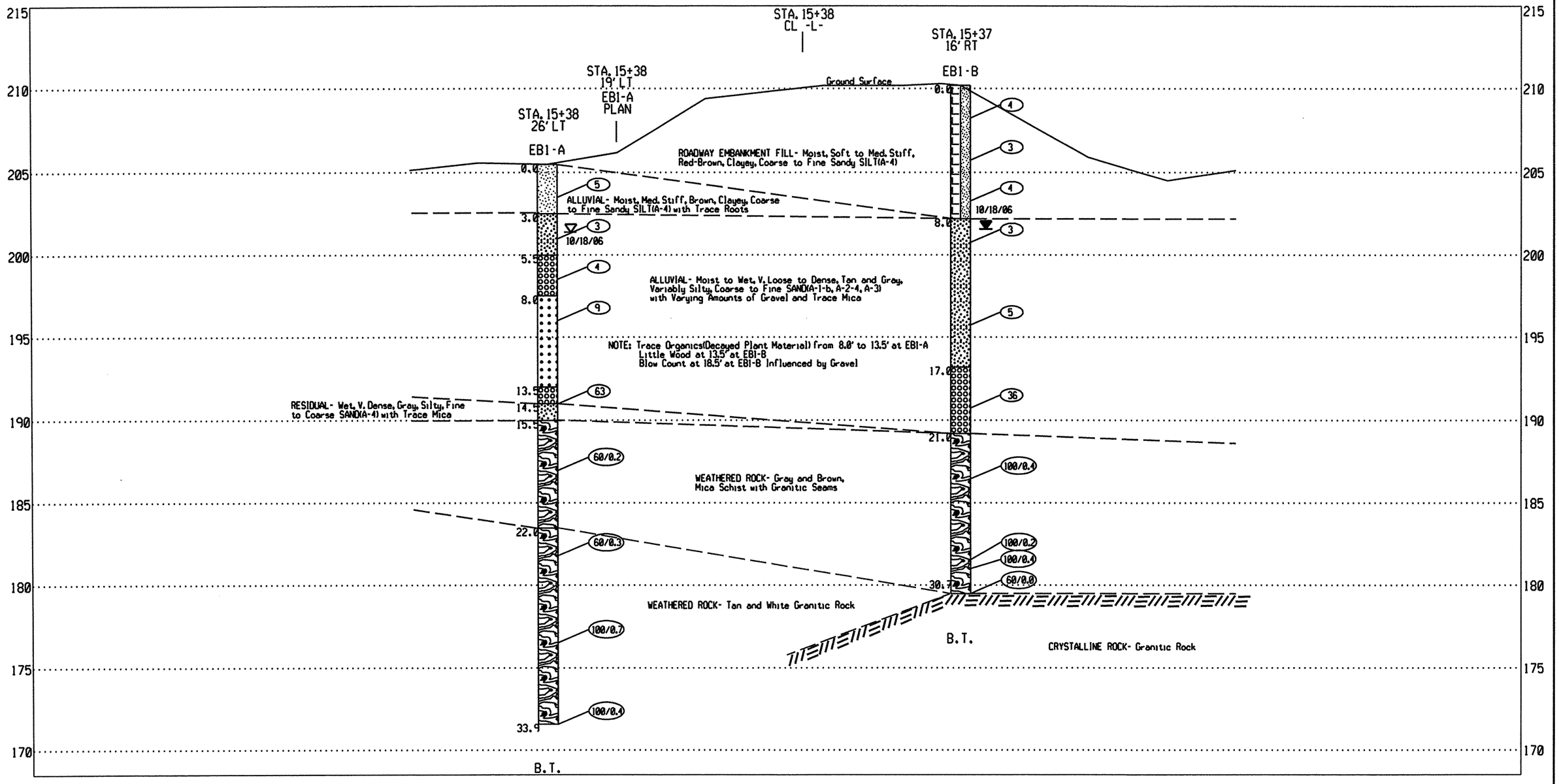

SCALE IN FEET

0 3 6
VERT. SCALE

0 5 10
HORZ. SCALE

ENGINEERING CONSULTANTS, INC.

CROSS-SECTION ALONG END BENT-1

BRIDGE #36 ON SR 1304 (COLE FARM RD.) OVER HAWTREE CREEK

Warren County, North Carolina

Project No. 33825.1.1	TIP No. B-4665
Federal No. BRZ-1304(8)	Vert. Scale 1" = 6'
Date 10/30/06	Horiz. Scale 1" = 10'
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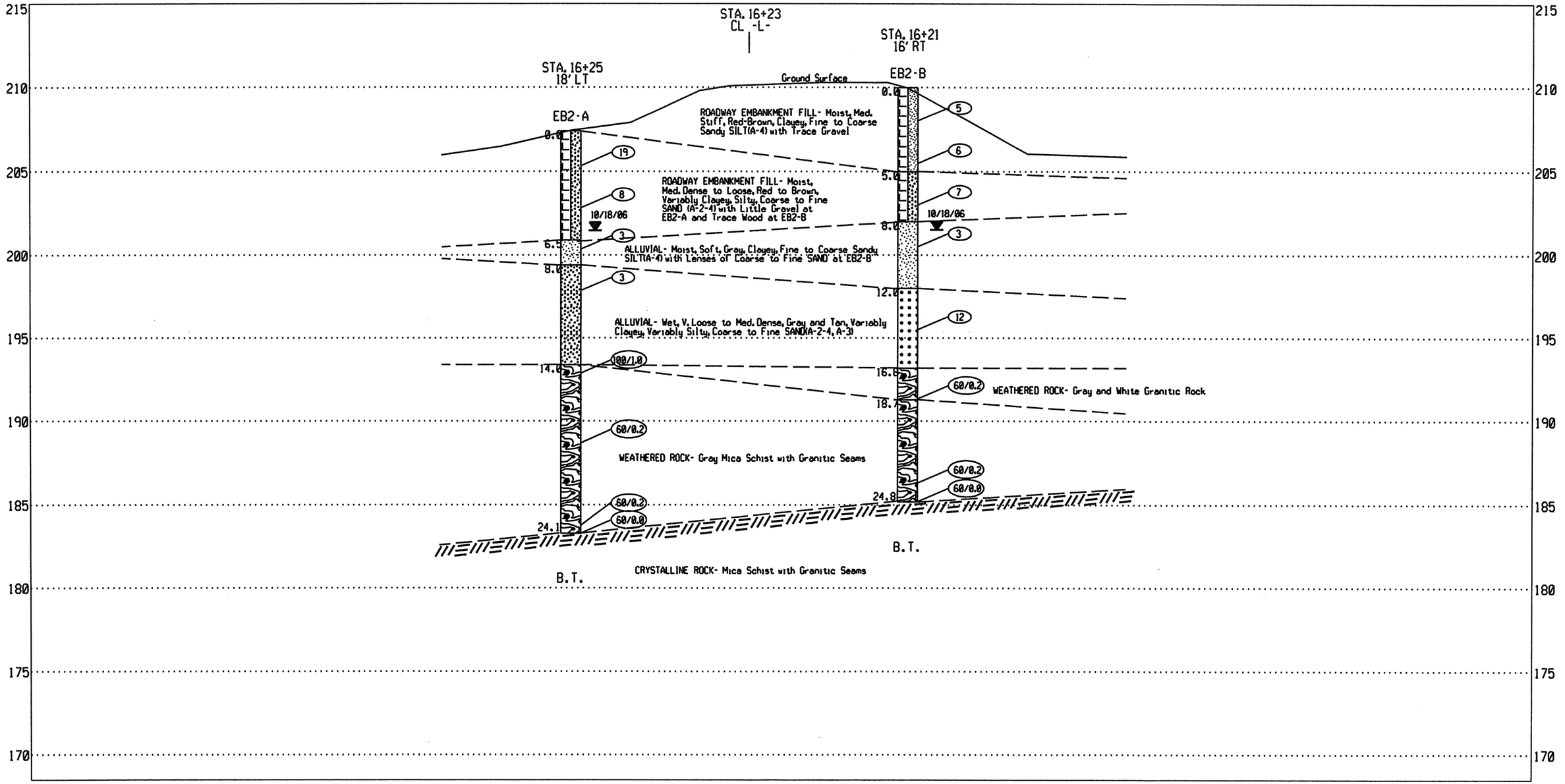

SCALE IN FEET

0 3 6

VERT. SCALE

0 5 10

HORZ. SCALE

TRIGON
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CROSS-SECTION ALONG END BENT-2

BRIDGE #36 ON SR 1304 (COLE FARM RD.) OVER HAWTREE CREEK

Warren County, North Carolina

Project No. 33825.1.1	TIP No. B-4665
Federal No. BRZ-1304(8)	Vert. Scale 1" = 6'
Date 10/30/06	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 5

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 1

PROJECT NO. 33825.1.1	**ID No.** B-4665	**COUNTY** Warren	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Br. No. 36 On SR 1304 (Cole Farm Rd.) Over Hawtree Creek			**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 15+38	**OFFSET** 26ft LT	**ALIGNMENT** -L-	**0 HR.** 4.2
COLLAR ELEV. 205.5 ft	**NORTHING** 1010438	**EASTING** 2258425		**24 HR.** NM
TOTAL DEPTH 33.9 ft	**DRILL MACHINE** CME 55 ATV	**DRILL METHOD** HSA	**HAMMER TYPE** 140lb Manual	
DATE STARTED 10/18/06	**COMPLETED** 10/18/06	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
205.5									205.5 0.00
204.5	1.0								ALLUVIAL: Medium Stiff, Brown, Clayey, Coarse To Fine Sandy SILT With Trace Roots
202.0	3.5	3	2	3	5		M		202.5 3.0
199.5	6.0	2	1	2	3		W		ALLUVIAL: Very Loose, Tan-Gray, Clayey, Silty, Coarse To Fine SAND 200.0 5.5
197.0	8.5	1	1	3	4		W		ALLUVIAL: Very Loose To Loose, Gray, Fine To Coarse SAND And Gravel 197.5 8.0
192.0	13.5	4	5	4	9	SS-1	W		ALLUVIAL: Loose, Gray, Coarse To Fine SAND With Trace Organics (Decayed Plants) 192.0 13.5
190.0	15.5	5	11	52	63	SS-2	W		ALLUVIAL: Medium Dense, Gray, Fine To Coarse SAND And Gravel 191.0 14.5
190.0	15.5	5	11	52					RESIDUAL: Very Dense, Gray, Silty, Fine To Coarse SAND With Trace Mica 190.0 15.5
187.0	18.5	60/0.2			60/0.2				WEATHERED ROCK: Gray, Mica Schist With Granitic Seams
182.0	23.5	60/0.2							183.5 22.0
177.0	28.5	60/0.3			60/0.3				Tan and White Granitic Rock
172.0	33.5	75	25/0.2		100/0.7				
		100/0.4			100/0.4				171.6 33.9
									Boring Terminated At Elevation 171.6ft. In Weathered Rock: Granitic Rock

NCDOT BORE SINGLE 07106034.GPJ NC_DOT.GDT 11/8/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 1

PROJECT NO. 33825.1.1	**ID No.** B-4665	**COUNTY** Warren	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Br. No. 36 On SR 1304 (Cole Farm Rd.) Over Hawtree Creek			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 15+37	**OFFSET** 16ft RT	**ALIGNMENT** -L-	**0 HR.** 9.3
COLLAR ELEV. 210.2 ft	**NORTHING** 1010396	**EASTING** 2258428		**24 HR.** 8.7
TOTAL DEPTH 30.7 ft	**DRILL MACHINE** CME 55 ATV	**DRILL METHOD** HSA	**HAMMER TYPE** 140lb Manual	
DATE STARTED 10/16/06	**COMPLETED** 10/16/06	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
210.2									210.2 0.00
209.2	1.0								ROADWAY EMBANKMENT FILL: Soft To Medium Stiff, Red Brown, Clayey, Coarse To Fine Sandy SILT
206.7	3.5	2	2	2	4		M		
204.2	6.0	2	2	1	3	SS-3	18.4%		
201.7	8.5	4	3	1	4		M		202.2 8.0
196.7	13.5	3	1	2	3	SS-4	M		ALLUVIAL: Very Loose To Loose, Tan And Gray, Silty, Coarse To Fine SAND With Little Wood At 13.5ft
191.7	18.5	3	2	3	5		W		
186.7	23.5	8	16	20	36	SS-5	W		193.2 17.0
181.7	28.5	100/0.4			100/0.4		W		ALLUVIAL: Dense, Gray, Fine To Coarse SAND And GRAVEL
181.3	28.9	100/0.2			100/0.2				189.2 21.0
179.5	30.7	100/0.4			100/0.4				Note: Blow Count Influenced by Gravel
		60/0.0			60/0.0				WEATHERED ROCK: Brown, Mica Schist With Granitic Seams
									179.5 30.7
									Boring Terminated With SPT Refusal At Elevation 179.5ft. on Crystalline Rock: Granitic Rock

NCDOT BORE SINGLE 07106034.GPJ NC_DOT.GDT 11/8/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 1

PROJECT NO. 33825.1.1	**ID No.** B-4665	**COUNTY** Warren	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Br. No. 36 On SR 1304 (Cole Farm Rd.) Over Hawtree Creek			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 16+25	**OFFSET** 18ft LT	**ALIGNMENT** -L-	**0 HR.** 6.5
COLLAR ELEV. 207.4 ft	**NORTHING** 1010446	**EASTING** 2258510		**24 HR.** 6.0
TOTAL DEPTH 24.1 ft	**DRILL MACHINE** CME 55 ATV	**DRILL METHOD** HSA	**HAMMER TYPE** 140lb Manual	
DATE STARTED 10/18/06	**COMPLETED** 10/18/06	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
207.4									207.4 0.00
206.4	1.0	6	11	8	19		M		ROADWAY EMBANKMENT FILL: Medium Dense To Loose, Brown, Silty, Coarse To Fine SAND With Little Gravel
203.9	3.5	3	3	5	8		M		
201.4	6.0	2	1	2	3		M		200.9 6.5
198.9	8.5	1	1	2	3	SS-6	W		199.4 8.0 ALLUVIAL: Soft, Gray, Clayey, Fine To Coarse Sandy SILT ALLUVIAL: Very Loose, Gray, Clayey, Silty, Fine To Coarse SAND
193.9	13.5	13	25	75	100/1.0				193.4 14.0 WEATHERED ROCK: Gray Mica Schist
188.9	18.5	60/0.2			60/0.2				
183.9	23.5				60/0.2				
183.3	24.1	60/0.2			60/0.0				183.3 24.1 Boring Terminated With SPT Refusal At Elevation 183.3ft. On Crystalline Rock: Mica Schist
		60/0.0							

NCDOT BORE SINGLE 07106034.GPJ NC_DOT.GDT 11/8/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

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PROJECT NO. 33825.1.1	**ID No.** B-4665	**COUNTY** Warren	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Br. No. 36 On SR 1304 (Cole Farm Rd.) Over Hawtree Creek			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 16+21	**OFFSET** 16ft RT	**ALIGNMENT** -L-	**0 HR.** 8.8
COLLAR ELEV. 210.0 ft	**NORTHING** 1010412	**EASTING** 2258513		**24 HR.** 8.5
TOTAL DEPTH 24.8 ft	**DRILL MACHINE** CME 55 ATV	**DRILL METHOD** HSA	**HAMMER TYPE** 140lb Manual	
DATE STARTED 10/16/06	**COMPLETED** 10/16/06	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
210.0									210.0 0.00
209.0	1.0	2	2	3	5	SS-7	19.2%		ROADWAY EMBANKMENT FILL: Medium Stiff, Red-Brown, Clayey, Fine To Coarse Sandy SILT With Trace Gravel
206.5	3.5	4	3	3	6		M		205.0 5.0
204.0	6.0	4	3	4	7		M		ROADWAY EMBANKMENT FILL: Loose, Red-Brown, Clayey, Silty, Coarse To Fine SAND With Trace Wood
201.5	8.5	3	1	2	3	SS-8	31.6%		202.0 8.0 ALLUVIAL: Soft, Gray, Clayey, Fine To Coarse Sandy SILT With Lenses Of Coarse To Fine SAND
196.5	13.5	5	6	6	12		W		198.0 12.0 ALLUVIAL: Medium Dense, Tan, Coarse To Fine SAND
191.5	18.5	60/0.2			60/0.2				193.2 16.8 WEATHERED ROCK: Gray And White Granitic Rock
186.5	23.5				60/0.2				191.3 18.7 WEATHERED ROCK: Gray Mica Shist With Granitic Seams
185.2	24.8	60/0.2			60/0.0				185.2 24.8 Boring Terminated With SPT Refusal At Elevation 185.2ft. On Crystalline Rock: Granitic Rock
		60/0.0							

NCDOT BORE SINGLE 07106034.GPJ NC_DOT.GDT 11/8/06

State Project No. 33825.1.1
TIP No. B-4665 F.A. No. BRZ-1304(8)
Bridge No. 36 on SR 1304 (Cole Farm Road) Over Hawtree Creek
Warren County, North Carolina
SUMMARY OF LABORATORY TEST DATA

						Atterberg Limits			Gradation Results							
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	8.5-10.0	SS-1	-	A-3 (0)	9	6	NP	NP	100	87	5	96	45	51	3	1
EB1-A	13.5-15.0	SS-2	-	A-1-b (0)	63	21	NP	NP	66	32	8	93	66	24	8	2
EB1-B	3.5-5.0	SS-3	18.4	A-4 (0)	3	24	18	6	95	78	43	60	30	27	19	24
EB1-B	8.5-10.0	SS-4	-	A-2-4 (0)	3	17	NP	NP	100	83	23	80	37	43	14	6
EB1-B	18.5-20.0	SS-5	-	A-1-b (0)	36	13	NP	NP	51	11	2	98	87	9	4	0
EB2-A	8.5-10.0	SS-6	-	A-2-4 (0)	3	18	16	2	100	83	33	69	35	34	18	13
EB2-B	1.0-2.5	SS-7	19.2	A-4 (1)	5	30	21	9	94	76	43	59	31	26	19	24
EB2-B	8.5-10.0	SS-8	31.6	A-4 (2)	3	31	27	4	100	86	63	38	23	15	44	18
SBK-1	0.0-1.0	G-1	-	A-2-4 (0)	NA	29	NP	NP	90	67	18	84	47	35	18	0
SBD-1	0.0-1.0	G-2	-	A-4 (2)	NA	28	20	8	100	93	55	48	19	29	26	26

* SS = Split-Spoon Sample (ASTM-D-1586)
** G = Grab Sample
***ST=Shelby Tube (Undisturbed) Sample
NP -- Non Plastic NA-- Non Applicable

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA
Trigon Job Number: 071-06-034
Page: 1 of 1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33825.1.1 TIP: B-4665 COUNTY: Warren

DESCRIPTION(1): Bridge No. 36 on SR 1304 (Cole Farm Road) over Hawtree Creek

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) Bridge Survey & Hydraulic Design Report

Bridge No.: 36 Length: 66 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Timber bridge w/timber joists for spans 1 & 3 and steel I-beam for span 2; timber pile supports

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Some scour in midde areas of abutments

Interior Bents: Scour evident around Bent-2 cap and around rip rap berm behind bents

Channel Bed: Possible scour through middle of channel

Channel Bank: Undercutting of channel banks with trees and stumps leaning into the channel

EXISTING SCOUR PROTECTION

Type(3): Rip rap berms behind interior bents; timber wingwalls at end bents

Extent(4): Both ends of bridge

Effectiveness(5): Effective in berm areas but interior bent foundations are largely unprotected

Obstructions(6): Fallen trees in channel upstream and downstream

INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing

DESIGN INFORMATION

Channel Bed Material(7): Clayey, Coarse to Fine Sandy SILT (A-4)

Channel Bank Material(8): Clayey, Coarse to Fine Sandy SILT (A-4); and Silty, Coarse to Fine SAND (A-2-4)

Channel Bank Cover(9): Weeds, small plants, briars, hardwood and pine trees

Floodplain Width(10): Approximately 300 feet

Floodplain Cover(11): Harwood Forest

Stream is(12): Aggrading ____ Degrading X Static ____

Channel Migration Tendency(13): could not be determined

Observations and Other Comments: It is not clear how far the rip rap protection extends into the channel, and it is not clear if the existing interior columns have rip rap protection surrounding them

Reported by: [signature] **Date:** 10/19/2006

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

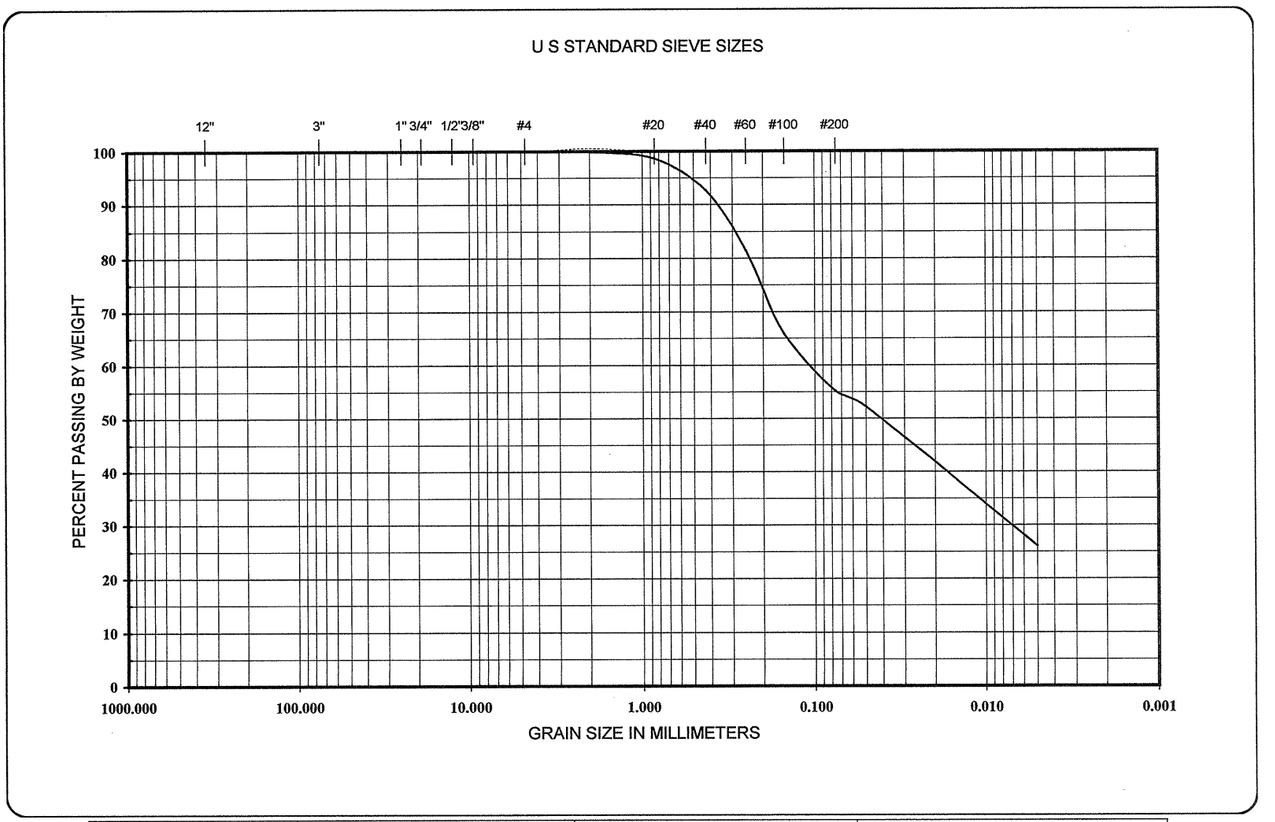
	100 yr									
15+81, CL	191.1'									

Comparison of DSE to Hydraulics Unit theoretical scour:
DSE calculations were based on the Bridge Survey and Hydraulics Report dated 7/13/06

DSE determined by: [signature] **Date:** 11/20/2006

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank	Bank	Bank	
Sample No.	G-2	SS-3	SS-4	SS-7	SS-8	G-1	
Retained #4	0%	3%	0%	3%	0%	5%	
Passed #10	100%	95%	100%	94%	100%	90%	
Passed #40	93%	78%	83%	76%	86%	67%	
Passed #200	55%	43%	23%	43%	63%	18%	
Coarse Sand	19%	30%	37%	31%	23%	47%	
Fine Sand	29%	27%	43%	26%	15%	35%	
Silt	26%	19%	14%	19%	44%	18%	
Clay	26%	24%	6%	24%	18%	0%	
LL	28	24	17	30	31	29	
PI	8	6	NP	9	4	NP	
AASHTO	A-4 (2)	A-4 (0)	A-2-4 (0)	A-4 (1)	A-4 (2)	A-2-4 (0)	
Station	15+63	15+37	15+37	16+21	16+21	16+00	
Offset	13' LT	16' RT	16' RT	16' RT	16' RT	18' RT	
Depth	0.0-1.0	3.5-5.0	8.5-10.0	1.0-2.5	8.5-10.0	0.0-1.0	



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBD-1	G-2	0.0-1.0	-	28	20	8	ALLUVIAL: Clayey, Coarse to Fine Sandy SILT (A-4)

GRAIN SIZE DISTRIBUTION

Bridge No. 36 (B-4665)

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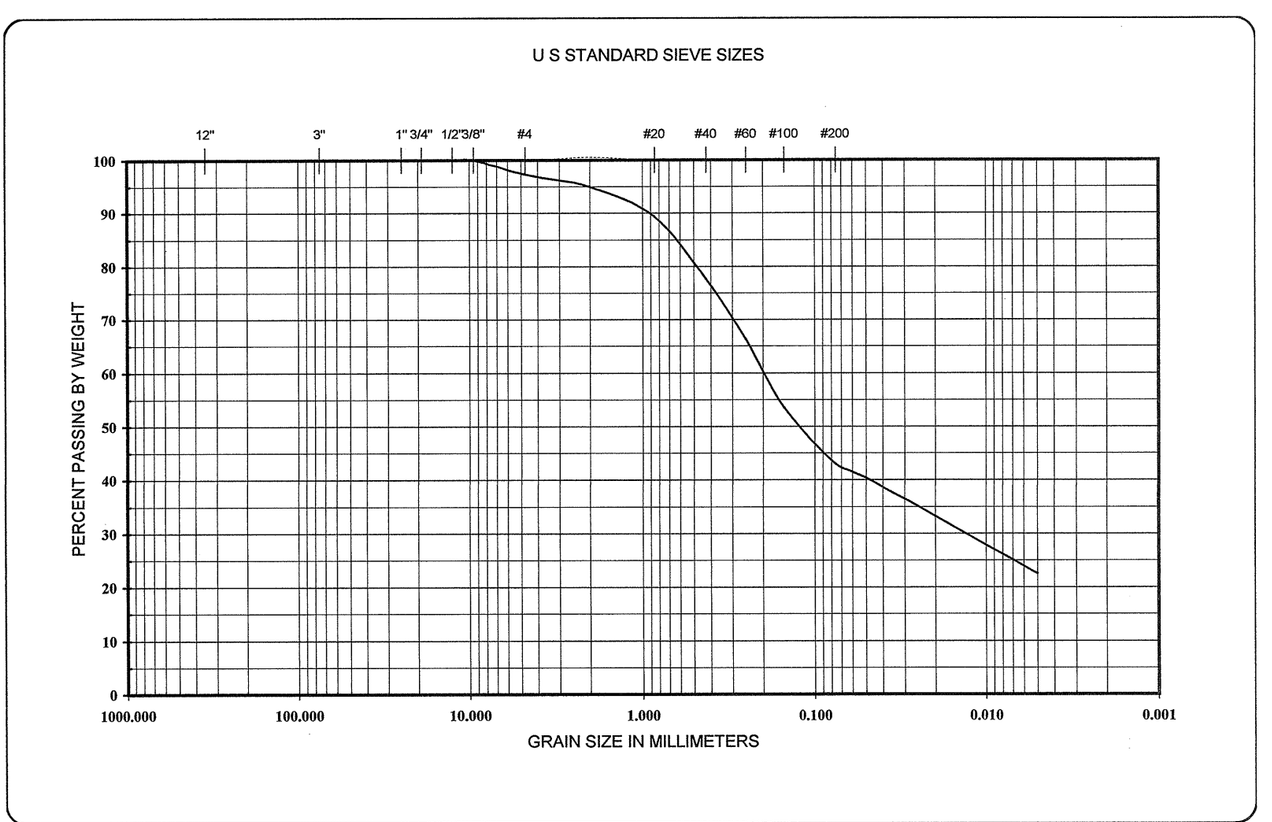

BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB1-B	SS-3	3.5-5.0	18.4	24	18	6	ALLUVIAL: Clayey, Coarse to Fine Sandy SILT (A-4)

GRAIN SIZE DISTRIBUTION

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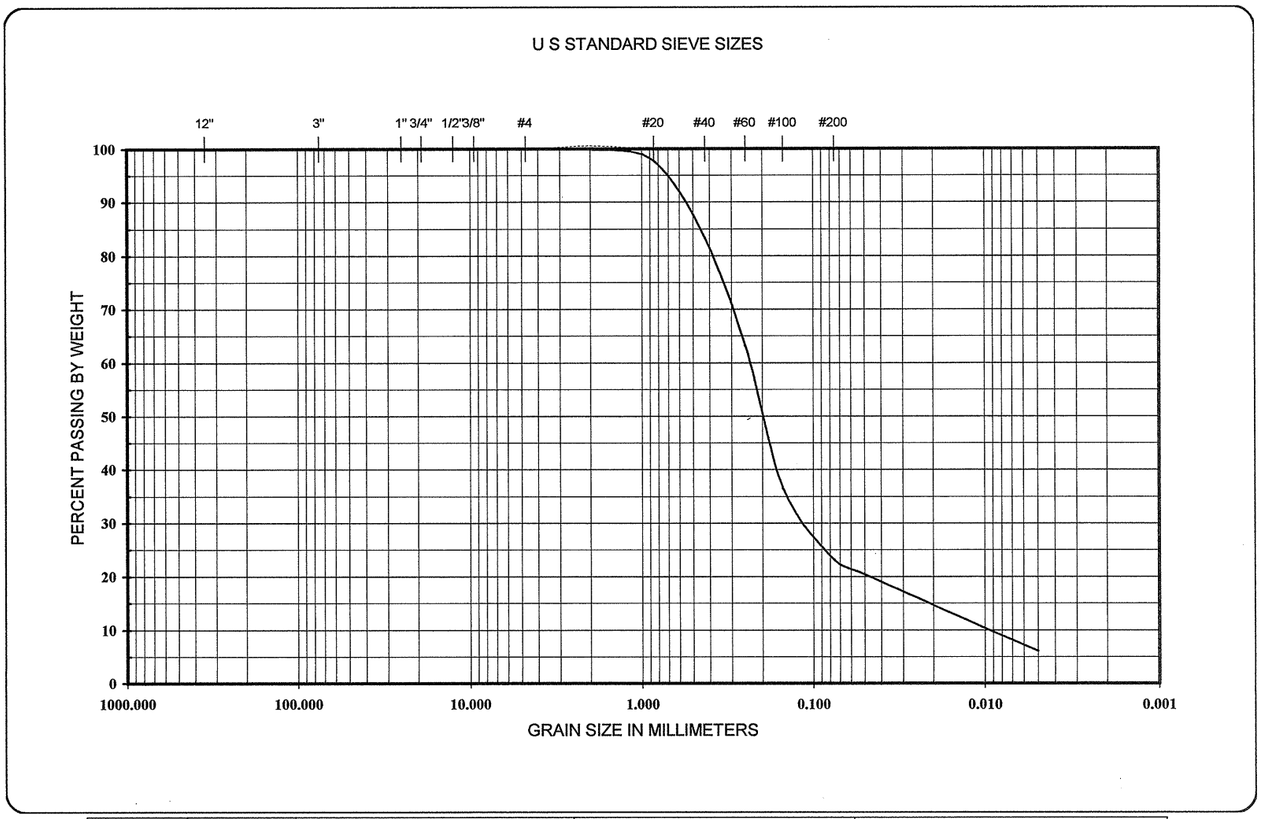

BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB1-B	SS-4	8.5-10.0	-	17	NP	NP	ALLUVIAL: Silty, Coarse to Fine SAND (A-2-4)

GRAIN SIZE DISTRIBUTION

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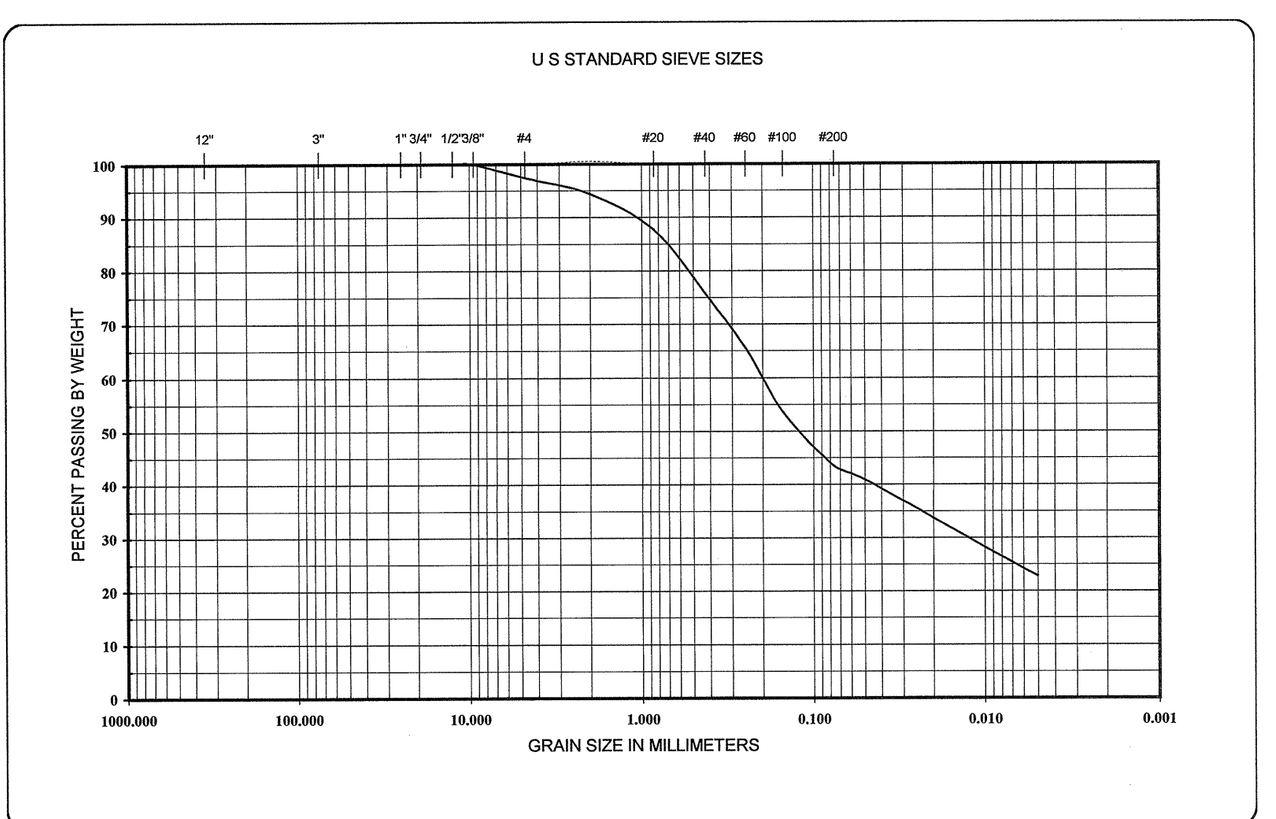

BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB2-B	SS-7	1.0-2.5	19.2	30	21	9	ALLUVIAL: Clayey, Fine to Coarse Sandy SILT (A-4)

GRAIN SIZE DISTRIBUTION

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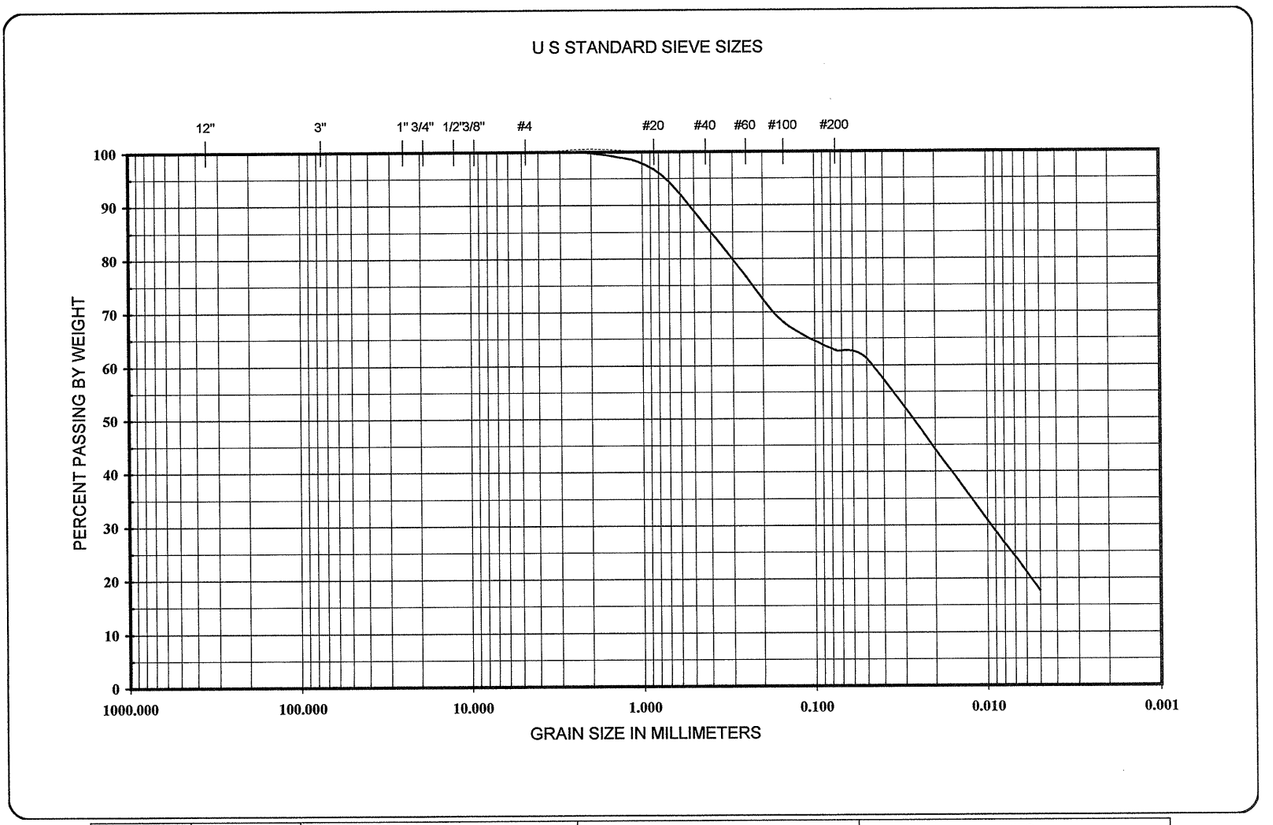

BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB2-B	SS-8	8.5-10.0	31.6	31	27	4	ALLUVIAL: Clayey, Fine to Coarse Sandy SILT (A-4)

GRAIN SIZE DISTRIBUTION

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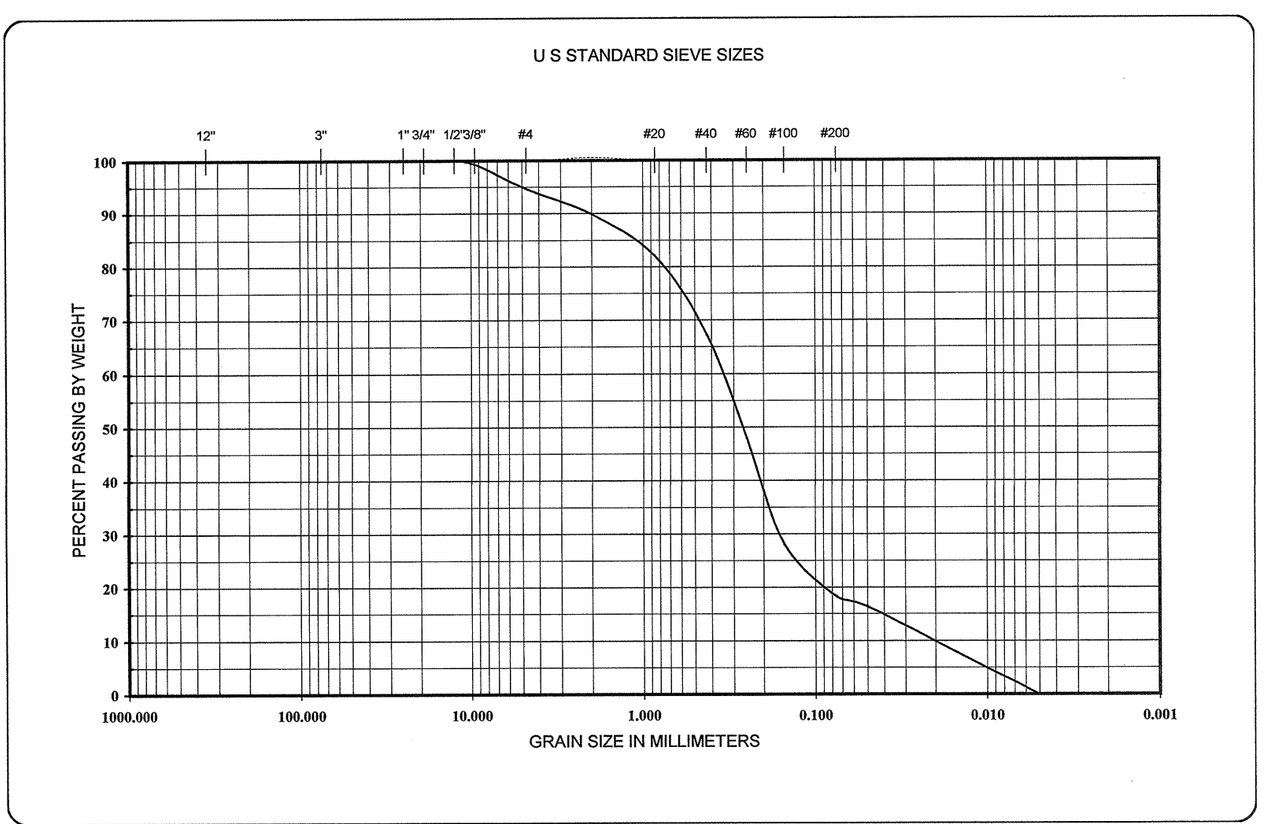

BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBK-1	G-1	0.0-1.0	-	29	NP	NP	ALLUVIAL: Silty, Fine to Coarse SAND (A-2-4)

GRAIN SIZE DISTRIBUTION

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SITE PHOTOGRAPHS
State Project No. 33825.1.1 TIP No. B-4665
Bridge No. 36 on SR 1304 (Cole Farm Road) Over Hawtree Creek
Warren County, North Carolina
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Photograph 1 – View Along Approximate CL of
Proposed Bridge Looking Upstation

Photograph 2 – View Along Proposed End Bent-1 from Left to Right

SITE PHOTOGRAPHS
State Project No. 33825.1.1 TIP No. B-4665
Bridge No. 36 on SR 1304 (Cole Farm Road) Over Hawtree Creek
Warren County, North Carolina
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Photograph 3 – View Along Proposed End Bent-2 from Left to Right

Photograph 4 – View of Existing Bridge Looking Downstream

SITE PHOTOGRAPHS
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Bridge No. 36 on SR 1304 (Cole Farm Road) Over Hawtree Creek
Warren County, North Carolina
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Photograph 5 – View of Existing Bridge Looking Upstream

Photograph 6 – View of Existing Bridge Supports Looking Northeast