STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4006	1	11
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

ID: B-4006

CONTRACT:

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33374.1.1 I.D. NO. B-4006

F.A. PROJECT

COUNTY ALEXANDER

PROJECT DESCRIPTION BRIDGE NO. 008 ON SR 1446 OVER ROCKY CREEK

SITE DESCRIPTION BRIDGE NO. 008 ON SR 1446 OVER ROCKY CREEK

CONTENTS:

CAUTION NOTICE

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INVESTIGATED BY J.E. BEVERLY PERSONNEL J.K. STICKNEY

CHECKED BY C.B. LITTLE C.L. SMITH

SUBMITTED BY C.B. LITTLE K. WISE

DATE JANUARY 2006

DRAWN BY: J.E. BEVERLY

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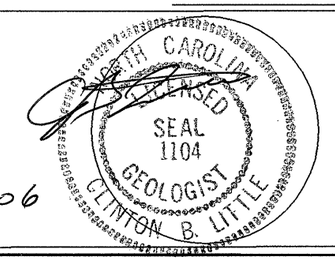


1-17-06

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4006	33374.1.1	2	//

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-7-5, A-7-6)	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							
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#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			
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 VST PMT - TEST BORING
- AUGER BORING
- CORE BORING
- MW - 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
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
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-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550X
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N XWL
- [ ] -H_____

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 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 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 (N 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 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL GPS 4006-2 @ 11+89.24 (-L- 16+91.33, 116.5' LT)

ELEVATION: 1194.66'

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY, GOVERNOR
P.O. BOX 25201, RALEIGH, N.C. 27611-5201
LYNDO TIPPETT, SECRETARY

January 13, 2006

STATE PROJECT: 33374.1.1 (B-4006)
COUNTY: Alexander
DESCRIPTION: Bridge #008 on SR 1446 (Linneys Mill Rd.) over Rocky Creek

SUBJECT: Geotechnical Report – Bridge Foundation Investigation

This is a proposed bridge replacement for bridge number 008 on SR 1446 over Rocky Creek. The new structure will be located south of the existing structure to conform with the realignment of Linneys Mill Rd (SR 1446) and Sulphur Springs Rd. (SR 1001). The proposed structure is a 120' single span composite plate girder design on a 49 degree skew at 34' 7" in total width. End bent slopes are proposed at 1.5:1 (H:V) with class II rip rap slope protection.

Four foundation test borings were performed utilizing a CME-550X drill machine, hollow stem augers, and an automatic drop hammer. The field investigation for this project was conducted in November of 2005.

Physiography/Geology

The project is located in northern Alexander County at its border with Wilkes County. The site area is gently sloping with wooded areas bounding the creek and a hay field to the west. Geologically this area is part of the Inner Piedmont/Chauga Belt and is underlain by Cenozoic age biotite gneiss and schist rock types.

Site specific soils noted during our investigation include existing roadway fill, alluvial, and residual types. Roadway fill soils associated with Linneys Mill Rd consist of soft to medium stiff sandy clay (A-7-5). Alluvial soils are soft to medium stiff clayey sandy silt (A-4, A-5) and very loose to medium dense clayey sand with gravel (A-2-4, A-1-b, A-1-a). Residual soils are loose to dense clayey sand (A-2-4, A-1-b).

Foundation Materials

End Bent 1:
Two borings were performed west of Rocky Creek for this bent location. Borings encountered 15 feet of alluvium consisting of tan-brown-gray very loose to medium dense clayey sand with quartz gravel (A-2-4, A-1-b) overlying residual soil. The residual soil boundary occurs at approximate elevation 1171.5 feet and soils below this horizon are composed of tan-brown-white-gray loose to dense micaceous clayey sand (A-2-4, A-1-b). Residual soil rests on top of weathered rock, which was followed quickly by auger refusal on hard rock. The following is a listing of weathered and hard rock elevations at each boring location:

Boring Location	Weathered Rock Elev. (feet)	Hard Rock Elev. (feet)
EB1-A	1145.65	1143.18
EB1-B	1149.40	1148.01

End Bent 2:
Two borings were performed east of Rocky Creek for this bent location. Boring EB2-A encountered 13.5 feet of roadway fill consisting of red-brown soft to medium stiff sandy clay (A-7-6). Beneath roadway fill in boring EB2-A, and beginning at the ground surface in boring EB2-B the soils are alluvial. Alluvium consists of 12.7 to 14 feet of gray and brown soft to medium stiff clayey sandy silt (A-4, A-5) and gray-tan loose to medium dense clayey sand (A-2-4, A-1-a). Additionally, A gravel layer was noted in boring EB2-B at a depth of 11.6-13.9 feet. A thin layer of residual soil was encountered below alluvium in boring EB2-B and consists of gray-white-yellow dense sand (A-2-4). This layer was not present in boring EB2-A. A very thin weathered rock seam followed by auger refusal on hard rock ends the strata sequence for our end bent borings. The following is a listing of weathered and hard rock elevations at each boring location:

Boring Location	Weathered Rock Elev. (feet)	Hard Rock Elev. (feet)
EB2-A	1175.45	1175.18
EB2-B	1172.70	1172.53

Groundwater

Groundwater measurements taken more than 24 hours after each boring was performed indicate the static groundwater table lies at approximate elevation 1180 - 1181 feet.

Respectfully submitted,

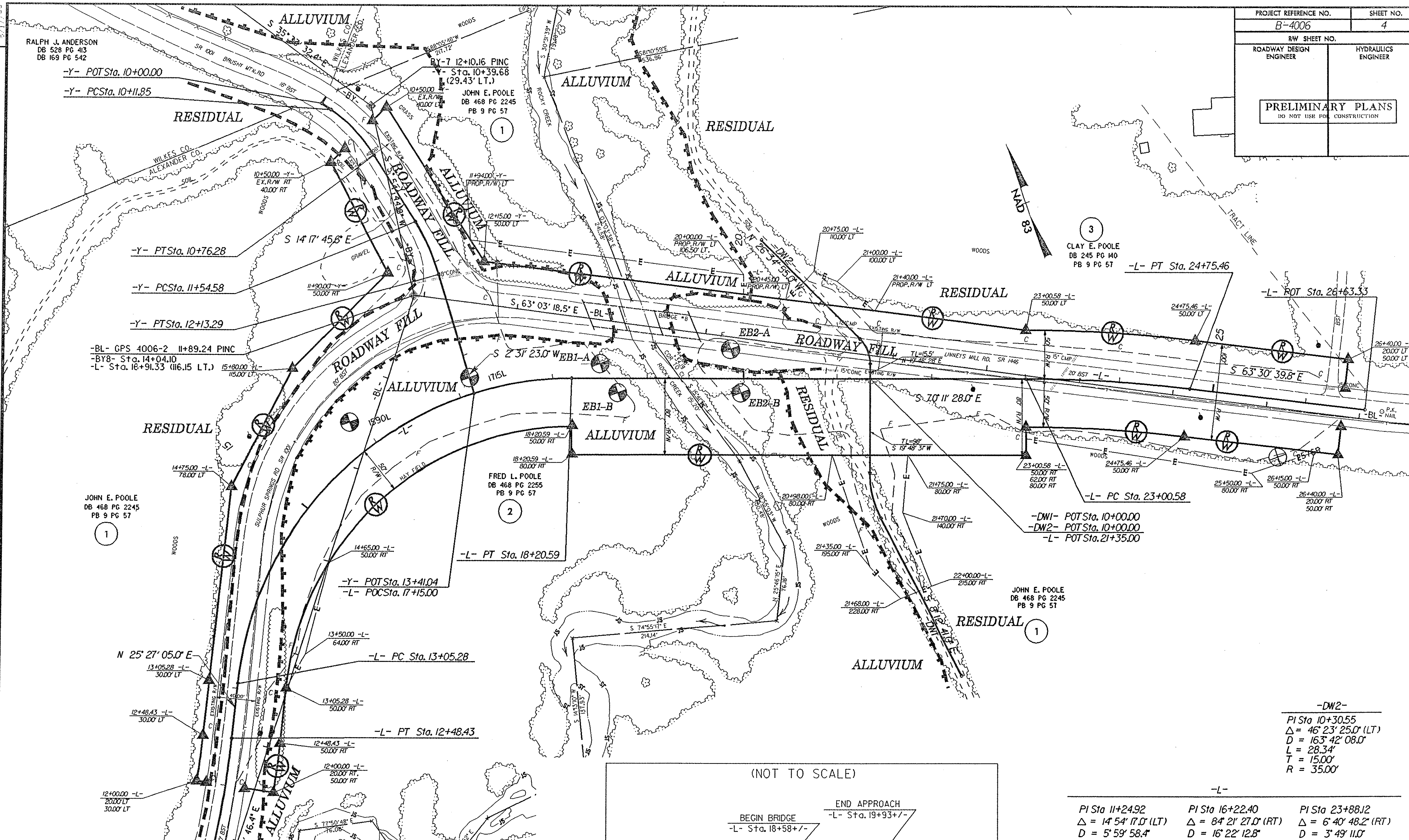
J.E. Beverly, Project Geologist

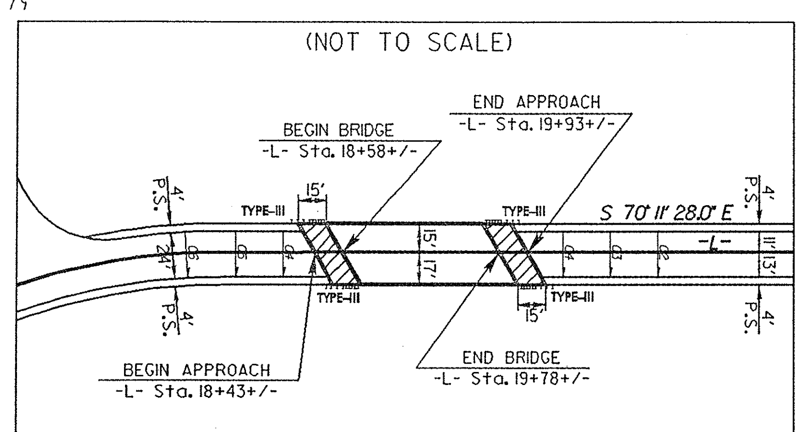
J E Beverly

PROJECT REFERENCE NO.	SHEET NO.
B-4006	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS





DETAIL SHOWING PAVEMENT AND BRIDGE RELATIONSHIP

NOTE: SEE SHEET 5 FOR -L- PROFILE
SEE SHEET 6 FOR -Y-, -DWI- & -DW2- PROFILES

-DW2-

PI Sta 10+30.55
Δ = 46° 23' 25.0" (LT)
D = 163° 42' 08.0"
L = 28.34'
T = 15.00'
R = 35.00'

-L-

PI Sta 11+24.92	PI Sta 16+22.40	PI Sta 23+88.12
Δ = 14° 54' 17.0" (LT)	Δ = 84° 21' 27.0" (RT)	Δ = 6° 40' 48.2" (RT)
D = 5° 59' 58.4"	D = 16° 22' 12.8"	D = 3° 49' 11.0"
L = 248.43'	L = 515.31'	L = 174.88'
T = 124.92'	T = 317.12'	T = 87.54'
R = 955.00'	R = 350.00'	R = 1,500.00'
SE = SEE PLANS	SE = SEE PLANS	SE = SEE PLANS

-Y-	-Y-	-DWI-
PI Sta 10+44.49	PI Sta 11+84.15	PI Sta 11+23.17
Δ = 22° 33' 06.6" (RT)	Δ = 16° 49' 08.6" (RT)	Δ = 28° 01' 12.0" (LT)
D = 35° 00' 01.7"	D = 28° 38' 52.4"	D = 57° 17' 44.8"
L = 64.43'	L = 58.71'	L = 48.90'
T = 32.64'	T = 29.57'	T = 24.95'
R = 163.70'	R = 200.00'	R = 100.00'
SE = SEE PLANS	SE = SEE PLANS	

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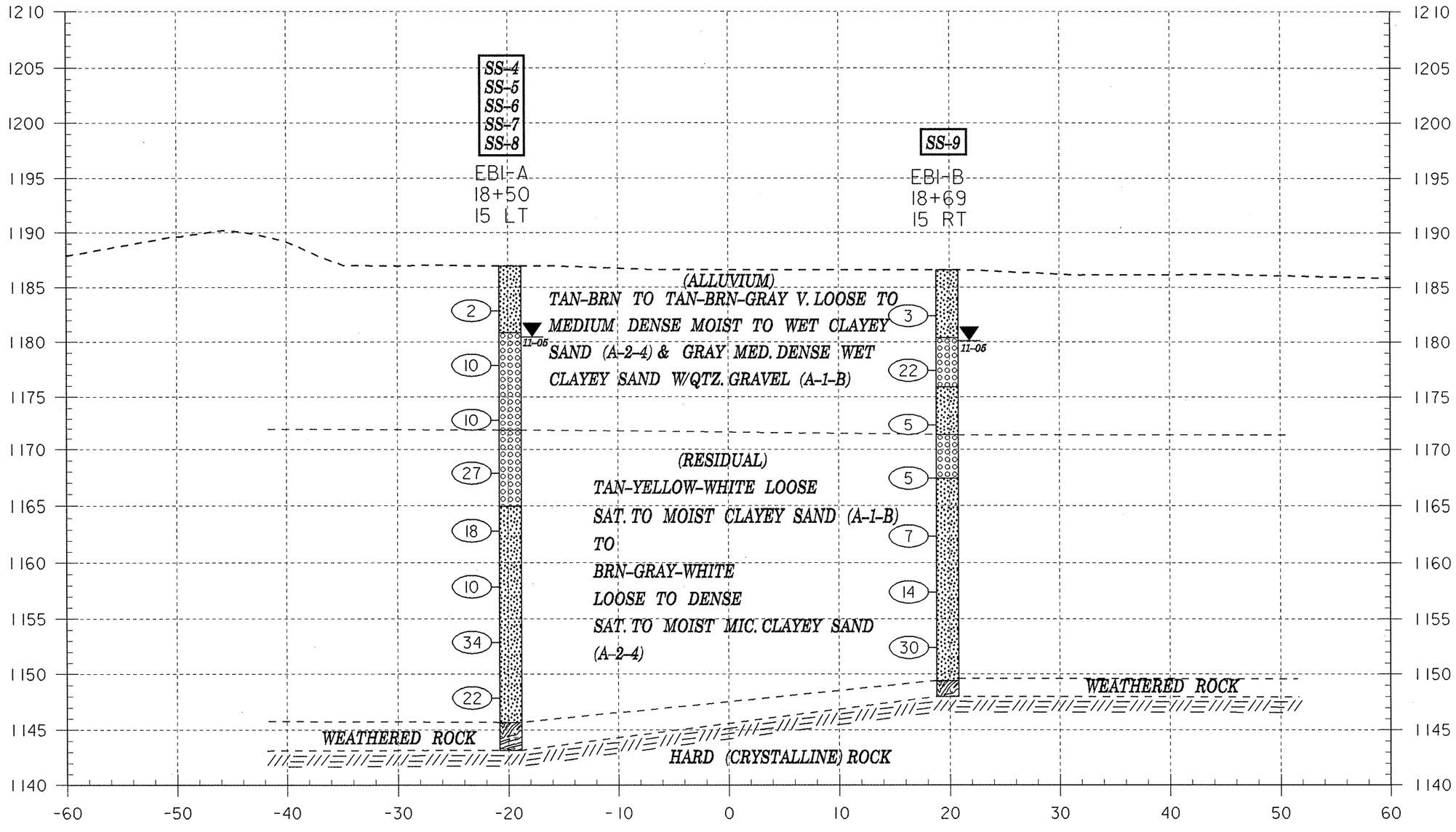
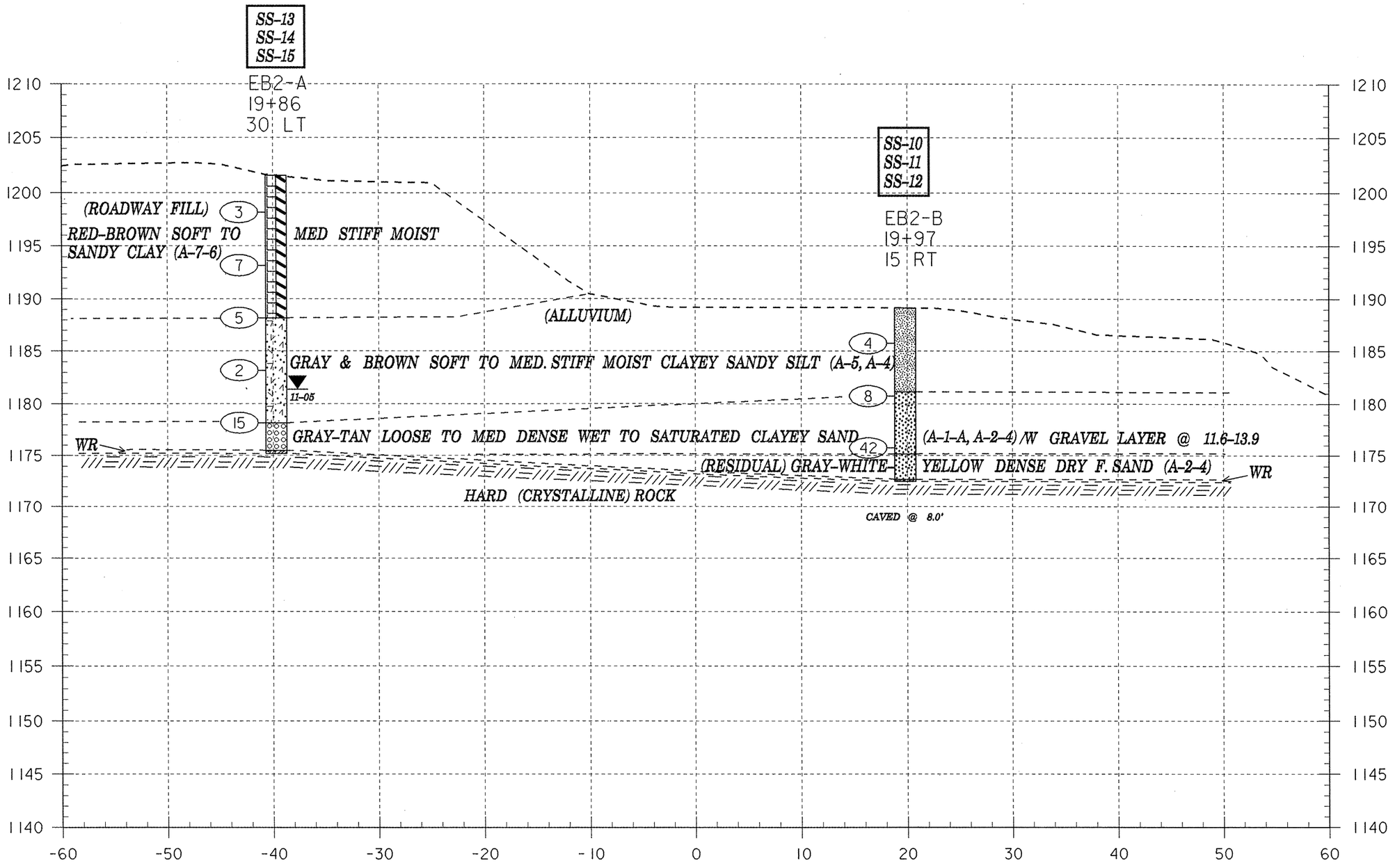
PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
B-4006	5	11

SECTION THROUGH EB I-A & EB I-B (ALONG SKEW)



PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
B-4006	6	11

SECTION THROUGH EB2-A & EB2-B (ALONG SKEW)



PROJECT REFERENCE NO.	SHEET NO.
B-4006	7

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

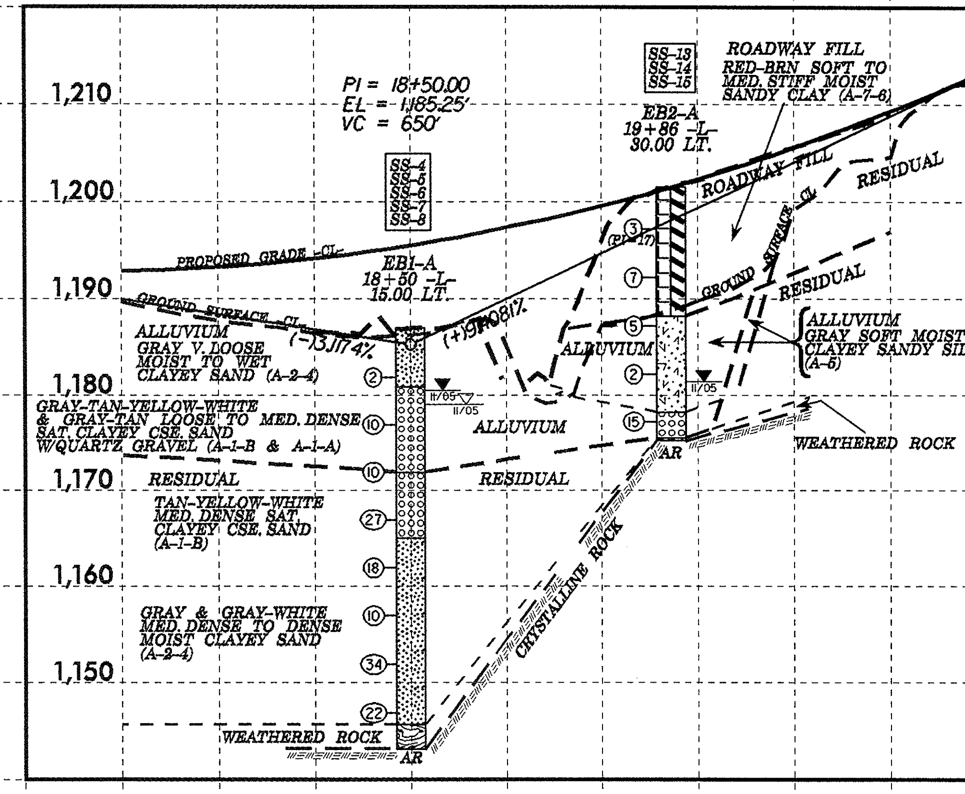
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

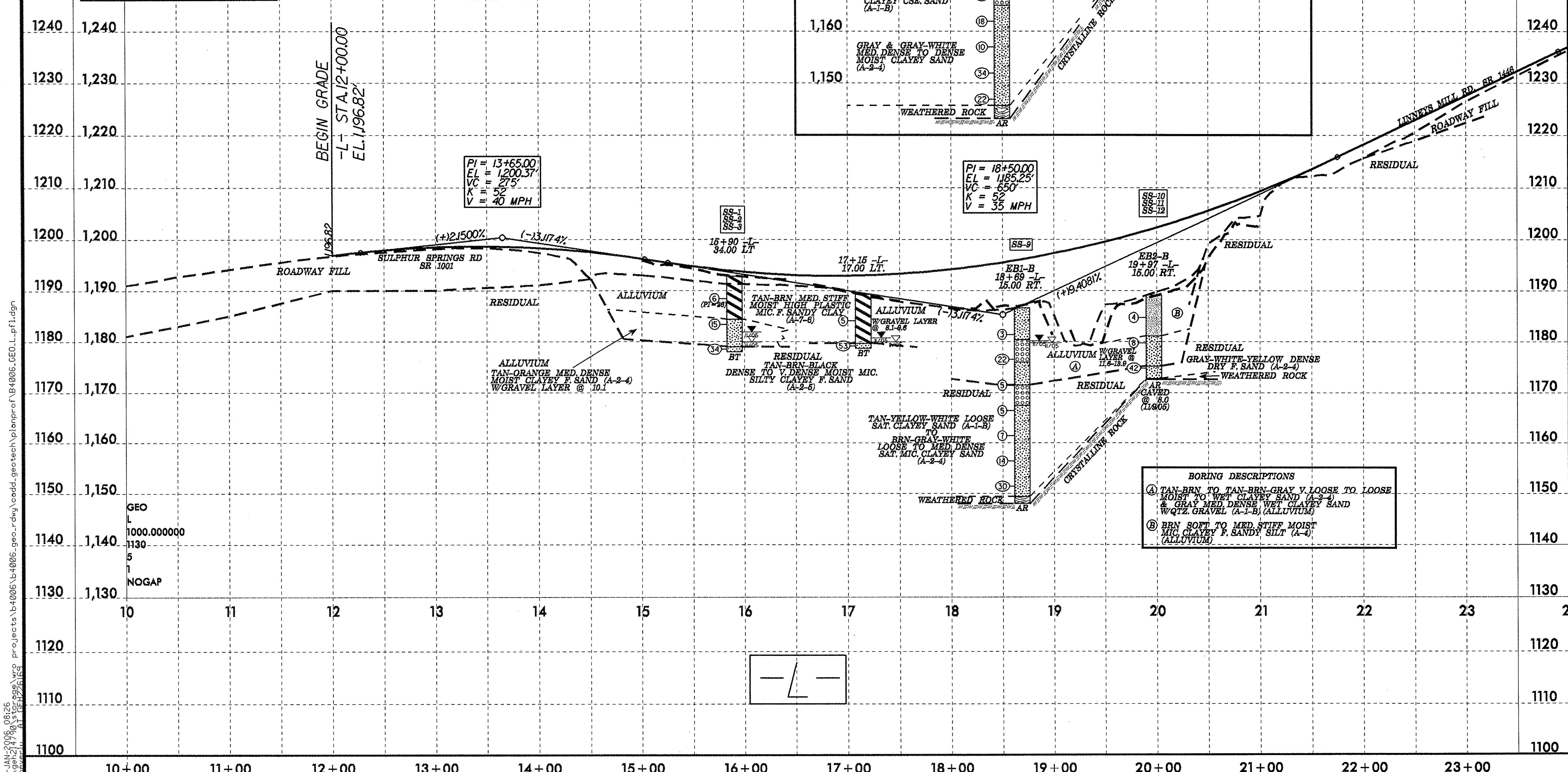
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	34 LT	15+90	3.90-4.90	A-7-6(16)	51	26	6.7	35.3	5.5	52.5	100	98	65	-	-
SS-2	34 LT	15+90	8.90-9.90	A-2-4(0)	27	NP	60.5	23.5	1.9	14.1	89	52	17	-	-
SS-3	34 LT	15+90	13.90-14.90	A-2-5(0)	61	NP	20.4	52.9	12.6	14.1	95	88	32	-	-
SS-4	15 LT	18+50	4.60-5.60	A-2-4(0)	29	NP	52.7	22.8	8.4	16.1	92	77	24	-	-
SS-5	15 LT	18+50	9.60-10.60	A-1-b(0)	26	NP	62.3	24.9	0.7	12.1	64	33	9	-	-
SS-6	15 LT	18+50	15.10-15.60	A-1-b(0)	26	NP	61.6	22.2	2.1	14.1	69	32	14	-	-
SS-7	15 LT	18+50	24.60-25.60	A-2-4(0)	38	NP	27.0	55.3	3.5	14.1	100	89	27	-	-
SS-8	15 LT	18+50	34.60-35.60	A-2-4(0)	33	NP	32.9	43.6	7.4	16.1	100	83	31	-	-
SS-9	15 RT	18+69	4.70-5.70	A-2-4(0)	30	NP	36.5	48.4	0.9	14.1	71	59	14	-	-
SS-13	30 LT	19+86	3.90-4.90	A-7-6(7)	41	17	22.2	27.0	4.3	46.4	100	86	55	-	-
SS-14	30 LT	19+86	13.90-14.90	A-5(2)	44	6	24.6	32.1	11.0	32.3	100	86	48	-	-
SS-15	30 LT	19+86	24.90-25.90	A-1-a(0)	25	NP	46.6	38.1	3.1	12.1	41	29	9	-	-
SS-10	15 RT	19+97	3.90-4.90	A-4(4)	39	9	5.2	43.8	14.6	36.3	100	99	59	-	-
SS-11	15 RT	19+97	8.90-9.90	A-2-4(0)	26	NP	21.3	64.7	1.9	12.1	100	98	18	-	-
SS-12	15 RT	19+97	13.90-14.90	A-2-4(0)	27	NP	31.3	53.9	7.8	7.1	96	82	22	-	-

BM#1
GPS CAP STAMPED B4006-1
ELEV = 1192.29'
-BL- STA.5+00.00 ON LINE
-L- STA.10+49.36 17.82' RT.

BM#2
8" SPIKE IN ROOT OF 10"
CHERRY TREE. ELEV = 1186.80'
-BL- STA.8+24.90 260.28' RT
-L- STA.13+67.91 318.30' RT.





BORING DESCRIPTIONS
Ⓐ TAN-BRN TO TAN-BRN-GRAY V. LOOSE TO LOOSE MOIST TO WET CLAYEY SAND (A-2-4) & GRAY MED. DENSE WET CLAYEY SAND W/QTZ. GRAVEL (A-1-B) (ALLUVIUM)
Ⓑ BRN SOFT TO MED. STIFF MOIST MIC. CLAYEY F. SANDY SILT (A-4) (ALLUVIUM)

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33374.1.1	**ID** B4006	**COUNTY** ALEXANDER	**GEOLOGIST** J K STICKNEY
SITE DESCRIPTION BRIDGE 08 OVER ROCKY CREEK ON SR 1446			**GND WATER**
BORING NO EB1-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** 8.00ft
ALIGNMENT L	**BORING LOCATION** 18+50.000	**OFFSET** 15.00ft LT	**24 HR** 6.50ft
COLLAR ELEV 1186.98ft	**TOTAL DEPTH** 43.80ft	**START DATE** 11/07/05	**COMPLETION DATE** 11/07/05
DRILL MACHINE CME-55OX	**DRILL METHOD** H.S. AUGERS		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 43.80ft		Log EB1-A, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1186.98						Ground Surface				
	4.10	0	1	1	1.0	2	SS-4	W		ALLUVIUM GRAY VERY LOOSE MOIST TO WET CLAYEY SAND (A-2-4)
1180.00	9.10	0	4	6	1.0	10	SS-5	SAT		GRAY-TAN-YELLOW-WHITE LOOSE SATURATED CLAY CSE SAND WITH QUARTZ GRAVEL (A-1-B)
	14.10	10	7	3	1.0	10	SS-6	SAT		
1170.00	19.10	20	14	13	1.0	27				RESIDUAL TAN-YELLOW-WHITE MED DENSE SATURATED CLAYEY CSE SAND (A-1-B)
	24.10	3	4	14	1.0	18	SS-7	M		GRAY & GRAY-WHITE MED DENSE TO DENSE MOIST CLAYEY SAND (A-2-4)
1160.00	29.10	0	2	8	1.0	10				
	34.10	5	12	22	1.0	34	SS-8	M		
1150.00	39.10	5	6	16	1.0	22				
1143.18						AUGER REFUSAL ON HARD ROCK @ ELEVATION 1143.18				WEATHERED ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33374.1.1	**ID** B4006	**COUNTY** ALEXANDER	**GEOLOGIST** J K STICKNEY
SITE DESCRIPTION BRIDGE 08 OVER ROCKY CREEK ON SR 1446			**GND WATER**
BORING NO EB1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** 6.90ft
ALIGNMENT L	**BORING LOCATION** 18+69.000	**OFFSET** 15.00ft RT	**24 HR** 6.50ft
COLLAR ELEV 1186.61ft	**TOTAL DEPTH** 38.60ft	**START DATE** 11/07/05	**COMPLETION DATE** 11/08/05
DRILL MACHINE CME-55OX	**DRILL METHOD** H.S. AUGERS		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 38.60ft		Log EB1-B, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1186.61						Ground Surface				
	4.20	1	2	1	1.0	3	SS-9	M		ALLUVIUM TAN-BROWN VERY LOOSE MOIST CLAYEY SAND (A-2-4)
1180.00	9.20	5	17	5	1.0	22				GRAY MED DENSE WET CLAYEY SAND WITH QUARTZ GRAVEL (A-1-B)
	14.20	2	2	3	1.0	5				TAN-BROWN VERY LOOSE MOIST CLAYEY SAND (A-2-4)
1170.00	19.20	2	2	3	1.0	5				RESIDUAL TAN-YELLOW-WHITE LOOSE SATURATED CLAYEY SAND (A-1-B)
	24.20	3	3	4	1.0	7				BROWN-GRAY-WHITE LOOSE TO MED DENSE SATURATED MIC CLAYEY SAND (A-2-4)
1160.00	29.20	2	3	11	1.0	14				
	34.20	13	14	16	1.0	30				
1150.00										
1148.01						AUGER REFUSAL ON HARD ROCK @ ELEVATION 1148.01				WEATHERED ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33374.1.1	**ID** B4006	**COUNTY** ALEXANDER	**GEOLOGIST** J K STICKNEY
SITE DESCRIPTION BRIDGE 08 OVER ROCKY CREEK ON SR 1446			**GND WATER**
BORING NO EB2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L	**BORING LOCATION** 19+86.000	**OFFSET** 30.00ft LT	**24 HR** 20.20ft
COLLAR ELEV 1201.58ft	**TOTAL DEPTH** 26.40ft	**START DATE** 11/08/05	**COMPLETION DATE** 11/08/05
DRILL MACHINE CME-55OX	**DRILL METHOD** H.S. AUGERS		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 26.40ft		Log EB2-A, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1201.58						Ground Surface				
1200.00	3.40	2	1	2	1.0	3	SS-13	M		ROADWAY FILL RED-BROWN SOFT TO MED STIFF MOIST SANDY CLAY (A-7-6)
	8.40	3	3	4	1.0	7				
1190.00	13.40	2	2	3	1.0	5	SS-14	M		ALLUVIUM GRAY. SOFT MOIST CLAYEY SANDY SILT (A-5)
	18.40	3	1	1	1.0	2		▼		
1180.00	23.40	20	9	6	1.0	15	SS-15	SAT		GRAY-TAN MED DENSE SATURATED CLAYEY SAND (A-1-A)
1175.18						AUGER REFUSAL ON HARD ROCK @ ELEVATION 1175.18'				WEATHERED ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33374.1.1	**ID** B4006	**COUNTY** ALEXANDER	**GEOLOGIST** J K STICKNEY
SITE DESCRIPTION BRIDGE 08 OVER ROCKY CREEK ON SR 1446			**GND WATER**
BORING NO EB2-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L	**BORING LOCATION** 19+97.000	**OFFSET** 15.00ft RT	**24 HR** N/A
COLLAR ELEV 1189.13ft	**TOTAL DEPTH** 16.60ft	**START DATE** 11/08/05	**COMPLETION DATE** 11/08/05
DRILL MACHINE CME-55OX	**DRILL METHOD** H.S. AUGERS		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** 16.60ft		Log EB2-B, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1189.13						Ground Surface				
	3.40	1	2	2	1.0	4	SS-10	M		ALLUVIUM BRN SOFT TO MED. STIFF MOIST MIC CLAYEY F SANDY SILT (A-4)
1180.00	8.40	5	5	3	1.0	8	SS-11	W		TAN-BROWN-GRAY LOOSE WET CLAYEY F SAND (A-2-4) WITH GRAVEL LAYER @ 11.6-13.9
	13.40	48	26	16	1.0	42	SS-12	D		RESIDUAL GRAY-WHITE-YELLOW DENSE DRY F SAND (A-2-4)
1172.53						AUGER REFUSAL ON HARD ROCK @ ELEVATION 1172.53'				WEATHERED ROCK

M & T Form 503

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY

T. I. P. No. B-4006

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	33374.1.1	**County**	ALEXANDER	**Owner**	
Date: Sampled		**Received**	11/14/05	**Reported**	11/16/2005
Sampled from	ROADWAY			**By**	J E BEVERLY
Submitted by	N WAINAINA				1995 **Standard Specifications**

726941 TO 726955
1/17/06

TEST RESULTS

Proj. Sample No.		SS-4	SS-5	SS-6	SS-7	SS-8	SS-9
Lab. Sample No.		#REF!	#REF!	#REF!	726941	726942	726943
Retained #4 Sieve	%	3	20	15	-	-	21
Passing #10 Sieve	%	92	64	69	100	100	71
Passing #40 Sieve	%	77	33	32	89	83	59
Passing #200 Sieve	%	24	9	14	27	31	14

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	52.7	62.3	61.6	27.0	32.9	36.5
Fine Sand Ret - #270	%	22.8	24.9	22.2	55.3	43.6	48.4
Silt 0.05 - 0.005 mm	%	8.4	0.7	2.1	3.5	7.4	0.9
Clay < 0.005 mm	%	16.1	12.1	14.1	14.1	16.1	14.1
Passing #40 Sieve	%	#REF!	#REF!	#REF!	-	-	-
LOCATION	%	FB1-A	FB1-A	FB1-A	FB1-A	FB1-A	FB1-B

L. L.	29	26	26	38	33	30
P. I.	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-2-4(0)	A-1-b(0)	A-1-b(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)
Station	18+50	18+50	18+50	18+50	18+50	18+69
OFFSET	15 LT	15 LT	15 LT	15 LT	15 LT	15 RT
ALIGNMENT	L	L	L	L	L	L
Depth (Ft)	4.60	9.60	15.10	24.60	34.60	4.70
to	5.60	10.60	15.60	25.60	35.60	5.70

cc: J E BEVERLY
Soils File

Soils Engineer

M & T Form 503

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY

T. I. P. No. B-4006

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	33374.1.1	**County**	ALEXANDER	**Owner**	
Date: Sampled		**Received**	11/14/05	**Reported**	11/16/2005
Sampled from	ROADWAY			**By**	J E BEVERLY
Submitted by	N WAINAINA				1995 **Standard Specifications**

726941 TO 726955
1/17/06

TEST RESULTS

Proj. Sample No.		SS-10	SS-11	SS-12	SS-13	SS-14	SS-15
Lab. Sample No.		726944	726945	726946	726947	726948	726949
Retained #4 Sieve	%	-	-	-	-	-	49
Passing #10 Sieve	%	100	100	96	100	100	41
Passing #40 Sieve	%	99	98	82	86	86	29
Passing #200 Sieve	%	59	18	22	55	48	9

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	5.2	21.3	31.3	22.2	24.6	46.6
Fine Sand Ret - #270	%	43.8	64.7	53.9	27.0	32.1	38.1
Silt 0.05 - 0.005 mm	%	14.6	1.9	7.8	4.3	11.0	3.1
Clay < 0.005 mm	%	36.3	12.1	7.1	46.4	32.3	12.1
Passing #40 Sieve	%	-	-	-	-	-	-
LOCATION	%	FB2-B	FB2-B	FB2-B	FB2-A	FB2-A	FB2-A

L. L.	39	26	27	41	44	25
P. I.	9	NP	NP	17	6	NP
AASHTO Classification	A-4(4)	A-2-4(0)	A-2-4(0)	A-7-6(7)	A-5(2)	A-1-a(0)
Station	19+97	19+97	19+97	19+86	19+86	19+86
OFFSET	15 RT	15 RT	15 RT	30 LT	30 LT	30 LT
ALIGNMENT	L	L	L	L	L	L
Depth (Ft)	3.90	8.90	13.90	3.90	13.90	24.90
to	4.90	9.90	14.90	4.90	14.90	25.90

Soils Engineer

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: *33374.1.1* TIP NO.: *B-4006* COUNTY: *Alexander*

DESCRIPTION(1): *Bridge # 008 on SR 1446 over Rocky Creek*

♦ ***INFORMATION ON EXISTING BRIDGES*** Information obtained from ☒ Field Inspection
☐ Microfilm (Reel: Position:)
☐ Other

COUNTY BRIDGE NO. *008* BRIDGE LENGTH *Appx 112'* NO. BENTS *4* NO. BENTS IN: CHANNEL *1* FLOODPLAIN *4*

FOUNDATION TYPE: *Concrete encased steel piles and concrete abutment piles*

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: *Erosion at both end bents*

INTERIOR BENTS: *None*

CHANNEL BED: *None*

CHANNEL BANKS: *Steep but stable*

♦ ***EXISTING SCOUR PROTECTION:***

TYPE(3): *Rip Rap*

EXTENT(4): *Slope of EB1 to Bent 1 and slope of EB2 to Bent 2*

EFFECTIVENESS(5): *Fair*

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): *None observed*

♦ ***DESIGN INFORMATION***

CHANNEL BED MATERIAL(7) (Sample Results Attached): *Coarse sand (SS-5)*

CHANNEL BANK MATERIAL(8) (Sample Results Attached): *Sandy clay (SS-1)*

CHANNEL BANK COVER(10): *Grass and shrubs with a few trees*

FLOOD PLAIN WIDTH(11): *approx 500' (entire project to sta 20+50)*

FLOOD PLAIN COVER(12): *Grass, mature trees and shrubs*

STREAM IS: ☐ DEGRADING ☒ AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: *Property owner F. Poole states that water has covered his field several times and the channel appeared to be flowing through the middle of his field.*

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♦ ***DESIGN INFORMATION CONT.***

CHANNEL MIGRATION TENDENCY(14): *moderate*

GEOTECHNICAL ADJUSTED SCOUR ELEVATIONS (15):

No NCDOT Hydraulics Report was available at the time this bridge was investigated.

Scour should not be a problem for the proposed structure since it is a single span design with end bents outside of the critical scour zone.

REPORTED BY: *JKS/JEB* DATE: *January 2006*

INSTRUCTIONS

(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIPRAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(8) DESCRIBE THE CHANNEL BANK MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(9) DESCRIBE THE FOUNDATION BEARING MATERIAL
(10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIPRAP, NONE, ETC.)
(11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
(14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(15) GIVE THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENT RQD; DIFFERENTIAL WEATHERING; SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.