ID: I-3819A

CONTRACT: 34192.1.2

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 F.A. PROJ. IMS -40-2(124)15

COUNTY IREDELL

PROJECT DESCRIPTION STATESVILLE - I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR2003 (RADIO ROAD) TO SR2158 (OLD MOCKSVILLE ROAD) & I-77 FROM SOUTH OF SR2321 (E. BROAD STREET) TO SOUTH OF SR2171 (JANE SOWER ROAD)

SITE DESCRIPTION BRIDGE No. 565 ON -Y4RPA- OVER FOURTH CREEK

INVENTORY

CONTENTS:

Title Sheet	Sheet 1
NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheet 2
Site Vicinity Map	Sheet 3
Boring Location Plan	Sheet 4
Generalized Subsurface Profile Along -Y4RPA-	Sheet 5
Generalized Subsurface Cross Section Through End Bent No. 1	Sheet 6
Generalized Subsurface Cross Section Through Interior Bent No. 1	Sheet 7
Generalized Subsurface Cross Section Through Interior Bent No. 2	Sheet 8
Generalized Subsurface Cross Section Through End Bent No. 2	Sheet 9
Test Boring Logs Core Reports Core Photographs	Sheets 10 - 16
Summary of Laboratory Test Data	Sheet 17
Summary of Rock Core Test Results	Sheet 18
Field Scour Report (Performed February 23, 2010)	Sheet 19
Grain Size Curves	Sheets 20 - 21
Site Photographs	Sheets 22 - 24

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-3819A	1	24

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34192.1.2	IMS-40-2(124)15	P.E.
		R/W & UTIL.

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SUBMITTED BY S&ME, INC.

DATE MARCH 17, 2010

NORTH CAROLINA PROFESSIONAL SEAL 14155 ENGINEER ALBERT F RIGGS, JR. 3/30/10

For Letting

DRAWN BY: T. PEREZ

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PROJECT REFERENCE NO.	SHEET NO.
34192.1.2	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 # 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		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 SOILS				
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 / DPT / 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	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL. - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HI. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2-15/16 STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] 3 1/4" H.S.A.

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N 0
- [ ] -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.

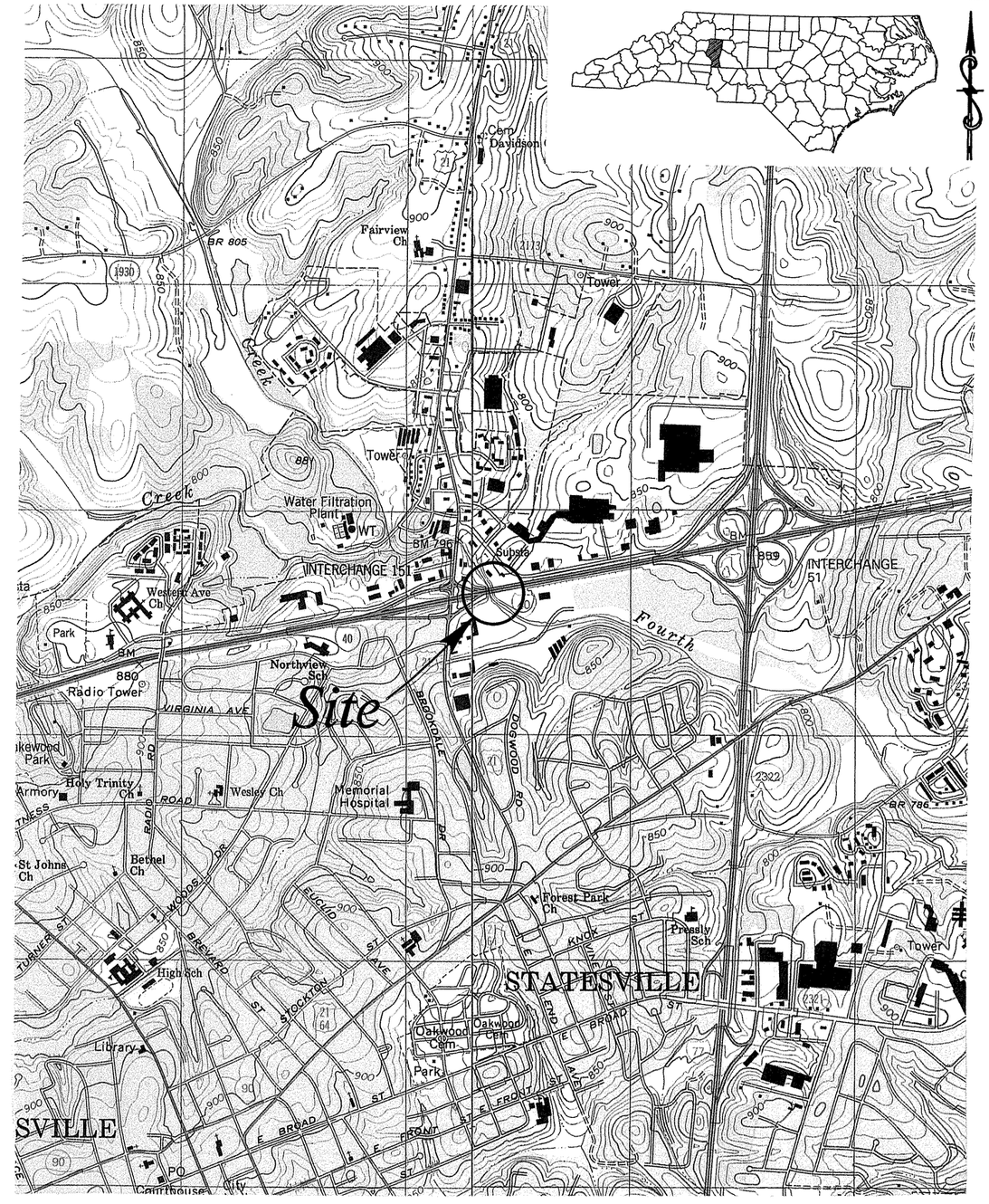
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BY4-131 NCDOT Traverse Station Rebar & Cap Stamped "BY4-131" Located at Station 29+19.54 -BY4-
ELEVATION: 790.37 FT.

NOTES:
- SPT LAB SAMPLE
- ST — SHELBY TUBE

REVISED 09/23/09

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
I-3819A	34192.1.2	3	24



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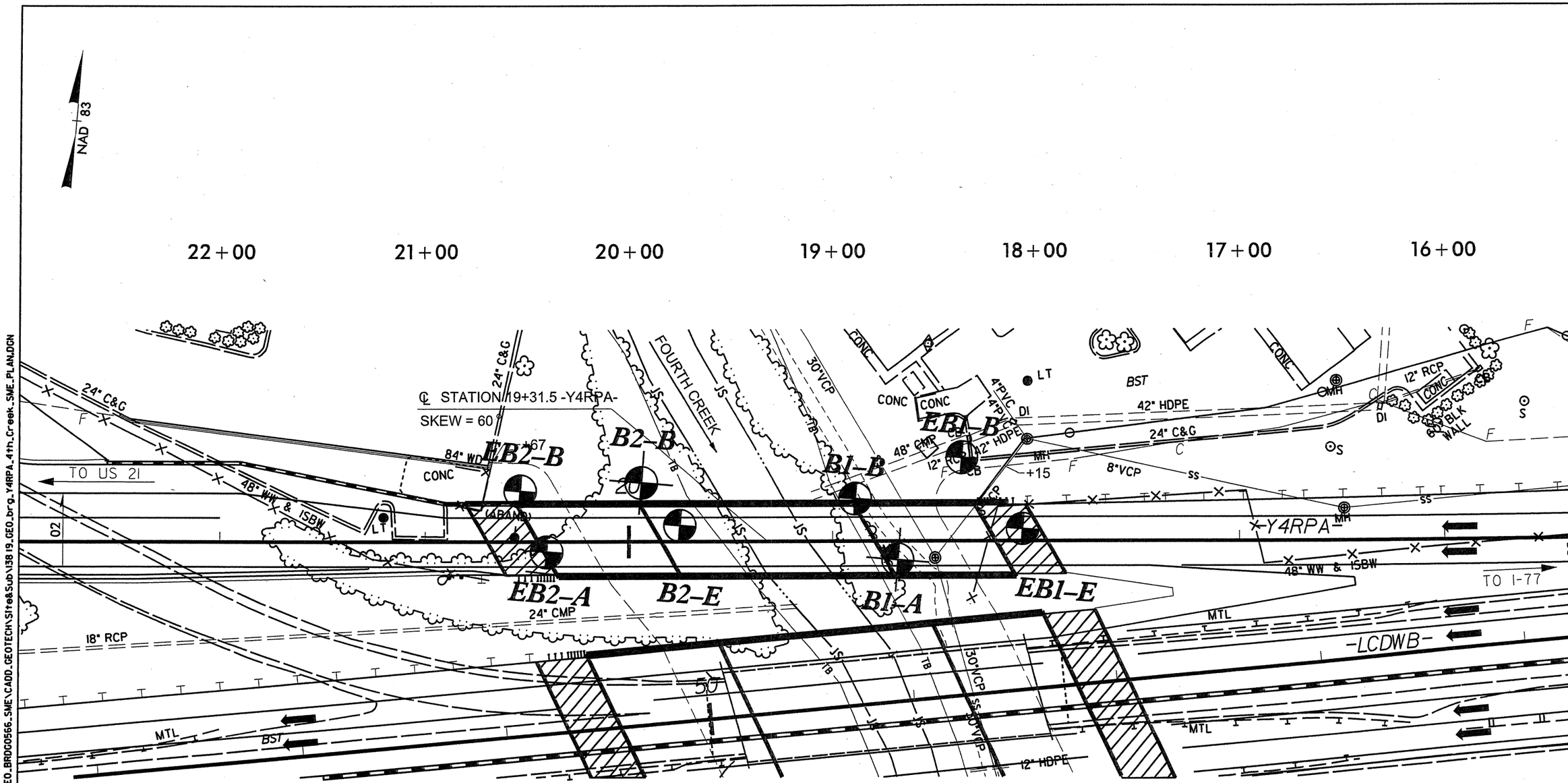
SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	MARCH 2010
JOB NO.	1051-10-005

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING -TESTING

SITE VICINITY MAP

BRIDGE No. 565 ON -Y4RPA-
OVER FOURTH CREEK
STATE PROJECT NO. 34192.1.2 TIP NO. I-3819A
FEDERAL I.D. NO. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA



BENCHMARK:
BY4-131 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-131"
LOCATED AT STATION 29+19.54 -BY4-
ELEV. 790.37'

BY4-130 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-130"
LOCATED AT STATION 24+07.07 -BY4-
ELEV. 799.81'

SKEW ANGLE FOR BENTS 60° 00'00" (TYPICAL)

NOTE: STATIONING ON PLAN RUNS RIGHT TO LEFT AS SHOWN ON HYDRAULIC DESIGN REPORT.

0 50 100
SCALE IN FEET

S:\PROJECTS\10-005\GEOTECH DOT\CADD\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_brg_Y4RPA_4th_Creek_SME_PLAN.DGN

SCALE:	1" = 50'
DATE:	MARCH 2010
JOB NO.	1051-10-005
APPROVED BY:	AFR
DRAWN BY:	TRP
SHEET	4

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

BORING LOCATION PLAN

BRIDGE No. 565 ON -Y4RPA-
OVER FOURTH CREEK

TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:PROJECTS/2010 / 10-005/GEOTECH DOT/CADD/I-3819A/13819A_GEO_BRDG0565_SME/CADD_GEOTECH/SITE&SUB/13819A_GEO_BRG_Y4RPA_4THCRK_PROFILE.DGN

GENERALIZED SUBSURFACE PROFILE ALONG -Y4PRA-

TO I-77 ← → TO US 21

EB1–E
18+06
6 ft RT. –Y4RPA–

EB2–A
20+40
5 ft LT. –Y4RPA–

B1–A
18+68
9 ft LT. –Y4PRA–

B2–E
19+75
8 ft RT. –Y4RPA–

820′ 810′ 800′ 790′ 780′ 770′ 760′ 750′ 740′ 730′ 720′ 710′ 700′ 690′

GROUND SURFACE

RESIDUAL: MEDIUM STIFF TO STIFF RED-BROWN SILTY COARSE TO FINE SANDY CLAY WITH TRACE OF MICA (M)

ST-1

SOFT TO STIFF BROWN-BLACK TO GRAY-BROWN FINE TO COARSE SANDY CLAYEY SILT WITH LITTLE TO SOME MICA (M)

02/10

LOOSE TO MEDIUM DENSE DARK GRAY TO BROWN CLAYEY SILTY FINE TO COARSE SAND WITH QUARTZ ROCK FRAGMENTS (SAT.)

WEATHERED ROCK: (BIOTITE GNEISS)

100/0.8

60/0.0

CRYSTALLINE ROCK: (BIOTITE GNEISS)

60/0.1

WEATHERED ROCK: (BIOTITE GNEISS)

100/0.5

60/0.1

CRYSTALLINE ROCK: (BIOTITE GNEISS)

100/0.8

60/0.0

WEATHERED ROCK: (BIOTITE GNEISS)

CRYSTALLINE ROCK: (BIOTITE GNEISS)

A

B

02/10

CREEK BOTTOM

WSE = 777.2' 2/23/10

C

E

100/0.6

60/0.0

GROUND SURFACE

ALLUVIAL: VERY SOFT TO MEDIUM STIFF ORANGE-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M TO W)

WOH

02/10

D

E

100/0.7

60/0.0

CRYSTALLINE ROCK: (BIOTITE GNEISS)

20′ 10′ 0

Vertical

Horizontal

0 50′

A ALLUVIAL: SOFT RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

B ALLUVIAL: SOFT BROWN FINE TO COARSE SANDY CLAY (W)

C ALLUVIAL: VERY LOOSE TO LOOSE RED-BROWN TO GRAY SILTY TO CLAYEY FINE TO COARSE SAND (M TO SAT.)

D RESIDUAL: VERY STIFF ORANGE-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA

E WEATHERED ROCK: (BIOTITE GNEISS)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE PROFILE.
GROUNDLINE PROFILE OF -Y4RPA- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 08/14/09.

17+00 17+50 18+00 18+50 19+00 19+50 20+00 20+50 21+00

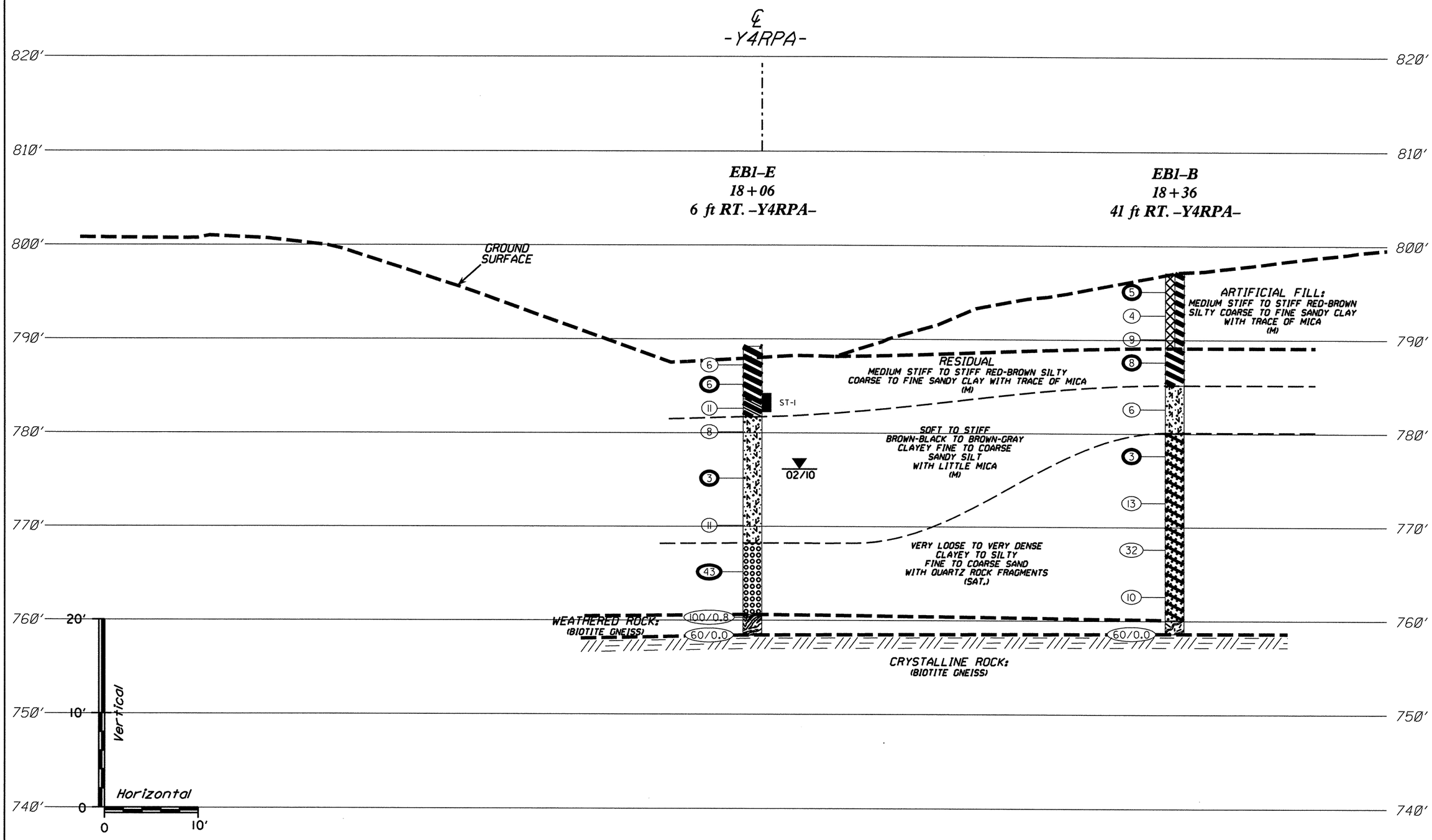
GENERALIZED SUBSURFACE PROFILE ALONG -Y4RPA-

BRIDGE No. 565 ON -Y4RPA-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	MARCH 2010	DRAWN BY:	TRP
JOB NO.	1051-10-005	SHEET	5

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 1



NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION. GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

S:PROJECTS\10-006\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_BRG-Y4RPD_4THCRK_XSC.DGN

APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	6
SCALE:	(V) 1" = 10' (H) 1" = 10'
DATE:	MARCH 2010
JOB NO.	1051-10-005

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 1
BRIDGE No. 565 on -Y4RPA-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 1

℄
-Y4RPA-

800′
790′
780′
770′
760′
750′
740′
730′
720′

B1–A
18+68
9 ft LT. –Y4RPA–

B1–B
18+89
21 ft RT. –Y4RPA–

GROUND SURFACE

ALLUVIAL:
SOFT RED-BROWN
FINE TO COARSE SANDY SILT
WITH TRACE OF MICA
(M)

RESIDUAL:
SOFT GRAY-BLACK
FINE TO COARSE SANDY SILT
WITH LITTLE TO SOME MICA
(M)

VERY LOOSE TO LOOSE
BROWN CLAYEY SILTY
COARSE TO FINE SAND
(SAT.)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

WEATHERED ROCK:
(BIOTITE GNEISS)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

WEATHERED ROCK:
(BIOTITE GNEISS)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

B1-A: 4, 3, 3, 4, 3, 7, 10, 60/0.1, 100/0.5, 60/0.1, 100/0.8, 60/0.0

B1-B: 3, 3, 16, 3, 3, 6, 3, 60/0.0

02/10

A

B

20′
10′
Vertical
Horizontal
0
0
10′

A ARTIFICIAL FILL: SOFT TO VERY STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH ROCK FRAGMENTS AND TRACE OF MICA AND CLAY LAYERS (M)

B ALLUVIAL: SOFT BROWN FINE TO COARSE SANDY CLAY (M)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
DRAWN BY: TRP
FIGURE 7

SCALE: (V) 1" = 10'
(H) 1" = 10'
DATE: MARCH 2010
JOB NO. 105I-10-005

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No.1
BRIDGE No.565 on -Y4RPA-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 2

℄
-Y4RPA-

820′
810′
800′
790′
780′
770′
760′
750′
740′

B2-E
19+75
8 ft RT. -Y4RPA-

B2-B
19+94
29 ft RT. -Y4RPA-

GROUND SURFACE

ALLUVIAL:
LOOSE RED-BROWN
SILTY CLAYEY
FINE TO COARSE SAND
(M)

VERY LOOSE TO LOOSE
RED-BROWN TO GRAY
FINE TO COARSE SAND
WITH TRACE OF SILT AND CLAY
(SAT.)

02/10

WEATHERED ROCK:
(BIOTITE GNEISS)

RESIDUAL:
VERY STIFF GRAY
FINE TO COARSE SANDY SILT (M)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

20′ Vertical
10′
0
Horizontal
0 10′

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	8
SCALE:	(V) 1" = 10' (H) 1" = 10'
DATE:	MARCH 2010
JOB NO.	1051-10-005

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 2
BRIDGE No. 565 on -Y4RPA-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 2

℄
-Y4RPA-

820′
810′
800′
790′
780′
770′
760′
750′
740′

EB2–A
20+40
5 ft LT. –Y4RPA–

EB2–B
20+53
25 ft RT. –Y4RPA–

GROUND SURFACE

ALLUVIAL:
VERY SOFT TO MEDIUM STIFF
ORANGE-BROWN
FINE TO COARSE
SANDY SILT
WITH TRACE OF MICA

5
5
WOH
3

02/10

A
10
89
B
60/0.1

C
D
100/0.7
60/0.0

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

20′
10′
Vertical
Horizontal
0
0
10′

A ARTIFICIAL FILL: STIFF RED-BROWN FINE TO COARSE SANDY SILT (M)
B RESIDUAL: VERY DENSE GRAY SILTY FINE TO COARSE SAND (M)
C RESIDUAL: VERY STIFF ORANGE-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)
D WEATHERED ROCK: (BIOTITE GNEISS)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
DRAWN BY: TRP
FIGURE 9
SCALE: (V) 1" = 10' (H) 1" = 10'
DATE: MARCH 2010
JOB NO. 1051-10-005

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 2
BRIDGE No. 565 on -Y4RPA-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek			**GROUND WTR (ft)**
BORING NO. EB1-E	**STATION** 18+06	**OFFSET** 6 ft RT	**ALIGNMENT** -Y4RPA-
COLLAR ELEV. 789.2 ft	**TOTAL DEPTH** 30.8 ft	**NORTHING** 754,300	**EASTING** 1,444,421
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 02/11/10	**COMP. DATE** 02/11/10	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)
0 HR. N/A
24 HR. 13.1

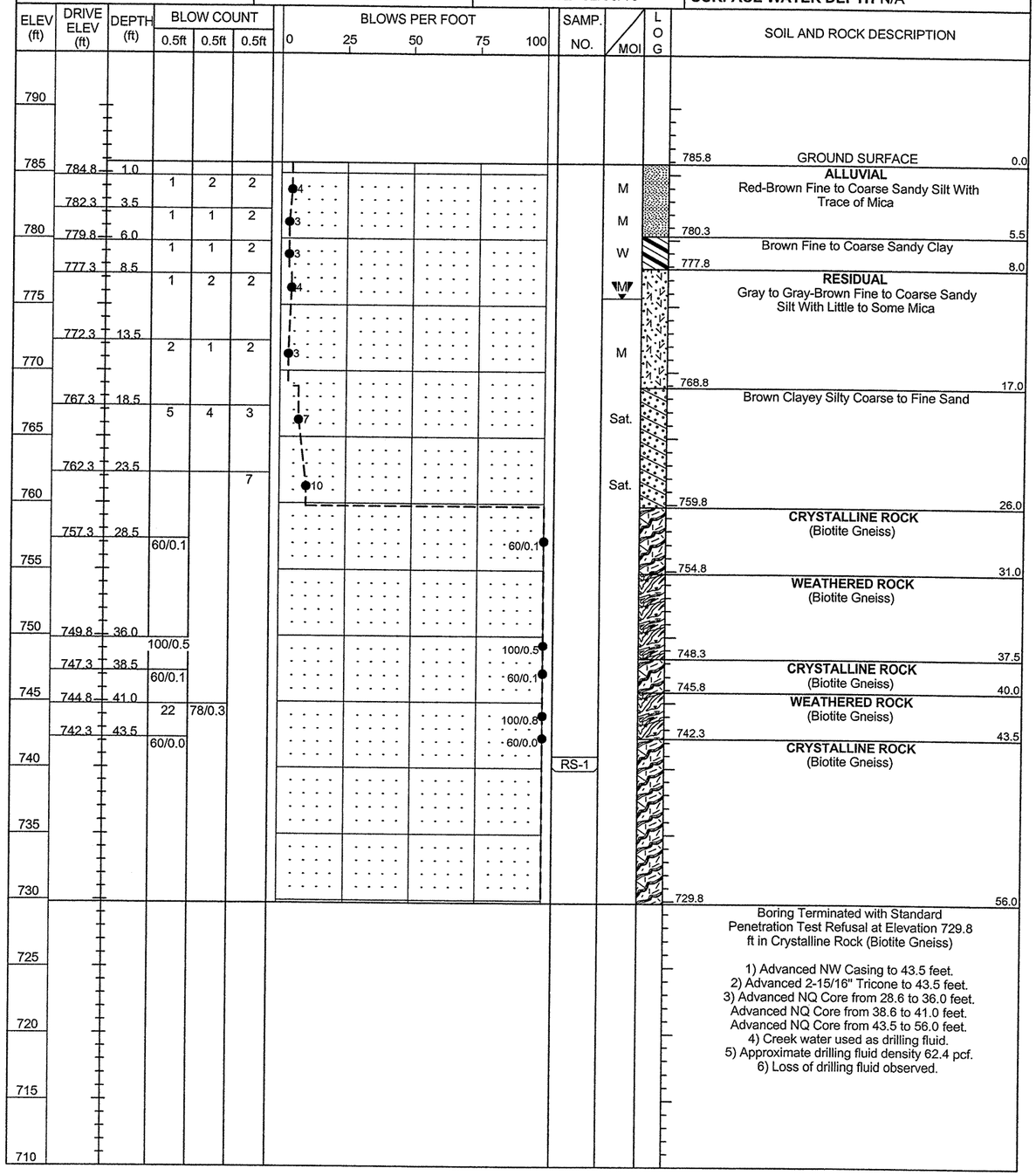
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
790										789.2 GROUND SURFACE 0.0
	788.2	1.0	4	3	3	6		M		**RESIDUAL** Red-Brown Silty Coarse to Fine Sandy Clay With Trace of Mica
785	786.1	3.1	3	3	3	6	SS-1	29% M		
	783.6	5.6	3	3	8	11		M		783.6 5.6
	781.1	8.1	9	5	3	8		M		781.7 7.5 Red-Brown Silty Coarse to Fine Sandy Clay With Trace of Mica
780										Brown-Black Clayey Coarse to Fine Sandy Silt With Little Mica
775	776.1	13.1	1	1	2	3	SS-2	48% M		
	771.1	18.1	4	4	7	11		M		768.2 21.0 Dark Gray Silty Fine to Coarse Sand with Trace of Clay and Quartz Rock Fragments
770										
765	766.1	23.1	5	17	26	43	SS-3	Sat.		
	761.1	28.1	42	58/0.3		100/0.8				760.6 28.6 **WEATHERED ROCK** (Biotite Gneiss)
760	758.4	30.8	60/0.0			60/0.0				758.4 30.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 758.4 ft on Crystalline Rock (Biotite Gneiss)
755										1) Advanced NW casing to 5.4 feet. 2) Advanced 2-15/16" Tricone to 30.8 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.
750										Other Samples: ST-1 (5.0 - 7.0)
745										
740										
735										
730										
725										
720										
715										
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 18+36	**OFFSET** 41 ft RT	**ALIGNMENT** -Y4RPA-
COLLAR ELEV. 797.1 ft	**TOTAL DEPTH** 38.5 ft	**NORTHING** 754,333	**EASTING** 1,444,381
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 02/09/10	**COMP. DATE** 02/09/10	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)
0 HR. N/A
24 HR. Dry

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
800										797.1 GROUND SURFACE 0.0
	796.1	1.0								**ARTIFICIAL FILL** Red-Brown Silty Coarse to Fine Sandy Clay With Trace of Mica
795	793.6	3.5	3	3	2	5	SS-4	30% M		
	791.1	6.0	2	2	2	4		M		
790	788.6	8.5	4	4	5	9		M		789.1 8.0
	783.6	13.5	5	4	4	8	SS-5	25% M		**RESIDUAL** Red-Brown Silty Coarse to Fine Sandy Clay
785	778.6	18.5	2	3	3	6		M		785.1 12.0 Brown to Brown-Gray Fine to Coarse Sandy Clayey Silt With Little Mica
780	773.6	23.5	4	1	2	3	SS-6	Sat.		780.1 17.0 Brown Clayey Silty Coarse to Fine Sand
775	768.6	28.5	4	6	7	13		Sat.		
770	763.6	33.5	2	23	9	32		Sat.		
765	758.6	38.5	8	4	6	10		Sat.		760.1 37.0 **CRYSTALLINE ROCK** (Biotite Gneiss) 758.6 38.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 758.6 ft in Crystalline Rock (Biotite Gneiss)
760			60/0.0			60/0.0				1) Advanced NW casing to 18.5 feet. 2) Advanced 2-15/16" Tricone to 38.5 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.
755										
750										
745										
740										
735										
730										
725										
720										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 18+68	**OFFSET** 9 ft LT	**ALIGNMENT** -Y4RPA- **0 HR.** N/A
COLLAR ELEV. 785.8 ft	**TOTAL DEPTH** 56.0 ft	**NORTHING** 754,280	**EASTING** 1,444,361 **24 HR.** 10.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 02/04/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A

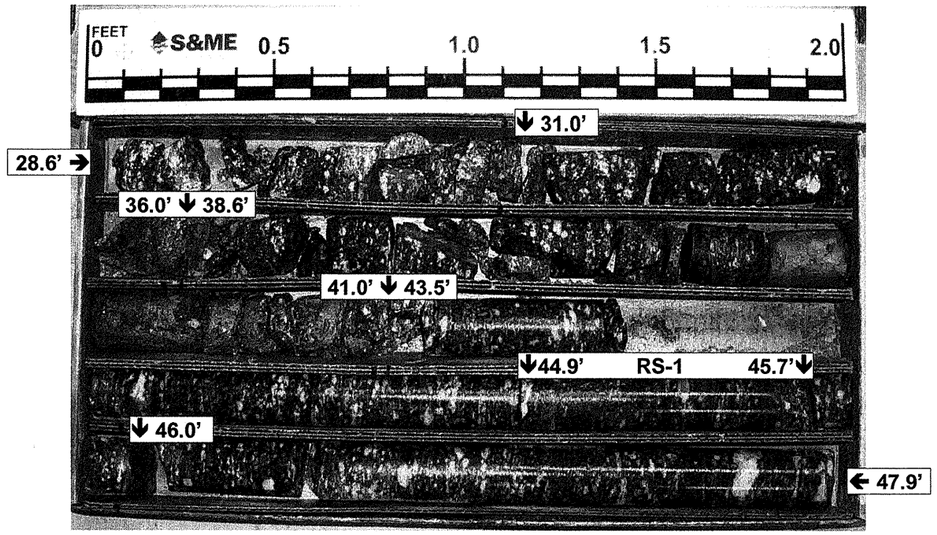


NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

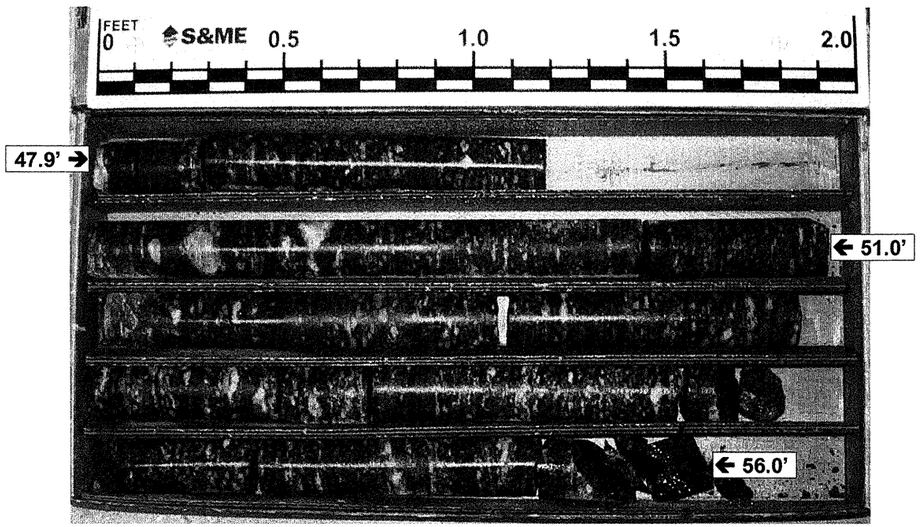
PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 18+68	**OFFSET** 9 ft LT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 785.8 ft	**TOTAL DEPTH** 56.0 ft	**NORTHING** 754,280	**EASTING** 1,444,361	**24 HR.** 10.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/04/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 22.3 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
757.2											Begin Coring @ 28.6 ft
	757.2	28.6	2.4	0:30/0.4 0:45/1.0 0:30/1.0	(0.9) 38%	(0.0) 0%		(0.9) 38%	(0.0) 0%		**CRYSTALLINE ROCK***(continued)* Black to Dark Gray Moderate to Moderate Severely Weathered Moderately Hard to Medium Hard With Very Close Fracture Spacing (Biotite Gneiss)
755	754.8	31.0									ELEV. (ft) 754.8 — DEPTH (ft) 31.0
			5.0	0:45/1.0 0:20/1.0 0:30/1.0 0:30/1.0 0:30/1.0	(1.1) 22%			(1.1) 17%	N/A		
750	749.8	36.0									
				N=100/0.5							**WEATHERED ROCK** (Biotite Gneiss)
	747.2	38.6						(1.4) 56%	(0.0) 0%		ELEV. (ft) 748.3 — DEPTH (ft) 37.5 **CRYSTALLINE ROCK** Black to Dark Gray
			2.4	*N=60/0.1* 0:30/0.4	(2.4) 100%	(0.0) 0%					Moderately Severe to Moderate Weathered Moderately Hard to Medium Hard With Close to Moderately Close Fracture Spacing (Biotite Gneiss)
745	744.8	41.0		1:00/1.0 0:30/1.0				(1.0) 29%	N/A		ELEV. (ft) 745.8 — DEPTH (ft) 40.0
				N=100/0.8							ELEV. (ft) 742.3 — DEPTH (ft) 43.5
	742.3	43.5									**WEATHERED ROCK** (Biotite Gneiss)
	739.8	46.0	2.5	*N=60/0.0* 0:45/0.5 2:00/1.0	(2.5) 100%	(2.5) 100%	RS-1	(12.4) 99%	(11.5) 92%		
740			5.0	1:50/1.0	(5.0) 100%	(4.8) 96%					**CRYSTALLINE ROCK** Black to Dark Gray Fresh to Very Slightly Weathered Hard to Very Hard With Close to Moderately Close Fracture Spacing (Biotite Gneiss)
				2:50/1.0 2:00/1.0 2:13/1.0 2:37/1.0 2:45/1.0							
735	734.8	51.0									
			5.0	2:17/1.0 3:30/1.0 3:10/1.0 3:30/1.0 3:15/1.0	(4.9) 98%	(4.2) 84%					Axial = 2255 KSF R1 = 12, R2 = 20, R3 = 20, R4 = 20, R5 = 7 RMR = 79 Rock Type E
730	729.8	56.0									ELEV. (ft) 729.8 — DEPTH (ft) 56.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 729.8 ft in Crystalline Rock (Biotite Gneiss)
725											
720											1) Advanced NW Casing to 43.5 feet. 2) Advanced 2-15/16" Tricone to 43.5 feet. 3) Advanced NQ Core from 28.6 to 36.0 feet. Advanced NQ Core from 38.6 to 41.0 feet. Advanced NQ Core from 43.5 to 56.0 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.
715											
710											
705											
700											
695											
690											
685											
680											

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B1-A
Site Description: Bridge No. 565 on -Y4RPA- over Fourth Creek			*Driller:* R. Norwood
Collar Elev.: 785.8 ft.	*Core Size:* NQ	*Equipment:* CME-550x	*Geologist:* N. Bradley
Elev. at T.D.: 729.8 ft.	*Total Depth:* 56.0 ft.	*Total Run:* 22.3 ft.	*Date:* 2/8/10

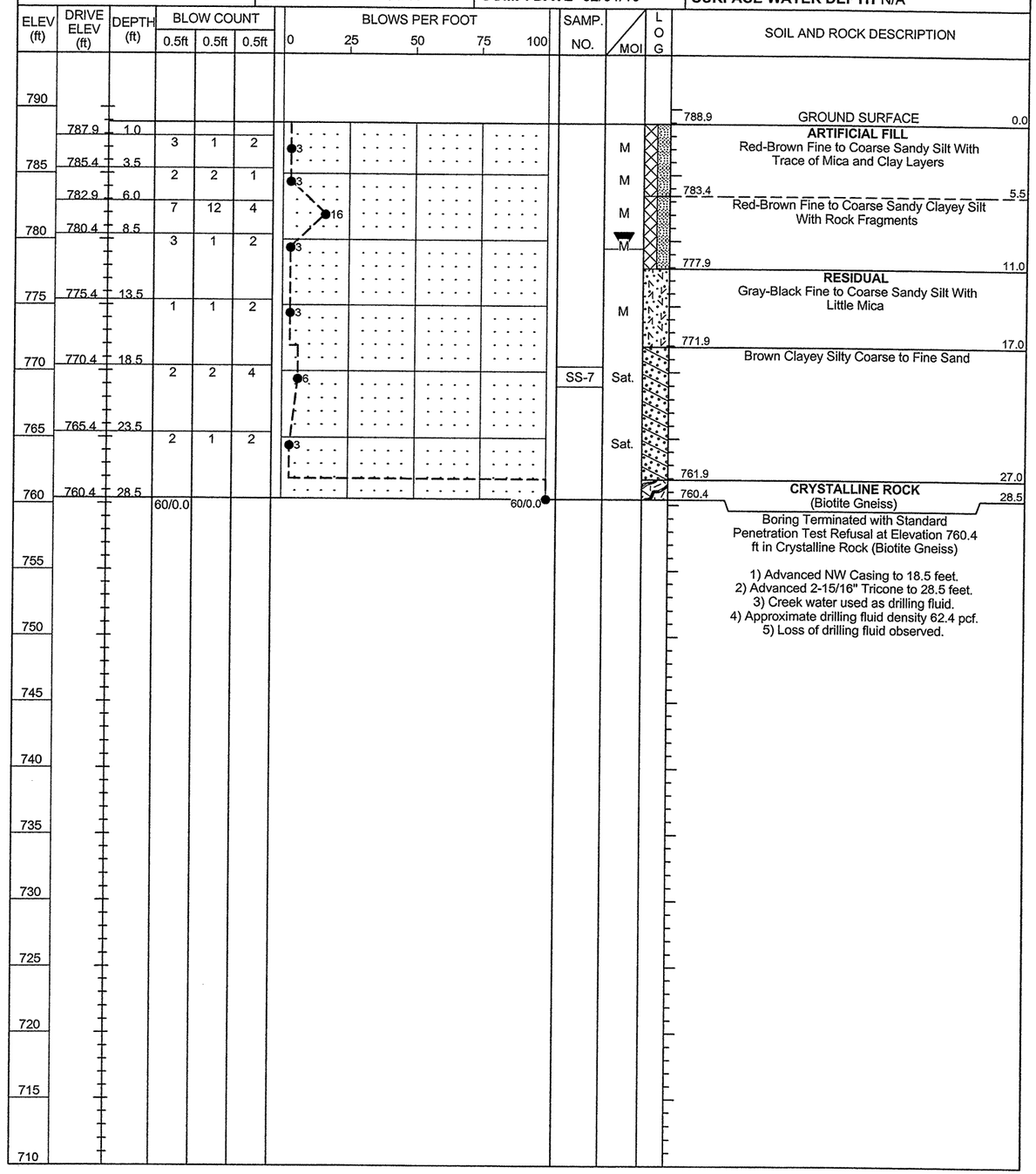


Box 1 of 2
Top of Box @ 28.6 feet; Bottom of Box @ 47.9 feet



Box 2 of 2
Top of Box @ 47.9 feet; Bottom of Box @ 56.0 feet

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 18+89	**OFFSET** 21 ft RT	**ALIGNMENT** -Y4RPA- — **0 HR.** N/A
COLLAR ELEV. 788.9 ft	**TOTAL DEPTH** 28.5 ft	**NORTHING** 754,308	**EASTING** 1,444,337 — **24 HR.** 9.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 02/01/10	**COMP. DATE** 02/01/10	**SURFACE WATER DEPTH** N/A



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-E	**STATION** 19+75	**OFFSET** 8 ft RT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/M
COLLAR ELEV. 784.6 ft	**TOTAL DEPTH** 23.0 ft	**NORTHING** 754,289	**EASTING** 1,444,252	**24 HR.** N/M
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/24/10	**COMP. DATE** 02/24/10	**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)
785										784.6 GROUND SURFACE 0.0
	783.6	1.0	2	3	3	6	SS-8	M		**ALLUVIAL** Red-Brown Silty Clayey Fine to Coarse Sand
	781.1	3.5	3	2	2	4		M		
780	778.6	6.0	1	2	2	4		M		779.1 5.5
	776.1	8.5	2	2	1	3		Sat.		Red-Brown to Gray Fine to Coarse Sand with Trace of Silt and Clay
775										
	771.1	13.5	1	1	1	2		Sat.		
770										
	766.1	18.5	44	56/0.01		100/0.6				765.6 19.0 **WEATHERED ROCK** (Biotite Gneiss)
765										
	761.6	23.0	60/0.0			60/0.0				761.6 23.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 761.6 ft on Crystalline Rock (Biotite Gneiss)
760										
755										1) Advanced NW casing to 18.5 feet. 2) Advanced 2-15/16 Tricone to 23.0 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Loss of drilling fluid observed.
750										
745										
740										
735										
730										
725										
720										
715										
710										
705										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 19+94	**OFFSET** 29 ft RT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 784.5 ft	**TOTAL DEPTH** 31.3 ft	**NORTHING** 754,307	**EASTING** 1,444,232	**24 HR.** 8.3
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/23/10	**COMP. DATE** 02/23/10	**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
785										784.5 GROUND SURFACE 0.0
	783.5	1.0	4	3	2	5		M		**ALLUVIAL** Red-Brown Silty Clayey Fine to Coarse Sand
	781.0	3.5	2	2	3	5		M		
780	778.5	6.0	2	2	2	4	SS-9	Sat.		779.0 5.5
	776.0	8.5	2	2	2	4		Sat.		Red-Brown to Gray Fine to Coarse Sand with Trace of Silt and Clay
775										
	771.0	13.5	2	2	1	3	SS-10	Sat.		
770										
	766.0	18.5	41	15	5	20		M		766.5 18.0 **RESIDUAL** Gray Fine to Coarse Sandy Silt
765	763.2	21.3	60/0.0			60/0.0				763.2 21.3 **CRYSTALLINE ROCK** (Biotite Gneiss)
760							RS-2			
755										753.2 31.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 753.2 ft in Crystalline Rock (Biotite Gneiss)
750										1) Advanced NW casing to 20.5 feet. 2) Advanced 2-15/16 Tricone to 21.3 feet. 3) Advanced NQ core from 21.3 to 31.3 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.
745										
740										
735										
730										
725										
720										
715										
710										
705										

NCDOT BORE DOUBLE I-3819A_BRDG0565.GPJ NC_DOT.GDT 3/30/10

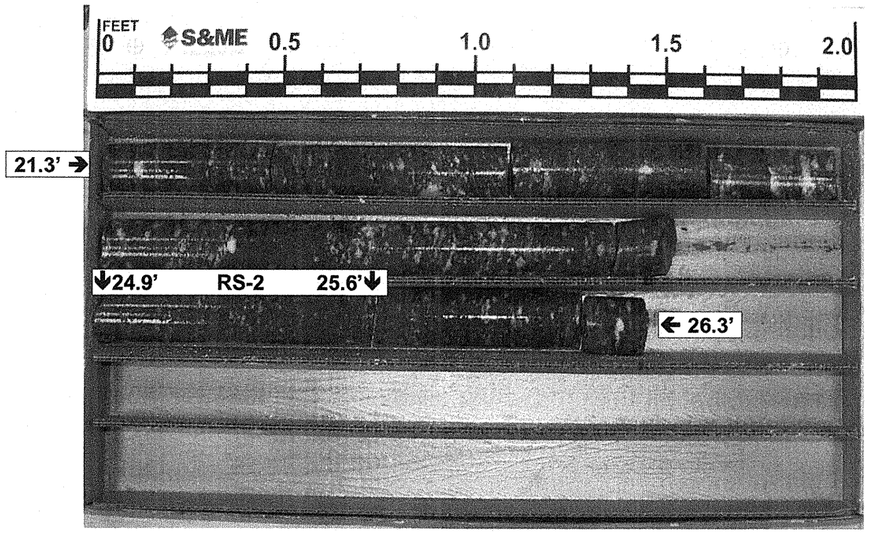
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 19+94	**OFFSET** 29 ft RT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 784.5 ft	**TOTAL DEPTH** 31.3 ft	**NORTHING** 754,307	**EASTING** 1,444,232	**24 HR.** 8.3
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/23/10	**COMP. DATE** 02/23/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 10.0 ft			

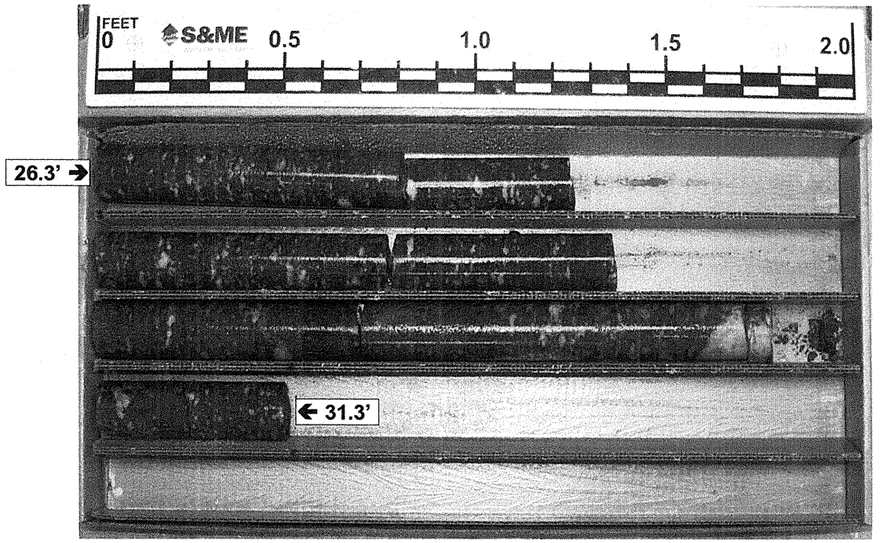
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
763.2											ELEV. (ft) DEPTH (ft)
											Begin Coring @ 21.3 ft
	763.2	21.3	5.0	3:30/1.0 3:00/1.0 3:05/1.0 3:10/1.0 3:45/1.0	(4.8) 96%	(4.8) 96%		(9.7) 97%	(9.7) 97%		**CRYSTALLINE ROCK** Black to Dark Gray Fresh to Very Slightly Weathered Hard to Very Hard With Close to Moderately Close Fracture Spacing (Biotite Gneiss)
760	758.2	26.3	5.0	3:00/1.0 3:15/1.0 3:45/1.0 3:15/1.0 4:00/1.0	(4.9) 98%	(4.9) 98%	RS-2				Axial = 2260 KSF R1 = 12, R2 = 20, R3 = 20, R4 = 20, R5 = 7 RMR = 79 Rock Type E
755	753.2	31.3									753.2 31.3
750											Boring Terminated with Standard Penetration Test Refusal at Elevation 753.2 ft in Crystalline Rock (Biotite Gneiss)
745											1) Advanced NW casing to 20.5 feet. 2) Advanced 2-15/16 Tricone to 21.3 feet. 3) Advanced NQ core from 21.3 to 31.3 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.
740											
735											
730											
725											
720											
715											
710											
705											
700											
695											
690											
685											

NCDOT CORE DOUBLE I-3819A_BRDG0565.GPJ NC_DOT.GDT 04/07/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B2-B
Site Description: Bridge No. 565 on -Y4RPA- over Fourth Creek			*Driller:* R. Norwood
Collar Elev.: 784.5 ft.	*Core Size:* NQ	*Equipment:* CME-550x	*Geologist:* N. Bradley
Elev. at T.D.: 753.2 ft.	*Total Depth:* 31.3 ft.	*Total Run:* 10.0 ft.	*Date:* 2/23/10



Box 1 of 2
Top of Box @ 21.3 feet; Bottom of Box @ 26.3 feet



Box 2 of 2
Top of Box @ 26.3 feet; Bottom of Box @ 31.1 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 20+40	**OFFSET** 5 ft LT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 788.4 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 754,270	**EASTING** 1,444,189	**24 HR.** 7.1
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/22/10	**COMP. DATE** 02/22/10	**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)
790										
	787.4	1.0								788.4 GROUND SURFACE 0.0
785	784.9	3.5	3	2	3	5		M		**ALLUVIAL** Orange-Brown Fine to Coarse Sandy Silt With Trace of Mica
	782.4	6.0	3	2	3	5		M		
780	779.9	8.5	WOH	WOH	WOH	0		W		
			1	2	1	3		W		
775	774.9	13.5								775.4 13.0
	773.3	15.1	21	79/0.2		100/0.7		M		774.2 14.2 **RESIDUAL** Orange-Brown Fine to Coarse Sandy Silt with Trace of Mica 773.3 15.1
770			60/0.0			60/0.0				**WEATHERED ROCK** (Biotite Gneiss)
765										Boring Terminated with Standard Penetration Test Refusal at Elevation 773.3 ft on Crystalline Rock (Biotite Gneiss)
760										1) Advanced NW casing to 8.5 feet. 2) Advanced 2-15/16 Tricone to 15.1 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Loss of drilling fluid observed.
755										
750										
745										
740										
735										
730										
725										
720										
715										
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 565 on -Y4RPA- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 20+53	**OFFSET** 25 ft RT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 788.1 ft	**TOTAL DEPTH** 6.1 ft	**NORTHING** 754,299	**EASTING** 1,444,173	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 02/19/10	**COMP. DATE** 02/19/10	**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
790										
	787.1	1.0								788.1 GROUND SURFACE 0.0
785	784.6	3.5	3	3	7	10		M		**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt 785.1 3.0
	782.1	6.0	47	51	38	89		M		**RESIDUAL** Gray Silty Fine to Coarse Sand 782.6 5.5
780			60/0.1			60/0.1				782.0 6.1 **CRYSTALLINE ROCK** (Biotite Gneiss)
775										Boring Terminated with Standard Penetration Test Refusal at Elevation 782.0 ft in Crystalline Rock (Biotite Gneiss)
770										1) Advanced NW casing to 3.5 feet. 2) Advanced 2-15/16 Tricone to 6.0 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) No loss of drilling fluid observed.
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										
715										
710										

NCDOT BORE DOUBLE I-3819A_BRDG0565.GPJ NC_DOT.GDT 3/30/10

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-005	Date Report	3/12/2010
State Project No.:	34192.1.2 County: Iredell	Date Tested	2/15 - 3/12/10
Federal ID No.:	IMS-40-2(124)15 TIP No. I-3819A		
Project Name:	Bridge No. 565 on -Y4RPA- over Fourth Creek		
Client Name:	NCDOT Client Address: Raleigh, North Carolina		

Boring No.	Sample No.	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Organic Content %	Moisture Content %
					10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay					
EB1-E	SS-1	3.1 - 4.6	A-7-6	(9)	100	92	85	54.0	48.5	15	37	14	34	43	20	23	ND	28.7
EB1-E	ST-1	5.0 - 7.0	A-6	(7)	100	85	75	53.4	49.0	25	25	13	36	39	19	20	ND	22.4
EB1-E	SS-2	13.1 - 14.6	A-5	(1)	99	81	70	37.6	28.7	29	42	17	12	46	36	10	ND	48.4
EB-1E	SS-3	23.1 - 24.6	A-1-a	(0)	39	27	21	10.3	7.4	45	36	14	5	28	0	N.P.	ND	ND
EB-1B	SS-4	1 - 2.5	A-7-5	(18)	100	91	85	68.3	63.6	15	21	17	47	59	33	26	ND	29.6
EB1-B	SS-5	8.5 - 10.0	A-7-6	(14)	99	88	79	54.1	50.9	20	29	6	45	53	21	32	ND	24.6
EB1-B	SS-6	18.5 - 20.0	A-2-7	(0)	98	79	66	27.5	18.8	33	48	15	4	56	45	11	ND	ND
B1-B	SS-7	18.5 - 20.0	A-2-7	(0)	100	76	62	26.6	18.0	38	44	12	6	47	35	12	ND	ND
B2-E	SS-8	1.0 - 2.5	A-2-4	(0)	96	60	49	27.6	24.0	49	26	10	15	33	27	6	ND	ND
B2-B	SS-9	8.5 - 10.0	A-1-b	(0)	82	18	10	4.1	3.3	88	8	3	1	22	0	N.P.	ND	ND
B2-B	SS-10	13.5 - 15.0	A-1-b	(0)	97	42	28	7.3	5.5	71	23	2	4	21	0	N.P.	ND	ND
NA	S-1	0.0 - 1.0	A-3	(0)	100	87	36	3.7	2.9	64	33	2	1	25	0	N.P.	ND	ND

References / Comments / Deviations:

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil/Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Abner F. Riggs, Jr., P.E.	Senior Engineer
Technician Name:	*Signature*	*Certification #*	*Technical Responsibility:*	*Position*

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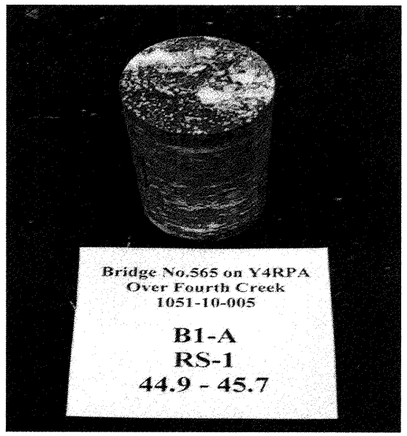
UNCONFINED COMPRESSION
(ASTM D 7012 Method C)

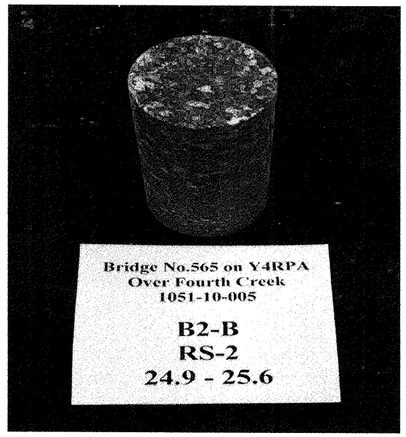
PROJECT: 34192.1.2 **TIP No.** (I-3819A)
Description.: Bridge No. 565 on -Y4RPA- over Fourth Creek
COUNTY: Iredell County
F.A. No.: IMS-40-2(124)15
JOB No.: 1051-10-005
Date: 3/10/2010
Tested by: Jeff Webb

Sample No.	Boring Location	Rock Type	Run RQD	Depth (ft)	Specimen Dimension, in.		Area (in^2)	Unit Wt. (lb/ft^3)	Loading Rate (psi/min)	Max. Load (lb)	Strength (psi)	Moisture (%)
					Length	Diameter						
RS-1	B1-A	Biotite Gneiss	100 %	44.9 - 45.7	4.16	1.86	2.72	179.8	2,519	42,600	15,662	0.1
RS-2	B2-B	Biotite Gneiss	96%	24.9 - 25.6	4.12	1.84	2.66	176.8	2,634	40,750	15,320	0.0

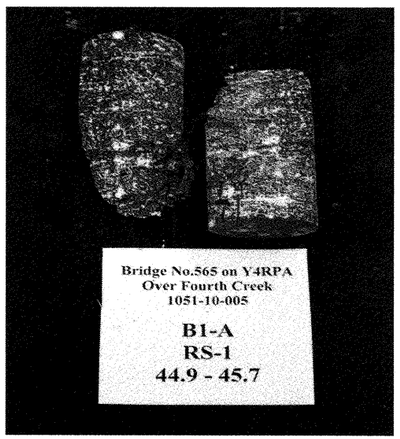
B1-A RS-1 Before Test



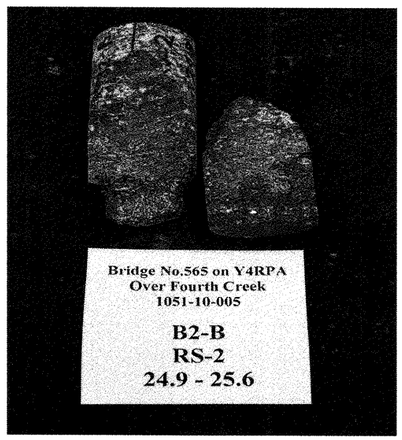
B2-B RS-2 Before Test



B1-A RS-1 After Test



B2-B RS-2 After Test



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34192.1.2 TIP: I-3819A COUNTY: Iredell

DESCRIPTION(1): Bridge No. 565 on -Y4RPA- over Fourth Creek

EXISTING BRIDGE

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

Bridge No.: 565 Length: N/A Total Bents: N/A Bents in Channel: N/A Bents in Floodplain: N/A
Foundation Type: N/A

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: N/A

Interior Bents: N/A

Channel Bed: None observed

Channel Bank: Scour observed on East and West banks, Near vertical banks

EXISTING SCOUR PROTECTION

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): Rip Rap in creek bed downstream Approximately 200'

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 structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Red-Brown and Gray -Brown Fine to Coarse SAND with trace of Silt and Clay
A-3(0) and (A-1-b)(0) Small Cobbles observed in creek bed

Channel Bank Material(8): Red-Brown F.to Coarse Sandy SILT (A-4) and Brown F. to Cse. Sandy CLAY(A-6)
Red-Brown and Gray Silty Clayey F.to Cse.SAND(A-2-4)(0) and (A-1-b)(0)

Channel Bank Cover(9): Thick vegetation and hardwood trees

Floodplain Width(10): Approx. 400' West and 75' East

Floodplain Cover(11): Wooded with grass covered roadway embankments and commercial development

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

Channel Migration Tendency(13): West

Observations and Other Comments: Severe erosion around 48" CMP on East bank and around 24" CMP on West bank.Debris in trees on West bank.Trail and sewer within floodplain on East bank .

Reported by: Abner F. Riggs,Jr P.E.. **Date:** 2/23/2010

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

DSE for Interior Bents

Interior Bent 1	784.0'										
Interior Bent 2	783.2'										

Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Engineering Unit Agrees with the Hydraulics Unit's theoretical scour, as show in the Bridge Survey and Hydraulic Design Report (dated 8/14/09).

DSE determined by: **Date:** 3/26/2010

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank			
Sample No.	S-1	SS-8	SS-9	SS-10			
Retained #4	0%	0%	2%	0%			
Passed #10	100%	96%	82%	97%			
Passed #40	87%	60%	18%	42%			
Passed #200	3.70%	27.60%	4.10%	7.30%			
Coarse Sand	64%	49%	88%	71%			
Fine Sand	33%	26%	8%	23%			
Silt	2%	10%	3%	2%			
Clay	1%	15%	1%	4%			
LL	25	33	22	21			
PI	NP	6	NP	NP			
AASHTO	A-3(0)	A-2-4(0)	A-1-b(0)	A-1-b(0)			
Station	19+40	19+75	19+94	19+94			
Offset	CL	8'RT	29'RT	29'RT			
Depth	0.0'-1.0'	1.0'-2.5'	8.5'-10'	13.5-15.0'			

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

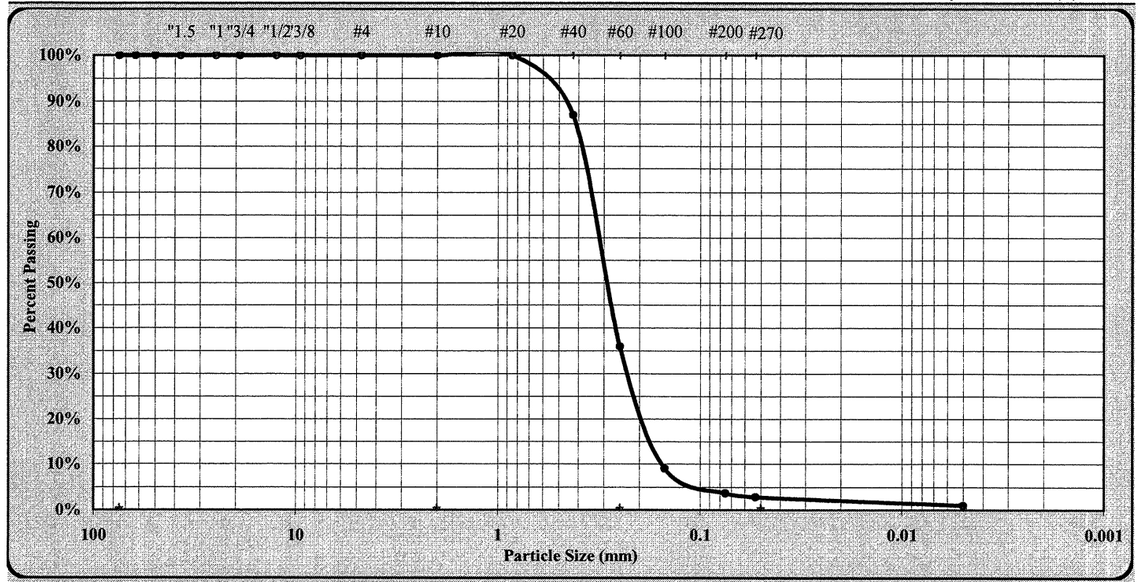
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-005 Iredell County			Report Date:	3/10/10
Project Name:	Bridge No. 565 on -Y4RPA- over Fourth Creek			Test Date(s):	3/8 - 3/10/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	N/A	Sample #:	S-1	Sample Date:	2/23/10
Location:	Creek Bed STA 19+40	Offset:	CL	Depth (ft):	0.0 - 1.0 ft.
Sample Description:	Brown Fine to Coarse SAND with trace of Silt and Clay				A-3 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	64%	Silt	2%
Gravel	0%	Fine Sand	33%	Clay	1%
Apparent Relative Density	ND	Moisture Content	1.0%	% Passing #200	3.7%
Liquid Limit	25	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	64%	Fine Sand	33%	Silt	2%	Clay	1%
Description of Sand & Gravel Particles:		Rounded	☐		Angular		☐
Hard & Durable	☐	Soft	☐		Weathered & Friable		☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/30/10
Technical Responsibility	*Signature*	*Position*	*Date*

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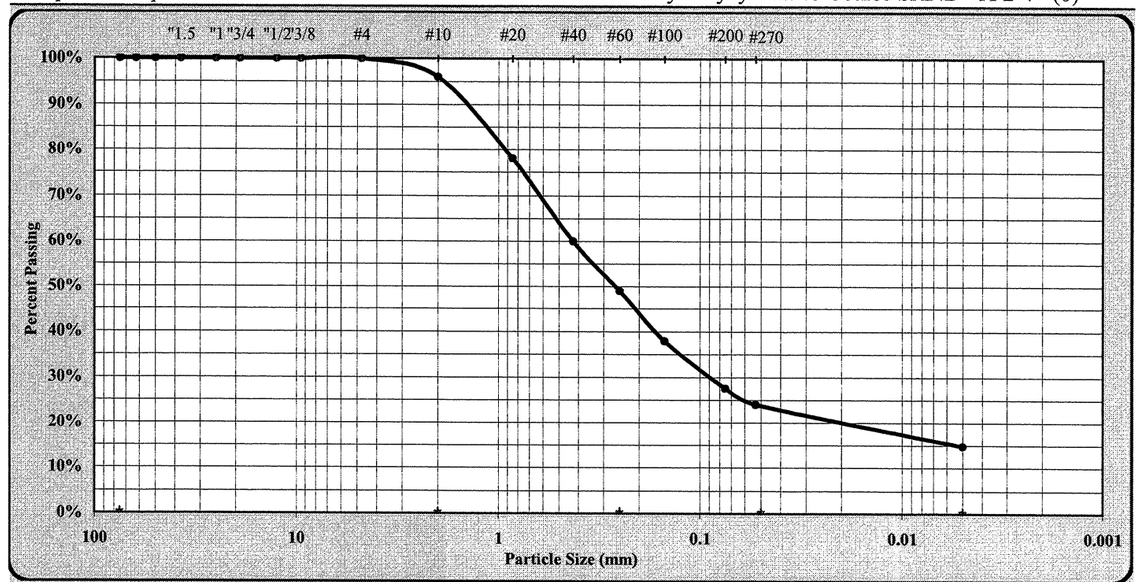
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-005 Iredell County			Report Date:	3/12/10
Project Name:	Bridge No. 565 on -Y4RPA- over Fourth Creek			Test Date(s):	3/8 - 3/12/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	B2-E	Sample #:	SS-8	Sample Date:	2/24/10
Location:	STA 19+75	Offset:	8' RT	Depth (ft):	1.0 - 2.5 ft.
Sample Description:	Red Brown Silty Clayey Fine to Coarse SAND				A-2-4 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#4	Coarse Sand	47%	Silt	9%
Gravel	4%	Fine Sand	25%	Clay	15%
Apparent Relative Density	ND	Moisture Content	18.8%	% Passing #200	27.6%
Liquid Limit	33	Plastic Limit	27	Plastic Index	6

Soil Mortar (-#10 Sieve)

Coarse Sand	49%	Fine Sand	26%	Silt	10%	Clay	15%
Description of Sand & Gravel Particles:		Rounded	☐		Angular		☐
Hard & Durable	☐	Soft	☐		Weathered & Friable		☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/30/10
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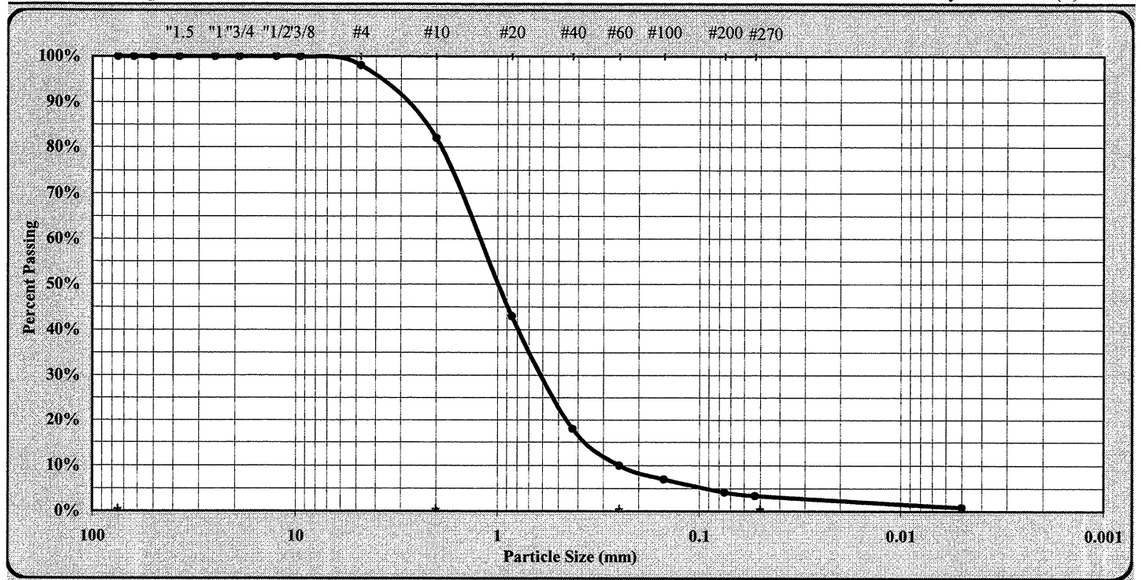
S&ME Project #:	1051-10-005 Iredell County	Report Date:	3/12/10
Project Name:	Bridge No. 565 on -Y4RPA- over Fourth Creek	Test Date(s):	3/8 - 3/12/10
State Project #:	34192.1.2 F.A. Project No: IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT		
Address:	Raleigh, NC		
Boring #:	B2-B Sample #: SS-9	Sample Date:	2/23/10
Location:	STA 19+94 Offset: 29' RT	Depth (ft):	8.5 - 10.0 ft.
Sample Description:	Red-Brown Fine to Coarse SAND with trace of Silt and Clay A-1-b (0)		



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	72%	Silt	3%
Gravel	18%	Fine Sand	7%	Clay	1%
Apparent Relative Density	ND	Moisture Content	27.2%	% Passing #200	4.1%
Liquid Limit	22	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	88%	Fine Sand	8%	Silt	3%	Clay	1%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/30/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Particle Size Analysis of Soils

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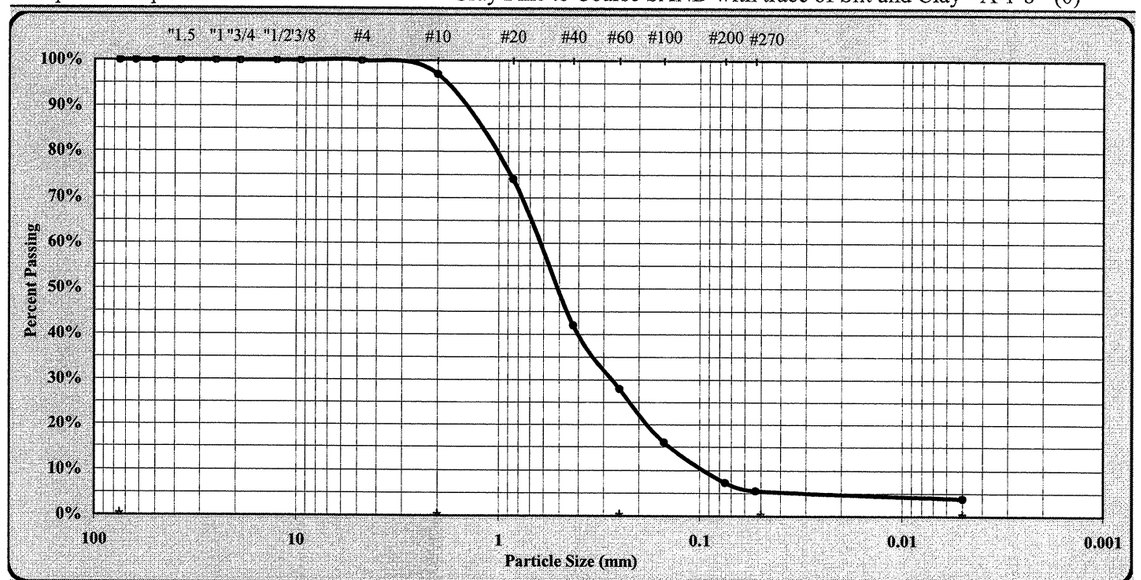
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-005 Iredell County	Report Date:	3/12/10
Project Name:	Bridge No. 565 on -Y4RPA- over Fourth Creek	Test Date(s):	3/8 - 3/12/10
State Project #:	34192.1.2 F.A. Project No: IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT		
Address:	Raleigh, NC		
Boring #:	B2-B Sample #: SS-10	Sample Date:	2/23/10
Location:	STA 19+94 Offset: 29' RT	Depth (ft):	13.5 - 15.0 ft.
Sample Description:	Gray Fine to Coarse SAND with trace of Silt and Clay A-1-b (0)		



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#4	Coarse Sand	69%	Silt	2%
Gravel	3%	Fine Sand	23%	Clay	4%
Apparent Relative Density	ND	Moisture Content	21.7%	% Passing #200	7.3%
Liquid Limit	21	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	71%	Fine Sand	23%	Silt	2%	Clay	4%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/30/10
Technical Responsibility	*Signature*	*Position*	*Date*

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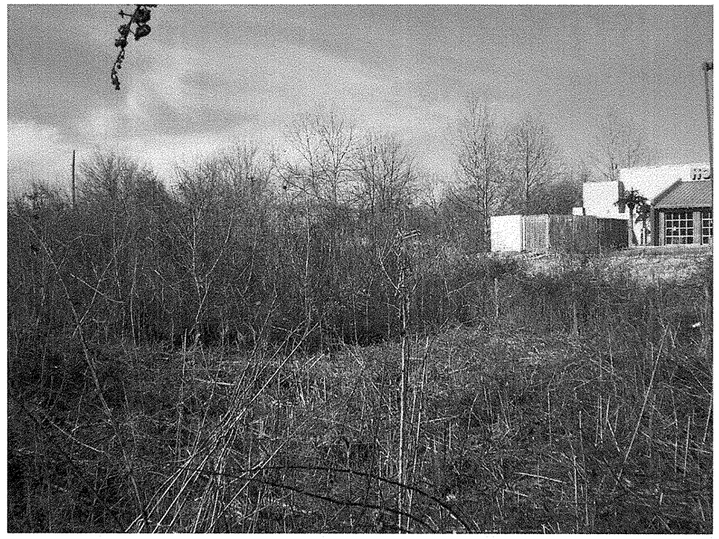
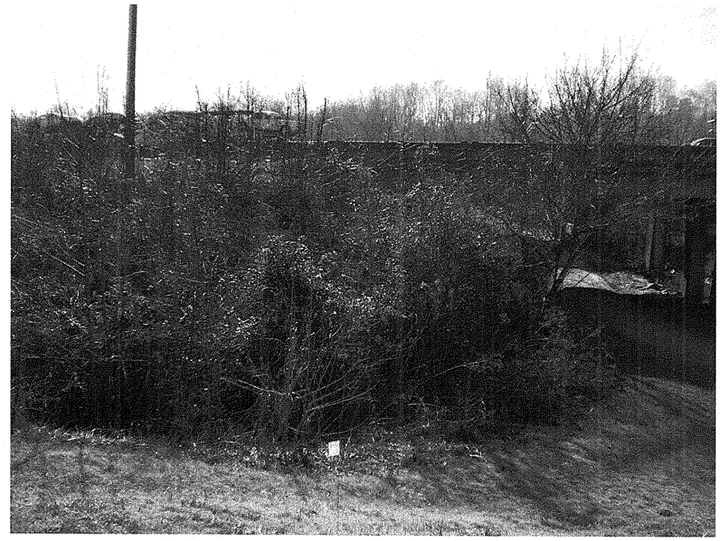
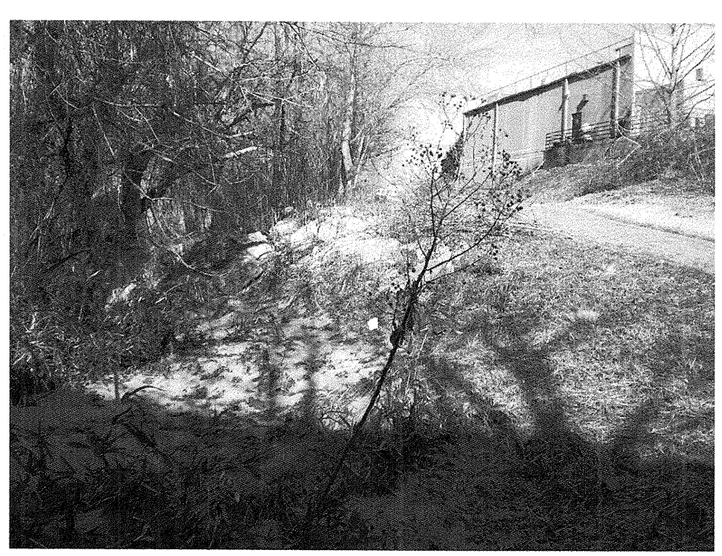


Photograph No. 1:
This photograph was taken from the east approach along the centerline of the -Y4RPA- alignment, looking west.

Photograph No. 2:
This photograph was taken from the left side of the -Y4RPA- alignment, looking north, across proposed End Bent No. 1.



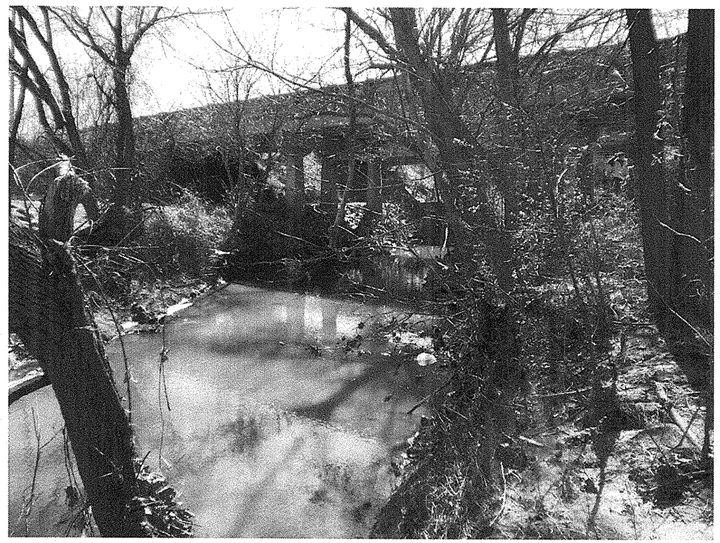
Photograph No. 3:
This photograph was taken from the right side of the -Y4RPA- alignment, looking south, across proposed End Bent No. 1.



Photograph No. 4:
This photograph was taken from the left side of the -Y4RPA- alignment, looking north across proposed Interior Bent No. 1.

Photograph No. 5:
This photograph was taken from the right side of the -Y4RPA- alignment, looking south across proposed Interior Bent No. 1.

Photograph No. 6:
This photograph was taken from the centerline of the -Y4RPA- alignment, looking north (upstream).



Photograph No. 7:
This photograph was taken from the centerline of the -Y4RPA- alignment, looking south (downstream).

Photograph No. 8:
This photograph was taken from the left side of the -Y4RPA- alignment, looking north across proposed Interior Bent No. 2.

Photograph No. 9:
This photograph was taken from the right side of the -Y4RPA- alignment, looking south across proposed Interior Bent No. 2.

Photograph No. 10:
This photograph was taken from the left side of the -Y4RPA- alignment, looking north across proposed End Bent No. 2.

Photograph No. 11:
This photograph was taken from the right side of the -Y4RPA- alignment, looking south across proposed End Bent No. 2.

Photograph No. 12:
This photograph was taken from the west approach along the centerline of the -Y4RPA- alignment, looking east.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	12

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)*

SITE DESCRIPTION *BRIDGE NO. 569 ON I-40 OVER -YRPBD- RAMP BETWEEN US 21 AND SR 2158 (LEFT LANE)*
BRIDGE NO. 570 ON I-40 OVER -YRPBD- RAMP BETWEEN US 21 AND SR 2158 (RIGHT LANE)

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5	PROFILE
6	CROSS SECTIONS
7-9	BORE LOG REPORTS
10	SOIL TEST RESULTS
11, 12	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

D. HERTTER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 5/14/2010

NORTH CAROLINA PROFESSIONAL SEAL 036026 ENGINEER SHANNON PROVANCE 5-14-10

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	
CLASS.	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6	A-3	A-6, A-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		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 SOILS				
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
- ☐ _____
- ☐ _____

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

HAMMER TYPE:
- ☒ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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.

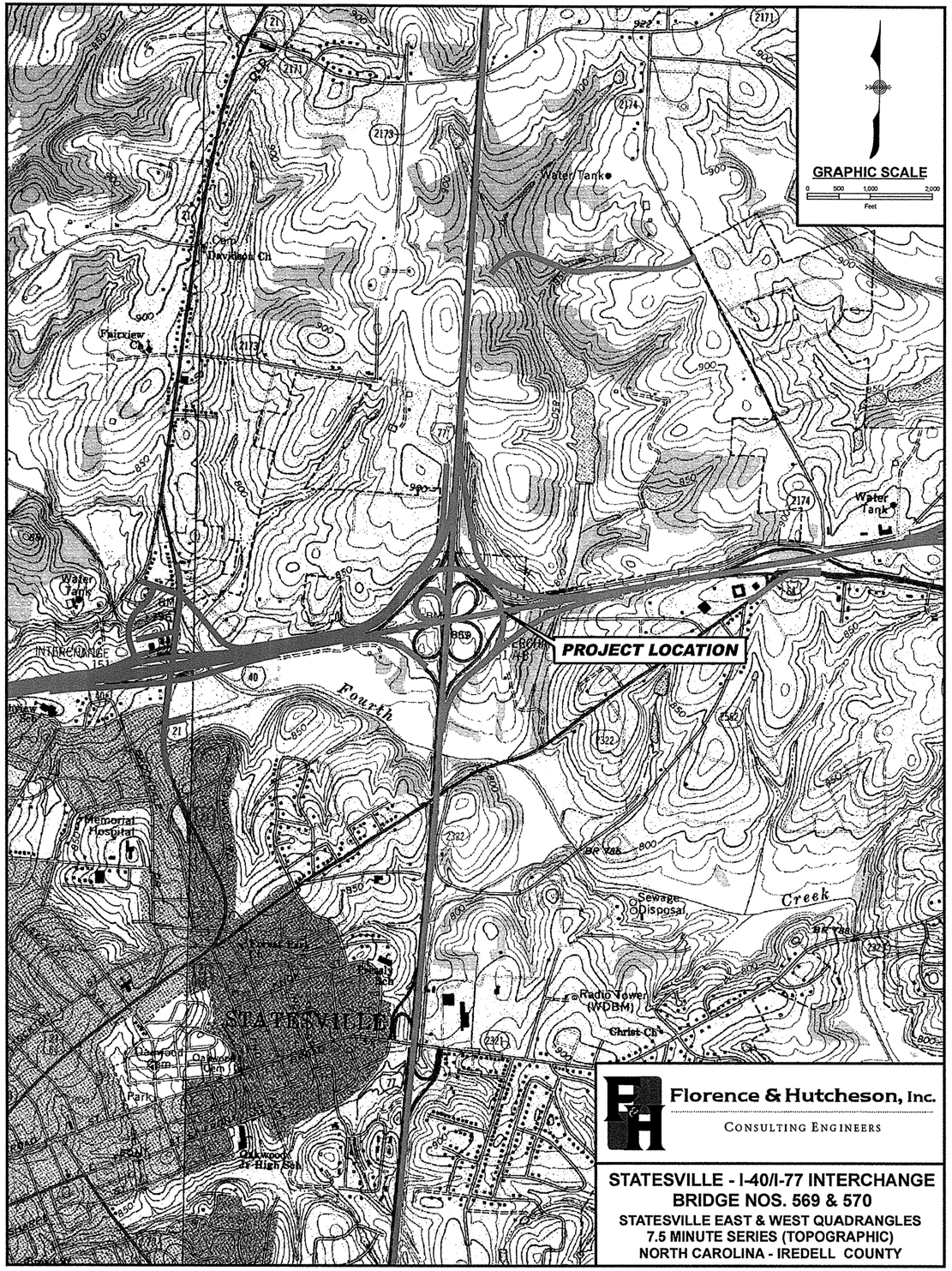
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #8
-BLE- STA. 115+46
74' LEFT ELEVATION: 835.61 FT.

NOTES:

REVISED 09/23/09



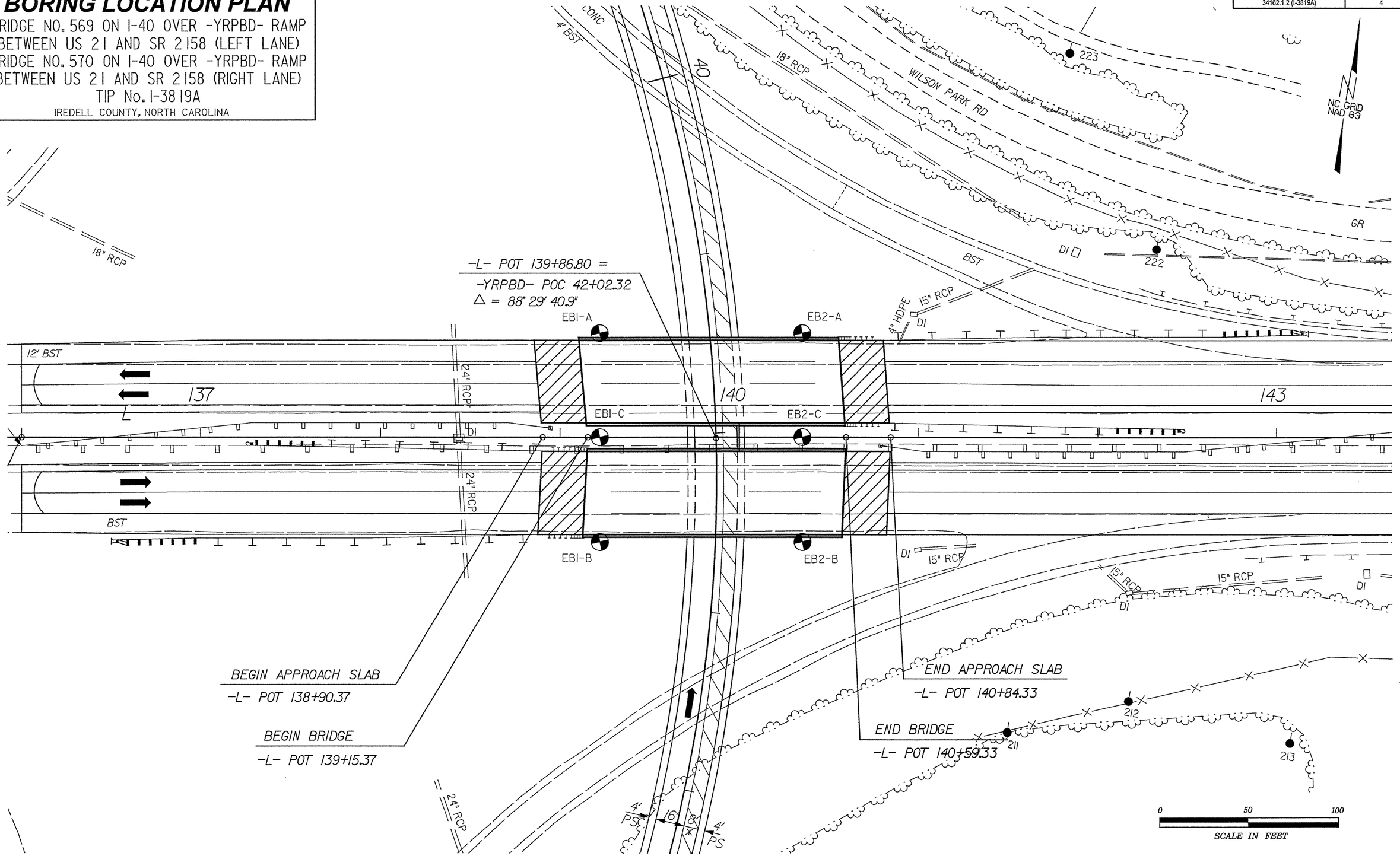
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

STATESVILLE - I-40/I-77 INTERCHANGE
BRIDGE NOS. 569 & 570
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

BRIDGE NO. 569 ON I-40 OVER -YRPBD- RAMP
BETWEEN US 21 AND SR 2158 (LEFT LANE)
BRIDGE NO. 570 ON I-40 OVER -YRPBD- RAMP
BETWEEN US 21 AND SR 2158 (RIGHT LANE)
TIP No. I-3819A
IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34162.1.2 (I-3819A)	4

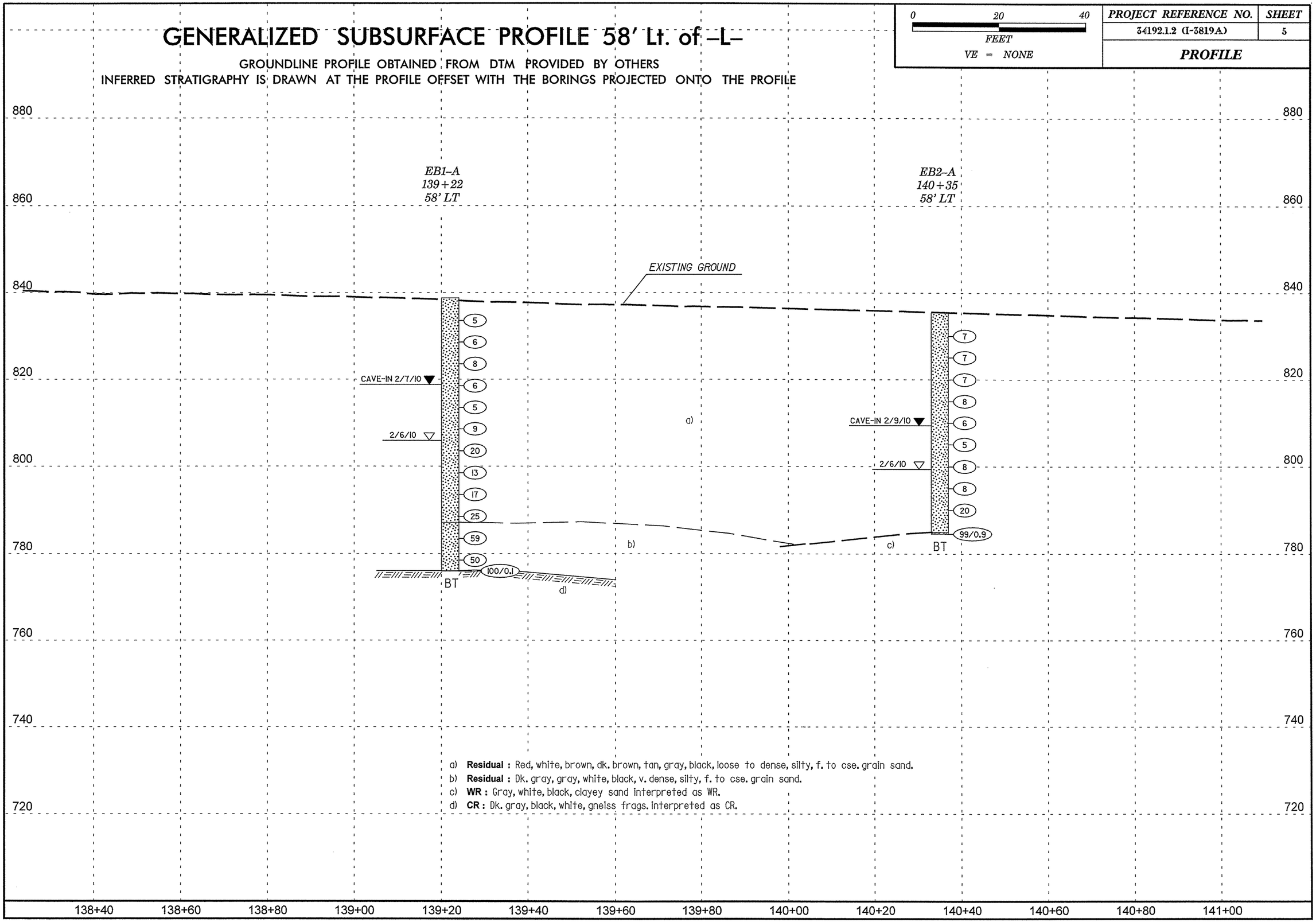


GENERALIZED SUBSURFACE PROFILE 58' Lt. of –L–

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5
PROFILE	



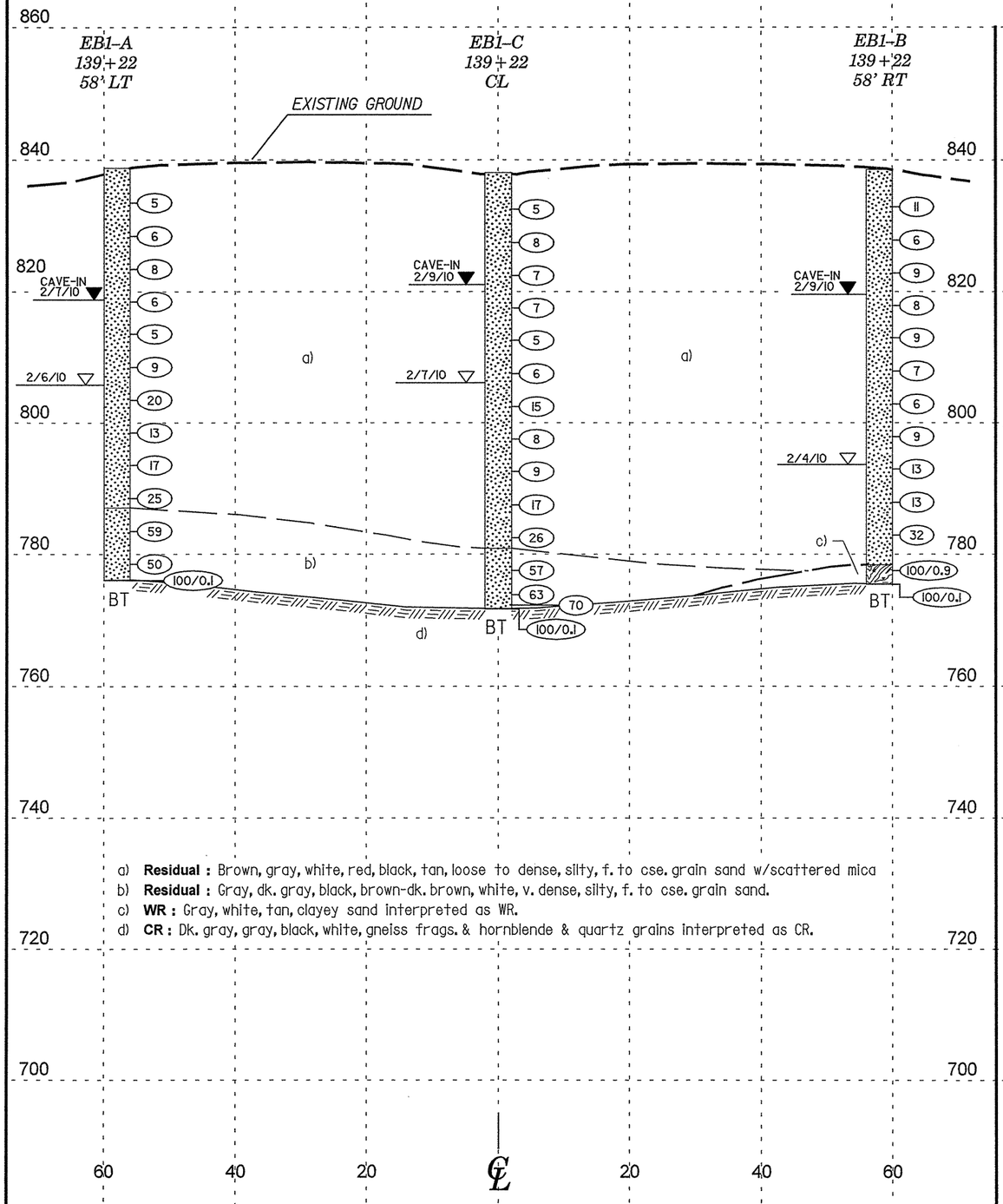
a) **Residual :** Red, white, brown, dk. brown, tan, gray, black, loose to dense, silty, f. to cse. grain sand.
b) **Residual :** Dk. gray, gray, white, black, v. dense, silty, f. to cse. grain sand.
c) **WR :** Gray, white, black, clayey sand interpreted as WR.
d) **CR :** Dk. gray, black, white, gneiss frags. interpreted as CR.

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	6

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS

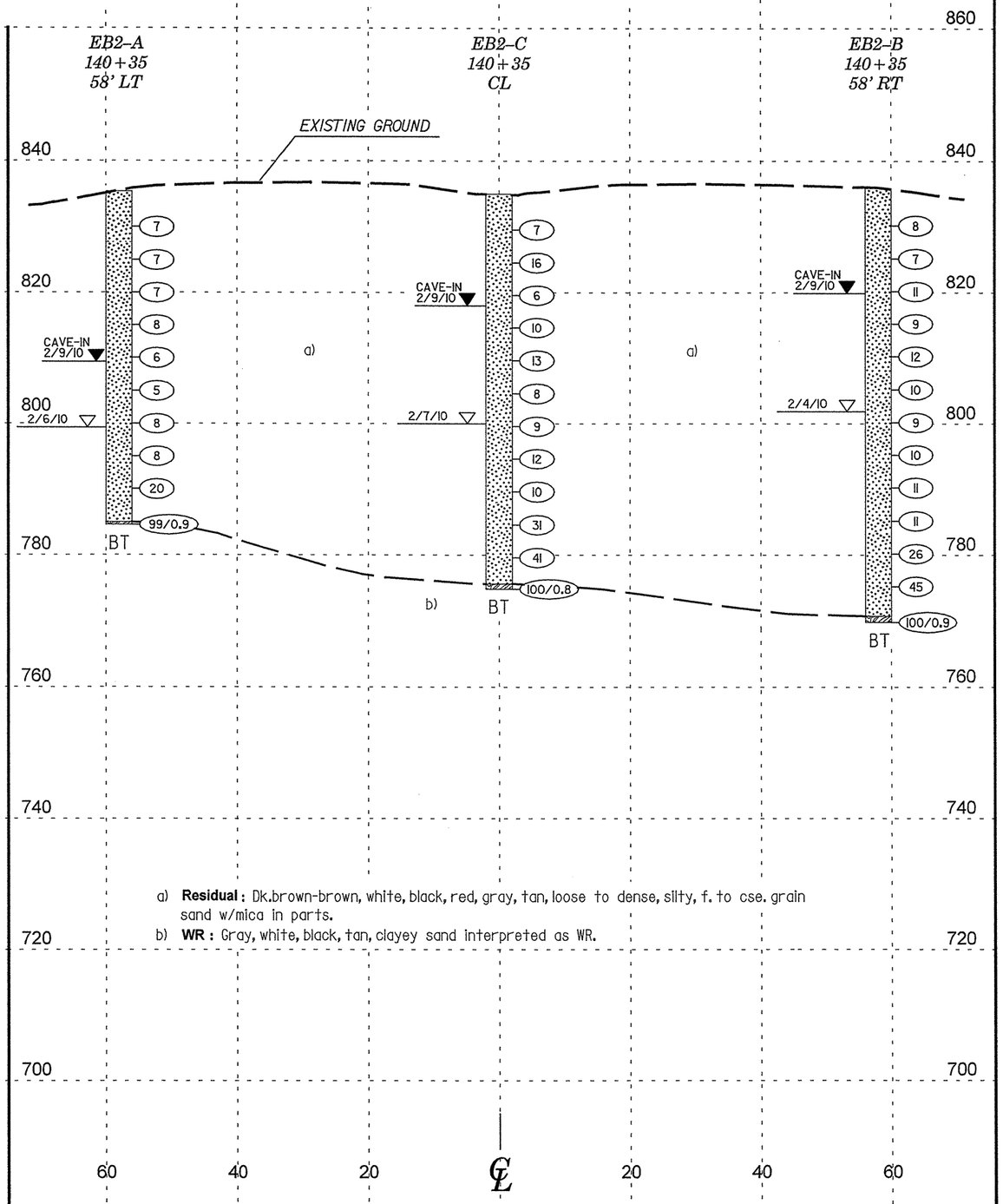
GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Residual :** Brown, gray, white, red, black, tan, loose to dense, silty, f. to cse. grain sand w/scattered mica
b) **Residual :** Gray, dk. gray, black, brown-dk. brown, white, v. dense, silty, f. to cse. grain sand.
c) **WR :** Gray, white, tan, clayey sand interpreted as WR.
d) **CR :** Dk. gray, gray, black, white, gneiss frags. & hornblende & quartz grains interpreted as CR.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 1 CROSS SECTION



a) **Residual :** Dk.brown-brown, white, black, red, gray, tan, loose to dense, silty, f. to cse. grain sand w/mica in parts.
b) **WR :** Gray, white, black, tan, clayey sand interpreted as WR.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 2 CROSS SECTION

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 139+22	**OFFSET** 58 ft LT	**ALIGNMENT** -L-	**0 HR.** 33.0
COLLAR ELEV. 838.8 ft	**TOTAL DEPTH** 62.8 ft	**NORTHING** 755,034	**EASTING** 1,449,014	**24 HR.** 20.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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)
840										838.8 GROUND SURFACE 0.0
										RESIDUAL Brown, gray, red, white, black, tan, loose to med dense, silty, f. to cse. grain sand (A-2-4).
835	834.5	4.3	1	2	3	5		M		
830	829.5	9.3	1	3	3	6		M		
825	824.5	14.3	1	3	5	8		M		
820	819.5	19.3	1	2	4	6		M		
815	814.5	24.3	1	2	3	5	SS-1	M		
810	809.5	29.3	4	4	5	9		M		
805	804.5	34.3	2	10	10	20		M		
800	799.5	39.3	3	5	8	13		M		
795	794.5	44.3	5	7	10	17		M		
790	789.5	49.3	6	12	13	25		M		
785	784.5	54.3	15	26	33	59		M		787.1 51.7 Dark gray, black, white, gray, dense to v. dense, silty, f. to cse. grain sand (A-2-4).
780	779.5	59.3	22	27	23	50		M		
775	776.1	62.7	100/0.1			100/0.1		M		776.1 62.7 **CRYSTALLINE ROCK** Dark gray, black, white, gneiss frags., interpreted as CR. 776.0 62.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 776.0 ft on Crystalline Rock (Gneiss).
770										
765										
760										

NCDOT BORE SINGLE I-3819A_GEO_BRDG056980570.GPJ NC_DOT.GDT 5/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 139+22	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 32.0
COLLAR ELEV. 838.1 ft	**TOTAL DEPTH** 66.5 ft	**NORTHING** 754,977	**EASTING** 1,449,024	**24 HR.** 17.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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)
840										838.1 GROUND SURFACE 0.0
										RESIDUAL Brown, gray, white, red, tan, black, loose to med dense, silty, f. to cse. grain sand (A-2-4).
835	833.5	4.6	1	2	3	5		M		
830	828.5	9.6	1	4	4	8		M		
825	823.5	14.6	1	3	4	7		M		
820	818.5	19.6	1	3	4	7		M		
815	813.5	24.6	1	2	3	5		M		
810	808.5	29.6	1	3	3	6		M		
805	803.5	34.6	2	7	8	15		M		
800	798.5	39.6	1	3	5	8		M		
795	793.5	44.6	3	3	6	9		M		
790	788.5	49.6	2	8	9	17		M		
785	783.5	54.6	6	11	15	26	SS-2	M		
780	778.5	59.6	13	22	35	57		M		780.9 57.2 Brown-dk. brown, gray, white, v. dense, silty, f. to cse. grain sand (A-2-4).
775	774.7	63.4	20	29	34	63		M		
770	773.2	64.9	6	20	50	70		M		771.7 66.4 **CRYSTALLINE ROCK** Black, white, gneiss rock frags., interpreted as CR. 771.6 66.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 771.6 ft on Crystalline Rock (Gneiss).
765	771.7	66.4	100/0.1			100/0.1		M		
760										

NCDOT BORE SINGLE I-3819A_GEO_BRDG056980570.GPJ NC_DOT.GDT 5/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 139+22	**OFFSET** 58 ft RT	**ALIGNMENT** -L-	**0 HR.** 45.0
COLLAR ELEV. 838.6 ft	**TOTAL DEPTH** 63.2 ft	**NORTHING** 754,920	**EASTING** 1,449,033	**24 HR.** 19.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**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
840										838.6 ELEV. (ft) GROUND SURFACE 0.0 DEPTH (ft)
										RESIDUAL Brown, black, gray, white, red, tan, loose to med. dense, silty, f. to cse. grain sand w/mica (A-2-4).
835	833.9	4.7	4	5	6	11		M		
830	828.9	9.7	3	3	3	6		M		
825	823.9	14.7	2	4	5	9		M		
820	818.9	19.7	2	4	4	8		M		
815	813.9	24.7	2	4	5	9		M		
810	808.9	29.7	1	3	4	7		M		
805	803.9	34.7	1	2	4	6		M		
800	798.9	39.7	2	4	5	9		M		
795	793.9	44.7	2	4	9	13		M		
790	788.9	49.7	2	5	8	13		M		
785	783.9	54.7	18	15	17	32		M		
780	778.9	59.7	17	49	51/0.4	100/0.9		M		778.4 ELEV. (ft) WEATHERED ROCK 60.2 DEPTH (ft)
775	775.5	63.1	100/0.1			100/0.1		M		Gray, white, tan, clayey sand, interpreted as WR.
770										775.5 / 775.4 CRYSTALLINE ROCK 63.1 / 63.2 DEPTH (ft)
765										Black, white, hornblende & quartz grains & gneiss frags., interpreted as CR.
760										Boring Terminated with Standard Penetration Test Refusal at Elevation 775.4 ft on Crystalline Rock (Gneiss).

NCDOT BORE SINGLE I-3819A_GEO_BRDG0569&0570.GPJ NC_DOT.GDT 5/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 140+35	**OFFSET** 58 ft LT	**ALIGNMENT** -L-	**0 HR.** 36.0
COLLAR ELEV. 835.4 ft	**TOTAL DEPTH** 50.8 ft	**NORTHING** 755,054	**EASTING** 1,449,125	**24 HR.** 26.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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
840										835.4 ELEV. (ft) GROUND SURFACE 0.0 DEPTH (ft)
										RESIDUAL Dark brown, brown, black, tan, white, gray, red, loose to med. dense, silty, f. to cse. grain sand (A-2-4).
835	831.0	4.4								
830	826.0	9.4	3	4	3	7	SS-3	M		
825	821.0	14.4	1	4	3	7		M		
820	816.0	19.4	1	3	4	7		M		
815	811.0	24.4	2	4	4	8		M		
810	806.0	29.4	1	2	4	6		M		
805	801.0	34.4	1	2	3	5		M		
800	796.0	39.4	1	3	5	8		M		
795	791.0	44.4	1	3	5	8		M		
790	786.0	49.4	4	8	12	20		M		
785			7	9	90/0.4	99/0.9		M		785.0 ELEV. (ft) 50.4 DEPTH (ft)
780										784.6 50.8 WEATHERED ROCK
775										Gray & white, to black & white, clayey sand, interpreted as WR.
770										Boring Terminated at Elevation 784.6 ft in Weathered Rock (Gneiss).
765										
760										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0569&0570.GPJ NC_DOT.GDT 5/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 140+35	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 35.0
COLLAR ELEV. 835.0 ft	**TOTAL DEPTH** 60.2 ft	**NORTHING** 754,996	**EASTING** 1,449,135	**24 HR.** 17.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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)
840										
835										835.0 GROUND SURFACE 0.0
										RESIDUAL
										Red, dk. brown-brown, white, gray, red, loose to dense, silty, f. to cse. grain sand (A-2-4).
830	830.6	4.4	1	3	4	7		M		
825	825.6	9.4	3	7	9	16		M		
820	820.6	14.4	1	2	4	6		M		
815	815.6	19.4	3	4	6	10		M		
810	810.6	24.4	3	6	7	13		M		
805	805.6	29.4	4	4	4	8		M		
800	800.6	34.4	3	4	5	9		M		
795	795.6	39.4	3	5	7	12		M		
790	790.6	44.4	2	4	6	10	SS-5	M		
785	785.6	49.4	5	11	20	31		M		
780	780.6	54.4	11	16	25	41		M		
775	775.6	59.4	55	90/0.3		100/0.8		M		775.6 59.4
										774.8 60.2
										WEATHERED ROCK
										Gray, white, sandy clay, interpreted as WR.
										Boring Terminated at Elevation 774.8 ft in Weathered Rock (Gneiss).
770										
765										
760										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0569&0570.GPJ NC_DOT.GDT 5/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci
SITE DESCRIPTION Bridge No. 569 & 570 on I-40 Over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 140+35	**OFFSET** 58 ft RT	**ALIGNMENT** -L-	**0 HR.** 34.0
COLLAR ELEV. 835.9 ft	**TOTAL DEPTH** 66.1 ft	**NORTHING** 754,939	**EASTING** 1,449,145	**24 HR.** 16.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**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)
840										
835										835.9 GROUND SURFACE 0.0
										RESIDUAL
										Dark brown-brown, black, gray, white, dk. red-red, loose to dense, silty, f. to cse grain sand w/mica in parts (A-2-4).
830	831.2	4.7	2	4	4	8		M		
825	826.2	9.7	1	3	4	7		M		
820	821.2	14.7	3	5	6	11		M		
815	816.2	19.7	2	4	5	9		M		
810	811.2	24.7	4	5	7	12		M		
805	806.2	29.7	2	4	6	10		M		
800	801.2	34.7	2	4	5	9		M		
795	796.2	39.7	2	4	6	10		M		
790	791.2	44.7	3	5	6	11	SS-4	M		
785	786.2	49.7	3	5	6	11		M		
780	781.2	54.7	5	9	17	26		M		
775	776.2	59.7	10	19	26	45		M		
770	771.2	64.7	13	54	60/0.4	100/0.9		M		770.7 65.2
										769.8 66.1
										WEATHERED ROCK
										Gray, white, black, tan, clayey sand, interpreted as WR.
										Boring Terminated at Elevation 769.8 ft in Weathered Rock (Gneiss).
765										
760										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0569&0570.GPJ NC_DOT.GDT 5/13/10

STATE PROJECT NO.: 34192.1.2

TIP NO.: I-3819A

COUNTY: IREDELL

SITE DESC.: Bridge No. 569 & 570 on I-40 over -YRPBD- Ramp Between US 21 and SR 2158 (Left and Right Lanes)

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Passing No.200	Percent Retained No. 60	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
EB1-A	SS-1	24.3'-25.8'	A-2-4(0)	5	97.6	75.3	32.6	36.9	35.3	35.5	21.0	8.2	37	10	27	N/A
EB1-C	SS-2	54.6'-56.1'	A-2-4(0)	26	97.3	71.1	23.8	43.8	42.2	36.6	15.3	6.0	34	5	29	N/A
EB2-A	SS-3	4.4'-5.9'	A-2-4(0)	7	95.3	79.5	35.0	31.2	27.8	40.5	23.6	8.1	35	8	27	N/A
EB2-B	SS-4	29.7'-31.2'	A-2-4(0)	10	98.9	77.8	26.9	38.6	37.9	38.9	20.1	3.0	39	NP	NP	N/A
EB2-C	SS-5	44.4'-45.9'	A-2-4(0)	10	96.0	68.3	24.9	44.9	42.6	35.2	16.8	5.4	36	7	29	N/A

F&H, CERT. No. 102-0603

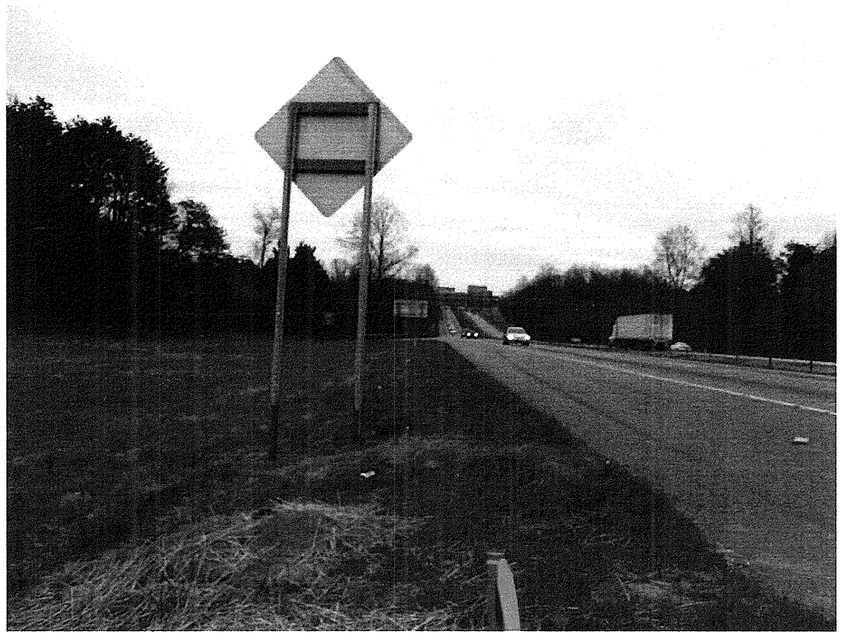
Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

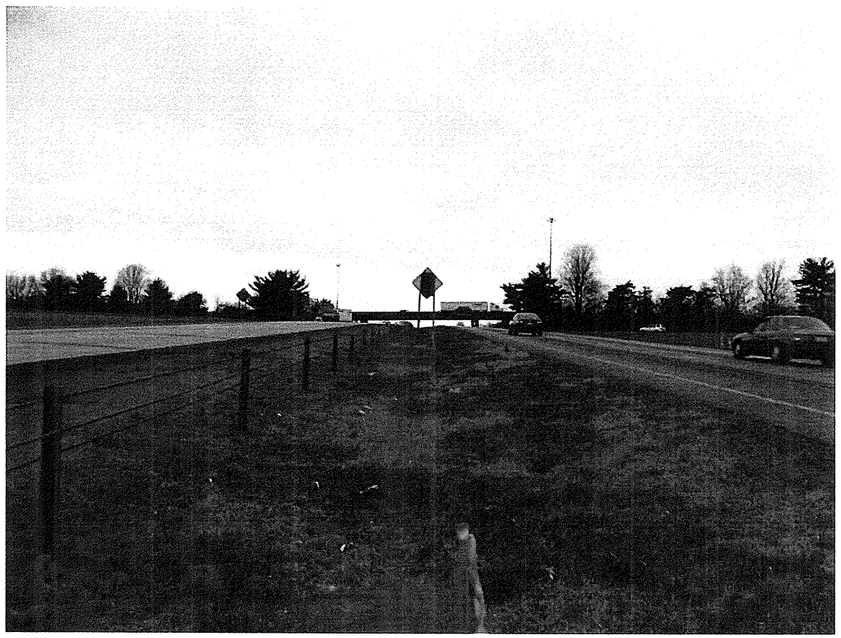
SITE PHOTOGRAPHIC RECORD

Bridge No. 569 on I-40 over –YRPBD- Ramp Between US 21 and SR 2158 (Left Lane)

Bridge No. 570 on I-40 over –YRPBD- Ramp Between US 21 and SR 2158 (Right Lane)



EB1-A Looking East Toward EB2-A



EB2-C Looking West Toward EB1-C

EB1-B Looking East Toward EB2-B

SITE PHOTOGRAPHIC RECORD

Bridge No. 569 on I-40 over –YRPBD- Ramp Between US 21 and SR 2158 (Left Lane)

Bridge No. 570 on I-40 over –YRPBD- Ramp Between US 21 and SR 2158 (Right Lane)

EB1-B Looking North Toward EB1-C

EB2-A Looking South Toward EB2-C

EB1-C Looking North Toward EB1-A

EB2-C Looking South Toward EB2-B

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	24

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)

SITE DESCRIPTION BRIDGE NO. 571 ON RAMP D (-YRPD-) OVER FOURTH CREEK TRIBUTARY 3 BETWEEN I-40 EAST BOUND LANE AND I-77 NORTH BOUND LANE

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5	PROFILE
6,7	CROSS SECTIONS
8-20	BORE LOG & CORE REPORTS WITH CORE PHOTOGRAPHS
21	SOIL AND ROCK TEST RESULTS
22	SCOUR REPORT
23,24	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PROJECT: 34192.1.2

ID: I-3819A

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

B. CAYTON

S. GOWER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 5/6/2010

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	
CLASS.	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6	A-3	A-6, A-7	
SYMBOL														
% PASSING #10	50 MX													
#40	30 MX	50 MX												
#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														
PLASTIC INDEX	6 MX		NP	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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 / DPT / 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
- [x] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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.
- [x] CORE BIT
- [ ] _____

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [x] -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.

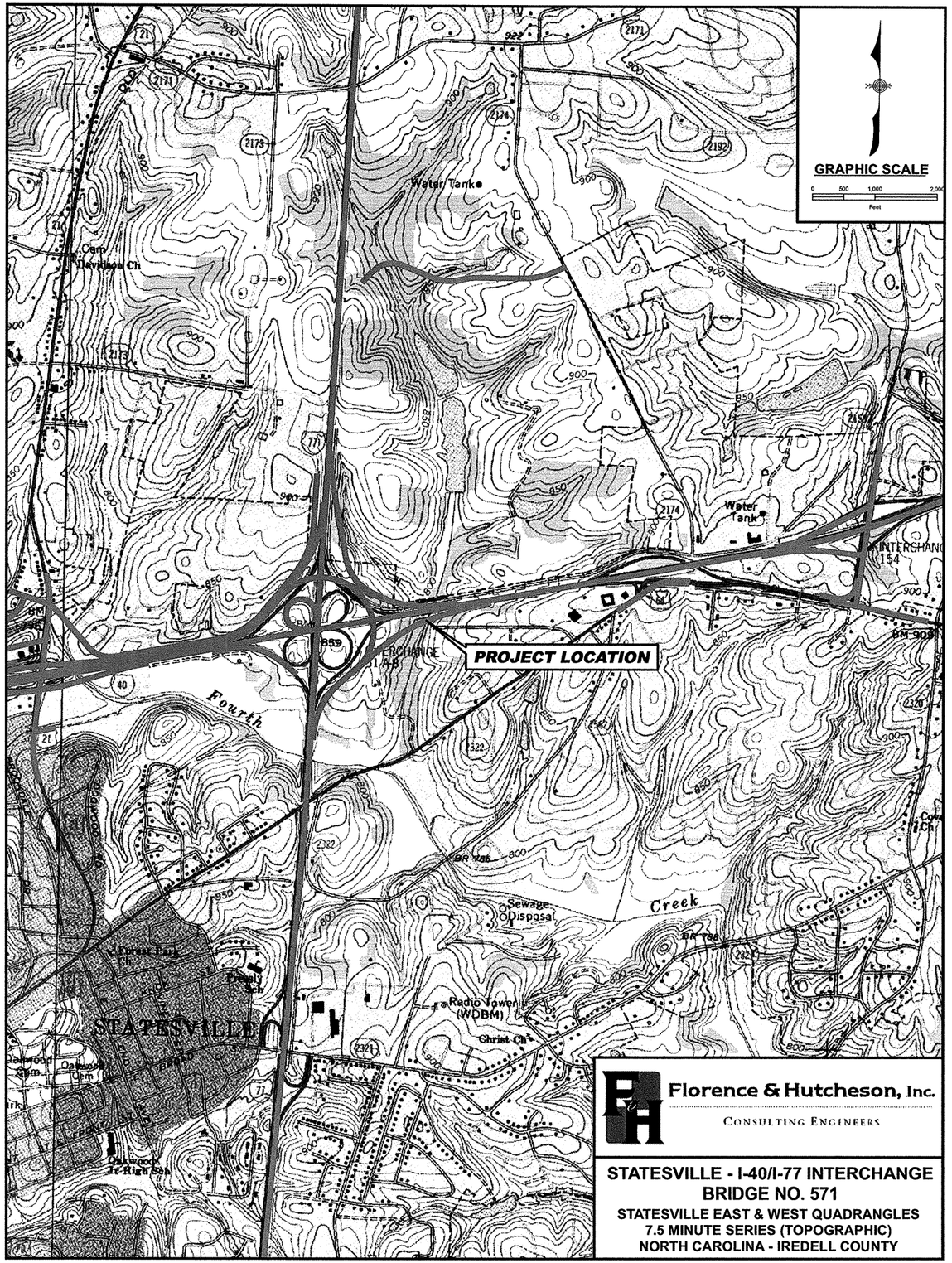
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #9 - STATION 150+14 117' RIGHT -L-, 8" NAIL IN BASE OF 24" RED OAK, N755047 E1450119

ELEVATION: 811.91 FT.

NOTES:

REVISED 09/23/09



Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

STATESVILLE - I-40/I-77 INTERCHANGE
BRIDGE NO. 571
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

BRIDGE No. 571 ON RAMP D (YRPD-)
OVER FOURTH CREEK TRIBUTARY 3
BETWEEN I-40 EAST BOUND LANE AND
I-77 NORTH BOUND LANE
TIP No. I-3819A
IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4

NC GRID NAD 83

-YRPD- POC 15+39.00
BEGIN APPROACH SLAB

-YRPD- POC 15+64.00
BEGIN BRIDGE

-YRPD- SC 15+29.40

BM #9
-BLE- STA 137+78
50' RIGHT
ELEV. = 811.91'

-YRPD- POC 17+64.00
END BRIDGE

-YRPD- POC 17+89.00
END APPROACH SLAB

EB1-A
B1-A
B2-A
EB2-A
EB1-B
B1-B
B2-B
EB2-B

UNNAMED CREEK

FOURTH CREEK

JS

15
20
10
150
15
15

0 50 100
SCALE IN FEET

GENERALIZED SUBSURFACE PROFILE 27' Lt. of –YRPD–

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5
PROFILE	

840
820
800
780
760
740
720
700
680

EB1–A
15+84
27' LT

B1–A
16+35
16' LT

B2–A
17+21
21' LT

EB2–A
17+89
27' LT.

EXISTING GROUND

APPROXIMATE WATER LEVEL AT TIME OF DRILLING

EB1–A: 9, 18, 31, 100/0.4 — BT — DRY 2/8/10

B1–A: 2/8/10 — 7, 23, 100/0.3 — REC.=0.5, RQD=NA, RMR=15; REC.=1.1, RQD=0.9, RMR=61; REC.=13.6, RQD=13.1, RMR=74 — BT

B2–A: 2/8/10 — 4, 36, 100/0.5 — REC.=3.8, RQD=2.2, RMR=49; REC.=13.1, RQD=11.6, RMR=50 — BT

EB2–A: 2/18/10 — ST, 0, 2, 60/0.1 — REC.=5.0, RQD=4.7; REC.=6.0, RQD=5.8; REC.=0.8, RQD=NA; REC.=7.2, RQD=6.6 — BT

a) **Alluvial :** Brown, v. soft, v. sandy, clayey silt.
b) **Alluvial :** Brown, tan, red, loose, clayey, f. to cse. grain sand.
c) **Alluvial :** Dark brown, loose, silty, f. to cse. grain sand.
d) **Alluvial :** Brown, v. soft, v. sandy, silty, micaceous clay.
e) **Residual :** Black, white, tan, brown, loose to dense, silty, f. to cse. grain sand.
f) **WR :** Black, white, tan, gray, clayey sand & sand interpreted as WR.
g) **WR :** Black, dk. gray, lt. green, orange stain, sev. weathered, hard, amphibolite frags. (to 2½") w/brown clay.
h) **CR :** White, black-gray-green, trace brown-pink, brown stain, fresh to mod. weathered w/intervals sev. weathered, hard to v. hard w/traces soft, v. close to mod. close frac. spacing, quartz hornblende biotite gneiss w/scattered garnets.
i) **CR :** Black, white, dk. gray-gray, lt. green, traces pink, fresh to sli. weathered w/interval sev. to v. sev. weathering, v. hard to hard w/traces soft, close to mod. close frac. spacing, hornblende quartz biotite gneiss w/garnets.
j) **WR :** Black, gray, white, brown stain, sev. to completely weathered, soft to mod. hard, v. close frac. spacing, hornblende quartz biotite gneiss w/traces garnet.

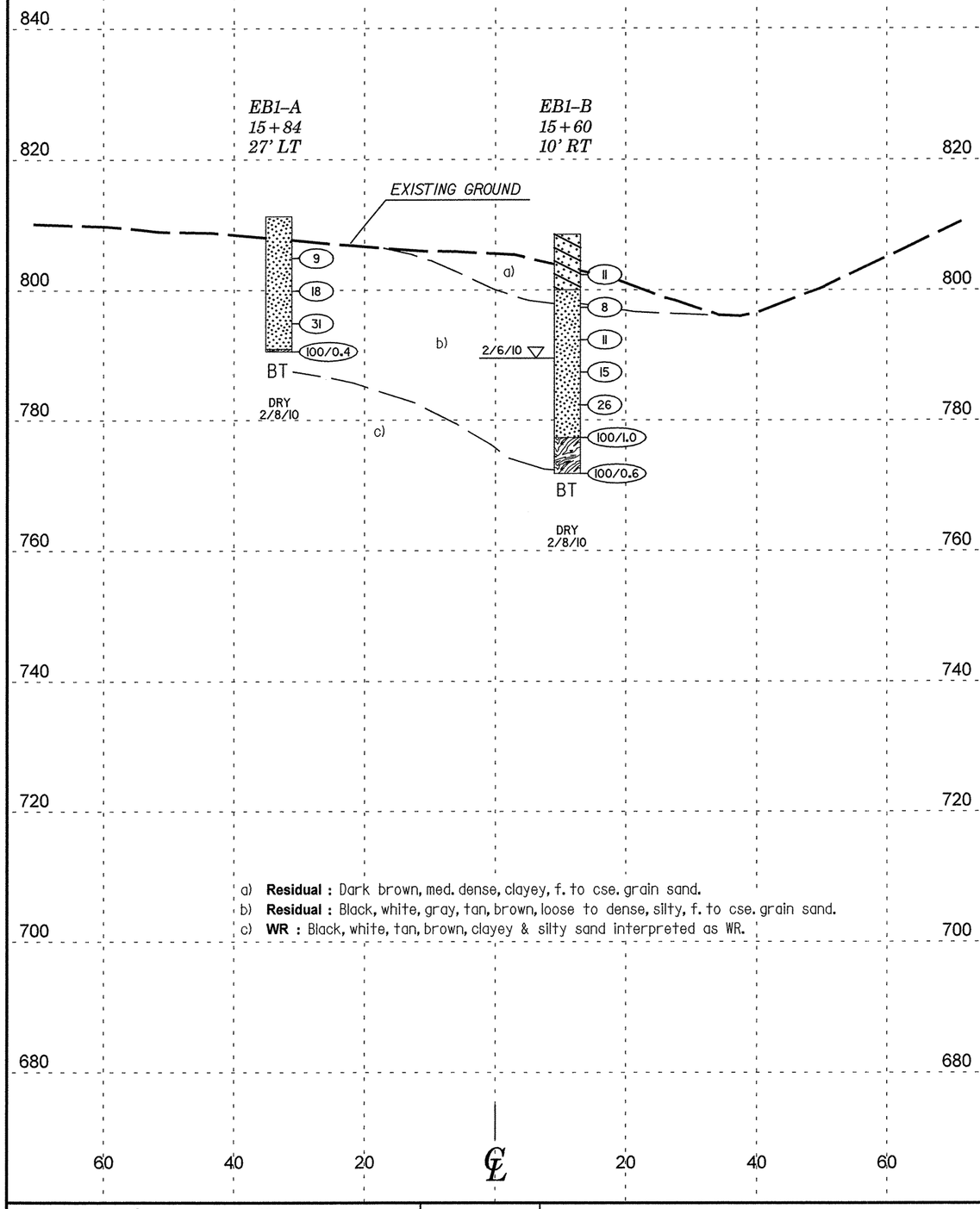
15+40 15+60 15+80 16+00 16+20 16+40 16+60 16+80 17+00 17+20 17+40 17+60 17+80 18+00 18+20

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	6

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

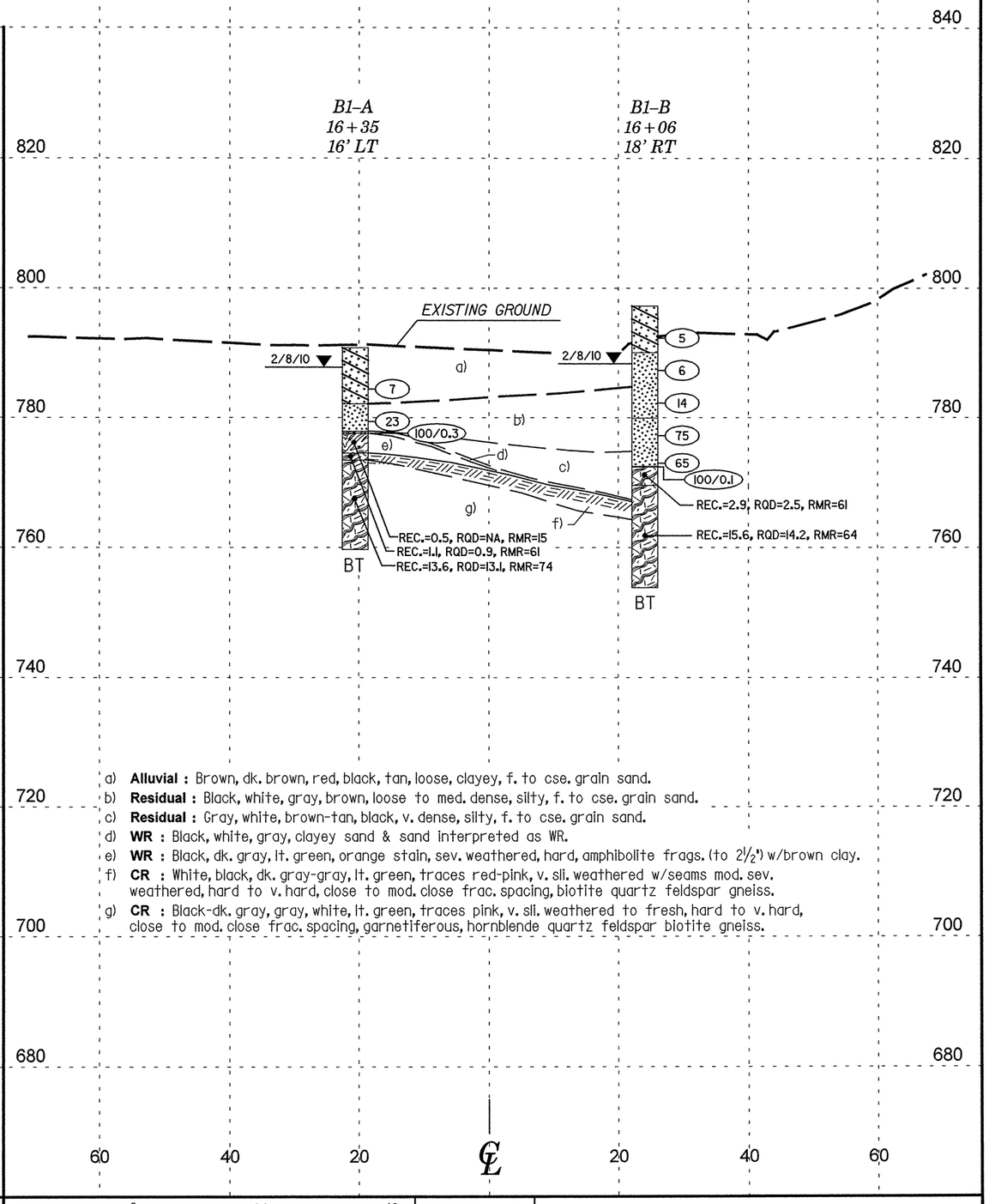
GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Residual :** Dark brown, med. dense, clayey, f. to cse. grain sand.
b) **Residual :** Black, white, gray, tan, brown, loose to dense, silty, f. to cse. grain sand.
c) **WR :** Black, white, tan, brown, clayey & silty sand interpreted as WR.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 1 CROSS SECTION



a) **Alluvial :** Brown, dk. brown, red, black, tan, loose, clayey, f. to cse. grain sand.
b) **Residual :** Black, white, gray, brown, loose to med. dense, silty, f. to cse. grain sand.
c) **Residual :** Gray, white, brown-tan, black, v. dense, silty, f. to cse. grain sand.
d) **WR :** Black, white, gray, clayey sand & sand interpreted as WR.
e) **WR :** Black, dk. gray, lt. green, orange stain, sev. weathered, hard, amphibolite frags. (to 2½") w/brown clay.
f) **CR :** White, black, dk. gray-gray, lt. green, traces red-pink, v. sli. weathered w/seams mod. sev. weathered, hard to v. hard, close to mod. close frac. spacing, biotite quartz feldspar gneiss.
g) **CR :** Black-dk. gray, gray, white, lt. green, traces pink, v. sli. weathered to fresh, hard to v. hard, close to mod. close frac. spacing, garnetiferous, hornblende quartz feldspar biotite gneiss.

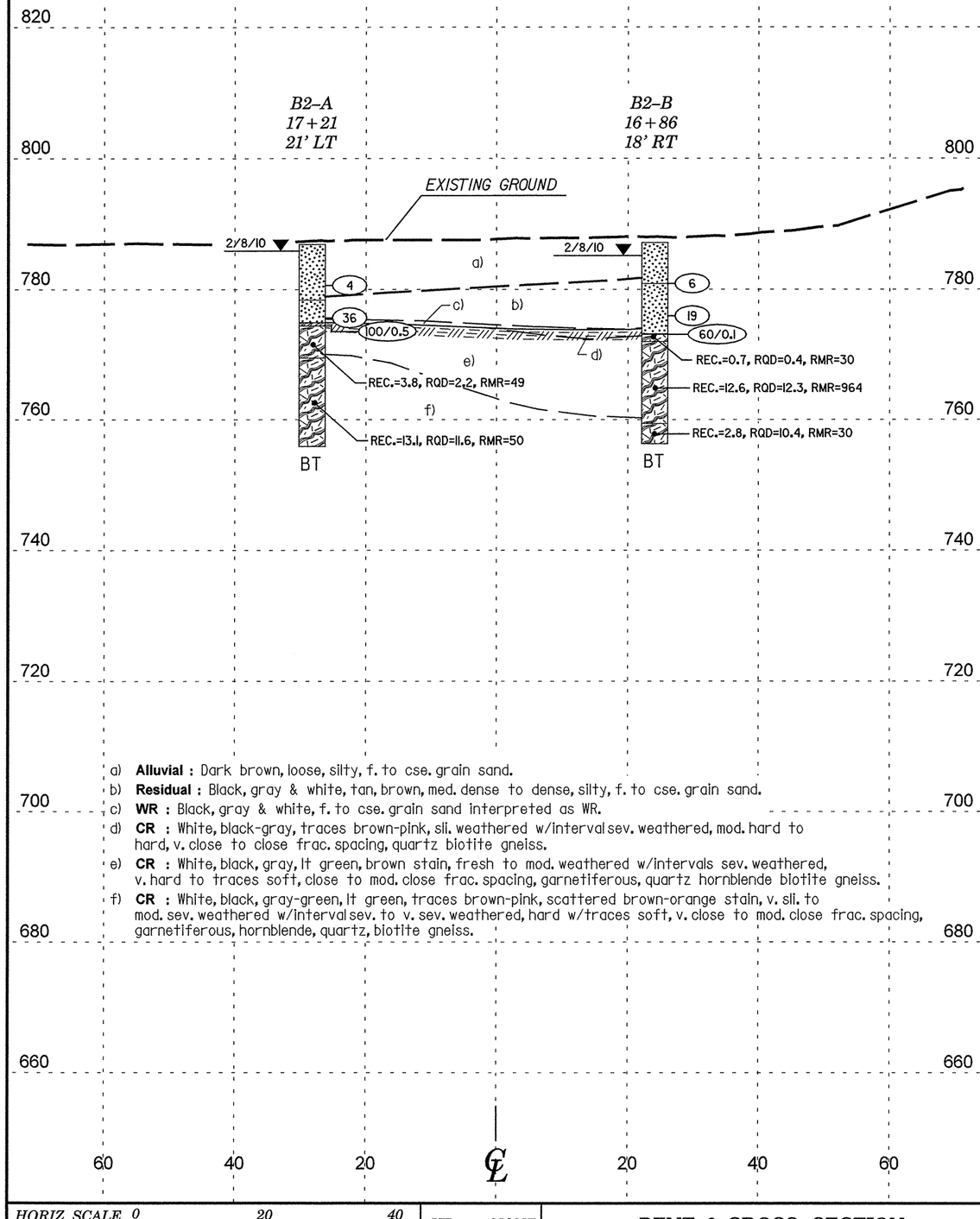
HORIZ. SCALE (FEET) 0 20 40	VE = NONE	BENT 1 CROSS SECTION

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	7

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

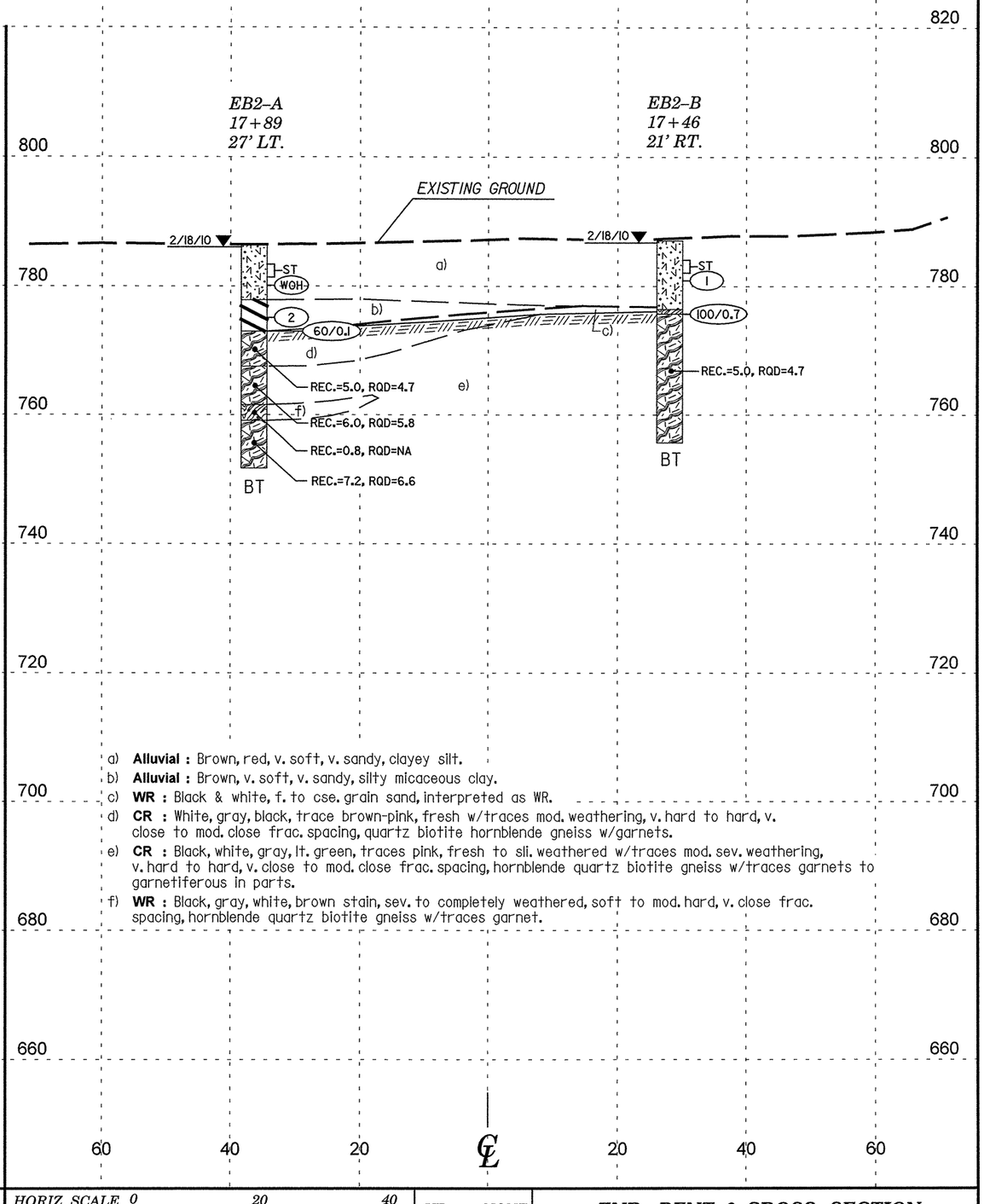
GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Alluvial :** Dark brown, loose, silty, f. to cse. grain sand.
b) **Residual :** Black, gray & white, tan, brown, med. dense to dense, silty, f. to cse. grain sand.
c) **WR :** Black, gray & white, f. to cse. grain sand interpreted as WR.
d) **CR :** White, black-gray, traces brown-pink, sli. weathered w/interval sev. weathered, mod. hard to hard, v. close to close frac. spacing, quartz biotite gneiss.
e) **CR :** White, black, gray, lt green, brown stain, fresh to mod. weathered w/intervals sev. weathered, v. hard to traces soft, close to mod. close frac. spacing, garnetiferous, quartz hornblende biotite gneiss.
f) **CR :** White, black, gray-green, lt green, traces brown-pink, scattered brown-orange stain, v. sli. to mod. sev. weathered w/interval sev. to v. sev. weathered, hard w/traces soft, v. close to mod. close frac. spacing, garnetiferous, hornblende, quartz, biotite gneiss.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	BENT 2 CROSS SECTION



a) **Alluvial :** Brown, red, v. soft, v. sandy, clayey silt.
b) **Alluvial :** Brown, v. soft, v. sandy, silty micaceous clay.
c) **WR :** Black & white, f. to cse. grain sand, interpreted as WR.
d) **CR :** White, gray, black, trace brown-pink, fresh w/traces mod. weathering, v. hard to hard, v. close to mod. close frac. spacing, quartz biotite hornblende gneiss w/garnets.
e) **CR :** Black, white, gray, lt. green, traces pink, fresh to sli. weathered w/traces mod. sev. weathering, v. hard to hard, v. close to mod. close frac. spacing, hornblende quartz biotite gneiss w/traces garnets to garnetiferous in parts.
f) **WR :** Black, gray, white, brown stain, sev. to completely weathered, soft to mod. hard, v. close frac. spacing, hornblende quartz biotite gneiss w/traces garnet.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 2 CROSS SECTION

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+84	**OFFSET** 27 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** Dry
COLLAR ELEV. 811.2 ft	**TOTAL DEPTH** 20.7 ft	**NORTHING** 754,981	**EASTING** 1,450,030	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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)
815										
810										811.2 GROUND SURFACE 0.0
										RESIDUAL White, black, tan, brown, loose to dense, silty, f. to cse. grain sand (A-2-4).
805	805.9	5.3	4	3	6	9		M		
800	800.9	10.3	7	9	9	18	SS-1	M		
795	795.9	15.3	8	16	15	31		D		
790	790.9	20.3	100/0.4			100/0.4		D		790.9 20.3 790.5 20.7 **WEATHERED ROCK** Black, white, tan, clayey sand, interpreted as WR.
785										Boring Terminated with Standard Penetration Test Refusal at Elevation 790.5 ft on Crystalline Rock (Gneiss).
780										Standard penetration test refusal occured in last 0.1' of sample starting at 20.3'.
775										
770										
765										
760										
755										
750										
745										
740										
735										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 15+60	**OFFSET** 10 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** 19.0
COLLAR ELEV. 808.4 ft	**TOTAL DEPTH** 36.7 ft	**NORTHING** 755,024	**EASTING** 1,450,040	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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)
810										808.4 GROUND SURFACE 0.0
805	803.3	5.1	2	5	6	11		M		**RESIDUAL** Dark brown, lt. brown, med. dense, clayey, f. to cse. grain sand (A-2-6).
800	798.3	10.1	3	4	4	8		M		800.0 8.4 Black, white, gray, brown, tan, loose to med. dense, silty, f. to cse. grain sand (A-2-4).
795	793.3	15.1	3	5	6	11		M		
790	788.3	20.1	5	7	8	15		M		
785	783.3	25.1	7	12	14	26		M		
780	778.3	30.1	14	26	100/0.5	100/1.0		M		777.3 31.1 **WEATHERED ROCK** Black, white, brown, tan, silty sand, interpreted as WR.
775	772.3	36.1	48	60/0.1		100/0.6		M		771.7 36.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 771.7 ft on Crystalline Rock ((Gneiss).
770										
765										
760										
755										
750										
745										
740										
735										
730										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+35	**OFFSET** 16 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 790.7 ft	**TOTAL DEPTH** 31.0 ft	**NORTHING** 754,973	**EASTING** 1,449,979	**24 HR.** 3.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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)
795											
790										790.7 GROUND SURFACE	0.0
										ALLUVIAL Brown, tan, red, loose, clayey, f. to cse. grain sand (A-2-6).	
785	785.4	5.3	2	3	4	7	SS-2	M			
										782.1 **RESIDUAL** Black, white, brown, med. dense, silty, f. to cse. grain sand (A-2-4).	8.6
780	780.4	10.3	8	11	12	23		M			
	777.9	12.8	100/0.3			100/0.3		M		777.9	12.8
775										777.6 **WEATHERED ROCK** Black, white, clayey sand, interpreted as WR.	13.1
										Amphibolite 774.5	16.2
770										773.4 **CRYSTALLINE ROCK** Biotite gneiss Hornblende gneiss	17.3
765											
760										759.7	31.0
755										Boring Terminated at Elevation 759.7 ft In Crystalline Rock (Gneiss).	
750											
745											
740											
735											
730											
725											
720											
715											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

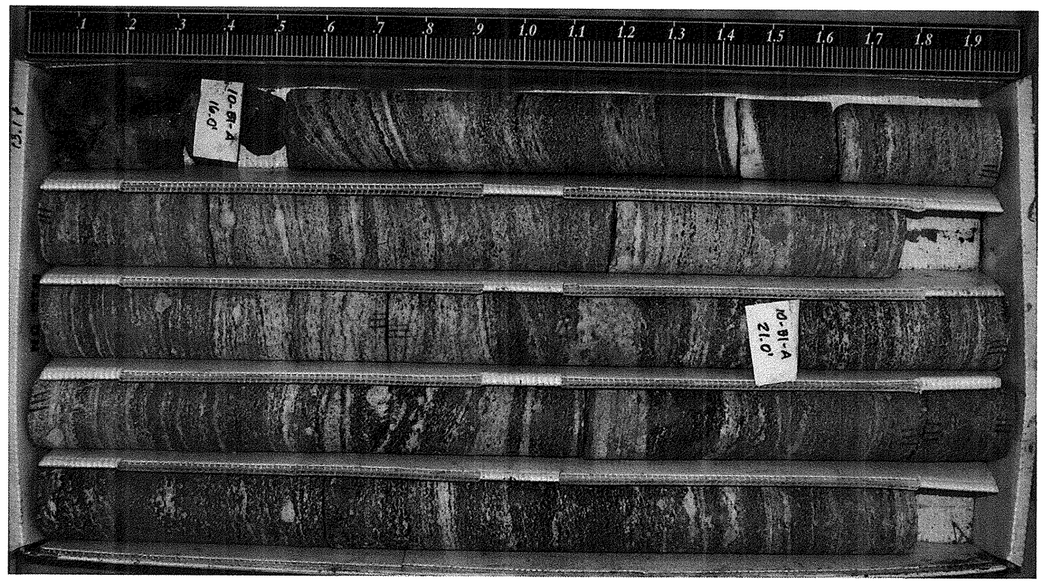
PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+35	**OFFSET** 16 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 790.7 ft	**TOTAL DEPTH** 31.0 ft	**NORTHING** 754,973	**EASTING** 1,449,979	**24 HR.** 3.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 17.9 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)
777.6											Begin Coring @ 13.1 ft	
	777.6	13.1	2.9	0:30/0.9 0:30 0:42	(0.4) 14%	N/A		(0.5) 16%	N/A		777.6 Black, dk. gray, lt. green, orange stain, sev. weathered, hard, amphibolite frags. (to 2 1/2"), w/brown clay.	13.1
775	774.7	16.0									774.5	16.2
			5.0	1:34 2:10 1:23 1:22 1:10	(4.9) 98%	(4.6) 92%		(1.1) 100%	(0.9) 82%		773.4 Uniaxial compressive strength=20 KSF (interpreted value) R1=0, R2=3, R3=5, R4=0, R5=7, RMR=15 Rock Type E	17.3
770	769.7	21.0						(13.6) 99%	(13.1) 96%		**CRYSTALLINE ROCK** White, gray-green, pink, v. slightly weathered, hard to v. hard, close frac. spacing, biotite quartz gneiss. 3 0°-10° fracs.	
			5.0	1:11 1:11 1:14 1:22 1:14	(5.0) 100%	(4.9) 98%					Uniaxial compressive strength=1171 KSF R1=7, R2=17, R3=10, R4=20, R5=7, RMR=61 Rock Type E	
765	764.7	26.0									Black-dk. gray, white, traces pink, v. slightly weathered to fresh, hard to v. hard, close to mod. close frac. spacing, hornblende quartz biotite gneiss w/garnets. 7 0°-10° fracs. w/rough walls; 2 30° fracs. w/rough walls	
			5.0	2:08 2:53 2:12 2:18 1:48	(4.9) 98%	(4.5) 90%					Uniaxial compressive strength=1171 KSF R1=7, R2=20, R3=20, R4=20, R5=7, RMR=74 Rock Type E	
760	759.7	31.0									759.7	31.0
755											Boring Terminated at Elevation 759.7 ft In Crystalline Rock (Gneiss).	
750												
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												

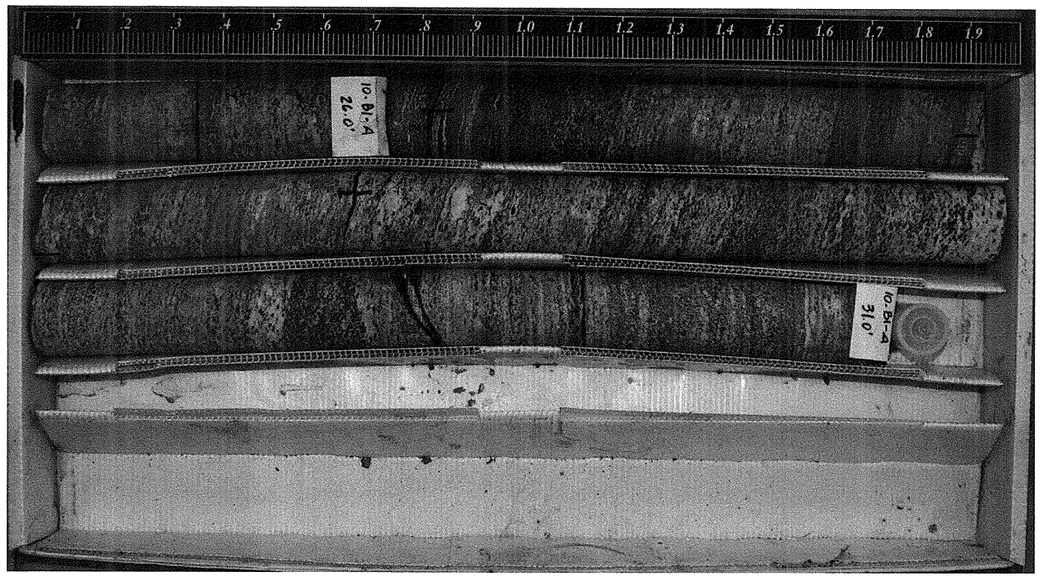
NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane



Boring B1-A – Station 16+35 @ 16' Lt. Box 1 of 2



Boring B1-A – Station 16+35 @ 16'Lt. Box 2 of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 16+06	**OFFSET** 18 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 797.3 ft	**TOTAL DEPTH** 43.4 ft	**NORTHING** 755,016	**EASTING** 1,449,994	**24 HR.** 9.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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)
800											
										797.3 GROUND SURFACE	0.0
795										**ALLUVIAL** Dark brown, red, black, loose, clayey, f. to cse. grain sand (A-2-6).	
	793.3	4.0	1	2	3	5		M			
790										790.0	7.3
	788.3	9.0	2	2	4	6		M		**RESIDUAL** Gray, white, black, loose to med. dense, silty, f. to cse. grain sand (A-2-4).	
785											
	783.3	14.0	4	6	8	14	SS-3	M			
780										780.0	17.3
	778.3	19.0	8	16	59	75		M		Gray, white, brown-tan, black, v. dense, silty, f. to cse. grain sand (A-2-4).	
775											
	774.0	23.3									
	772.5	24.8	18	15	50	65 100/0.1		M		772.5	24.8
			100/0.1							772.4 **WEATHERED ROCK** Black, white, gray, sand, interpreted as WR.	24.9
770								M		769.5 **CRYSTALLINE ROCK** Biotite gneiss Hornblende gneiss	27.8
							RS-1				
765											
760											
755										753.9	43.4
										Boring Terminated at Elevation 753.9 ft In Crystalline Rock (Gneiss).	
750											
745											
740											
735											
730											
725											
720											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 16+06	**OFFSET** 18 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 797.3 ft	**TOTAL DEPTH** 43.4 ft	**NORTHING** 755,016	**EASTING** 1,449,994	**24 HR.** 9.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 18.5 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)
772.4											Begin Coring @ 24.9 ft	
770	772.4	24.9	3.5	0:48/0.5 1:30 1:27 1:18	(3.5) 100%	(3.1) 89%		(2.9) 100%	(2.5) 86%		772.4 **CRYSTALLINE ROCK** Black, white, gray, lt. green, traces red-pink, v. sli. weathered w/mod. sev. weathered @ top (0.2'), hard, close to mod. close frac. spacing, garnetiferous, biotite feldspar gneiss. 5 0°-10° fracs. w/iron stain, 1 25° frac. w/iron stain	24.9
	768.9	28.4										
			5.0	1:33 1:30 1:07 1:22 1:04	(5.0) 100%	(4.9) 98%	RS-1	(15.6) 100%	(14.2) 91%		769.5 Uniaxial compressive strength=1171 KSF R1=7, R2=17, R3=10, R4=20, R5=7, RMR=61 Rock Type E	27.8
765	763.9	33.4									Black, white, gray, lt green, traces pink, v. sli. weathered, hard, close to mod. close frac. spacing, garnetiferous, hornblende, feldspar, biotite gneiss. 13 0°-15° fracs.; 2 25° fracs.; 2 35° fracs. w/fresh walls; 1 45° frac. w/rough walls	
			5.0	0:59 1:06 1:02 1:12 1:07	(5.0) 100%	(3.9) 78%						
760	758.9	38.4									Uniaxial compressive strength=1171 KSF R1=7, R2=20, R3=10, R4=20, R5=7, RMR=64 Rock Type E	
			5.0	1:30 1:32 1:47 1:54 1:38	(5.0) 100%	(4.8) 96%						
755	753.9	43.4									753.9	43.4
											Boring Terminated at Elevation 753.9 ft In Crystalline Rock (Gneiss).	
750												
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												
695												

NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

Boring B1-B – Station 16+06 @ 18' Rt. Box 1 of 2

Boring B1-B – Station 16+06 @ 18' Rt. Box 2 of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 17+21	**OFFSET** 21 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.0 ft	**TOTAL DEPTH** 31.0 ft	**NORTHING** 754,936	**EASTING** 1,449,902	**24 HR.** 1.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**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)
790											
785										787.0 GROUND SURFACE	0.0
										ALLUVIAL Dark brown, loose, silty, f. to cse. grain sand (A-2-4).	
	781.7	5.3	1	2	2	4		W			
780										778.4	8.6
	776.7	10.3	12	19	17	36		W		**RESIDUAL** Black, white, tan, brown, dense, silty, f. to cse. grain sand (A-2-4).	
775	775.0	12.0	100/0.5			100/0.5		W		775.0	12.0
										774.5 **WEATHERED ROCK** Black, gray sand, interpreted as WR.	12.5
770							RS-2			**CRYSTALLINE ROCK** Biotite gneiss	
										769.6	17.4
765										Hornblende gneiss	
760										756.0	31.0
755										Boring Terminated at Elevation 756.0 ft In Crystalline Rock (Gneiss).	
750											
745											
740											
735											
730											
725											
720											
715											
710											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 17+21	**OFFSET** 21 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.0 ft	**TOTAL DEPTH** 31.0 ft	**NORTHING** 754,936	**EASTING** 1,449,902	**24 HR.** 1.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 18.5 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)
774.5											Begin Coring @ 12.5 ft	
	774.5	12.5	3.5	0:15/0.5 1:16 1:43 1:32	(2.5) 71%	(2.2) 63%		(3.8) 78%	(2.2) 45%		774.5 **CRYSTALLINE ROCK** White, gray-black, brown stain, v. sli. to mod. weathering w/intervals sev. weathered (12.5'-12.6' & 16.5'-17.4'), hard to traces soft, close to mod. close frac. spacing, garnetiferous, quartz biotite hornblende gneiss w/scattered healed fracs. & trace pyrite.	12.5
770	771.0	16.0	5.0	1:00 1:12 1:17 1:25 1:10	(4.8) 96%	(3.6) 72%	RS-2	(13.1) 96%	(11.6) 85%		15 0°-10° fracs. w/stain; 3 20°-30° fracs. w/stain; 1 65° frac. partly healed	
	766.0	21.0	5.0	1:26 1:27 1:18 1:15 1:15	(4.8) 96%	(4.5) 90%					769.6 Uniaxial compressive strength=660 KSF R1=4, R2=8, R3=10, R4=20, R5=7, RMR=49 Rock Type E	17.4
765	761.0	26.0	5.0	1:12 0:58 1:00 0:51 1:32	(4.8) 96%	(3.5) 70%					White, black, lt. green, traces brown-pink, v. sli. weathered w/interval sev. to v. sev. weathered, traces soft to hard, mod. close to close frac. spacing, w/interval v. close frac. spacing, garnetiferous, quartz hornblende, biotite gneiss. 22 0°-10° fracs. w/stain and/or sev. weathering	
760	756.0	31.0									Uniaxial compressive strength=964 KSF R1=4, R2=17, R3=10, R4=12, R5=7, RMR=50 Rock Type E	
755											756.0 Boring Terminated at Elevation 756.0 ft In Crystalline Rock (Gneiss).	31.0
750												
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												
695												

NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

Boring B2-A – Station 17+21 @ 21' Lt. Box 1 of 2

Boring B2-A – Station 17+21 @ 21' Lt. Box 2 of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 16+86	**OFFSET** 18 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 30.9 ft	**NORTHING** 754,986	**EASTING** 1,449,919	**24 HR.** 2.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**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)
										787.2	0.0
										GROUND SURFACE	
										ALLUVIAL Dark brown, loose, sandy, silty, f. to cse. grain sand (A-2-4).	
	781.9	5.3	WOH	3	3	6		W		780.9	6.3
										RESIDUAL Gray to tan & brown, med. dense, silty, f. to cse. grain sand (A-2-4).	
	776.9	10.3	5	7	12	19		W			
	773.2	14.0	60/0.1			60/0.1		W		773.2 / 773.1 / 772.0	14.0 / 14.1 / 15.2
										WEATHERED ROCK Gray & white, f. to cse. grain sand, interpreted as WR.	
										CRYSTALLINE ROCK Biotite gneiss Garnetiferous hornblende gneiss	
							RS-3				
										759.4	27.8
										Hornblende gneiss	
										756.3	30.9
										Boring Terminated at Elevation 756.3 ft In Crystalline Rock (Gneiss).	

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 16+86	**OFFSET** 18 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 30.9 ft	**NORTHING** 754,986	**EASTING** 1,449,919	**24 HR.** 2.0
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/04/10	**COMP. DATE** 02/04/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 16.8 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)
773.1											Begin Coring @ 14.1 ft	
	773.1	14.1	1.8	1:50/0.8	(1.5)	(0.8)		(0.7)	(0.4)		773.1	14.1
	771.3	15.9		0:45	83%	44%		64%	36%		772.0	15.2
770			5.0	0:50	(5.0)	(5.0)		(12.6)	(12.3)		**CRYSTALLINE ROCK** White, black-gray, traces brown-pink, sli. weathered w/interval sev. weathered (14.6'-15.2'), mod. hard to hard, v. close to close frac. spacing, quartz biotite gneiss.	
				1:25	100%	100%		100%	98%			
				0:56							Uniaxial compressive strength=660 KSF R1=4, R2=8, R3=5, R4=6, R5=7, RMR=30 Rock Type E	
	766.3	20.9		1:10								
765			5.0	0:55	(5.0)	(4.7)						
				1:05	100%	94%					White, black, gray, lt. green, v. sli. weathered to fresh, hard to v. hard, close to mod. close frac. spacing, hornlende, quartz biotite gneiss, garnetiferous in parts. 12 0°-10° fracs.; 1 25° frac.	
				1:50			RS-3					
				1:25								
				1:30								
	761.3	25.9		1:27							759.4	27.8
760			5.0	1:38	(4.6)	(2.6)					Uniaxial compressive strength=964 KSF R1=4, R2=20, R3=10, R4=20, R5=7, RMR=964 Rock Type E	
				1:49	92%	52%		(2.8)	(0.4)			
				1:10				90%	13%			
				1:36								
	756.3	30.9		1:25							756.3	30.9
755											White, black, gray-green, scattered brown-orange stain, sli. to mod. sev. weathered, hard, v. close to close frac. spacing, hornblende quartz biotite gneiss w/trace garnets. 13 0°-15° fracs. w/stain; 4 30° fracs. w/stain	
750											Uniaxial compressive strength=964 KSF R1=4, R2=3, R3=10, R4=6, R5=7, RMR=30 Rock Type E	
745											Boring Terminated at Elevation 756.3 ft In Crystalline Rock (Gneiss).	
740												
735												
730												
725												
720												
715												
710												
705												
700												
695												

NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

Boring B2-B – Station 16+86 @ 18' Rt. Box 1 of 2

Boring B2-B – Station 16+86 @ 18' Rt. Box 2 of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+89	**OFFSET** 27 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 786.4 ft	**TOTAL DEPTH** 34.6 ft	**NORTHING** 754,904	**EASTING** 1,449,842	**24 HR.** 0.3
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/17/10	**COMP. DATE** 02/17/10	**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)
790										
785										786.4 GROUND SURFACE 0.0
	781.1	5.3	WOH	WOH	WOH	0		58%		**ALLUVIAL** Brown, v. soft, v. sandy, clayey silt (A-5).
780								W		777.8 8.6
	776.1	10.3	1	1	1	2		39%		Brown, v. soft, v. sandy, silty, micaceous clay (A-7-5).
775										773.0 13.4
	773.0	13.4	60/0.0			60/0.0				**CRYSTALLINE ROCK** Biotite gneiss
770										767.6 18.8
765										Hornblende gneiss
760										761.6 24.8
755										**WEATHERED ROCK** Gneiss 759.1 27.3
										CRYSTALLINE ROCK Hornblende gneiss
750										751.8 34.6
745										Boring Terminated at Elevation 751.8 ft In Crystalline Rock (Gneiss).
740										Other Samples: ST-1 (3.0 - 5.0)
735										
730										
725										
720										
715										
710										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+89	**OFFSET** 27 ft LT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 786.4 ft	**TOTAL DEPTH** 34.6 ft	**NORTHING** 754,904	**EASTING** 1,449,842	**24 HR.** 0.3
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/17/10	**COMP. DATE** 02/17/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 21.2 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)
773											Begin Coring @ 13.4 ft
	773.0	13.4	2.2	2:00/1.2	(2.1)	(2.1)		(5.0)	(4.7)		773.0 **CRYSTALLINE ROCK** 13.4
770	770.8	15.6		2:11	95%	95%		93%	87%		White, gray, black w/trace brown-pink, fresh w/traces mod. weathering, v. hard to hard, mod. close to v. close frac. spacing, quartz biotite hornblende gneiss w/garnets.
			5.0	2:25	(4.7)	(4.4)					8 0°-10° fracs. w/schistose walls 767.6 18.8
	765.8	20.6		2:17	94%	88%		(6.0)	(5.8)		White, black-gray, sli. weathered to fresh, hard to v. hard, close to mod.
765				2:31				100%	97%		close frac. spacing, hornblende quartz biotite gneiss w/traces garnet.
			5.0	2:17	(4.7)	(4.1)					4 0° fracs.; 2 25°-35° fracs. w/rough walls
				3:21							761.6 24.8
				2:32							
760	760.8	25.6		2:27	94%	82%		(0.8)	N/A		**WEATHERED ROCK**
				2:11				32%			Black, gray, white, brown stain, sev. to comp. weathered, soft to mod. hard, v. close frac. spacing, hornblende biotite quartz gneiss. 759.1 27.3
				2:09							
				1:49							
			5.0	1:51	(3.8)	(2.8)		(7.2)	(6.6)		**CRYSTALLINE ROCK**
755	755.8	30.6		1:11	76%	56%		99%	90%		Gray-black, white, traces pink, fresh to sli. weathered, hard to v. hard, close to mod. close frac. spacing, hornblende quartz biotite gneiss, garnetiferous in parts.
				2:22							6 0°-15° fracs. w/mod. weathering on walls.
				2:23							751.8 34.6
				2:27							
			4.0	2:43	(3.7)	(3.7)					Boring Terminated at Elevation 751.8 ft In Crystalline Rock (Gneiss).
750	751.8	34.6		2:37	93%	93%					
				2:39							Other Samples: ST-1 (3.0 - 5.0)
				2:41							
745											
740											
735											
730											
725											
720											
715											
710											
705											
700											
695											

NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

Boring EB2-A – Station 17+89 @ 27' Lt. Box 1 of 2

Boring EB2-A – Station 17+89 @ 27' Lt. Box 2of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 17+46	**OFFSET** 21 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.1 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 754,965	**EASTING** 1,449,862	**24 HR.** 0.3
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/17/10	**COMP. DATE** 02/17/10	**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)
790											
										787.1 GROUND SURFACE	0.0
785										**ALLUVIAL** Red & brown, v. soft, v. sandy, clayey silt (A-5).	
	781.9	5.2	WOH	WOH	1	1		70% M			
780											
	776.9	10.2	10	58	100/0.2	100/0.7		M		776.4	10.7
775										775.7 **WEATHERED ROCK** Black & white, f. to coarse grain sand interpreted as WR.	11.4
770										**CRYSTALLINE ROCK** Gneiss	
765											
760											
										755.7	31.4
755										Boring Terminated at Elevation 755.7 ft In Crystalline Rock (Gneiss).	
										Other Samples: ST-2 (3.0 - 5.0)	
750											
745											
740											
735											
730											
725											
720											
715											
710											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 571 on Ramp D (-YRPD-) Over Fourth Creek Tributary 3 Between I-40 EB Lane and I-77 NB Lane				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 17+46	**OFFSET** 21 ft RT	**ALIGNMENT** -YRPD-	**0 HR.** N/A
COLLAR ELEV. 787.1 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 754,965	**EASTING** 1,449,862	**24 HR.** 0.3
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/17/10	**COMP. DATE** 02/17/10	**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 ELEV. (ft)	DEPTH (ft)
775.7											Begin Coring @ 11.4 ft	
775	775.7	11.4	5.0	2:31 2:20 2:40 2:21 2:27	(4.9) 98%	(4.7) 94%		(19.2) 96%	(17.7) 89%		775.7 **CRYSTALLINE ROCK** Black, white, and gray, lt. green, fresh w/intervals mod. sev. weathering (18.6'-18.7', 19.5'-19.6', 24.1'-24.2', 25.4'-25.5' & 28.3'-28.6'), v. hard to hard, mod. close to v. close frac. spacing, quartz hornblende biotite gneiss w/traces garnet. 25 0°-15° fracs. some w/mod. sev. weathered walls; 1 20° frac. w/rough walls; 2 30°-40° fracs. w/schistose walls	11.4
770	770.7	16.4	5.0	2:22 2:32 2:29 2:21 2:37	(4.6) 92%	(4.4) 88%						
765	765.7	21.4	5.0	2:29 2:26 2:25 2:30 2:31	(4.7) 94%	(4.0) 80%						
760	760.7	26.4	5.0	2:31 2:37 2:29 2:32 2:31	(5.0) 100%	(4.6) 92%						
755	755.7	31.4									755.7 Boring Terminated at Elevation 755.7 ft In Crystalline Rock (Gneiss).	31.4
750											Other Samples: ST-2 (3.0 - 5.0)	
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												

NCDOT CORE SINGLE I-3819A_GEO_BRDG0571.GPJ NC_DOT.GDT 5/6/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

Boring EB2-B – Station 17+46 @ 21' Rt. Box 1 of 2

Boring EB2-B – Station 17+46 @ 21' Rt. Box 2 of 2

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Passing No.200	Percent Retained No. 60	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
EB2-A	*ST-1	3.0'-4.6'	A-5(3)	N/A	100.0	82.0	51.4	26.4	26.4	25.0	21.6	26.9	41	8	33	57.7
EB2-B	*ST-2	3.0'-4.4'	A-7-5(3)	N/A	100.0	76.3	47.6	32.0	32.0	23.1	18.8	26.1	45	12	33	69.6
EB1-A	SS-1	10.3'-11.8'	A-2-4(0)	18	98.7	65.2	16.2	51.9	51.3	35.4	10.9	2.4	15	NP	NP	N/A
B1-A	SS-2	5.3'-6.8'	A-2-6(0)	7	97.4	68.6	27.2	45.3	43.9	30.5	12.3	13.3	35	11	24	N/A
B1-B	SS-3	14.0'-15.5'	A-2-4(0)	14	98.0	62.6	15.8	53.0	52.1	34.9	9.6	3.4	27	NP	NP	N/A
Bed Sample	S-1	N/A	A-1-b(0)	N/A	76.5	24.4	3.4	90.0	86.9	9.0	3.6	0.5	16	NP	NP	N/A
Bank Sample	S-2	N/A	A-2-4(0)	N/A	94.4	65.8	20.7	55.8	53.1	26.8	9.4	10.8	22	NP	NP	N/A

*Additional test results (Consolidation, Unconfined Compressive Strength, etc.) are included in the Laboratory Results attachment.

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: I-3819A
F.A. NO.: 34192.1.1
COUNTY: Iredell
Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

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)	Splitting Tensile Strength (PSI)	Remarks
RS-1	B1-B	28.9-29.5	Gneiss	CZab/CZbg	90%	0.332	0.165	199	7,438			v. sli. weathered
RS-2	B2-A	15.6-16.0	Gneiss	CZab/CZbg	60%	0.320	0.166	175	4,584			sli. to mod. weathered; failed along joint
RS-3	B2-B	22.3-22.8	Gneiss	CZab/CZbg	92%	0.331	0.165	168	6,694			fresh

F&H CERT. No. 102-0603

Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34192.1.2 TIP: I-3819A COUNTY: IREDELL

DESCRIPTION(1): Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 EBL and I-77 NBL

EXISTING BRIDGE

Information from: Field Inspection ____ Microfilm ____ (reel ____ pos: ____)
Other (explain) No existing bridge at this location.

Bridge No.: n/a Length: n/a Total Bents: n/a Bents in Channel: n/a Bents in Floodplain: n/a
Foundation Type: n/a

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: n/a

Interior Bents: n/a

Channel Bed: n/a

Channel Bank: n/a

EXISTING SCOUR PROTECTION

Type(3): n/a

Extent(4): n/a

Effectiveness(5): n/a

Obstructions(6): n/a

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 structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): silt, fine to coarse sand, gravels, cobbles and boulders (most of which appear to be rip-rap)

Channel Bank Material(8): silt, clay, some fine to coarse sand, gravels, cobbles and boulders (some natural, most rip-rap)

Channel Bank Cover(9): trees, shrubs, grass, cobbles and boulders, rip-rap

Floodplain Width(10): 150 ft.

Floodplain Cover(11): trees, shrubs, grass

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

Channel Migration Tendency(13): not likely

Observations and Other Comments: While some cobbles and boulders appear natural, most are likely rip-rap due to close proximity of I-40 roadway embankment.

Reported by: Brett Smith **Date:** 2/20/2010
Brett Smith

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

	BENTS B1	B2									
-YRPD-	789.0	784.6									

Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Unit concurs with the Hydraulics Unit's theoretical scour as shown above.

DSE determined by: William F. Goforth, P.G. **Date:** 4/22/2010

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	bank	bed					
Sample No.	1	1					
Retained #4	98.9	84					
Passed #10	94.4	76.5					
Passed #40	65.8	24.4					
Passed #200	20.7	3.4					
Coarse Sand	53.1	86.9					
Fine Sand	26.8	9					
Silt	9.4	3.6					
Clay	10.8	0.5					
LL	22	16					
PI	NP	NP					
AASHTO	A-2-4(0)	A-1-b(0)					
Station	16+40	16+80					
Offset	CL	CL					
Depth	surface	surface					

SITE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

EB1-A Looking West Toward B1-A

EB2-A Looking East Toward B2-A

B1-A Looking West Toward B2-A

B2-A Looking East Toward B1-A

SITE PHOTOGRAPHIC RECORD

Bridge No. 571 on Ramp D (-YRPD-) over Fourth Creek Tributary 3 Between I-40 East Bound Lane and I-77 North Bound Lane

EB1-B Looking South Toward EB1-A

B2-B Looking South Toward B2-A

B1-A Looking North Toward B1-B

EB2-A Looking North Toward EB2-B

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2	1	34

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

INFILTRATION BASIN SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3-3A	GEOTECHNICAL REPORT
4-9	BORING LOCATION PLAN
10-17	CONSTANT HEAD PERMEAMETER TEST RESULTS
18-25	HAND AUGER SOIL PROFILE DESCRIPTIONS
26-34	LABORATORY TEST REPORT SUMMARY AND GRAIN SIZE CURVES

CAUTION NOTICE

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

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

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

Original

PROJECT: 34192.1.2

ID: I-3819A

PERSONNEL

J. WITHERSPOON

D. ATKINSON

B. DEOBALD

R. RAHIE

INVESTIGATED BY MACTEC

CHECKED BY J. VEITH

SUBMITTED BY MACTEC

DATE AUGUST 25, 2009

REVISED NOVEMBER 23, 2009

DRAWN BY: R. RAHIE

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 PROFESSIONAL ENGINEER SEAL 023232 JAMES E. VEITH SEAL

MACTEC

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SIGNATURE

MACTEC NC LICENSE F-0653

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2	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 #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		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 SOILS				
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/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 0.50
	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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- _ MOBILE B- _
- _ BK-51
- _ CME-45C
- _ CME-550
- _ PORTABLE HOIST
- _ _
- _ _

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

HAMMER TYPE:
- _ AUTOMATIC _ MANUAL

CORE SIZE:
- _ -B -
- _ -N -
- _ -H -

HAND TOOLS:
- _ POST HOLE DIGGER
- X 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:

Benchmark Site 1: BY3A-120, 35+20.17	ELEVATION: 831.58	FT.
Benchmark Sites 2, 3 & 4: BLE-9, 78+92.02	ELEVATION: 803.46	FT.
Benchmark Site 5: BYN-4, 29+62.74	ELEVATION: 877.51	FT.
Benchmark Sites 6 & 7: BYS-23, 31+54.51	ELEVATION: 875.58	FT.
Benchmark Site 8: BY14-279, 37+22.53	ELEVATION: 878.61	FT.
Benchmark Sites 9 & 10: BYS-20, 60+51.23	ELEVATION: 813.56	FT.
Benchmark Site 11: BYN-7, 57+86.38	ELEVATION: 821.59	FT.
Benchmark Sites 12 & 13: BYS-19, 70+69.82	ELEVATION: 800.13	FT.
Benchmark Sites 14 & 15: BYS-17, 91+36.40	ELEVATION: 815.05	FT.

NOTES:
-

NCDOT PROJECT NO.: **34192.1.2**
TIP NO.: **I-3819A**
FEDERAL AID NO.: **IMS-40-2-(124)**
COUNTY: **IREDELL**
DESCRIPTION: **I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171**
SUBJECT: **Constant Head Permeameter Testing**

Project Description

The purpose of this subsurface investigation was to evaluate 15 locations, identified by the NCDOT, at the project study area for the I-40/I-77 Interchange. Our understanding of this project comes from conversations with NCDOT Geotechnical Engineering Unit personnel; and from documents and drawings provided by the Geotechnical Engineering Unit including a Request for Proposal dated August 3, 2009 and electronic files on the NCDOT ftp site.

The project study area is located in Statesville in central Iredell County, North Carolina. The project study area is the I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 and I-77 from south of SR 2321 to south of SR 2171. The project study area includes maintained road shoulders and medians, forested areas, and pastures/fields either within the NCDOT rights-of-way or in close proximity.

Methodology

MACTEC conducted a subsurface investigation to determine depth to seasonal high water table (SHWT), apparent water table (if present), and *in-situ* saturated hydraulic conductivity. A MACTEC soil scientist advanced 15 hand auger borings to depths of 6.0 feet below ground surface (BGS) where possible. Representative soil samples were collected at approximately 1-foot intervals or where significant changes in soil texture were observed. The soil samples were described in the field and placed in sealed containers for transportation to and testing in MACTEC's laboratory. Infiltration testing with a constant head permeameter was conducted adjacent to the hand-auger boring locations. The infiltration tests were conducted at approximately 1.0-1.5 feet BGS, as specified by the NCDOT, and in general accordance with ASTM D 5216 procedures.

MACTEC identified the test boring locations in the field utilizing non-survey grade sub-meter Global Positioning System (GPS) using northing/easting coordinates provided by NCDOT. GPS (horizontal) and conventional level surveys (vertical) were performed to obtain northing, easting, and ground surface elevations of the test boring locations. The boring locations are shown on the Boring Location Plan (Boring Location Plans 5-10) and listed in the following table.

Table 1. Hand Auger and Permeameter Test Locations

Location	Northing	Easting	Elevation (ft)	Alignment, Station, Offset
Site 1	754,083	1,442,435	831.2	-L- Sta. 72+70, 245' LT
Site 2	753,861	1,444,291	787.5	-L- Sta. 90+68, 260' RT
Site 3	753,902	1,444,395	787.4	-L- Sta. 91+77, 237' RT
Site 4	754,005	1,444,765	788.5	-L- Sta. 95+60, 198' RT
Site 5	744,447	1,447,413	879.0	-Y- Sta. 37+98, 99' RT
Site 6	744,702	1,447,243	878.2	-Y- Sta. 40+35, 95' LT
Site 7	744,771	1,447,252	881.7	-Y- Sta. 41+05, 92' LT
Site 8	744,971	1,447,477	878.8	-Y- Sta. 43+25, 111' RT
Site 9	747,279	1,447,397	798.9	-Y- Sta. 66+15, 190' LT
Site 10	747,373	1,447,439	798.2	-Y- Sta. 67+12, 157' RT
Site 11	747,479	1,447,776	810.4	-Y- Sta. 68+50, 168' RT
Site 12	748,673	1,447,580	802.2	-Y- Sta. 80+20, 142' LT
Site 13	748,811	1,447,612	800.2	-Y- Sta. 81+60, 123' LT
Site 14	749,758	1,447,983	783.5	-Y- Sta. 91+48, 165' RT
Site 15	749,858	1,447,992	783.6	-Y- Sta. 92+61, 163' RT

Representative soil samples were tested to determine the soil index properties and to verify field classification. Fifteen soil samples from the project study area (S-1 to S-15) were tested for grain size distribution (including hydrometer), Atterberg limits, natural moisture content, and AASHTO classification. Laboratory testing was performed in accordance with applicable ASTM/AASHTO/NCDOT specifications. The results of the laboratory testing are included with this report.

Physiography and Geology

The project study area includes gently sloping to strongly sloping areas within the I-40 and I-77 rights-of-way, or in close proximity, and is located within the Piedmont Physiographic Province, in central Iredell County, NC. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geological Survey, indicates that the project study area is within the Inner Piedmont Belt and is underlain by biotite gneiss and schist and amphibolites and biotite schist.

The soils encountered in the fifteen hand-auger borings were mostly cohesive, consisting of brown to reddish yellow sandy silt (A-4, A-5) and clay (A-6, A-7-6, A-7-5). Surficial soils also include silty and clayey sand (A-2-4, A-2-6).

Infiltration Rates

Infiltration rates were measured at Site 1 though Site 15 in the project study area. K_{sat} measurements were conducted with a Guelph Permeameter (GP). The K_{sat} measurements were conducted in the unsaturated material above the apparent water table (if observed) on August 12 through 14, 2009. These measurements were conducted at soil depths of approximately 18 inches BGS. A detailed soil profile description was completed at each test location and is included with this report.

The *in-situ* K_{sat} values were calculated based on field measurements using the Glover Equation. K_{sat} measurements for 12 of the 15 sites ranged from 0.02 to 2.33 inches/hour (in/hr) or 0.32 to 34.85 gallons

per day per square-foot (gpd/ft^2). The soils present at the test depths at these sites ranged from loamy sand to clay. Infiltration was not observed at Sites 4, 9 and 10 within two to three hours of commencing the infiltration tests. The soil present at the test depth at these locations included heavy clay to sandy clay textures. These soils were beyond the capability of the GP to measure the K_{sat}. Table 2 summarizes the *in-situ* K_{sat} measurements for each location and includes: location; depth and horizon; hydraulic conductivity test method used; and conductivity measurement at each location.

Table 2. *In-situ* Saturated Hydraulic Conductivity Measurements

Site Number	Depth/Horizon (inches BGS)	Method	Result	
			gpd/ft^2	in/hr
Site 1	18/Bt	*In-Situ* (GP)	3.61	0.24
Site 2	18/Bt	*In-Situ* (GP)	0.32	0.02
Site 3	18/Bt	*In-Situ* (GP)	1.01	0.07
Site 4	18/Bt	*In-Situ* (GP)	NIO	NIO
Site 5	18/Bt	*In-Situ* (GP)	7.57	0.51
Site 6	18/Bt	*In-Situ* (GP)	3.96	0.26
Site 7	18/Bt	*In-Situ* (GP)	7.99	0.53
Site 8	18/C	*In-Situ* (GP)	34.85	2.33
Site 9	18/Bt	*In-Situ* (GP)	NIO	NIO
Site 10	18/Bt	*In-Situ* (GP)	NIO	NIO
Site 11	18/Bt	*In-Situ* (GP)	2.68	0.18
Site 12	18/BC	*In-Situ* (GP)	12.32	0.82
Site 13	18/BC	*In-Situ* (GP)	1.33	0.09
Site 14	18/Bt	*In-Situ* (GP)	0.43	0.03
Site 15	18/Bt	*In-Situ* (GP)	0.33	0.02

Note: NIO = No Infiltration Observed

Groundwater

The hand-auger borings were terminated at 72 inches BGS. Apparent water tables were not observed within 72 inches BGS in the 15 borings. Seasonal high water table (SHWT) depths were estimated based on soil characteristics through identification of low chroma redoximorphic features (mottles). The low chroma mottles suggest past conditions of saturation and reducing soil conditions. Evidence of a SHWT was observed at depths ranging from 18 to greater than 72 inches BGS as indicated in Table 3.

Table 3. Seasonal High Water Table (SHWT) Estimates on August 12-14, 2009.

Site Number	Elevation of Ground Surface (feet)	SHWT Depth (inches BGS)	Apparent Water Table Depth (inches BGS)
Site 1	831.2	>54	>54
Site 2	787.5	>72	>72
Site 3	787.4	>72	>72
Site 4	788.5	42	>72
Site 5	879.0	>46	>46
Site 6	878.2	>72	>72
Site 7	881.7	>44	>44
Site 8	878.8	>72	>72
Site 9	798.9	18	>72
Site 10	798.2	18	>72
Site 11	810.4	>72	>72
Site 12	802.2	>72	>72
Site 13	800.2	>72	>72
Site 14	783.5	28	>72
Site 15	783.6	28	>72

Closure

MACTEC provided these services in accordance with our Proposal No. 09-RAIL-268 dated August 11, 2009. Our services were performed under the Terms of the Agreement made and entered into on August 20, 2008 by and between the NCDOT and MACTEC.

We are available to discuss our findings with you and to provide additional studies or services necessary to complete the project. We appreciate the opportunity to assist you on this project and look forward to serving as your geotechnical consultant on future projects.

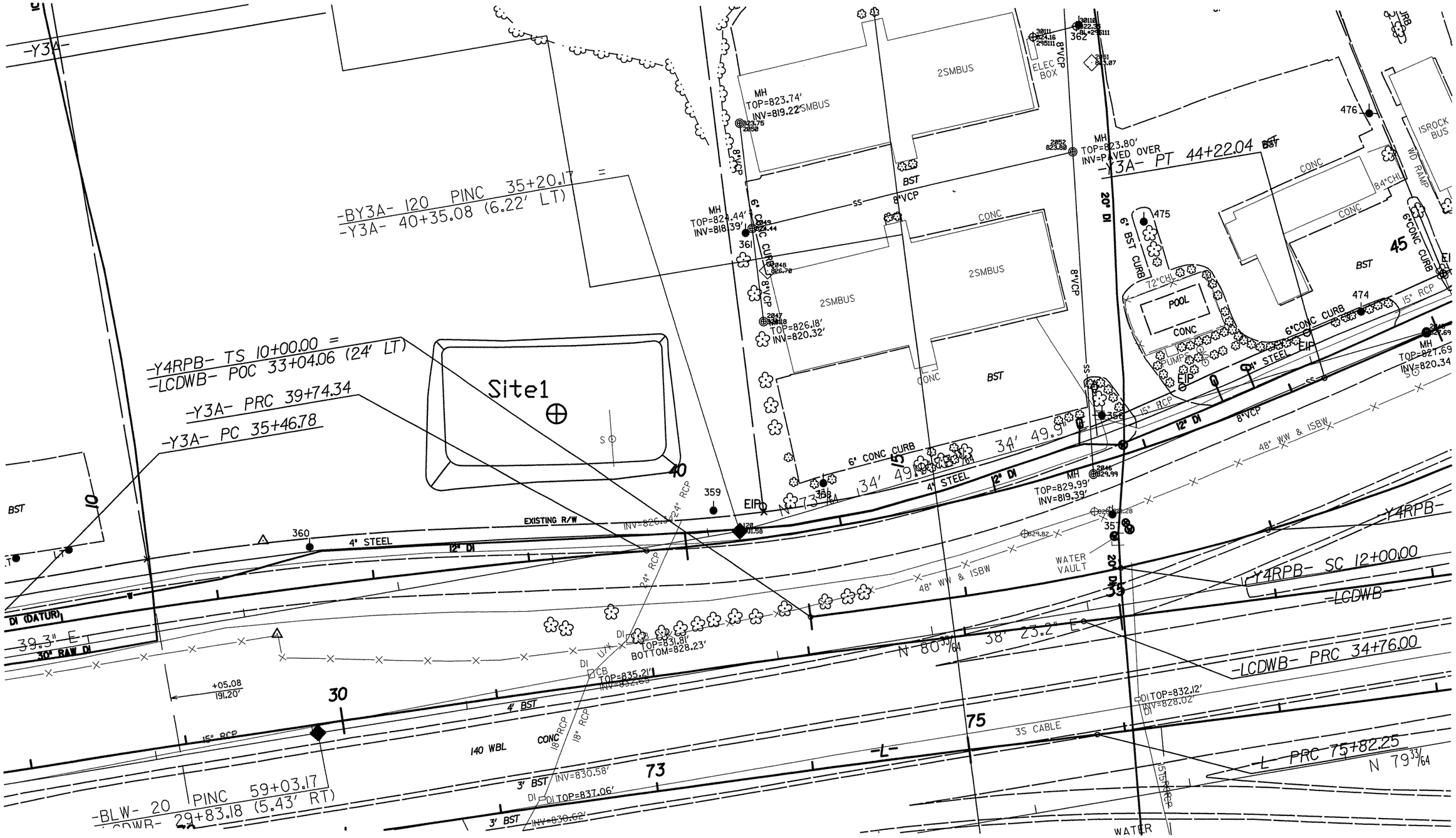
Very truly yours,

MACTEC Engineering and Consulting, Inc.

Joseph W. Witherspoon, LSS
Senior Scientist
Registered, North Carolina 1246

James E. Veith, P.E.
Principal Geotechnical Engineer
Registered, North Carolina 23232

LICENSED SOIL SCIENTIST
JOSEPH W. WITHERSPOON
1246
STATE OF NORTH CAROLINA



60 0 60
GRAPHIC SCALE - IN FEET
1" = 60'

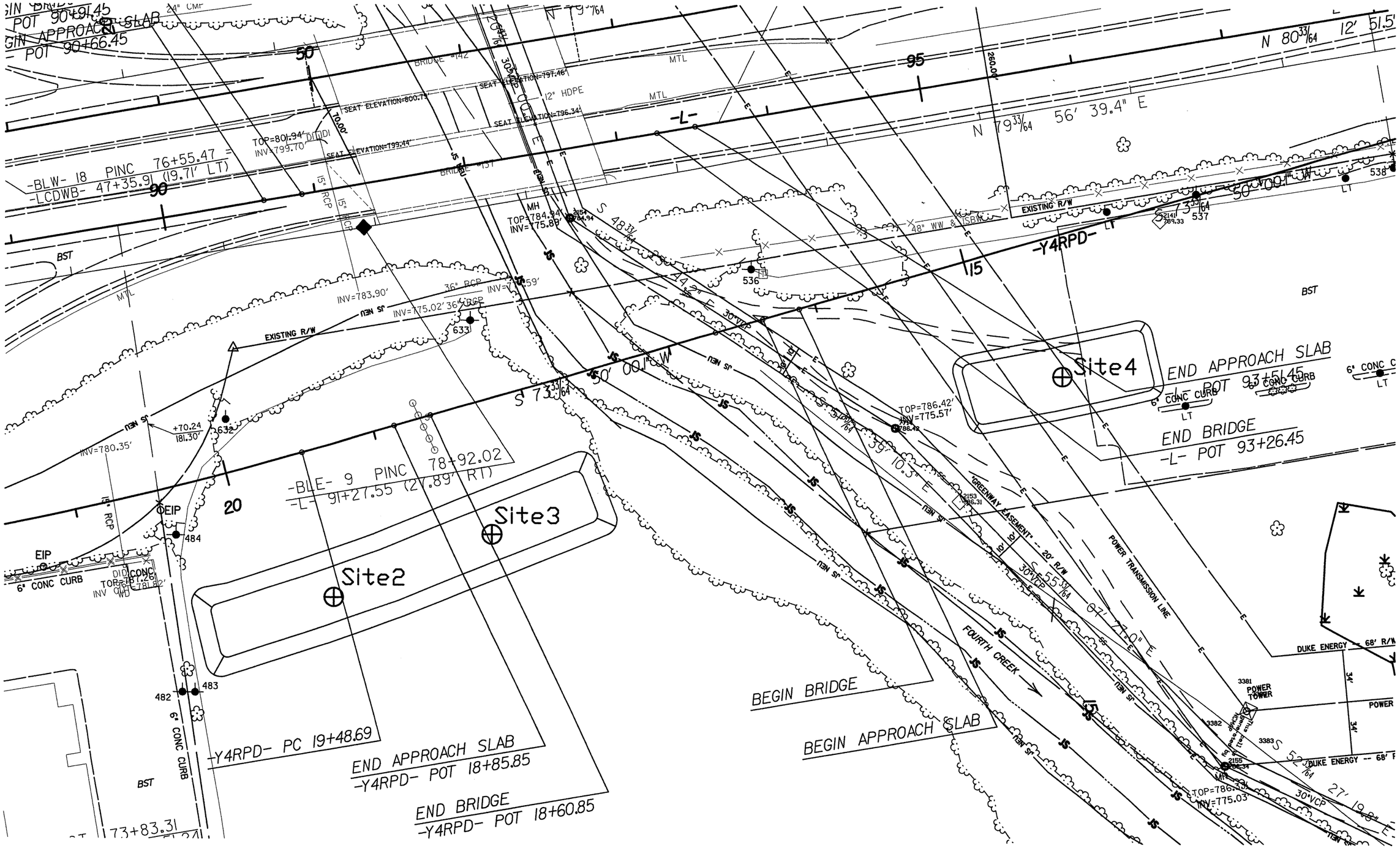
NAD 83

BORING LOCATION PLAN – SITE 1

I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

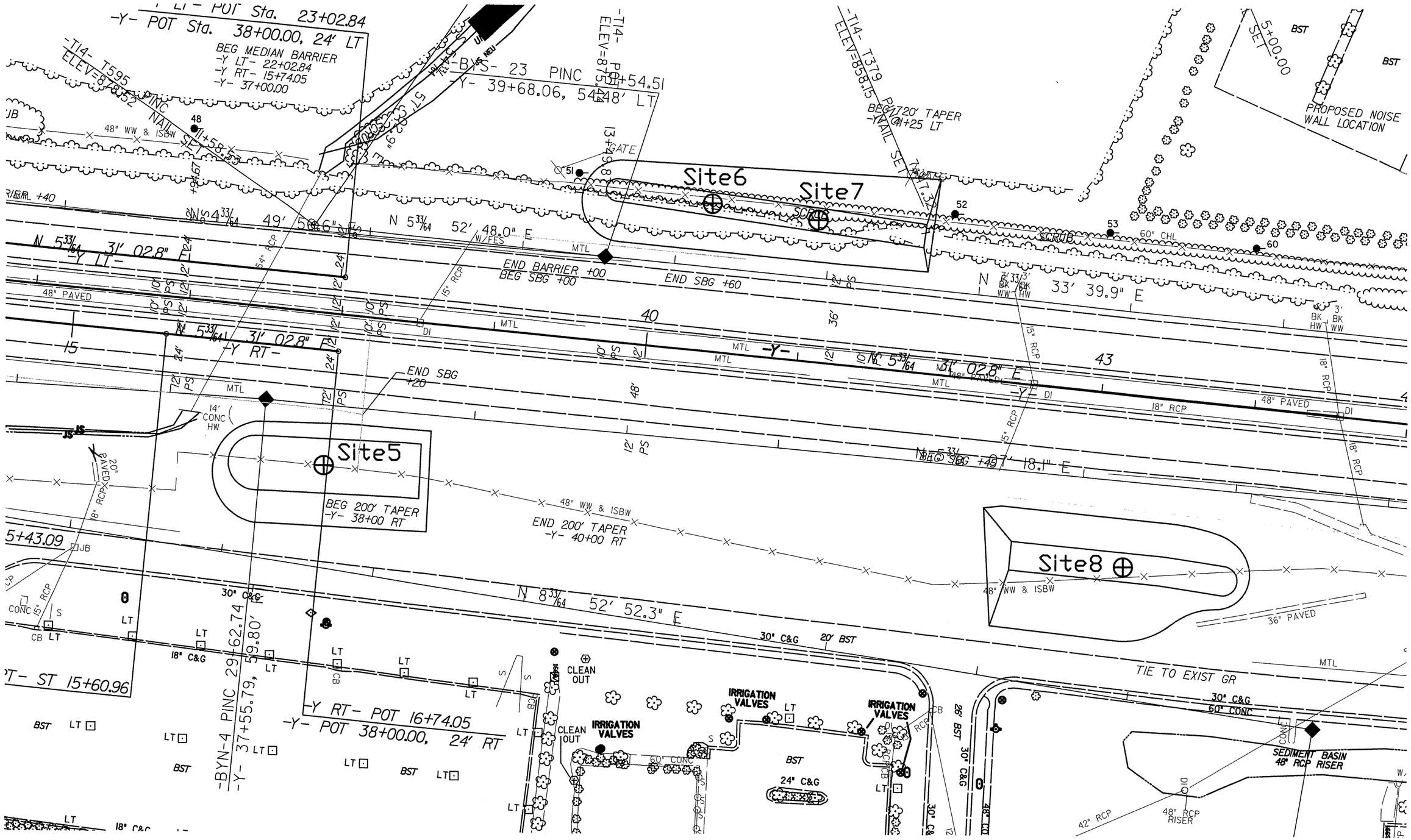
REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 1



BORING LOCATION PLAN – SITES 2, 3, & 4
I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 2



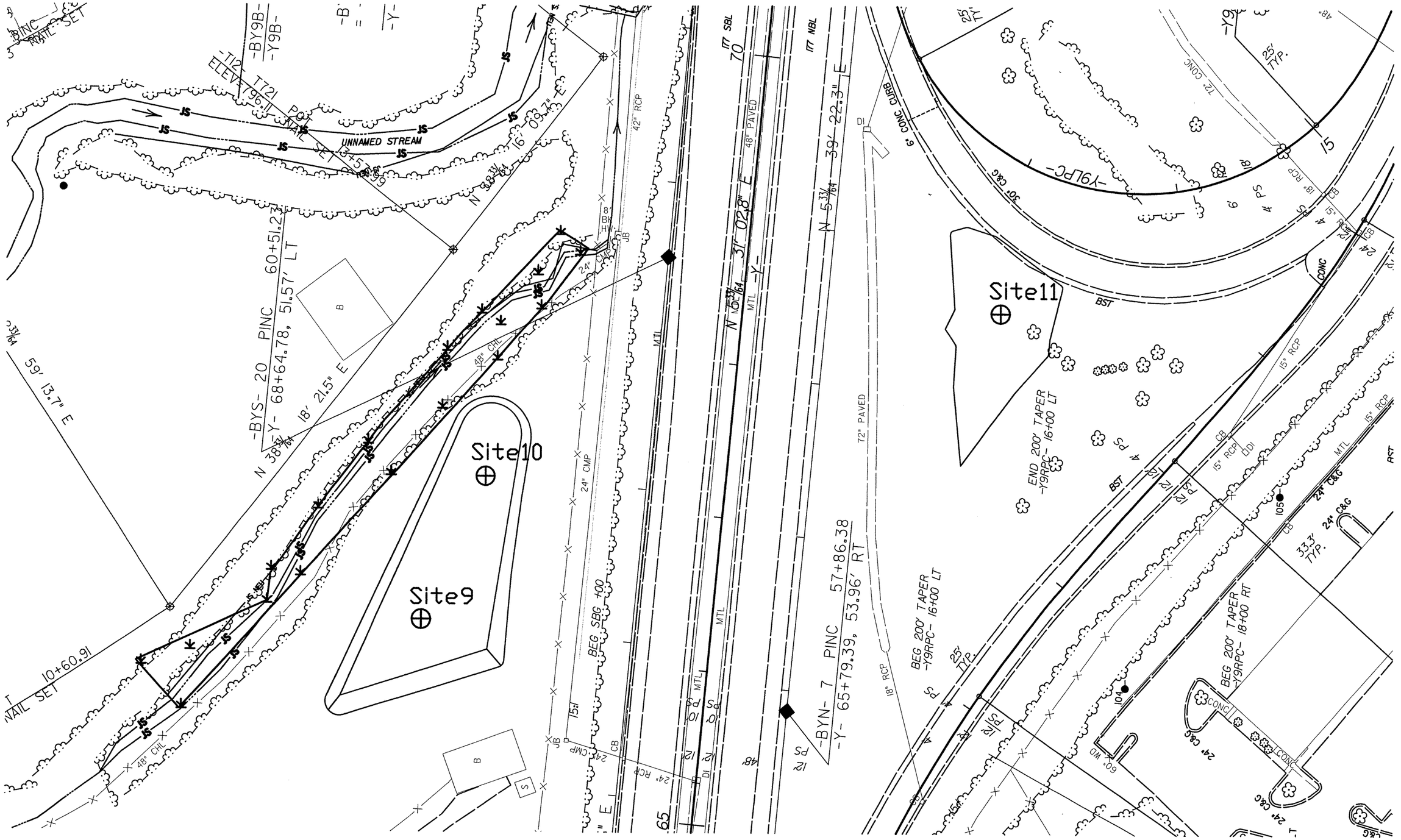
60 0 60
GRAPHIC SCALE - IN FEET
1" = 60'

NAD 83

BORING LOCATION PLAN – SITES 5, 6, 7, & 8
I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 3



60 0 60

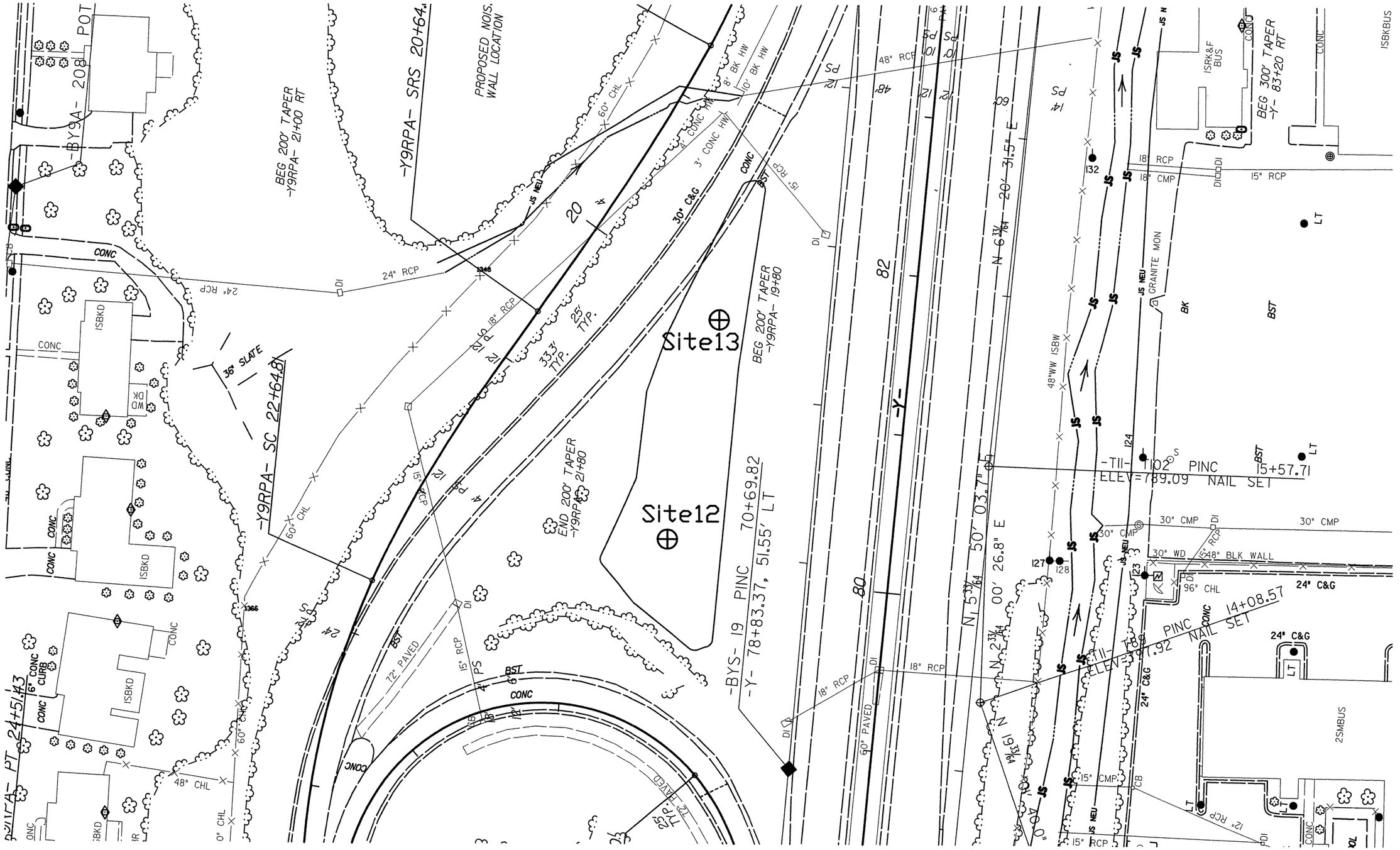
GRAPHIC SCALE - IN FEET
1" = 60'

NAD 83

BORING LOCATION PLAN – SITES 9, 10, & 11
I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 4



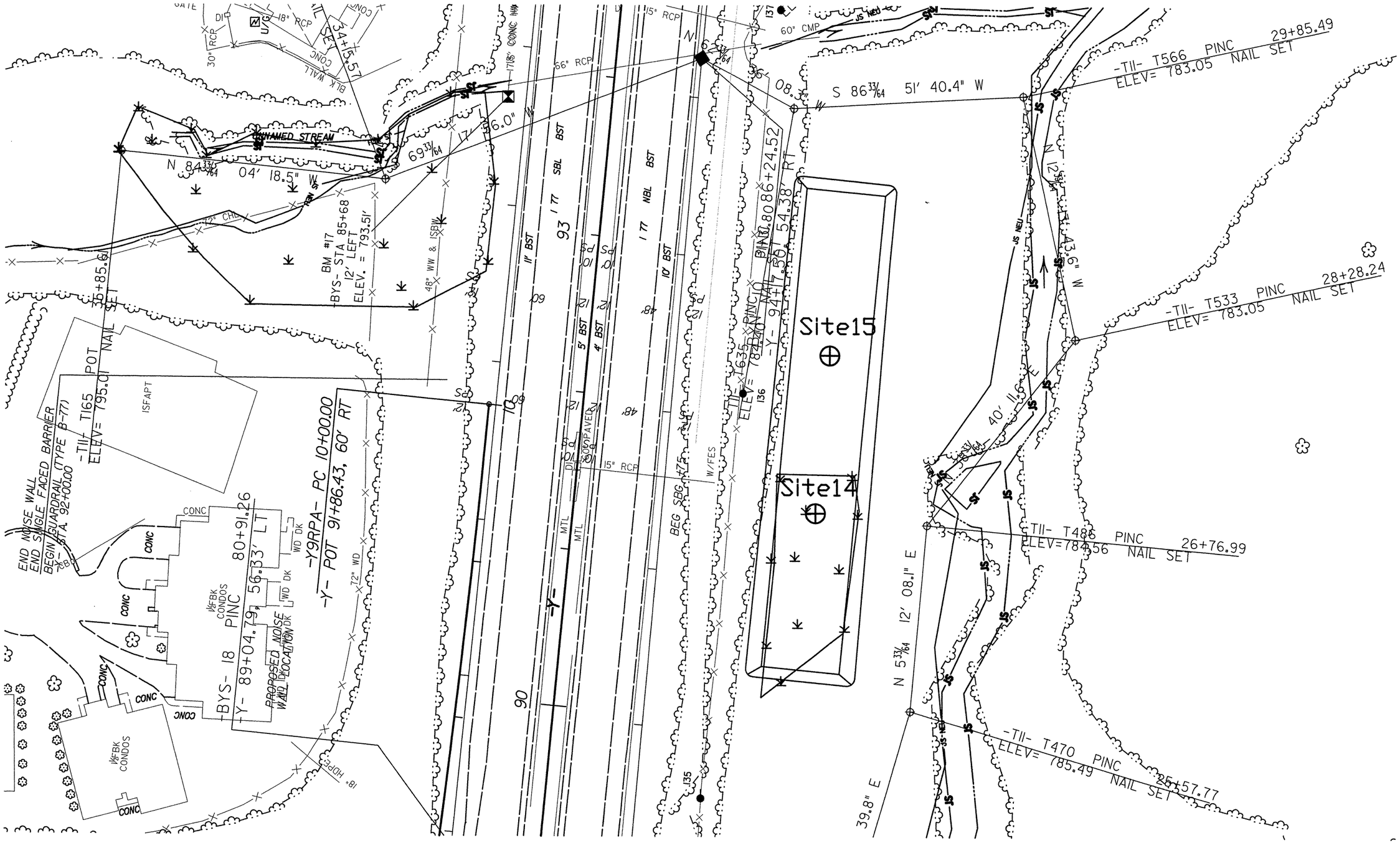
60 0 60
GRAPHIC SCALE - IN FEET
1" = 60'

NAD 83

BORING LOCATION PLAN – SITES 12, & 13
I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 5



60 0 60
GRAPHIC SCALE - IN FEET
1" = 60'

NAD 83

BORING LOCATION PLAN – SITES 14, & 15
I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171
NCDOT PROJECT NO. 34192.1.2 (I-3819A)
F.A. No. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 07/25/09
09/10/09	DFT CHECK: W.B.D.	JOB : 6468-09-2478
	ENG CHECK: J.E.V.	DWG: 6

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 1 Alignment, Station, Offset: -L- Sta. 72+70, 245' LT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: >54" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	8:05:00	0.0			
1	8:38:00	33.0	11.4	0.0	
2	8:39:00	1.0	11.5	0.1	
3	8:41:00	2.0	11.9	0.4	
4	8:43:00	2.0	12.4	0.5	
5	8:45:00	2.0	12.9	0.5	
6	8:47:00	2.0	13.4	0.5	0.25
7	8:49:00	2.0	13.9	0.5	0.25
8	8:51:00	2.0	14.4	0.5	0.25
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.25

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	8:53:00	0.0	17.5		
1	8:55:00	2.0	18.4	0.9	
2	8:57:00	2.0	19.1	0.7	
3	8:59:00	2.0	20.0	0.9	
4	9:01:00	2.0	20.9	0.9	
5	9:03:00	2.0	21.6	0.7	
6	9:05:00	2.0	22.5	0.9	
7	9:07:00	2.0	23.4	0.9	
8	9:09:00	2.0	24.1	0.7	
9	9:11:00	2.0	24.9	0.8	
10	9:13:00	2.0	25.5	0.6	
11	9:15:00	2.0	26.3	0.8	
12	9:17:00	2.0	27.1	0.8	0.4
13	9:19:00	2.0	27.9	0.8	0.4
14	9:21:00	2.0	28.7	0.8	0.4
15	9:23:00	2.0	29.8	1.1	
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.4

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 4.2E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 6.7E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.7E-04	*cm/sec*
K_{fs} =	0.24	in/hr
K_{fs} =	3.61	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Sheet 10

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 2 Alignment, Station, Offset: -L- Sta. 90+68, 260' RT
Date: 08/12/09
Field Personnel: J. Witherspoon
Well Hole Depth, (inches): 18
Field Notes: Loamy sand
Combined Reservoirs X, (cm^2) 35.22 Horizon: B
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	4:34:00	0.0	34.9		
1	4:35:00	1.0	35.2	0.3	
2	4:36:00	1.0	36.0	0.8	
3	4:37:00	1.0	36.8	0.8	
4	4:38:00	1.0	37.6	0.8	
5	4:39:00	1.0	38.8	1.2	
6	4:40:00	1.0	40.0	1.2	
7	4:41:00	1.0	44.2	4.2	
8	4:41:30	0.5	45.2	1.0	
9	4:42:00	0.5	46.2	1.0	
10	4:42:30	0.5	47.5	1.3	
11	4:43:00	0.5	48.8	1.3	
12	4:43:30	0.5	49.9	1.1	
13	4:44:00	0.5	51.0	1.1	
14	4:44:30	0.5	52.1	1.1	2.2
15	4:45:00	0.5	53.2	1.1	2.2
16	4:45:30	0.5	54.3	1.1	2.2
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	2.2

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	4:58:00	0.0	42.9		
1	4:58:30	0.5	44.1	1.2	
2	4:59:00	0.5	45.5	1.4	
3	4:59:30	0.5	47.0	1.5	
4	5:00:00	0.5	48.5	1.5	
5	5:00:30	0.5	50.0	1.5	
6	5:01:00	0.5	51.5	1.5	
7	5:01:30	0.5	53.0	1.5	
8	5:02:00	0.5	54.5	1.5	
9	5:02:30	0.5	56.0	1.5	
10	5:03:00	0.5	57.5	1.5	
11	5:03:30	0.5	59.0	1.5	
12	5:04:00	0.5	60.5	1.5	3.0
13	5:04:30	0.5	62.0	1.5	3.0
14	5:05:00	0.5	63.5	1.5	3.0
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	3.0

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 3.7E-02 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 5.0E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.5E-05	*cm/sec*
K_{fs} =	0.02	in/hr
K_{fs} =	0.32	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 3 Alignment, Station, Offset: -L- Sta. 91+77, 237' RT
Date: 08/12/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	4:38:00	0.0	13.3		
1	4:40:00	2.0	13.8	0.5	
2	4:42:00	2.0	14.5	0.7	
3	4:44:00	2.0	15.1	0.6	
4	4:46:00	2.0	15.9	0.8	
5	4:48:00	2.0	16.6	0.7	
6	4:50:00	2.0	17.1	0.5	
7	4:52:00	2.0	17.9	0.8	
8	4:54:00	2.0	18.5	0.6	0.3
9	4:56:00	2.0	19.1	0.6	0.3
10	4:58:00	2.0	19.7	0.6	0.3
11	5:00:00	2.0	20.2	0.5	
12	5:02:00	2.0	20.8	0.6	
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.3

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0	5:22:00	0.0	20.8		
1	5:32:00	10.0	28.8	8.0	
2	5:42:00	10.0	36.0	7.2	
3	5:47:00	5.0	39.6	3.6	
4	5:52:00	5.0	43.2	3.6	
5	5:57:00	5.0	46.8	3.6	
6	6:02:00	5.0	50.4	3.6	
7	6:07:00	5.0	54.0	3.6	0.72
8	6:12:00	5.0	57.6	3.6	0.72
9	6:17:00	5.0	61.2	3.6	0.72
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.72

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 5.0E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 1.2E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	4.8E-05	***cm/sec***
K_{fs} =	0.07	in/hr
K_{fs} =	1.01	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Sheet 11

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 4 Alignment, Station, Offset: -L- Sta. 95+60, 198' RT
Date: 08/12/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Sandy clay
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: 42" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	5:30:00	0.0	13.3		
1	7:30:00	120.0	13.3	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 0.0E+00 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 0.0E+00 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	0.0E+00	***cm/sec***
K_{fs} =	0.00	in/hr
K_{fs} =	0.00	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 5 Alignment, Station, Offset: -Y- Sta. 37+98, 99' RT
Date: 08/13/09
Field Personnel: J. Witherspoon / D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Sandy clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: >46" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	4:13:00	0.0	15.8		
1	4:16:00	3.0	16.2	0.4	
2	4:19:00	3.0	16.6	0.4	
3	4:22:00	3.0	17.0	0.4	
4	4:25:00	3.0	17.4	0.4	
5	4:28:00	3.0	18.0	0.6	
6	4:31:00	3.0	18.9	0.9	
7	4:34:00	3.0	19.6	0.7	
8	4:37:00	3.0	20.2	0.6	
9	4:40:00	3.0	21.0	0.8	0.267
10	4:43:00	3.0	21.8	0.8	0.267
11	4:46:00	3.0	22.6	0.8	0.267
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.267

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0	4:52:00	0.0	27.8		
1	4:54:00	2.0	28.8	1.0	
2	4:56:00	2.0	29.8	1.0	
3	4:58:00	2.0	30.8	1.0	
4	5:00:00	2.0	31.8	1.0	
5	5:02:00	2.0	32.8	1.0	
6	5:04:00	2.0	33.8	1.0	
7	5:06:00	2.0	34.8	1.0	0.5
8	5:08:00	2.0	35.8	1.0	0.5
9	5:10:00	2.0	36.8	1.0	0.5
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.5

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 4.5E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 8.3E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	3.6E-04	*cm/sec*
K_{fs} =	0.51	in/hr
K_{fs} =	7.57	g/d/ft^2

Guelph Permeameter Field Data Sheet

Sheet 12

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 6 Alignment, Station, Offset: -Y- Sta. 40+35, 95' LT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	2:05:00	0.0			
1	2:23:00	18.0	9.8		
2	2:39:00	16.0	10.5	0.7	
3	2:42:00	3.0	12.0	1.5	
4	2:45:00	3.0	14.1	2.1	
5	2:48:00	3.0	16.0	1.9	
6	2:51:00	3.0	18.0	2.0	
7	2:54:00	3.0	20.0	2.0	
8	2:57:00	3.0	22.0	2.0	
9	3:00:00	3.0	24.0	2.0	0.667
10	3:03:00	3.0	26.0	2.0	0.667
11	3:06:00	3.0	28.0	2.0	0.667
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.667

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0	3:11:00	0.0	26.5		
1	3:13:00	2.0	32.0	5.5	
2	3:15:00	2.0	37.0	5.0	
3	3:17:00	2.0	42.0	5.0	
4	3:19:00	2.0	47.0	5.0	
5	3:21:00	2.0	51.2	4.2	
6	3:23:00	2.0	55.5	4.3	
7	3:25:00	2.0	59.8	4.3	2.15
8	3:27:00	2.0	64.1	4.3	2.15
9	3:29:00	2.0	68.4	4.3	2.15
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	2.15

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 1.1E-02 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 3.6E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.9E-04	*cm/sec*
K_{fs} =	0.26	in/hr
K_{fs} =	3.96	g/d/ft^2

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 7 Alignment, Station, Offset: -Y- Sta. 41+05, 92' LT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: >44" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	2:41:00	0.0	10.0		
1	2:44:00	3.0	11.5	1.5	
2	2:47:00	3.0	13.0	1.5	
3	2:50:00	3.0	14.0	1.0	
4	2:53:00	3.0	15.5	1.5	
5	2:56:00	3.0	16.5	1.0	
6	2:59:00	3.0	17.5	1.0	
7	3:02:00	3.0	18.5	1.0	0.33
8	3:05:00	3.0	19.5	1.0	0.33
9	3:08:00	3.0	20.5	1.0	0.33
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.33

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:ms)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0	3:12:00	0.0	15.2		
1	3:14:00	2.0	20.0	4.8	
2	3:16:00	2.0	24.8	4.8	
3	3:18:00	2.0	29.9	5.1	
4	3:20:00	2.0	34.8	4.9	
5	3:22:00	2.0	40.8	6.0	
6	3:24:00	2.0	46.8	6.0	
7	3:26:00	2.0	52.8	6.0	3.0
8	3:28:00	2.0	58.8	6.0	3.0
9	3:30:00	2.0	64.8	6.0	3.0
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	3.0

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 5.5E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 5.0E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	3.8E-04	*cm/sec*
K_{fs} =	0.53	in/hr
K_{fs} =	7.99	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Sheet 13

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 8 Alignment, Station, Offset: -Y- Sta. 43+25, 111' RT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Loamy sand
Combined Reservoirs X, (cm^2) 35.22 Horizon: C
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	4:21:00	0.0	14.4		
1	4:22:00	1.0	15.5	1.1	
2	4:23:00	1.0	16.5	1.0	
3	4:24:00	1.0	17.5	1.0	
4	4:25:00	1.0	18.5	1.0	
5	4:26:00	1.0	19.5	1.0	
6	4:27:00	1.0	20.5	1.0	1.0
7	4:28:00	1.0	21.5	1.0	1.0
8	4:29:00	1.0	22.5	1.0	1.0
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	1.0

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:ms)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_2, (cm/min)
0	4:31:00	0.0	30.2		
1	4:32:00	1.0	32.5	2.3	
2	4:33:00	1.0	34.8	2.3	
3	4:34:00	1.0	36.7	1.9	
4	4:35:00	1.0	38.7	2.0	
5	4:36:00	1.0	40.8	2.1	
6	4:37:00	1.0	42.8	2.0	
7	4:38:00	1.0	44.8	2.0	
8	4:39:00	1.0	46.8	2.0	
9	4:40:00	1.0	48.8	2.0	2.0
10	4:41:00	1.0	50.8	2.0	2.0
11	4:42:00	1.0	52.8	2.0	2.0
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	2.0

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 1.7E-02 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 3.3E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.6E-03	*cm/sec*
K_{fs} =	2.33	in/hr
K_{fs} =	34.85	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 9 Alignment, Station, Offset: -Y- Sta. 66+15, 190' LT
Date: 08/12/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: 18" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	2:30:00	0.0	22.3		
1	5:30:00	180.0	22.3	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 0.0E+00 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 0.0E+00 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	0.0E+00	*cm/sec*
K_{fs} =	0.00	in/hr
K_{fs} =	0.00	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Sheet 14

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 10 Alignment, Station, Offset: -Y- Sta. 67+12, 157' RT
Date: 08/14/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: 18" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	2:20:00	0.0	18.7		
1	5:20:00	180.0	18.7	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10			NO INFILTRATION		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 0.0E+00 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 0.0E+00 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	0.0E+00	*cm/sec*
K_{fs} =	0.00	in/hr
K_{fs} =	0.00	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 11 Alignment, Station, Offset: -Y- Sta. 68+50, 168' RT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Loamy sand
Combined Reservoirs X, (cm^2) 35.22 Horizon: B/C
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	12:18:00	0.0			
1	12:20:00	2.0	13.0	0.6	
2	12:22:00	2.0	13.4	0.4	
3	12:24:00	2.0	13.8	0.4	
4	12:26:00	2.0	14.2	0.4	
5	12:28:00	2.0	14.6	0.4	
6	12:30:00	2.0	14.9	0.3	
7	12:32:00	2.0	15.0	0.1	
8	12:34:00	2.0	15.3	0.3	
9	12:36:00	2.0	15.6	0.3	
10	12:38:00	2.0	15.9	0.3	
11	12:40:00	2.0	16.2	0.3	0.15
12	12:42:00	2.0	16.5	0.3	0.15
13	12:44:00	2.0	16.8	0.3	0.15
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.15

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	12:44:00	0.0			
1	12:49:00	5.0	21.1		
2	12:51:00	2.0	21.6	0.5	
3	12:53:00	2.0	22.2	0.6	
4	12:55:00	2.0	22.7	0.5	
5	12:57:00	2.0	23.2	0.5	
6	12:59:00	2.0	23.8	0.6	
7	1:01:00	2.0	24.3	0.5	
8	1:03:00	2.0	24.9	0.6	
9	1:05:00	2.0	25.4	0.5	0.25
10	1:07:00	2.0	25.9	0.5	0.25
11	1:09:00	2.0	26.4	0.5	0.25
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.25

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 2.5E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 4.2E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.3E-04	*cm/sec*
K_{fs} =	0.18	in/hr
K_{fs} =	2.68	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Sheet 15

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 12 Alignment, Station, Offset: -Y- Sta. 80+20, 142' LT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Silt loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: B/C
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	10:00:00	0.0			
1	10:04:00	4.0	13.1		
2	10:07:00	3.0	14.5	1.4	
3	10:10:00	3.0	16.0	1.5	
4	10:13:00	3.0	17.5	1.5	
5	10:16:00	3.0	19.0	1.5	0.5
6	10:19:00	3.0	20.5	1.5	0.5
7	10:22:00	3.0	22.0	1.5	0.5
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.5

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	10:26:00	0.0	28.1		
1	10:29:00	3.0	30.8	2.7	
2	10:32:00	3.0	33.5	2.7	
3	10:35:00	3.0	36.2	2.7	
4	10:38:00	3.0	38.9	2.7	
5	10:41:00	3.0	41.6	2.7	0.9
6	10:44:00	3.0	44.3	2.7	0.9
7	10:47:00	3.0	47.0	2.7	0.9
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.9

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 8.3E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 1.5E-02 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	5.8E-04	*cm/sec*
K_{fs} =	0.82	in/hr
K_{fs} =	12.32	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 13 Alignment, Station, Offset: -Y- Sta. 81+60, 123' LT
Date: 08/13/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Silt loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: B/C
Inner Reservoir Y, (cm^2): 2.15 SHWT: >72" BGS
Reservoir Constant: 35.22 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_{H_1} (cm/min)
0	9:50:00	0.0			
1	10:03:00	13.0	7.8		
2	10:06:00	3.0	8.2	0.4	
3	10:09:00	3.0	8.9	0.7	
4	10:12:00	3.0	9.6	0.7	
5	10:15:00	3.0	10.3	0.7	0.233
6	10:18:00	3.0	11.0	0.7	0.233
7	10:21:00	3.0	11.7	0.7	0.233
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.233

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_{H_2} (cm/min)
0	10:25:00	0.0	12.6		
1	10:28:00	3.0	13.5	0.9	
2	10:31:00	3.0	14.4	0.9	
3	10:34:00	3.0	15.0	0.6	
4	10:37:00	3.0	15.9	0.9	
5	10:40:00	3.0	16.9	1.0	
6	10:43:00	3.0	17.9	1.0	
7	10:46:00	3.0	18.9	1.0	0.333
8	10:49:00	3.0	19.9	1.0	0.333
9	10:52:00	3.0	20.9	1.0	0.333
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.333

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 3.9E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 5.6E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	6.3E-05	*cm/sec*
K_{fs} =	0.09	in/hr
K_{fs} =	1.33	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Sheet 16

Standard Procedure for Permeameter Readings and Calculations

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 14 Alignment, Station, Offset: -Y- Sta. 91+48, 165' RT
Date: 08/14/09
Field Personnel: D. Atkinson
Well Hole Depth, (inches): 18
Field Notes: Clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: 28" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_{H_1} (cm/min)
0	11:18:00	0.0	12.0		
1	11:21:00	3.0	12.5	0.5	
2	11:24:00	3.0	13.2	0.7	
3	11:27:00	3.0	14.0	0.8	
4	11:30:00	3.0	14.5	0.5	
5	11:33:00	3.0	15.1	0.6	
6	11:36:00	3.0	15.7	0.6	
7	11:39:00	3.0	16.3	0.6	0.2
8	11:42:00	3.0	16.9	0.6	0.2
9	11:45:00	3.0	17.5	0.6	0.2
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.2

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_{H_2} (cm/min)
0	12:49:00	0.0	21.9		
1	12:50:00	1.0	22.3	0.4	
2	12:51:00	1.0	22.7	0.4	
3	12:52:00	1.0	23.1	0.4	
4	12:53:00	1.0	23.5	0.4	
5	12:54:00	1.0	24.9	1.4	
6	12:55:00	1.0	25.4	0.5	
7	12:56:00	1.0	25.8	0.4	
8	12:57:00	1.0	26.2	0.4	
9	12:58:00	1.0	26.6	0.4	0.4
10	12:59:00	1.0	27.0	0.4	0.4
11	1:00:00	1.0	27.4	0.4	0.4
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.4

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 3.3E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 6.7E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***
where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	2.0E-05	*cm/sec*
K_{fs} =	0.03	in/hr
K_{fs} =	0.43	$g/d/ft^2$

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Sheet 17

Job Name: I/40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to south of SR 2171
Job Number: 34192.1.2 (I-3819A)
Location ID: Site 15 Alignment, Station, Offset: -Y- Sta. 92+61, 163' RT
Date: 08/14/09
Field Personnel: D. Atkinson / J. Witherspoon
Well Hole Depth, (inches): 18
Field Notes: Clay loam
Combined Reservoirs X, (cm^2) 35.22 Horizon: Bt
Inner Reservoir Y, (cm^2): 2.15 SHWT: 28" BGS
Reservoir Constant: 2.15 cm^2
Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H_1) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	11:17:00	0.0	6.4		
1	11:20:00	3.0	6.9	0.5	
2	11:23:00	3.0	7.4	0.5	
3	11:26:00	3.0	8.2	0.8	
4	11:29:00	3.0	9.0	0.8	
5	11:32:00	3.0	9.9	0.9	
6	11:35:00	3.0	10.8	0.9	
7	11:38:00	3.0	11.7	0.9	0.3
8	11:42:00	3.0	12.6	0.9	0.3
9	11:45:00	3.0	13.5	0.9	0.3
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R1-bar	0.3

2nd set of readings with height of water in well (H_2) set at 10 cm.

Reading Number	Time	Time Interval, (h:m:s)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R_1, (cm/min)
0	12:48:00	0.0	36.8		
1	12:49:00	1.0	37.5	0.7	
2	12:50:00	1.0	37.9	0.4	
3	12:51:00	1.0	38.3	0.4	
4	12:52:00	1.0	38.7	0.4	
5	12:53:00	1.0	39.2	0.5	
6	12:54:00	1.0	39.8	0.6	
7	12:55:00	1.0	40.3	0.5	
8	12:56:00	1.0	40.8	0.5	
9	12:57:00	1.0	41.3	0.5	
10	12:58:00	1.0	41.8	0.5	
11	12:59:00	1.0	42.3	0.5	0.5
12	1:00:00	1.0	42.8	0.5	0.5
13	1:01:00	1.0	43.3	0.5	0.5
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25				R2-bar	0.5

For the first set of readings $R_{1\text{-bar}}$ = $R_{1\text{-bar}}$ / 60 = 5.0E-03 cm/sec
For the second set of readings $R_{2\text{-bar}}$ = $R_{2\text{-bar}}$ / 60 = 8.3E-03 cm/sec

K_{fs} = [(0.0041)*(Res. Const)*($R_{2\text{-bar}}$)] - [(0.0054)*(Res. Const)*($R_{1\text{-bar}}$)] ***cm/sec***

where,
K_{fs} = field sat'd hydraulic conductivity

Calculated K_{fs}:		
K_{fs} =	1.5E-05	***cm/sec***
K_{fs} =	0.02	**in/hr**
K_{fs} =	0.33	**g/d/ft²**

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: North of I-40, West of US 21
County: Iredell State: North Carolina
Northing: 754,083 Us ft Easting: 1,442,435 Us ft
Elevation: 831.2 ft
Alignment, Station, Offset: -L- Sta. 72+70, 245' LT

Site/Boring Location #: Site 1
Vegetation: Pasture/Field

Seasonal High Water Table: >54 inches
Apparent Water Table: >54 inches
Slope: 2-4%
Boring Termination Depth: 54 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-10	2.5YR 4/8		L	1mgr	friable	
Bt1	10-28	2.5YR 5/6		CL	1fsbk	friable	
Bt2	28-54*	2.5YR 5/6		C	2msbk	firm	

*Auger refusal at 54" BGS due to rock

Notes: Sample S-1 at 0.0'-2.3' Red, silty, sandy CLAY (A-6) (7)

Soil Textures: L = Loam; CL – Clay loam; C = Clay

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, fine, subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 12 August 2009
Location: South of I-40, East of US 21
County: Iredell State: North Carolina
Northing: 753,861 Us ft Easting: 1,444,291 Us ft
Elevation: 787.5 ft
Alignment, Station, Offset: -L- Sta. 90+68, 260' RT

Site/Boring Location #: Site 2
Vegetation: Grass field

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-8	7.5YR 4/6		LS	1mgr	friable	
B1	8-20	7.5YR 5/6		SL	1mgr	friable	
B2	20-30	2.5YR 4/6		LS/SL mix	1mgr/1fsbk	friable	
B/C	30-54	2.5YR 3/4		SCL	1msbk	friable	
C	54-72	7.5YR 4/3		SL mixed with SCL	massive	friable	

Notes: Sample S-2 at 0.0'-1.7' Strong brown, clayey SAND (A-2-6) (0)

Soil Textures: LS = Loamy sand; SL = Sandy loam; SCL = Sandy Clay Loam

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, fine, subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 12 August 2009
Location: South if I-40, East of US 21
County: Iredell State: North Carolina
Northing: 753,902 Us ft Easting: 1,444,395 Us ft
Elevation: 787.4 ft
Alignment, Station, Offset: -L- Sta. 91+77, 237' RT

Site/Boring Location #: Site 3
Vegetation: Grass field

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A1	0-7	7.5YR 4/6		LS	1mgr	friable	
A2	7-12	7.5YR 5/8		LS	1mgr	friable	
Bt1	12-38	2.5YR 4/6		C	1msbk	friable	
B/C	38-52	5YR 4/6		LS	1mgr	friable	
Bt2/C	52-68	5YR 4/4		CL	1msbk	friable	
B/C	68-72	5YR 4/6		LS	1mgr	friable	

Notes: Sample S-3 at 1.0'-3.2' Red, silty, sandy CLAY (A-7-5) (8)

Soil Textures: LS = Loamy sand; C = Clay; CL – Clay loam

Soil Structure: 1mgr = weak, medium, granular; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 12 August 2009
Location: South of I-40, East of US 21
County: Iredell State: North Carolina
Northing: 754,005 Us ft Easting: 1,444,765 Us ft
Elevation: 788.5 ft
Alignment, Station, Offset: -L- Sta. 95+60, 198' RT

Site/Boring Location #: Site 4
Vegetation: Grass field

Seasonal High Water Table: 42 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A/Fill	0-5	5YR 4/6		SL	1mgr	friable	Mixed with gravel
Bt1	5-30	7.5YR 5/8	5YR 4/6	SC	1mabk	firm	Mixed with gravel
Bt2	30-42	10YR 5/8	2.5Y 6/3	SL	massive	friable	
			7.5YR 4/6				
Bt3	42-62	10YR 5/6	2.5Y 6/2	SC	massive	firm	Plinthite nodules present
Cg	62-72	2.5Y 6/2	10YR 5/6	SL	massive	friable	

Notes: Sample S-4 at 0.4'-2.5' Yellowish red, silty, sandy CLAY (A-7-6) (9)

Soil Textures: SL = Sandy loam; SC = Sandy clay

Soil Structure: 1mgr = weak, medium, granular; 1mabk = weak, medium, angular blocky;

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South of I-40, East of I-77
County: Iredell State: North Carolina
Northing: 744,447 Us ft Easting: 1,447,413 Us ft
Elevation: 879.0 ft
Alignment, Station, Offset: -Y- Sta. 37+98, 99' RT

Site/Boring Location #: Site 5
Vegetation: Maintained road shoulder

Seasonal High Water Table: >46 inches
Apparent Water Table: >46 inches
Slope: 5-10%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-10	7.5YR 4/6		SL	1mgr	friable	
Bt1	10-30	10YR 4/4		SCL	1fsbk	friable	
Bt3	30-46*	10YR 5/6	5YR 5/3	SCL	1msbk	friable	

* Auger refusal at 46" BGS due to rock

Notes: Sample S-5 at 0.8'-2.5' Dark yellowish brown, silty, sandy CLAY (A-6) (7)

Soil Textures: SL = Sandy loam; SCL = Sandy Clay Loam

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, fine, subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South of I-40, West of I-77
County: Iredell State: North Carolina
Northing: 744,702 Us ft Easting: 1,447,243 Us ft
Elevation: 878.2 ft
Alignment, Station, Offset: -Y- Sta. 40+35, 95' LT

Site/Boring Location #: Site 6
Vegetation: Maintained road shoulder

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 2-6%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-12	10YR 4/4		SL	1mgr	friable	
Bt	12-30	5YR 5/6	5YR 4/6	CL	1msbk	friable	
C	30-72	5YR 4/6	10YR 7/3	LS	massive	friable	saprolite

Notes: Sample S-6 at 1.0'-2.5' Yellowish red, silty, sandy CLAY (A-7-6) (25)

Soil Textures: SL = Sandy loam; CL – Clay loam; LS – Loamy sand

Soil Structure: 1mgr = weak, medium, granular; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South if I-40, West of I-77
County: Iredell State: North Carolina
Northing: 744,771 Us ft Easting: 1,447,252 Us ft
Elevation: 881.7 ft
Alignment, Station, Offset: -Y- Sta. 41+05, 92' LT

Site/Boring Location #: Site 7
Vegetation: Maintained road shoulder

Seasonal High Water Table: >44 inches
Apparent Water Table: >44 inches
Slope: 2-6%
Boring Termination Depth: 44 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-8	7.5YR 4/4		SL	1mgr	friable	
Bt1	8-26	5YR 5/8		CL	1fsbk	friable	
Bt2	26-36	5YR 4/6		C	1msbk	friable	
B/C	36-44*	5YR 4/6		LS	massive	firm	

* Auger refusal at 44" BGS due to hard saprolite

Notes: Sample S-7 at 0.7'-2.2' Yellowish red, silty, sandy CLAY (A-7-5) (10)

Soil Textures: SL = Sandy loam; CL – Clay loam; C = Clay; LS = Loamy sand

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, fine, subangular blocky;
1msbk = weak, medium subangular blocky

Prepared By: JRW 9-10-09
Checked By: WTJ 9-10-09

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South of I-40, East of I-77
County: Iredell State: North Carolina
Northing: 744,971 Us ft Easting: 1,447,477 Us ft
Elevation: 878.8 ft
Alignment, Station, Offset: -Y- Sta. 43+25, 111' RT

Site/Boring Location #: Site 8
Vegetation: Maintained road shoulder (barren)

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 5-10%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
C1	0-26	10YR 6/4	10YR 5/8	LS	1mgr	friable	Saprolite
			5YR 5/6				
C2	26-72	7.5YR 4/6	7.5YR 7/2	L	1mgr	Friable	Saprolite

Notes: Sample S-8 at 0.0'-2.2' Dark yellowish brown, clayey, sandy SILT (A-4) (0)

Soil Textures: LS = Loamy sand; L = Loam

Soil Structure: 1mgr = weak, medium, granular;

Prepared By: JRW 9-10-09
Checked By: WTJ 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 14 August 2009
Location: South of I-40, West of I-77
County: Iredell State: North Carolina
Northing: 747,279 Us ft Easting: 1,447,397 Us ft
Elevation: 798.9 ft
Alignment, Station, Offset: -Y- Sta. 66+15, 190' LT

Site/Boring Location #: Site 9
Vegetation: Forested floodplain

Seasonal High Water Table: 18 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-18	5YR 4/6		CL	1fsbk	friable	
Bt1	18-32	5YR 4/4	5YR 5/1	C	1msbk	firm	
Btg1	32-60	10YR 4/2	2.5YR 4/6	CL	1fsbk	friable	
Btg2	60-72	10YR 4/1	5YR 5/6	CL	massive	friable	

Notes: Sample S-9 at 0.0'-2.7' Yellowish red, silty, sandy CLAY (A-6) (4)

Soil Textures: CL – Clay loam; C = Clay

Soil Structure: 1fsbk = weak, fine, subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: WGD 9-10-09

MACTEC Engineering and Consulting, Inc. Sheet 22

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 14 August 2009
Location: South of I-40, West of I-77
County: Iredell State: North Carolina
Northing: 747,373 Us ft Easting: 1,447,439 Us ft
Elevation: 798.2 ft
Alignment, Station, Offset: -Y- Sta. 67+12, 157' RT

Site/Boring Location #: Site 10
Vegetation: Forested floodplain

Seasonal High Water Table: 18 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-4	7.5YR 4/4		SL	1mgr	friable	
Bt1	4-18	5YR 4/6		C	1msbk	firm	
Bt2	18-30	5YR 4/6	10YR 4/1	C	1msbk	firm	
Btg1	30-58	2.5Y 5/2	10YR 4/1	SCL	massive	friable	
Cg	58-72	10YR 4/1		L	massive	friable	

Notes: Sample S-10 at 0.3'-2.5' Yellowish red, sandy CLAY (A-6) (5)

Soil Textures: SL = Sandy loam; C – Clay; SCL = Sandy Clay Loam; L = Loam

Soil Structure: 1mgr = weak, medium, granular; 1msbk = weak, medium subangular blocky

Prepared By: 9-10-09

Checked By: WGD 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South of I-40, East of I-77 on south side of Broad Street interchange
County: Iredell State: North Carolina
Northing: 747,479 Us ft Easting: 1,447,776 Us ft
Elevation: 810.4 ft
Alignment, Station, Offset: -Y- Sta. 68+50, 168' RT

Site/Boring Location #: Site 11
Vegetation: Grassed road median

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 2-6%

Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
B/C	0-25	7.5YR 4/4		LS	1mgr	friable	chunks of saprolite
C1	25-36	10YR 4/6		S	SG	friable	
C2	36-72	7.5YR 4/6		LS	1mgr	friable	

Notes: Sample S-11 at 0.0'-2.1' Brown, silty SAND (A-2-4) (0)

Soil Textures: LS = Loamy sand; S = Sand

Soil Structure: 1mgr = weak, medium, granular; SG = single grained

Prepared By: 9-10-09

Checked By: WFO 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 14 August 2009
Location: South of I-40, West of I-77 on north side of Broad Street interchange
County: Iredell State: North Carolina
Northing: 748,673 Us ft Easting: 1,447,580 Us ft
Elevation: 802.2 ft
Alignment, Station, Offset: -Y- Sta. 80+20, 142' LT

Site/Boring Location #: Site 12
Vegetation: Grassed road median

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 0-2%

Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
B/C	0-20	7.5YR 5/8		SiL	1mgr	friable	
C1	20-40	7.5YR 7/1 & 10YR 4/4	10YR 4/4	SiL	massive	friable	saprolite
C2	40-72	2.5YR 5/6, 2.5YR 7/1 & 7.5YR 5/6	5YR 5/8	SL	massive	friable	Multi-colored saprolite

Notes: Sample S-12 at 0.0'-1.7' Strong brown, clayey, sandy, SILT (A-5) (2)

Soil Textures: SiL – Silt loam; SL – Sandy loam;

Soil Structure: 1mgr = weak, medium granular

Prepared By: 9-10-09

Checked By: WFO 9-10-09

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 13 August 2009
Location: South of I-40, West of I-77 on north side of Broad Street interchange
County: Iredell State: North Carolina
Northing: 748,811 Us ft Easting: 1,447,612 Us ft
Elevation: 800.2 ft
Alignment, Station, Offset: -Y- Sta. 81+60, 123' LT

Site/Boring Location #: Site 13
Vegetation: Grassed road median

Seasonal High Water Table: >72 inches
Apparent Water Table: >72 inches
Slope: 0-2%

Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
B/C	0-18	10YR 5/6		SiL	lfsbk	friable	
C1	18-48	7.5Y 5/6	5YR 5/6	SiL	massive	friable	multi-colored saprolite
			10YR 5/8				
			10YR 7/2				Orthoclase feldspar chunks
C2	48-72	2.5Y 5/3	2.5Y 5/6	SiL	massive	friable	
			10YR 7/2				Orthoclase feldspar chunks

Notes: Sample S-13 at 0.0'-1.5' Yellowish brown, clayey, sandy, SILT (A-5) (3)

Soil Textures: SiL = Silt loam

Soil Structure: 1fsbk = weak, fine subangular blocky

Prepared By: JMW 9-10-09
Checked By: WTH 9-10-09

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 14 August 2009
Location: South of I-40, East of I-77
County: Iredell State: North Carolina
Northing: 749,758 Us ft Easting: 1,447,983 Us ft
Elevation: 783.5 ft
Alignment, Station, Offset: -Y- Sta. 91+48, 165' RT

Site/Boring Location #: Site 14
Vegetation: Forested Floodplain

Seasonal High Water Table: 28 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-2	7.5YR 4/3		L	1fsbk	friable	
Bt1	2-18	7.5YR 4/6	5YR 5/8	CL	1fsbk	friable	
Bt2	18-28	7.5YR 4/6	5YR 5/8	CL	1msbk	friable	
			10YR 5/3				
Bt3	28-38	10YR 5/6	10YR 5/2	CL	1msbk	friable	
			5YR 4/6				
BCg	38-54	10YR 5/2	5YR 4/6	L	1fsbk	friable	
Cg	54-72	5GY 6/1	10YR 5/6	C	massive	friable	

Notes: Sample S-14 at 0.0'-3.2' Strong brown, sandy, silty CLAY (A-7-5) (19)

Soil Textures: L = Loam; CL – Clay loam; C = Clay

Soil Structure: 1fsbk = weak, fine subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: JMW 11-23-09
Checked By: WTH 11-23-09

Soil Profile Description

Client: NCDOT
Project Name: I-40/I-77 Interchange including I-40 from west of SR 2003 to SR 2158 & I-77 from south of SR 2321 to South of SR 2171
Project Number: 34192.1.2 (I-3819A)
Date: 14 August 2009
Location: South of I-40, East of I-77
County: Iredell State: North Carolina
Northing: 749,858 Us ft Easting: 1,447,992 Us ft
Elevation: 783.6 ft
Alignment, Station, Offset: -Y- Sta. 92+61, 163' RT

Site/Boring Location #: Site 15
Vegetation: Forested Floodplain

Seasonal High Water Table: 28 inches
Apparent Water Table: >72 inches
Slope: 0-2%
Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
Bt1	0-20	5YR 4/6		CL	1fsbk	friable	
Bt2	20-28	5YR 4/6	7.5YR 5/4	CL	1msbk	friable	
B/C	28-44	7.5YR 5/6	7.5YR 6/2	FSL	1fsbk	friable	
			10YR 5/6				
Cg1	44-60	10YR 4/2	2.5YR 4/8	SL	1fsbk	friable	
Cg2	60-72	2.5Y 6/1	10YR 5/8	SL	massive	friable	
			2.5YR 4/8				

Notes: Sample S-15 at 0.0'-2.3' Yellowish red, sandy, silty CLAY (A-7-6) (24)

Soil Textures: CL – Clay loam; FSL = Fine sandy loam; SL = Sandy loam

Soil Structure: 1fsbk = weak, fine subangular blocky; 1msbk = weak, medium subangular blocky

Prepared By: JDW 11-23-09

Checked By: WBD 11-23-09

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MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: I-40/I-77 Interchange Infiltration Testing (MACTEC Job No.: 6468-09-2478)

NCDOT PROJ. NO.: 34192.1.2 (I-3819A) **COUNTY:** Iredell **OWNER:** N.C.D.O.T.

DATE SAMPLED: August 2009 **RECEIVED:** 8/17/2009 **REPORTED BY:** MACTEC

SAMPLED FROM: Sites 1 through 6

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-1	S-2	S-3	S-4	S-5	S-6
Retained No. 4 Sieve	(%)	0.0	3.0	0.1	0.0	2.4	0.0
Passing No. 10 Sieve	(%)	99.8	94.3	99.7	100.0	96.7	99.5
Passing No. 40 Sieve	(%)	88.3	72.0	88.9	99.0	89.5	91.9
Passing No. 200 Sieve	(%)	58.9	34.3	58.5	56.0	57.7	71.9

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand	(%)	21.0	36.9	19.5	6.1	15.4	14.1
Fine Sand	(%)	23.2	31.2	27.2	43.2	30.4	16.9
Silt	(%)	13.5	8.8	16.2	8.1	12.4	10.9
Clay	(%)	42.1	23.1	37.1	42.6	41.8	58.2

Moisture Content	(%)	ND	ND	24.2	ND	16.9	23.1
Liquid Limit, L.L.		37	38	49	46	37	62
Plasticity Index, P.I.		16	11	16	20	17	33
AASHTO Classification		A-6(7)	A-2-6(0)	A-7-5(8)	A-7-6(9)	A-6(7)	A-7-6(25)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Station		72+70	90+68	91+77	95+60	37+98	40+35
Offset		245 ft LT	260 ft RT	237 ft RT	198 ft RT	99 ft RT	95 ft LT
Alignment		-L-	-L-	-L-	-L-	-Y-	-Y-
Depth (FT)	From	0.0	0.0	1.0	0.4	0.8	1.0
	to	2.3	1.7	3.2	2.5	2.5	2.5

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504 Chana Savanapridi
Signature

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MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: I-40/I-77 Interchange Infiltration Testing (MACTEC Job No.: 6468-09-2478)

NCDOT PROJ. NO.: 34192.1.2 (I-3819A) **COUNTY:** Iredell **OWNER:** N.C.D.O.T.

DATE SAMPLED: August 2009 **RECEIVED:** 8/17/2009 **REPORTED BY:** MACTEC

SAMPLED FROM: Sites 7 through 12

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-7	S-8	S-9	S-10	S-11	S-12
Retained No. 4 Sieve	(%)	13.9	8.9	0.6	12.9	28.3	0.0
Passing No. 10 Sieve	(%)	81.3	82.3	98.4	86.7	64.8	99.6
Passing No. 40 Sieve	(%)	75.2	66.5	87.1	76.6	56.5	93.8
Passing No. 200 Sieve	(%)	59.4	40.2	52.4	48.5	20.9	51.0

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand	(%)	12.4	28.2	21.4	21.8	26.2	14.5
Fine Sand	(%)	18.7	29.6	30.3	26.3	50.5	43.6
Silt	(%)	16.2	21.5	12.1	3.9	13.9	22.4
Clay	(%)	52.6	20.7	36.2	48.0	9.4	19.6

Moisture Content	(%)	ND	ND	13.9	17.2	ND	25.7
Liquid Limit, L.L.		51	34	31	36	28	42
Plasticity Index, P.I.		19	5	13	17	4	7
AASHTO Classification		A-7-5(10)	A-4(0)	A-6(4)	A-6(5)	A-2-4(0)	A-5(2)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Station		41+05	43+25	66+15	67+12	68+50	80+20
Offset		92 ft LT	111 ft RT	190 ft LT	157 ft RT	168 ft RT	142 ft LT
Alignment		-Y-	-Y-	-Y-	-Y-	-Y-	-Y-
Depth (FT)	From	0.7	0.0	0.0	0.3	0.0	0.0
	to	2.2	2.2	2.7	2.5	2.1	1.7

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504 Chana Savanapridi
Signature

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: I-40/I-77 Interchange Infiltration Testing (MACTEC Job No.: 6468-09-2478)
NCDOT PROJ. NO.: 34192.1.2 (I-3819A) **COUNTY: Iredell** **OWNER: N.C.D.O.T.**
DATE SAMPLED: August 2009 **RECEIVED:** 8/17/2009 **REPORTED BY: MACTEC**
SAMPLED FROM: Sites 13 through 15
SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.
1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-13	S-14	S-15			
Retained No. 4 Sieve	(%)	2.7	0.0	0.3			
Passing No. 10 Sieve	(%)	96.9	100.0	99.7			
Passing No. 40 Sieve	(%)	88.6	99.4	97.5			
Passing No. 200 Sieve	(%)	53.4	90.4	90.2			

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand	(%)	17.2	1.4	4.2			
Fine Sand	(%)	33.9	12.9	7.9			
Silt	(%)	22.1	34.1	36.7			
Clay	(%)	23.7	51.6	51.2			

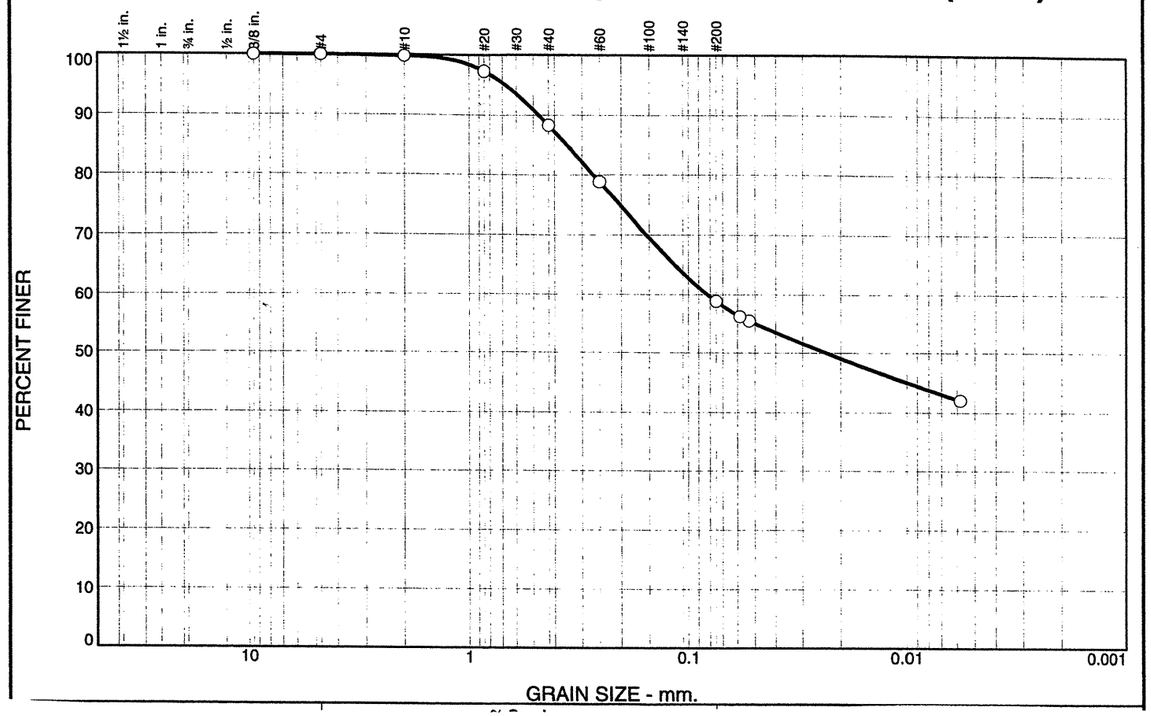
Moisture Content	(%)	18.9	27.7	24.5			
Liquid Limit, L.L.		42	48	50			
Plasticity Index, P.I.		7	18	23			
AASHTO Classification		A-5(3)	A-7-5(19)	A-7-6(24)			
Organic Content	(%)	ND	ND	ND			

Boring No.		Site 13	Site 14	Site 15			
Station		81+60	91+48	92+61			
Offset		123 ft LT	165 ft RT	163 ft RT			
Alignment		-Y-	-Y-	-Y-			
Depth (FT)	From	0.0	0.0	0.0			
	to	1.5	3.2	2.3			

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504 Signature

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#10	99.8		
#20	97.3		
#40	88.3		
#60	78.8		
#200	58.9		
#270	55.6		

* (no specification provided)

Material Description
Reddish Brown Sandy CLAY

Atterberg Limits
PL= 21 LL= 37 PI= 16

Coefficients
D_{85}= 0.3505 D_{60}= 0.0821 D_{50}= 0.0232
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= CL AASHTO= A-6(7)

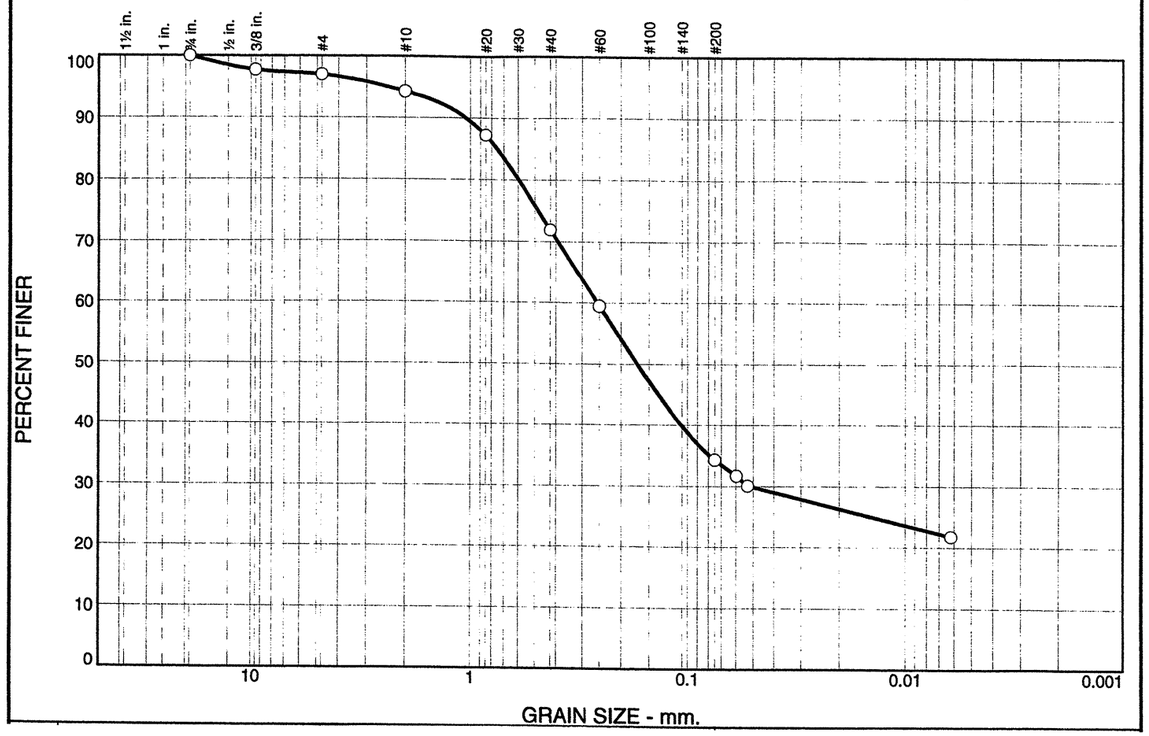
Remarks
ND = Not Determined
Specific Gravity is assumed

Source of Sample: Boring Site 1 **Depth:** 0.0-2.3'
Sample Number: S-1 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	**Client:** NCDOT **Project:** I-40 & I-77 Interchange **Project No:** 6468092478 **Figure** N/A

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	97.7		
#4	97.0		
#10	94.3		
#20	87.1		
#40	72.0		
#60	59.5		
#200	34.3		
#270	30.1		

* (no specification provided)

Material Description

Dark Reddish Brown Sandy SILT

Atterberg Limits

PL= 27 LL= 38 PI= 11

Coefficients

D_{85}= 0.7533 D_{60}= 0.2551 D_{50}= 0.1686
D_{30}= 0.0516 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-6(0)

Remarks

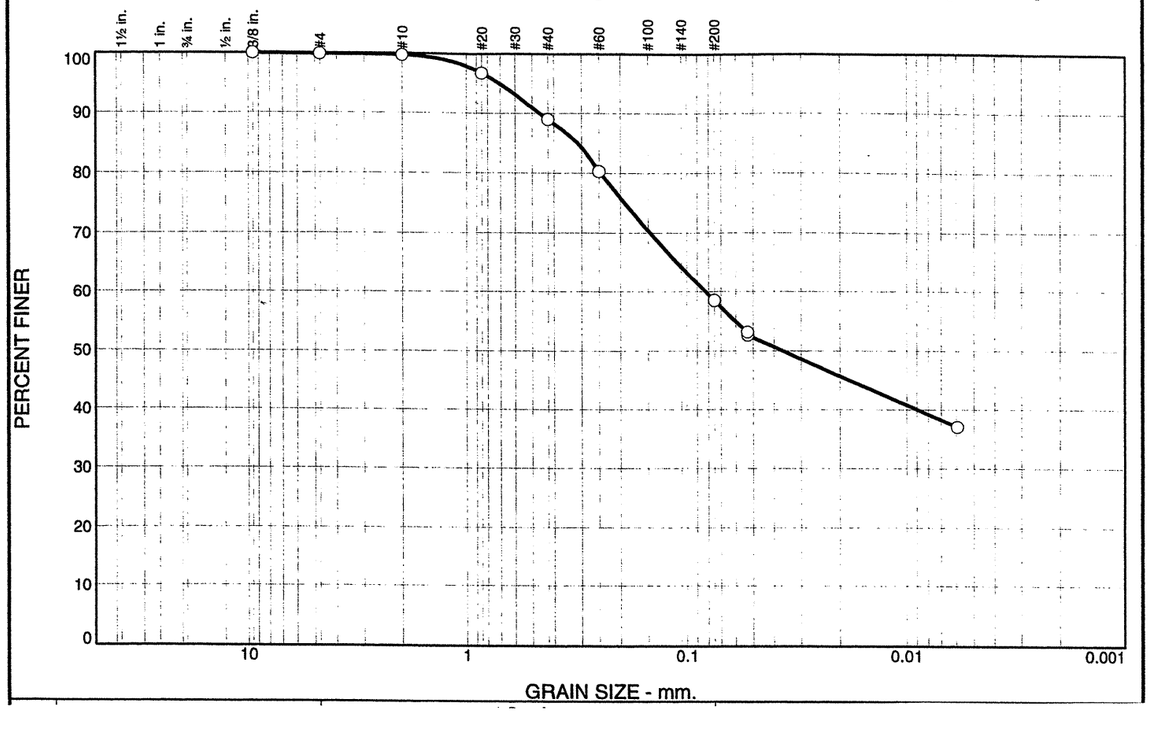
Source of Sample: Boring Site 2 **Depth:** 0.0-1.7'
Sample Number: S-2

Date: 8/17/09

MACTEC Engineering and Consulting, Inc. **Raleigh, North Carolina**	**Client:** NCDOT **Project:** I-40 & I-77 Interchange **Project No:** 6468092478 **Figure** NA

WTP 8-26-09

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#10	99.7		
#20	96.8		
#40	88.9		
#60	80.3		
#200	58.5		
#270	53.2		

* (no specification provided)

Material Description

Reddish Brown Sandy SILT

Atterberg Limits

PL= 33 LL= 49 PI= 16

Coefficients

D_{85}= 0.3140 D_{60}= 0.0823 D_{50}= 0.0363
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(8)

Remarks

Specific Gravity is assumed

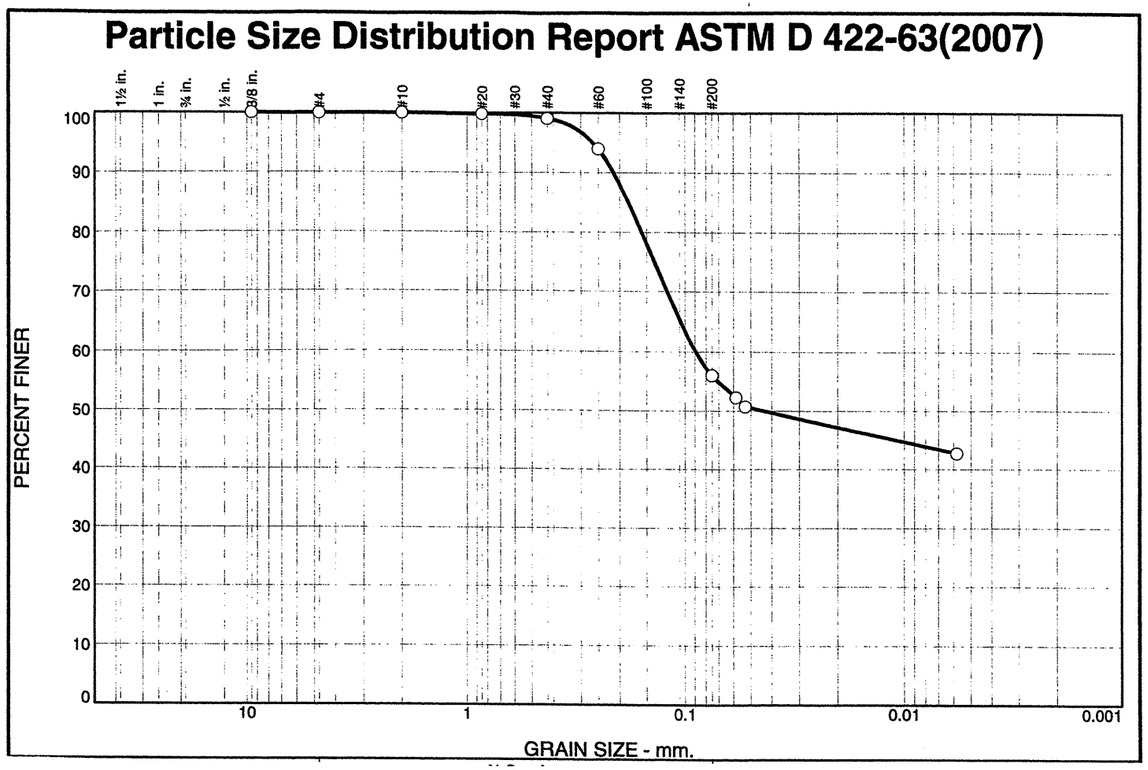
Source of Sample: Boring Site 3 **Depth:** 1.0-3.2'
Sample Number: S-3

Date: 8/17/09

MACTEC Engineering and Consulting, Inc. **Raleigh, North Carolina**	**Client:** NCDOT **Project:** I-40 & I-77 Interchange **Project No:** 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.8		
#40	99.0		
#60	93.9		
#200	56.0		
#270	50.7		

* (no specification provided)

Material Description

Yellowish Brown Sandy CLAY

Atterberg Limits

PL= 26 LL= 46 PI= 20

Coefficients

D_{85}= 0.1824 D_{60}= 0.0891 D_{50}= 0.0433
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(9)

Remarks

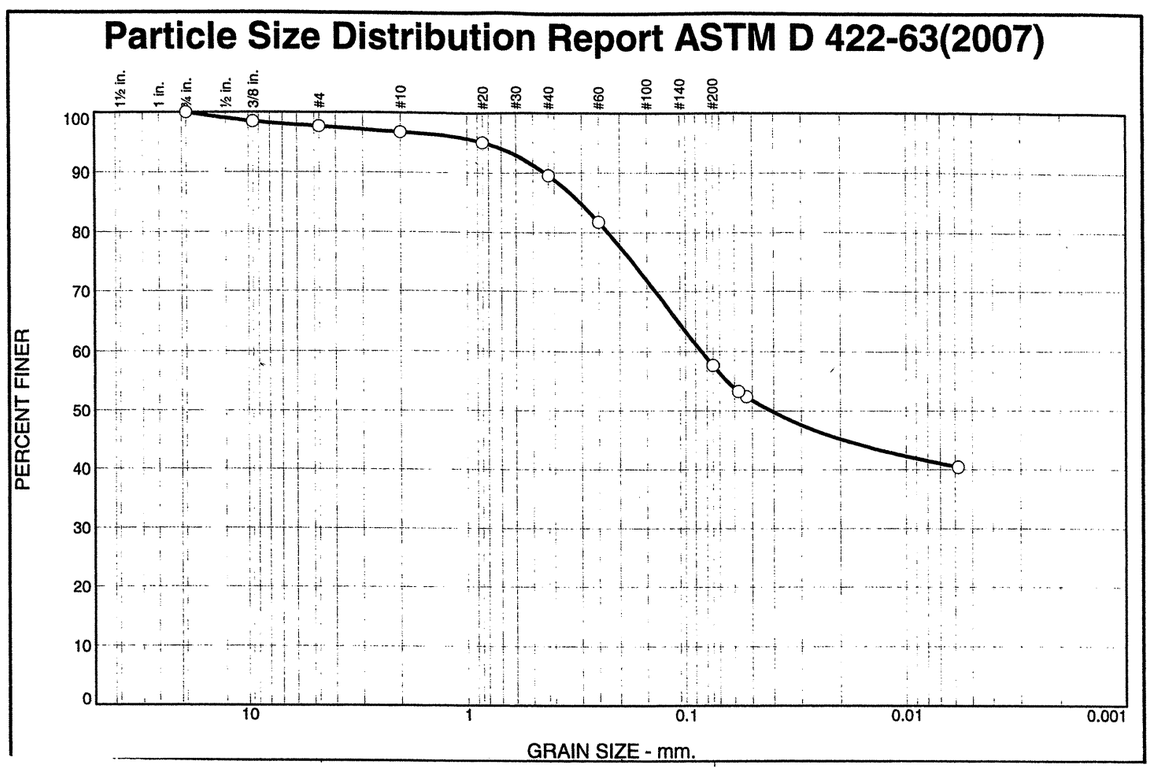
ND = Not Determined
Specific Gravity is assumed

Source of Sample: Boring Site 4 **Depth:** 0.4-2.5'
Sample Number: S-4 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.	**Client:** NCDOT
	Project: I-40 & I-77 Interchange
Raleigh, North Carolina	**Project No:** 6468092478 **Figure** NA

Tested By: CS(Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	98.5		
#4	97.6		
#10	96.7		
#20	95.0		
#40	89.5		
#60	81.8		
#200	57.7		
#270	52.4		

* (no specification provided)

Material Description

Yellowish Brown Sandy CLAY

Atterberg Limits

PL= 20 LL= 37 PI= 17

Coefficients

D_{85}= 0.3043 D_{60}= 0.0846 D_{50}= 0.0409
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

Remarks

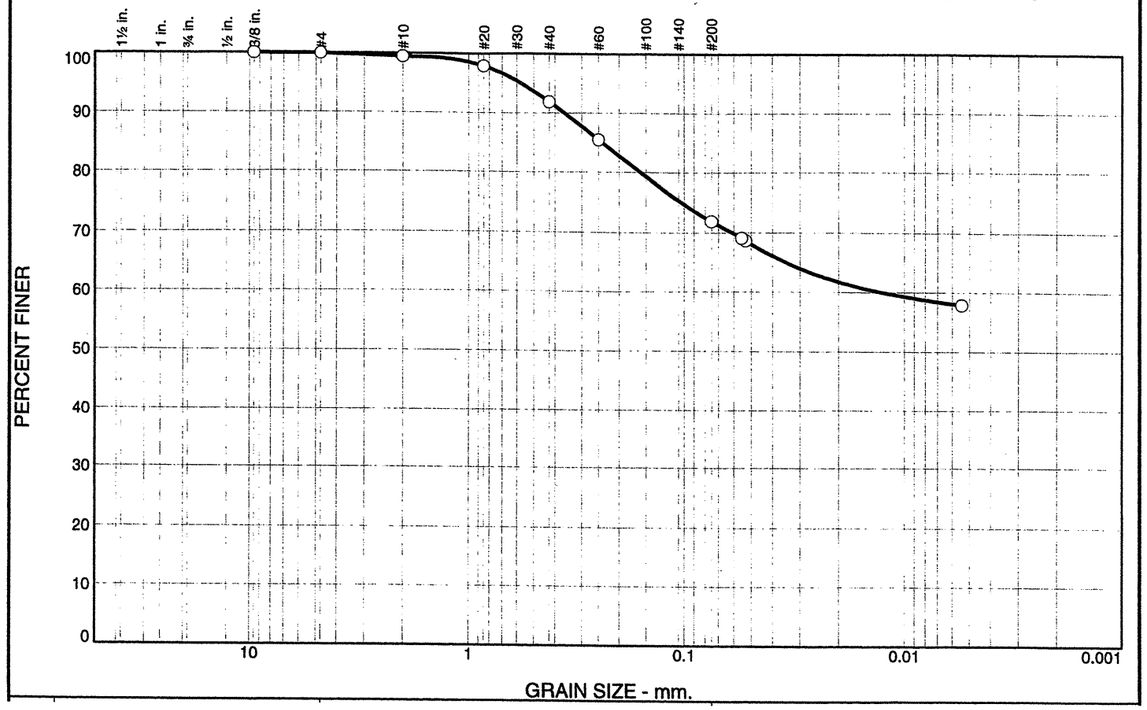
Specific Gravity is assumed

Source of Sample: Boring Site 5 **Depth:** 0.8-2.5'
Sample Number: S-5 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.	**Client:** NCDOT
	Project: I-40 & I-77 Interchange
Raleigh, North Carolina	**Project No:** 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#10	99.5		
#20	97.9		
#40	91.9		
#60	85.5		
#200	71.9		
#270	68.7		

* (no specification provided)

Material Description
Yellowish Brown Sandy CLAY

Atterberg Limits
PL= 29 LL= 62 PI= 33

Coefficients
D_{85}= 0.2401 D_{60}= 0.0128 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= CH AASHTO= A-7-6(25)

Remarks
Specific Gravity is assumed

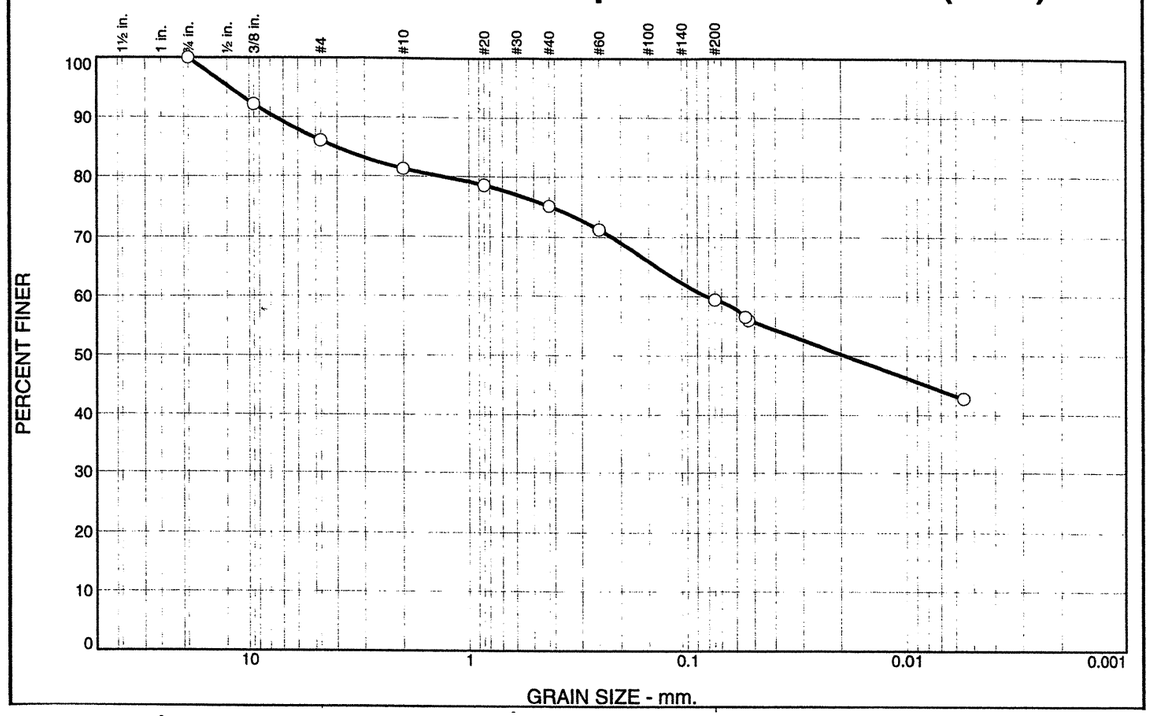
Source of Sample: Boring Site 6 **Depth:** 1.0-2.5'
Sample Number: S-6 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange
Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	92.2		
#4	86.1		
#10	81.3		
#20	78.6		
#40	75.2		
#60	71.2		
#200	59.4		
#270	56.0		

* (no specification provided)

Material Description
Yellowish Brown Sandy SILT

Atterberg Limits
PL= 32 LL= 51 PI= 19

Coefficients
D_{85}= 4.0903 D_{60}= 0.0815 D_{50}= 0.0191
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= MH AASHTO= A-7-5(10)

Remarks
ND = Not Determined
Specific Gravity is assumed

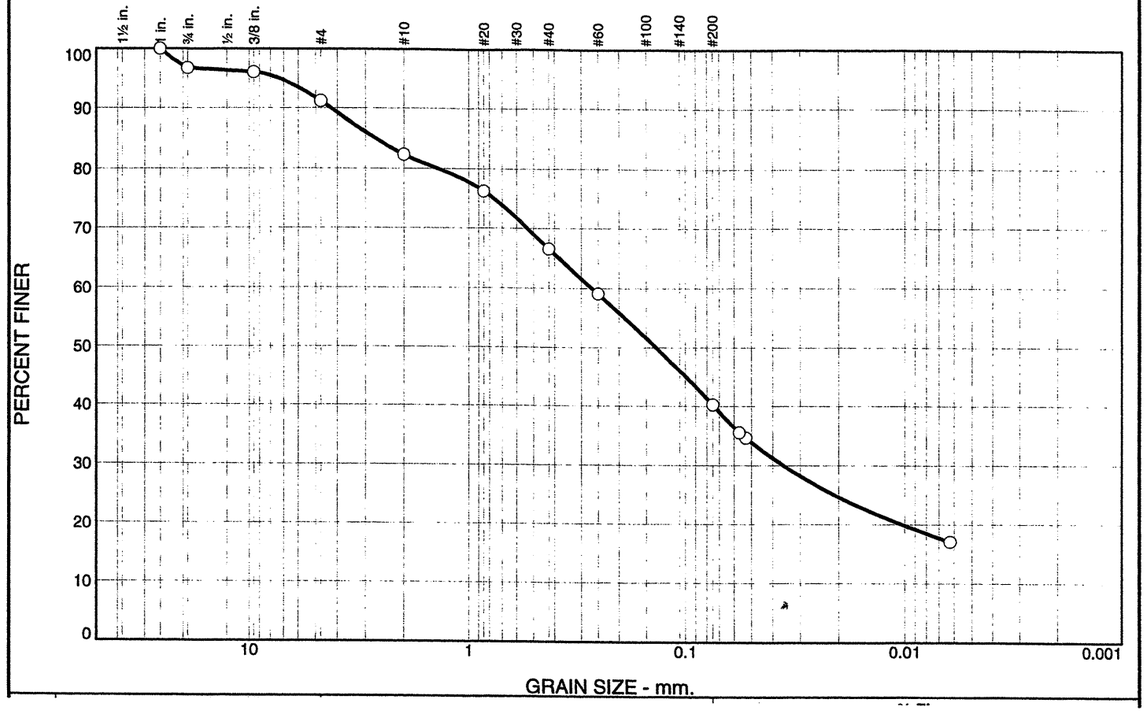
Source of Sample: Boring Site 7 **Depth:** 0.7-2.2'
Sample Number: S-7 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange
Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	96.7		
3/8	96.1		
#4	91.1		
#10	82.3		
#20	76.3		
#40	66.5		
#60	59.1		
#200	40.2		
#270	34.7		

* (no specification provided)

Material Description

Yellow Sandy SILT

Atterberg Limits

PL= 29 LL= 34 PI= 5

Coefficients

D_{85}= 2.6903 D_{60}= 0.2674 D_{50}= 0.1355
D_{30}= 0.0357 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

ND = Not Determined
Specific Gravity is assumed

Source of Sample: Boring Site 8 **Depth:** 0.0-2.2'
Sample Number: S-8

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

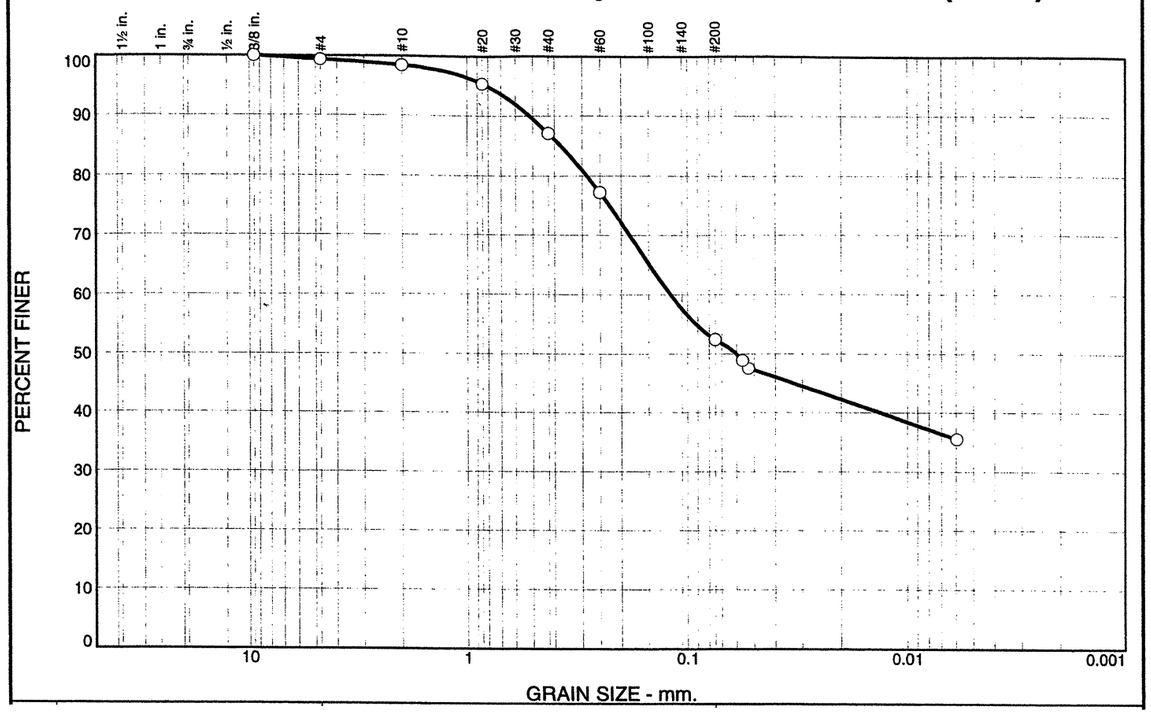
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.4		
#10	98.4		
#20	95.3		
#40	87.1		
#60	77.3		
#200	52.4		
#270	47.5		

* (no specification provided)

Material Description

Reddish Brown Sandy CLAY

Atterberg Limits

PL= 18 LL= 31 PI= 13

Coefficients

D_{85}= 0.3729 D_{60}= 0.1193 D_{50}= 0.0598
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

Specific Gravity is assumed

Source of Sample: Boring Site 9 **Depth:** 0.0-2.7'
Sample Number: S-9

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

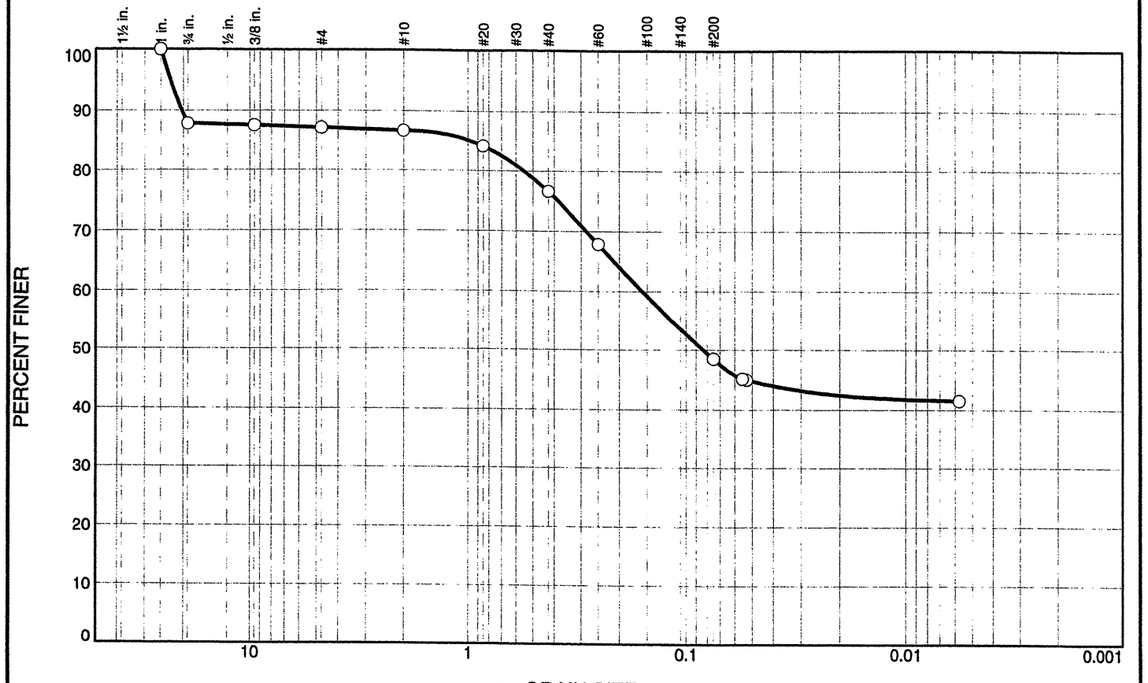
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	87.8		
3/8	87.5		
#4	87.1		
#10	86.7		
#20	84.2		
#40	76.6		
#60	67.8		
#200	48.5		
#270	45.0		

* (no specification provided)

Material Description

Reddish Brown Sandy CLAY

Atterberg Limits

PL= 19 LL= 36 PI= 17

Coefficients

D_{85}= 0.9710 D_{60}= 0.1575 D_{50}= 0.0833
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-6(5)

Remarks

Specific Gravity is assumed

Source of Sample: Boring Site 10 **Depth:** 0.3-2.5'
Sample Number: SS-10

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

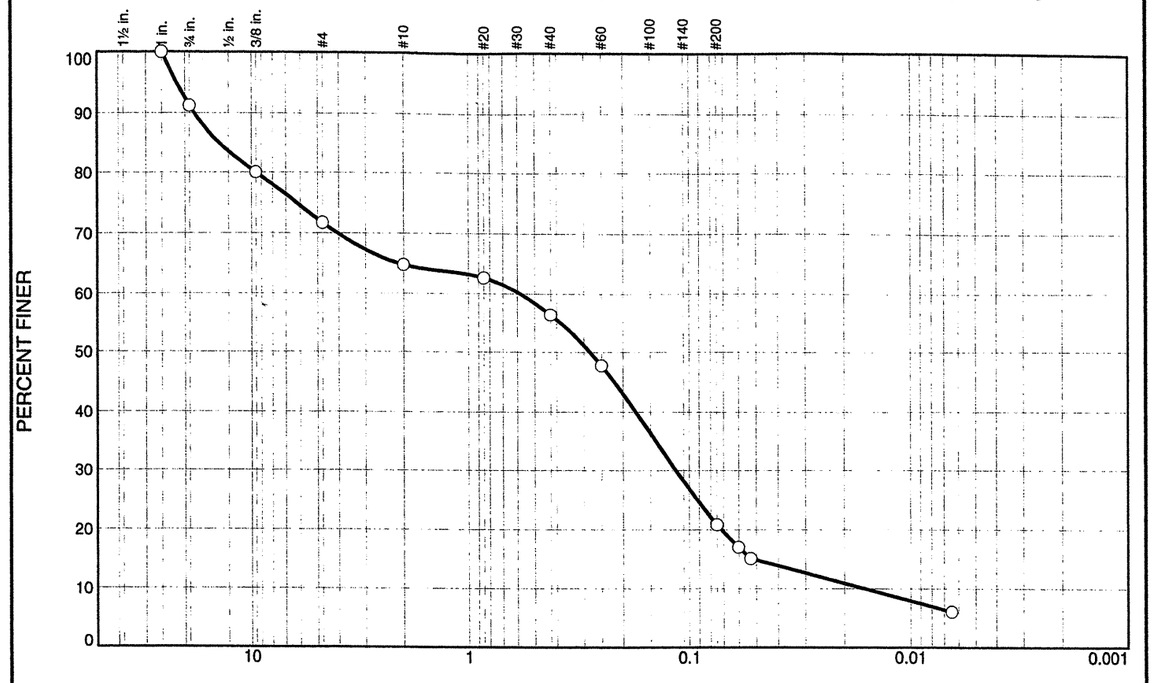
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	91.2		
3/8	80.0		
#4	71.7		
#10	64.8		
#20	62.6		
#40	56.5		
#60	47.8		
#200	20.9		
#270	15.1		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= 24 LL= 28 PI= 4

Coefficients

D_{85}= 14.0219 D_{60}= 0.5839 D_{50}= 0.2808
D_{30}= 0.1147 D_{15}= 0.0517 D_{10}= 0.0161
C_u= 36.32 C_c= 1.40

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Specific Gravity is assumed

Source of Sample: Boring Site 11 **Depth:** 0.0-2.1'
Sample Number: S-11

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

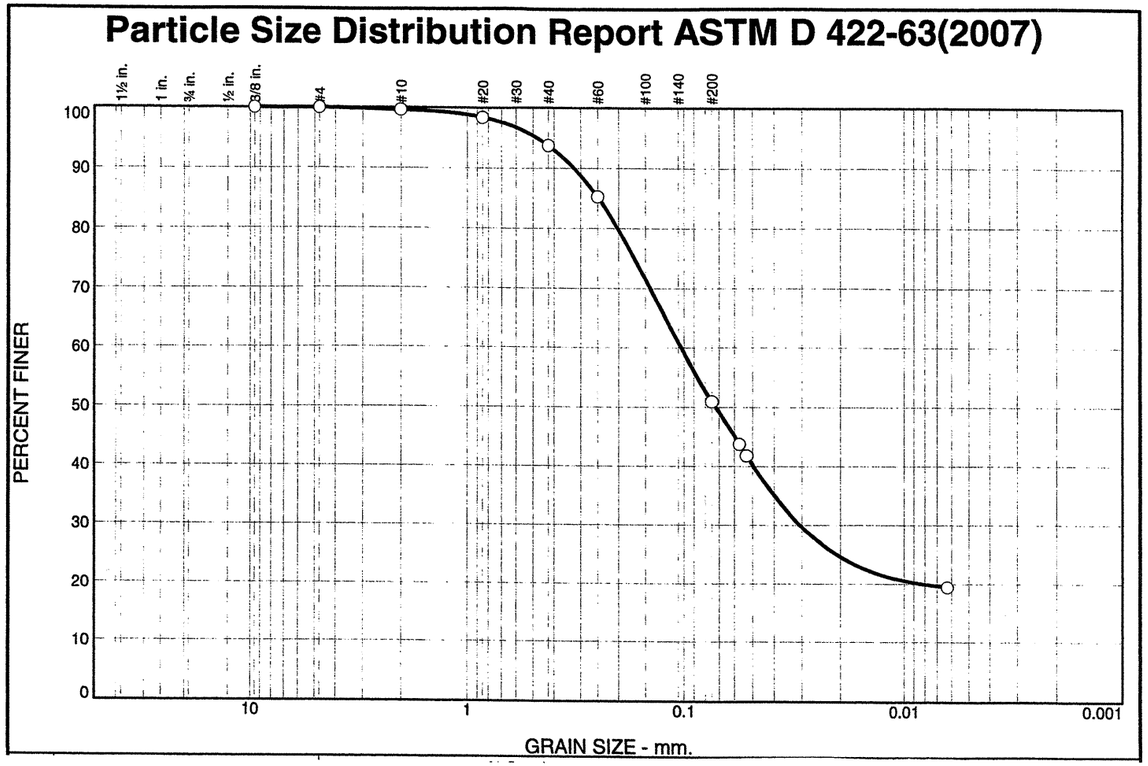
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#10	99.6		
#20	98.4		
#40	93.8		
#60	85.2		
#200	51.0		
#270	41.8		

* (no specification provided)

Material Description
Yellowish Brown Sandy SILT

Atterberg Limits
PL= 35 LL= 42 PI= 7

Coefficients
D_{85}= 0.2480 D_{60}= 0.1028 D_{50}= 0.0723
D_{30}= 0.0306 D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= ML AASHTO= A-5(2)

Remarks
Specific Gravity is assumed

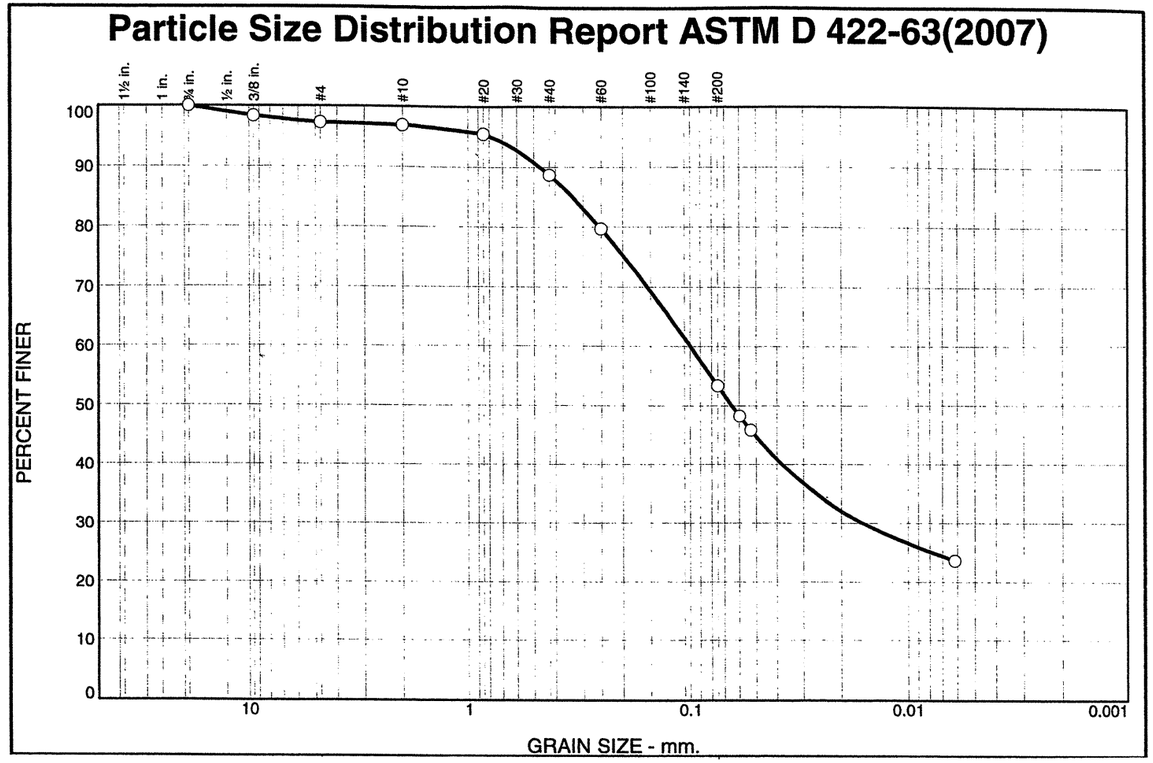
Source of Sample: Boring Site 12 **Depth:** 0.0-1.7'
Sample Number: S-12 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange
Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	98.3		
#4	97.3		
#10	96.9		
#20	95.5		
#40	88.6		
#60	79.7		
#200	53.4		
#270	45.8		

* (no specification provided)

Material Description
Yellowish Brown Sandy SILT

Atterberg Limits
PL= 35 LL= 42 PI= 7

Coefficients
D_{85}= 0.3356 D_{60}= 0.0997 D_{50}= 0.0647
D_{30}= 0.0160 D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= ML AASHTO= A-5(3)

Remarks
Specific Gravity is assumed

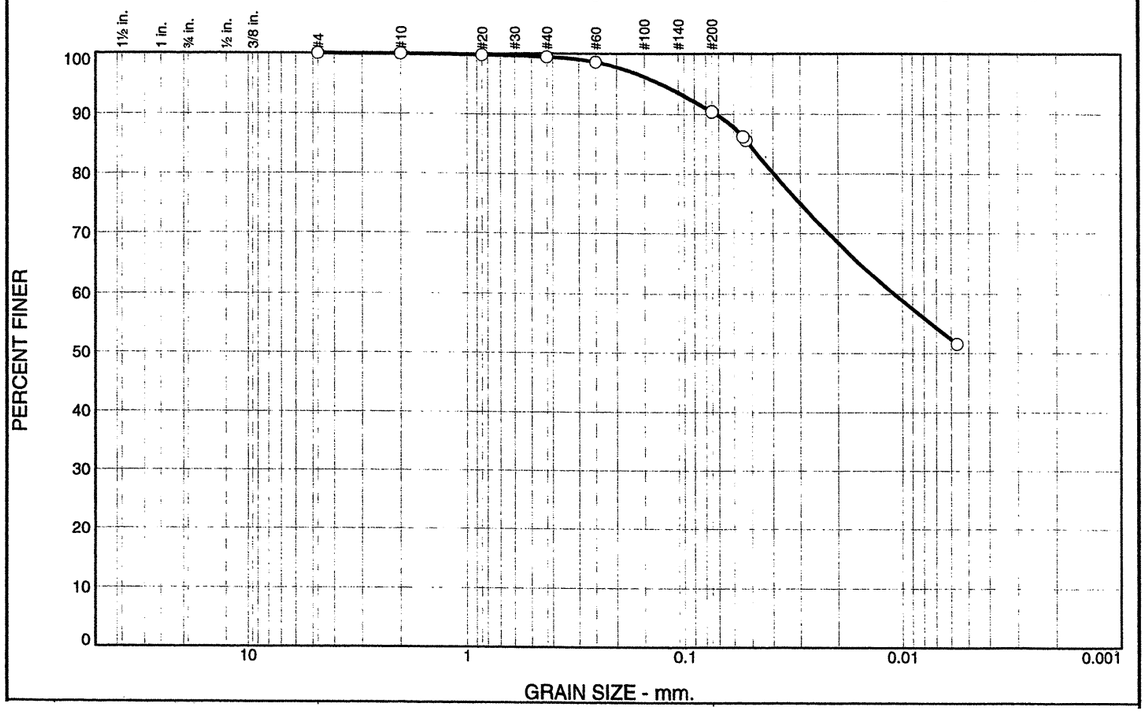
Source of Sample: Boring Site 13 **Depth:** 0.0-1.5'
Sample Number: S-13 **Date:** 8/17/09

MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange
Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.8		
#40	99.4		
#60	98.6		
#200	90.4		
#270	85.7		

* (no specification provided)

Material Description

Brown SILT

Atterberg Limits

PL= 30 LL= 48 PI= 18

Coefficients

D_{85}= 0.0513 D_{60}= 0.0109 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(19)

Remarks

Specific Gravity is assumed

Source of Sample: Boring Site 14 **Depth:** 0.0- -3.2'
Sample Number: S-14

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

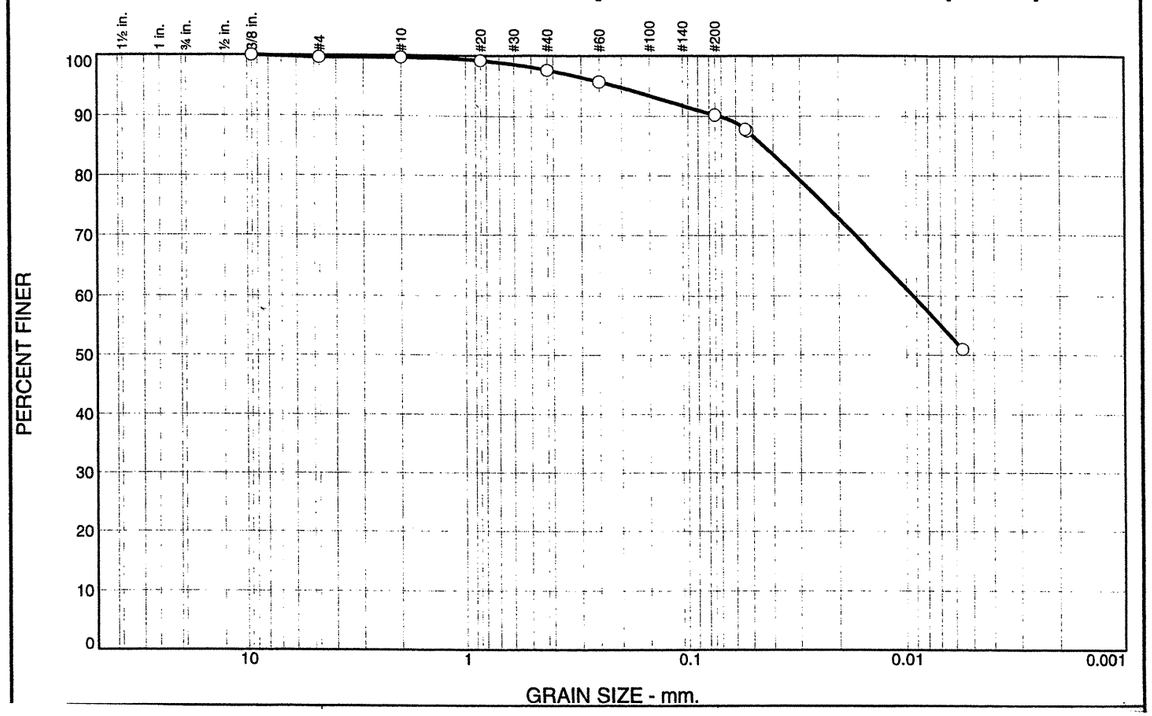
Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

Particle Size Distribution Report ASTM D 422-63(2007)



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.7		
#10	99.7		
#20	99.2		
#40	97.5		
#60	95.5		
#200	90.2		
#270	87.6		

* (no specification provided)

Material Description

Dark Reddish Brown CLAY

Atterberg Limits

PL= 27 LL= 50 PI= 23

Coefficients

D_{85}= 0.0441 D_{60}= 0.0094 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(24)

Remarks

Specific Gravity is assumed

Source of Sample: Boring Site 15 **Depth:** 0.0-2.3'
Sample Number: S-15

Date: 8/17/09

MACTEC Engineering and Consulting, Inc.

Raleigh, North Carolina

Client: NCDOT
Project: I-40 & I-77 Interchange

Project No: 6468092478 **Figure** NA

Tested By: CS (Cert.104.04.0504)

ID: I-3819A

CONTRACT: 34192.1.2

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-3819A	1	31

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34192.1.2	IMS-40-2(124)15	P.E.
		R/W & UTIL.

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 F.A. PROJ. IMS -40-2(124)15

COUNTY IREDELL

PROJECT DESCRIPTION STATESVILLE - I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR2003 (RADIO ROAD) TO SR2158 (OLD MOCKSVILLE ROAD) & I-77 FROM SOUTH OF SR2321 (E. BROAD STREET) TO SOUTH OF SR2171 (JANE SOWER ROAD)

SITE DESCRIPTION BRIDGE No. 564 ON I-40 (-L-) OVER FOURTH CREEK

INVENTORY

CONTENTS:

Title Sheet	Sheet 1
NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheet 2
Site Vicinity Map	Sheet 3
Boring Location Plan	Sheet 4
Generalized Subsurface Profile Along -L-	Sheet 5
Generalized Subsurface Cross Section Through End Bent No. 1	Sheet 6
Generalized Subsurface Cross Section Through Interior Bent No. 1	Sheet 7
Generalized Subsurface Cross Section Through Interior Bent No. 2	Sheet 8
Generalized Subsurface Cross Section Through End Bent No. 2	Sheet 9
Test Boring Logs Core Reports Core Photographs	Sheets 10 - 21
Summary of Laboratory Test Data	Sheet 22
Summary of Rock Core Test Results	Sheet 23
Field Scour Report (Performed February 23, 2010)	Sheet 24
Grain Size Curves	Sheets 25 - 27
Site Photographs	Sheets 28 - 31

CAUTION NOTICE

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PERSONNEL

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INVESTIGATED BY S&ME, INC.

CHECKED BY A.F. RIGGS, JR.

SUBMITTED BY S&ME, INC.

DATE MARCH 19, 2010

Regional Engineering Geologist

NORTH CAROLINA PROFESSIONAL SEAL 14155 ENGINEER ALBERT F RIGGS, JR.

DRAWN BY: T. PEREZ

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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.
34192.1.2	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	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	
CLASS.	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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

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 SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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-550X
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2-15/16 STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3 1/4" H.S.A.
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N Q
- [ ] -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 ND 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: BY4-131 NCDOT Traverse Station Rebar & Cap Stamped "BY4-131" Located at Station 29+19.54 -BY4-
ELEVATION: 790.37 FT.

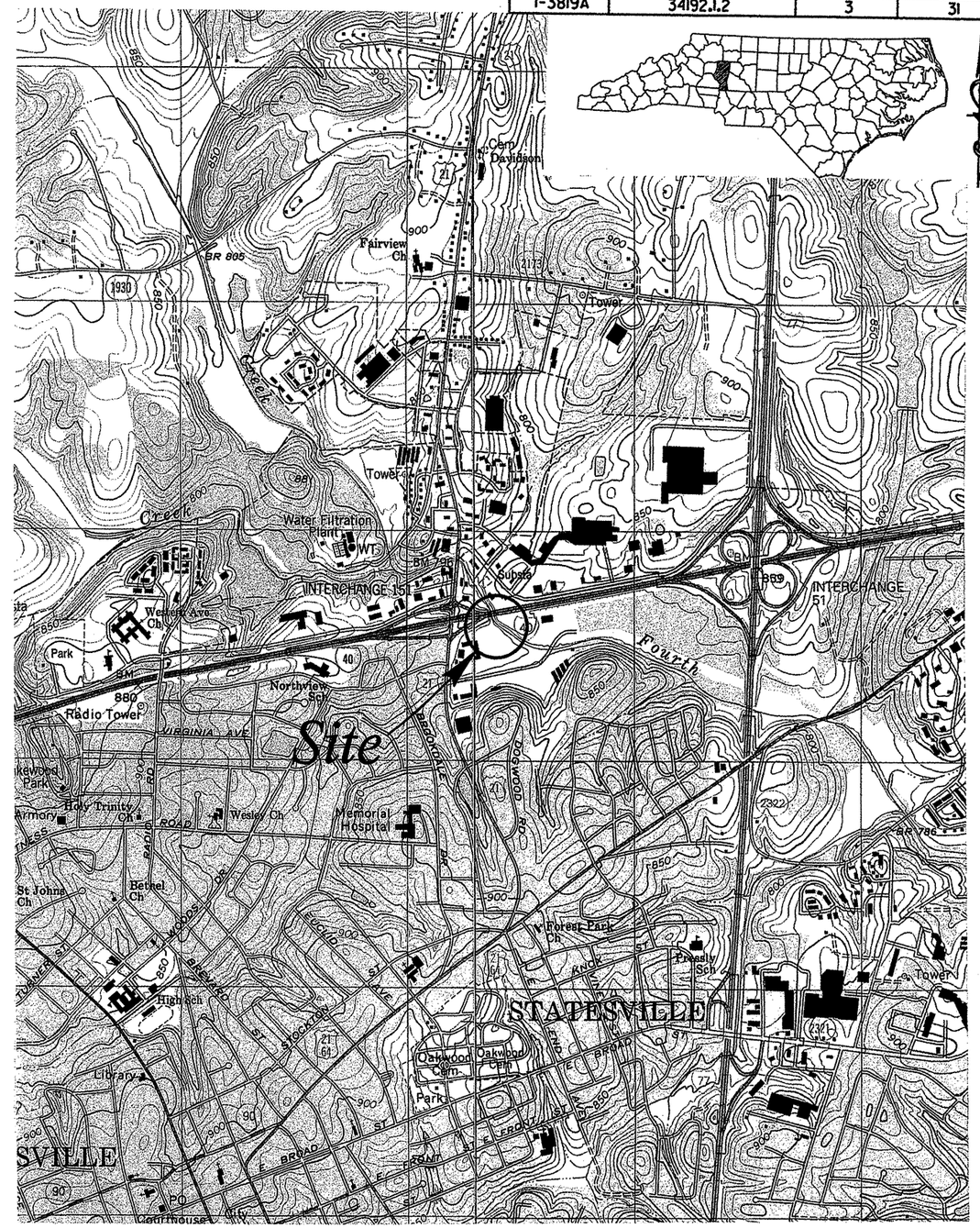
BENCH MARK: BY4-130 NCDOT Traverse Station Rebar & Cap Stamped "BY4-130" Located at Station 24+07.07 -BY4-
ELEVATION: 799.81 FT.

BENCH MARK: BLE-9 NCDOT Traverse Station Rebar & Cap Stamped "BLE-9" Located at Station 78+92.02
ELEVATION: 803.46' FT.

NOTES:
- SPT LAB SAMPLE
- ST — SHELBY TUBE

REVISED 09/23/09

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
I-3819A	34192.1.2	3	31



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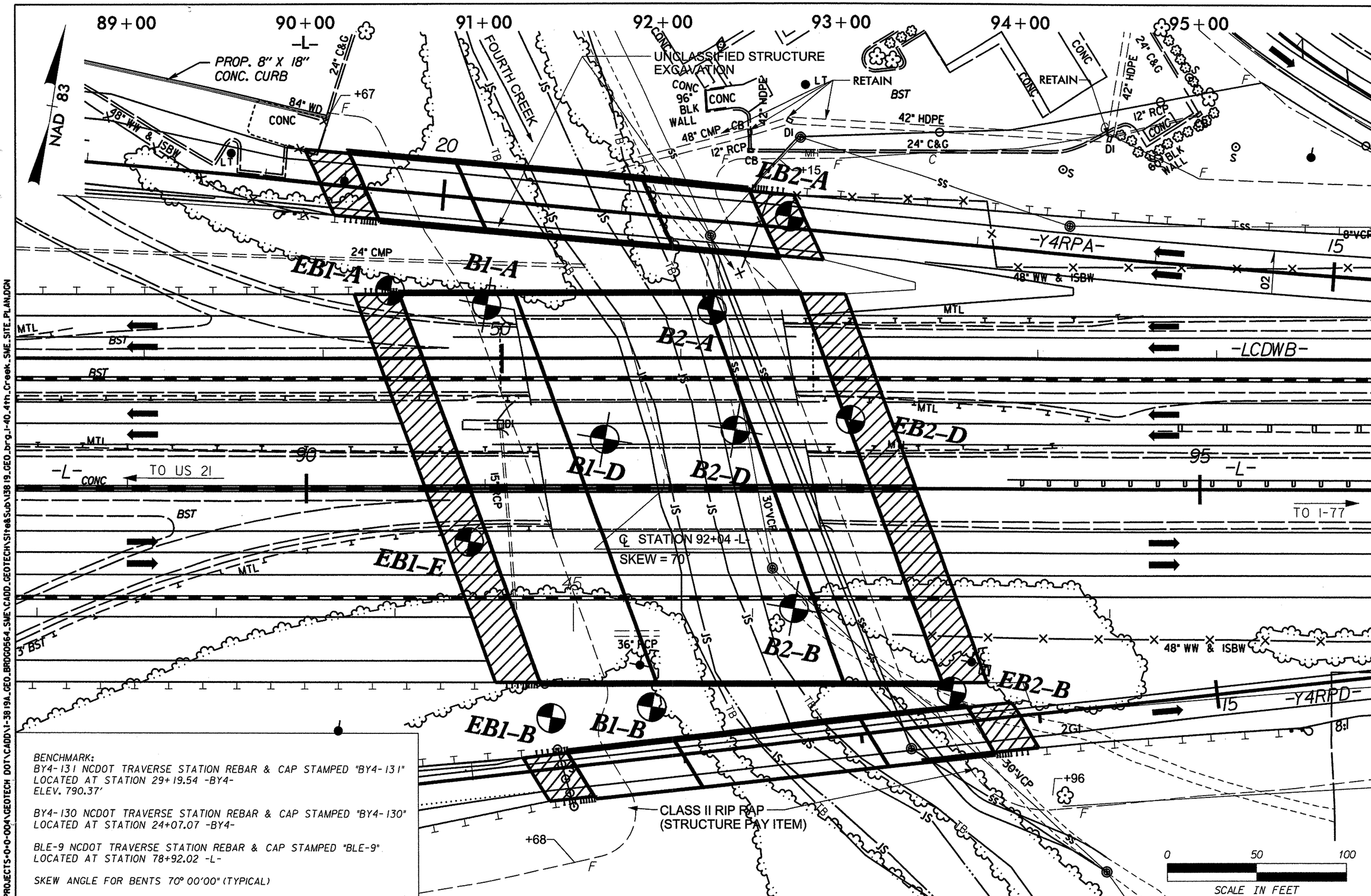
SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	MARCH 2010
JOB NO.	1051-10-004

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING • TESTING

SITE VICINITY MAP

BRIDGE No. 564 ON I-40 (-L-)
OVER FOURTH CREEK
STATE PROJECT NO. 34192.1.2 TIP NO. I-3819A
FEDERAL I.D. NO. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA



BENCHMARK:
BY4-131 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-131"
LOCATED AT STATION 29+19.54 -BY4-
ELEV. 790.37'

BY4-130 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-130"
LOCATED AT STATION 24+07.07 -BY4-

BLE-9 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BLE-9"
LOCATED AT STATION 78+92.02 -L-

SKEW ANGLE FOR BENTS 70° 00'00" (TYPICAL)

S:\PROJECTS\0-0-004\GEOTECH DOT\CADD\I-3819A_GEO_BRDG0564_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_brg_I-40_4th_Creek_SME_SITE_PLAN.DGN

APPROVED BY:	AFR
DRAWN BY:	TRP
SHEET	4
SCALE:	1" = 50'
DATE:	MARCH 2010
JOB NO.	1051-10-004

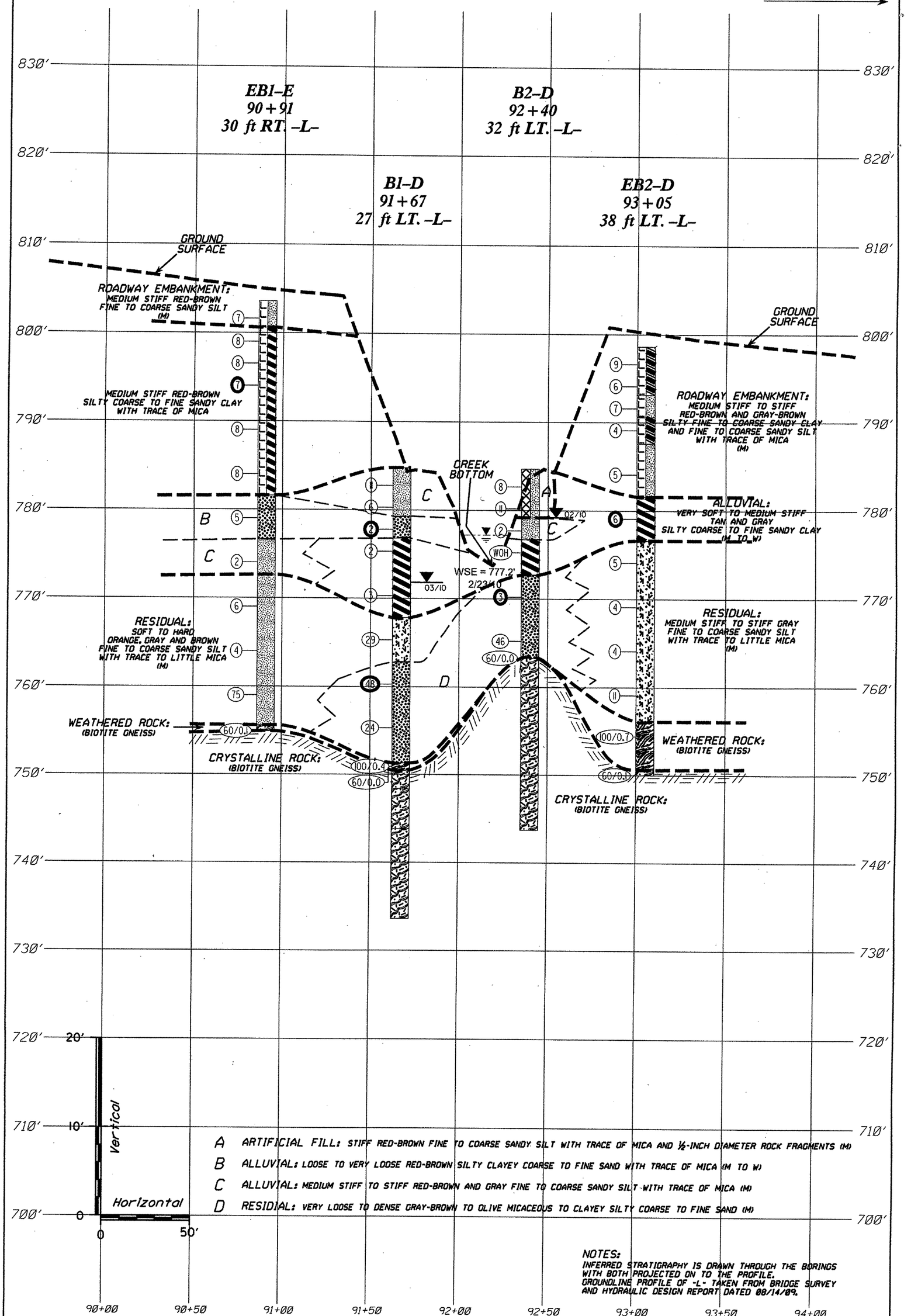
S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

BORING LOCATION PLAN

BRIDGE No. 564 ON I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:PROJECTS/2010 /10- 004/GEOTECH DOT/CADD/I-3819A/I-3819A_GEO_BRDG0564_SME/CADD_GEOTECH/SITE&SUB/13819A PROFILE.DGN

GENERALIZED SUBSURFACE PROFILE ALONG -L-



A ARTIFICIAL FILL: STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA AND ½-INCH DIAMETER ROCK FRAGMENTS (M)

B ALLUVIAL: LOOSE TO VERY LOOSE RED-BROWN SILTY CLAYEY COARSE TO FINE SAND WITH TRACE OF MICA (M TO W)

C ALLUVIAL: MEDIUM STIFF TO STIFF RED-BROWN AND GRAY FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

D RESIDIAL: VERY LOOSE TO DENSE GRAY-BROWN TO OLIVE MICACEOUS TO CLAYEY SILTY COARSE TO FINE SAND (M)

NOTES:

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE PROFILE.
GROUNDLINE PROFILE OF -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 08/14/09.

GENERALIZED SUBSURFACE PROFILE ALONG -L-

BRIDGE No. 564 ON I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	MARCH 2010	DRAWN BY:	TRP
JOB NO.	1051-10-004	SHEET	5

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 1

℄ -L-

EB1-A
90+47
110 ft LT. -L-

EB1-E
90+91
30 ft RT. -L-

EB1-B
91+37
128 ft RT. -L-

820′ 810′ 800′ 790′ 780′ 770′ 760′ 750′ 740′

PAVEMENT SURFACE

PAVEMENT SURFACE

GROUND SURFACE

GROUND SURFACE

ROADWAY EMBANKMENT FILL:
MEDIUM STIFF TO STIFF
ORANGE-BROWN AND RED-BROWN
FINE TO COARSE SANDY CLAYEY SILT
WITH TRACE OF MICA
AND ½-INCH DIAMETER ROCK FRAGMENTS
(M)

MEDIUM STIFF RED-BROWN
SILTY COARSE TO FINE SANDY CLAY
(M)

ALLUVIAL:
VERY LOOSE TO LOOSE
BROWN, RED-BROWN TO GRAY
SILTY CLAYEY COARSE TO FINE SAND
(M TO W)

3/10

SOFT TO MEDIUM STIFF
GRAY FINE TO COARSE SANDY SILT
WITH TRACE OF MICA
(M)

WEATHERED ROCK:
(BIOTITE GNEISS)

100/0.8

60/0.1

RESIDUAL:
SOFT TO HARD
ORANGE AND GRAY-BROWN
FINE TO COARSE SANDY SILT
WITH TRACE TO LITTLE MICA
(M)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

60/0.1

60/0.0

A

B

ST-1

ALLUVIAL:
VERY LOOSE TO LOOSE
BROWN, RED-BROWN TO GRAY
SILTY CLAYEY COARSE TO FINE SAND
(M TO W)

20′ Vertical 10′ 0

Horizontal 0 30′

A ARTIFICIAL FILL: MEDIUM STIFF TO STIFF RED-BROWN FINE TO COARSE SANDY SILT (M)

B ALLUVIAL: SOFT TO MEDIUM STIFF RED-BROWN COARSE TO FINE SANDY CLAYEY SILT WITH TRACE OF MICA (M)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

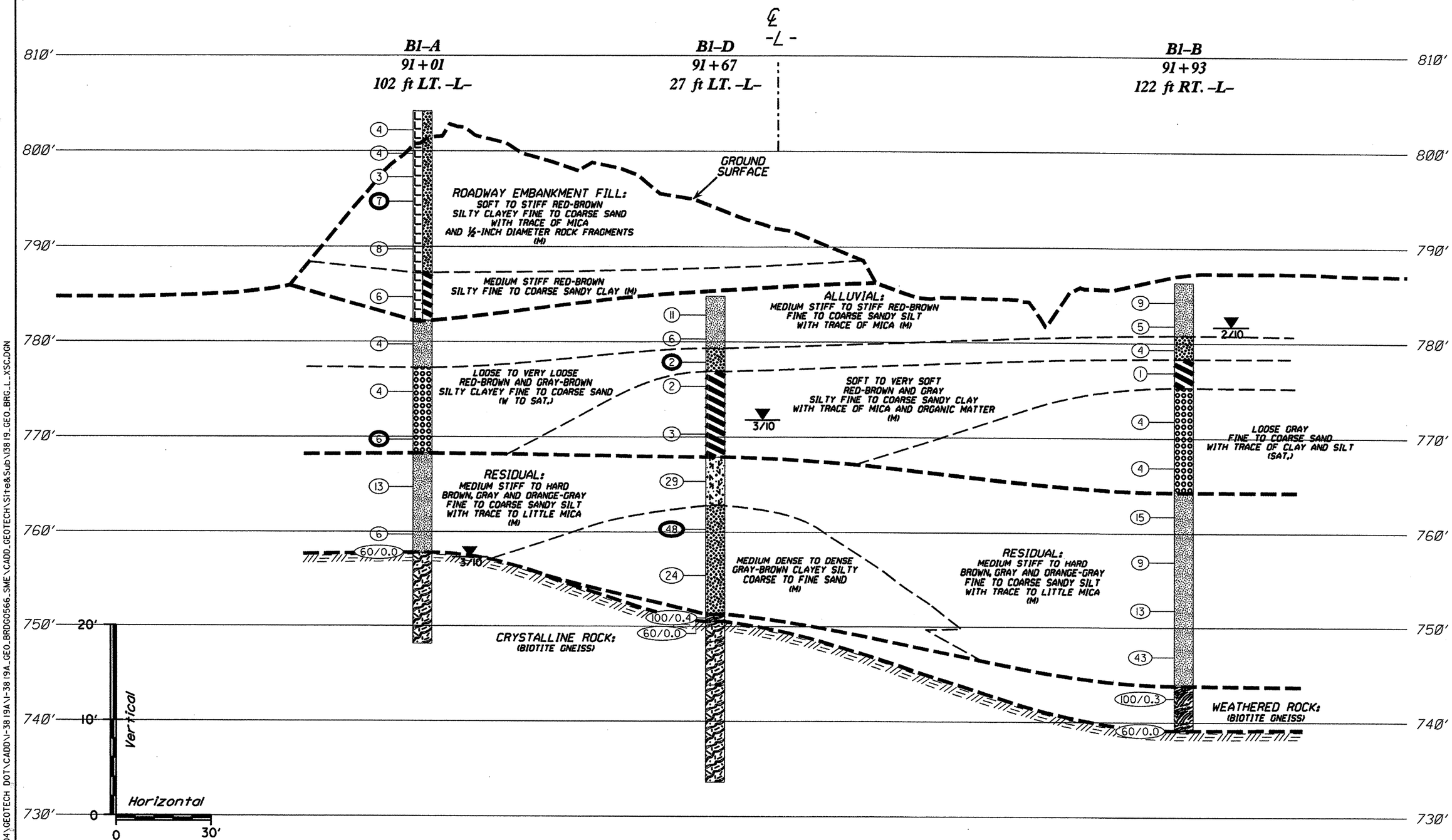
SCALE: (V) 1" = 10' (H) 1" = 30'
APPROVED BY: AFR
DATE: MARCH 2010
DRAWN BY: TRP
JOB NO. 105I-10-004
FIGURE 6

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END INTERIOR BENT No. 1 2
BRIDGE No. 564 on I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-38 19A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\10-004\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0564_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 1



NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION. GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

S:PROJECTS\10-004\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\13819_GEO_BRG_L_XSC.DGN

APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	7
SCALE:	(V) 1" = 10' (H) 1" = 30'
DATE:	MARCH 2010
JOB NO.	1051-10-004

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 1
BRIDGE No. 564 on I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 2

℄
-L-

B2-A
92+27
99 ft LT. -L-

B2-D
92+40
32 ft LT. -L-

B2-B
92+73
67 ft RT. -L-

810′
800′
790′
780′
770′
760′
750′
740′
730′

GROUND SURFACE

ARTIFICIAL FILL: MEDIUM STIFF TO STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA AND ½-INCH DIAMETER ROCK FRAGMENTS (M)

ALLUVIAL: SOFT TO MEDIUM STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M TO W)

RESIDUAL: SOFT GRAY-BLACK FINE TO COARSE SANDY SILT (M)

RESIDUAL: ORANGE-WHITE FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

RESIDUAL: VERY LOOSE TO DENSE TAN TO OLIVE CLAYEY SILTY COARSE TO FINE SAND WITH TRACE OF MICA (M)

WEATHERED ROCK: (BIOTITE GNEISS)

CRYSTALLINE ROCK: (BIOTITE GNEISS)

WEATHERED ROCK: (BIOTITE GNEISS)

2/10 2/10

B2-A: 8, A 4, WOH, 3, 4, 3, 3, 100/0.9, 60/0.1

B2-D: 8, 11, 2, WOH, 3, 46, 60/0.0

B2-B: 7, 14, 3, 2, 4, 6, 11, 11, 100/0.7, 60/0.1

20′ 10′ 0 — Vertical
0 30′ — Horizontal

A ALLUVIAL: LOOSE BROWN SILTY FINE TO COARSE SAND (M)

B ALLUVIAL: VERY SOFT ORANGE-BROWN TO GRAY SILTY FINE TO COARSE SANDY CLAY WITH TRACE OF MICA (M)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	8
SCALE:	(V) 1" = 10' (H) 1" = 30'
DATE:	MARCH 2010
JOB NO.	105I-10-004

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 2
BRIDGE No. 564 on I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 2

EB2-A
92+71
151 ft LT. -L-

EB2-D
93+05
38 ft LT. -L-

EB2-B
93+61
113ft RT. -L-

PAVEMENT SURFACE

GROUND SURFACE

800′
790′
780′
770′
760′
750′
740′
730′
720′

RESIDUAL:
MEDIUM STIFF TO STIFF RED-BROWN SILTY COARSE TO FINE SANDY CLAY WITH TRACE OF MICA (M)

6, 6, 11, 8, 3, 11

ST-1

2/10

ROADWAY EMBANKMENT FILL:
MEDIUM STIFF TO STIFF RED-BROWN AND GRAY-BROWN SILTY FINE TO COARSE SANDY CLAY AND FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

9, 6, 7, 4, 5, 6, 5, 4, 4, 11

ALLUVIAL:
VERY SOFT TO MEDIUM STIFF TAN TO GRAY SILTY COARSE TO FINE SANDY CLAY WITH TRACE OF MICA (M)

4, 3, 3, 5

A
B
A
B

1/10

WOH

ST-1

RESIDUAL:
SOFT TO STIFF BROWN-BLACK AND ORANGE-BROWN FINE TO COARSE SANDY CLAYEY SILT WITH TRACE TO LITTLE MICA (W TO M)

6, 9, 12, 17, 14, 16, 83, 38

43

VERY DENSE DARK GRAY SILTY FINE TO COARSE SAND WITH TRACE OF MICA AND QUARTZ ROCK FRAGMENTS (SAT.)

100/0.8
60/0.0

WEATHERED ROCK:
(BIOTITE GNEISS)

100/0.7

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

60/0.1

LOOSE TO VERY DENSE ORANGE-BROWN TO GRAY-WHITE SILTY CLAYEY COARSE TO FINE SAND (M)

100/0.9
100/0.9
100/0.8

WEATHERED ROCK:
(BIOTITE GNEISS)

20′
10′
Vertical
Horizontal
0
0
30′

A ALLUVIAL: RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

B ALLUVIAL: VERY LOOSE TO LOOSE RED-BROWN TO GRAY-BROWN SILTY TO CLAYEY COARSE TO FINE SAND (SAT.)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
SCALE: (V) 1" = 10' (H) 1" = 50'
DRAWN BY: TRP
DATE: MARCH 2010
FIGURE 9
JOB NO. 1051-10-004

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 2
BRIDGE No. 564 on I-40 (-L-)
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\10-004\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0564_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_BRG-L_4THCRK_XSC.DGN

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 90+47	**OFFSET** 110 ft LT	**ALIGNMENT** -L-	**0 HR.** 28.0
COLLAR ELEV. 804.6 ft	**TOTAL DEPTH** 38.6 ft	**NORTHING** 754,222	**EASTING** 1,444,208	**24 HR.** N/M
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" H.S.A.		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/03/10	**COMP. DATE** 03/03/10	**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)
805										804.6 GROUND SURFACE 0.0
	803.6	1.0								**ROADWAY EMBANKMENT**
	801.1	3.5	3	2	3	5		M		Orange-Brown, Brown and Red-Brown Fine to Coarse Sandy Clayey Silt with Trace of Mica and Some 1/2-inch Diameter Rock Fragments
800	798.6	6.0	3	3	3	6		M		
	796.1	8.5	4	4	8	12		M		
795			2	2	2	4		M		
	791.1	13.5								
790			2	5	3	8		M		
	786.1	18.5								787.6 17.0
785			3	2	3	5	SS-1	33% M		Red-Brown Silty Coarse to Fine Sandy Clay
	781.1	23.5								782.6 22.0
780			2	1	1	2	SS-2	M		**ALLUVIAL**
	776.1	28.5								Brown Silty Clayey Coarse to Fine Sand
775			2	2	3	5		M		777.6 27.0
	771.1	33.5								Gray Fine to Coarse Sandy Silt with Trace of Mica
770			70	30/0.3		100/0.8				772.1 32.5
	766.1	38.5								**WEATHERED ROCK**
765			60/0.1			60/0.1				(Biotite Gneiss)
760										767.6 37.0
755										766.0 38.6
750										**CRYSTALLINE ROCK**
745										(Biotite Gneiss)
740										Boring Terminated with Standard Penetration Test Refusal at Elevation 766.0 ft in Crystalline Rock (Biotite Gneiss)
735										1) Advanced 3-1/4" HSA to 38.5 feet.
730										
725										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB1-E	**STATION** 90+91	**OFFSET** 30 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 803.6 ft	**TOTAL DEPTH** 48.7 ft	**NORTHING** 754,092	**EASTING** 1,444,274	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/25/10	**COMP. DATE** 02/25/10	**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
805										803.6 GROUND SURFACE 0.0
	802.6	1.0								**ROADWAY EMBANKMENT**
	800.0	3.6	4	3	4	7		M		Red-Brown Fine to Coarse Sandy Silt
800	797.5	6.1	3	3	5	8		M		800.6 3.0
	795.0	8.6	4	4	4	8		M		Red-Brown Silty Coarse to Fine Sandy Clay with Trace of Mica
795										
	790.0	13.6	3	3	4	7	SS-3	27% M		
790			3	4	4	8		M		
	785.0	18.6								
785			2	3	5	8		M		
	780.0	23.6								
780			3	2	3	5		M		
	775.0	28.6								
775			1	1	1	2		M		
	770.0	33.6								
770			1	2	4	6		M		
	765.0	38.6								
765			1	2	2	4		M		
	760.0	43.6								781.6 22.0
760			10	10	65	75		M		**ALLUVIAL**
	755.0	48.6								Red-Brown Silty Coarse to Fine Sand with Trace of Mica
755			60/0.1			60/0.1				776.6 27.0
750										Gray Fine to Coarse Sandy Silt with Trace of Mica
745										772.6 31.0
740										**RESIDUAL**
735										Orange, Gray and Brown Fine to Coarse Sandy Silt with Trace of Mica
730										755.6 48.0
725										754.9 48.7
										WEATHERED ROCK
										(Biotite Gneiss)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 754.9 ft on Crystalline Rock (Biotite Gneiss)
										1) Advanced NW casing to 3.5 feet.
										2) Advanced 2-15/16 Tricone to 48.6 feet.
										3) Creek water used as drilling fluid.
										4) Approximate drilling fluid density 62.4 pcf.
										5) Loss of drilling fluid observed.

NCDOT BORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/25/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 91+37	**OFFSET** 128 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 30.8 ft	**NORTHING** 754,003	**EASTING** 1,444,337	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 02/18/10	**COMP. DATE** 02/18/10	**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)
790										787.2 GROUND SURFACE	0.0
	786.2	1.0								**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt	
785	783.7	3.5	9	6	4	10		M		784.2	3.0
	781.2	6.0	5	4	4	8		M		**ALLUVIAL** Red-Brown Coarse to Fine Sandy Clayey Silt with Trace of Mica	
780	778.7	8.5	2	1	2	3		M		779.2	8.0
			1	1	2	3		30% W		Gray Silty Fine to Coarse Sand	
775	773.7	13.5								776.2	11.0
			3	2	3	5		W		Gray Fine to Coarse Sand With Trace of Silt	
770	768.7	18.5								769.2	18.0
			3	2	3	5		M		**RESIDUAL** Gray-Brown Fine to Coarse Sandy Silt	
765	763.7	23.5								766.2	21.0
			4	4	4	8		M		Gray-Brown Fine Sandy Silt With Little Mica	
760	758.7	28.5								761.2	26.0
	756.4	30.8	6	4	9	13		M		Gray-Brown Fine to Coarse Sandy Silt With Trace of Mica	
755			60/0.0			60/0.0				756.4	30.8
750										Boring Terminated with Standard Penetration Test Refusal at Elevation 756.4 ft on Crystalline Rock (Biotite Gneiss)	
745										1) Advanced NW casing to 18.5 feet. 2) Advanced 2-15/16 Tricone to 30.8 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.	
740										Other Samples: ST-1 (6.0 - 8.0)	
735											
730											
725											
720											
715											
710											

NCDOT BORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/25/10

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 91+01	**OFFSET** 102 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 804.2 ft	**TOTAL DEPTH** 56.1 ft	**NORTHING** 754,223	**EASTING** 1,444,262	**24 HR.** 47.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/03/10	**COMP. DATE** 03/04/10	**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)
805										804.2 GROUND SURFACE	0.0
	803.2	1.0								**ROADWAY EMBANKMENT** Red-Brown Silty Clayey Fine to Coarse Sand with Trace of Mica and 1/2-inch Diameter Rock Fragments	
			4	2	2	4		M			
800	800.7	3.5									
	798.2	6.0	3	2	2	4		M			
			1	1	2	3		M			
795	795.7	8.5									
			3	3	4	7	SS-4	M			
790	790.7	13.5									
			3	3	5	8		M			
785	785.7	18.5									
			3	3	3	6		M			
780	780.7	23.5									
			2	1	3	4		M			
775	775.7	28.5									
			2	2	2	4		W			
770	770.7	33.5									
			2	4	2	6	SS-5	W			
765	765.7	38.5									
			4	5	8	13		M			
760	760.7	43.5									
			1	2	4	6		M			
755	757.7	46.5	60/0.0			60/0.0	RS-1			787.2 Red-Brown Silty Fine to Coarse Sandy Clay	17.0
750										782.2 **ALLUVIAL** Red-Brown Fine to Coarse Sandy Silt with Trace of Mica	22.0
745										777.2 Red-Brown and Gray Fine to Coarse Sand with Trace of Clay and Silt	27.0
740										768.2 **RESIDUAL** Brown and Gray Fine to Coarse Sandy Silt with Trace of Mica	36.0
735										757.7 **CRYSTALLINE ROCK** (Biotite Gneiss)	46.5
730										748.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 748.1 ft in Crystalline Rock (Biotite Gneiss)	56.1
725										1) Advanced NW casing to 43.5 feet. 2) Advanced 2-15/16 Tricone to 46.5 feet. 3) Advanced NQ core from 46.5' to 56.1'. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.	

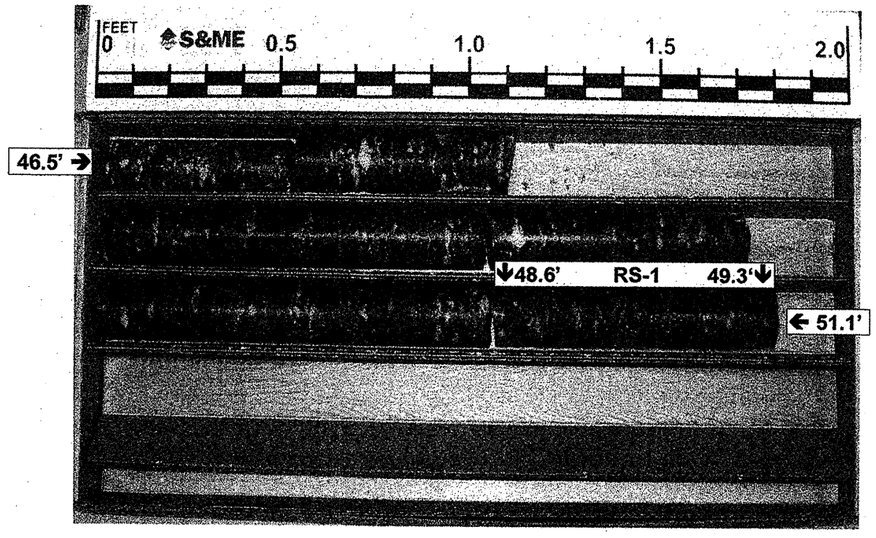
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 91+01	**OFFSET** 102 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 804.2 ft	**TOTAL DEPTH** 56.1 ft	**NORTHING** 754,223	**EASTING** 1,444,262	**24 HR.** 47.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/03/10	**COMP. DATE** 03/04/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ Core	**TOTAL RUN** 9.6 ft			

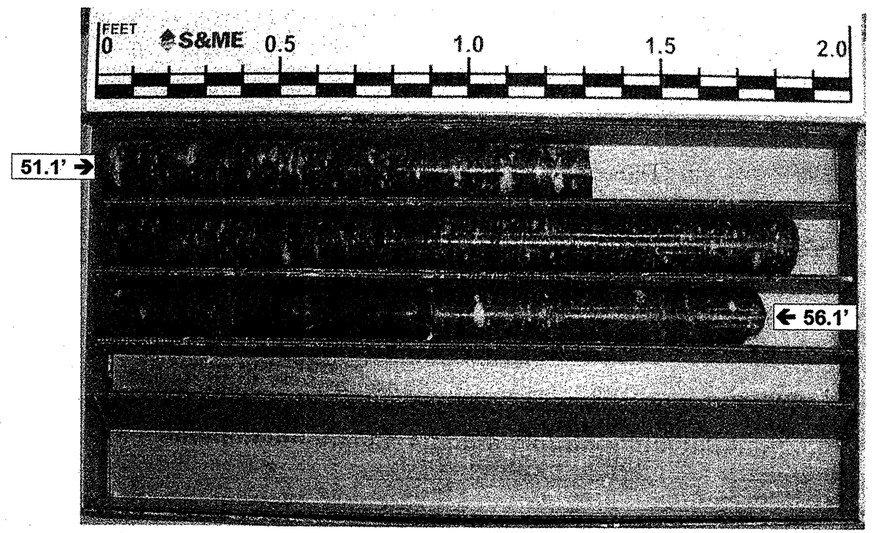
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
757.7											Begin Coring @ 46.5 ft
755	757.7	46.5	4.6	N=60/0.0 1:45/0.6 2:30/1.0 3:15/1.0 3:30/1.0 3:25/1.0	(4.6) 100%	(4.6) 100%	RS-1	(9.4) 98%	(9.4) 98%		757.7 **CRYSTALLINE ROCK** 46.5 Gray Fresh to Very Slightly Weathered Hard to Very Hard Close to Moderately Close Fracture Spacing (Biotite Gneiss)
750	753.1	51.1	5.0	3:15/1.0 3:30/1.0 3:53/1.0 4:30/1.0 4:45/1.0	(4.8) 96%	(4.8) 96%					Axial = 2188 KSF R1 = 12, R2 = 20, R30 = 20, R4 = 20, R5 = 7 RMR = 79 Rock Type E
745	748.1	56.1									748.1 56.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 748.1 ft in Crystalline Rock (Biotite Gneiss)
740											1) Advanced NW casing to 43.5 feet. 2) Advanced 2-15/16 Tricone to 46.5 feet. 3) Advanced NQ core from 46.5' to 56.1'. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.
735											
730											
725											
720											
715											
710											
705											
700											
695											
690											
685											
680											

NCDOT CORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 3/22/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B1-A
Site Description: Bridge No. 564 on I-40 over Fourth Creek			*Driller*: R. Norwood
Collar Elev.: 804.2 ft.	*Core Size:* NQ	*Equipment:* CME-550X	*Geologist*: N. Bradley
Elev. at T.D.: 748.1 ft.	*Total Depth:* 56.1 ft.	*Total Run:* 9.6 ft.	*Date*: 3/4/10

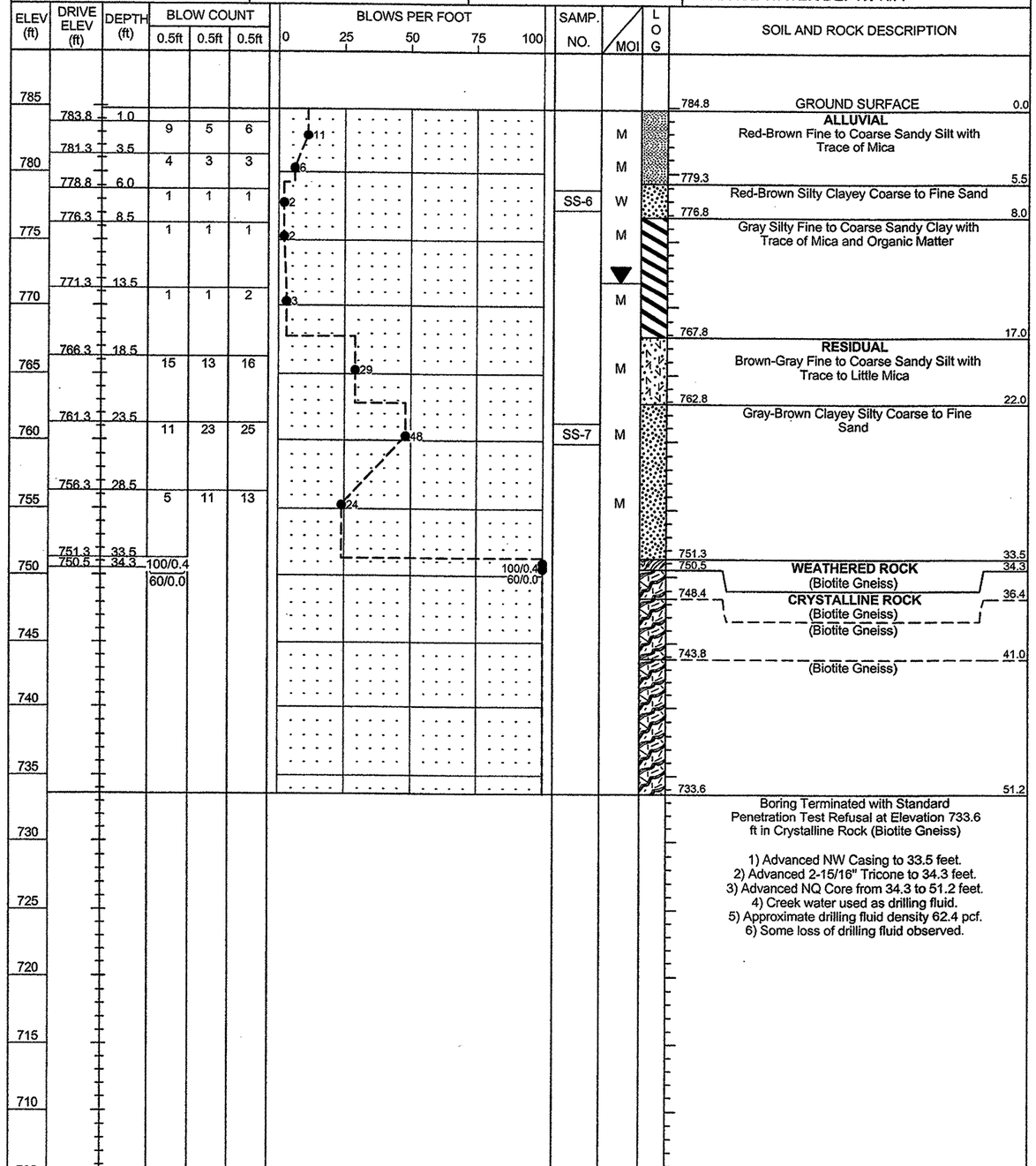


Box 1 of 2
Top of Box @ 46.5 feet; Bottom of Box @ 51.1 feet



Box 2 of 2
Top of Box @ 51.1 feet; Bottom of Box @ 56.1 feet

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B1-D	**STATION** 91+67	**OFFSET** 27 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 784.8 ft	**TOTAL DEPTH** 51.2 ft	**NORTHING** 754,161	**EASTING** 1,444,340 / **24 HR.** 13.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 03/01/10	**COMP. DATE** 03/01/10	**SURFACE WATER DEPTH** N/A



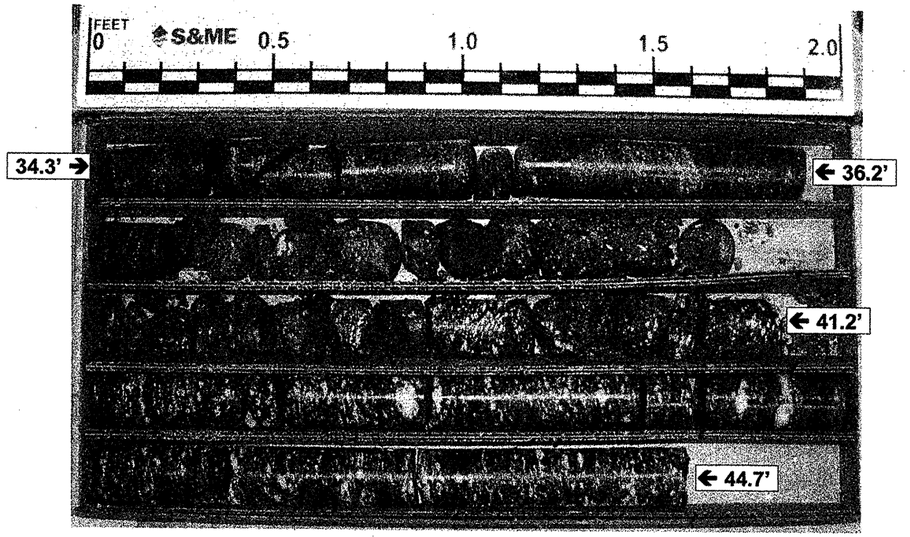
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B1-D	**STATION** 91+67	**OFFSET** 27 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 784.8 ft	**TOTAL DEPTH** 51.2 ft	**NORTHING** 754,161	**EASTING** 1,444,340	**24 HR.** 13.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 03/01/10	**COMP. DATE** 03/01/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ Core	**TOTAL RUN** 16.9 ft		

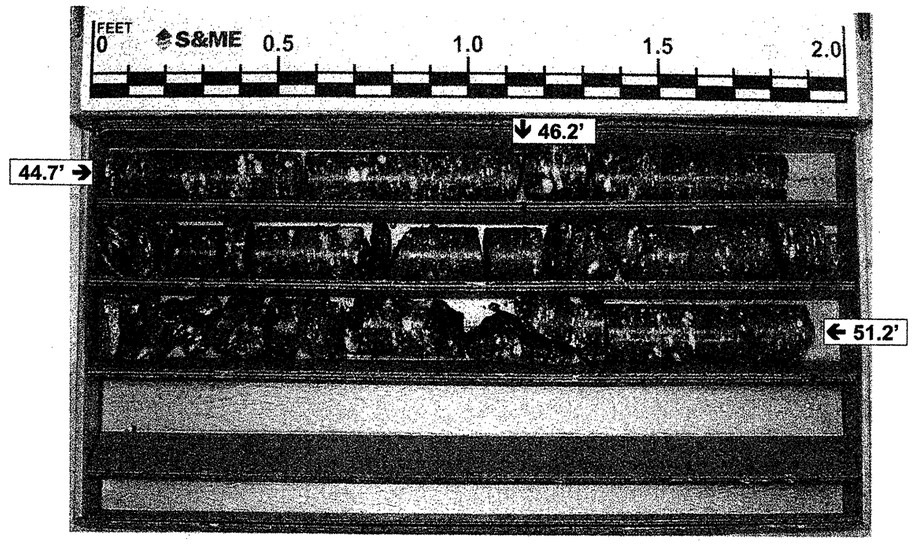
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
750.5											Begin Coring @ 34.3 ft
	750.5	34.3	1.9	2:00/0.9 2:15/1.0	(1.8) 95%	(0.8) 42%		(14.4) 85%	(6.6) 39%		ELEV. (ft) 750.5 — DEPTH (ft) 34.3 **CRYSTALLINE ROCK** Gray Fresh to Very Slightly Weathered Hard to Very Hard Close Fracture Spacing (Biotite Gneiss)
	748.6	36.2									ELEV. (ft) 748.4 — DEPTH (ft) 36.4
745			5.0	2:15/1.0 2:45/1.0 3:00/1.0 2:45/1.0 3:00/1.0	(3.6) 72%	N/A					Gray Moderate to Moderately Severe Weathered Hard to Medium Hard Close to Very Close Fracture Spacing (Biotite Gneiss)
	743.6	41.2									ELEV. (ft) 743.8 — DEPTH (ft) 41.0
740			5.0	2:45/1.0 3:10/1.0 3:00/1.0 4:00/1.0 3:00/1.0	(4.6) 92%	(3.9) 78%					Gray Fresh to Very Slightly Weathered Hard to Very Hard Close to Very Close Fracture Spacing (Biotite Gneiss)
	738.6	46.2									
735			5.0	4:00/1.0 3:00/1.0 3:15/1.0 3:30/1.0 4:10/1.0	(4.4) 88%	(1.9) 38%					
	733.6	51.2									ELEV. (ft) 733.6 — DEPTH (ft) 51.2
730											Boring Terminated with Standard Penetration Test Refusal at Elevation 733.6 ft in Crystalline Rock (Biotite Gneiss) 1) Advanced NW Casing to 33.5 feet. 2) Advanced 2-15/16" Tricone to 34.3 feet. 3) Advanced NQ Core from 34.3 to 51.2 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Some loss of drilling fluid observed.
725											
720											
715											
710											
705											
700											
695											
690											
685											
680											
675											

NCDOT CORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/19/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B1-D
Site Description: Bridge No. 564 on I-40 over Fourth Creek			*Driller*: R. Norwood
Collar Elev.: 784.8 ft.	*Core Size:* NQ	*Equipment:* CME-550X	*Geologist*: N. Bradley
Elev. at T.D.: 733.6 ft.	*Total Depth:* 51.2 ft.	*Total Run:* 16.9 ft.	*Date*: 3/1/10



Box 1 of 2
Top of Box @ 34.3 feet; Bottom of Box @ 44.7 feet



Box 2 of 2
Top of Box @ 44.7 feet; Bottom of Box @ 51.2 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 91+93	**OFFSET** 122 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 786.3 ft	**TOTAL DEPTH** 47.2 ft	**NORTHING** 754,018	**EASTING** 1,444,391	**24 HR.** 4.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 02/18/10	**COMP. DATE** 02/18/10	**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)
										GROUND SURFACE	786.3	0.0
										ALLUVIAL Red-Brown Fine to Coarse Sandy Silt		
	785.3	1.0						M				
	782.8	3.5	4	4	5	9		M				
			3	2	3	5					780.8	5.5
	780.3	6.0						Sat.		Red-Brown Silty Fine to Coarse Sand	778.3	8.0
			1	3	1	4				Red-Brown Silty Fine Sandy Clay		
	777.8	8.5	WOH	WOH	1	1		M			775.3	11.0
	772.8	13.5	1	2	2	4		Sat.		Gray Fine to Coarse Sand With Trace of Clay and Silt		
	767.8	18.5	1	2	2	4		Sat.			764.3	22.0
	762.8	23.5	7	7	8			M		**RESIDUAL** Orange-Gray Fine to Coarse Sandy Silt		
	757.8	28.5	3	4	5	9		M				
	752.8	33.5	4	6	7	13		M				
	747.8	38.5	15	18	25	43		M				
	742.8	43.5	100/0.3			100/0.3					743.8	42.5
										WEATHERED ROCK (Biotite Gneiss)		
	739.1	47.2	60/0.0			60/0.0					739.1	47.2

Boring Terminated with Standard Penetration Test Refusal at Elevation 739.1 ft on Crystalline Rock (Biotite Gneiss)

1) Advanced NW casing to 23.5 feet.
2) Advanced 2-15/16 Tricone to 47.2 feet.
3) Creek water used as drilling fluid.
4) Approximate drilling fluid density 62.4 pcf.
5) Loss of drilling fluid observed.

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 92+27	**OFFSET** 99 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 785.0 ft	**TOTAL DEPTH** 33.6 ft	**NORTHING** 754,242	**EASTING** 1,444,387	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 01/29/10	**COMP. DATE** 01/29/10	**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)
										GROUND SURFACE	785.0	0.0
										ALLUVIAL Red-Brown Fine to Coarse Sandy Silt with Trace of Mica	782.0	3.0
	784.0	1.0						M				
	781.5	3.5	8	4	4	8		M		Brown Silty Fine to Coarse Sand	779.5	5.5
	779.0	6.0	3	1	3	4		M		Orange-Brown Silty Fine to Coarse Sandy Clay	777.0	8.0
	776.5	8.5	WOH	WOH	WOH	0		M		**RESIDUAL** Gray-Black Fine to Coarse Sandy Silt	773.0	12.0
	771.5	13.5	2	2	1	3		M		Gray-Brown Coarse to Fine Sandy Silt With Trace to Some Mica	768.0	17.0
	766.5	18.5	4	2	2	4		M		Tan Clayey Silty Coarse to Fine Sand with Some Mica		
	761.5	23.5	2	1	2	3	SS-8	M				
	756.5	28.5	2	1	2	3		M				
	751.5	33.5	6	13	67/0.4	100/0.9		M			755.5	29.5
			60/0.1			60/0.1				**WEATHERED ROCK** (Biotite Gneiss)	753.0	32.0
										CRYSTALLINE ROCK (Biotite Gneiss)	751.4	33.6

Boring Terminated with Standard Penetration Test Refusal at Elevation 751.4 ft in Crystalline Rock (Biotite Gneiss)

1) Advanced NW casing to 18.5 feet.
2) Advanced 2-15/16" Tricone to 33.5 feet.
3) Creek water used as drilling fluid.
4) Approximate drilling fluid density 62.4 pcf.
5) Some loss of drilling fluid observed.

NCDOT BORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/25/10

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B2-D	**STATION** 92+40	**OFFSET** 32 ft LT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 784.7 ft	**TOTAL DEPTH** 41.0 ft	**NORTHING** 754,178	**EASTING** 1,444,411 **24 HR.** 5.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic
DRILLER R. Norwood	**START DATE** 02/03/10	**COMP. DATE** 02/04/10	**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
										784.7 GROUND SURFACE 0.0
	783.7	1.0	3	4	4	8		M		**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica and 1/2-inch Diameter Rock Fragments
	781.2	3.5	4	5	6	11		M		779.2 5.5
	778.7	6.0	1	1	1	2		W		**ALLUVIAL** Brown Fine to Coarse Sandy Silt With Trace of Mica 776.7 8.0
	776.2	8.5	WOH	WOH	WOH	0		W		Gray Silty Fine Sandy Clay With Trace of Mica 772.7 12.0
	771.2	13.5	1	1	2	3	SS-9	M		**RESIDUAL** Olive Clayey Silty Coarse to Fine Sand with Trace of Mica
	766.2	18.5	9	23	23	46		M		
	763.3	21.4	60/0.0			60/0.0				763.3 21.4 **CRYSTALLINE ROCK** (Biotite Gneiss)
										743.7 41.0 Boring Terminated at Elevation 743.7 ft in Crystalline Rock (Biotite Gneiss)

1) Advanced NW Casing to 21.2 feet.
2) Advanced 2-15/16" Tricone to 21.4 feet.
3) Advanced NQ Core from 21.4 to 41.0 feet.
4) Creek water used as drilling fluid.
5) Approximate drilling fluid density 62.4 pcf.
6) Some loss of drilling fluid observed.

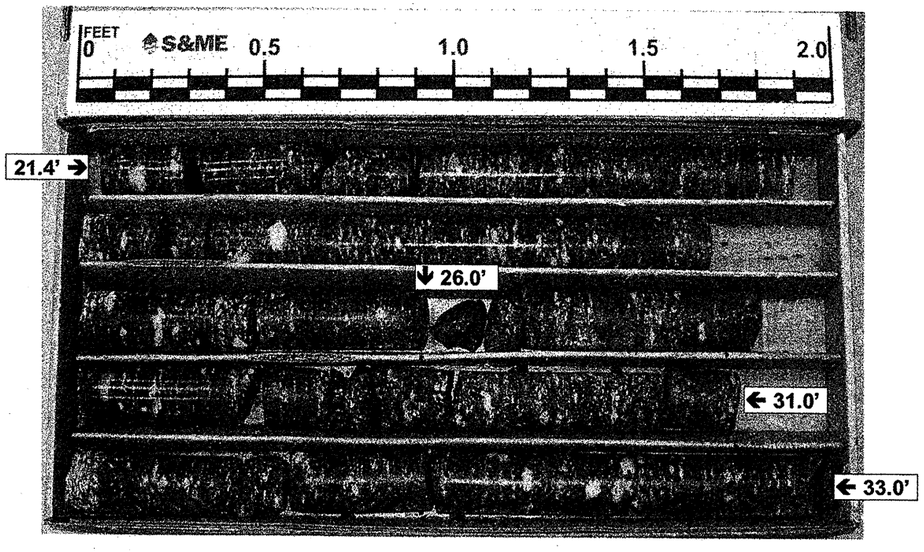
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-D	**STATION** 92+40	**OFFSET** 32 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 784.7 ft	**TOTAL DEPTH** 41.0 ft	**NORTHING** 754,178	**EASTING** 1,444,411	**24 HR.** 5.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 02/03/10	**COMP. DATE** 02/04/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ Core	**TOTAL RUN** 19.6 ft			

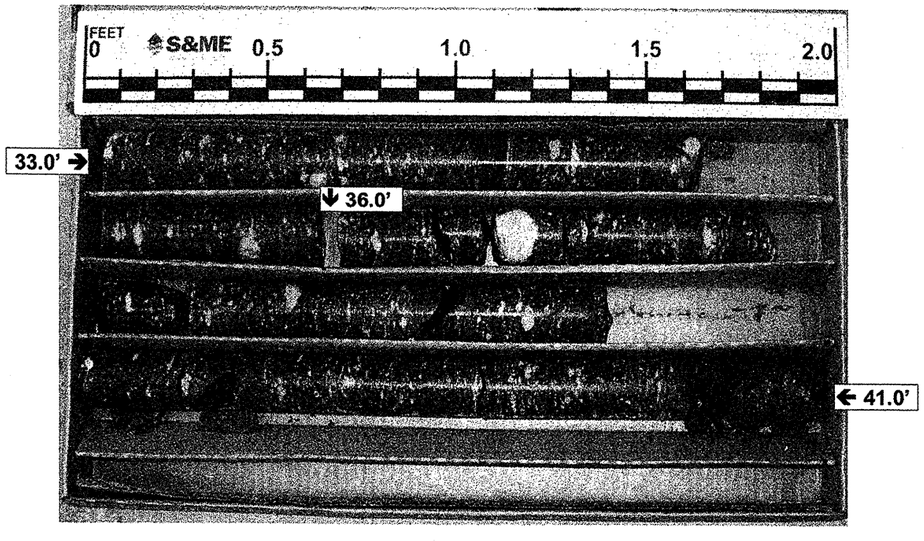
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
763.3											Begin Coring @ 21.4 ft
	763.3	21.4	4.6	3:15/1.0 3:10/1.0 3:05/1.0 3:00/1.0	(4.3) 93%	(4.0) 87%					**CRYSTALLINE ROCK** Black to Dark Gray Fresh to Very Slightly Weathered Very Hard to Hard Close to Moderately Close Fracture Spacing (Biotite Gneiss) *(continued)*
760											
	758.7	26.0	5.0	2:30/1.0 2:00/1.0 0:05/1.0 0:10/1.0 2:00/1.0	(2.5) 50%	(1.6) 32%					
755	753.7	31.0	5.0	1:00/1.0 0:45/1.0 1:45/1.0 1:55/1.0 3:25/1.0	(4.2) 84%	(4.0) 80%					
750	748.7	36.0	5.0	2:21/1.0 2:16/1.0 2:50/1.0 2:18/1.0 1:45/1.0	(4.4) 88%	(3.2) 64%					
745	743.7	41.0									743.7 41.0 Boring Terminated at Elevation 743.7 ft in Crystalline Rock (Biotite Gneiss) 1) Advanced NW Casing to 21.2 feet. 2) Advanced 2-15/16" Tricone to 21.4 feet. 3) Advanced NQ Core from 21.4 to 41.0 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Some loss of drilling fluid observed.
740											
735											
730											
725											
720											
715											
710											
705											
700											
695											
690											
685											

NCDOT CORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 3/19/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B2-D
Site Description: Bridge No. 564 on I-40 over Fourth Creek			*Driller:* R. Norwood
Collar Elev.: 784.7 ft.	*Core Size:* NQ	*Equipment:* CME-550X	*Geologist:* N. Bradley
Elev. at T.D.: 743.7 ft.	*Total Depth:* 41.0 ft.	*Total Run:* 19.6 ft.	*Date:* 02/04/10



Box 1 of 2
Top of Box @ 21.4 feet; Bottom of Box @ 33.0 feet



Box 2 of 2
Top of Box @ 33.0 feet; Bottom of Box @ 41.0 feet

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 92+73	**OFFSET** 67 ft RT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 785.2 ft	**TOTAL DEPTH** 51.4 ft	**NORTHING** 754,086	**EASTING** 1,444,460 **24 HR.** 5.9
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic
DRILLER R. Norwood	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**SURFACE WATER DEPTH** N/A

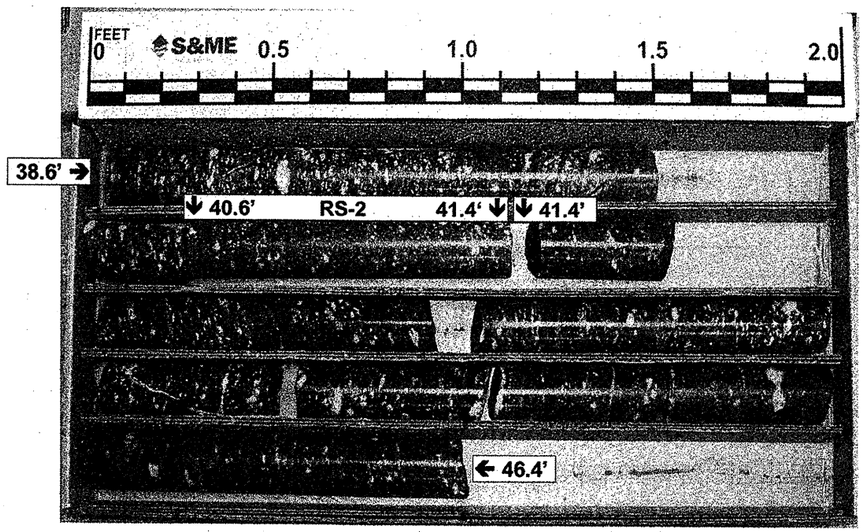
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
790										
785										785.2 GROUND SURFACE 0.0
	784.2	1.0	4	3	4	7 14		M		**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica and 1/2-inch Diameter Rock Fragments
780	781.7	3.5	9	6	8			M		779.7 5.5
	779.2	6.0	2	2	1	3 2		M		**ALLUVIAL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica
775	776.7	8.5	1	1	1			M		772.7 12.5
	771.7	13.5	2	2	2	4		M		**RESIDUAL** Orange-White Fine to Coarse Sandy Silt With Trace of Mica
770	766.7	18.5	1	4	2	6		M		768.2 17.0
765	761.7	23.5	3	5	6	11		M		Tan Clayey Silty Coarse to Fine Sand with Some Mica
760	756.7	28.5	3	4	7	11		M		
755	751.7	33.5	14	69	31/0.2	100/0.7				753.2 32.0
750	746.7	38.5	60/0.1			60/0.1	RS-2			**WEATHERED ROCK** (Biotite Gneiss)
745										746.6 38.6
740										**CRYSTALLINE ROCK** (Biotite Gneiss)
735										733.8 51.4
730										Boring Terminated at Elevation 733.8 ft in Crystalline Rock (Biotite Gneiss)
725										1) Advanced NW Casing to 33.5 feet. 2) Advanced 2-15/16" Tricone to 38.5 feet. 3) Advanced NQ core from 38.6 to 51.4 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Some loss of drilling fluid observed.
720										
715										
710										

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

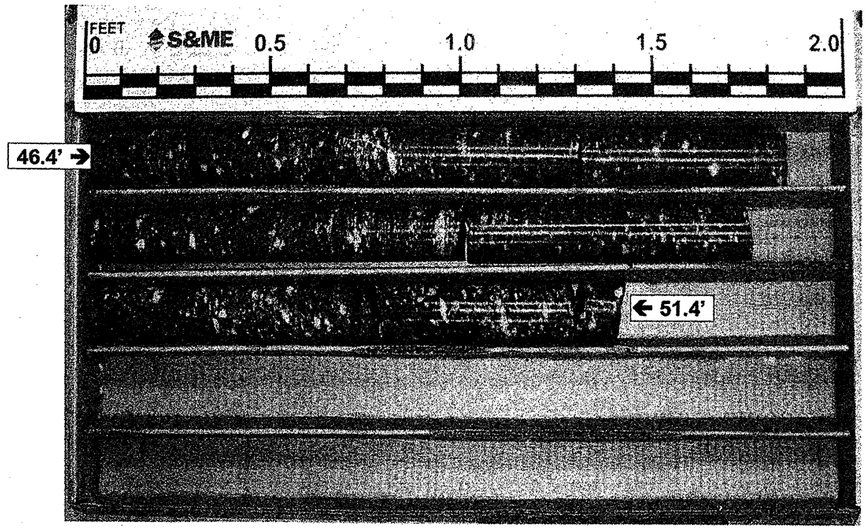
PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 92+73	**OFFSET** 67 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 785.2 ft	**TOTAL DEPTH** 51.4 ft	**NORTHING** 754,086	**EASTING** 1,444,460	**24 HR.** 5.9
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R. Norwood	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ Core	**TOTAL RUN** 12.8 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
746.6											Begin Coring @ 38.6 ft
745	746.6	38.6	2.8	2:30/0.8 5:00/1.0 5:10/1.0	(2.6) 93%	(2.6) 93%		(12.6) 98%	(12.6) 98%		ELEV. (ft) 746.6 — **CRYSTALLINE ROCK** — DEPTH (ft) 38.6 Black to Dark Gray Fresh to Very Slightly Weathered Very Hard to Hard Moderately Close to Wide Fracture Spacing (Biotite Gneiss)
	743.8	41.4					RS-2				
			5.0	3:14/1.0 3:10/1.0 3:05/1.0 3:00/1.0 3:30/1.0	(5.0) 100%	(5.0) 100%					
740	738.8	46.4									Axial = 2229 KSF R1 = 12, R2 = 20, R30 = 25, R4 = 4 = 20, R5 = 4 RMR = 81 Rock Type E
			5.0	3:07/1.0 3:15/1.0 3:30/1.0 4:00/1.0 4:00/1.0	(5.0) 100%	(5.0) 100%					
735	733.8	51.4									ELEV. (ft) 733.8 — DEPTH (ft) 51.4
730											Boring Terminated at Elevation 733.8 ft in Crystalline Rock (Biotite Gneiss) 1) Advanced NW Casing to 33.5 feet. 2) Advanced 2-15/16" Tricone to 38.5 feet. 3) Advanced NQ core from 38.6 to 51.4 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Some loss of drilling fluid observed.
725											
720											
715											
710											
705											
700											
695											
690											
685											
680											
675											
670											

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B2-B
Site Description: Bridge No. 564 on I-40 over Fourth Creek			*Driller*: R. Norwood
Collar Elev.: 785.2 ft.	*Core Size:* NQ	*Equipment:* CME-550X	*Geologist*: N. Bradley
Elev. at T.D.: 733.8 ft.	*Total Depth:* 51.4 ft.	*Total Run:* 12.8 ft.	*Date*: 02/03/10



Box 1 of 2
Top of Box @ 38.6 feet; Bottom of Box @ 46.4 feet



Box 2 of 2
Top of Box @ 46.4 feet; Bottom of Box @ 51.4 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-A*	**STATION** 92+71	**OFFSET** 151 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 789.2 ft	**TOTAL DEPTH** 30.8 ft	**NORTHING** 754,300	**EASTING** 1,444,421	**24 HR.** 13.1
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/11/10	**COMP. DATE** 02/11/10	**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)
790	789.2	0.0								789.2 GROUND SURFACE 0.0
	788.2	1.0								**RESIDUAL**
	786.1	3.1	4	3	3	6 6		M		Red-Brown Silty Coarse to Fine Sandy Clay With Trace of Mica
785	783.6	5.6	3	3	3		SS-10	29% M		
	781.1	8.1	3	3	8	11 8		M		783.6 5.6
										Red-Brown Silty Coarse to Fine Sandy Clay With Trace of Mica
780			9	5	3			M		781.7 7.5
	776.1	13.1								Brown-Black Clayey Coarse to Fine Sandy Silt With Little Mica
775			1	1	2	3	SS-11	48% M		
	771.1	18.1								
770			4	4	7	11		M		
	766.1	23.1								768.2 21.0
765			5	17	26	43	SS-12	Sat.		Dark Gray Silty Fine to Coarse Sand with Trace of Clay and Quartz Rock Fragments
	761.1	28.1								760.6 28.6
760			42	58/0.3		100/0.8				**WEATHERED ROCK**
	758.4	30.8	60/0.0			60/0.0				(Biotite Gneiss) 758.4 30.8
755										Boring Terminated with Standard Penetration Test Refusal at Elevation 758.4 ft on Crystalline Rock (Biotite Gneiss)
750										1) Advanced NW casing to 5.4 feet.
745										2) Advanced 2-15/16" Tricone to 30.8 feet.
740										3) Creek water used as drilling fluid.
735										4) Approximate drilling fluid density 62.4 pcf.
730										5) Some loss of drilling fluid observed.
725										* This boring was labelled as EB1-E performed during subsurface investigation for Bridge No. 565 on I-40 over Fourth Creek.
720										Other Samples: ST-1 (5.0 - 7.0)
715										
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-D	**STATION** 93+05	**OFFSET** 38 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 798.6 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** 754,195	**EASTING** 1,444,474	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16" Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/25/10	**COMP. DATE** 02/25/10	**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)
800	798.6	0.0								798.6 GROUND SURFACE 0.0
	797.6	1.0								**ROADWAY EMBANKMENT**
	795.1	3.5	6	5	4	9		M		Red-Brown Silty Fine to Coarse Sandy Clay
795	792.6	6.0	3	3	3	6		M		793.1 5.5
	790.1	8.5	3	3	4	7		M		Gray-Brown Fine to Coarse Sandy Silt with Trace of Mica
790			2	2	2	4		M		790.6 8.0
	785.1	13.5								Gray-Red-Brown Silty Fine to Coarse Sandy Clay
785			2	2	3	5		M		787.6 11.0
	780.1	18.5								Red-Brown Fine to Coarse Sandy Silt with Trace of Mica
780			2	2	4	6	SS-13	30% M		781.6 17.0
	775.1	23.5								**ALLUVIAL**
775			1	2	3	5		W		Tan Silty Coarse to Fine Sandy Clay
	770.1	28.5								776.6 22.0
770			2	2	2	4		M		**RESIDUAL**
	765.1	33.5								Gray Fine to Coarse Sandy Silt with Trace to Little Mica
765			1	2	2	4		M		
	760.1	38.5								
760			3	4	7	11		M		
	755.1	43.5								756.1 42.5
755			30	70/0.2		100/0.7				**WEATHERED ROCK**
	750.1	48.5	60/0.1			60/0.1				(Biotite Gneiss)
750										750.6 48.0
745										750.0 48.6 **CRYSTALLINE ROCK**
740										(Biotite Gneiss)
735										Boring Terminated with Standard Penetration Test Refusal at Elevation 750.0 ft in Crystalline Rock (Biotite Gneiss)
730										1) Advanced NW casing to 3.5 feet.
725										2) Advanced 2-15/16 Tricone to 48.5 feet.
720										3) Creek water used as drilling fluid.
										4) Approximate drilling fluid density 62.4 pcf.
										5) Loss of drilling fluid observed.

NCDOT BORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/25/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. EB2-B*	**STATION** 93+61	**OFFSET** 113 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 785.7 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 754,055	**EASTING** 1,444,555 / **24 HR.** 5.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**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)
790										
785	784.7	1.0								785.7 0.0 GROUND SURFACE
			4	2	2	4		M		**ALLUVIAL** Red-Brown Fine Sandy Silt With Trace of Mica
	782.2	3.5								782.7 3.0
			2	2	1	3		Sat.		Red-Brown Silty Fine to Coarse Sand
780	779.7	6.0								780.2 5.5
			1	1	2	3		M		Red-Brown Fine to Coarse Sandy Silt With Trace of Mica
	777.2	8.5								777.7 8.0
			2	2	3	5		Sat.		Gray-Brown Clayey Coarse to Fine Sand
775										773.7 12.0
	772.2	13.5								Gray Silty Fine Sandy Clay With Trace of Mica
			WOH	WOH	WOH	0		M		
770	767.2	18.5								768.7 17.0
			2	2	4	6		M		**RESIDUAL** Orange-Brown to Gray-White Fine to Coarse Sandy Silt With Trace of Mica
765	762.2	23.5								
			3	3	6	9		M		
760	757.2	28.5								
			8	6	6	12		M		
755	752.2	33.5								752.7 33.0
			8	8	9	17	SS-14	M		Orange-Brown to Gray-White Silty Clayey Coarse to Fine Sand
750	747.2	38.5								
			7	6	8	14		M		
745	742.2	43.5								
			4	5	11	16		M		
740	737.2	48.5								
			38	34	49	83		M		
735	732.2	53.5								
			10	16	22	38		M		
730	727.2	58.5								
			32	68/0.4		100/0.9				
725	722.2	63.5								
			42	58/0.4		100/0.9				
720	717.2	68.5								
			33	67/0.3		100/0.8				716.4 69.3
715										Boring Terminated at Elevation 716.4 ft in Weathered Rock (Biotite Gneiss)
										1) Advanced NW Casing to 23.5 feet.
710										2) Advanced 2-15/16" Tricone to 68.5 feet.
										3) Creek water used as drilling fluid.
										4) Approximate drilling fluid density 62.4 pcf.
										5) Some loss of drilling fluid observed.
										* This boring was labelled as EB1-B performed during subsurface investigation for Bridge No. 566 on I-40 over Fourth Creek.
										Other Samples: ST-1 (13.0 - 15.0)

WEATHERED ROCK (Biotite Gneiss)

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 564 on I-40 over Fourth Creek			**GROUND WTR (ft)**
BORING NO. EB2-B*	**STATION** 93+61	**OFFSET** 113 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 785.7 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 754,055	**EASTING** 1,444,555 / **24 HR.** 5.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**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
710						Match Line				
705										
700										
695										
690										
685										
680										
675										
670										
665										
660										
655										
650										
645										
640										
635										
630										

NCDOT BORE DOUBLE I-3819A_BRDG0564.GPJ NC_DOT.GDT 03/19/10

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #: 1051-10-004

State Project No.: 34192.1.2 County: Iredell Date Report 3/17/2010

Federal ID No.: IMS-40-2(124)15 TIP No. I-3819A Date Tested 2/1-3/17/10

Project Name: Bridge No. 564 on I-40 over Fourth Creek

Client Name: NCDOT Client Address: Raleigh, North Carolina

Boring No.	Sample No.	Sample Depth (ft)	AASHTO Classification	Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Organic Content %	Moisture Content %
				10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay					
EB1-A	SS-1	18.5 - 20	A-7-5 (25)	99	88	81	65.9	60.6	18	21	17	44	73	36	37	ND	32.9
EB1-A	SS-2	23.5 - 25	A-2-4 (0)	99	87	68	31.2	26.3	31	42	11	16	23	17	6	ND	ND
EB1-E	SS-3	8.6 - 10.1	A-7-6 (21)	99	88	81	66.6	63.4	18	18	14	50	59	27	32	ND	27.2
EB1-B	ST-1	6.0 - 8.0	A-4 (0)	99	88	75	38.4	33.5	24	42	20	14	27	22	5	ND	30.2
B1-A	SS-4	8.5 - 10	A-2-4 (0)	72	55	47	31.5	27.9	35	26	15	24	25	22	3	ND	ND
B1-A	SS-5	33.5 - 35	A-1-b (0)	87	44	28	10.4	8.2	68	23	6	3	25	0	N.P.	ND	ND
B1-D	SS-6	6.0- 7.5	A-2-4 (0)	100	91	65	24.5	21.0	35	44	7	14	25	22	3	ND	ND
B1-D	SS-7	23.5 -25	A-2-4 (0)	98	77	66	31.1	18.7	33	48	15	4	32	27	5	ND	ND
B2-A	SS-8	18.5 - 20	A-2-7 (0)	98	83	72	27.9	17.4	27	55	10	8	48	34	14	ND	ND
B2-D	SS-9	13.5 - 15	A-2-5 (0)	100	87	76	27.4	13.5	24	63	10	3	57	51	6	ND	ND
EB2-A	SS-10	3.1 - 4.6	A-7-6 (9)	100	92	85	54.0	48.5	15	37	14	34	43	20	23	ND	28.7
EB2-A	SS-11	13.1 - 14.6	A-5 (1)	99	81	70	37.6	28.7	29	42	17	12	46	36	10	ND	48.4
EB2-A	SS-12	23.1 - 24.6	A-1-a (0)	39	27	21	10.3	7.4	45	36	14	5	28	0	N.P.	ND	ND
EB2-A	ST-1	5.0 - 7.0	A-6 (7)	100	85	75	53.4	49.0	25	25	13	36	39	19	20	ND	22.4
EB2-D	SS-13	18.5 - 20	A-7-5 (13)	94	85	79	56.0	51.0	16	30	18	36	58	32	26	ND	30.0
EB2-B	SS-14	33.5-35.0	A-2-4 (0)	100	88	73	31.3	20.7	27	52	9	12	36	33	N.P.	ND	ND
EB2-B	ST-1	13.0 - 15.0	A-6 (2)	100	99	95	40.9	32.9	5	62	10	23	35	23	12	ND	39.0
NA	SS-1	0.0 - 1.0	A-3 (0)	100	87	31	4.4	3.7	69	27	2	2	24	0	N.P.	ND	ND

References / Comments / Deviations: **ND=Not Determined.**

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET — *Technician Name:*

Signature

104-01-0703 — *Certification #*

Abner F. Riggs, Jr., P.E. — *Technical Responsibility:*

Senior Engineer — *Position*

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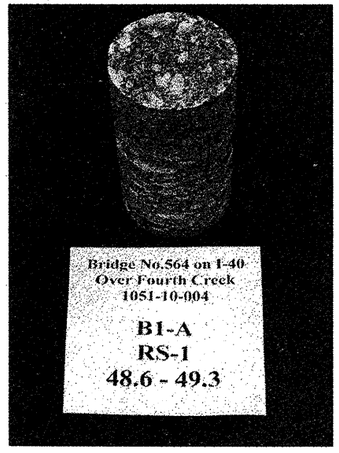
UNCONFINED COMPRESSION
(ASTM D 7012 Method C)

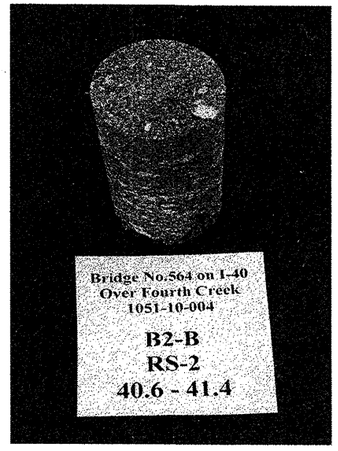
PROJECT: 34192.1.2 **TIP No.** (I-3819A)
Description.: Bridge No. 564 on I-40 over Fourth Creek
COUNTY: Iredell County
F.A. No.: IMS-40-2(124)15
JOB No.: 1051-10-004
Date: 3/10/2010
Tested by: Jeff Webb

Sample No.	Boring Location	Rock Type	Run RQD	Depth (ft)	Specimen Dimension, in.		Area (in^2)	Unit Wt. (lb/ft^3)	Loading Rate (psi/min)	Max. Load (lb)	Strength (psi)	Moisture (%)
					Length	Diameter						
RS-1	B1-A	Biotite Gneiss	100%	48.6 - 49.3	4.22	1.86	2.72	177.6	2,091	41,320	15,191	0.1
RS-2	B2-B	Biotite Gneiss	93%	40.6 - 41.4	4.13	1.87	2.75	172.9	2,668	42,560	15,476	0.0

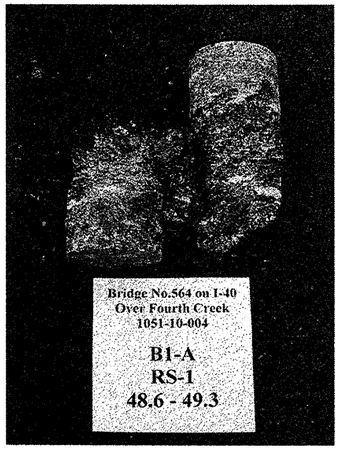
B1-A RS-1 Before Test



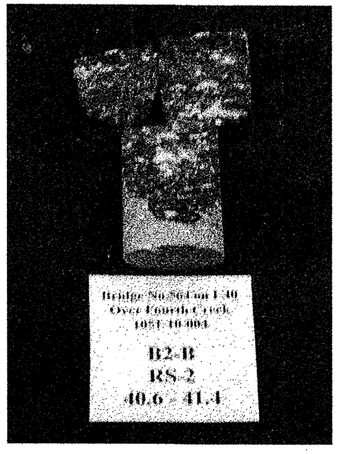
B2-B RS-2 Before Test



B1-A RS-1 After Test



B2-B RS-2 After Test



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34192.1.2 TIP: I-3819A COUNTY: Iredell

DESCRIPTION(1): Bridge No. 564 on -L-(I-40) over Fourth Creek

EXISTING BRIDGE

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

Bridge No.: 144/147 Length: 150 Total Bents: 4 Bents in Channel: 0 Bents in Floodplain: 4
Foundation Type: Piles on end bents and interior bents on pile supported footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None observed

Interior Bents: None observed

Channel Bed: None observed

Channel Bank: None observed

EXISTING SCOUR PROTECTION

Type(3): Unprotected none observed

Extent(4): None

Effectiveness(5): None observed

Obstructions(6): Rip Rap in creek bed downstream and fabric and rip rap around interior bents on both banks

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 structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Red-Brown and Gray -Brown Fine to Coarse SAND with trace of Silt and Clay
A-3(0) and (A-1-b)(0) Small Cobbles observed in creek bed

Channel Bank Material(8): Red-Brown F.to Coarse Sandy SILT (A-4) and Brown F. to Cse. Sandy CLAY(A-6)
/(A-7-5)(13)Red-Brown and Gray Silty Clayey F.to Cse.SAND(A-2-4)(0)/ (A-1-b)(0)

Channel Bank Cover(9): Thick vegetation

Floodplain Width(10): Approx. 400' West and 200' East

Floodplain Cover(11): Wooded with grass covered roadway embankments and commercial development

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

Channel Migration Tendency(13): West

Observations and Other Comments: Severe erosion around 48" CMP on East bank approximately 75' upstream
and at 24"CMP on West bank approx.30' upstream. Trail and sewer on East bank

Reported by: Abner F. Riggs,Jr P.E.. **Date:** 2/23/2010

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

DSE for Interior Bents

Interior Bent 1	784.0'										
Interior Bent 2	783.2'										

Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Engineering Unit Agrees with the Hydraulics Unit's theoretical scour, as show in the Bridge Survey and Hydraulic Design Report (dated 8/14/09).

DSE determined by: **Date:** 3/19/2010

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank	Bank		
Sample No.	S-1	SS-2	SS-5	SS-6	SS-13		
Retained #4	0%	0%	0%	0%	0%		
Passed #10	100%	99%	87%	100%	94%		
Passed #40	87%	87%	44%	91%	85%		
Passed #200	4.40%	31.20%	10.40%	24.50%	56.00%		
Coarse Sand	69%	31%	68%	35%	16%		
Fine Sand	27%	42%	23%	44%	30%		
Silt	2%	11%	6%	7%	18%		
Clay	2%	16%	3%	14%	36%		
LL	24	23	25	25	58		
PI	NP	6	NP	3	26		
AASHTO	A-3(0)	A-2-4(0)	A-1-b(0)	A-1-b(0)	A-7-5(13)		
Station	92+05-L-	90+47-L-	91+01-L-	91+67	93+05		
Offset	CL	110'LT	102'LT	27'LRT	38'LT		
Depth	0.0'-1.0'	23.5'-25.0'	33.5'-35.0'	6.0'-7.5'	18.5'-20.0'		

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

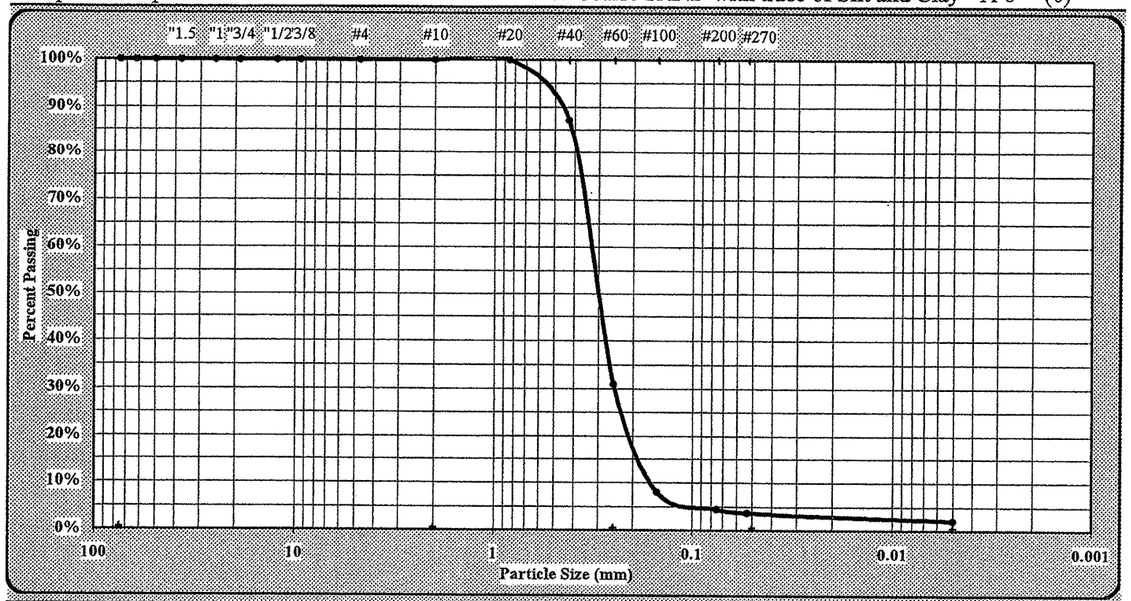
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-004			Report Date:	3/10/10
Project Name:	Bridge No. 564 on I-40 over Fourth Creek			Test Date(s):	3/8 - 3/10/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	NA	Sample #:	S-1	Sample Date:	NA
Location:	STA 92+05 -L-	Offset:	CL	Depth (ft):	0.0 - 1.0 ft.
Sample Description:	Brown Fine to Coarse SAND with trace of Silt and Clay A-3 (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	69%	Silt	2%
Gravel	0%	Fine Sand	27%	Clay	2%
Apparent Relative Density	ND	Moisture Content	1.2%	% Passing #200	4.4%
Liquid Limit	24	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (#10 Sieve)

Coarse Sand	69%	Fine Sand	27%	Silt	2%	Clay	2% = 100%
Description of Sand & Gravel Particles:		Rounded	☐		Angular	☐	
Hard & Durable	☐	Soft	☐		Weathered & Friable	☐	

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET — *Technician Name* — 104-01-0703 — *Certification No.* — Laboratory Manager — *Position* — *Date*

Mal Krajan, ET — *Technical Responsibility* — *Signature* — Laboratory Manager — *Position* — 3/19/10 *Date*

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Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

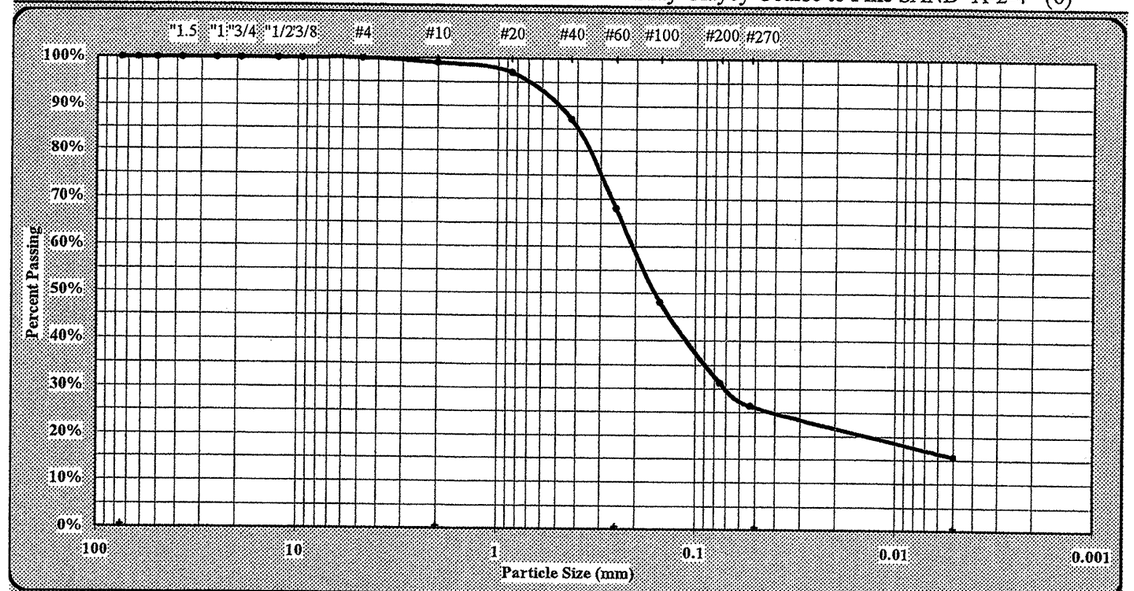
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-004			Report Date:	3/17/10
Project Name:	Bridge No. 564 on I-40 over Fourth Creek			Test Date(s):	3/11 - 3/17/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	EB1-A	Sample #:	SS-2	Sample Date:	3/3/10
Location:	STA 90+47	Offset:	110' LT	Depth (ft):	23.5 - 25.0 ft.
Sample Description:	Dark Brown Silty Clayey Coarse to Fine SAND A-2-4 (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	31%	Silt	11%
Gravel	1%	Fine Sand	42%	Clay	16%
Apparent Relative Density	ND	Moisture Content	22.4%	% Passing #200	31.2%
Liquid Limit	23	Plastic Limit	17	Plastic Index	6

Soil Mortar (#10 Sieve)

Coarse Sand	31%	Fine Sand	42%	Silt	11%	Clay	16%
Description of Sand & Gravel Particles:		Rounded	☐		Angular	☐	
Hard & Durable	☐	Soft	☐		Weathered & Friable	☐	

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET — *Technician Name* — 104-01-0703 — *Certification No.* — Laboratory Manager — *Position* — *Date*

Mal Krajan, ET — *Technical Responsibility* — *Signature* — Laboratory Manager — *Position* — 3/19/10 *Date*

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Particle Size Analysis of Soils

AASHTO T88 as Modified by NCDOT

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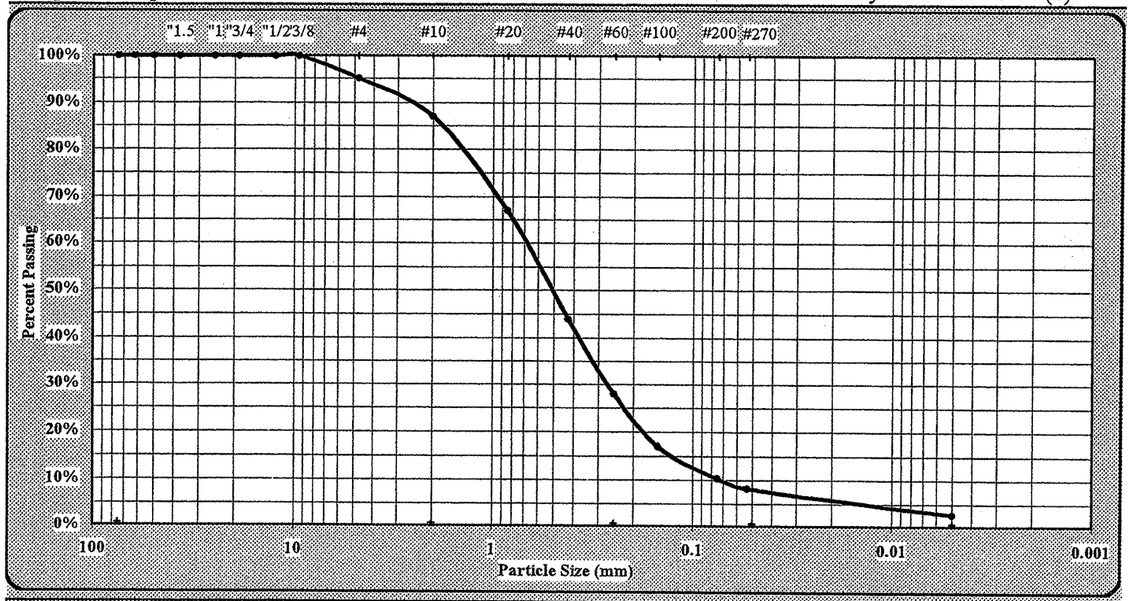
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-004			Report Date:	3/17/10
Project Name:	Bridge No. 564 on I-40 over Fourth Creek			Test Date(s):	3/11 - 3/17/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	B1-A	Sample #:	SS-5	Sample Date:	3/3/10
Location:	STA 91+01	Offset:	102' LT	Depth (ft):	33.5 - 35.0 ft.
Sample Description:	Brown Fine to Coarse SAND with Trace of Clay and Silt A-1-b (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	59%	Silt	6%
Gravel	13%	Fine Sand	20%	Clay	3%
Apparent Relative Density	ND	Moisture Content	32.4%	% Passing #200	10.4%
Liquid Limit	25	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	68%	Fine Sand	23%	Silt	6%	Clay	3% = 100%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET — *Technician Name*
104-01-0703 — *Certification No.*
Laboratory Manager — *Position*
Date

Mal Krajan, ET — *Technical Responsibility*
Signature
Laboratory Manager — *Position*
3/19/10 — *Date*

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Particle Size Analysis of Soils

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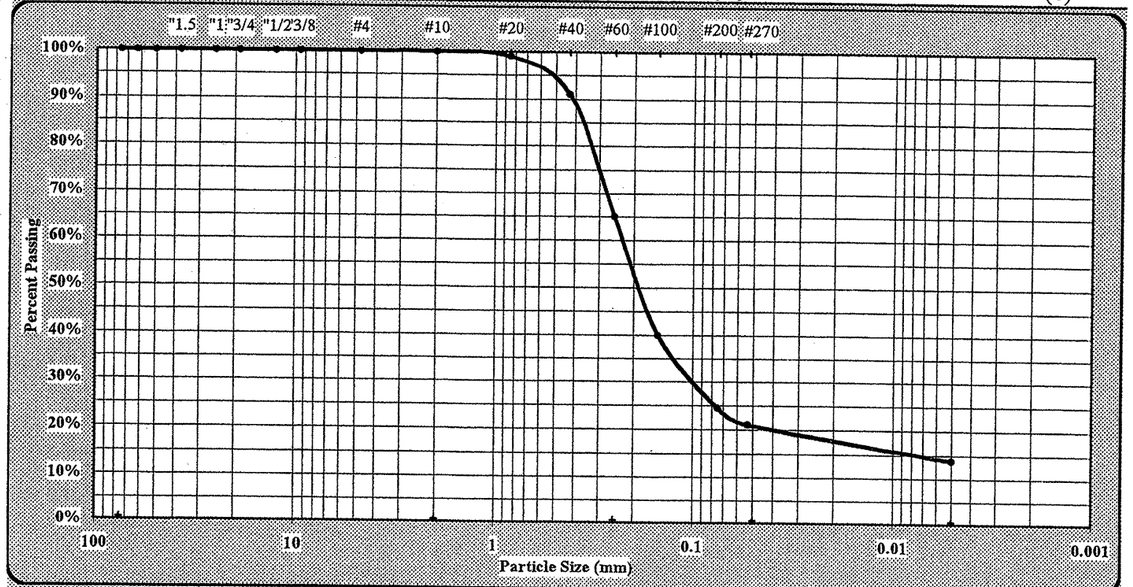
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-004			Report Date:	3/17/10
Project Name:	Bridge No. 564 on I-40 over Fourth Creek			Test Date(s):	3/11 - 3/17/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	B1-D	Sample #:	SS-6	Sample Date:	3/1/10
Location:	STA 91+67	Offset:	27' LT	Depth (ft):	6.0 - 7.5 ft.
Sample Description:	Brown Silty Clayey Coarse to Fine SAND A-2-4 (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	35%	Silt	7%
Gravel	0%	Fine Sand	44%	Clay	14%
Apparent Relative Density	ND	Moisture Content	26.1%	% Passing #200	24.5%
Liquid Limit	25	Plastic Limit	22	Plastic Index	3

Soil Mortar (-#10 Sieve)

Coarse Sand	35%	Fine Sand	44%	Silt	7%	Clay	14%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET — *Technician Name*
104-01-0703 — *Certification No.*
Laboratory Manager — *Position*
Date

Mal Krajan, ET — *Technical Responsibility*
Signature
Laboratory Manager — *Position*
3/19/10 — *Date*

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Particle Size Analysis of Soils

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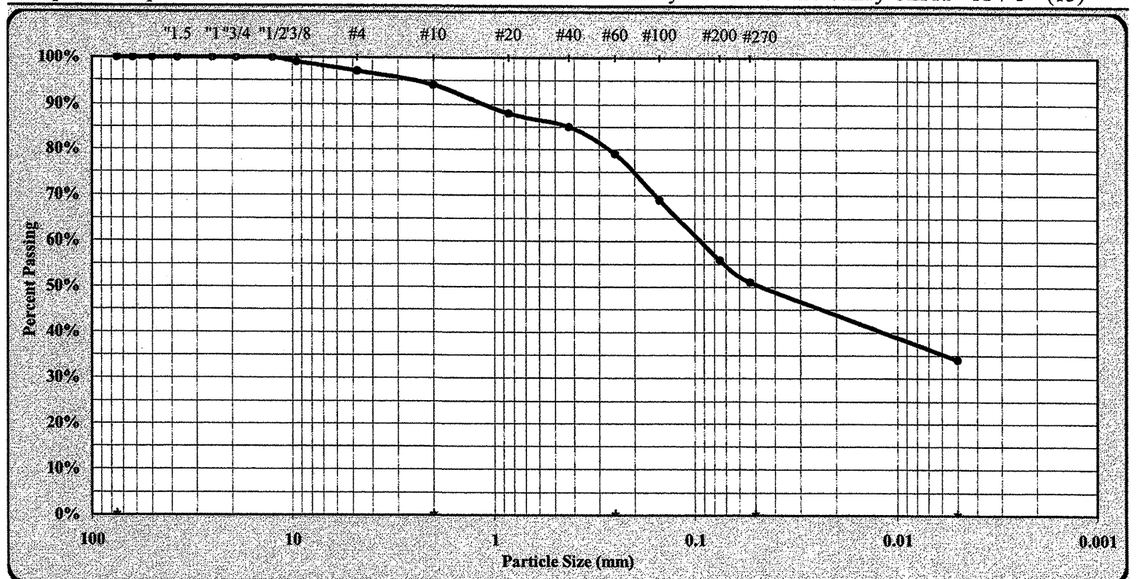
S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-004			Report Date:	3/17/10
Project Name:	Bridge No. 564 on I-40 over Fourth Creek			Test Date(s):	3/11 - 3/17/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	EB2-D	Sample #:	SS-13	Sample Date:	2/25/10
Location:	STA 93+05	Offset:	38' LT	Depth (ft):	18.5 - 20.0 ft.
Sample Description:	Tan Silty Coarse to Fine Sandy CLAY A-7-5 (13)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	1/2"	Coarse Sand	15%	Silt	17%
Gravel	6%	Fine Sand	28%	Clay	34%
Apparent Relative Density	ND	Moisture Content	30.0%	% Passing #200	56.0%
Liquid Limit	58	Plastic Limit	32	Plastic Index	26

Soil Mortar (-#10 Sieve)

Coarse Sand	16%	Fine Sand	30%	Silt	18%	Clay	36%

Description of Sand & Gravel Particles:		Rounded	☐	Angular	☐
Hard & Durable	☐	Soft	☐	Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/25/10
Technical Responsibility	*Signature*	*Position*	*Date*

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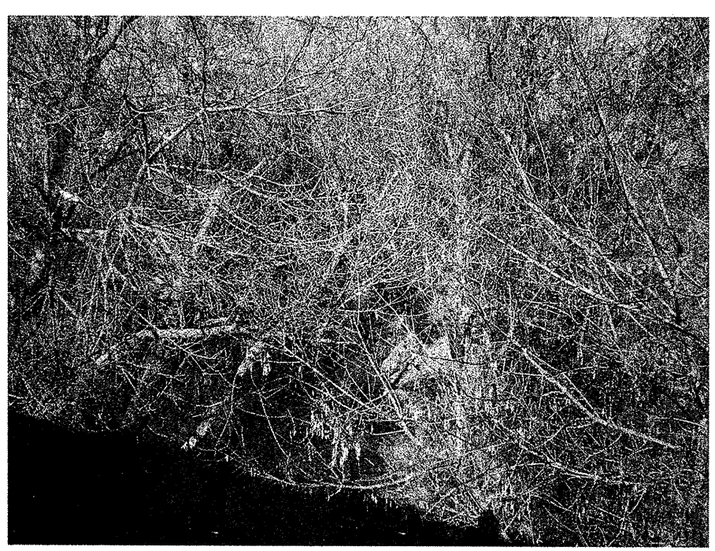
Photograph No. 1:
This photograph was taken from the west approach along the centerline of the -L- alignment, looking east.

Photograph No. 2:
This photograph was taken from the left side of the -L- alignment, looking south, across proposed End Bent No. 1.

Photograph No. 3:
This photograph was taken from the right side of the -L- alignment, looking north, across proposed End Bent No. 1.

Photograph No. 4:
This photograph was taken from the left side of the -L- alignment, looking south, across proposed Interior Bent No. 1.

Photograph No. 5:
This photograph was taken from the right side of the -L- alignment, looking north, across proposed Interior Bent No. 1.



Photograph No. 6:
This photograph was taken from the existing bridge, looking north (upstream).

Photograph No. 7:
This photograph was taken from beneath the existing bridge, looking north (upstream).

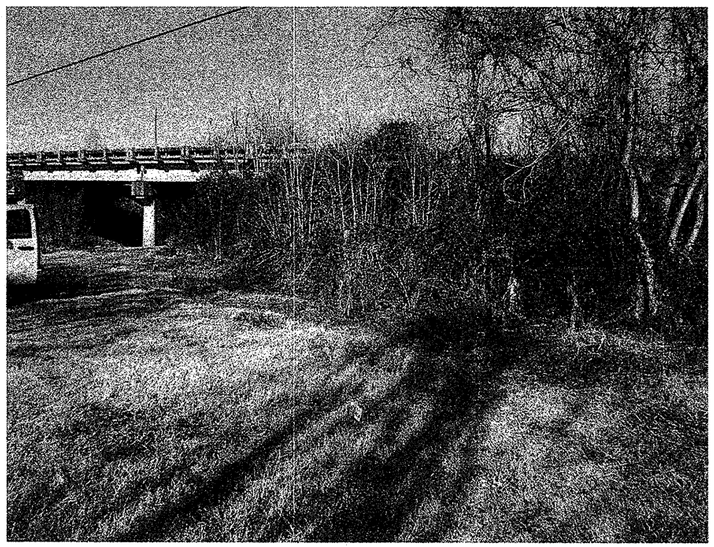
Photograph No. 8:
This photograph was taken from the existing bridge, looking south (downstream).

Photograph No. 9:
This photograph was taken from beneath the existing bridge, looking south (downstream).

Photograph No. 10:
This photograph was taken from the left side of the -L- alignment, looking south, across proposed Interior Bent No. 2.

Photograph No. 11:
This photograph was taken from the right side of the -L- alignment, looking north, across proposed Interior Bent No. 2.

Photograph No. 12:
This photograph was taken from the left side of the -L- alignment, looking south, across proposed End Bent No. 2.



Photograph No. 13:
This photograph was taken from the right side of the -L- alignment, looking north across proposed End Bent No. 2.

Photograph No. 14:
This photograph was taken from the east approach along the centerline of the -L- alignment, looking west.

CONTRACT: 34192.1.2

ID: I-3819A

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2* F.A. PROJ. *IMS -40-2(124)15*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE - I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR2003 (RADIO ROAD) TO SR2158 (OLD MOCKSVILLE ROAD) & I-77 FROM SOUTH OF SR2321 (E. BROAD STREET) TO SOUTH OF SR2171 (JANE SOWER ROAD)*

SITE DESCRIPTION *BRIDGE No. 566 ON -Y4RPD- OVER FOURTH CREEK*

INVENTORY

CONTENTS:

Title Sheet	Sheet 1
NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheet 2
Site Vicinity Map	Sheet 3
Boring Location Plan	Sheet 4
Generalized Subsurface Profile Along -Y4RPD-	Sheet 5
Generalized Subsurface Cross Section Through End Bent No. 1	Sheet 6
Generalized Subsurface Cross Section Through Interior Bent No. 1	Sheet 7
Generalized Subsurface Cross Section Through Interior Bent No. 2	Sheet 8
Generalized Subsurface Cross Section Through End Bent No. 2	Sheet 9
Test Boring Logs Core Reports Core Photographs	Sheets 10 - 17
Summary of Laboratory Test Data	Sheet 18
Summary of Rock Core Test Results	Sheet 19
Field Scour Report (Performed February 23, 2010)	Sheet 20
Grain Size Curves	Sheets 21 - 23
Site Photographs	Sheets 24 - 26

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-3819A	1	26

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34192.1.2	IMS-40-2(124)15	P.E.
		R/W & UTIL.

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

A. RIGGS

N. BRADLEY

R. NORWOOD

S. LOW

P. PHELPS

T. PEREZ

INVESTIGATED BY *S&ME, INC.*

CHECKED BY *A.F. RIGGS, JR.*

SUBMITTED BY *S&ME, INC.*

DATE *MARCH 12, 2010*

NORTH CAROLINA PROFESSIONAL SEAL 14155 ENGINEER ALBERT F RIGGS, JR. 3/30/10

DRAWN BY: *T. PEREZ*

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.
34192.1.2	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 #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		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 SOILS				
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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

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		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — 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-550X
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2-15/16 STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3-¼" H.S.A.

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N 0
- [ ] -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.

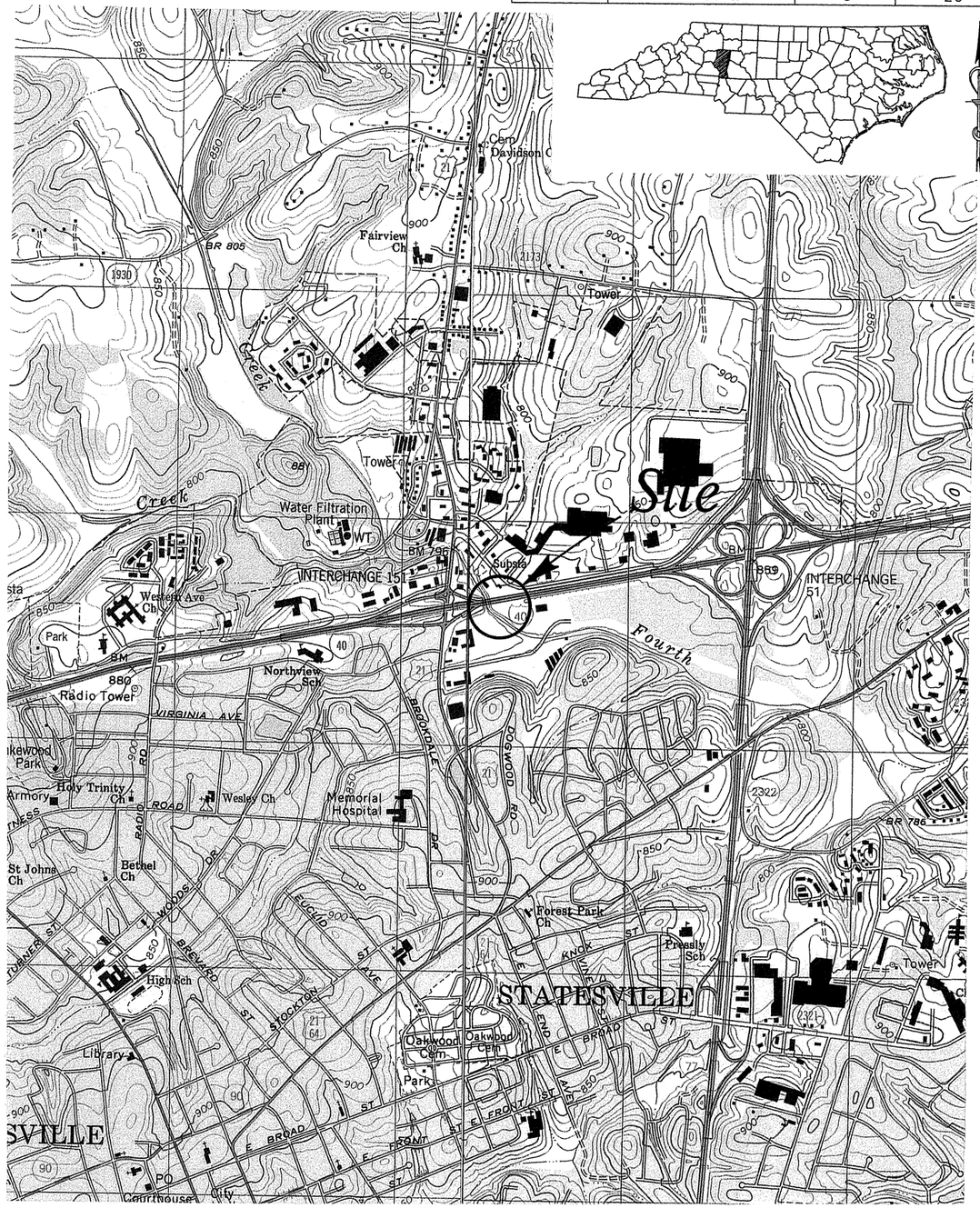
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BY4-131NCDOT Traverse Station Rebar & Cap Stamped "BY4-131" Located at Station 29+19.54 -BY4-
ELEVATION: 790.37 FT.

NOTES:
- SPT LAB SAMPLE
- ST — SHELBY TUBE

REVISED 09/23/09

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
I-3819A	34192.1.2	3	26



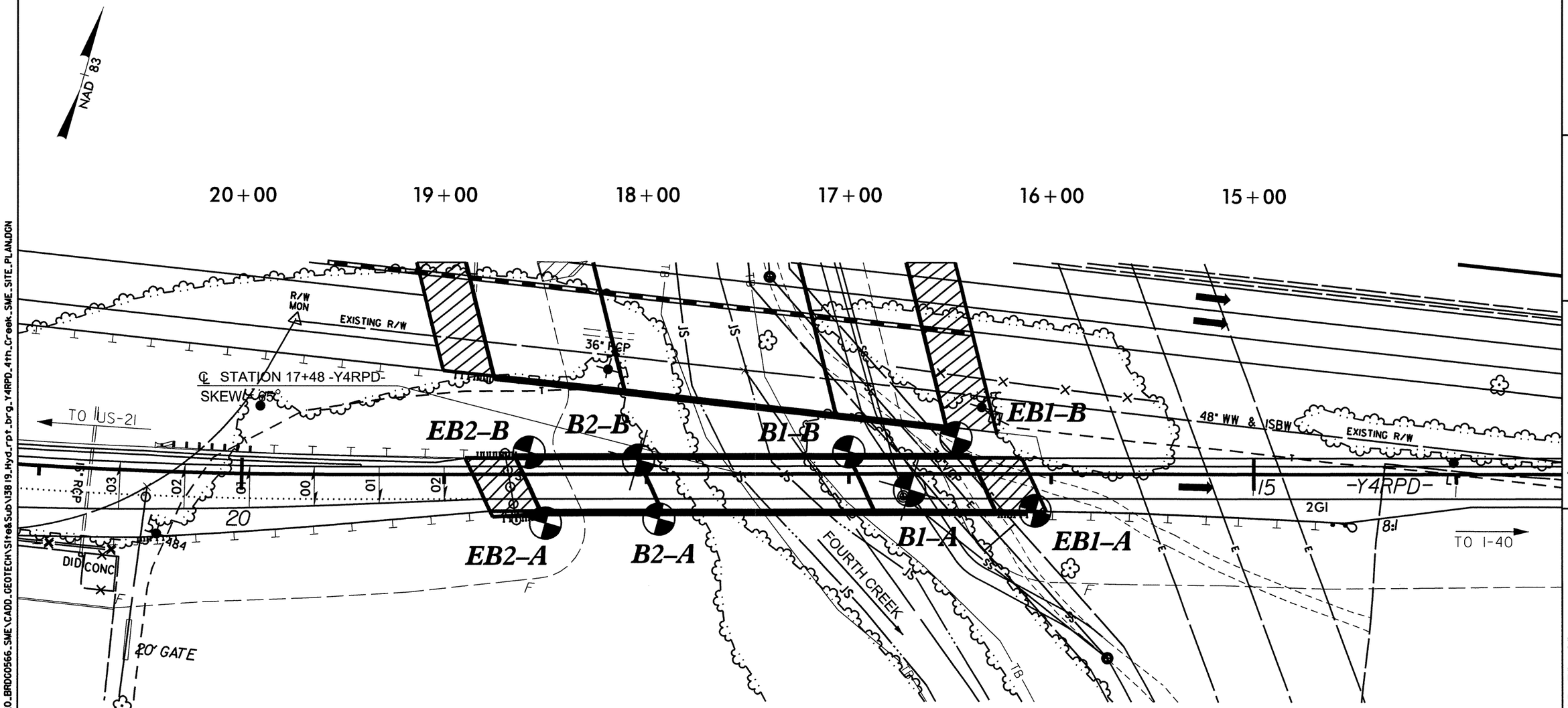
SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	MARCH 2010
JOB NO.	1051-10-006

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

SITE VICINITY MAP

BRIDGE No. 566 ON -Y4RPD-
OVER FOURTH CREEK
STATE PROJECT NO. 34192.1.2 TIP NO. I-3819A
FEDERAL I.D. NO. IMS-40-2(124)15
IREDELL CO., NORTH CAROLINA

S:\PROJECTS\2010\10-006\GEOTECH\CADD\I-3819A\I-3819A_GED_BRDG0566_SME\CADD_GEOTECH\Site&Sub\I3819A-SITEVIC.DGN



BENCHMARK:
BY4-131 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-131"
LOCATED AT STATION 29+19.54 -BY4-
ELEV. 790.37'
SKEW ANGLE FOR BENTS 65^00'00" (TYPICAL)

NOTE: STATIONING ON PLAN RUNS RIGHT TO LEFT AS SHOWN ON HYDRAULIC DESIGN REPORT.

0 50 100
SCALE IN FEET

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

SCALE:	1" = 50'
DATE:	MARCH 2010
JOB NO.	1051-10-006
APPROVED BY:	AFR
DRAWN BY:	TRP
SHEET	4

BORING LOCATION PLAN

BRIDGE No. 566 ON -Y4RPD-
OVER FOURTH CREEK

TIP No. I-3819A STATE PROJECT No. 34192.2.1 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\2010-0006\GEOTECH DOT\CADD\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\13819_Hyd_rpt_brg_Y4RPD_4th_Creek_SME_SITE_PLAN.DGN

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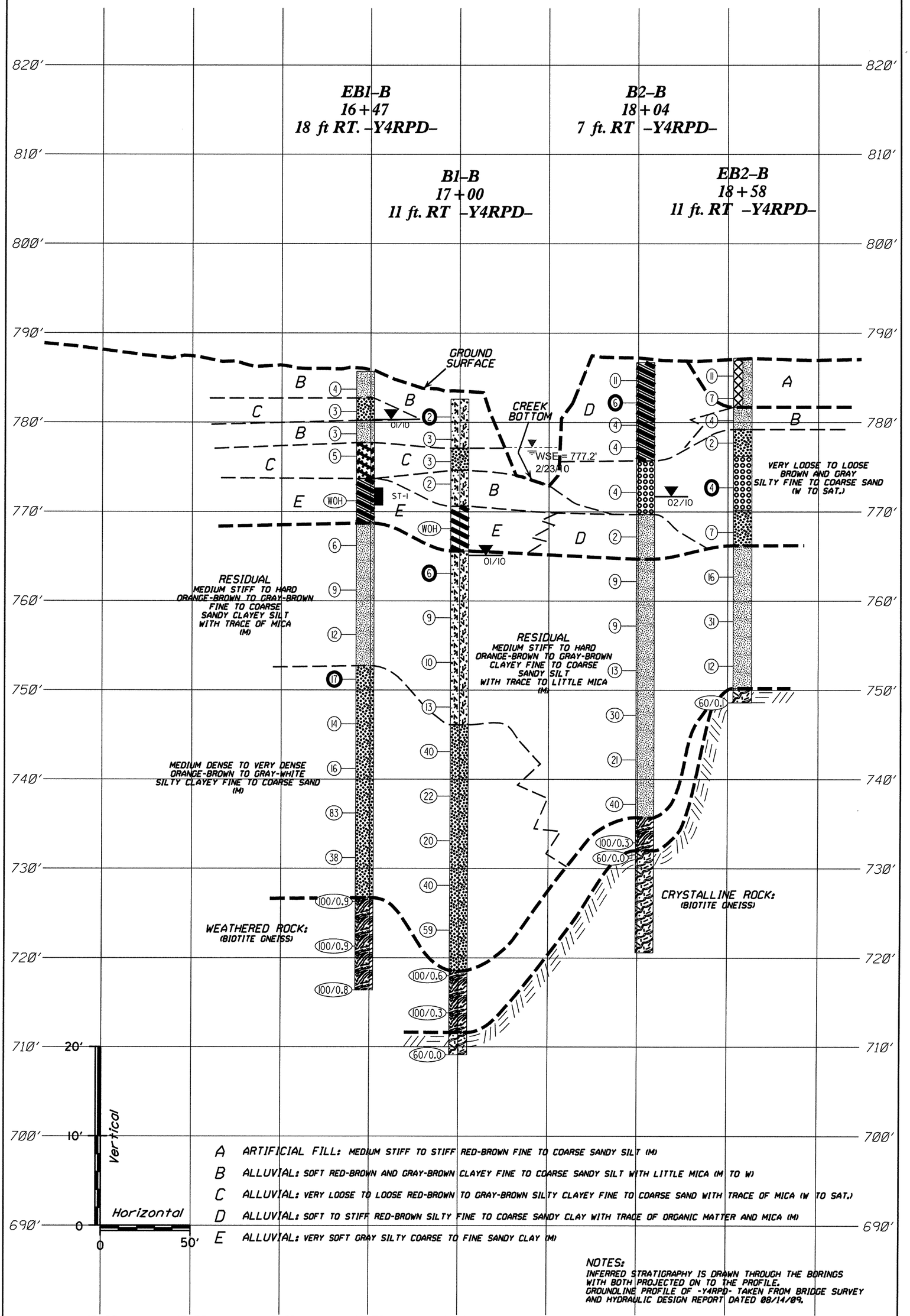
GENERALIZED SUBSURFACE PROFILE ALONG -Y4RPD-

TO I-77 ← → TO US 21



A ARTIFICIAL FILL: MEDIUM STIFF TO STIFF RED-BROWN FINE TO COARSE SANDY SILT (M)

B ALLUVIAL: SOFT RED-BROWN AND GRAY-BROWN CLAYEY FINE TO COARSE SANDY SILT WITH LITTLE MICA (M TO W)

C ALLUVIAL: VERY LOOSE TO LOOSE RED-BROWN TO GRAY-BROWN SILTY CLAYEY FINE TO COARSE SAND WITH TRACE OF MICA (W TO SAT.)

D ALLUVIAL: SOFT TO STIFF RED-BROWN SILTY FINE TO COARSE SANDY CLAY WITH TRACE OF ORGANIC MATTER AND MICA (M)

E ALLUVIAL: VERY SOFT GRAY SILTY COARSE TO FINE SANDY CLAY (M)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE PROFILE.
GROUNDLINE PROFILE OF -Y4RPD- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 08/14/09.

GENERALIZED SUBSURFACE PROFILE ALONG -Y4RPD-

BRIDGE No. 566 ON -Y4RPD-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.2.1 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	MARCH 2010	DRAWN BY:	TRP
JOB NO.	1051-10-006	SHEET	5

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 1

℄
-Y4RPD-

800′
790′
780′
770′
760′
750′
740′
730′
720′

EB1–A
16 + 08
18 ft LT. –Y4RPD–

EB1–B
16 + 47
18 ft RT. –Y4RPD–

GROUND SURFACE

A
B
C

EB1–A: 6, 11, 3, 4, 5, 6, 13, 13, 24, 23, 32, 24, 100/0.5, 60/0.0
EB1–B: 4, 3, 3, 5, WOH, 6, 9, 12, 17, 14, 16, 83, 38, 100/0.9, 100/0.9, 100/0.8

01/10 (EB1–A)
01/10 (EB1–B)
ST-1

LOOSE BROWN-GRAY CLAYEY COARSE TO FINE SAND (SAT.)

VERY SOFT TO MEDIUM STIFF GRAY SILTY COARSE TO FINE SANDY CLAY WITH TRACE OF MICA (M)

RESIDUAL
MEDIUM STIFF TO HARD ORANGE-BROWN TO GRAY-WHITE FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

MEDIUM DENSE TO VERY DENSE ORANGE-BROWN TO GRAY-WHITE SILTY CLAYEY COARSE TO FINE SAND (M)

WEATHERED ROCK: (BIOTITE GNEISS)

CRYSTALLINE ROCK: (BIOTITE GNEISS)

20′ Vertical
10′
0
Horizontal
0 10′

A ARTIFICIAL FILL: MEDIUM STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

B ALLUVIAL: SOFT TO STIFF RED-BROWN FINE TO COARSE SANDY SILT WITH TRACE OF MICA (M)

C ALLUVIAL: VERY LOOSE RED-BROWN CLAYEY TO SILTY FINE TO COARSE SAND (SAT.)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

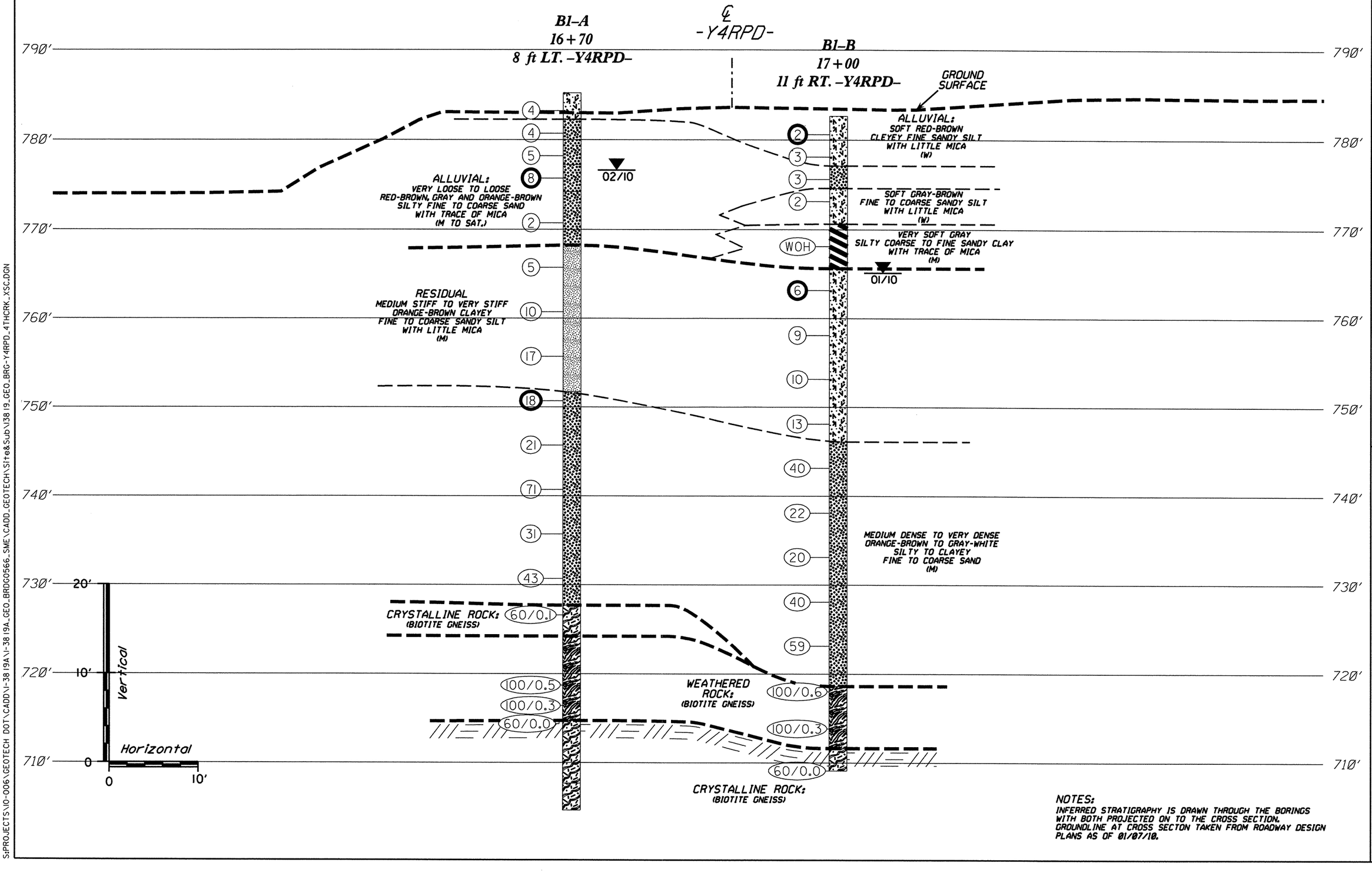
APPROVED BY: AFR
SCALE: (V) 1" = 10' (H) 1" = 10'
DRAWN BY: TRP
DATE: MARCH 2010
FIGURE 6
JOB NO. 10511-10-006

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 1
BRIDGE No. 566 on -Y4RPD-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\10-006\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\I38 19_GEO_BRG-Y4RPD_4THCRK_XSC.DGN

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 1



NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION. GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
DRAWN BY: TRP
FIGURE 7
SCALE: (V) 1" = 10' (H) 1" = 10'
DATE: MARCH 2010
JOB NO. 105I-10-006

S&ME ENVIRONMENTAL SERVICES ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 1
BRIDGE No. 566 on -Y4RPD-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 2

℄
-Y4RPD-

800′
790′
780′
770′
760′
750′
740′
730′
720′

B2–A
17 + 94
22 ft LT. –Y4RPD–

B2–B
18 + 04
7 ft RT. –Y4RPD–

GROUND SURFACE

9
5
4
4

LOOSE RED-BROWN SILTY FINE TO COARSE SAND WITH TRACE OF MICA (SAT.)

02/10

ALLUVUAL:
MEDIUM STIFF TO STIFF RED-BROWN SILTY FINE TO COARSE SANDY CLAY WITH TRACE OF ORGANIC MATTER AND MICA (M)

11
6
4
4

5
7
8
11

LOOSE GRAY TO BROWN FINE TO COARSE SAND WITH TRACE OF SILT (SAT.)

4
2
9
9

02/10

SOFT GRAY FINE SANDY CLAYEY SILT WITH TRACE OF MICA AND ORGANIC MATTER (M)

18
33
55

RESIDUAL
STIFF TO HARD ORANGE-BROWN TO GRAY-BROWN FINE TO COARSE SANDY SILT (M)

13
30
21

100/0.8
60/0.0

WEATHERED ROCK:
(BIOTITE GNEISS)

40
100/0.3
60/0.0

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

20′
10′
0
Vertical
Horizontal
0
10′

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION. GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
DRAWN BY: TRP
FIGURE 8

SCALE: (V) 1" = 10'
(H) 1" = 10'
DATE: MARCH 2010
JOB NO. 105 I-10-006

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 2
BRIDGE No. 566 on -Y4RPD-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

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GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 2

℄
-Y4RPD-

800′
790′
780′
770′
760′
750′
740′
730′
720′

EB2–A
18+50
24 ft LT. –Y4RPD–

EB2–B
18+58
11 ft RT. –Y4RPD–

GROUND SURFACE

ARTIFICIAL FILL:
MEDIUM STIFF TO STIFF
RED-BROWN FINE TO COARSE SANDY SILT
WITH TRACE OF MICA
(M)

ALLUVIUL:
SOFT TO MEDIUM STIFF
RED-BROWN AND GRAY
CLAYEY FINE TO COARSE SANDY SILT
WITH TRACE OF ORGANIC MATTER
AND LITTLE MICA
(M TO W)

02/10

VERY LOOSE TO LOOSE
BROWN TO GREEN-GRAY
SILTY FINE TO COARSE SAND
(SAT.)

RESIDUAL
SOFT TO HARD
ORANGE-BROWN TO GRAY-BROWN
FINE TO COARSE SANDY SILT
WITH TRACE OF MICA
(W TO M)

60/0.1

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

WEATHERED ROCK: (BIOTITE GNEISS) 100/0.1

60/0.0

20′
10′
0
Vertical
Horizontal
0
10′

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

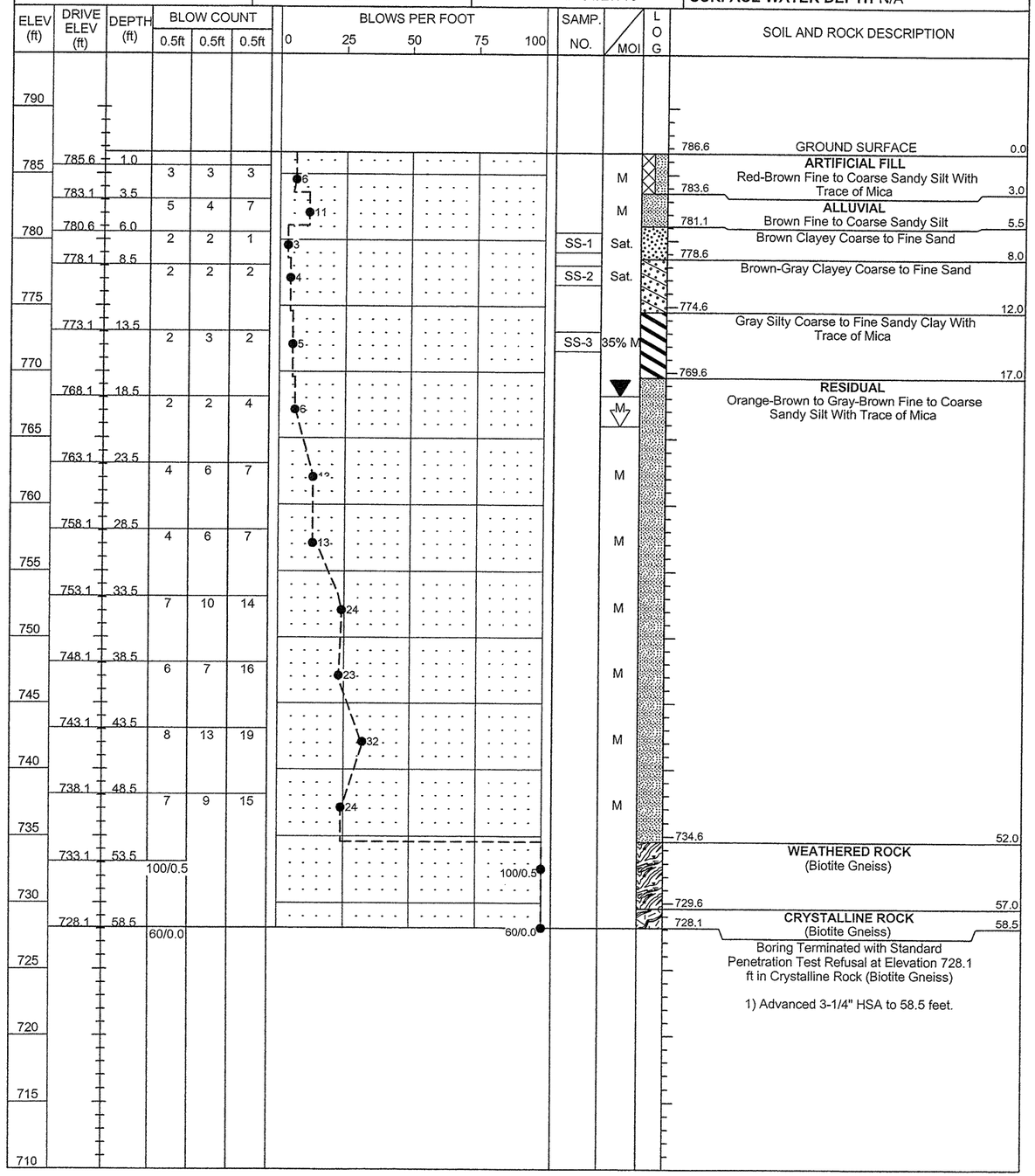
APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	9
SCALE:	(V) 1" = 10' (H) 1" = 10'
DATE:	MARCH 2010
JOB NO.	1051-10-006

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 2
BRIDGE No. 566 on -Y4RPD-
OVER FOURTH CREEK
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)15
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\10-006\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0566_SME\CADD_GEOTECH\Site&Sub\I38 19_GEO_BRG-Y4RPD_4THCRK_XSC.DGN

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 16+08	**OFFSET** 18 ft LT	**ALIGNMENT** -Y4RPD- **0 HR.** 20.7
COLLAR ELEV. 786.6 ft	**TOTAL DEPTH** 58.5 ft	**NORTHING** 754,031	**EASTING** 1,444,603 **24 HR.** 18.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic
DRILLER R.Norwood	**START DATE** 01/27/10	**COMP. DATE** 01/27/10	**SURFACE WATER DEPTH** N/A



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+47	**OFFSET** 18 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 785.7 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 754,055	**EASTING** 1,444,555	**24 HR.** 5.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**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
790										785.7 GROUND SURFACE 0.0
785	784.7	1.0								**ALLUVIAL**
	782.2	3.5	4	2	2	4		M		Red-Brown Fine Sandy Silt With Trace of Mica
780	779.7	6.0	2	2	1	3		Sat.		782.7 3.0 Red-Brown Silty Fine to Coarse Sand 780.2 5.5
	777.2	8.5	1	1	2	3		M		Red-Brown Fine to Coarse Sandy Silt With Trace of Mica
775			2	2	3	5		Sat.		777.7 8.0 Gray-Brown Clayey Coarse to Fine Sand
	772.2	13.5								773.7 12.0
770			WOH	WOH	WOH	0		M		Gray Silty Fine Sandy Clay With Trace of Mica
	767.2	18.5								768.7 17.0 **RESIDUAL**
765			2	2	4	6		M		Orange-Brown to Gray-White Fine to Coarse Sandy Silt With Trace of Mica
	762.2	23.5								
760			3	3	6	9		M		
	757.2	28.5								
755			8	6	6	12		M		
	752.2	33.5								752.7 33.0
750			8	8	9	17	SS-4	M		Orange-Brown to Gray-White Silty Clayey Coarse to Fine Sand
	747.2	38.5								
745			7	6	8	14		M		
	742.2	43.5								
740			4	5	11	16		M		
	737.2	48.5								
735			38	34	49	83		M		
	732.2	53.5								
730			10	16	22	38		M		
	727.2	58.5								726.7 59.0 **WEATHERED ROCK**
725			32	68/0.4		100/0.9				(Biotite Gneiss)
	722.2	63.5								
720			42	58/0.4		100/0.9				
	717.2	68.5								716.4 69.3
715			33	67/0.3		100/0.8				Boring Terminated at Elevation 716.4 ft in Weathered Rock (Biotite Gneiss)
710										1) Advanced NW Casing to 23.5 feet. 2) Advanced 2-15/16" Tricone to 68.5 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.

Other Samples:
ST-1 (13.0 - 15.0)

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+47	**OFFSET** 18 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 785.7 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 754,055	**EASTING** 1,444,555	**24 HR.** 5.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**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
710						Match Line				
705										
700										
695										
690										
685										
680										
675										
670										
665										
660										
655										
650										
645										
640										
635										
630										

NCDOT BORE DOUBLE 006 I-3819A_566.GPJ NC_DOT.GDT 03/23/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+70	**OFFSET** 8 ft LT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 785.2 ft	**TOTAL DEPTH** 80.5 ft	**NORTHING** 754,024	**EASTING** 1,444,540	**24 HR.** 8.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**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)
790										
785	784.2	1.0								785.2 GROUND SURFACE 0.0
			1	2	2	4		M		**ALLUVIAL** Red-Brown Fine Sandy Clayey Silt With Trace of Mica
	781.7	3.5								782.2 3.0
780			3	2	2	4		M		Red-Brown Silty Fine to Coarse Sand
	779.2	6.0								
			2	2	3	5		M		
	776.7	8.5								777.2 8.0
775			4	4	4	8	SS-5	Sat.		Gray Fine to Coarse Sand With Trace of Silt and Clay
	771.7	13.5								774.2 11.0
770			2	1	1	2		Sat.		Orange-Brown Silty Fine to Coarse Sand
	766.7	18.5								768.2 17.0
765			2	2	3	5		M		**RESIDUAL** Orange-Brown Fine to Coarse Sandy Silt
	761.7	23.5								
760			3	4	6	10		M		
	756.7	28.5								
755			5	6	11	17		M		
	751.7	33.5								751.7 33.5
750			8	9	9	18	SS-6	M		Orange-Brown Clayey Silty Fine to Coarse Sand
	746.7	38.5								
745			9	9	12	21		M		
	741.7	43.5								
740			14	23	48	71		M		
	736.7	48.5								
735			6	13	18	31		M		
	731.7	53.5								
730			25	24	19	43		M		
	726.7	58.5								727.7 57.5
725			60/0.1			60/0.1				**CRYSTALLINE ROCK** (Biotite Gneiss)
720										724.2 61.0
	719.2	66.0	100/0.5			100/0.5				**WEATHERED ROCK** (Biotite Gneiss)
	716.7	68.5	100/0.3			100/0.3				
715	714.7	70.5								714.7 70.5
			60/0.0			60/0.0				**CRYSTALLINE ROCK** (Biotite Gneiss)
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+70	**OFFSET** 8 ft LT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 785.2 ft	**TOTAL DEPTH** 80.5 ft	**NORTHING** 754,024	**EASTING** 1,444,540	**24 HR.** 8.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**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
710						Match Line				
705							RS-1			707.7 **CRYSTALLINE ROCK** (Biotite Gneiss) *(continued)* 77.5
700										704.7 **CRYSTALLINE ROCK** (Biotite Gneiss) with Quartz Vein 80.5
695										Boring Terminated with Standard Penetration Test Refusal at Elevation 704.7 ft in Crystalline Rock (Biotite Gneiss)
690										1) Advanced NW Casing to 43.5 feet. 2) Advanced 2-15/16" Tricone to 58.6 feet. 3) Advanced NQ Core from 58.6 to 66.0 feet. 4) Advanced 2-15/16" Tricon from 66.0 to 70.5 feet. 5) Advanced NQ2 Core from 70.5 to 80.5 feet. 6) Creek water used as drilling fluid. 7) Approximate drilling fluid density 62.4 pcf. 8) Some loss of drilling fluid observed.
685										
680										
675										
670										
665										
660										
655										
650										
645										
640										
635										
630										

NCDOT BORE DOUBLE 006 I-3819A_566.GPJ NC_DOT.GDT 03/23/10

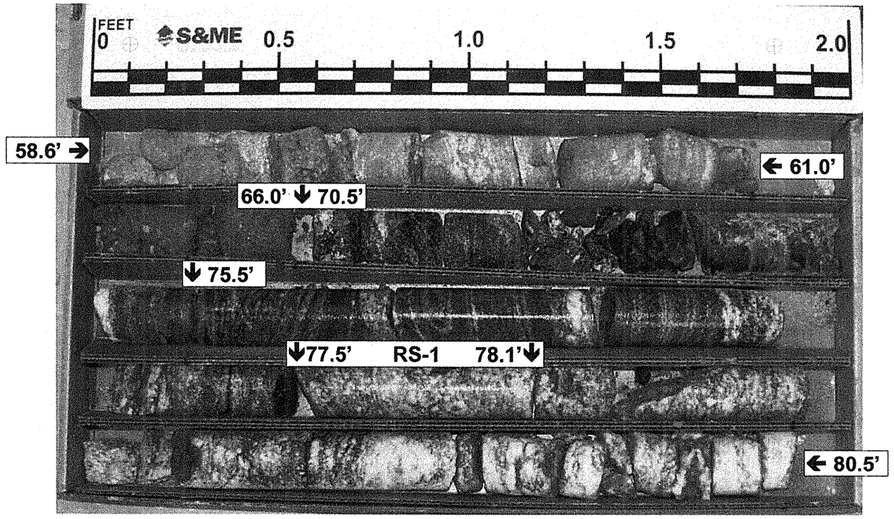
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+70	**OFFSET** 8 ft LT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 785.2 ft	**TOTAL DEPTH** 80.5 ft	**NORTHING** 754,024	**EASTING** 1,444,540	**24 HR.** 8.6
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 17.4 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
726.6											Begin Coring @ 58.6 ft
725	726.6	58.6	2.4	0:30/0.4 2:10/1.0 2:00/1.0	(1.6) 67%	(0.0) 0%		(1.6) 67%	(0.0) 0%		**CRYSTALLINE ROCK** *(continued)* Brown Moderate to Moderately Severely Weathered Moderately Hard to Medium Hard With Close to Very Close Fracture Spacing (Biotite Gneiss)
	724.2	61.0									724.2 — 61.0
			5.0	0:30/1.0 1:00/1.0 0:55/1.0 0:45/1.0 1:00/1.0	(0.5) 10%	N/A		(0.5) 5%	N/A		**WEATHERED ROCK** (Biotite Gneiss)
720	719.2	66.0									
				N=100/0.5 *N=100/0.3*							
715	714.7	70.5									714.7 — 70.5
			5.0	*W=60/0.0* 0:30/1.0 0:45/1.0 0:45/1.0 1:00/1.0 1:30/1.0	(1.5) 30%	(0.0) 0%		(3.5) 50%	(1.5) 21%		**CRYSTALLINE ROCK** Black to Dark Gray Slight to Very Slightly Weathered Hard to Very Hard With Close to Very Close Fracture Spacing (Biotite Gneiss)
710	709.7	75.5									
			5.0	2:00/1.0 3:10/1.0 2:40/1.0 3:10/1.0 2:00/1.0	(5.0) 100%	(3.1) 62%					707.7 — 77.5
705	704.7	80.5					RS-1	(3.0) 100%	(1.6) 53%		**CRYSTALLINE ROCK** Gray and White Slight to Moderately Weathered Very Hard to Hard With Close to Very Close Fracture Spacing (Biotite Gneiss) with Quartz Vein
											704.7 — 80.5
700											Axial = 2615 KSF R1 = 12, R2 = 13, R3 = 10, R4 = 12, R5 = 5 RMR = 51 Rock Type E
											Boring Terminated with Standard Penetration Test Refusal at Elevation 704.7 ft in Crystalline Rock (Biotite Gneiss)
695											1) Advanced NW Casing to 43.5 feet. 2) Advanced 2-15/16" Tricone to 58.6 feet. 3) Advanced NQ Core from 58.6 to 66.0 feet. 4) Advanced 2-15/16" Tricon from 66.0 to 70.5 feet. 5) Advanced NQ2 Core from 70.5 to 80.5 feet. 6) Creek water used as drilling fluid. 7) Approximate drilling fluid density 62.4 pcf. 8) Some loss of drilling fluid observed.
690											
685											
680											
675											
670											
665											
660											
655											
650											

NCDOT CORE DOUBLE 006 I-3819A NO.5.GPJ NC_DOT.GDT 03/12/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B1-A
Site Description: Bridge No. 566 on -Y4RPD- over Fourth Creek			*Driller*: R. Norwood
Collar Elev.: 785.2 ft.	*Core Size:* NQ	*Equipment:* CME-550x	*Geologist*: N. Bradley
Elev. at T.D.: 704.7 ft.	*Total Depth:* 80.5 ft.	*Total Run:* 17.4 ft.	*Date*: 2/10/10



Box 1 of 1
Top of Box @ 58.6 feet; Bottom of Box @ 80.5 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+00	**OFFSET** 11 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 782.6 ft	**TOTAL DEPTH** 73.5 ft	**NORTHING** 754,034	**EASTING** 1,444,506	**24 HR.** 17.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 01/27/10	**COMP. DATE** 01/27/10	**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)
										782.6	0.0
										GROUND SURFACE	
	781.6	1.0	1	1	1	2	SS-7	38% M		**ALLUVIAL** Red-Brown Clayey Fine Sandy Silt With Little Mica	
	779.1	3.5	1	2	1	3		M		777.1	5.5
	776.6	6.0	3	1	2	3		Sat.		Red-Brown Silty Fine to Coarse Sand With Trace of Mica	
	774.1	8.5	WOH	1	1	2		W		774.6	8.0
	769.1	13.5	WOH	WOH	WOH	0		M		Gray-Brown Fine to Coarse Sandy Silt With Little Mica	
	764.1	18.5	3	2	4	6	SS-8	54% M		770.6	12.0
	759.1	23.5	2	4	5	9		M		Gray Coarse to Fine Sandy Silty Clay With Trace of Mica	
	754.1	28.5	5	5	5	10		M		765.6	17.0
	749.1	33.5	4	5	8	13		M		**RESIDUAL** Orange-Brown Clayey Coarse to Fine Sandy Silt With Little Mica	
	744.1	38.5	13	14	26	40		M		746.1	36.5
	739.1	43.5	5	8	14	22		M		Orange-Brown to Gray-White Silty Clayey Fine to Coarse Sand	
	734.1	48.5	6	8	12	20		M		718.6	64.0
	729.1	53.5	12	17	23	40		M		**WEATHERED ROCK** (Biotite Gneiss)	
	724.1	58.5	23	31	28	59		M		711.6	71.0
	719.1	63.5	39	50	50/0.1	100/0.6				**CRYSTALLINE ROCK** (Biotite Gneiss)	
	714.1	68.5	100/0.3			100/0.3				709.1	73.5
	709.1	73.5	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 709.1 ft in Crystalline Rock (Biotite Gneiss)	

1) Advanced NW Casing to 23.5 feet.
2) Advanced 2-15/16" Tricone to 73.5 feet.
3) Creek water used as drilling fluid.
4) Approximate drilling fluid density 62.4 pcf.
5) Some loss of drilling fluid observed.

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+00	**OFFSET** 11 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 782.6 ft	**TOTAL DEPTH** 73.5 ft	**NORTHING** 754,034	**EASTING** 1,444,506	**24 HR.** 17.5
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 01/27/10	**COMP. DATE** 01/27/10	**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
705						Match Line				

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 17+94	**OFFSET** 22 ft LT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 786.7 ft	**TOTAL DEPTH** 52.1 ft	**NORTHING** 753,976	**EASTING** 1,444,425	**24 HR.** 4.4
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/16/10	**COMP. DATE** 02/16/10	**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)
790										786.7 GROUND SURFACE 0.0
785	785.7	1.0						M		**ALLUVIAL** Red-Brown Silty Fine to Coarse Sandy Clay With Trace of Mica
	783.2	3.5	6	5	4	9		M		781.2 5.5
780	780.7	6.0	5	3	2	5		Sat.		Red-Brown Silty Fine to Coarse Sand With Trace of Mica
	778.2	8.5	2	2	2	4		Sat.		775.7 11.0
775			1	2	2	4				Gray to Brown-Gray Fine to Coarse Sand With Trace of Silt
	773.2	13.5								
770			2	2	3	5		Sat.		
	768.2	18.5								
765			4	3	4	7		Sat.		763.7 23.0
	763.2	23.5								**RESIDUAL** Gray-Brown to Orange-Brown Fine to Coarse Sandy Silt
760			4	2	6	8		M		
	758.2	28.5								
755			4	5	6	11		M		
	753.2	33.5								
750			6	9	9	18		M		
	748.2	38.5								
745			8	13	20	33		M		
	743.2	43.5								
740			20	17	38	55		M		
	738.2	48.5								737.7 49.0
735	734.6	52.1	27	73/0.3		100/0.8				**WEATHERED ROCK** (Biotite Gneiss)
			60/0.0			60/0.0				734.6 52.1
730										Boring Terminated with Standard Penetration Test Refusal at Elevation 734.6 ft on Crystalline Rock (Biotite Gneiss)
725										1) Advanced NW casing to 23.5 feet. 2) Advanced 2-15/16 Tricone to 52.1 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.
720										
715										
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 18+04	**OFFSET** 7 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 786.7 ft	**TOTAL DEPTH** 66.1 ft	**NORTHING** 754,001	**EASTING** 1,444,407	**24 HR.** 15.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/16/10	**COMP. DATE** 02/17/10	**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)
790										786.7 GROUND SURFACE 0.0
785	785.7	1.0						M		**ALLUVIAL** Red-Brown Silty Fine to Coarse Sandy Clay With Trace of Organic Matter and Mica
	783.2	3.5	5	6	5	11		31% M		
780	780.7	6.0	8	3	3	6	SS-9	M		
	778.2	8.5	2	1	3	4		M		775.7 11.0
775			1	1	3	4				Gray Fine to Coarse Sand With Trace of Silt
	773.2	13.5								
770			1	2	2	4		Sat.		
	768.2	18.5								769.7 17.0
765			1	1	1	2		M		Gray Fine Sandy Clayey Silt With Trace of Mica and Organic Matter
	763.2	23.5								764.7 22.0
760			2	4	5	9		M		**RESIDUAL** Orange-Brown Fine to Coarse Sandy Silt
	758.2	28.5								
755			2	4	5	9		M		
	753.2	33.5								
750			5	4	9	13		M		
	748.2	38.5								
745			8	12	18	30		M		
	743.2	43.5								
740			5	7	14	21		M		
	738.2	48.5								
735			5	15	25	40		M		735.7 51.0
	733.2	53.5								**WEATHERED ROCK** (Biotite Gneiss)
	732.0	54.7	100/0.3			100/0.3				732.0 54.7
730			60/0.0			60/0.0	RS-2			**CRYSTALLINE ROCK** (Biotite Gneiss)
725										
720										720.6 66.1
715										Boring Terminated at Elevation 720.6 ft in Crystalline Rock (Biotite Gneiss)
710										1) Advanced NW casing to 23.5 feet. 2) Advanced 2-15/16 Tricone to 54.7 feet. 3) Advanced NQ Core from 54.7 to 66.1 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.

NCDOT BORE DOUBLE 006 I-3819A_566.GPJ NC_DOT.GDT 03/23/10

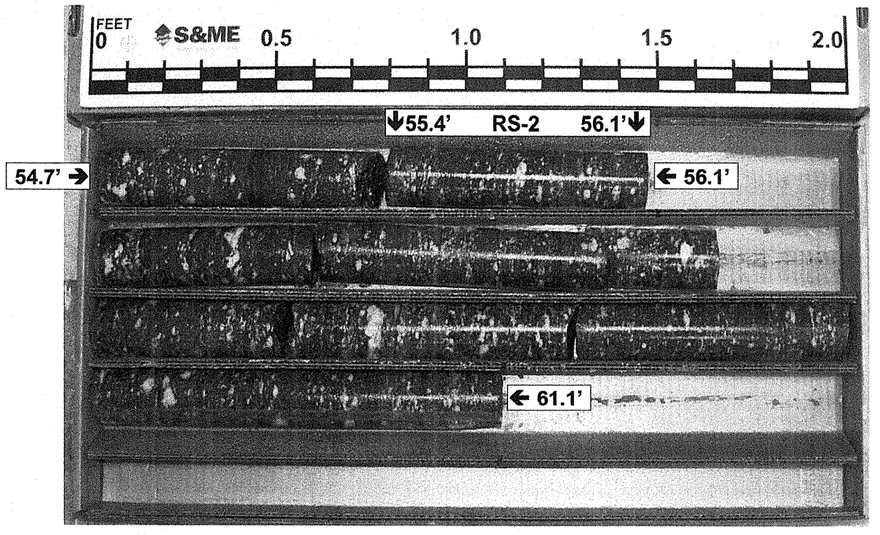
NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 18+04	**OFFSET** 7 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 786.7 ft	**TOTAL DEPTH** 66.1 ft	**NORTHING** 754,001	**EASTING** 1,444,407	**24 HR.** 15.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone/NQ Core		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/16/10	**COMP. DATE** 02/17/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 11.4 ft			

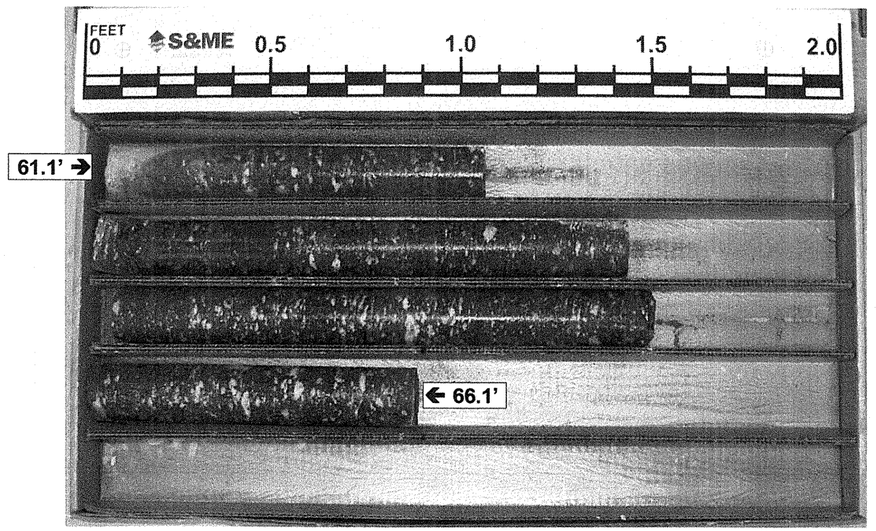
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
732											Begin Coring @ 54.7 ft
730	732.0 730.6	54.7 56.1	1.4	1:00/0.4 3:15/1.0	(1.4) 100%	(1.4) 100%	RS-2	(10.8) 95%	(10.8) 95%		732.0 ELEV. (ft) **CRYSTALLINE ROCK** 54.7 DEPTH (ft) Gray-Black Fresh to Very Slightly Weathered Very Hard to Hard With Close to Moderately Close Fracture Spacing (Biotite Gneiss)
			5.0	3:05/1.0 3:47/1.0 4:51/1.0 4:08/1.0 3:21/1.0	(4.7) 94%	(4.7) 94%					Axial = 2656 KSF R1 = 12, R2 = 20, R3 = 20, R4 = 20, R5 = 7 RMR = 79 Rock Type E
725	725.6	61.1									
			5.0	3:16/1.0 3:30/1.0 3:12/1.0 3:54/1.0 4:15/1.0	(4.7) 94%	(4.7) 94%					
720	720.6	66.1									720.6 66.1 Boring Terminated at Elevation 720.6 ft in Crystalline Rock (Biotite Gneiss)
715											1) Advanced NW casing to 23.5 feet. 2) Advanced 2-15/16 Tricone to 54.7 feet. 3) Advanced NQ Core from 54.7 to 66.1 feet. 4) Creek water used as drilling fluid. 5) Approximate drilling fluid density 62.4 pcf. 6) Loss of drilling fluid observed.
710											
705											
700											
695											
690											
685											
680											
675											
670											
665											
660											
655											

NCDOT CORE DOUBLE 006 I-3819A NO.5.GPJ NC_DOT.GDT 03/12/10

Project No.: 34192.1.2	*ID No.:* I-3819A	*Location:* Iredell Co., N.C.	*Boring No.:* B2-B
Site Description: Bridge No. 566 on -Y4RPD- over Fourth Creek			*Driller:* R. Norwood
Collar Elev.: 786.7 ft.	*Core Size:* NQ	*Equipment:* CME-550x	*Geologist:* N. Bradley
Elev. at T.D.: 720.6 ft.	*Total Depth:* 66.1 ft.	*Total Run:* 11.4 ft.	*Date:* 2/17/10



Box 1 of 2
Top of Box @ 54.7 feet; Bottom of Box @ 61.1 feet



Box 2 of 2
Top of Box @ 61.1 feet; Bottom of Box @ 66.1 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+50	**OFFSET** 24 ft LT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 60.7 ft	**NORTHING** 753,959	**EASTING** 1,444,372	**24 HR.** 11.9
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/12/10	**COMP. DATE** 02/12/10	**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)
790										GROUND SURFACE	787.2	0.0
	786.2	1.0						M		**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica		
785	783.7	3.5	5	5	5	10		M			781.7	5.5
	781.2	6.0	11	5	6	11		M		**ALLUVIAL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica	779.2	8.0
780	778.7	8.5	2	2	2	4		M				
			1	1	2	3		W		Gray Clayey Coarse to Fine Sandy Silt With Trace of Organic Matter and Little Mica		
775	773.7	13.5						▼				
			2	3	2	5	SS-10	47% W				
770	768.7	18.5									770.2	17.0
			1	1	2	3		W		**RESIDUAL** Orange-Brown Fine to Coarse Sandy Silt With Trace of Mica		
765	763.7	23.5										
			2	2	3	5		W				
760	758.7	28.5										
			3	4	7	11		M				
755	753.7	33.5										
			10	8	12	20		M				
750	748.7	38.5										
			7	14	19	33		M				
745	743.7	43.5										
			9	11	14	25		M				
740	738.7	48.5										
			10	20	32	52		M				
735	733.7	53.5										
			22	25	22	47		M				
730	728.7	58.5									728.2	59.0
	726.5	60.7	15	60	40/0.2	100/0.7				**WEATHERED ROCK** (Biotite Gneiss)	726.5	60.7
725			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 726.5 ft on Crystalline Rock (Biotite Gneiss)		
720										1) Advanced NW casing to 5.4 feet. 2) Advanced 2-15/16" Tricone to 60.7 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.		
715												
710												

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 566 on -Y4RPD- over Fourth Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+58	**OFFSET** 11 ft RT	**ALIGNMENT** -Y4RPD-	**0 HR.** N/A
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 38.6 ft	**NORTHING** 753,990	**EASTING** 1,444,354	**24 HR.** Caved 12.2
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing/2-15/16 Tricone		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 02/15/10	**COMP. DATE** 02/16/10	**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)
790										GROUND SURFACE	787.2	0.0
	786.2	1.0						M		**ARTIFICIAL FILL** Red-Brown Fine to Coarse Sandy Silt with Trace of Mica		
785	783.7	3.5	6	6	5	11		M			781.7	5.5
	781.2	6.0	8	3	4	7		M		**ALLUVIAL** Red-Brown Fine to Coarse Sandy Silt With Trace of Mica	779.2	8.0
780	778.7	8.5	1	2	2	4		M				
			1	1	1	2		Sat.		Brown Silty Fine to Coarse Sand	776.2	11.0
775	773.7	13.5								Gray Fine to Coarse Sand With Trace of Silt		
			2	2	2	4	SS-11	Sat.				
770	768.7	18.5									770.2	17.0
			2	3	4	7		Sat.		Green-Gray Silty Fine to Coarse Sand		
765	763.7	23.5									766.2	21.0
			2	5	11	16		M		**RESIDUAL** Brown to Gray-Brown Fine to Coarse Sandy Silt		
760	758.7	28.5										
			3	14	17	31		M				
755	753.7	33.5										
			4	4	8	12		M				
750	748.7	38.5									750.2	37.0
			60/0.1			60/0.1				**CRYSTALLINE ROCK** (Biotite Gneiss)	748.6	38.6
745										Boring Terminated with Standard Penetration Test Refusal at Elevation 748.6 ft in Crystalline Rock (Biotite Gneiss)		
740										1) Advanced NW casing to 23.5 feet. 2) Advanced 2-15/16 Tricone to 38.6 feet. 3) Creek water used as drilling fluid. 4) Approximate drilling fluid density 62.4 pcf. 5) Some loss of drilling fluid observed.		
735												
730												
725												
720												
715												
710												

NCDOT BORE DOUBLE 006 I-3819A_566.GPJ NC_DOT.GDT 03/23/10

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-006		
State Project No.:	34192.1.2	County: Iredell	Date Report 2/24/2010
Federal ID No.:	IMS-40-2(124)15	TIP No. I-3819A	Date Tested 2/1 - 2/24/10
Project Name:	Bridge No.566 on -Y4PRD- over Fourth Creek		
Client Name:	NCDOT	Client Address: Raleigh, North Carolina	

Boring No.	Sample No.	Sample Depth (ft)	AASHTO Classification	Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Organic Content %	Moisture Content %
				10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay					
EB1-A	SS-1	6.0- 7.5	A-2-4 (0)	100	88	64	23.7	19.9	36	44	4	16	26	22	4	ND	ND
EB1-A	SS-2	8.5 - 10	A-2-6 (0)	100	96	81	33.3	28.8	19	52	3	26	34	23	11	ND	ND
EB1-A	SS-3	13.5 - 15	A-7-6 (12)	100	99	93	60.4	54.0	7	39	15	39	44	19	25	ND	35.3
EB1-B	ST-1	13.0 - 15.0	A-6 (2)	100	99	95	40.9	32.9	5	62	10	23	35	23	12	ND	39.0
EB1-B	SS-4	33.5 - 35	A-2-4 (0)	100	88	73	31.3	20.7	27	52	9	12	36	33	3	ND	ND
B1-A	SS-5	8.5 - 10	A-2-4 (0)	100	78	45	11.5	8.7	55	36	5	4	19	0	N.P.	ND	ND
B1-A	SS-6	33.5 - 35	A-2-4 (0)	93	63	52	31.9	26.1	44	28	20	8	31	25	6	ND	ND
B1-B	SS-7	1.0 - 2.5	A-5 (3)	100	99	96	50.8	41.6	4	54	28	14	41	33	8	ND	38.1
B1-B	SS-8	18.5 - 20	A-5 (2)	100	90	77	47.1	39.1	23	38	22	17	42	34	8	ND	54.1
B2-B	SS-9	3.5 - 5.0	A-6 (2)	99	80	69	45.0	40.0	30	30	16	24	37	25	12	ND	31.5
EB2-A	SS-10	13.5-15	A-5 (0)	99	75	65	36.5	27.6	34	38	20	8	41	36	5	ND	47.1
EB2-B	SS-11	13.5 - 15	A-1-b (0)	93	36	21	5.9	4.3	77	18	4	1	22	0	N.P.	ND	ND
N/A	S-1	0.0 - 1.0	A-2-4 (0)	100	99	88	15.4	10.8	12	77	5	6	23	0	N.P.	ND	ND

References / Comments / Deviations: **ND=Not Determined.**

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Abner F. Riggs, Jr., P.E.	Senior Engineer
Technician Name:	*Signature*	*Certification #*	*Technical Responsibility:*	*Position*

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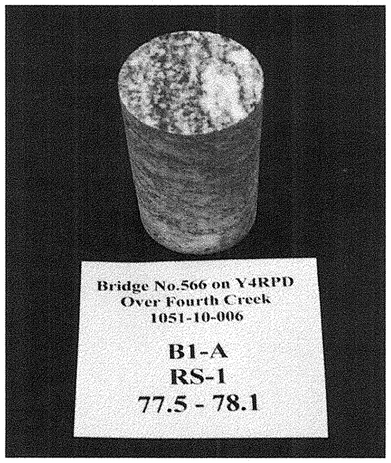
UNCONFINED COMPRESSION
(ASTM D 7012 Method C)

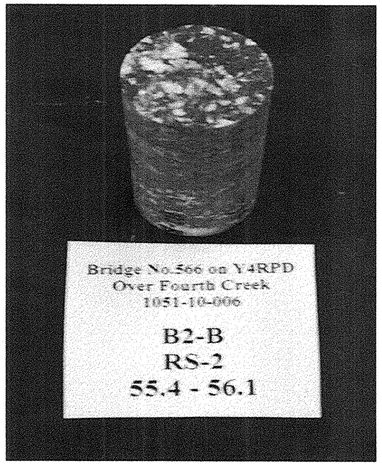
PROJECT: 34192.1.2 **TIP No.**(I-3819A)
Description: Bridge No.566 on -Y4RPD- over Fourth Creek
COUNTY: Iredell County
F.A. No. IMS-40-2(124)15
JOB No.: 1051-10-006
Date: 3/10/2010
Tested by: Jeff Webb

Sample No.	Boring Location	Rock Type	Run RQD	Depth (ft)	Specimen Dimension, in.		Area (in^2)	Unit Wt. (lb/ft^3)	Loading Rate (psi/min)	Max. Load (lb)	Strength (psi)	Moisture (%)
					Length	Diameter						
RS-1	B1-A	Biotite Gneiss	62%	77.5 - 78.1	4.16	1.87	2.75	165.9	2,437	49,930	18,156	0.2
RS-2	B2-B	Biotite Gneiss	100%	55.4 - 56.1	4.07	1.87	2.75	174.4	2,521	50,730	18,447	0.0

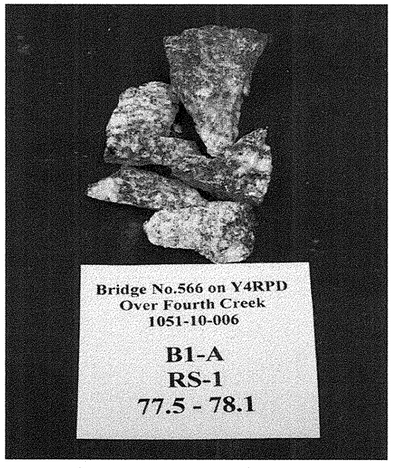
B1-A RS-1 Before Test



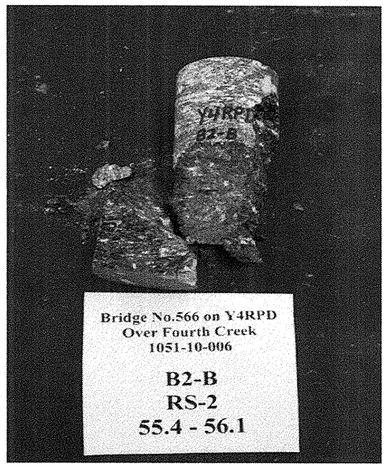
B2-B RS-2 Before Test



B1-A RS-1 After Test



B2-B RS-2 After Test



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34192.1.2 TIP: I-3819A COUNTY: Iredell

DESCRIPTION(1): Bridge No. 566 on -Y4RPD- over Fourth Creek

EXISTING BRIDGE

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

Bridge No.: 566 Length: N/A Total Bents: N/A Bents in Channel: N/A Bents in Floodplain: N/A
Foundation Type: N/A

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: N/A

Interior Bents: N/A

Channel Bed: None observed

Channel Bank: Scour observed on East and West banks, Near vertical banks

EXISTING SCOUR PROTECTION

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): Rip Rap in creek bed upstream Approximately 120'

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 structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Red-Brown and Gray -Brown Silty Fine to Coarse SAND (A-2-4)(0) and (A-1-b)(0)
Small Cobbles observed in creek bed

Channel Bank Material(8): Red-Brown and Gray Coarse to Fine Sandy Silty CLAY (A-7-6)(12)and A-6(2)
Red-Brown and Gray F.to Cse.SAND(A-2-4)(0) and F.Sandy Clayey SILT (A-5)(3)

Channel Bank Cover(9): Thick vegetation and hardwood trees

Floodplain Width(10): Approx. 500' West and 2300' East

Floodplain Cover(11): Open grass covered fields

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

Channel Migration Tendency(13): West

Observations and Other Comments: Rock exposed in creek bed downstream on West bank less than 50'.
Debris in trees on West bank.Trail and sewer within floodplain on East bank .

Reported by: Abner F. Riggs,Jr P.E.. **Date:** 2/23/2010

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

DSE for Interior Bents

Interior Bent 1	782.2'										
Interior Bent 2	783.6'										

Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Engineering Unit Agrees with the Hydraulics Unit's theoretical scour, as show in the Bridge Survey and Hydraulic Design Report (dated 8/14/09).

DSE determined by: Bradley D. Wolfe **Date:** 3-19-10

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank	Bank		
Sample No.	S-1	SS-3	SS-5	SS-7	SS-9		
Retained #4	0%	0%	0%	0%	1%		
Passed #10	100%	100%	93%	100%	99%		
Passed #40	99%	99%	63%	99%	80%		
Passed #200	15.40%	60.40%	31.90%	50.80%	45.00%		
Coarse Sand	12%	7%	55%	4%	30%		
Fine Sand	77%	39%	36%	54%	29%		
Silt	5%	15%	5%	28%	16%		
Clay	6%	39%	4%	14%	24%		
LL	23	44	19	41	37		
PI	NP	25	NP	8	12		
AASHTO	A-2-4 (0)	A-7-6 (12)	A-2-4 (0)	A-5 (3)	A-6 (2)		
Station	17+35	16+08	16+70	17+00	18+04		
Offset	CL	18' LT	8' LT	11'RT	7'RT		
Depth	0.0'-1.0'	13.5'-15.0'	8.5'-10'	1.0'-2.5'	3.5'-5.0'		

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

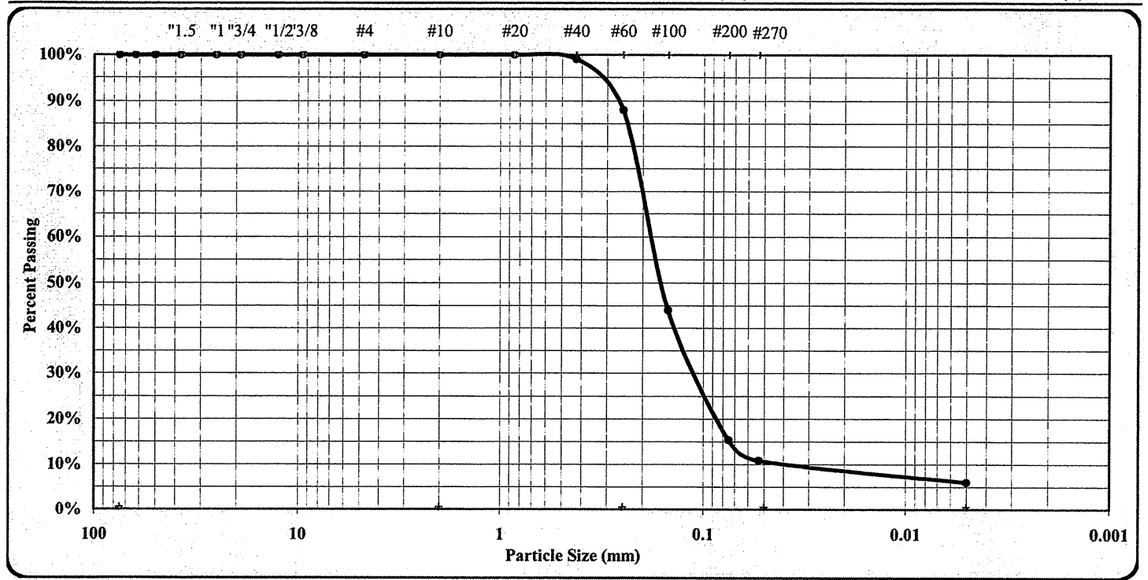
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-006 Iredell County			Report Date:	3/10/10
Project Name:	Bridge No.566 on -Y4RPD- over Fourth Creek			Test Date(s):	3/8 - 3/10/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	Creek Bed	Sample #:	S-1	Sample Date:	2/23/10
Location:	STA 17+35	Offset:	NA	Depth (ft):	0.0 - 1.0 ft.
Sample Description:	Brown Slightly Silty Clayey Coarse to Fine SAND A-2-4 (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	12%	Silt	5%
Gravel	0%	Fine Sand	77%	Clay	6%
Apparent Relative Density	ND	Moisture Content	14.9%	% Passing #200	15.4%
Liquid Limit	23	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	12%	Fine Sand	77%	Silt	5%	Clay	6%
Description of Sand & Gravel Particles:		Rounded	☐		Angular		☐
Hard & Durable	☐	Soft	☐		Weathered & Friable		☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/29/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Quality Assurance

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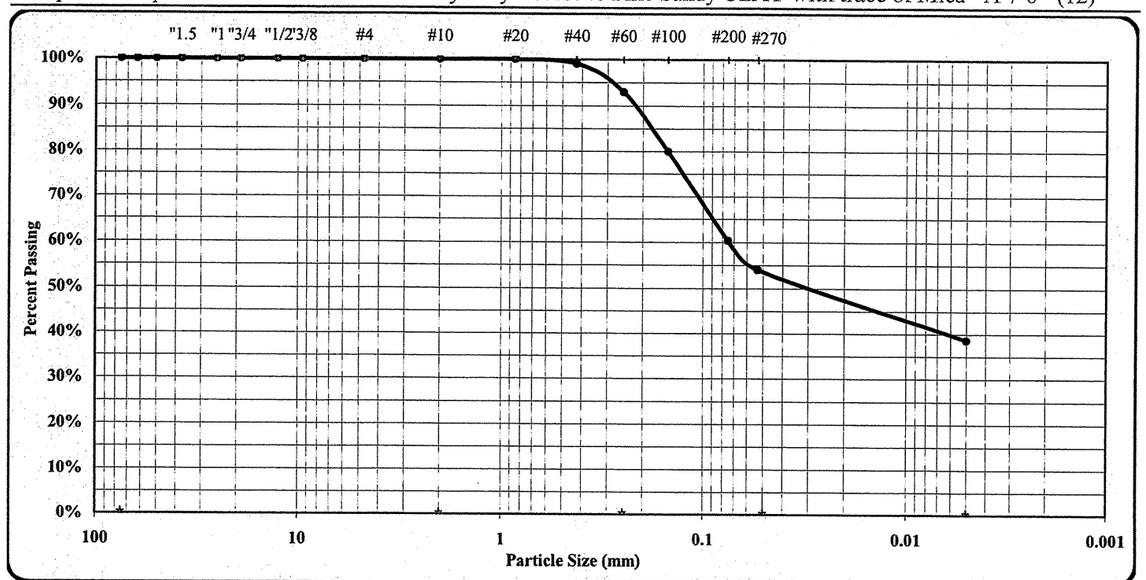
S&ME Project #:	1051-10-006 Iredell County			Report Date:	3/10/10
Project Name:	Bridge No. 566 on -Y4RPD- over Fourth Creek			Test Date(s):	3/8 - 3/10/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	EB1-A	Sample #:	SS-3	Sample Date:	1/27/10
Location:	STA 16+08	Offset:	18' LT.	Depth (ft):	13.5 - 15 ft.
Sample Description:	Gray Silty Coarse to Fine Sandy CLAY with trace of Mica A-7-6 (12)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	7%	Silt	15%
Gravel	0%	Fine Sand	39%	Clay	39%
Apparent Relative Density	ND	Moisture Content	35.3%	% Passing #200	60.4%
Liquid Limit	44	Plastic Limit	19	Plastic Index	25

Soil Mortar (-#10 Sieve)

Coarse Sand	7%	Fine Sand	39%	Silt	15%	Clay	39%
Description of Sand & Gravel Particles:		Rounded	☐		Angular		☐
Hard & Durable	☐	Soft	☐		Weathered & Friable		☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/29/10
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Particle Size Analysis of Soils

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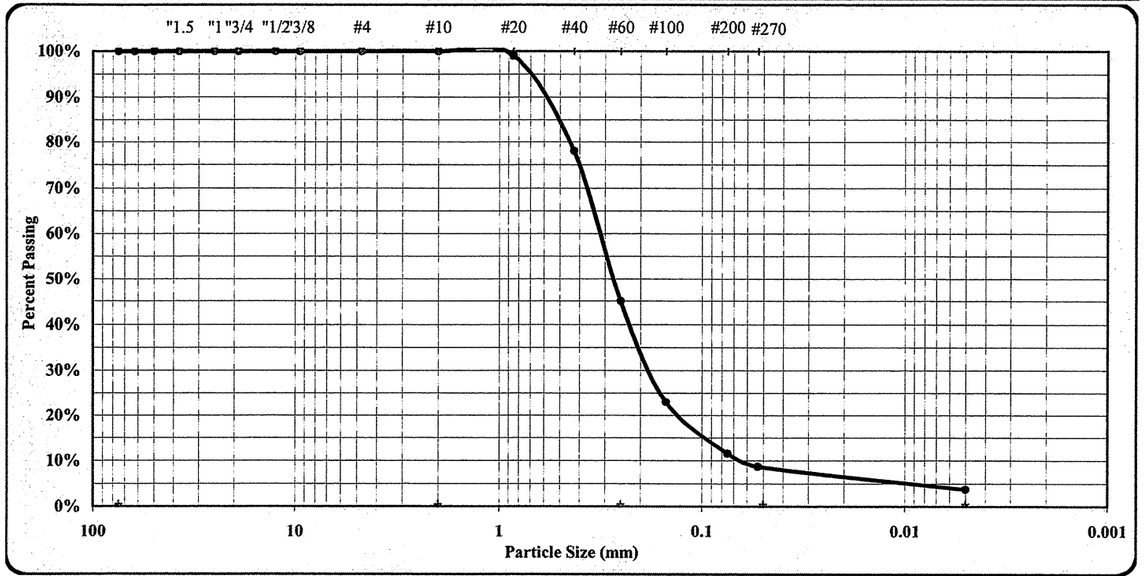
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-006 Iredell County			Report Date:	2/17/10
Project Name:	Bridge No.566 on -Y4RPD- over Fourth Creek			Test Date(s):	2/15 - 2/17/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	B1-A	Sample #:	SS-5	Sample Date:	2/10/10
Location:	STA 16+70	Offset:	8' LT.	Depth (ft):	8.5 - 10 ft.
Sample Description:	Gray Fine to Coarse SAND with Trace of Silt and Clay A-2-4 (0)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	55%	Silt	5%
Gravel	0%	Fine Sand	36%	Clay	4%
Apparent Relative Density	ND	Moisture Content	23.0%	% Passing #200	11.5%
Liquid Limit	19	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	55%	Fine Sand	36%	Silt	5%	Clay	4%	= 100%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐	
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐	

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/29/10
Technical Responsibility	*Signature*	*Position*	*Date*

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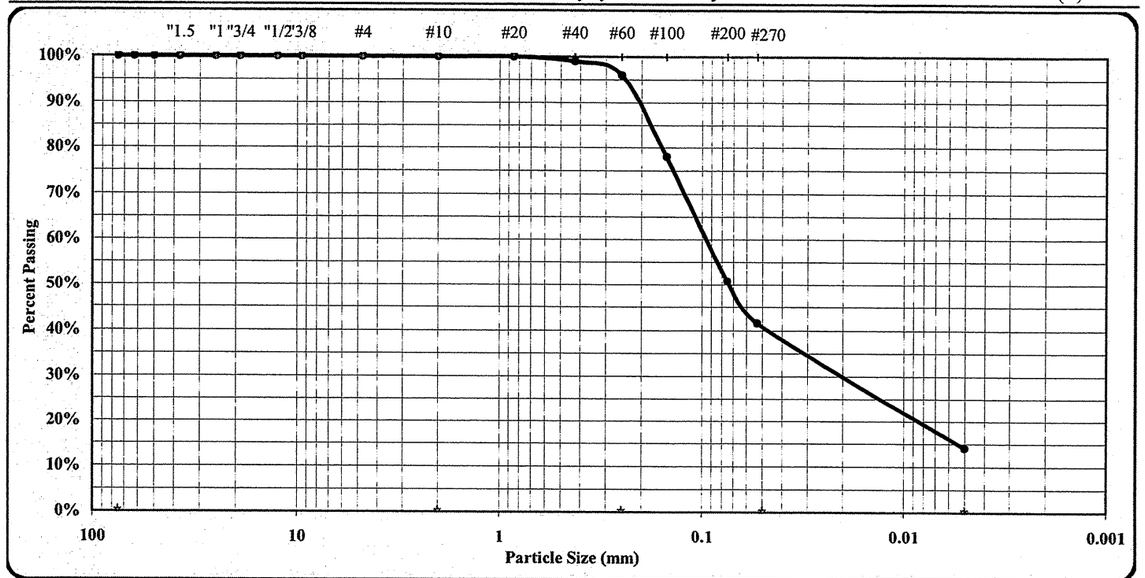
S&ME
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-006 Iredell County			Report Date:	2/4/10
Project Name:	Bridge No.566 on -Y4RPD- over Fourth Creek			Test Date(s):	2/1 - 2/4/10
State Project #:	34192.1.2	F.A. Project No:	IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT				
Address:	Raleigh, NC				
Boring #:	B1-B	Sample #:	SS-7	Sample Date:	1/29/10
Location:	STA 17+00	Offset:	11' RT.	Depth (ft):	1.0 - 2.5 ft.
Sample Description:	Red-Brown Clayey Fine Sandy SILT with Trace of Mica A-5 (3)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#20	Coarse Sand	4%	Silt	28%
Gravel	0%	Fine Sand	54%	Clay	14%
Apparent Relative Density	ND	Moisture Content	38.1%	% Passing #200	50.8%
Liquid Limit	41	Plastic Limit	33	Plastic Index	8

Soil Mortar (-#10 Sieve)

Coarse Sand	4%	Fine Sand	54%	Silt	28%	Clay	14%	
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐	
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐	

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/29/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Quality Assurance

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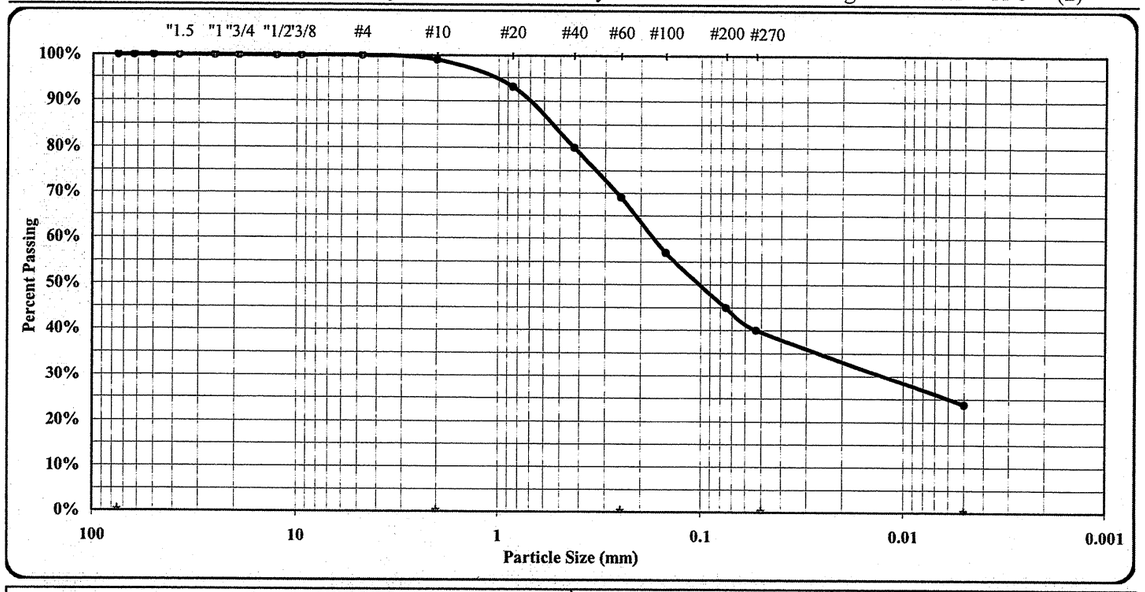
S&ME Project #:	1051-10-006 Iredell County	Report Date:	3/10/10
Project Name:	Bridge No. 566 on -Y4RPD- over Fourth Creek	Test Date(s):	3/8 - 3/10/10
State Project #:	34192.1.2 F.A. Project No: IMS-40-2(124)15	TIP NO:	I-3819A
Client Name:	NCDOT		
Address:	Raleigh, NC		
Boring #:	B2-B Sample #: SS-9	Sample Date:	2/17/10
Location:	STA 18+04 Offset: 7' RT.	Depth (ft):	3.5 - 5.0 ft.
Sample Description:	Red-Brown Silty Fine to Course Sandy CLAY With Trace of Organic Matter	A-6	(2)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	30%	Silt	16%
Gravel	1%	Fine Sand	29%	Clay	24%
Apparent Relative Density	ND	Moisture Content	31.5%	% Passing #200	45.0%
Liquid Limit	37	Plastic Limit	25	Plastic Index	12

Soil Mortar (-#10 Sieve)

Coarse Sand	30%	Fine Sand	30%	Silt	16%	Clay	24%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	3/29/10
Technical Responsibility	*Signature*	*Position*	*Date*

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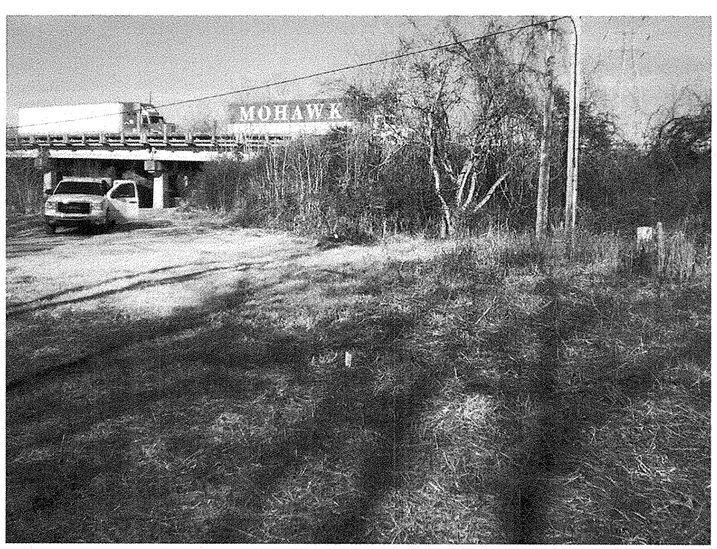
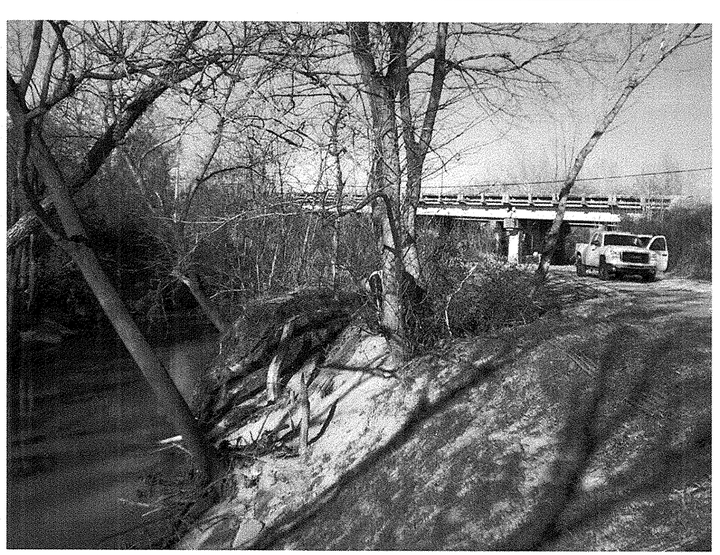
Photograph No. 1:
This photograph was taken from the east approach along the centerline of the -Y4RPD- alignment, looking west.



Photograph No. 2:
This photograph was taken from the left side of the -Y4RPD- alignment, looking north, across proposed End Bent No. 1.

Photograph No. 3:
This photograph was taken from the right side of the -Y4RPD- alignment, looking south, across proposed End Bent No. 1.



Photograph No. 4:
This photograph was taken from the left side of the -Y4RPD- alignment, looking north across proposed Interior Bent No. 1.

Photograph No. 5:
This photograph was taken from the right side of the -Y4RPD- alignment, looking south across proposed Interior Bent No. 1.

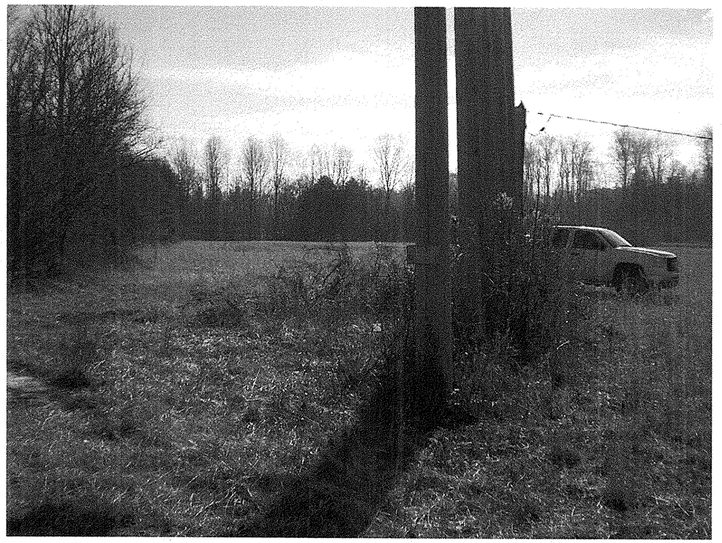
Photograph No. 6:
This photograph was taken from the left side of the -Y4RPD- alignment, looking north (upstream).

Photograph No. 7:
This photograph was taken from the right side of the -Y4RPD- alignment, looking south (downstream)

Photograph No. 8:
This photograph was taken from the left side of the -Y4RPD- alignment, looking north across proposed Interior Bent No. 2.

Photograph No. 9:
This photograph was taken from the right side of the -Y4RPD- alignment, looking south across proposed Interior Bent No. 2.

Photograph No. 10:
This photograph was taken from the left side of the -Y4RPD- alignment, looking north across proposed End Bent No. 2.



Photograph No. 11:
This photograph was taken from the right side of the -Y4RPD- alignment, looking south at proposed End Bent No. 2.

Photograph No. 12:
This photograph was taken from the west approach along the centerline of the -Y4RPD- alignment, looking east.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-3819A	1	6

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 F.A. PROJ. I-3819A

COUNTY IREDELL

PROJECT DESCRIPTION I-77 /I-40 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171.

SITE DESCRIPTION RETAINING WALL FROM STATION 20+09 Y4RPA TO 22+55 Y4RPA, RIGHT

PROJECT: ID: I-3819A

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	ORIGINAL PLAN & PROFILE SHEET
4	PLAN & PROFILE SHEET W/ BORING
5	BORING LOG
6	SAMPLES

CAUTION NOTICE

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

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

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

PERSONNEL

RW TOOD

ML SMITH

AC SMITH

INVESTIGATED BY JP ROGERS

CHECKED BY CB LITTLE

SUBMITTED BY CB LITTLE

DATE 10/08

NORTH CAROLINA PROFESSIONAL SEAL 25521 ENGINEER JOHN L. PILIPCHUK 10/30/08

DRAWN BY: JP ROGERS

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.
I-3819A	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											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		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 SOILS				
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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:

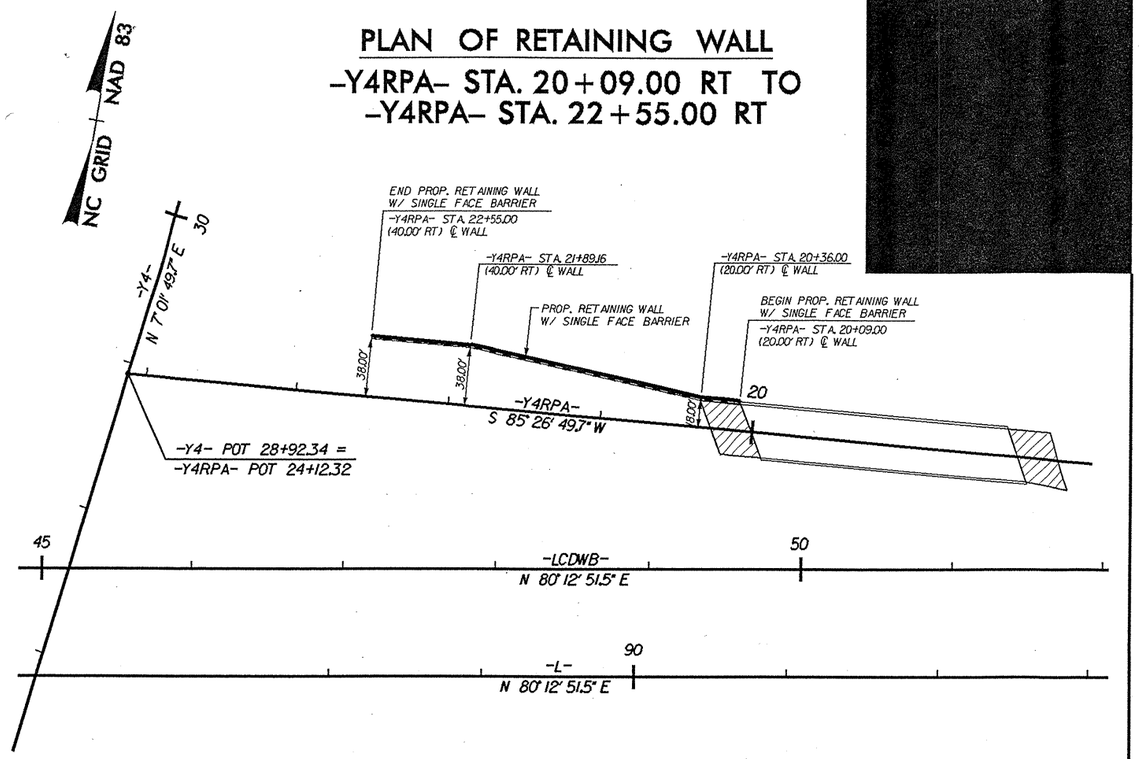
ELEVATION: FT.

NOTES:

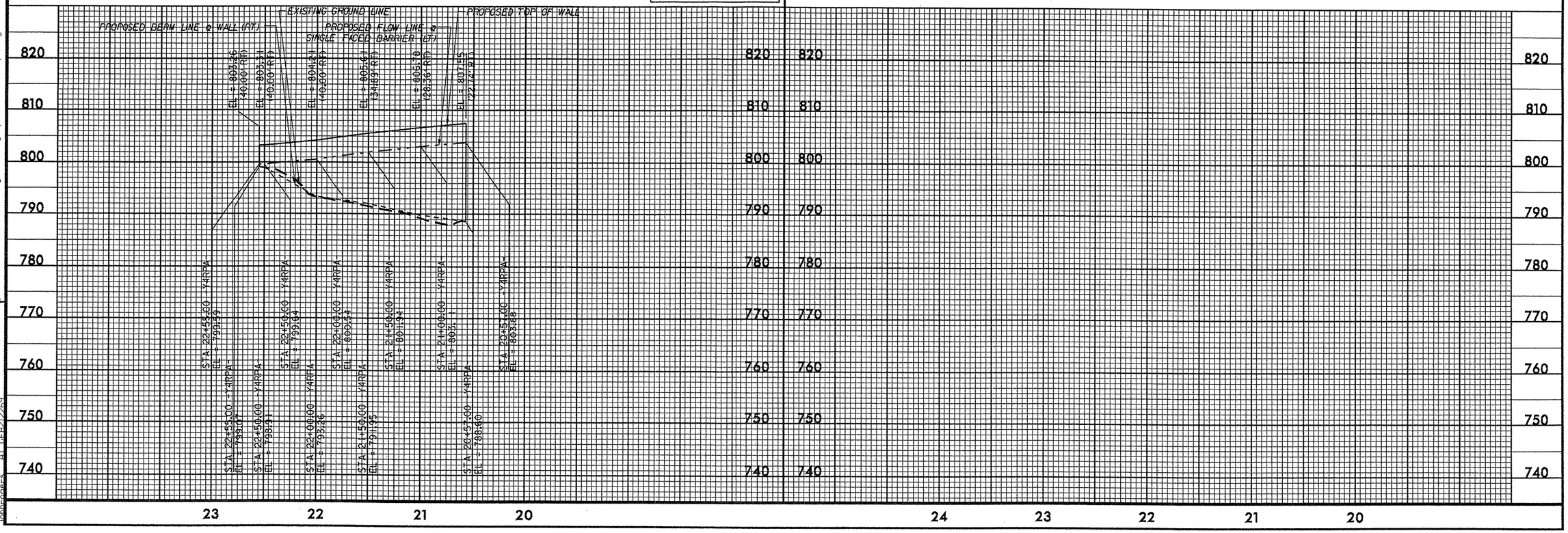
REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLAN OF RETAINING WALL
-Y4RPA- STA. 20+09.00 RT TO -Y4RPA- STA. 22+55.00 RT



FOR PLANS, SEE SHEET NO. 8



REVISIONS

8/17/99

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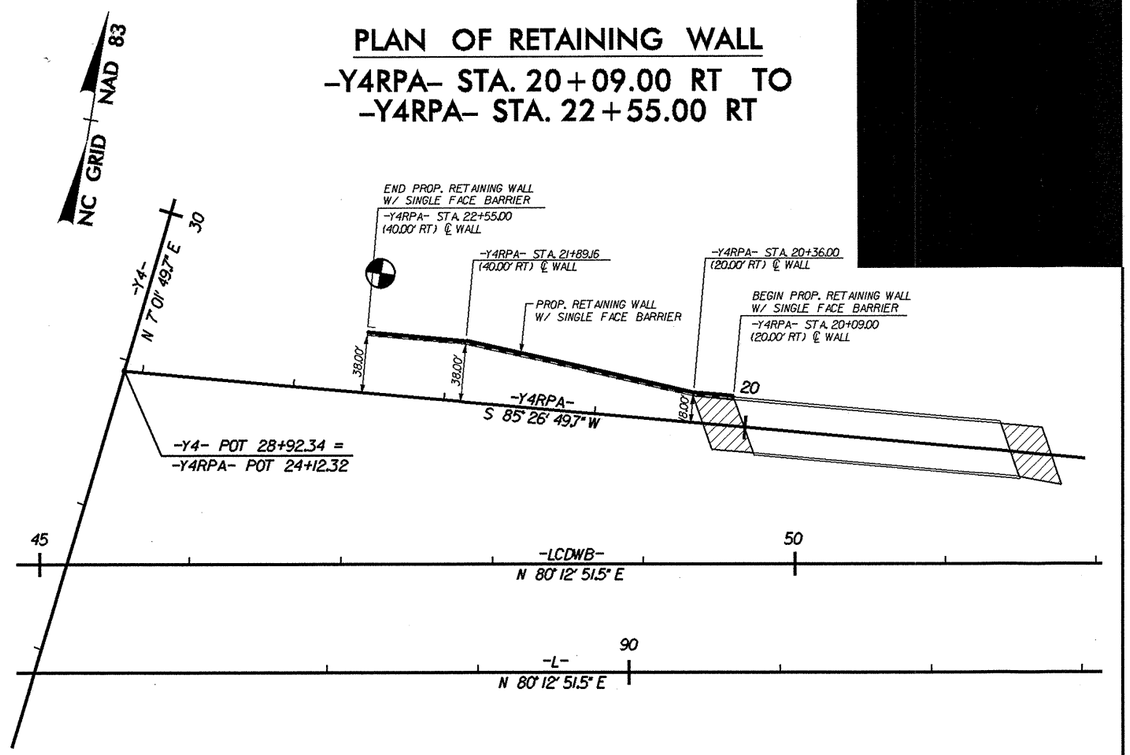
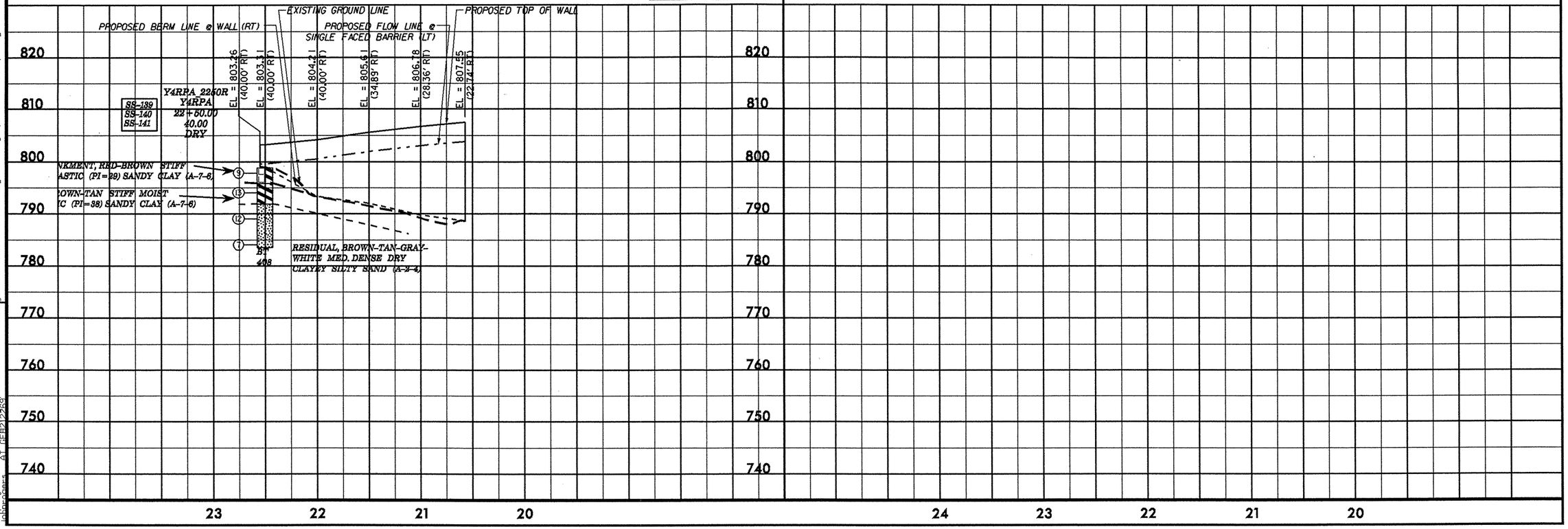
PROJECT REFERENCE NO.	SHEET NO.
I-3819A	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLAN OF RETAINING WALL
-Y4RPA- STA. 20+09.00 RT TO -Y4RPA- STA. 22+55.00 RT



FOR PLANS, SEE SHEET NO. 8



REVISIONS

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

5

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION I-40/I-77 INTERCHANGE				**GROUND WTR (ft)**
BORING NO. Y4RPD_2150	**STATION** 21+50	**OFFSET** CL	**ALIGNMENT** -Y4RPD-	**0 HR.** 7.0
COLLAR ELEV. 783.2 ft	**TOTAL DEPTH** 10.5 ft	**NORTHING** 753,905	**EASTING** 1,444,075	**24 HR.** 3.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
785										
	783.2	0.0								783.2 GROUND SURFACE 0.0
			3	3	4	7	SS-38	M		**ALLUVIAL** BROWN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
780	779.2	4.0								780.2 3.0
			3	3	3	6	SS-39	M		**ALLUVIAL** BROWN MED. STIFF MOIST LOW PLASTIC (PI=13) SANDY CLAY (A-6)
775										775.4 7.8
	774.2	9.0								**RESIDUAL** BROWN-TAN- WHITE SOFT WET CLAYEY SANDY SILT (A-5)
			1	1	1	2	SS-40	W		772.7 10.5
770										Boring Terminated at Elevation 772.7 ft IN SOFT CLAYEY SANDY SILT
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										
715										
710										
705										

NCDOT BORE SINGLE I-3819A_GEO_BH_Y4RPDWALL_IREDELL.GPJ NC_DOT.GDT 10/29/08

M & T Form 503

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

T. I. P. No. I-3819A

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	34192.1.2	**County**	IREDELL	**Owner**	
Date: Sampled	4/8/08	**Received**	4/21/08	**Reported**	4/25/08
Sampled from	ROADWAY			**By**	J P ROGERS
Submitted by	N WAINAINA				1995 **Standard Specifications**

745351 TO 745370
5/1/08

TEST RESULTS

Proj. Sample No.		SS-134	SS-135	SS-136	SS-137	SS-138	SS-139
Lab. Sample No.		745351	745352	745353	745354	745355	745356
Retained #4 Sieve	%	-	-	-	3	-	-
Passing #10 Sieve	%	98	100	100	92	89	100
Passing #40 Sieve	%	83	87	99	31	65	90
Passing #200 Sieve	%	33	35	50	6	19	64

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	29.0	25.9	11.8	82.3	43.1	16.8
Fine Sand Ret - #270	%	44.5	45.6	43.3	12.0	41.7	21.2
Silt 0.05 - 0.005 mm	%	14.2	14.2	16.2	1.6	11.1	4.8
Clay < 0.005 mm	%	12.3	14.3	28.6	4.1	4.1	57.2
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	40	38	32	25	32	53
P. I.	NP	NP	7	NP	NP	29
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-4(1)	A-1-b(0)	A-2-4(0)	A-7-6(17)
Station	14+00	10+50	90+70	90+70	90+70	22+50
OFFSET	CL	CL	185 LT	185 LT	185 LT	40 LT
ALIGNMENT	Y8	Y8	L	L	L	Y4 RPA
Depth (Ft)	4.00	8.80	0.00	8.50	18.50	0.00
to	5.50	10.30	1.50	10.00	19.50	1.50

cc: J P ROGERS
Soils File

Soils Engineer

6

M & T Form 503

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

T. I. P. No. I-3819A

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	34192.1.2	**County**	IREDELL	**Owner**	
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Sampled from	ROADWAY			**By**	J P ROGERS
Submitted by	N WAINAINA				1995 **Standard Specifications**

745351 TO 745370
5/1/08

TEST RESULTS

Proj. Sample No.		SS-140	SS-141	SS-142	SS-143	SS-144	SS-145
Lab. Sample No.		745357	745358	745359	745360	745361	745362
Retained #4 Sieve	%	-	7	-	-	-	12
Passing #10 Sieve	%	93	83	98	100	98	68
Passing #40 Sieve	%	73	60	84	93	82	48
Passing #200 Sieve	%	47	29	41	65	40	21

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	32.1	38.8	24.5	13.5	29.0	41.3
Fine Sand Ret - #270	%	19.8	32.7	41.9	29.4	39.4	35.3
Silt 0.05 - 0.005 mm	%	7.3	18.3	27.5	32.6	19.3	17.3
Clay < 0.005 mm	%	40.9	10.2	6.1	24.5	12.3	6.1
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	64	39	43	52	33	26
P. I.	38	8	3	11	NP	NP
AASHTO Classification	A-7-6(13)	A-2-4(0)	A-5(0)	A-7-5(8)	A-4(0)	A-1-b(0)
Station	22+50	22+50	13+50	15+00	17+50	17+50
OFFSET	40 LT	40 LT	45 RT	20 RT	CL	CL
ALIGNMENT	Y4 RPA	Y4 RPA	Y5A	Y5A	Y8	Y8
Depth (Ft)	3.80	8.8	0.00	0.00	0.00	13.80
to	5.30	10.3	1.50	1.50	1.50	14.80

Soils Engineer

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	8

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)*

SITE DESCRIPTION *PROPOSED RETAINING WALL FROM STATION 20+09 ON -Y4RPA- TO 22+55 ON -Y4RPA-, RIGHT*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5	PROFILES
6	BORE LOG REPORTS
7	SOIL TEST RESULTS
8	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

B. CAYTON

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 5/21/2010

NORTH CAROLINA PROFESSIONAL SEAL 036026 ENGINEER SHANNON PROVANCE 5-21-10

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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											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		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 SOILS				
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, DPT, 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
- ☐ _____
- ☐ _____

ADVANCING TOOLS:
- ☐ CLAY BITS
- ☐ 6" CONTINUOUS FLIGHT AUGER
- ☒ 8" HOLLOW AUGERS
- ☐ HARD FACED FINGER BITS
- ☐ TUNG.-CARBIDE INSERTS
- ☐ CASING ☐ W/ ADVANCER
- ☐ TRICONE_____" STEEL TEETH
- ☐ TRICONE_____" TUNG.-CARB.
- ☐ CORE BIT
- ☐ _____

HAMMER TYPE:
- ☒ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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.

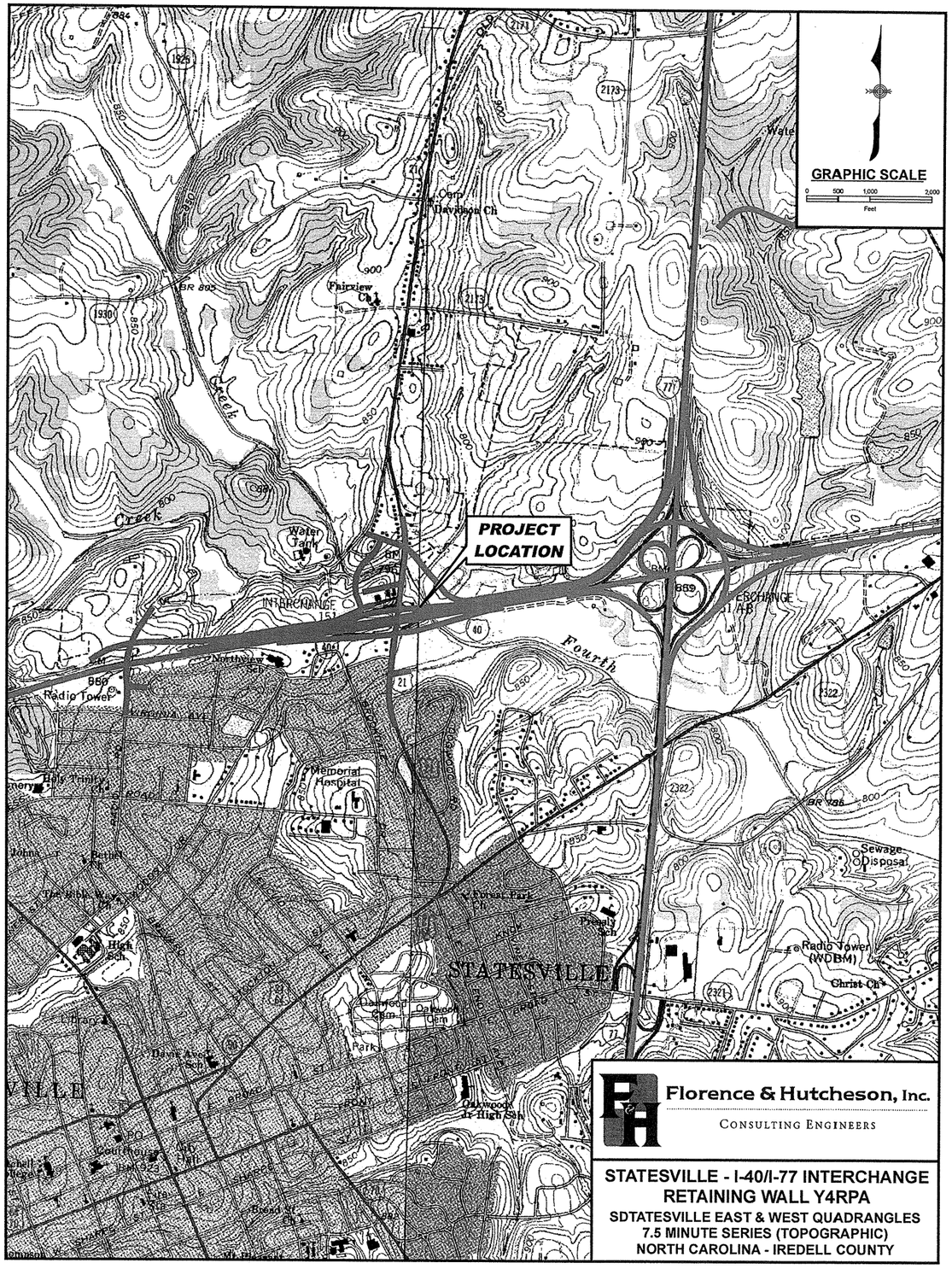
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #5
-L- STA. 83+86
309' LEFT ELEVATION: 824.70 FT.

NOTES: ADDITIONAL ABBREVIATION
FIAD - FILLED IN AFTER DRILLING

REVISED 09/23/09



Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

STATESVILLE - I-40/I-77 INTERCHANGE RETAINING WALL Y4RPA

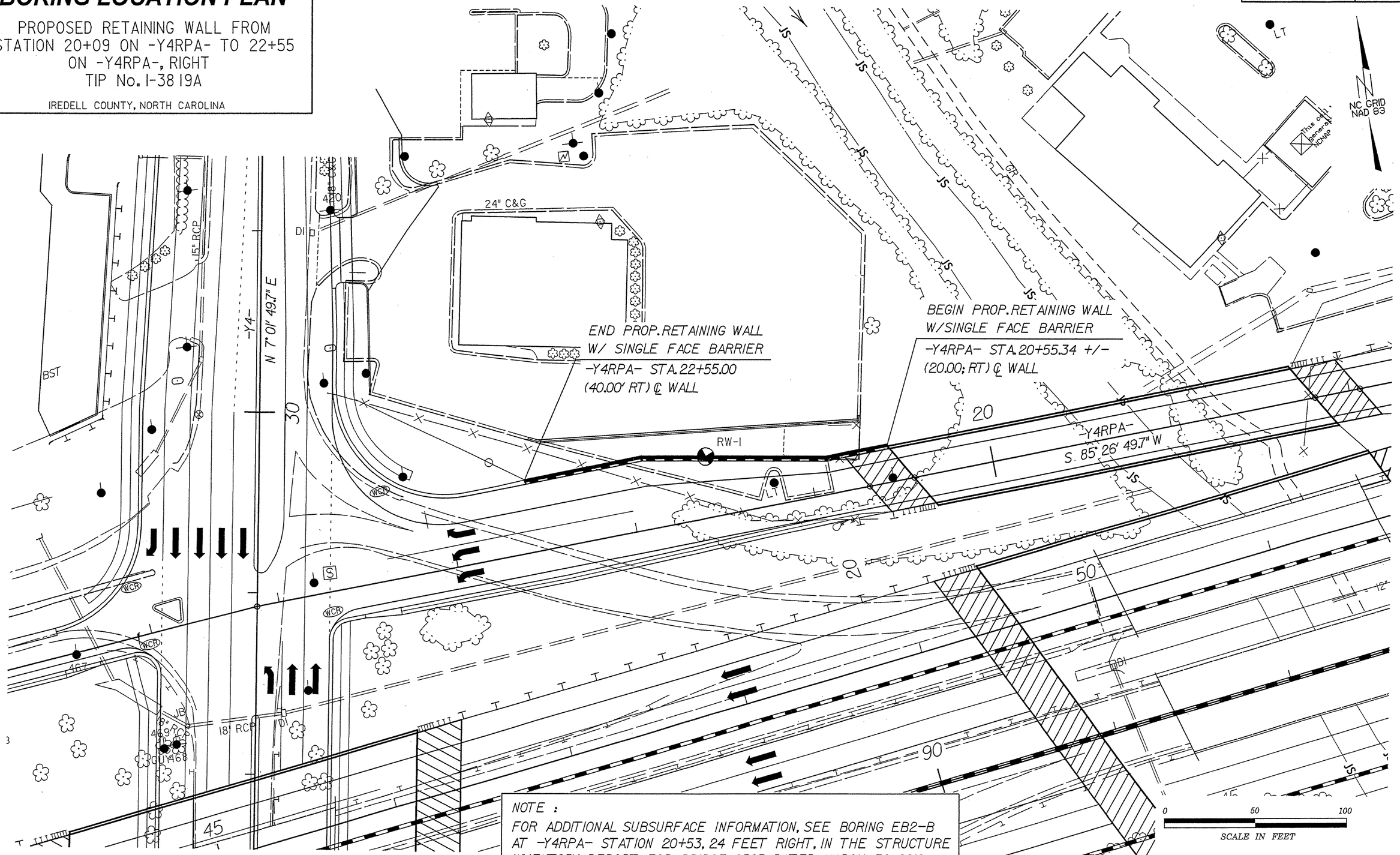
SDTATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

PROPOSED RETAINING WALL FROM
STATION 20+09 ON -Y4RPA- TO 22+55
ON -Y4RPA-, RIGHT
TIP No. I-3819A

IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4



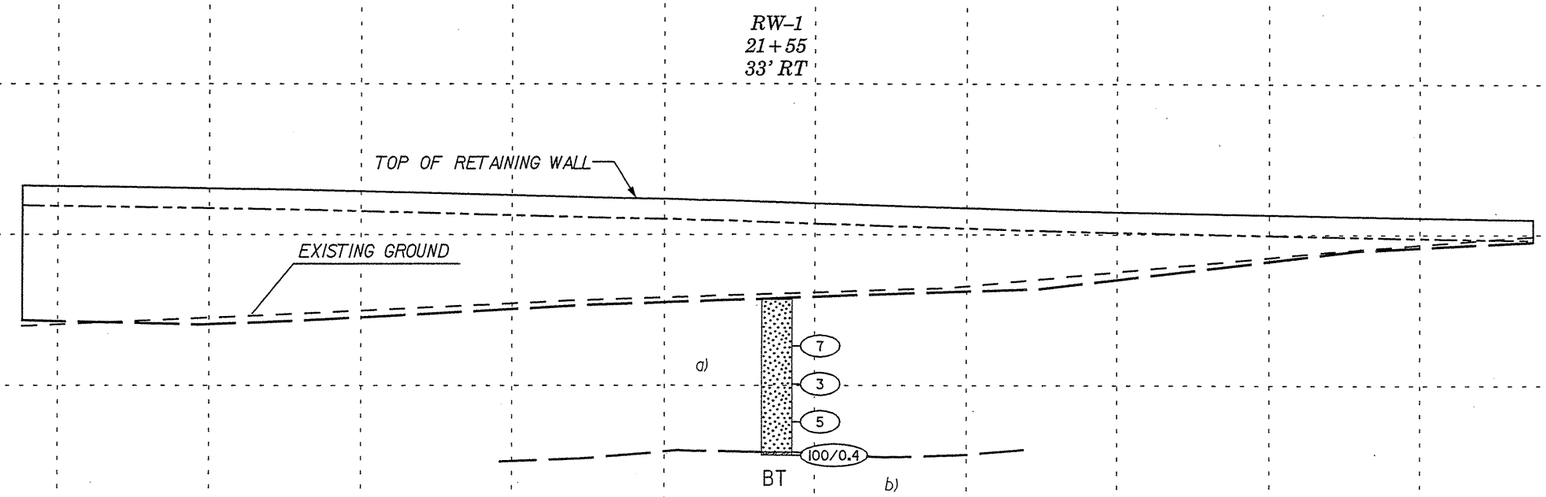
NOTE :
FOR ADDITIONAL SUBSURFACE INFORMATION, SEE BORING EB2-B AT -Y4RPA- STATION 20+53, 24 FEET RIGHT, IN THE STRUCTURE INVENTORY REPORT FOR BRIDGE #565 DATED MARCH 30, 2010.

GENERALIZED SUBSURFACE PROFILE ALONG RETAINING WALL

0 20 40 FEET	PROJECT REFERENCE NO.	SHEET
VE = NONE	34192.1.2 (I-3819A)	5
	PROFILE	

GROUNDLINE PROFILE PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN ALONG RETAINING WALL PROFILE WITH THE BORING PROJECTED ONTO THE PROFILE



840 820 800 780 760 740 720 700 680

20+20 20+40 20+60 20+80 21+00 21+20 21+40 21+60 21+80 22+00 22+20 22+40 22+60 22+80

a) **Residual:** Black, brown-dk. brown, tan, gray, white, v. loose to loose, silty, f. to cse. grain sand.
b) **WR :** Black, white, tan, silty clay interpreted as WR.

NOTE :
FOR ADDITIONAL SUBSURFACE INFORMATION, SEE BORING EB2-B AT -Y4RPA- STATION 20+53, 24 FEET RIGHT, IN THE STRUCTURE INVENTORY REPORT FOR BRIDGE #565 DATED MARCH 30, 2010.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Proposed Retaining Wall from Station 20+09 on -Y4RPA- to 22+55 on -Y4RPA-, Right				**GROUND WTR (ft)**
BORING NO. RW-1	**STATION** 21+55	**OFFSET** 33 ft RT	**ALIGNMENT** -Y4RPA-	**0 HR.** N/A
COLLAR ELEV. 791.5 ft	**TOTAL DEPTH** 20.7 ft	**NORTHING** 754,299	**EASTING** 1,444,071	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
795										
	791.5									791.5 GROUND SURFACE 0.0
790										**RESIDUAL** Black, brown-dk. brown, tan, gray, white, v. loose to loose, silty, f. to cse. grain sand (A-2-5).
	786.2	5.3	4	3	4	7		M		
785										
	781.2	10.3	1	1	2	3	SS-1	M		
780										
	776.2	15.3	2	2	3	5		M		
775										
	771.2	20.3	100/0.4			100/0.4		M		771.2 20.3
770										770.8 20.7 **WEATHERED ROCK** Black, white, tan, silty clay, interpreted as WR.
765										Boring Terminated at Elevation 770.8 ft in Weathered Rock (Gneiss).
760										Boring backfilled immediately upon completion.
755										
750										
745										
740										
735										
730										
725										
720										
715										

NCDOT BORE SINGLE I-3819A_GEO_RWALY4RPA.GPJ NC_DOT.GDT 5/18/10

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Proposed Retaining Wall from Station 20+09 on -Y4RPA- to 22+55 on -Y4RPA-, Right

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Passing No.200	Percent Retained No. 60	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
RW-1	SS-1	10.3'-11.8'	A-2-5(0)	3	94.7	70.7	24.5	43.2	40.0	37.6	16.9	5.5	44	6	38	32.7

F&H, CERT. No. 102-0603

Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

SITE PHOTOGRAPHIC RECORD

Proposed Retaining Wall (-Y4RPA- 20+10)

RW-1 Looking West

RW-1 Looking East

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	10

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE – I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)*

SITE DESCRIPTION *PROPOSED RETAINING WALL FROM STATION 15+00 ON -YRPAB- TO 17+50 ON -YRPAB-, RIGHT*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5	PROFILES
6-8	BORE LOG REPORTS
9	SOIL TEST RESULTS
10	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

B. CAYTON

D. HERTTER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 5/21/2010

NORTH CAROLINA PROFESSIONAL SEAL 036026 5-21-10 ENGINEER SHANNON PROVANCE

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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 #40 #200	50 MX 30 MX 15 MX		51 MN 25 MX	50 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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- ☐ _____
- ☐ _____

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

HAMMER TYPE:
- ☒ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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.

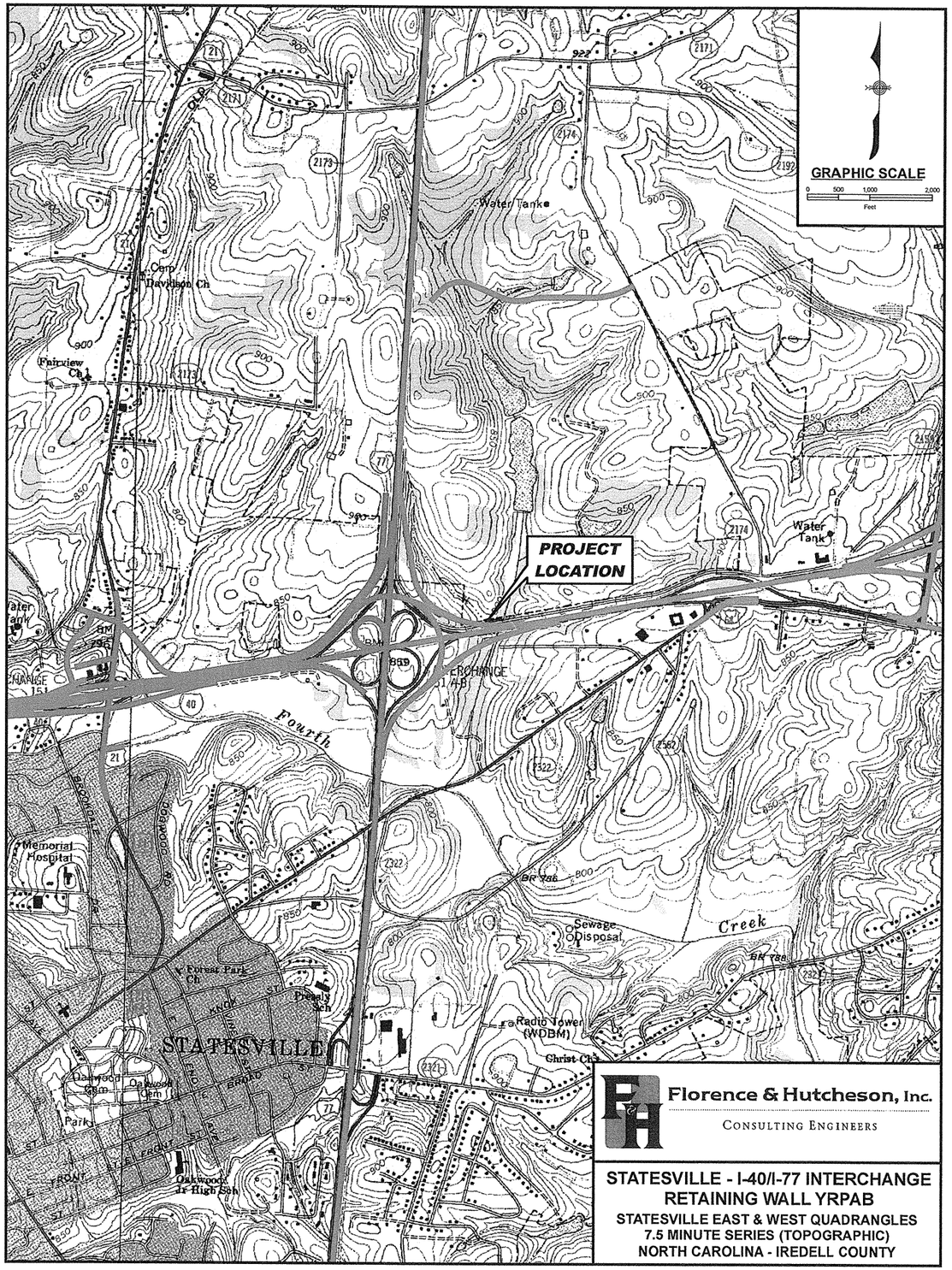
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #9
-BLE- STA. 137+78
50' RIGHT ELEVATION: 811.91 FT.

NOTES:

REVISED 09/23/09


GRAPHIC SCALE
0 500 1,000 2,000
Feet
PROJECT LOCATION
Water Tank
Cem
Davidson Ch
Fairview Ch
Fourth
Creek
Memorial Hospital
Forest Park Ch
Presely Sch
STATESVILLE
Oakwood Cem
Park
Oakwood Jr High Sch
Sewage Disposal
Radio Tower (WDBM)
Christ Ch
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS
STATESVILLE - I-40/I-77 INTERCHANGE
RETAINING WALL YRPAB
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

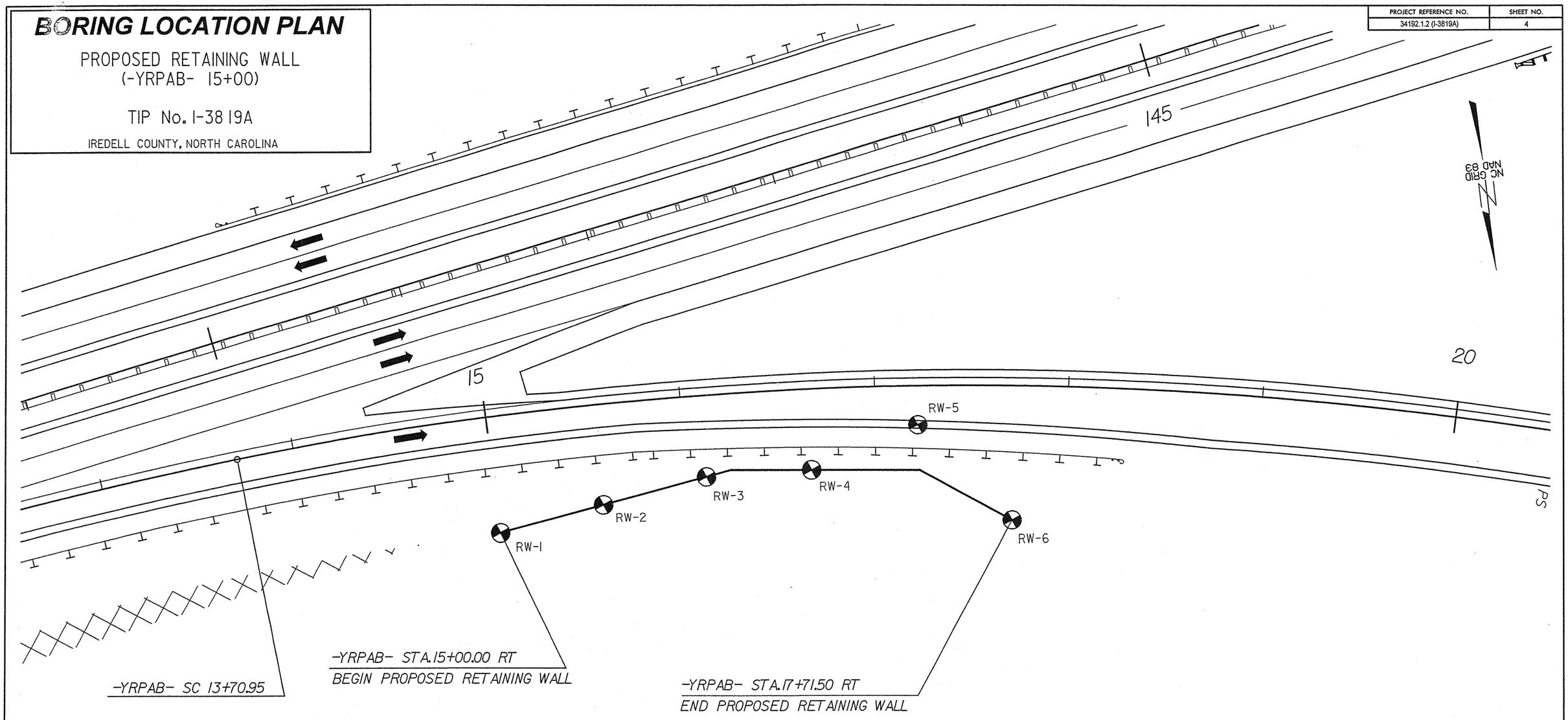
BORING LOCATION PLAN

PROPOSED RETAINING WALL
(-YRPAB- 15+00)

TIP No. I-3819A

IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4



0 50 100

SCALE IN FEET

GENERALIZED SUBSURFACE PROFILE ALONG RETAINING WALL

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5
PROFILE	

RW-1
15+00
59' RT

RW-2
15+56
51' RT

RW-3
16+11
42' RT

RW-4
16+66
41' RT

RW-5
17+22
20' RT

RW-6
17+72
69' RT

TOP OF RETAINING WALL

EXISTING GROUND

BT
DRY
2/9/10

BT
DRY
2/9/10

BT
DRY
2/3/10

BT
DRY
2/3/10

BT
DRY
2/3/10

BT
DRY
2/3/10

a) **Artificial Fill :** Red, soft, sandy, med. plasticity clay w/gravel.
b) **Residual :** Red, gray, tan, soft to med. stiff, sandy, med. plasticity clay.
c) **Residual :** Red, brown, gray, tan, loose, silty, f. to cse. grain sand.
d) **Residual :** Dark gray, dk. brown, red, gray, v. soft to med. stiff, v. sandy, low plasticity silt.
e) **Residual :** Red, tan, gray, v. soft to stiff, sandy, med. plasticity clay w/rock frags. in parts.
f) **Residual :** White, black, gray, brown, tan, v. loose to dense, silty, f. to cse. grain sand.
g) **WR :** Black, white, gray, brown, clayey sand w/rock frags. interpreted as WR.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right				**GROUND WTR (ft)**
BORING NO. RW-1	**STATION** 15+00	**OFFSET** 59 ft RT	**ALIGNMENT** -YRPAB-	**0 HR.** Dry
COLLAR ELEV. 797.7 ft	**TOTAL DEPTH** 25.9 ft	**NORTHING** 755,274	**EASTING** 1,449,951	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
800										797.7 GROUND SURFACE 0.0
795										**RESIDUAL** Red & tan, soft to med. stiff, sandy, med. plasticity clay (A-7-6).
	786.3	11.4						33%		
790								M		
785	783.3	14.4	1	1	2	3		M		784.0 13.7 Dark gray, soft, v. sandy, low plasticity, silt (A-4).
	778.3	19.4	0	1	2	3		M		780.0 17.7 White, black, gray, tan, med. dense to dense, silty, f. to cse. grain sand (A-2-4).
780										
775	773.3	24.4	3	7	9	16		M		
			12	17	18	35		M		771.8 25.9 Boring Terminated at Elevation 771.8 ft in Residual Soils (A-2-4).
770										No recovery, ST sample 9.4'-11.4'
765										Other Samples: ST-1 (4.4 - 6.0)
760										
755										
750										
745										
740										
735										
730										
725										
720										

NCDOT BORE SINGLE I-3819A_GEO_RWALYRPAB.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right				**GROUND WTR (ft)**
BORING NO. RW-2	**STATION** 15+56	**OFFSET** 51 ft RT	**ALIGNMENT** -YRPAB-	**0 HR.** 17.3
COLLAR ELEV. 798.1 ft	**TOTAL DEPTH** 25.8 ft	**NORTHING** 755,266	**EASTING** 1,449,897	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
800										798.1 GROUND SURFACE 0.0
795										**RESIDUAL** Red to gray, med. stiff, sandy, med. plasticity clay (A-7-6).
	793.8	4.3	1	2	5	7		M		
790	788.8	9.3	1	2	2	4		M		
785										785.5 12.6 Dark gray, dk. brown, med. stiff, v. sandy, low plasticity silt (A-4).
	783.8	14.3	1	4	3	7		M		780.5 17.6 Gray, white, brown, black, v. loose to med. dense, f. to cse. grain sand (A-2-4).
780	778.8	19.3	1	1	2	3		M		
775	773.8	24.3	4	7	10	17		M		772.3 25.8 Boring Terminated at Elevation 772.3 ft in Residual Soils (A-2-4).
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										

NCDOT BORE SINGLE I-3819A_GEO_RWALYRPAB.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right				**GROUND WTR (ft)**
BORING NO. RW-3	**STATION** 16+11	**OFFSET** 42 ft RT	**ALIGNMENT** -YRPAB-	**0 HR.** Dry
COLLAR ELEV. 799.5 ft	**TOTAL DEPTH** 25.9 ft	**NORTHING** 755,259	**EASTING** 1,449,843	**24 HR.** 9.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
										799.5	GROUND SURFACE 0.0
	795.1	4.4						M		**RESIDUAL** Red, brown to gray, loose, silty, f. to cse. grain sand (A-2-4).	
	790.1	9.4	2	2	3	5		M			
			1	2	3	5				786.8	12.7
								37%		Red to gray, dk. brown, v. soft to soft, v. sandy, low plasticity silt (A-4).	
										778.1	21.4
	775.1	24.4						50%		White, gray, black, med. dense, silty, f. to cse. grain sand (A-2-4).	
			6	9	12	21		M		773.6	25.9
										Boring Terminated at Elevation 773.6 ft in Residual Soils (A-2-4).	

Other Samples:
ST-2 (14.4 - 15.9)
ST-3 (19.4 - 20.8)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right				**GROUND WTR (ft)**
BORING NO. RW-4	**STATION** 16+66	**OFFSET** 41 ft RT	**ALIGNMENT** -YRPAB-	**0 HR.** Dry
COLLAR ELEV. 801.2 ft	**TOTAL DEPTH** 26.0 ft	**NORTHING** 755,262	**EASTING** 1,449,788	**24 HR.** 9.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
										801.2	GROUND SURFACE 0.0
	796.7	4.5						M		**RESIDUAL** Red, brown, tan, gray, loose, silty, f. to cse. grain sand (A-2-4).	
			3	4	5	9				794.2	7.0
	791.7	9.5						M		Red, tan, gray, v. soft to soft, sandy, med. plasticity clay (A-7-6).	
			2	2	2	4					
	786.7	14.5						M			
			1	1	2	3					
										781.0	20.2
	776.7	24.5						92% M		White, black, gray, brown, med. dense, silty, f. to cse. grain sand (A-2-4).	
			5	7	15	22		M		775.2	26.0
										Boring Terminated at Elevation 775.2 ft in Residual Soils (A-2-4).	

Other Samples:
ST-4 (19.5 - 20.2)
ST-5 (20.2 - 21.3)

NCDOT BORE SINGLE I-3819A_GEO_RWALYRPAB.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right			**GROUND WTR (ft)**
BORING NO. RW-5	**STATION** 17+22	**OFFSET** 20 ft RT	**ALIGNMENT** -YRPAB- **0 HR.** Dry
COLLAR ELEV. 802.5 ft	**TOTAL DEPTH** 25.4 ft	**NORTHING** 755,245	**EASTING** 1,449,732 **24 HR.** 10.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D. Hertter	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
805										802.5 GROUND SURFACE	0.0
800	797.7	4.8	1	1	3	4		M		**ARTIFICIAL FILL** Red, soft, sandy, med. plasticity clay w/gravel (A-7-6).	
795	792.7	9.8	4	5	7	12		M		794.4 **RESIDUAL** Red, stiff, sandy, med. plasticity clay w/rock frags. (A-7-6).	8.1
790	787.7	14.8	2	2	3	5		M		789.4 Red, loose, silty, f. to cse. grain sand (A-2-4).	13.1
785	782.7	19.8	8	18	23	41		M		785.0 White, gray, black, dense, silty, f. to cse. grain sand (A-2-4).	17.5
780	777.7	24.8	83	22/0.1		100/0.6		M		777.7 **WEATHERED ROCK** Black, white, gray, brown, clayey sand with rock frags., interpreted as WR. 777.1	24.8 25.4
775										Boring Terminated at Elevation 777.1 ft in Weathered Rock (Gneiss).	
770											
765											
760											
755											
750											
745											
740											
735											
730											
725											

NCDOT BORE SINGLE I-3819A_GEO_RWALYRPAB.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci
SITE DESCRIPTION Proposed Retaining Wall from Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right			**GROUND WTR (ft)**
BORING NO. RW-6	**STATION** 17+72	**OFFSET** 69 ft RT	**ALIGNMENT** -YRPAB- **0 HR.** Dry
COLLAR ELEV. 799.4 ft	**TOTAL DEPTH** 26.6 ft	**NORTHING** 755,299	**EASTING** 1,449,689 **24 HR.** 4.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER B. Cayton	**START DATE** 02/03/10	**COMP. DATE** 02/03/10	**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)
800										799.4 GROUND SURFACE	0.0
795								29%		**RESIDUAL** Red, med. stiff, sandy, med. plasticity clay (A-7-6).	
790										788.8 Black, white, gray, tan, loose, silty, f. to cse. grain sand (A-2-4).	10.6
785	784.3	15.1	2	2	3	5		D			
780	779.3	20.1	5	10	10	20		M		781.0 White, black, gray, tan, med. dense, silty, f. to cse. grain sand (A-2-4).	18.4
775	774.3	25.1	7	9	11	20		M		772.8 Boring Terminated at Elevation 772.8 ft in Residual Soils (A-2-4).	26.6
770											
765											
760											
755											
750											
745											
740											
735											
730											
725											
720											

Other Samples:
ST-6 (5.1 - 6.8)
ST-7 (10.1 - 11.5)

NCDOT BORE SINGLE I-3819A_GEO_RWALYRPAB.GPJ NC_DOT.GDT 5/18/10

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Proposed Retaining Wall From Station 15+00 on -YRPAB- to 17+50 on -YRPAB-, Right

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Passing No.200	Percent Retained No. 60	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
RW-1	ST-1	4.4'-6.0'	A-7-6(8)	N/A	99.2	83.9	57.0	23.6	23.0	22.5	19.7	34.8	46	16	30	33.1
RW-3	ST-2	14.4'-15.9'	A-4(2)	N/A	99.2	84.5	50.0	23.8	23.3	29.6	21.8	25.3	33	8	25	37.4
RW-3	ST-3	19.4'-20.8'	A-4(0)	N/A	98.9	84.2	40.0	26.5	25.7	37.3	18.6	18.4	29	7	22	50.4
RW-4	ST-4	19.5'-20.2'	A-7-6(7)	N/A	99.4	80.7	52.2	28.1	27.7	22.2	16.9	33.1	41	19	22	91.9
RW-4	ST-5	20.2'-21.3'	A-2-4(0)	N/A	97.6	63.1	24.5	50.7	49.5	28.8	16.9	4.8	35	NP	NP	22.7
RW-6	ST-6	5.1'-6.8'	A-7-6(14)	N/A	98.2	86.8	67.0	19.7	18.3	14.6	15.3	51.8	46	22	24	29.1
RW-6	ST-7	10.1'-11.5'	A-2-4(0)	N/A	99.3	72.8	26.0	41.5	41.0	36.1	16.9	5.9	40	NP	NP	6.6

F&H, CERT. No. 102-0603

Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

SITE PHOTOGRAPHIC RECORD

Proposed Retaining Wall (-YRPAB - 15+00)

RW-1 Looking West Toward RW-5

RW-3 Looking South

RW-5 Looking East Toward RW-1

RW-3 Looking North

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	3

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION I40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171

SITE DESCRIPTION RETAINING WALL -Y2DW- STA. 12+55 LT TO -Y2DW- STA. 13+85 LT

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE

CAUTION NOTICE

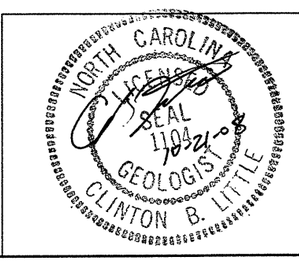
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING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

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

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

PERSONNEL
R. W. TODD
M. L. SMITH
A. C. SMITH

INVESTIGATED BY J. P. ROGERS
CHECKED BY C. B. LITTLE
SUBMITTED BY C. B. LITTLE
DATE AUGUST 2008



ID: I-3819A

PROJECT: 34192.1.2

DRAWN BY: C. E. BURRIS

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.
34192.1.2 (1-3819A)	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 # 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		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 SOILS				
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- _ MOBILE B-__
- _ BK-51
- _ CME-45C
- _ CME-550
- _ PORTABLE HOIST
- _ _____
- _ _____

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

HAMMER TYPE:
- _ AUTOMATIC _ MANUAL

CORE SIZE:
- _ -B-__
- _ -N-__
- _ -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:
-

REVISED 02/23/06

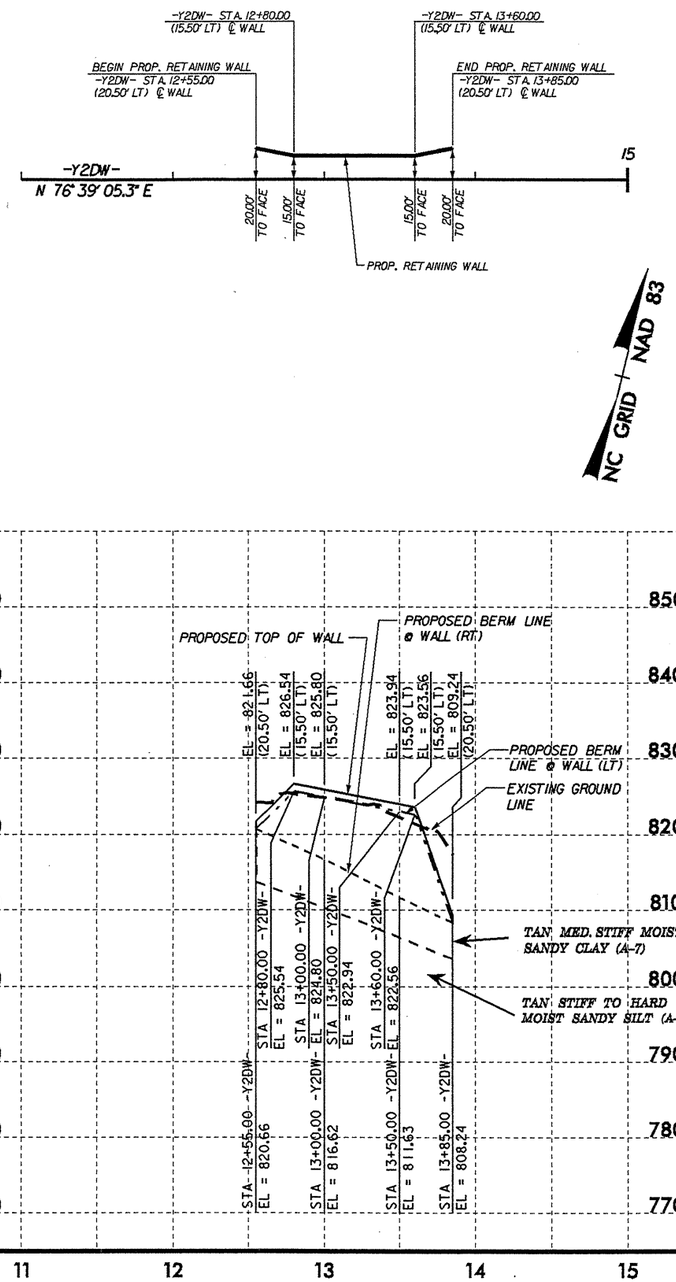
PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN OF RETAINING WALL

-Y2DW- STA. 12+55.00 LT TO -Y2DW- STA. 13+85.00 LT



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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	6

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION I40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171

SITE DESCRIPTION RETAINING WALL -Y2DW- STA. 13+10 RT TO -Y2DW- STA. 15+35 RT

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE
4	SITE PLAN WITH BORING
4	PROFILE WITH BORING
5	BORING LOG
6	SAMPLES

CAUTION NOTICE

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

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

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

PERSONNEL

R. W. TODD

M. L. SMITH

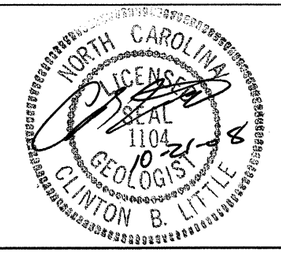
A. C. SMITH

INVESTIGATED BY J. P. ROGERS

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE AUGUST 2008



DRAWN BY: C. E. BURRIS /JP ROGERS

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: 34192.1.2

ID: I-3819A

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	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											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		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 SOILS				
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/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 0.50
	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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT / DPT PMT / 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ☐ MOBILE B-___
- ☐ BK-51
- ☐ CME-45C
- ☐ CME-550
- ☐ PORTABLE HOIST
- ☐ _____
- ☐ _____

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

HAMMER TYPE:
- ☐ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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.

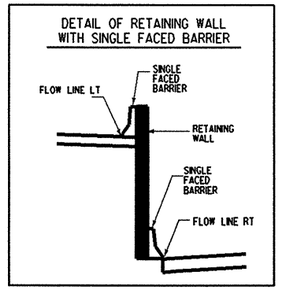
BENCH MARK:

ELEVATION: FT.

NOTES:

REVISED 02/23/06

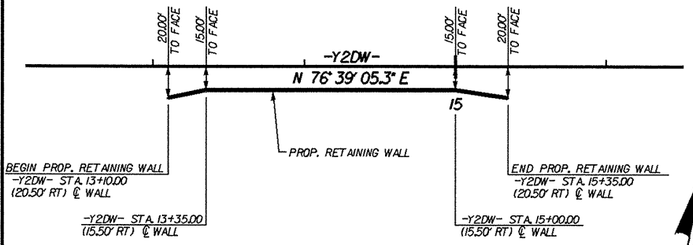
8/17/99



PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

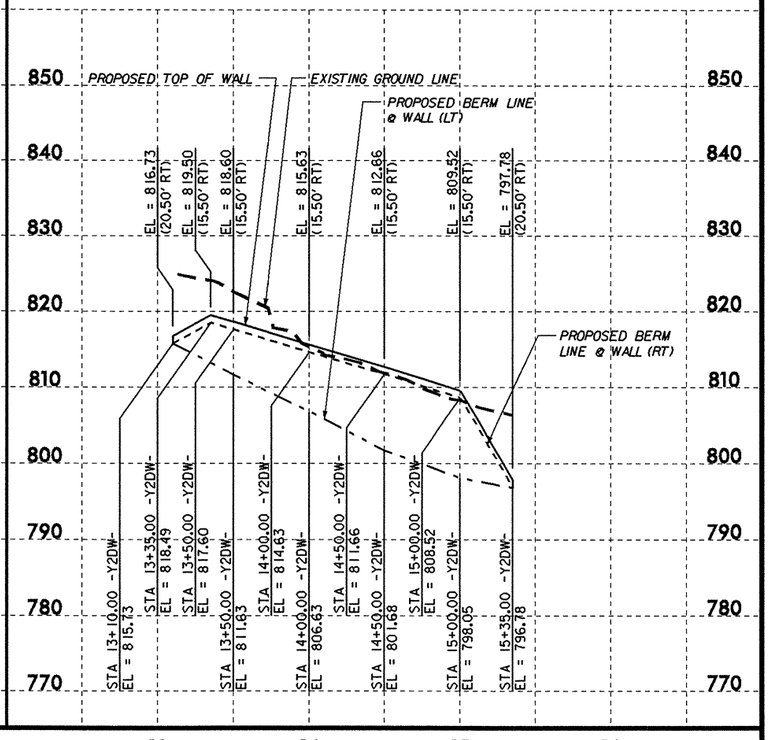
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NC GRID + NAD 83

PLAN OF RETAINING WALL
-Y2DW- STA. 13+10.00 RT TO -Y2DW- STA. 15+35.00 RT



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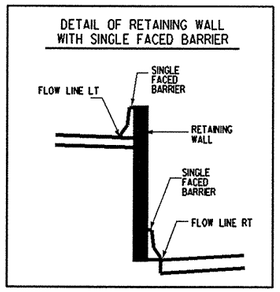
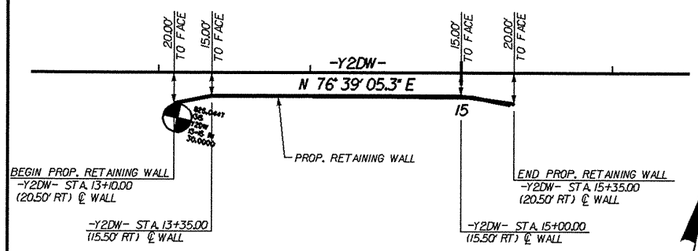


PROJECT REFERENCE NO.	SHEET NO.
I-3819A	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

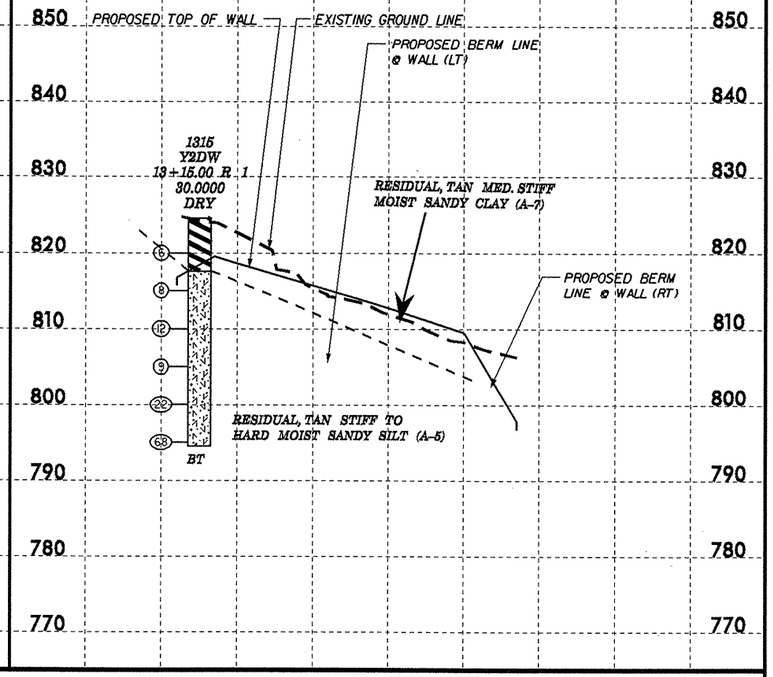
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PLAN OF RETAINING WALL
-Y2DW- STA. 13+10.00 RT TO -Y2DW- STA. 15+35.00 RT

NC GRID NAD 83



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jhopkins (Geopak Ver 2004.01)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

SHEET

5

PROJECT NO. 34192.1.2	**ID.** I3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL AT -Y2DW-			**GROUND WTR (ft)**
BORING NO. 1315	**STATION** 13+15	**OFFSET** 30ft RT	**ALIGNMENT** Y2DW	**0 HR.** N/A
COLLAR ELEV. N/A	**TOTAL DEPTH** 30.1 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 09/24/08	**COMP. DATE** 09/24/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										GROUND SURFACE 0.0
		3.6								**RESIDUAL** TAN MED. STIFF MOIST SANDY CLAY (A-7)
			2	3	3	6	SS-1	M		
		8.6								7.0
			2	4	4	8	SS-2	36%		**RESIDUAL** TAN STIFF TO HARD MOIST SANDY SILT (A-5)
		13.6								
			4	6	6	12	SS-3	43%		
		18.6								
			3	4	5	9		M		
		23.6								
			4	9	13	22		M		
		28.6								
			9	22	46	68		M		30.1
										Boring Terminated at Depth 30.1 ft TAN HARD MOIST SANDY SILT

NCDOT BORE SINGLE Y2DW_I3819A.GPJ NC_DOT.GDT 10/20/08

M & T Form 503

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

T. I. P. No. I-3819A

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 34192.1.2 **County** IREDELL **Owner**

Date: Sampled 9/8/08 **Received** 10/1/08 **Reported** 10/9/08

Sampled from RET WALL **By** J P ROGERS

Submitted by N WAINAINA 1995 **Standard Specifications**

749408 TO 749410
10/13/08

TEST RESULTS

Proj. Sample No.		SS-1	SS-2	SS-3			
Lab. Sample No.		749408	749409	749410			
Retained #4 Sieve	%	-	-	-			
Passing #10 Sieve	%	100	100	99			
Passing #40 Sieve	%	95	94	84			
Passing #200 Sieve	%	62	57	51			

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	12.7	15.5	25.5			
Fine Sand Ret - #270	%	33.9	35.9	29.1			
Silt 0.05 - 0.005 mm	%	31.3	28.5	25.3			
Clay < 0.005 mm	%	22.1	20.1	20.1			
Passing #40 Sieve	%	-	-	-			
Passing #200 Sieve	%	-	-	-			

L. L.		50	46	48			
P. I.		11	10	10			
AASHTO Classification		A-7-5(7)	A-5(5)	A-5(4)			
Station		13+15	13+15	13+15			
OFFSET		30 RT	30 RT	30 RT			
ALIGNMENT		Y-2DW	Y-2DW	Y-2DW			
Depth (Ft)		3.60	8.60	13.60			
	to	5.10	10.10	15.10			

cc: J P ROGERS
Soils File

Soils Engineer

M & T Form 503

6/6

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

T. I. P. No. I-3819A

REPORT ON SAMPLES OF SOILS FOR MOISTURE

Project 34192.1.2 **County** IREDELL **Owner**

Date: Sampled 9/8/08 **Received** 10/8/08 **Reported** 10/10/08

Sampled from RET WALL **By** J P ROGERS

Submitted by N WAINAINA 1995 **Standard Specifications**

749420 TO 749421
10/17/08

TEST RESULTS

Proj. Sample No.		MS-2	MS-3				
Lab. Sample No.		749420	749421				
Retained #4 Sieve	%	-	-				
Passing #10 Sieve	%						
Passing #40 Sieve	%						
Passing #200 Sieve	%						

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%						
Fine Sand Ret - #270	%						
Silt 0.05 - 0.005 mm	%						
Clay < 0.005 mm	%						
Passing #40 Sieve	%	-	-				
Passing #200 Sieve	%	-	-				

L. L.							
P. I.							
AASHTO Classification							
Station		13+15	13+15				
OFFSET		30 RT	30 RT				
ALIGNMENT		Y2DW	Y2DW				
Depth (Ft)		8.60	13.60				
	to	10.10	15.10				
%MOISTURE		35.8	43.3				

cc: J P ROGERS
Soils File

Soils Engineer

Page 1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	7

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171*

SITE DESCRIPTION *RETAINING WALL -L- STA. 28+50.00 LT TO -L- STA. 35+75.00 LT*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE
4 - 6	BORE LOGS
7	SOIL TEST RESULTS

CAUTION NOTICE

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

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

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

PERSONNEL

J. K. STICKNEY

C. L. SMITH

M. MAULDIN

R. W. TODD

M. L. SMITH

A. C. SMITH

INVESTIGATED BY *J. P. ROGERS*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *AUGUST 2008*

NORTH CAROLINA PROFESSIONAL SEAL 25521 ENGINEER JOHN L. PILIPCHUK 12/12/08

DRAWN BY: *C. E. BURRIS*

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: 34192.1.2

ID: I-3819A

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	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											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		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 SOILS				
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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:

REVISED 02/23/06

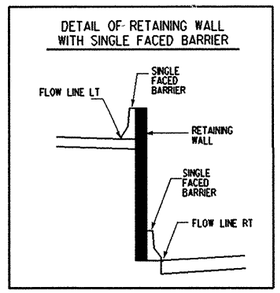
PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

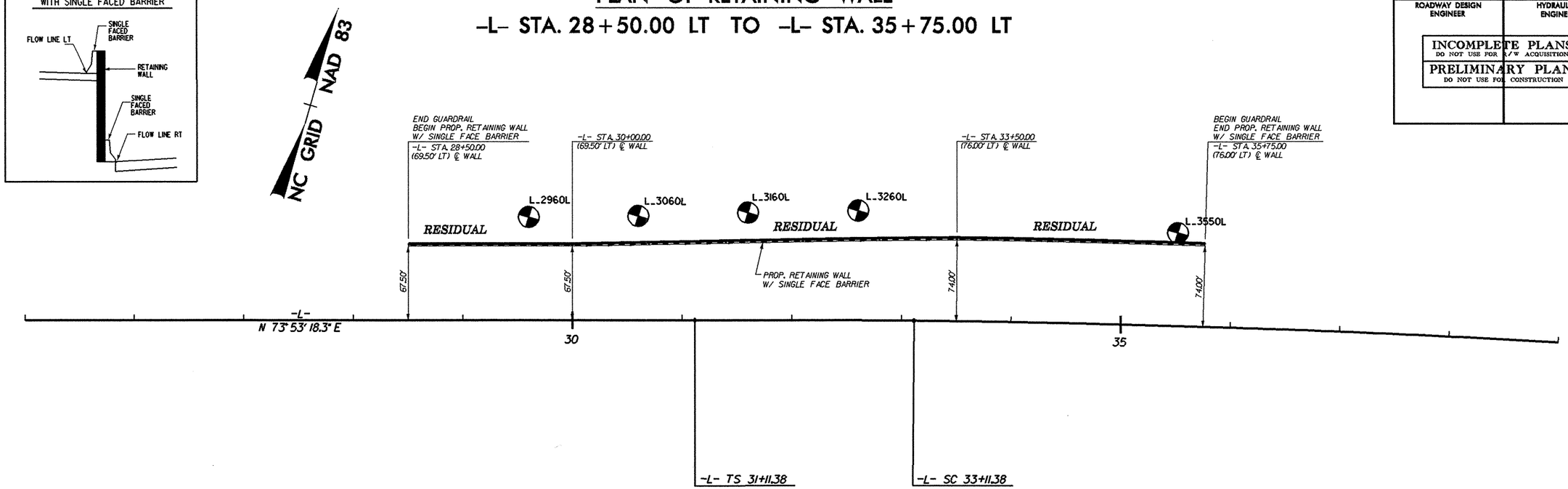
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

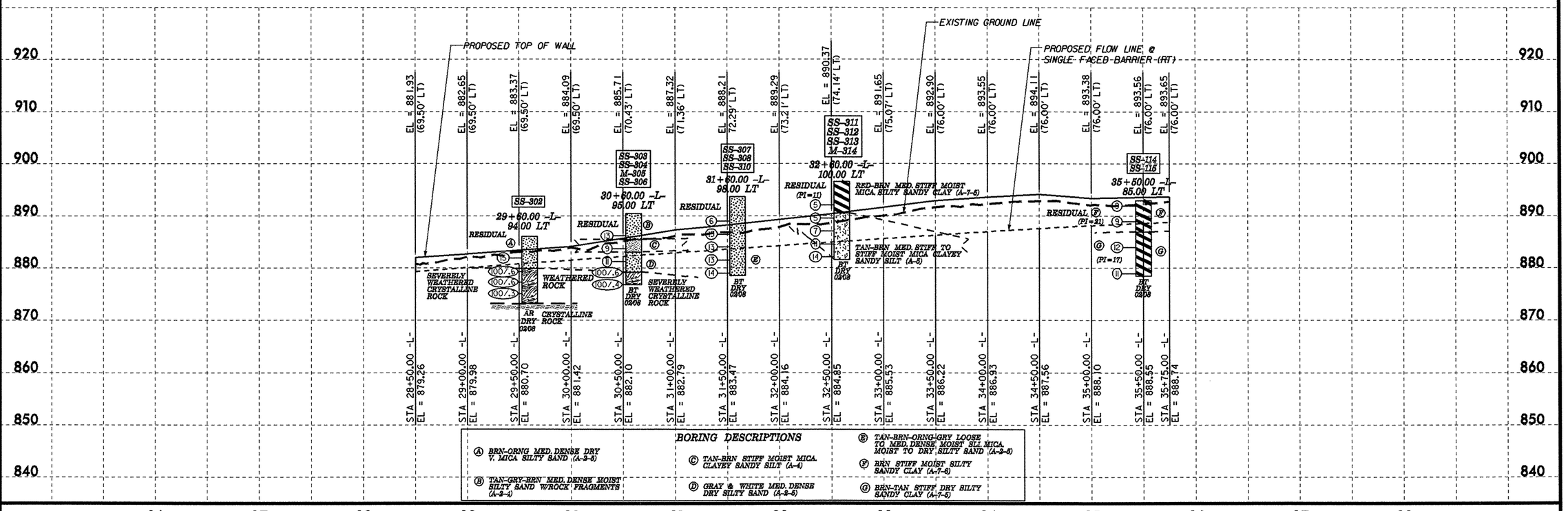
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN OF RETAINING WALL

-L- STA. 28+50.00 LT TO -L- STA. 35+75.00 LT







BORING DESCRIPTIONS

- (A) BRN-ORNG MED. DENSE DRY V. MICA SILTY SAND (A-2-5)
- (B) TAN-GRY-BRN MED. DENSE MOIST SILTY SAND W/ROCK FRAGMENTS (A-2-4)
- (C) TAN-BRN STIFF MOIST MICA. CLAYEY SANDY SILT (A-4)
- (D) GRAY & WHITE MED. DENSE DRY SILTY SAND (A-2-5)
- (E) TAN-BRN-ORNG-GRY LOOSE TO MED. DENSE MOIST SLI. MICA. MOIST TO DRY SILTY SAND (A-2-5)
- (F) BRN STIFF MOIST SILTY SANDY CLAY (A-7-6)
- (G) BRN-TAN STIFF DRY SILTY SANDY CLAY (A-7-5)

8/17/99

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION RETAINING WALL -L- STA. 28+50 LT TO -L- STA. 35+75 LT				**GROUND WTR (ft)**
BORING NO. L_2960L	**STATION** 29+60	**OFFSET** 94ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 886.1 ft	**TOTAL DEPTH** 12.9 ft	**NORTHING** 753,107	**EASTING** 1,438,217	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/27/08	**COMP. DATE** 02/27/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 12.9 ft	

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
	890									886.1	GROUND SURFACE	0.0
885	882.9	3.2	1	3	12	15	SS-302	D		879.9	**RESIDUAL** BRN-ORNG MED. DENSE DRY V. MICA SILTY SAND (A-2-5)	6.2
880	880.4	5.7	12	60	40/.1	100/.6		D		873.2	**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	12.9
	877.9	8.2	80	20/.1		100/.6		D			Boring Terminated BY AUGER REFUSAL at Elevation 873.2 ft ON CRYSTALLINE ROCK	
875	875.4	10.7	100/.3			100/.3		D				
870												
865												
860												
855												
850												
845												
840												
835												
830												
825												
820												
815												
810												

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_L_2850-3575.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION RETAINING WALL -L- STA. 28+50 LT TO -L- STA. 35+75 LT				**GROUND WTR (ft)**
BORING NO. L_3060L	**STATION** 30+60	**OFFSET** 95ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 890.5 ft	**TOTAL DEPTH** 13.7 ft	**NORTHING** 753,135	**EASTING** 1,438,313	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/27/08	**COMP. DATE** 02/27/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
	895									890.5	GROUND SURFACE	0.0
890	887.2	3.3	2	3	10	13	SS-303			885.5	**RESIDUAL** TAN-GRY-BRN MED. DENSE MOIST SILTY SAND W/ ROCK FRAGMENTS (A-2-4)	5.0
885	884.7	5.8	5	6	3	9	SS-304	19%		883.0	**RESIDUAL** TAN-BRN STIFF MOIST MICA. CLAYEY SANDY SILT (A-4)	7.5
880	882.2	8.3	4	5	6	11	SS-306	D		879.2	**RESIDUAL** GRAY & WHITE MED. DENSE DRY SILTY SAND (A-2-5)	11.3
	879.7	10.8	15	50	50/.1	100/.6		D		876.8	**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	13.7
875	877.2	13.3	100/.4			100/.4		D			Boring Terminated at Elevation 876.8 ft IN SEVERELY WEATHERED CRYSTALLINE ROCK	
870											Other Samples: M-305 (6.3 - 7.3)	
865												
860												
855												
850												
845												
840												
835												
830												
825												
820												
815												

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_L_2850-3575.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION RETAINING WALL -L- STA. 28+50 LT TO -L- STA. 35+75 LT				**GROUND WTR (ft)**
BORING NO. L_3160L	**STATION** 31+60	**OFFSET** 98ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 893.7 ft	**TOTAL DEPTH** 15.2 ft	**NORTHING** 753,166	**EASTING** 1,438,408	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/28/08	**COMP. DATE** 02/28/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	895									893.7 GROUND SURFACE 0.0
										RESIDUAL TAN-BRN-ORNG-GRY LOOSE TO MED. DENSE MOIST SLI. MICA. MOIST TO DRY SILTY SAND (A-2-5)
890	890.0	3.7								
	887.5	6.2	2	2	4	6, 13	SS-307			
885	885.0	8.7	7	7	6					
	882.5	11.2	5	6	7	13, 13	SS-308			
880	880.0	13.7	5	7	6					
			6	8	6	14	SS-310	D		878.5 15.2
875										Boring Terminated at Elevation 878.5 ft IN MEDIUM DENSE CLAYEY SILTY SAND
870										
865										
860										
855										
850										
845										
840										
835										
830										
825										
820										
815										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_L_2850-3575.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION RETAINING WALL -L- STA. 28+50 LT TO -L- STA. 35+75 LT				**GROUND WTR (ft)**
BORING NO. L_3260L	**STATION** 32+60	**OFFSET** 100ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 896.6 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 753,196	**EASTING** 1,438,504	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/28/08	**COMP. DATE** 02/28/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	900									896.6 GROUND SURFACE 0.0
895										**RESIDUAL** RED-BRN MED. STIFF MOIST MICA. SILTY SANDY CLAY (A-7-5)
	893.1	3.5								890.6 6.0
890	890.6	6.0	1	2	3	5	SS-311	M		**RESIDUAL** TAN-BRN MED. STIFF TO STIFF MOIST MICA CLAYEY SANDY SILT (A-5)
	888.1	8.5	3	3	2	5	SS-312	M		
885	885.6	11.0	2	3	4	7	SS-313	M 26%		
	883.1	13.5	5	6	5	11				
			5	6	8	14				881.6 15.0
880										Boring Terminated at Elevation 881.6 ft IN STIFF CLAYEY SANDY SILT
875										Other Samples: M-314 (9.0 - 10.0)
870										
865										
860										
855										
850										
845										
840										
835										
830										
825										
820										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_L_2850-3575.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	ID. I-3819A	COUNTY IREDELL		GEOLOGIST Todd, R. W.
SITE DESCRIPTION RETAINING WALL -L- STA. 38+50 LT TO -L- STA. 35+75 LT				GROUND WTR (ft)
BORING NO. L_3550L	STATION 35+50	OFFSET 85ft LT	ALIGNMENT -L-	0 HR. NM
COLLAR ELEV. 893.0 ft	TOTAL DEPTH 14.5 ft	NORTHING 753,258	EASTING 1,438,790	24 HR. Dry
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers			HAMMER TYPE Automatic
START DATE 04/09/08	COMP. DATE 04/09/08	SURFACE WATER DEPTH N/A		DEPTH TO ROCK 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
	895									ELEV. (ft) DEPTH (ft)
	893.0	0.0								893.0 GROUND SURFACE 0.0
890	890.0	3.0	4	4	5	9	SS-114	M		**RESIDUAL** BRN STIFF MOIST MED PLASTIC (PI=21) SILTY SANDY CLAY (A-7-6)
885	885.0	8.0	3	4	5	9		M		887.0 6.0
880	880.0	13.0	3	5	7	12	SS-115	D		**RESIDUAL** BRN-TAN STIFF DRY MED PLASTIC (PI=17) SILTY SANDY CLAY (A-7-5)
			3	5	6	11		D		878.5 14.5
875										Boring Terminated at Elevation 878.5 ft IN STIFF SILTY SANDY CLAY
870										
865										
860										
855										
850										
845										
840										
835										
830										
825										
820										
815										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_L_2850-3575.GPJ NC_DOT.GDT 09/02/08

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	
SS-114	85 LT	35+50	0.00-1.50	A-7-6(14)	47	21	16.6	17.8	13.1	52.5	100	91	68			L
SS-115	85 LT	35+50	8.00-9.50	A-7-5(14)	53	17	12.2	20.9	32.5	34.5	100	94	73			L
SS-302	94 LT	29+60	3.70-4.70	A-2-5(0)	53	10	37.6	39.4	17.1	6.0	90	72	25	-	-	L
SS-303	95 LT	30+60	3.80-4.80	A-2-4(0)	34	5	36.5	38.0	19.5	6.0	94	72	31	-	-	L
SS-304	95 LT	30+60	6.30-7.30	A-4(0)	35	3	27.9	36.9	23.1	12.0	88	72	37	-	-	L
M-305	95 LT	30+60	6.30-7.30											18.8		L
SS-306	95 LT	30+60	8.80-9.80	A-2-5(0)	44	NP	29.7	43.8	18.5	8.0	96	78	32	-	-	L
SS-307	98 LT	31+60	4.20-5.20	A-2-5(0)	43	NP	32.7	41.4	17.9	8.0	94	75	32	-	-	L
SS-308	98 LT	31+60	9.20-10.20	A-2-5(0)	55	NP	25.7	49.4	10.8	14.1	97	83	32	-	-	L
SS-310	98 LT	31+60	14.20-15.20	A-2-5(0)	50	NP	35.3	40.0	16.7	8.0	83	65	25	-	-	L
SS-311	100 LT	32+60	4.00-5.00	A-7-5(8)	52	11	15.7	25.5	28.7	30.1	99	89	65	-	-	L
SS-312	100 LT	32+60	6.50-7.50	A-5(2)	55	6	15.7	44.8	23.5	16.1	98	90	47	-	-	L
SS-313	100 LT	32+60	9.00-10.00	A-5(3)	57	10	20.7	39.2	22.1	18.1	100	90	46	-	-	L
M-314	100 LT	32+60	9.00-10.00				0.0	0.0	0.0	0.0		0	0	25.8	-	L

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171

SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 11+50.00 RT TO -Y4RPC- STA. 21+00.00 RT

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3 - 4	SITE PLAN
3 - 4	PROFILE
5 - 12	BORE LOGS
13	SOIL TEST RESULTS

CAUTION NOTICE

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

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

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

PERSONNEL

R. W. TODD

M. L. SMITH

A. C. SMITH

INVESTIGATED BY J. P. ROGERS

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE SEPTEMBER 2008

NORTH CAROLINA PROFESSIONAL SEAL 25521 ENGINEER JOHN L. PILIPCHUK 10/22/08

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: C. E. BURRIS

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	2

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, SETY 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											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		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 SOILS				
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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:

REVISED 02/23/06

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

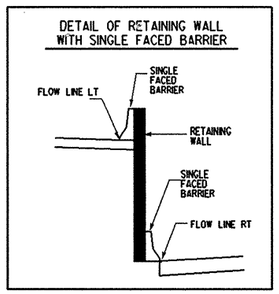
PLAN OF RETAINING WALL

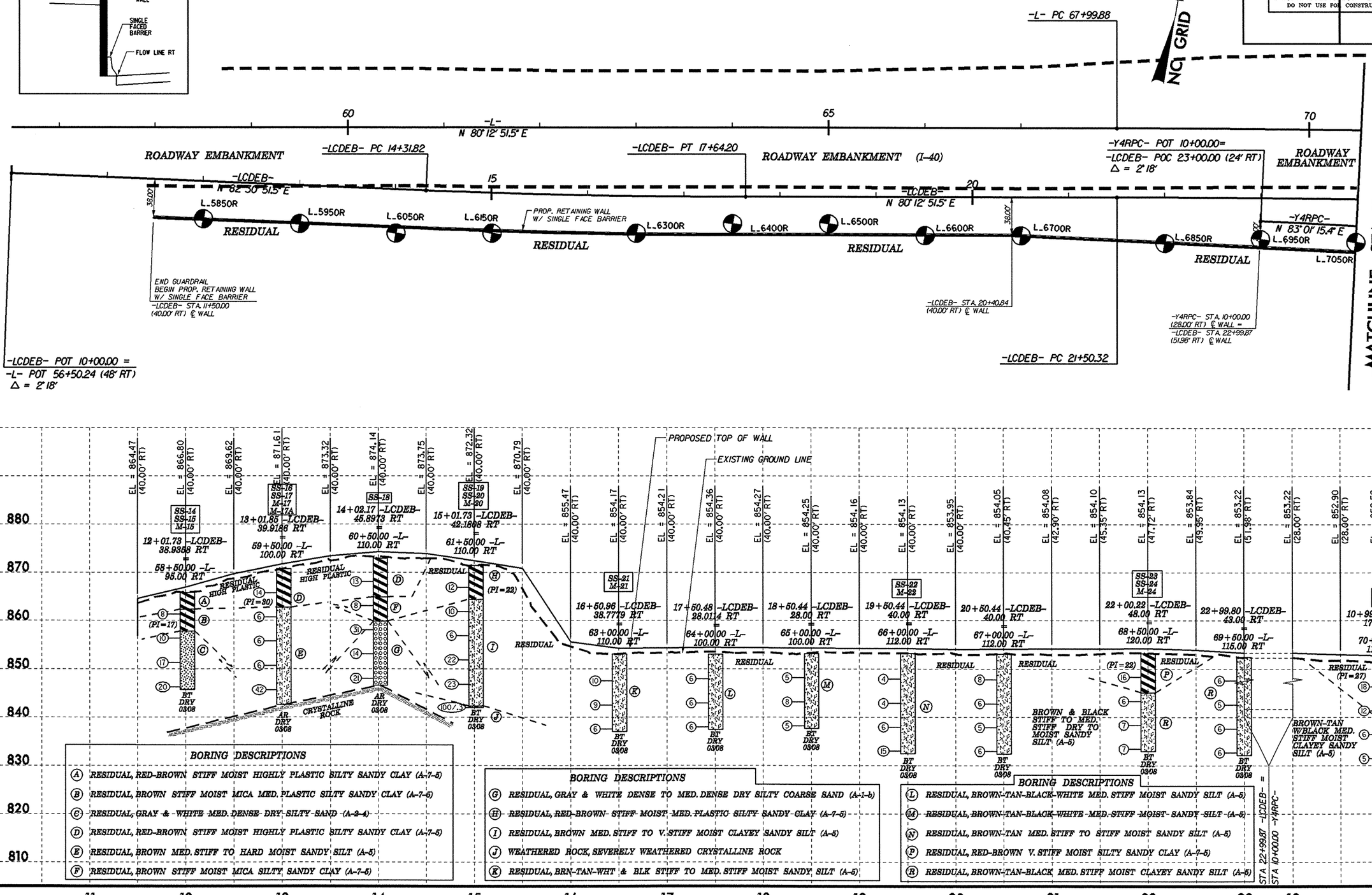
-LCDEB- STA. 11+50.00 RT TO -Y4RPC- STA. 21+00.00 RT

(SHEET 1 OF 2)

NC GRID NAD 83

DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER





BORING DESCRIPTIONS

- (A) RESIDUAL, RED-BROWN STIFF MOIST HIGHLY PLASTIC SILTY SANDY CLAY (A-7-5)
- (B) RESIDUAL, BROWN STIFF MOIST MICA MED. PLASTIC SILTY SANDY CLAY (A-7-6)
- (C) RESIDUAL, GRAY & WHITE MED. DENSE DRY SILTY SAND (A-2-4)
- (D) RESIDUAL, RED-BROWN STIFF MOIST HIGHLY PLASTIC SILTY SANDY CLAY (A-7-5)
- (E) RESIDUAL, BROWN MED. STIFF TO HARD MOIST SANDY SILT (A-5)
- (F) RESIDUAL, BROWN STIFF MOIST MICA SILTY SANDY CLAY (A-7-5)

BORING DESCRIPTIONS

- (G) RESIDUAL, GRAY & WHITE DENSE TO MED. DENSE DRY SILTY COARSE SAND (A-1-b)
- (H) RESIDUAL, RED-BROWN STIFF MOIST MED. PLASTIC SILTY SANDY CLAY (A-7-5)
- (I) RESIDUAL, BROWN MED. STIFF TO V. STIFF MOIST CLAYEY SANDY SILT (A-5)
- (J) WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK
- (K) RESIDUAL, BRN-TAN-WHT & BLK STIFF TO MED. STIFF MOIST SANDY SILT (A-5)

BORING DESCRIPTIONS

- (L) RESIDUAL, BROWN-TAN-BLACK-WHITE MED. STIFF MOIST SANDY SILT (A-5)
- (M) RESIDUAL, BROWN-TAN-BLACK-WHITE MED. STIFF MOIST SANDY SILT (A-5)
- (N) RESIDUAL, BROWN-TAN MED. STIFF TO STIFF MOIST SANDY SILT (A-5)
- (P) RESIDUAL, RED-BROWN V. STIFF MOIST SILTY SANDY CLAY (A-7-5)
- (R) RESIDUAL, BROWN-TAN-BLACK MED. STIFF MOIST CLAYEY SANDY SILT (A-5)

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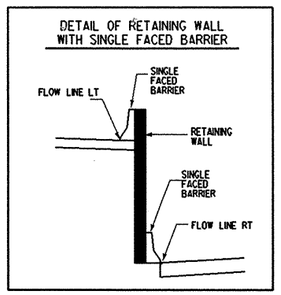
All Units: Feet

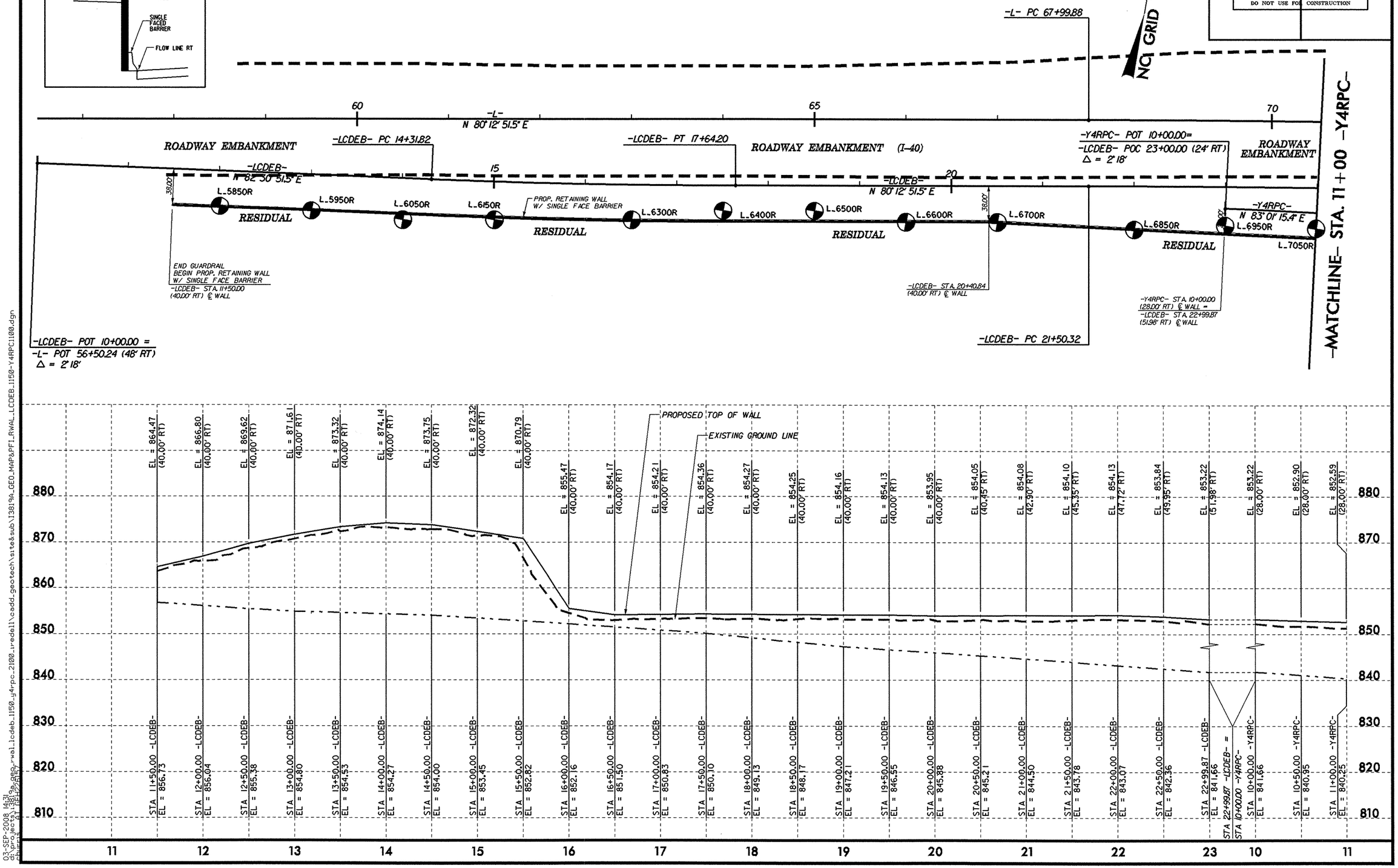
PLAN OF RETAINING WALL

-LCDEB- STA. 11+50.00 RT TO -Y4RPC- STA. 21+00.00 RT
(SHEET 1 OF 2)

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





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PROJECT REFERENCE NO.	SHEET NO.
I-3819A	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN OF RETAINING WALL

-LCDEB- STA. 11+50.00 RT TO -Y4RPC- STA. 21+00.00 RT

(SHEET 2 OF 2)

NC GRID NAD 83

-MATCHLINE- STA. 11+00 -Y4RPC-

ROADWAY EMBANKMENT (I-40)

ROADWAY EMBANKMENT (I-40)

-L- PRC 75+82.25

-L- PT 83+64.63

-LCDEB- PRC 29+29.38

-LCDEB- PT 37+15.06

-Y4RPC- N 83°01'15.4" E

L_7050R

L_7200R

L_7500R

L_7800R -Y4RPC- N 85°04'25.7" E

L_8000R

26.00'

35.93'

RESIDUAL

BST

ROADWAY EMBANKMENT

-Y4RPC- PC 11+95.36

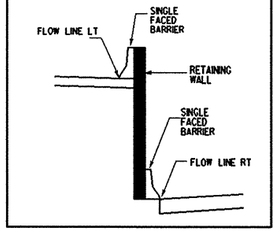
-Y4RPC- PT 14+10.34

PROP. RETAINING WALL W/ SINGLE FACE BARRIER

-Y4RPC- STA. 19+34.52 (28.00' RT) ℄ WALL

BEGIN GUARDRAIL
END PROP. RETAINING WALL W/ SINGLE FACE BARRIER
-Y4RPC- STA. 21+00.00 (37.93' RT) ℄ WALL

DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER



PROPOSED TOP OF WALL

EXISTING GROUND LINE

EL = 852.59 (28.00' RT)
EL = 851.03 (28.00' RT)
EL = 848.83 (28.00' RT)
EL = 844.90 (28.00' RT)
EL = 841.60 (28.00' RT)
EL = 839.39 (28.00' RT)
EL = 838.69 (28.00' RT)
EL = 837.98 (28.00' RT)
EL = 837.27 (28.00' RT)
EL = 836.57 (28.00' RT)
EL = 835.86 (28.00' RT)
EL = 835.16 (28.00' RT)
EL = 834.36 (28.00' RT)
EL = 833.26 (28.00' RT)
EL = 831.88 (28.00' RT)
EL = 830.19 (28.00' RT)
EL = 828.21 (28.00' RT)
EL = 825.91 (28.93' RT)
EL = 823.27 (31.93' RT)
EL = 820.33 (34.93' RT)
EL = 817.10 (37.93' RT)

SS-25
M-25
10+99.89 -Y4RPC- 17.2962 RT
=
70+50.00 -L- 117.00 RT

SS-26
12+47.64 -Y4RPC- 24.3680 LT
=
72+00.00 -L- 80.00 RT

SS-27
SS-28
SS-29
16+45.00 -Y4RPC- 27.8175 LT
=
75+00.00 -L- 90.00 RT

SS-30
18+47.83 -Y4RPC- 6.1250 LT
=
78+00.00 -L- 125.00 RT

20+51.82 -Y4RPC- 27.21 RT
=
80+00.00 -L- 170.00 RT

RESIDUAL (PI=27)

RESIDUAL (PI=19)

BROWN-TAN WITH BLACK STIFF MOIST CLAYEY SANDY SILT (A-6)

ROADWAY EMBANKMENT BROWN- MED. STIFF- MOIST MED. PLASTIC (PI=17) SILTY SANDY CLAY (A-6)

BROWN-TAN-WHITE-BLACK MED. STIFF TO SOFT MOIST TO WET CLAYEY SANDY SILT (A-6)

BROWN-TAN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-6)

RESIDUAL RED-BROWN WITH BLACK MED. STIFF TO STIFF MOIST MED. PLASTIC SILTY SANDY CLAY (A-7-6, A-7-5)

BROWN-TAN-BLACK-WHITE MED. STIFF MOIST CLAYEY SANDY SILT (A-6)

BT DRY 0308

BORING DESCRIPTIONS

(S) RESIDUAL, RED-BROWN V. STIFF TO STIFF MOIST HIGHLY PLASTIC SILTY SANDY CLAY (A-7-6)

(T) RESIDUAL, BROWN-TAN WITH BLACK MED. STIFF MOIST CLAYEY SANDY SILT (A-6)

(U) RESIDUAL, RED-BROWN STIFF MOIST SILTY SANDY CLAY (A-7-6)

(V) RESIDUAL, BROWN MED. STIFF MOIST MED. PLASTIC SILTY SANDY CLAY (A-7-6)

(X) RED-BROWN STIFF TO MED. STIFF MOIST MED. PLASTIC SILTY SANDY CLAY (A-7-6)

870 860 850 840 830 820 810 800 790

11 12 13 14 15 16 17 18 19 20 21

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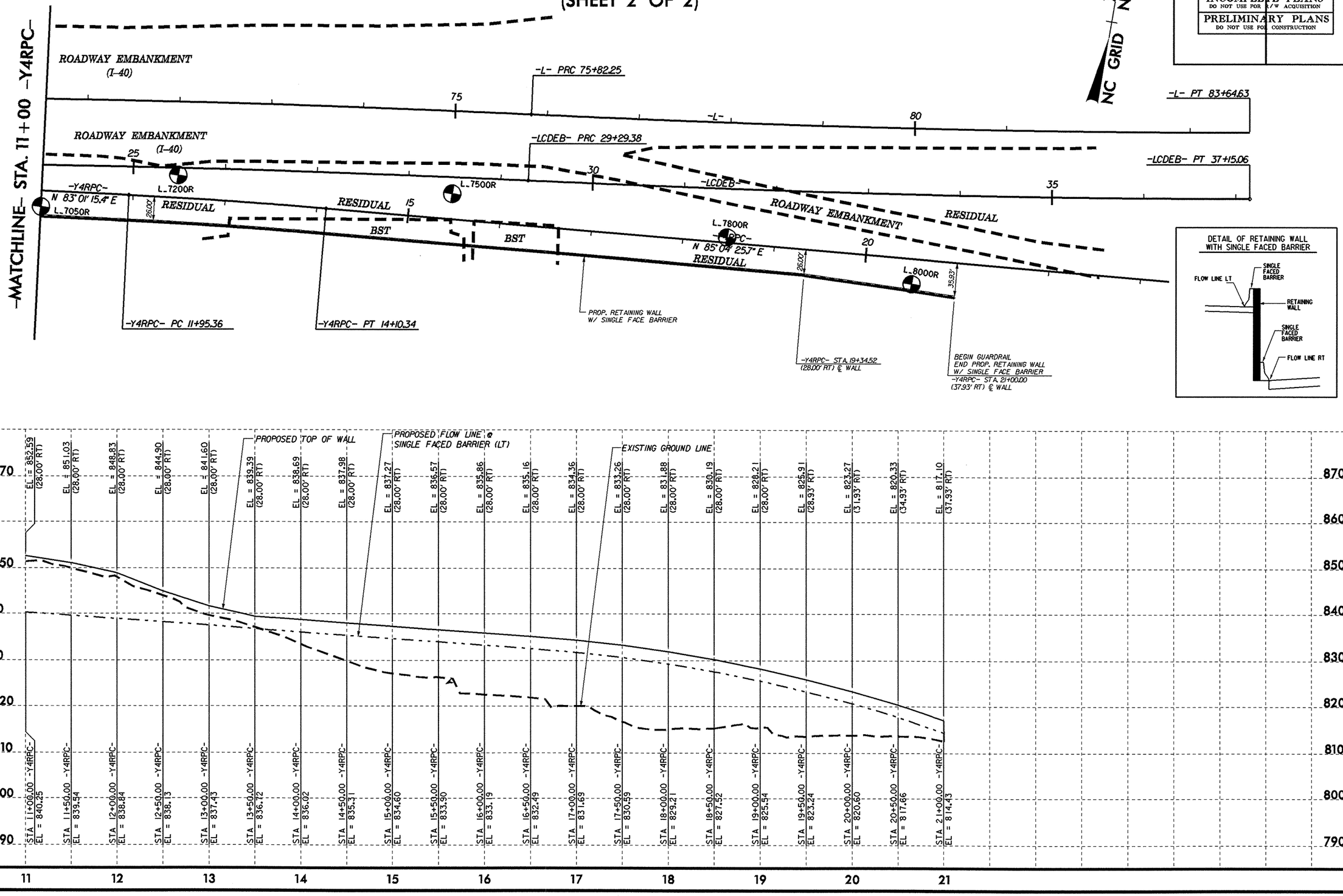
PROJECT REFERENCE NO.	SHEET NO.
I-3819A	4A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN OF RETAINING WALL
-LCDEB- STA. 11+50.00 RT TO -Y4RPC- STA. 21+00.00 RT
(SHEET 2 OF 2)



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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_5850R	**STATION** 58+50	**OFFSET** 95ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 865.8 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 753,512	**EASTING** 1,441,086	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
870	870									
865										865.8 GROUND SURFACE 0.0
	862.3	3.5								**RESIDUAL** RED-BROWN STIFF MOIST HIGHLY PLASTIC SILTY SANDY CLAY (A-7-5) 862.3 3.5
860			2	3	5	8	SS-14	M		**RESIDUAL** BROWN STIFF MOIST MICA MED. PLASTIC (PI=17) SILTY SANDY CLAY (A-7-5) 857.8 8.0
	857.3	8.5								
855			3	6	4	10	SS-15	18% D		**RESIDUAL** GRAY & WHITE MED. DENSE DRY SILTY SAND (A-2-4)
	852.3	13.5								
850			3	8	9	17		D		
	847.3	18.5								
845			3	10	10	20		D		845.8 20.0
										Boring Terminated at Elevation 845.8 ft IN MED. DENSE SILTY SAND
840										Other Samples: M-15 (8.5 - 10.0)
835										
830										
825										
820										
815										
810										
805										
800										
795										
790										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_5950R	**STATION** 59+50	**OFFSET** 100ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 870.7 ft	**TOTAL DEPTH** 28.1 ft	**NORTHING** 753,524	**EASTING** 1,441,186	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/08/08	**COMP. DATE** 02/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 28.1 ft	

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)
	875									
870										870.7 GROUND SURFACE 0.0
	866.7	4.0								**RESIDUAL** RED-BROWN STIFF MOIST HIGHLY PLASTIC (PI=30) SILTY SANDY CLAY (A-7-5)
865			3	6	8	14	S-16	M		
	861.7	9.0								862.7 8.0
860			3	3	3	6		M		**RESIDUAL** BROWN MED. STIFF TO HARD MOIST SANDY SILT (A-5)
	856.7	14.0								
855			3	3	3	6	SS-17	16% M		
	851.7	19.0								
850			3	3	3	6		20%		
	846.7	24.0								
845			7	19	23	42		M		
										842.6 28.1
840										Boring Terminated BY AUGER REFUSAL at Elevation 842.6 ft ON CRYSTALLINE ROCK
835										Other Samples: M-17 (14.0 - 15.5) M-17A (19.0 - 20.5)
830										
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT			**GROUND WTR (ft)**
BORING NO. L_6050R	**STATION** 60+50	**OFFSET** 110ft RT	**ALIGNMENT** -L- — **0 HR.** NM
COLLAR ELEV. 872.8 ft	**TOTAL DEPTH** 26.2 ft	**NORTHING** 753,531	**EASTING** 1,441,286 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 26.2 ft

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)
	875									
										872.8 GROUND SURFACE 0.0
870										**RESIDUAL** RED-BROWN STIFF MOIST HIGHLY PLASTIC SILTY SANDY CLAY (A-7-5)
	869.0	3.8	3	6	7	13		M		
865										864.8 8.0
	864.0	8.8	4	4	4	8		M		**RESIDUAL** BROWN STIFF MOIST MICA SILTY SANDY CLAY (A-7-5)
860	859.0	13.8								859.8 13.0
			4	12	19	31	SS-18	D		**RESIDUAL** GRAY & WHITE DENSE TO MED. DENSE DRY SILTY COARSE SAND (A-1-b)
855	854.0	18.8								
			6	10	4	14		D		
850	849.0	23.8								
			6	4	17	21		D		
845										846.6 26.2
										Boring Terminated BY AUGER REFUSAL at Elevation 846.6 ft ON CRYSTALLINE ROCK
840										
835										
830										
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT			**GROUND WTR (ft)**
BORING NO. L_6150R	**STATION** 61+50	**OFFSET** 110ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 871.3 ft	**TOTAL DEPTH** 29.3 ft	**NORTHING** 753,548	**EASTING** 1,441,384 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	875									
										871.3 GROUND SURFACE 0.0
870										**RESIDUAL** RED-BROWN STIFF MOIST MED. PLASTIC (PI=22) SILTY SANDY CLAY (A-7-5)
	867.8	3.5					S-19	M		
865			4	6	6	12		M		
	862.8	8.5								864.3 7.0
860			6	5	5	10		M		**RESIDUAL** BROWN MED. STIFF TO V. STIFF MOIST CLAYEY SANDY SILT (A-5)
	857.8	13.5								
855			2	3	3	6	SS-20	M		
	852.8	18.5								
850			17	9	13	22		21% M		
	847.8	23.5								
845			5	7	16	23		M		
	842.8	28.5	17	100/.3		100/.3				842.3 29.0
										842.0 29.3
840										**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
										Boring Terminated at Elevation 842.0 ft IN SEVERELY WEATHERED CRYSTALLINE ROCK
835										
830										Other Samples: M-20 (18.5 - 20.0)
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6300R	**STATION** 63+00	**OFFSET** 110ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 853.0 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 753,574	**EASTING** 1,441,532	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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)
	855									853.0 GROUND SURFACE 0.0
850										**RESIDUAL** BRN-TAN-WHT & BLK STIFF TO MED. STIFF MOIST SANDY SILT (A-5)
	848.5	4.5	5	5	5	10	SS-21	34% M		
845	843.5	9.5	3	4	5	9		M		
840	838.5	14.5	3	3	3	6		M		837.0 16.0
835										Boring Terminated at Elevation 837.0 ft IN MED. STIFF SANDY SILT
830										Other Samples: M-21 (4.5 - 6.0)
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6400R	**STATION** 64+00	**OFFSET** 100ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 852.9 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 753,600	**EASTING** 1,441,629	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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)
	855									852.9 GROUND SURFACE 0.0
850										**RESIDUAL** BROWN-TAN-BLACK-WHITE MED. STIFF MOIST SANDY SILT (A-5)
	848.9	4.0	3	3	3	6		M		
845	843.9	9.0	3	3	3	6		M		
840	838.9	14.0	3	3	3	6		M		837.4 15.5
835										Boring Terminated at Elevation 837.4 ft IN MED. STIFF SANDY SILT
830										
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6500R	**STATION** 65+00	**OFFSET** 100ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 853.1 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 753,617	**EASTING** 1,441,728	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	855									
										853.1 GROUND SURFACE 0.0
850	849.2	3.9								**RESIDUAL** BROWN-TAN-BLACK-WHITE MED. STIFF MOIST SANDY SILT (A-5)
			2	2	3	5		M		
845	844.2	8.9								
			4	4	4	8		M		
840	839.2	13.9								
			3	2	3	5		M		837.7 15.4
835										Boring Terminated at Elevation 837.7 ft IN MED. STIFF SANDY SILT
830										
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6600R	**STATION** 66+00	**OFFSET** 112ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 853.1 ft	**TOTAL DEPTH** 20.7 ft	**NORTHING** 753,623	**EASTING** 1,441,828	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	855									
										853.1 GROUND SURFACE 0.0
850	848.9	4.2								**RESIDUAL** BROWN-TAN MED. STIFF TO STIFF MOIST SANDY SILT (A-5)
			2	2	2	4	SS-22	D		
845	843.9	9.2								
			2	2	2	4		19% M		
840	838.9	14.2								
			2	3	3	6		M		
835	833.9	19.2								
			22	10	5	15		M		832.4 20.7
830										Boring Terminated at Elevation 832.4 ft IN MED. STIFF TO STIFF SANDY SILT
825										Other Samples: M-22 (9.2 - 10.7)
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6700R	**STATION** 67+00	**OFFSET** 112ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 853.0 ft	**TOTAL DEPTH** 20.7 ft	**NORTHING** 753,640	**EASTING** 1,441,927	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
	855									ELEV. (ft) 853.0 GROUND SURFACE DEPTH (ft) 0.0
850	848.8	4.2	4	4	4	8		D		**RESIDUAL** BROWN & BLACK STIFF TO MED. STIFF DRY TO MOIST SANDY SILT (A-5)
845	843.8	9.2	3	3	3	6		D		
840	838.8	14.2	3	2	3	5		M		
835	833.8	19.2	2	3	3	6		M		ELEV. (ft) 832.3 DEPTH (ft) 20.7 Boring Terminated at Elevation 832.3 ft IN MED. STIFF SANDY SILT
830										
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6850R	**STATION** 68+50	**OFFSET** 120ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 853.1 ft	**TOTAL DEPTH** 20.3 ft	**NORTHING** 753,657	**EASTING** 1,442,076	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
	855									ELEV. (ft) 853.1 GROUND SURFACE DEPTH (ft) 0.0
850	849.3	3.8	4	7	9	16	SS-23	M		**RESIDUAL** RED-BROWN V. STIFF MOIST MED. PLASTIC (PI=22) SILTY SANDY CLAY (A-7-5)
845	844.3	8.8	3	3	3	6	SS-24	32% M		ELEV. (ft) 845.1 DEPTH (ft) 8.0 **RESIDUAL** BROWN-TAN WITH BLACK MED. STIFF MOIST CLAYEY SANDY SILT (A-5)
840	839.3	13.8	3	3	4	7		M		
835	834.3	18.8	3	3	4	7		M		ELEV. (ft) 832.8 DEPTH (ft) 20.3 Boring Terminated at Elevation 832.8 ft IN MED. STIFF CLAYEY SANDY SILT
830										Other Samples: M-24 (8.8 - 10.3)
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_6950R	**STATION** 69+50	**OFFSET** 115ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 852.4 ft	**TOTAL DEPTH** 20.3 ft	**NORTHING** 753,678	**EASTING** 1,442,173	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	855									
										852.4 GROUND SURFACE 0.0
850										**RESIDUAL**
	848.6	3.8								BROWN-TAN WITH BLACK MED. STIFF
			3	3	3	6		M		MOIST CLAYEY SANDY SILT (A-5)
845										
	843.6	8.8								
			3	2	3	5		M		
840										
	838.6	13.8								
			3	3	3	6		M		
835										
	833.6	18.8								
			3	3	3	6		M		
										832.1 20.3
830										Boring Terminated at Elevation 832.1 ft IN
										MED. STIFF CLAYEY SANDY SILT
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RWAL_LCDEB_1150_Y4RPC_2100.GPJ NC_DOT.GDT 09/10/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_7050R	**STATION** 70+50	**OFFSET** 117ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 851.3 ft	**TOTAL DEPTH** 20.4 ft	**NORTHING** 753,692	**EASTING** 1,442,271	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	855									
										851.3 GROUND SURFACE 0.0
850										**RESIDUAL**
	847.4	3.9								RED-BROWN V. STIFF TO STIFF MOIST
			3	7	11	18	SS-25			HIGH PLASTIC (PI=27) SILTY SANDY CLAY
845										(A-7-5)
	842.4	8.9								
			6	6	6	12		19%		
840										
	837.4	13.9								839.3 12.0
			2	2	4	6		M		**RESIDUAL**
835										BROWN-TAN WITH BLACK MED. STIFF
	832.4	18.9								MOIST CLAYEY SANDY SILT (A-5)
			2	2	3	5		M		
										830.9 20.4
830										Boring Terminated at Elevation 830.9 ft IN
										MED. STIFF CLAYEY SANDY SILT
825										
										Other Samples:
820										M-25 (8.9 - 10.4)
815										
810										
805										
800										
795										
790										
785										
780										
775										

NCDOT BORE SINGLE I-3819A_GEO_RWAL_LCDEB_1150_Y4RPC_2100.GPJ NC_DOT.GDT 09/10/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_7200R	**STATION** 72+00	**OFFSET** 80ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 840.2 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 753,751	**EASTING** 1,442,413	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/08/08	**COMP. DATE** 03/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
840	845									840.2 GROUND SURFACE 0.0
	836.2	4.0	2	4	5	9	SS-26	M		**RESIDUAL** RED-BROWN STIFF MOIST MED PLASTIC (PI=19) SILTY SANDY CLAY (A-7-5)
835										832.2 8.0
	831.2	9.0	3	4	5	9		M		**RESIDUAL** BROWN-TAN WITH BLACK STIFF MOIST CLAYEY SANDY SILT (A-5)
830										
	826.2	14.0	2	4	4	8		M		824.7 15.5 Boring Terminated at Elevation 824.7 ft IN STIFF CLAYEY SANDY SILT
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										
770										
765										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT				**GROUND WTR (ft)**
BORING NO. L_7500R	**STATION** 75+00	**OFFSET** 90ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 827.7 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 753,782	**EASTING** 1,442,710	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	830									
	827.7	0.0								827.7 GROUND SURFACE 0.0
825			3	3	4	7	SS-27	M		**ROADWAY EMBANKMENT** BROWN MED. STIFF MOIST MED. PLASTIC (PI=17) SILTY SANDY CLAY (A-6)
	823.7	4.0								824.7 3.0
820			2	3	3	6	SS-28	M		**RESIDUAL** BROWN MED. STIFF MOIST MED. PLASTIC (PI=19) SILTY SANDY CLAY (A-7-5)
	818.7	9.0								819.7 8.0
815			2	3	4	7	SS-29	M		**RESIDUAL** BROWN-TAN-WHITE-BLACK MED. STIFF TO SOFT MOIST TO WET CLAYEY SANDY SILT (A-5)
	813.7	14.0								
810			1	3	1	4		W		812.2 15.5 Boring Terminated at Elevation 812.2 ft IN MED. STIFF CLAYEY SANDY SILT
805										
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT			**GROUND WTR (ft)**
BORING NO. L_7800R	**STATION** 78+00	**OFFSET** 125ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 820.4 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 753,787	**EASTING** 1,443,013 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
820	825									
	820.4	0.0								820.4 GROUND SURFACE 0.0
			3	4	5	9		M		**RESIDUAL** RED-BROWN STIFF TO MED. STIFF MOIST MED PLASTIC (PI=19) SILTY SANDY CLAY (A-7-5)
815	816.6	3.8	2	2	3	5		M		
										812.9 7.5
	811.6	8.8								**RESIDUAL** BROWN-TAN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-5)
810			3	2	2	4		M		
	806.6	13.8								805.1 15.3
805			2	2	2	4		M		Boring Terminated at Elevation 805.1 ft IN MED. STIFF CLAYEY SANDY SILT
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB-STA. 11+50 RT TO -Y4RPC- STA. 21+00 RT			**GROUND WTR (ft)**
BORING NO. L_8000R	**STATION** 80+00	**OFFSET** 170ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 814.7 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 753,771	**EASTING** 1,443,219 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	815									
	814.7	0.0								814.7 GROUND SURFACE 0.0
			2	3	4	7	SS-30	M		**RESIDUAL** RED-BROWN WITH BLK MED. STIFF TO STIFF MOIST MED. PLASTIC (PI=20) SILTY SANDY CLAY (A-7-6, A-7-5)
810	810.7	4.0								
			3	4	6	10		M		806.7 8.0
805	805.7	9.0								**RESIDUAL** BROWN-TAN-BLACK-WHITE MED. STIFF MOIST CLAYEY SANDY SILT (A-5)
			3	3	3	6		M		
800	800.7	14.0								799.2 15.5
			3	3	3	6		M		Boring Terminated at Elevation 799.2 ft IN MED. STIFF CLAYEY SANDY SILT
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										

NCDOT BORE SINGLE I-3819A_GEO_RDWY.GPJ NC_DOT.GDT 09/03/08

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	
SS-14	95 RT	58+50	3.50-5.00	A-7-5(8)	53	17	19.9	17.0	26.6	36.5	79	67	54	-	-	L
SS-15	95 RT	58+50	8.50-10.00	A-2-4(0)	36	NP	49.3	31.0	15.6	4.1	97	64	23	-	-	L
M-15	95 RT	58+50	8.50-10.00											18.1		L
SS-16	100 RT	59+50	0.00-4.00	A-7-5(21)	61	30	17.6	15.6	18.1	48.7	100	89	69	-	-	L
SS-17	100 RT	59+50	14.00-15.50	A-5(0)	48	NP	29.0	42.6	22.3	6.1	100	85	38	-	-	L
M-17	100 RT	59+50	14.00-15.50											15.6		L
M-17A	100 RT	59+50	19.00-20.50											19.6		L
SS-18	110 RT	60+50	13.80-15.30	A-1-b(0)	36	NP	43.0	31.6	19.3	6.1	56	38	17	-	-	L
SS-19	110 RT	61+50	0.00-3.50	A-7-5(22)	63	22	10.3	12.6	16.2	60.9	100	94	79	-	-	L
SS-20	110 RT	61+50	13.50-15.00	A-5(2)	44	6	19.9	32.5	31.4	16.2	91	80	50	-	-	L
M-20	110 RT	61+50	18.50-20.00											20.8		L
SS-21	110 RT	63+00	4.50-6.00	A-5(1)	41	8	24.5	40.0	27.4	8.1	91	79	40	-	-	L
M-21	110 RT	63+00	4.50-6.00											34.2		L
SS-22	112 RT	66+00	4.20-5.70	A-5(2)	56	6	23.1	38.3	30.4	8.1	100	88	46	-	-	L
M-22	112 RT	66+00	9.20-10.70											19.2		L
SS-23	120 RT	68+50	3.80-5.30	A-7-5(22)	60	22	7.1	14.2	26.0	52.7	100	97	82	-	-	L
SS-24	120 RT	68+50	8.80-10.30	A-5(5)	50	6	15.6	28.6	35.5	20.3	100	91	62	-	-	L
M-24	120 RT	68+50	8.80-10.30											31.6		L
SS-25	117 RT	70+50	3.90-5.40	A-7-5(22)	62	27	13.8	15.4	18.1	52.7	100	94	74	-	-	L
M-25	117 RT	70+50	8.90-10.40											18.9		L
SS-26	80 RT	72+00	4.00-5.50	A-7-5(12)	54	19	19.0	21.6	16.9	42.5	100	91	63	-	-	L
SS-27	90 RT	75+00	0.00-1.50	A-6(10)	40	17	16.8	20.0	12.8	50.5	100	91	67	-	-	L
SS-28	90 RT	75+00	4.00-5.50	A-7-5(14)	51	19	14.3	21.2	20.1	44.4	100	91	69	-	-	L
SS-29	90 RT	75+00	9.00-10.50	A-5(2)	41	7	21.4	34.3	30.2	14.1	100	88	50	-	-	L
SS-30	170 RT	80+00	0.00-1.50	A-7-6(13)	49	20	18.4	18.0	17.3	46.4	100	87	67	-	-	L

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	7

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION I40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171

SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- STA. 41+05 RT

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE
4 - 6	BORING LOGS
7	SOIL TEST RESULTS

CAUTION NOTICE

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

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

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

PERSONNEL

R. W. TODD

M. L. SMITH

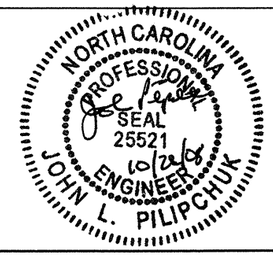
A. C. SMITH

INVESTIGATED BY J. P. ROGERS

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE SEPTEMBER 2008



PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: C. E. BURRIS

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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.
34192.1.2 (I-3819A)	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 #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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

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/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 0.50
	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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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:

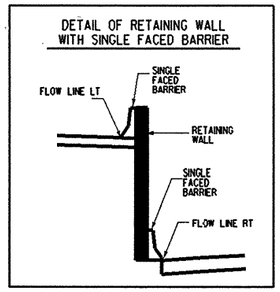
REVISED 02/23/06

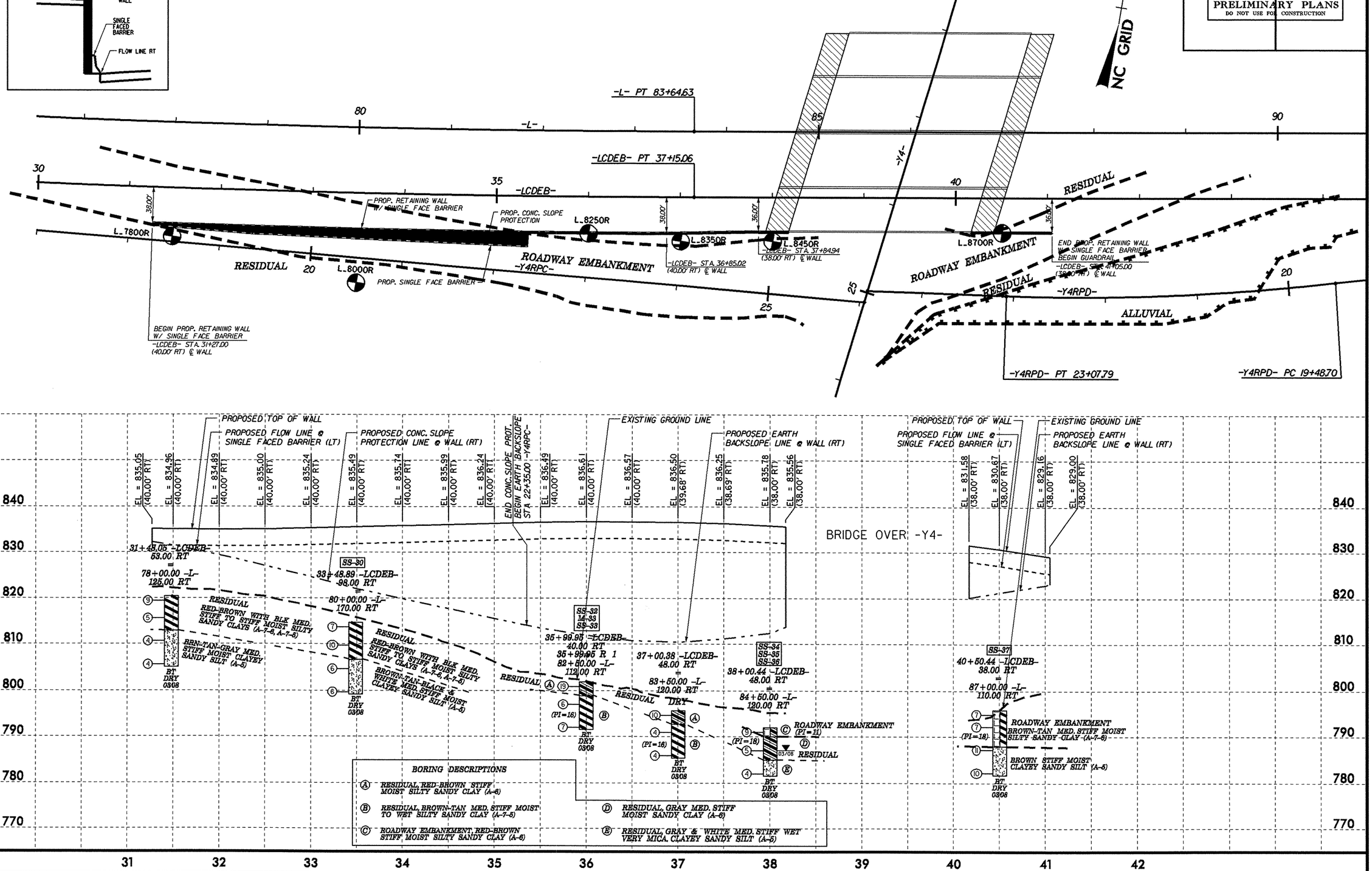
PLAN OF RETAINING WALL

-LCDEB- STA. 31+27.00 RT TO -LCDEB- STA. 41+05.00 RT
(SHEET 1 OF 1)

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





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PLAN OF RETAINING WALL
-LCDEB- STA. 31+27.00 RT TO -LCDEB- STA. 41+05.00 RT
(SHEET 1 OF 1)
PROJECT REFERENCE NO. I-3819A
SHEET NO. 3A
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NC GRID NAD 83
DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER
SINGLE FACED BARRIER
FLOW LINE LT
RETAINING WALL
SINGLE FACED BARRIER
FLOW LINE RT
-L- PT 83+64.63
-L-
80
85
90
-LCDEB- PT 37+15.06
-LCDEB-
30
35
40
38.00'
36.00'
PROP. RETAINING WALL W/ SINGLE FACE BARRIER
PROP. CONC. SLOPE PROTECTION
L_7800R
L_8000R
L_8250R
L_8350R
L_8450R
L_8700R
RESIDUAL
ROADWAY EMBANKMENT
ALLUVIAL
-Y4-
-Y4RPC-
-Y4RPD-
20
25
PROP. SINGLE FACE BARRIER
BEGIN PROP. RETAINING WALL W/ SINGLE FACE BARRIER
-LCDEB- STA. 31+27.00 (40.00' RT) ℄ WALL
-LCDEB- STA. 36+85.02 (40.00' RT) ℄ WALL
-LCDEB- STA. 37+84.94 (38.00' RT) ℄ WALL
END PROP. RETAINING WALL W/ SINGLE FACE BARRIER BEGIN GUARDRAIL
-LCDEB- STA. 41+05.00 (38.00' RT) ℄ WALL
-Y4RPD- PT 23+07.79
-Y4RPD- PC 19+48.70
PROPOSED TOP OF WALL
PROPOSED FLOW LINE @ SINGLE FACED BARRIER (LT)
PROPOSED CONC. SLOPE PROTECTION LINE @ WALL (RT)
END CONC. SLOPE PROT. BEGIN EARTH BACKSLOPE STA 22+35.00 -Y4RPC-
EXISTING GROUND LINE
PROPOSED EARTH BACKSLOPE LINE @ WALL (RT)
BRIDGE OVER -Y4-
EL = 835.05 (40.00' RT)
EL = 834.96 (40.00' RT)
EL = 834.89 (40.00' RT)
EL = 835.00 (40.00' RT)
EL = 835.24 (40.00' RT)
EL = 835.49 (40.00' RT)
EL = 835.74 (40.00' RT)
EL = 835.99 (40.00' RT)
EL = 836.24 (40.00' RT)
EL = 836.49 (40.00' RT)
EL = 836.61 (40.00' RT)
EL = 836.57 (40.00' RT)
EL = 836.50 (39.68' RT)
EL = 836.25 (38.69' RT)
EL = 835.78 (38.00' RT)
EL = 835.56 (38.00' RT)
EL = 831.58 (38.00' RT)
EL = 830.67 (38.00' RT)
EL = 829.16 (38.00' RT)
EL = 829.00 (38.00' RT)
STA 18+25.40 -Y4RPC- EL = 832.17
STA 31+27.00 -LCDEB- EL = 831.38
STA 31+50.00 -LCDEB- EL = 831.29
STA 18+49.12 -Y4RPC- EL = 831.34
STA 32+00.00 -LCDEB- EL = 831.22
STA 18+99.16 -Y4RPC- EL = 829.22
STA 32+50.00 -LCDEB- EL = 831.33
STA 19+49.20 -Y4RPC- EL = 826.92
STA 33+00.00 -LCDEB- EL = 831.57
STA 19+99.23 -Y4RPC- EL = 824.57
STA 33+50.00 -LCDEB- EL = 831.82
STA 20+49.25 -Y4RPC- EL = 821.98
STA 34+00.00 -LCDEB- EL = 832.07
STA 20+99.26 -Y4RPC- EL = 819.82
STA 34+50.00 -LCDEB- EL = 832.32
STA 21+49.27 -Y4RPC- EL = 817.67
STA 35+00.00 -LCDEB- EL = 832.57
STA 21+99.26 -Y4RPC- EL = 815.51
STA 35+50.00 -LCDEB- EL = 832.82
STA 22+49.24 -Y4RPC- EL = 813.35
STA 36+00.00 -LCDEB- EL = 832.94
STA 22+99.21 -Y4RPC- EL = 811.82
STA 36+50.00 -LCDEB- EL = 832.90
STA 23+49.17 -Y4RPC- EL = 810.69
STA 37+00.00 -LCDEB- EL = 832.83
STA 23+99.09 -Y4RPC- EL = 810.35
STA 37+50.00 -LCDEB- EL = 832.58
STA 24+48.86 -Y4RPC- EL = 811.08
STA 38+00.00 -LCDEB- EL = 832.11
STA 24+98.62 -Y4RPC- EL = 812.36
STA 25+15.56 -Y4RPC- EL = 813.71
STA 38+17.00 -LCDEB- EL = 831.89
STA 40+17.00 -LCDEB- EL = 827.91
STA 23+48.92 -Y4RPD- EL = 820.16
STA 40+50.00 -LCDEB- EL = 827.00
STA 23+15.26 -Y4RPD- EL = 821.22
STA 41+00.00 -LCDEB- EL = 825.49
STA 22+64.07 -Y4RPD- EL = 822.92
STA 22+58.92 -Y4RPD- EL = 823.26
STA 41+05.00 -LCDEB- EL = 825.33
840
830
820
810
800
790
780
770
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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT				**GROUND WTR (ft)**
BORING NO. L_7800R	**STATION** 78+00	**OFFSET** 125ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 820.4 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 753,787	**EASTING** 1,443,013	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	825									
820	820.4	0.0								820.4 GROUND SURFACE 0.0
			3	4	5	9		M		**RESIDUAL** RED-BROWN STIFF TO MED. STIFF MOIST MED PLASTIC SILTY SANDY CLAY (A-7-5)
	816.6	3.8						M		
815			2	2	3	5				812.9 7.5
	811.6	8.8								**RESIDUAL** BROWN-TAN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-5)
810			3	2	2	4		M		
	806.6	13.8								
805			2	2	2	4		M		805.1 15.3
										Boring Terminated at Elevation 805.1 ft IN MED. STIFF CLAYEY SANDY SILT
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT				**GROUND WTR (ft)**
BORING NO. L_8000R	**STATION** 80+00	**OFFSET** 170ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 814.7 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 753,771	**EASTING** 1,443,219	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	815									
	814.7	0.0								814.7 GROUND SURFACE 0.0
			2	3	4	7	SS-30	M		**RESIDUAL** RED-BROWN WITH BLK MED. STIFF TO STIFF MOIST MED. PLASTIC (PI=20) SILTY SANDY CLAY (A-7-6, A-7-5)
810	810.7	4.0								
			3	4	6	10		M		
805	805.7	9.0								806.7 8.0
			3	3	3	6				**RESIDUAL** BROWN-TAN-BLACK-WHITE MED. STIFF MOIST CLAYEY SANDY SILT (A-5)
800	800.7	14.0						M		
			3	3	3	6				799.2 15.5
795										Boring Terminated at Elevation 799.2 ft IN MED. STIFF CLAYEY SANDY SILT
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT			**GROUND WTR (ft)**
BORING NO. L_8250R	**STATION** 82+50	**OFFSET** 112ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 801.9 ft	**TOTAL DEPTH** 10.4 ft	**NORTHING** 753,868	**EASTING** 1,443,459 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	805									
	801.9	0.0								801.9 GROUND SURFACE 0.0
800			8	9	10	19	SS-32	M		**RESIDUAL** RED-BROWN VERY STIFF MOIST LOW PLASTIC (PI=15) SILTY SANDY CLAY (A-6))
	798.0	3.9								798.9 3.0
			1	3	3	6	SS-33	52% W		**RESIDUAL** BROWN-TAN MED. STIFF MOIST TO WET MED. PLASTIC (PI=16) SILTY SANDY CLAY (A-7-5)
795	793.0	8.9								
			2	3	4	7		M		791.5 10.4
790										Boring Terminated at Elevation 791.5 ft IN MED. STIFF SILTY SANDY CLAY
										Other Samples: M-33 (3.9 - 5.4)
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT			**GROUND WTR (ft)**
BORING NO. L_8350R	**STATION** 83+50	**OFFSET** 120ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 795.7 ft	**TOTAL DEPTH** 10.3 ft	**NORTHING** 753,877	**EASTING** 1,443,560 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	800									
	795.7	0.0								795.7 GROUND SURFACE 0.0
795			4	5	5	10		M		**RESIDUAL** RED-BROWN STIFF MOIST LOW PLASTIC SLIGHTLY MICA SILTY SANDY CLAY (A-6)
	791.9	3.8								792.7 3.0
790			1	2	2	4		W		**RESIDUAL** BROWN-TAN MED. STIFF MOIST TO WET MED. PLASTIC SILTY SANDY CLAY (A-7-5)
	786.9	8.8								
785			1	2	2	4		W		785.4 10.3
										Boring Terminated at Elevation 785.4 ft IN MED. STIFF SILTY SANDY CLAY
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT			**GROUND WTR (ft)**
BORING NO. L_8450R	**STATION** 84+50	**OFFSET** 120ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 792.0 ft	**TOTAL DEPTH** 10.5 ft	**NORTHING** 753,894	**EASTING** 1,443,658 — **24 HR.** 5.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	795									
	792.0	0.0								792.0 GROUND SURFACE 0.0
790			3	4	5	9	SS-34	M		**ROADWAY EMBANKMENT**
	788.0	4.0								790.0 RED-BROWN STIFF MOIST LOW PLASTIC (PI=11) SILTY SANDY CLAY (A-6) 2.0
785			1	2	3	5	SS-35	M		**RESIDUAL** GRAY MED. STIFF MOIST MED. PLASTIC (PI=18) SANDY CLAY (A-6)
	783.0	9.0								785.0 7.0
			1	2	2	4	SS-36	W		**RESIDUAL** GRAY & WHITE MED. STIFF WET VERY MICA. CLAYEY SANDY SILT (A-5)
780										781.5 10.5
										Boring Terminated at Elevation 781.5 ft IN MED. STIFF CLAYEY SANDY SILT
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										
715										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -LCDEB- STA. 31+27 RT TO -LCDEB- 41+05 RT			**GROUND WTR (ft)**
BORING NO. L_8700R	**STATION** 87+00	**OFFSET** 110ft RT	**ALIGNMENT** -L- — **0 HR.** Dry
COLLAR ELEV. 795.9 ft	**TOTAL DEPTH** 14.2 ft	**NORTHING** 753,946	**EASTING** 1,443,903 — **24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/07/08	**COMP. DATE** 03/07/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	800									
	795.9	0.0								795.9 GROUND SURFACE 0.0
795			3	3	4	7	SS-37	M		**ROADWAY EMBANKMENT**
	793.2	2.7								BROWN-TAN MED. STIFF MOIST MED. PLASTIC (PI=18) SILTY SANDY CLAY (A-7-6)
790			2	3	4	7		M		
	788.2	7.7								787.9 8.0
785			2	4	7	11		M		**RESIDUAL** BROWN STIFF MOIST CLAYEY SANDY SILT (A-5)
	783.2	12.7								781.7 14.2
			2	4	6	10		M		Boring Terminated at Elevation 781.7 ft IN STIFF CLAYEY SANDY SILT
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										

NCDOT BORE SINGLE I-3819A_GEO_BH_RWAL_LCDEB_3127-4105.GPJ NC_DOT.GDT 09/02/08

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	
SS-30	170 RT	80+00	0.00-1.50	A-7-6(13)	49	20	18.4	18.0	17.3	46.4	100	87	67	-	-	L
SS-32	112 RT	82+50	0.00-1.50	A-6(5)	39	15	26.0	25.2	16.4	32.3	96	80	50	-	-	L
SS-33	112 RT	82+50	3.90-5.40	A-7-5(11)	54	16	15.1	26.2	20.3	38.3	100	92	64	-	-	L
M-33	112 RT	82+50	3.90-5.40											52.4		L
SS-34	120 RT	84+50	0.00-1.50	A-6(3)	29	11	25.4	26.6	13.6	34.3	100	85	51	-	-	L
SS-35	120 RT	84+50	4.00-5.50	A-6(4)	35	18	26.2	30.7	8.8	34.3	98	84	44	-	-	L
SS-36	120 RT	84+50	9.00-10.50	A-5(0)	69	NP	22.2	45.0	16.6	16.1	100	87	43	-	-	L
SS-37	110 RT	87+00	0.00-1.50	A-7-6(10)	45	18	20.4	21.8	17.5	40.4	98	84	61	-	-	L

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	3

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *I40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171*

SITE DESCRIPTION *RETAINING WALL -Y4- STA. 29+75 LT TO -Y4- STA. 31+26 LT*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE

CAUTION NOTICE

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

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

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

PERSONNEL

R. W. TODD

M. L. SMITH

A. C. SMITH

INVESTIGATED BY *J. P. ROGERS*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *AUGUST 2008*

NORTH CAROLINA PROFESSIONAL SEAL 25521 ENGINEER JOHN L. PILIPCHUK 10/22/08

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: *C. E. BURRIS*

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.
34192.1.2 (I-3819A)	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											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		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 SOILS				
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/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 0.50
	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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ☐ MOBILE B-___
- ☐ BK-51
- ☐ CME-45C
- ☐ CME-550
- ☐ PORTABLE HOIST
- ☐ _____
- ☐ _____

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

HAMMER TYPE:
- ☐ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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:

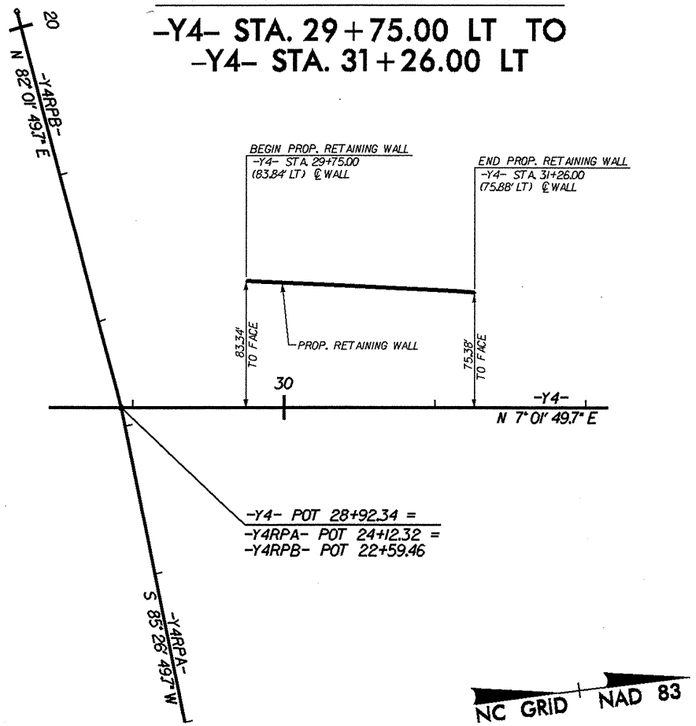
REVISED 02/23/06

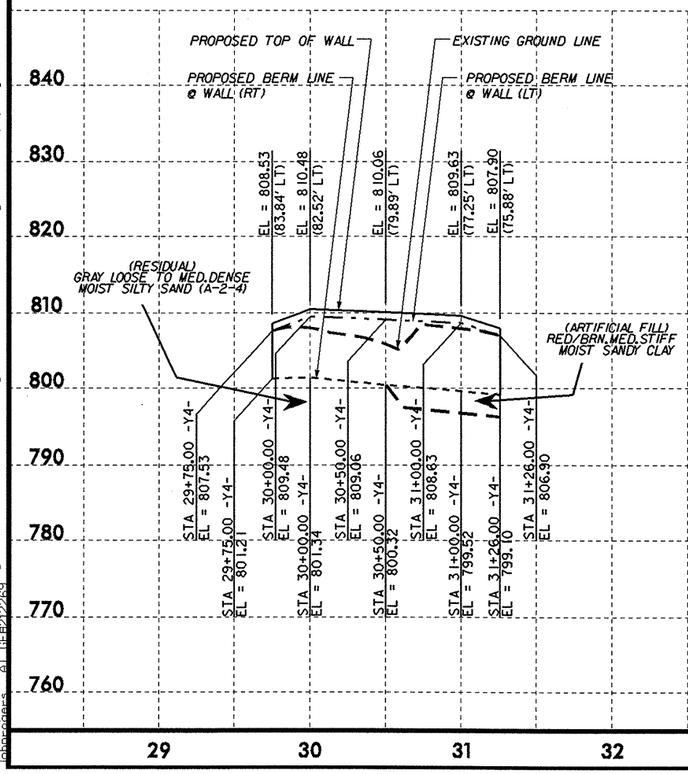
PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLAN OF RETAINING WALL
-Y4- STA. 29+75.00 LT TO -Y4- STA. 31+26.00 LT





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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	12

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *I40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 TO SR 2158 & I-77 FROM SOUTH OF SR 2321 TO SOUTH OF SR 2171*

SITE DESCRIPTION *RETAINING WALL -Y5- STA. 22+51.39 TO -Y5- STA. 59+30 LT*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3 - 5	SITE PLAN
3 - 5	PROFILE
6 - 11	BORING LOGS
12	SOIL TEST RESULTS

CAUTION NOTICE

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

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

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

PERSONNEL

R. W. TODD

M. L. SMITH

A. C. SMITH

INVESTIGATED BY *J. P. ROGERS*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *SEPTEMBER 2008*

NORTH CAROLINA PROFESSIONAL SEAL 25521 ENGINEER JOHN L. PILIPCHUK 10/22/08

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: *C. E. BURRIS*

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.
34192.1.2 (I-3819A)	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 # 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			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 SOILS					
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/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 0.50
	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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- 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 - CALIFORNIA BEARING RATIO 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, 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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, YIELDS SPT N 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:

REVISED 02/23/06

8/17/99

PLAN OF RETAINING WALL
-Y5- STA. 22+51.39 TO 35+00 LT
(SHEET 1 OF 3)

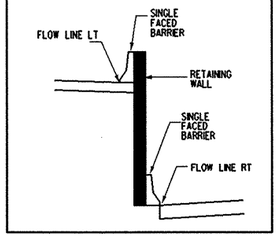
NC GRID + NAD 83

KO & ASSOCIATES, P.C.
Consulting Engineers
6121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 865-6066

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER



BEGIN GUARDRAIL
END PROP. RETAINING WALL
W/ SINGLE FACE BARRIER
-Y4RPA- STA 14+00.00
(28.00' RT) ℄ WALL

-Y5- PT 24+06.50

BEGIN SINGLE FACE BARRIER
STA. 27+17.50 -Y5-

PROP. SINGLE FACE BARRIER

ROADWAY EMBANKMENT

RESIDUAL

26.00'

23.00'

50.00'

PROP. RETAINING WALL
W/ SINGLE FACE BARRIER

N 80°16'14" E

-Y5-

ROADWAY EMBANKMENT
(I-40 WBL)

-Y4RPA- PC 13+32.86

-Y4RPA- POT 10+00.00 =
-LCDWB- POT 59+65.00 (24' LT)
Δ = 2°18'

-LCDWB-

-L-

-MATCHLINE- STA. 35+00 -Y5-

FOR PLANS, SEE SHEET NOS. 9 & 10

PROPOSED FLOW LINE (LT)
PROPOSED TOP OF WALL
PROPOSED FLOW LINE @ SINGLE FACED BARRIER (RT)
PROPOSED FLOW LINE @ SINGLE FACED BARRIER (RT)
PROPOSED FLOW LINE @ SINGLE FACED BARRIER (LT)
PROPOSED TOP OF WALL

EL = 797.07 (28.00' RT)
EL = 796.87 (28.00' RT)
EL = 796.67 (28.00' RT)
EL = 796.48 (28.00' RT)
EL = 796.28 (28.00' RT)
EL = 796.09 (28.00' RT)
EL = 795.87 (28.00' RT)
EL = 795.69 (28.00' RT)
EL = 795.46 (52.00' RT)
EL = 795.23 (52.00' RT)
EL = 794.99 (52.00' RT)
EL = 794.76 (52.00' RT)
EL = 794.52 (52.00' RT)
EL = 795.04 (52.00' RT)
EL = 796.40 (52.00' RT)
EL = 797.47 (52.00' RT)
EL = 798.02 (52.00' RT)
EL = 798.22 (52.00' RT)
EL = 798.36 (52.00' RT)
EL = 798.25 (52.00' RT)
EL = 797.78 (52.00' RT)
EL = 797.06 (52.00' RT)
EL = 796.29 (52.00' RT)
EL = 795.46 (52.00' RT)
EL = 794.87 (52.00' RT)
EL = 794.72 (62.00' RT)
EL = 794.67 (52.00' RT)

RESIDUAL

STA 13+74.88 -Y4RPA- EL = 794.41
STA 13+24.83 -Y4RPA- EL = 794.20
STA 12+74.79 -Y4RPA- EL = 794.00
STA 12+24.75 -Y4RPA- EL = 793.81
STA 11+74.71 -Y4RPA- EL = 793.61
STA 11+24.67 -Y4RPA- EL = 793.42
STA 10+74.63 -Y4RPA- EL = 793.21
STA 10+24.59 -Y4RPA- EL = 793.03
STA 59+90.43 -LCDWB- EL = 792.80
STA 60+40.43 -LCDWB- EL = 792.56
STA 60+90.43 -LCDWB- EL = 792.33
STA 61+40.43 -LCDWB- EL = 792.09
STA 61+90.43 -LCDWB- EL = 791.86
STA 62+40.43 -LCDWB- EL = 791.62
STA 62+90.43 -LCDWB- EL = 791.39
STA 63+40.43 -LCDWB- EL = 791.16
STA 63+73.37 -LCDWB- EL = 790.99
STA 63+90.43 -LCDWB- EL = 790.91
STA 64+40.43 -LCDWB- EL = 790.68
STA 64+90.43 -LCDWB- EL = 790.48
STA 65+40.43 -LCDWB- EL = 790.36
STA 65+90.43 -LCDWB- EL = 790.32
STA 66+40.43 -LCDWB- EL = 790.36
STA 66+90.43 -LCDWB- EL = 790.48
STA 67+40.43 -LCDWB- EL = 790.69
STA 67+90.43 -LCDWB- EL = 790.94
STA 68+40.43 -LCDWB- EL = 791.19

STA 22+64.09 -Y5- EL = 790.32
STA 23+15.67 -Y5- EL = 788.18
STA 23+66.18 -Y5- EL = 788.37
STA 24+16.23 -Y5- EL = 787.91
STA 24+66.23 -Y5- EL = 787.79
STA 25+16.23 -Y5- EL = 787.83
STA 25+66.23 -Y5- EL = 787.60
STA 26+16.23 -Y5- EL = 787.47
STA 26+66.23 -Y5- EL = 787.41
STA 27+16.23 -Y5- EL = 787.83
STA 27+66.23 -Y5- EL = 788.21
STA 28+16.23 -Y5- EL = 789.51
STA 28+66.23 -Y5- EL = 790.86
STA 29+16.23 -Y5- EL = 792.37
STA 29+66.22 -Y5- EL = 793.73
STA 30+16.22 -Y5- EL = 794.80
STA 30+49.16 -Y5- EL = 795.35
STA 30+66.22 -Y5- EL = 795.55
STA 31+16.22 -Y5- EL = 795.70
STA 31+66.22 -Y5- EL = 795.58
STA 32+16.22 -Y5- EL = 795.11
STA 32+66.22 -Y5- EL = 794.39
STA 33+16.22 -Y5- EL = 793.62
STA 33+66.22 -Y5- EL = 792.80
STA 34+16.22 -Y5- EL = 792.20
STA 34+66.22 -Y5- EL = 792.06
STA 35+16.22 -Y5- EL = 792.00

EXISTING GROUND LINE
EXISTING GROUND LINE

800 790 780 770 760

14 13 12 11 10 60 61 62 63 64 65 66 67 68

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PROJECT REFERENCE NO.	SHEET NO.
I-3819A	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

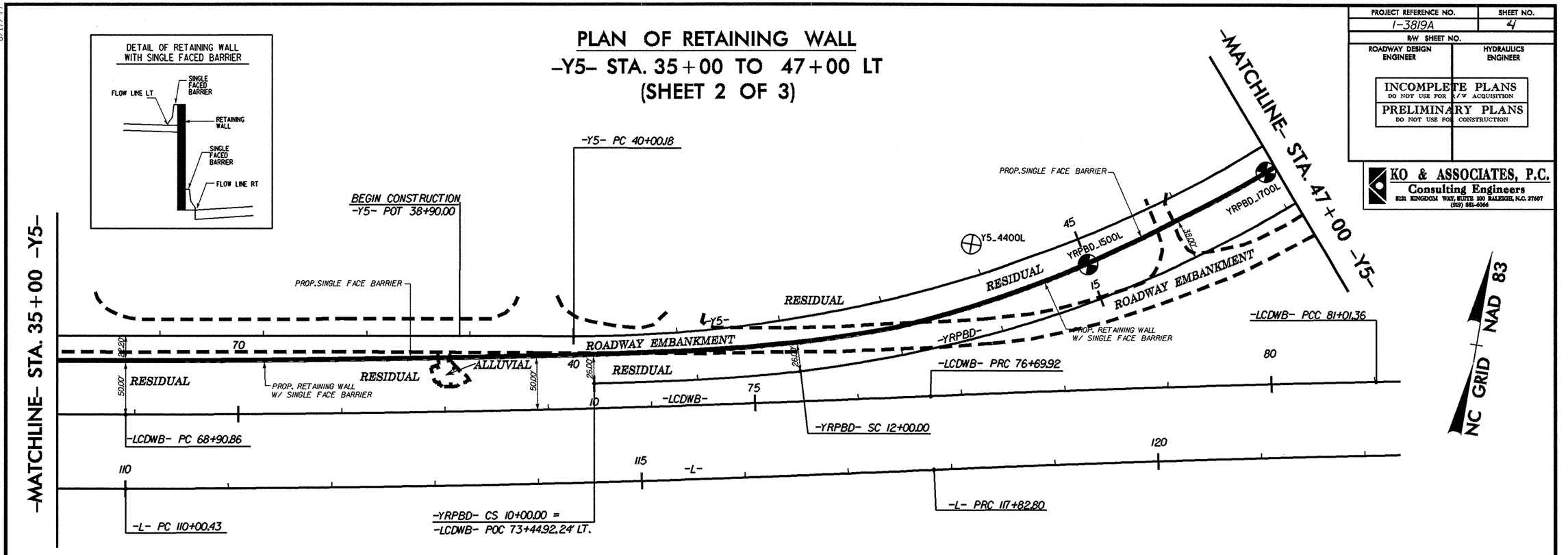
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

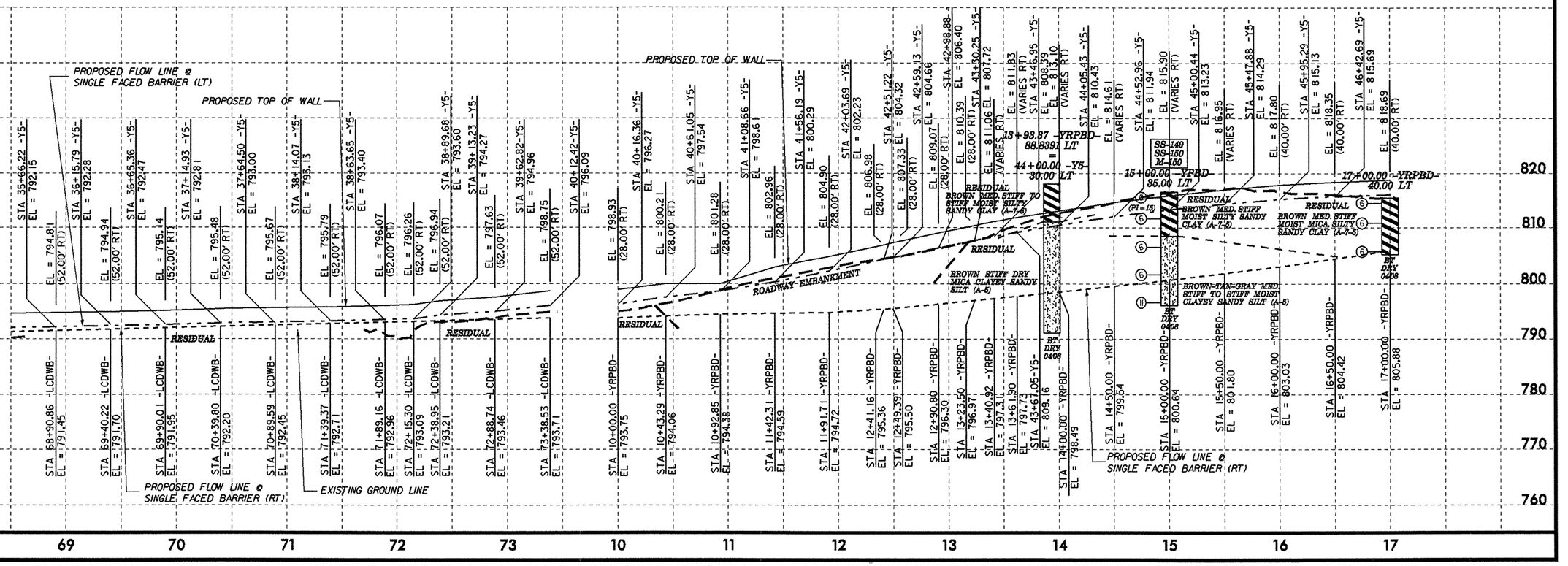
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

KO & ASSOCIATES, P.C.
Consulting Engineers
8121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PLAN OF RETAINING WALL
-Y5- STA. 35+00 TO 47+00 LT
(SHEET 2 OF 3)

DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER





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8/17/99

PLAN OF RETAINING WALL
-Y5- STA. 47+00 TO 59+30 LT
(SHEET 3 OF 3)

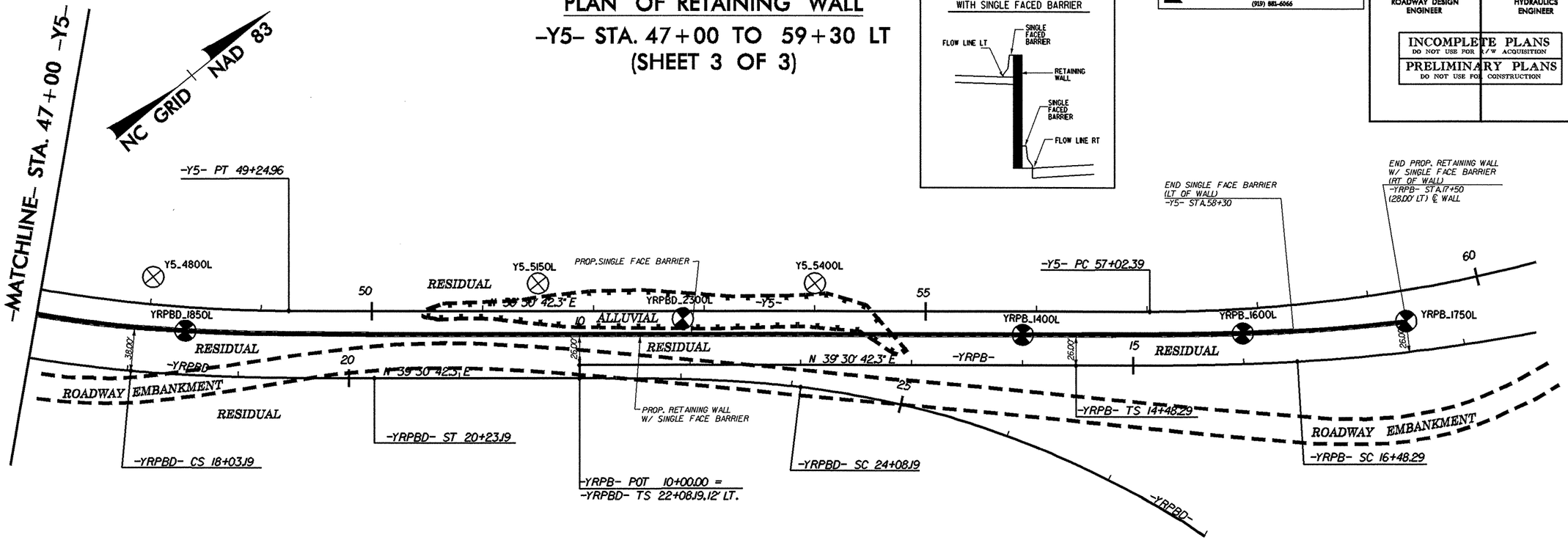
KO & ASSOCIATES, P.C.
Consulting Engineers
8121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER



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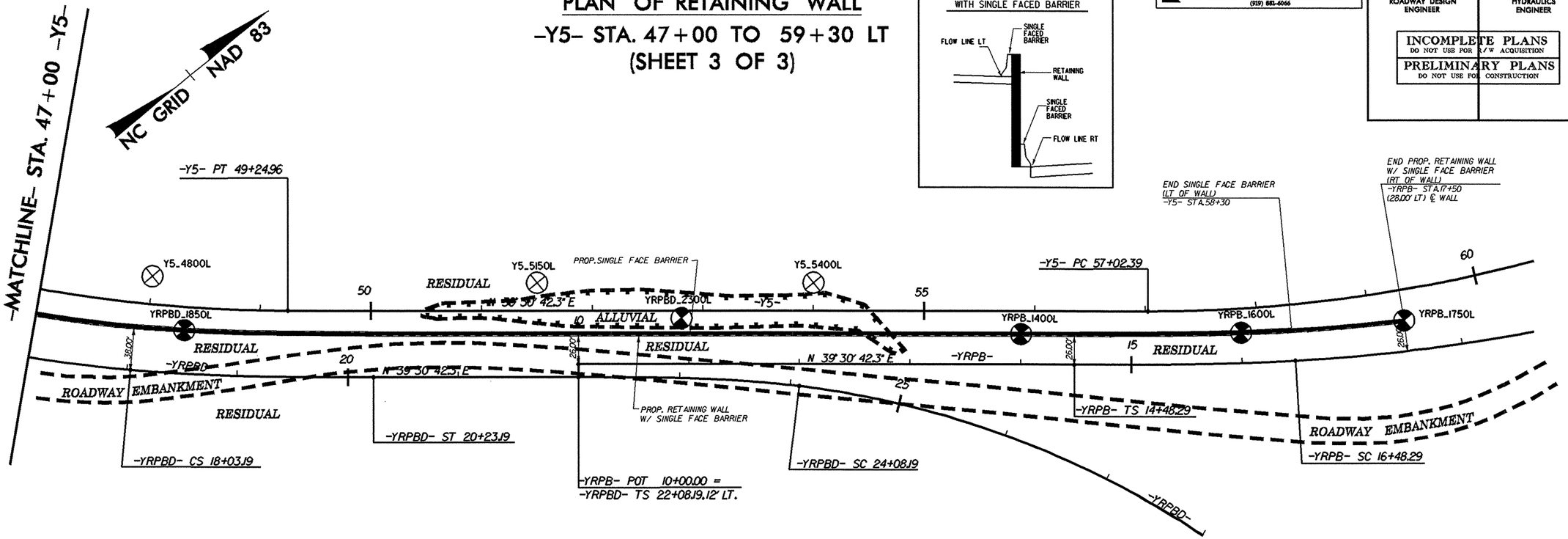
8/17/99

PLAN OF RETAINING WALL
-Y5- STA. 47+00 TO 59+30 LT
(SHEET 3 OF 3)



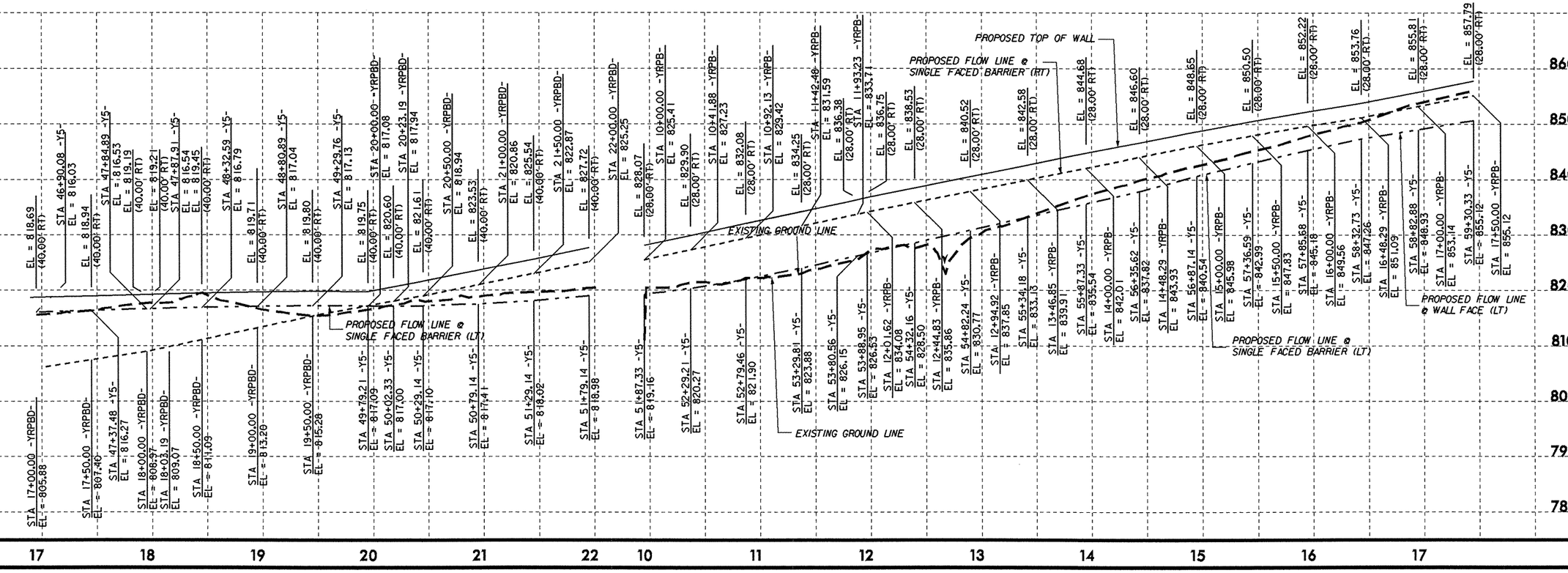
DETAIL OF RETAINING WALL WITH SINGLE FACED BARRIER

KO & ASSOCIATES, P.C.
Consulting Engineers
8121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
I-3819A	5-A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. Y5_4400L	**STATION** 44+00	**OFFSET** 30ft LT	**ALIGNMENT** -Y5-	**0 HR.** NM
COLLAR ELEV. 818.0 ft	**TOTAL DEPTH** 27.0 ft	**NORTHING** 754,818	**EASTING** 1,446,917	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** Solid Augers		**HAMMER TYPE** N/A	
START DATE 04/23/08	**COMP. DATE** 04/23/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	820									818.0 GROUND SURFACE 0.0
815										**RESIDUAL** BROWN MED. STIFF TO STIFF MOIST SILTY SANDY CLAY (A-7-5)
810										811.0 7.0
805										**RESIDUAL** BROWN STIFF DRY MICA CLAYEY SANDY SILT (A-5)
800										
795										791.0 27.0
790										Boring Terminated at Elevation 791.0 ft IN STIFF CLAYEY SANDY SILT
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. Y5_4800L	**STATION** 48+00	**OFFSET** 25ft LT	**ALIGNMENT** -Y5-	**0 HR.** NM
COLLAR ELEV. 821.8 ft	**TOTAL DEPTH** 23.0 ft	**NORTHING** 755,044	**EASTING** 1,447,235	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** Solid Augers		**HAMMER TYPE** N/A	
START DATE 04/23/08	**COMP. DATE** 04/23/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	825									821.8 GROUND SURFACE 0.0
820										**RESIDUAL** BROWN-TAN-GRAY MED. STIFF MOIST MICA. CLAYEY SANDY SILT (A-5)
815										
810										
805										
800										
795										798.8 23.0
790										Boring Terminated at Elevation 798.8 ft IN STIFF CLAYEY SANDY SILT
785										
780										
775										
770										
765										
760										
755										
750										
745										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. Y5_5150L	**STATION** 51+50	**OFFSET** 25ft LT	**ALIGNMENT** -Y5-	**0 HR.** 11.0
COLLAR ELEV. 821.2 ft	**TOTAL DEPTH** 18.0 ft	**NORTHING** 755,308	**EASTING** 1,447,460	**24 HR.** 11.0
DRILL MACHINE CME-550X	**DRILL METHOD** Solid Augers			**HAMMER TYPE** N/A
START DATE 04/23/08	**COMP. DATE** 04/23/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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)
	825									821.2 GROUND SURFACE	0.0
820										**RESIDUAL** BROWN MED. STIFF MOIST HIGHLY PLASTIC SANDY CLAY (A-7-6) 818.2	3.0
815										**RESIDUAL** BROWN-TAN-GRAY MED. DENSE SAT. V. MICA. SILTY SAND (A-2-5)	
810								▼			
805										803.2	18.0
800										Boring Terminated at Elevation 803.2 ft IN MED. DENSE SILTY SAND	
795											
790											
785											
780											
775											
770											
765											
760											
755											
750											
745											

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/17/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. Y5_5400L	**STATION** 54+00	**OFFSET** 25ft LT	**ALIGNMENT** -Y5-	**0 HR.** NM
COLLAR ELEV. 830.5 ft	**TOTAL DEPTH** 6.0 ft	**NORTHING** 755,501	**EASTING** 1,447,619	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** Solid Augers			**HAMMER TYPE** N/A
START DATE 04/23/08	**COMP. DATE** 04/23/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 6.0 ft

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)
	835									830.5 GROUND SURFACE	0.0
830										**RESIDUAL** RED-BROWN MED. STIFF TO STIFF MOIST HIGH PLASTIC SANDY CLAY (A-7-6)	
825										824.5	6.0
820										Boring Terminated BY AUGER REFUSAL at Elevation 824.5 ft ON CRYSTALLINE ROCK	
815											
810											
805											
800											
795											
790											
785											
780											
775											
770											
765											
760											
755											

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/17/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPB_1400L	**STATION** 14+00	**OFFSET** 28ft LT	**ALIGNMENT** -YRPB-	**0 HR.** 10.0
COLLAR ELEV. 837.0 ft	**TOTAL DEPTH** 14.7 ft	**NORTHING** 755,616	**EASTING** 1,447,774	**24 HR.** 9.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 04/08/08	**COMP. DATE** 04/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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
	840									ELEV. (ft) DEPTH (ft)
	837.0	0.0								837.0 GROUND SURFACE 0.0
835	833.8	3.2	2	2	2	4	SS-154	M		**RESIDUAL** BROWN MED. STIFF MOIST MED. PLASTIC (PI=16) SILTY SANDY CLAY (A-6)
830	828.8	8.2	2	2	2	4		M		830.0 7.0
825	823.8	13.2	3	3	4	7	SS-155	48% W		**RESIDUAL** BROWN-TAN MED. STIFF WET CLAYEY SANDY SILT (A-4)
			6	2	2	4		W		822.3 14.7
820										Boring Terminated at Elevation 822.3 ft IN MED. STIFF CLAYEY SANDY SILT
815										Other Samples: M-155 (8.2 - 9.7)
810										
805										
800										
795										
790										
785										
780										
775										
770										
765										
760										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPB_1600L	**STATION** 16+00	**OFFSET** 28ft LT	**ALIGNMENT** -YRPB-	**0 HR.** NM
COLLAR ELEV. 847.7 ft	**TOTAL DEPTH** 14.7 ft	**NORTHING** 755,771	**EASTING** 1,447,899	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 04/08/08	**COMP. DATE** 04/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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
	850									ELEV. (ft) DEPTH (ft)
	847.7	0.0								847.7 GROUND SURFACE 0.0
845	844.5	3.2	2	2	2	4	SS-156	26% M		**RESIDUAL** RED-BROWN MED. STIFF MOIST HIGHLY PLASTIC (PI=29) SANDY CLAY (A-7-6)
840	839.5	8.2	2	2	3	5		M		839.7 8.0
835	834.5	13.2	3	5	6	11		M		**RESIDUAL** BROWN-TAN STIFF MOIST CLAYEY SANDY SILT (A-4)
			3	5	7	12		M		833.0 14.7
830										Boring Terminated at Elevation 833.0 ft IN STIFF CLAYEY SANDY SILT
825										Other Samples: M-156 (0.0 - 1.5)
820										
815										
810										
805										
800										
795										
790										
785										
780										
775										
770										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPB_1750L	**STATION** 17+50	**OFFSET** 28ft LT	**ALIGNMENT** -YRPB-	**0 HR.** NM
COLLAR ELEV. 856.0 ft	**TOTAL DEPTH** 14.7 ft	**NORTHING** 755,892	**EASTING** 1,447,985	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 04/08/08	**COMP. DATE** 04/08/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	860									
	856.0	0.0								856.0 GROUND SURFACE 0.0
855			2	2	2	4		M		**RESIDUAL** RED-BROWN W/ BLACK MED. STIFF MOIST HIGH PLASTIC MICA SANDY CLAY (A-7-6)
	852.8	3.2								
850			2	2	4	6		M		
	847.8	8.2								849.0 7.0
			2	3	2	5		D		**RESIDUAL** BROWN-TAN MED. STIFF DRY MICA. CLAYEY SANDY SILT (A-4)
845	842.8	13.2								
			3	3	4	7		D		841.3 14.7
840										Boring Terminated at Elevation 841.3 ft IN MED. STIFF CLAYEY SANDY SILT
835										
830										
825										
820										
815										
810										
805										
800										
795										
790										
785										
780										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL	**GEOLOGIST** Todd, R. W.	
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPBD_1500L	**STATION** 15+00	**OFFSET** 35ft LT	**ALIGNMENT** -YRPBD-	**0 HR.** NM
COLLAR ELEV. 816.6 ft	**TOTAL DEPTH** 20.4 ft	**NORTHING** 754,818	**EASTING** 1,447,032	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 04/06/08	**COMP. DATE** 04/06/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
	820									
	816.6	0.0								816.6 GROUND SURFACE 0.0
815			3	3	3	6	SS-149	M		**RESIDUAL** BROWN MED.STIFF MOIST LOW PLASTIC (PI=15) SILTY SANDY CLAY (A-7-5)
	812.7	3.9								
810			3	3	3	6		M		
	807.7	8.9								808.6 8.0
805			3	3	3	6	SS-150	D		**RESIDUAL** BROWN-TAN-GRAY MED. STIFF TO STIFF MOIST CLAYEY SANDY SILT (A-5)
	802.7	13.9								
800			3	3	3	6		M		
	797.7	18.9								
795			3	4	7	11		33% M		796.2 20.4
										Boring Terminated at Elevation 796.2 ft IN STIFF MOIST CLAYEY SANDY SILT
790										Other Samples: M-150 (18.9 - 20.4)
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPBD_1700L	**STATION** 17+00	**OFFSET** 40ft LT	**ALIGNMENT** -YRPBD-	**0 HR.** NM
COLLAR ELEV. 815.5 ft	**TOTAL DEPTH** 10.2 ft	**NORTHING** 754,935	**EASTING** 1,447,186	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 04/06/08	**COMP. DATE** 04/06/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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
	820									ELEV. (ft) DEPTH (ft)
815	815.5	0.0								815.5 GROUND SURFACE 0.0
			3	3	3	6		M		**RESIDUAL**
	811.8	3.7								BROWN MED. STIFF MOIST MICA. SILTY
810			2	3	3	6		M		SANDY CLAY (A-7-5)
	806.8	8.7								
805			2	3	3	6		M		805.3 10.2
										Boring Terminated at Elevation 805.3 ft IN
800										MED. STIFF SILTY SANDY CLAY
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPBD_1850L	**STATION** 18+50	**OFFSET** 40ft LT	**ALIGNMENT** -YRPBD-	**0 HR.** NM
COLLAR ELEV. 819.4 ft	**TOTAL DEPTH** 10.4 ft	**NORTHING** 755,035	**EASTING** 1,447,291	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 04/08/08	**COMP. DATE** 04/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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
	820									ELEV. (ft) DEPTH (ft)
	819.4	0.0								819.4 GROUND SURFACE 0.0
			2	3	2	5	SS-151	M		**RESIDUAL**
815	815.5	3.9								BROWN MED. STIFF MOIST MICA.
			2	2	2	4		M		CLAYEY SANDY SILT (A-5)
810	810.5	8.9								
			2	2	2	4		M		809.0 10.4
805										Boring Terminated at Elevation 809.0 ft IN
										MED. STIFF CLAYEY SANDY SILT
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** IREDELL		**GEOLOGIST** Todd, R. W.
SITE DESCRIPTION RETAINING WALL -Y5- STA. 22+51.39 TO 59+30 LT				**GROUND WTR (ft)**
BORING NO. YRPBD_2300L	**STATION** 23+00	**OFFSET** 55ft LT	**ALIGNMENT** -YRPBD-	**0 HR.** 7.0
COLLAR ELEV. 820.5 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 755,389	**EASTING** 1,447,568	**24 HR.** 7.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 04/08/08	**COMP. DATE** 04/08/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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)
	825										
820	820.5	0.0								820.5 GROUND SURFACE	0.0
			0	0	0 WOH	0	SS-152	W		**ALLUVIAL** BROWN & GRAY VERY SOFT MICA. MED. PLASTIC (PI=16) SILTY SANDY CLAY (A-7-5)	
	817.4	3.1									
815			1	0	0	0		W			
	812.4	8.1								812.5	8.0
			1	1	1	2	SS-153	W		**RESIDUAL** BROWN W/ BLACK STREAKS VERY LOOSE TO LOOSE WET VERY MICA. SILTY SAND (A-2-5)	
810	807.4	13.1									
			1	2	2	4		W		805.9	14.6
805										Boring Terminated at Elevation 805.9 ft IN LOOSE SILTY SAND	
800											
795											
790											
785											
780											
775											
770											
765											
760											
755											
750											
745											

NCDOT BORE SINGLE I3819A_GEO_BH_RWAL_Y5_2251-5930.GPJ NC_DOT.GDT 09/03/08

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
SS-149	35 LT	15+00	0.00-1.50	A-7-5(8)	66	15	21.7	28.4	15.2	34.7	100	89	54	-	-	YRPBD
SS-150	35 LT	15+00	8.90-10.40	A-5(0)	43	NP	25.5	37.6	24.6	12.3	100	87	43	-	-	YRPBD
M-150	35 LT	15+00	18.90-20.40											33.3		YRPBD
SS-151	40 LT	18+50	0.00-1.50	A-5(4)	60	9	14.7	44.7	18.1	22.5	100	93	49	-	-	YRPBD
SS-152	55 LT	23+00	0.00-1.50	A-7-5(4)	47	16	30.6	28.6	14.2	26.6	99	82	45	-	-	YRPBD
SS-153	55 LT	23+00	8.10-9.60	A-2-5(0)	53	NP	41.5	38.8	11.5	8.2	100	78	24	-	-	YRPBD
SS-154	28 LT	14+00	0.00-1.50	A-6(4)	32	16	28.7	25.9	17.2	28.3	100	83	49	-	-	YRPB
SS-155	28 LT	14+00	8.20-9.70	A-4(0)	40	9	35.2	32.7	13.9	18.2	96	77	36	-	-	YRPB
M-155	28 LT	14+00	8.20-9.70											47.5		YRPB
SS-156	28 LT	16+00	0.00-1.50	A-7-6(17)	52	29	20.4	17.6	7.5	54.5	100	88	64	-	-	YRPB
M-156	28 LT	16+00	0.00-1.50				0.0	0.0	0.0	0.0		0	0	26.4	-	YRPB

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)

SITE DESCRIPTION BRIDGE NO. 568 ON I-77 OVER RAMP BD (-YRPBD-) BETWEEN US 64 AND SR 2171

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5	PROFILE
6, 7	CROSS SECTIONS
8-10	BORE LOG REPORTS
11	SOIL TEST RESULTS
12, 13	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

S. GOWER

D. HERTTER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 4/12/2010

NORTH CAROLINA PROFESSIONAL SEAL 036026 ENGINEER SHANNON PROVANCE 5-6-10

PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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 • 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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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

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, DPT, DHT, 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
- [x] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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
- [ ] _____

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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.

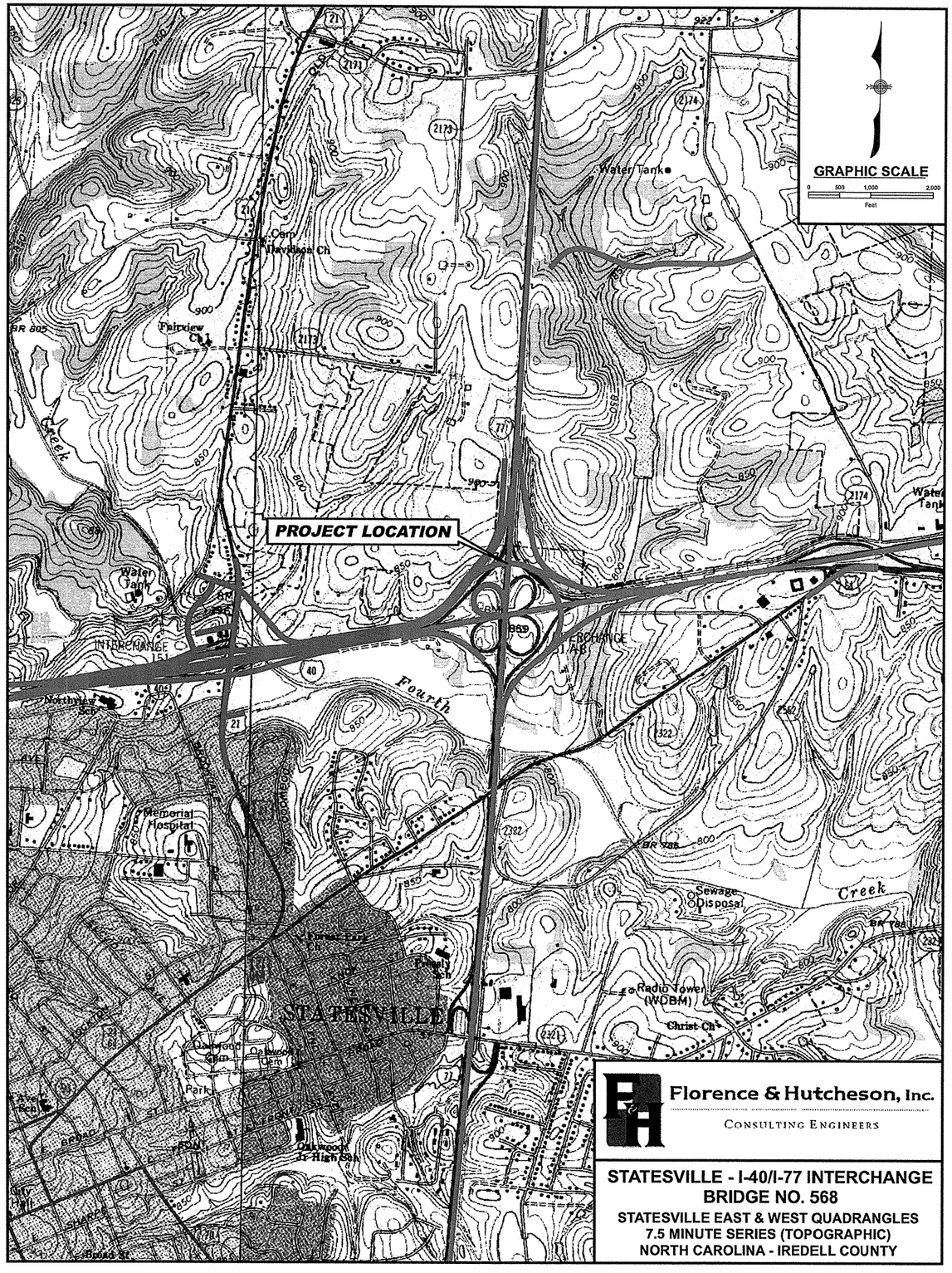
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #18
8" NAIL IN BASE OF TWIN 26" WILD CHERRY
113.46' LEFT STA. 152+59.18 -Y- ELEVATION: 858.89 FT.

NOTES:

REVISED 09/23/09


GRAPHIC SCALE
0 500 1,000 2,000
Feet
PROJECT LOCATION
Water Tank
Cem
Davidson Ch
Fairview Ch
Creek
Fourth
Memorial Hospital
Sewage Disposal
Radio Tower (WDBM)
Christ Ch
STATESVILLE
Oakwood Cem
Park
Oakwood Jr High Sch
Northview Sch
INTERCHANGE 151
INTERCHANGE 151 A-B
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS
STATESVILLE - I-40/I-77 INTERCHANGE
BRIDGE NO. 568
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

BRIDGE NO. 568 ON I-77
OVER RAMP BD (-YRPBD-) BETWEEN
US 64 AND SR 2171
TIP No. I-3819A

IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4

NC GRID NAD 83

-YRPBD- POC 30+42.48 =
-Y- POT 150+45.40
Δ = 85° 55' 39.7"

BEGIN BRIDGE
-Y- POT 149+76.90

BEGIN APPROACH SLAB
-Y- POT 149+52.74

147

150

154

MTL

BM #18
-BY5- STA 55+50
57' RIGHT
ELEV. = 858.89'

EB1-A

EB2-A

EB1-C

EB2-C

EB1-B

EB2-B

30

END APPROACH SLAB
-Y- POT 151+22.56

END BRIDGE
-Y- POT 150+96.40

229

228

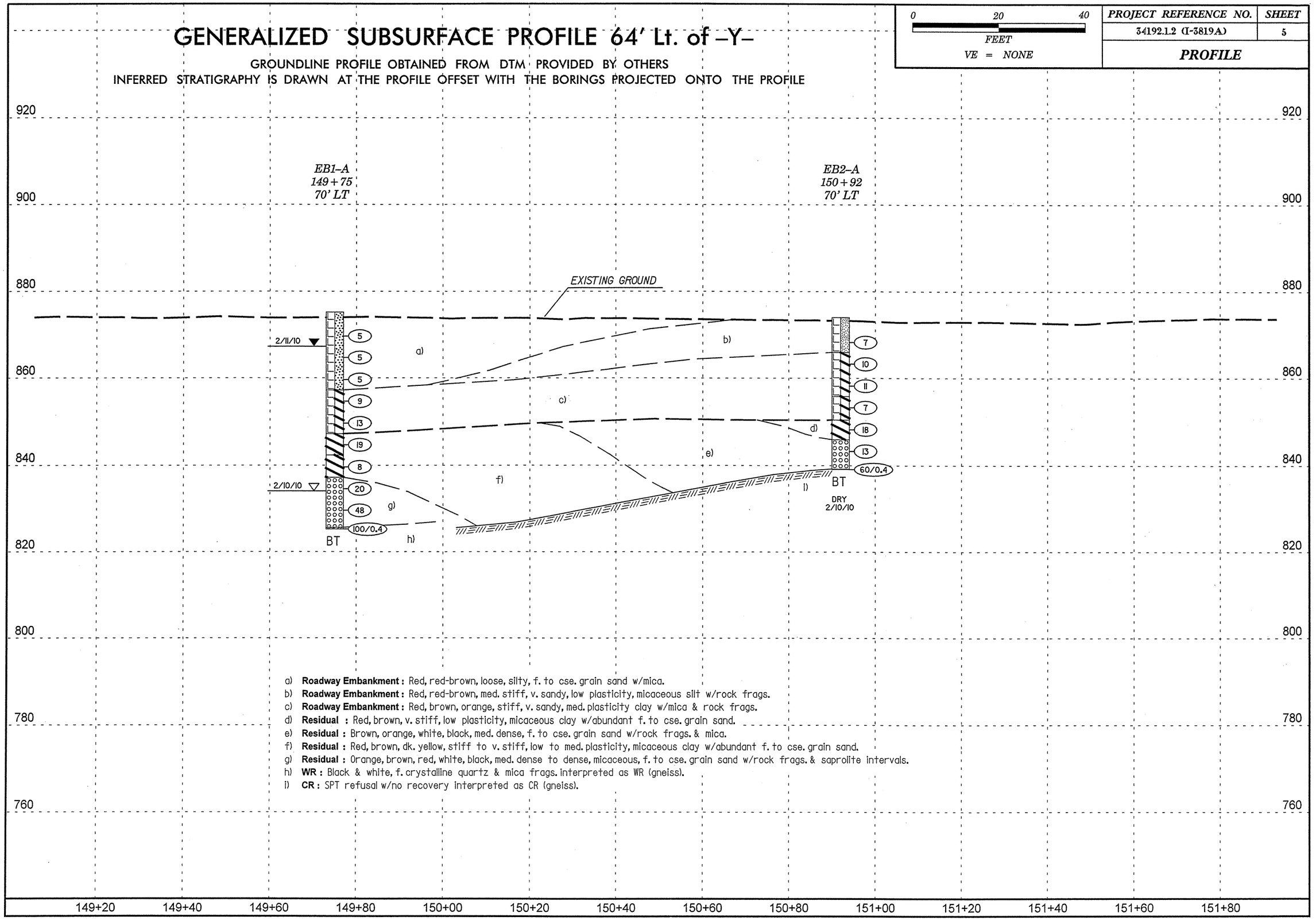
0 50 100
SCALE IN FEET

GENERALIZED SUBSURFACE PROFILE 64' Lt. of –Y–

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5
PROFILE	



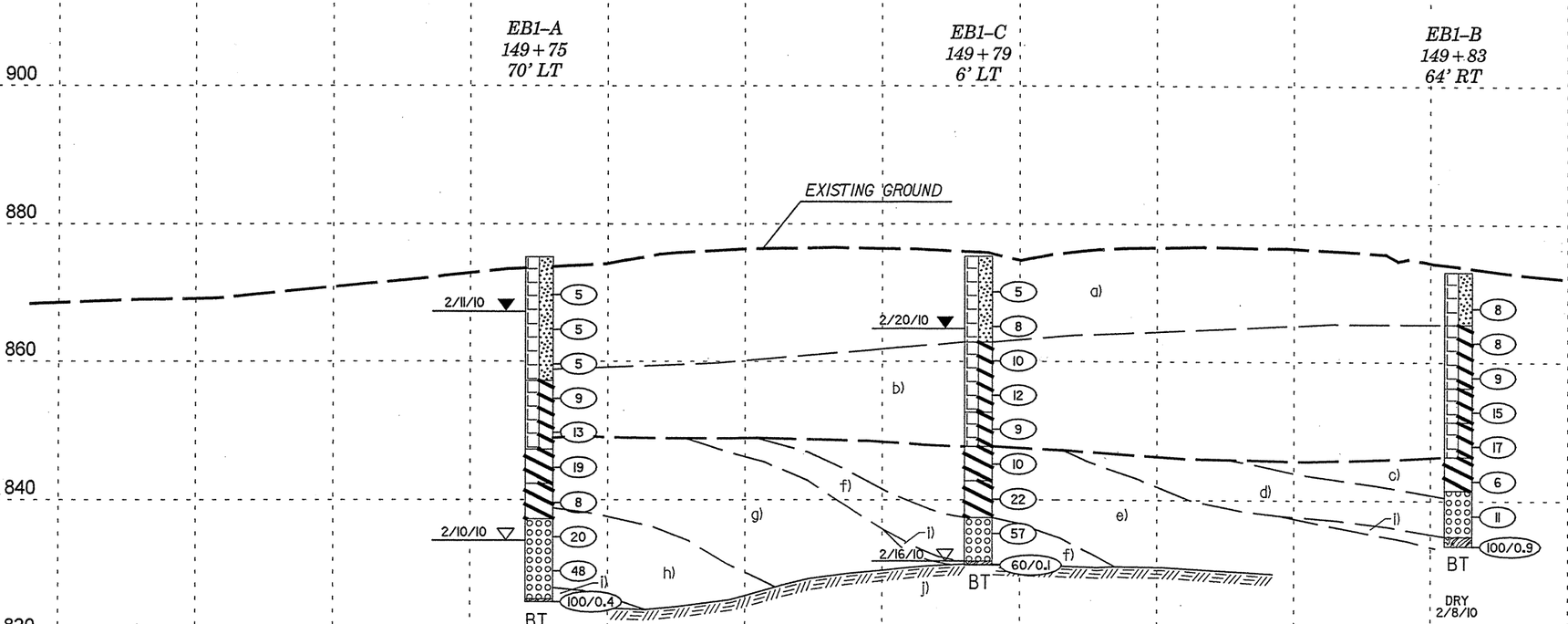
a) **Roadway Embankment :** Red, red-brown, loose, silty, f. to cse. grain sand w/mica.
b) **Roadway Embankment :** Red, red-brown, med. stiff, v. sandy, low plasticity, micaceous silt w/rock frags.
c) **Roadway Embankment :** Red, brown, orange, stiff, v. sandy, med. plasticity clay w/mica & rock frags.
d) **Residual :** Red, brown, v. stiff, low plasticity, micaceous clay w/abundant f. to cse. grain sand.
e) **Residual :** Brown, orange, white, black, med. dense, f. to cse. grain sand w/rock frags. & mica.
f) **Residual :** Red, brown, dk. yellow, stiff to v. stiff, low to med. plasticity, micaceous clay w/abundant f. to cse. grain sand.
g) **Residual :** Orange, brown, red, white, black, med. dense to dense, micaceous, f. to cse. grain sand w/rock frags. & saprolite intervals.
h) **WR :** Black & white, f. crystalline quartz & mica frags. interpreted as WR (gneiss).
i) **CR :** SPT refusal w/no recovery interpreted as CR (gneiss).

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	6

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Roadway Embankment :** Red, red-brown, dk. red-brown, brown, loose, silty, f. to cse. grain sand w/mica & wood frags.
b) **Roadway Embankment :** Red, brown, orange, stiff to v. stiff, v. sandy, low to med. plasticity clay w/mica, wood & rock frags.
c) **Residual :** Red, black, med. stiff, low plasticity clay w/abundant f. to cse. grain sand.
d) **Residual :** Brown, gray, white, med. dense, f. to cse. grain sand w/rock frags.
e) **Residual :** Red, brown, orange, stiff to v. stiff, low to med. plasticity clay w/abundant f. to cse. grain sand, rock frags., saprolite intervals & mica.
f) **Residual :** Black, white, v. dense, f. to cse. grain sand w/rock frags., saprolite intervals & mica.
g) **Residual :** Red, brown, yellow, stiff to v. stiff, low to med. plasticity clay w/abundant f. to cse. grain sand & mica.
h) **Residual :** Orange, brown, red, black & white, med. dense to dense, micaceous, f. to cse. grain sand w/rock frags. & saprolite intervals.
i) **WR :** Black & white, f. crystalline quartz, amphibole & mica frags. w/gray clayey sand, interpreted as WR (gneiss).
j) **CR :** Black & white, quartz & hornblende frags., interpreted as CR (gneiss).

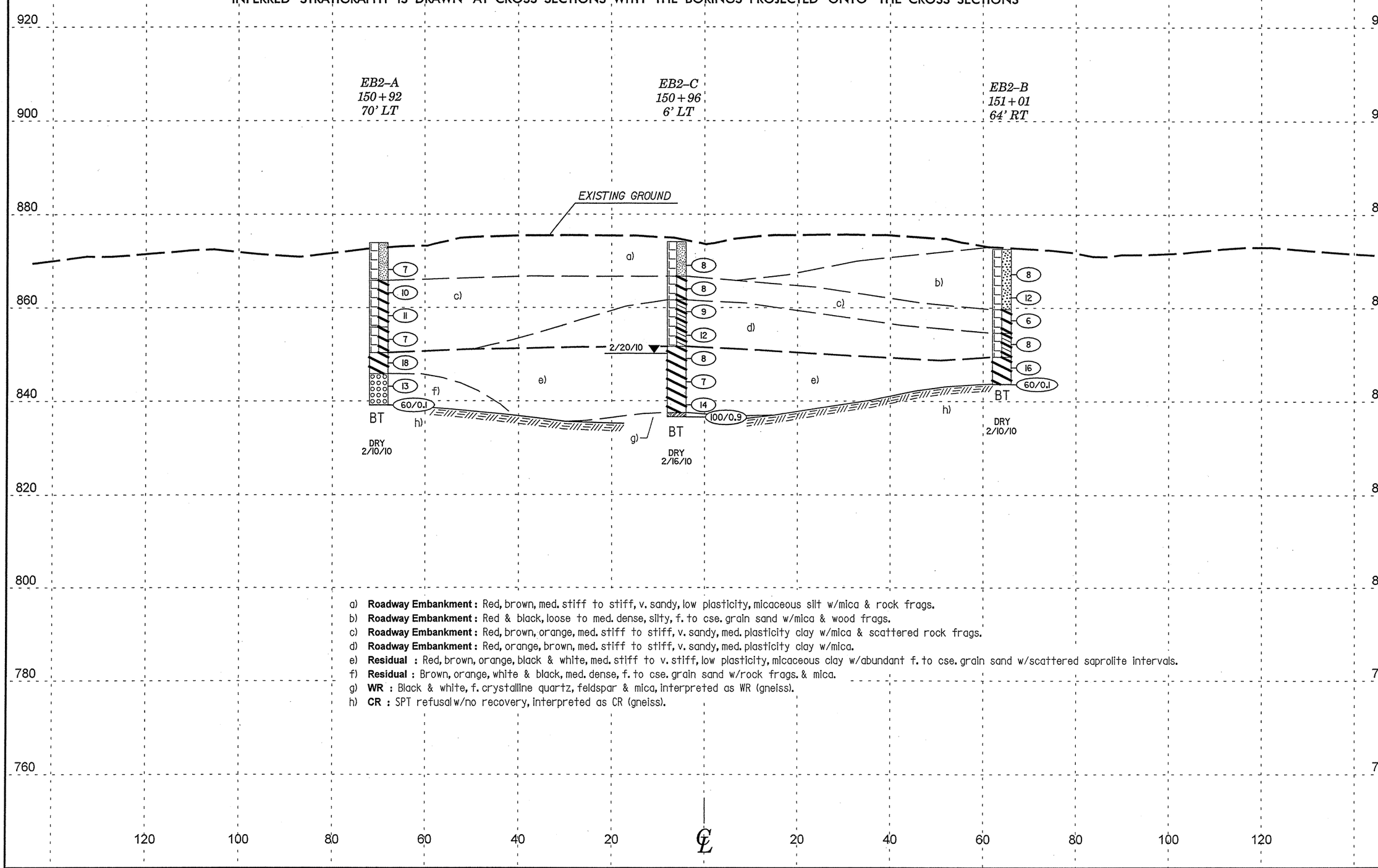
HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 1 CROSS SECTION

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	7

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Roadway Embankment :** Red, brown, med. stiff to stiff, v. sandy, low plasticity, micaceous silt w/mica & rock frags.
b) **Roadway Embankment :** Red & black, loose to med. dense, silty, f. to cse. grain sand w/mica & wood frags.
c) **Roadway Embankment :** Red, brown, orange, med. stiff to stiff, v. sandy, med. plasticity clay w/mica & scattered rock frags.
d) **Roadway Embankment :** Red, orange, brown, med. stiff to stiff, v. sandy, med. plasticity clay w/mica.
e) **Residual :** Red, brown, orange, black & white, med. stiff to v. stiff, low plasticity, micaceous clay w/abundant f. to cse. grain sand w/scattered saprolite intervals.
f) **Residual :** Brown, orange, white & black, med. dense, f. to cse. grain sand w/rock frags. & mica.
g) **WR :** Black & white, f. crystalline quartz, feldspar & mica, interpreted as WR (gneiss).
h) **CR :** SPT refusal w/no recovery, interpreted as CR (gneiss).

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 2 CROSS SECTION

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 149+75	**OFFSET** 70 ft LT	**ALIGNMENT** -Y- **0 HR.** 41.1
COLLAR ELEV. 875.2 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 755,598	**EASTING** 1,448,183 **24 HR.** 8.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Gower	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**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)
880											
875										875.2 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Red, brown, loose, silty, fine to cse. grain sand w/mica (A-2-5).	
870	870.6	4.6	2	2	3	5	SS-1	M			
865	865.6	9.6	3	3	2	5		M			
860	860.6	14.6	2	3	2	5		M		857.2 Red, orange, brown, stiff, v. sandy, med. plasticity clay w/mica (A-7-5).	18.0
855	855.6	19.6	4	4	5	9		M			
850	850.6	24.6	5	8	5	13		M			
845	845.6	29.6	5	10	9	19		M		847.2 **RESIDUAL** Red, brown, v. stiff, v. sandy, med. plasticity, clay w/mica (A-7-6).	28.0
840	840.6	34.6	2	4	4	8		M		842.3 Red, yellow. brown, stiff, low plasticity, micaceous clay w/abundant f. to cse. grain sand (A-7-5).	32.9
835	835.6	39.6	5	6	14	20		M		837.2 Orange, brown, black & white, med. dense to dense, micaceous, f. to cse. grain sand w/rock frags. & saprolite intervals (A-1-b).	38.0
830	830.6	44.6	4	12	36	48	SS-7	W			
825	825.6	49.6	100/0.4			100/0.4		D		825.6 **WEATHERED ROCK** Black & white, f. crystalline, quartz & mica frags., interpreted as WR (Gneiss). 825.2 Boring Terminated at Elevation 825.2 ft in Weathered Rock (Gneiss)	49.6 50.0
820										No SPT recovery 14.6'-16.1'.	
815											
810											
805											
800											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171			**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 149+79	**OFFSET** 6 ft LT	**ALIGNMENT** -Y- **0 HR.** 44.2
COLLAR ELEV. 875.3 ft	**TOTAL DEPTH** 44.8 ft	**NORTHING** 755,598	**EASTING** 1,448,248 **24 HR.** 10.5
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Gower	**START DATE** 02/16/10	**COMP. DATE** 02/16/10	**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)
880											
875										875.3 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Red to brown, loose, silty, f. to cse. grain sand w/wood frags. (A-2-5).	
870	871.1	4.2	3	2	3	5		M			
865	866.1	9.2	3	4	4	8		M		862.8 Red, brown, stiff, v. sandy, med. plasticity clay w/wood frags., rock frags. & mica (A-7-5).	12.5
860	861.1	14.2	6	5	5	10		M			
855	856.1	19.2	2	5	7	12		M		852.6 Red, brown, orange, stiff, v. sandy, med. plasticity clay w/mica (A-7-6).	22.7
850	851.1	24.2	2	4	5	9		M			
845	846.1	29.2	4	5	5	10	SS-4	22%		847.6 **RESIDUAL** Red, brown, stiff, v. sandy, med. plasticity clay w/mica (A-7-6).	27.7
840	841.1	34.2	4	6	16	22		M		842.7 Red, brown, orange, white & black, v. stiff, low plasticity clay w/abundant f. to cse. grain sand, saprolite intervals & mica (A-7-5).	32.6
835	836.1	39.2	20	38	19	57		M		837.4 Black, white, v. dense, f. to cse. grain sand w/rock frags., saprolite intervals & mica (A-1-b).	37.9
830	831.1	44.2	60	60/0.1		60/0.1		D		831.1 **WEATHERED ROCK** Black & white, quartz, amphibole & mica frags., interpreted as WR (Gneiss). 830.6 **CRYSTALLINE ROCK** Black & white, quartz & hornblende frags., interpreted as CR (Gneiss). 830.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 830.5 ft on Crystalline Rock (Gneiss).	44.2 44.7 44.8
825										Moved hole 6.0' left to center of median for safety.	
820											
815											
810											
805											
800											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 149+83	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 873.1 ft	**TOTAL DEPTH** 39.7 ft	**NORTHING** 755,597	**EASTING** 1,448,318	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**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)
875										873.1 GROUND SURFACE 0.0
	868.8	4.3								**ROADWAY EMBANKMENT** Red, loose, f. to cse. grain, silty sand (A-2-5).
870			1	3	5	8		M		
	863.8	9.3								865.5 7.6
865			3	3	5	8	SS-3	31%		Red, brown, stiff, v. sandy, med. plasticity, clay w/rock frags. (A-7-5).
	858.8	14.3								
860			4	4	5	9		M		
	853.8	19.3								856.3 16.8
855			3	7	8	15		M		Red, v. stiff, v. sandy, med. plasticity clay (A-7-6).
	848.8	24.3								851.3 21.8
850			5	7	10	17		M		Red, tan, v. stiff, low plasticity clay w/abundant f. to cse. grain sand & trace rock frags. (A-7-5).
	843.8	29.3								846.3 26.8
845			3	3	3	6		M		**RESIDUAL** Red, black, med. stiff, low plasticity clay w/abundant f. to cse. grain sand (A-7-5).
	838.8	34.3								841.5 31.6
840			6	4	7	11		M		Brown, gray, white, med. dense, f. to cse. grain sand w/rock frags. (A-1-b).
	834.8	38.3								834.8 38.3
835			30	25	90/0.4	100/0.9		M		**WEATHERED ROCK** 833.4 39.7 Black, white, rock frags. w/gray clayey sand, interpreted as WR (Gneiss).
830										Boring Terminated at Elevation 833.4 ft in Weathered Rock (Gneiss).
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 150+92	**OFFSET** 70 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 874.0 ft	**TOTAL DEPTH** 34.9 ft	**NORTHING** 755,715	**EASTING** 1,448,191	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**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)
875										874.0 GROUND SURFACE 0.0
	869.2	4.8								**ROADWAY EMBANKMENT** Red, brown, med. stiff, v. sandy, low plasticity, micaceous silt w/rock frags. (A-4).
870			3	3	4	7	SS-2	13%		
	864.2	9.8								865.9 8.1
865			4	4	6	10		M		Red, brown, stiff, v. sandy, med. plasticity clay w/mica & rock frags. (A-7-5).
	859.2	14.8								
860			3	5	6	11		M		
	854.2	19.8								855.8 18.2
855			2	3	4	7		M		Red, brown, med. stiff, v. sandy, med. plasticity clay w/mica (A-7-6).
	849.2	24.8								850.4 23.6
850			5	7	11	18		M		**RESIDUAL** Red, brown, v. stiff, low plasticity, micaceous clay w/abundant f. to cse. grain sand (A-7-5).
	844.2	29.8								845.9 28.1
845			6	6	7	13		M		Brown, orange, white & black, med. dense, f. to cse. grain sand w/rock frags. & mica (A-1-b).
	839.2	34.8	60/0.1			60/0.1		D		839.2 34.8 839.1 34.9 **CRYSTALLINE ROCK** SPT refusal, no recovery, interpreted as CR (Gneiss).
840										Boring Terminated with Standard Penetration Test Refusal at Elevation 839.1 ft on Crystalline Rock (Gneiss).
835										Boring backfilled immediately upon completion.
830										
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 150+96	**OFFSET** 6 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 874.2 ft	**TOTAL DEPTH** 37.7 ft	**NORTHING** 755,715	**EASTING** 1,448,255	**24 HR.** 24.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/16/10	**COMP. DATE** 02/16/10	**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)
875										
										874.2 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT Red, brown, stiff, v. sandy, low plasticity silt w/mica & rock frags. (A-4).
870	870.1	4.1								
			3	3	5	8		M		
865	865.1	9.1								866.8 7.4
			2	3	5	8		M		Red, orange, brown, stiff, v. sandy, med. plasticity clay w/mica (A-7-5).
860	860.1	14.1								861.7 12.5
			1	3	6	9		M		Red, orange, brown, stiff, v. sandy, med. plasticity clay w/mica (A-6).
855	855.1	19.1								
			4	5	7	12	SS-5	37%		
850	850.1	24.1						▼		851.7 22.5
			2	5	3	8		M		**RESIDUAL** Red, brown, orange, black & white, med. stiff to stiff, low plasticity, micaceous clay w/abundant f. to cse. grain sand (A-7-5).
845	845.1	29.1								
			2	3	4	7	SS-6	31%		
840	840.1	34.1								
			5	7	7	14		M		
	837.4	36.8								837.4 36.8
			35	65/0.4		100/0.9		M		836.5 37.7 **WEATHERED ROCK** Black & white, f. crystalline quartz, feldspar & mica, interpreted as WR (Gneiss).
835										Boring Terminated at Elevation 836.5 ft in Weathered Rock (Gneiss).
830										
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 568 on I-77 Over Ramp BD (-YRPBD-) Between US 64 and SR 2171			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 151+01	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 872.7 ft	**TOTAL DEPTH** 29.0 ft	**NORTHING** 755,715	**EASTING** 1,448,325	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/10/10	**COMP. DATE** 02/10/10	**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)
875										
										872.7 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT Red & black, loose to med. dense, silty, f. to cse. grain sand w/mica & wood frags. (A-2-5).
870	868.3	4.4								
			4	3	5	8		M		
865	863.3	9.4								859.7 13.0
			4	5	7	12		M		Red, med. stiff, v. sandy, med. plasticity clay w/mica (A-7-6).
860	858.3	14.4								
			1	2	4	6		M		
855	853.3	19.4								854.7 18.0
			3	4	4	8		M		Red, med. stiff to stiff, v. sandy, med. plasticity clay (A-6).
850	848.3	24.4								849.6 23.1
			4	7	9	16		M		**RESIDUAL** Red, orange, brown, white, black, v. stiff, low plasticity clay w/abundant f. to cse. grain sand, w/saprolite intervals & mica (A-7-5).
845	843.8	28.9								
			60/0.1			60/0.1		D		843.8 28.9 643.7 29.0 **CRYSTALLINE ROCK** Auger refusal & SPT refusal @ 28.9', interpreted as CR (Gneiss).
840										Boring Terminated with Standard Penetration Test Refusal at Elevation 843.7 ft on Crystalline Rock (Gneiss).
835										Boring backfilled immediately upon completion. Very poor recovery 19.4'-20.9'
830										
825										
820										
815										
810										
805										
800										
795										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0568.GPJ NC_DOT.GDT 5/5/10

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Bridge No. 568 on I-77 over Ramp BD (-YRPBD) Between US 64 and SR 2171

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Retained No. 60	Percent Passing No.200	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
EB1-A	SS-1	4.6'-6.1'	A-2-5(0)	5	89.6	71.2	41.0	33.3	34.1	32.4	19.5	14.0	41	5	36	N/A
EB2-A	SS-2	4.8'-6.3'	A-4(2)	7	89.2	69.2	37.9	44.1	30.4	23.8	25.0	20.8	40	10	30	12.8
EB1-B	SS-3	9.3'-10.8'	A-7-5(9)	8	98.9	84.8	21.3	58.8	20.4	23.4	22.4	33.8	48	17	31	30.8
EB1-C	SS-4	29.2'-30.7'	A-7-6(6)	10	93.8	76.4	32.0	48.5	27.6	23.7	17.1	31.6	45	18	27	22.3
EB2-C	SS-5	19.1'-20.6'	A-6(6)	12	99.8	86.9	23.7	52.9	23.5	26.3	15.4	34.8	40	16	24	37.4
EB2-C	SS-6	29.1'-30.6'	A-7-5(1)	7	97.1	78.4	33.1	37.8	31.2	34.0	15.8	19.1	42	12	30	31.2
EB1-A	SS-7	44.6'-46.1'	A-1-b(0)	48	76.6	49.0	64.5	12.0	53.7	33.5	8.9	3.9	29	NP	NP	N/A

F&H, CERT. No. 102-0603

Aundrey Ligon, CERT. No. 102-01-0603

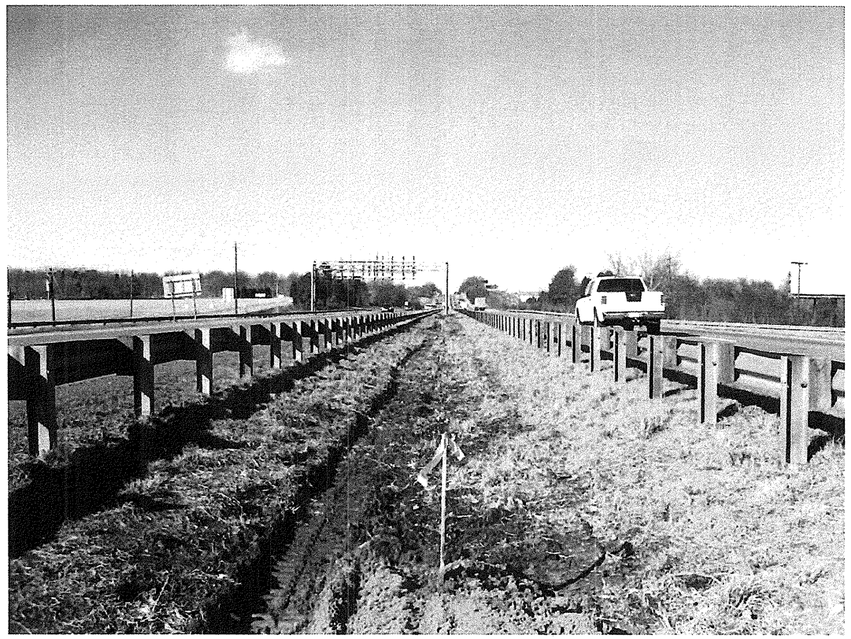
Michael Garrison, CERT. No. 102-02-0603

SITE PHOTOGRAPHIC RECORD

Bridge No. 568 on I-77 over Ramp BD (-YRPBD-) Between US 64 and SR 2171

EB1-A Looking North Toward EB2-A

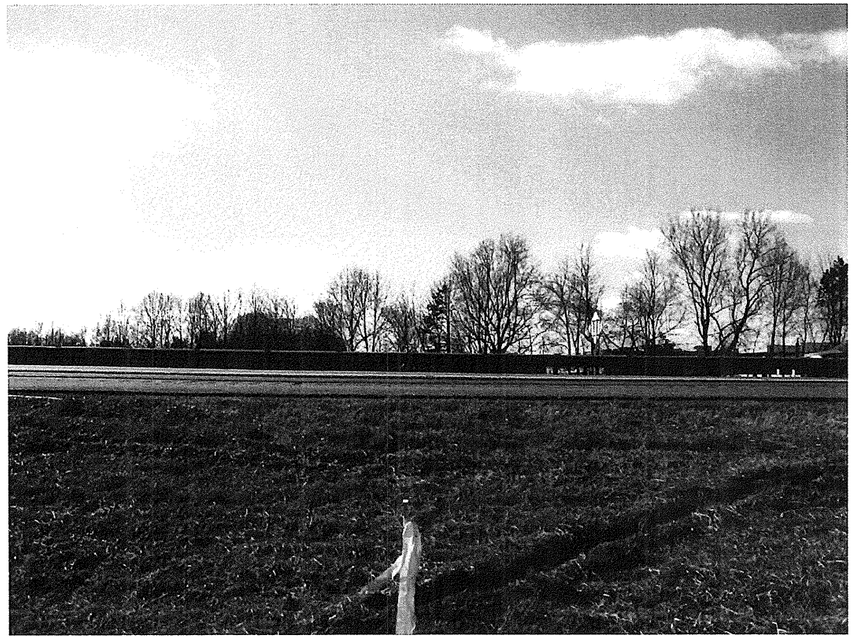
EB1-B Looking North Toward EB2-B



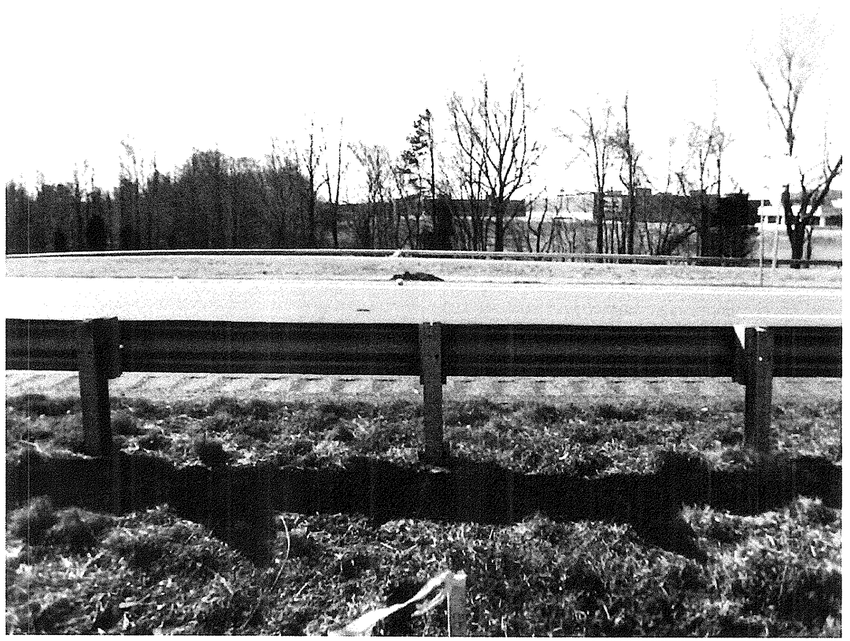
EB1-C Looking North Toward EB2-C

SITE PHOTOGRAPHIC RECORD

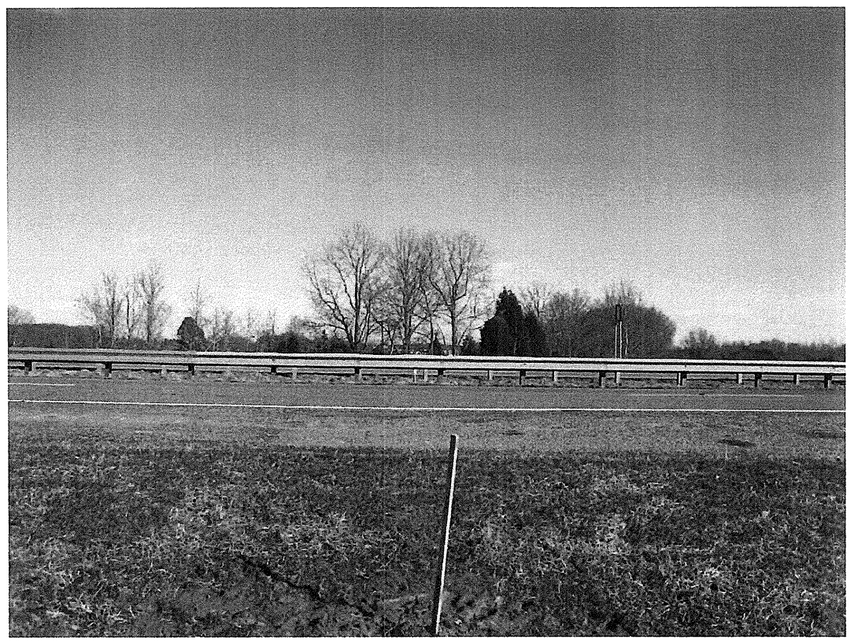
Bridge No. 568 on I-77 over Ramp BD (-YRPBD-) Between US 64 and SR 2171



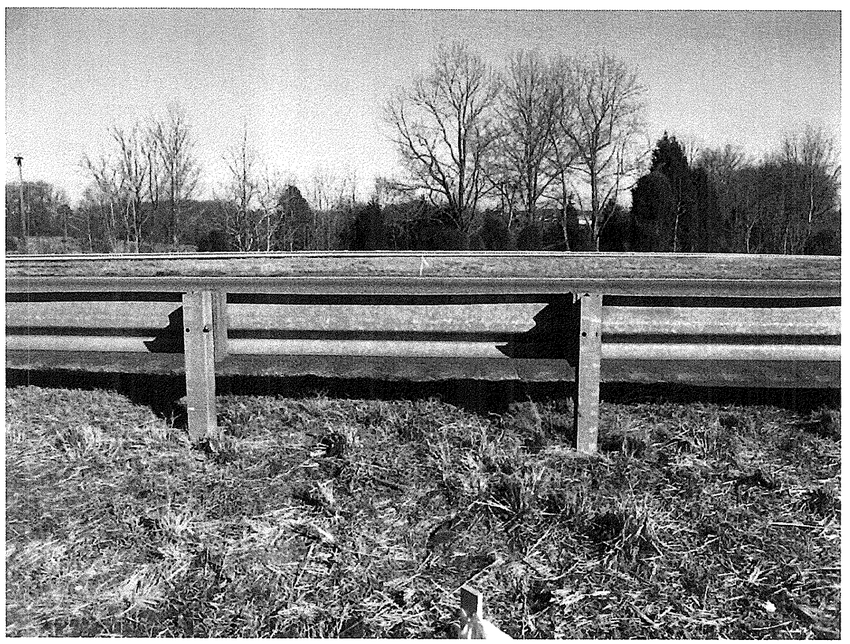
EB1-B Looking West Toward EB1-C



EB1-C Looking West Toward EB1-A



EB2-A Looking East Toward EB2-C



EB2-C Looking East Toward EB2-B

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2 (I-3819A)* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)*

SITE DESCRIPTION *BRIDGE NO. 567 ON HILLSIDE LANE (SR 1934) OVER FOURTH CREEK BETWEEN SR 1965 AND SR 1935*

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5, 6	PROFILES
7,8	CROSS SECTIONS
9-16	BORE LOG & CORE REPORTS WITH CORE PHOTOGRAPHS
17	SOIL TEST RESULTS, ROCK TEST RESULTS
18	SCOUR REPORT
19, 20	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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

For Letting

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

B. CAYTON

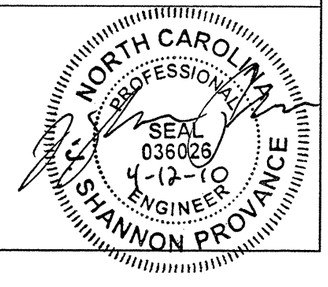
D. HERTTER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 4/12/2010



PROJECT: 34192.1.2

ID: I-3819A

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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 #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 PLASTIC INDEX	6 MX			NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		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

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 LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

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 / DPT / DHT / 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	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL. - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HI. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [x] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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.
- [x] CORE BIT
- [ ] _____

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [x] -N Q2
- [ ] -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.

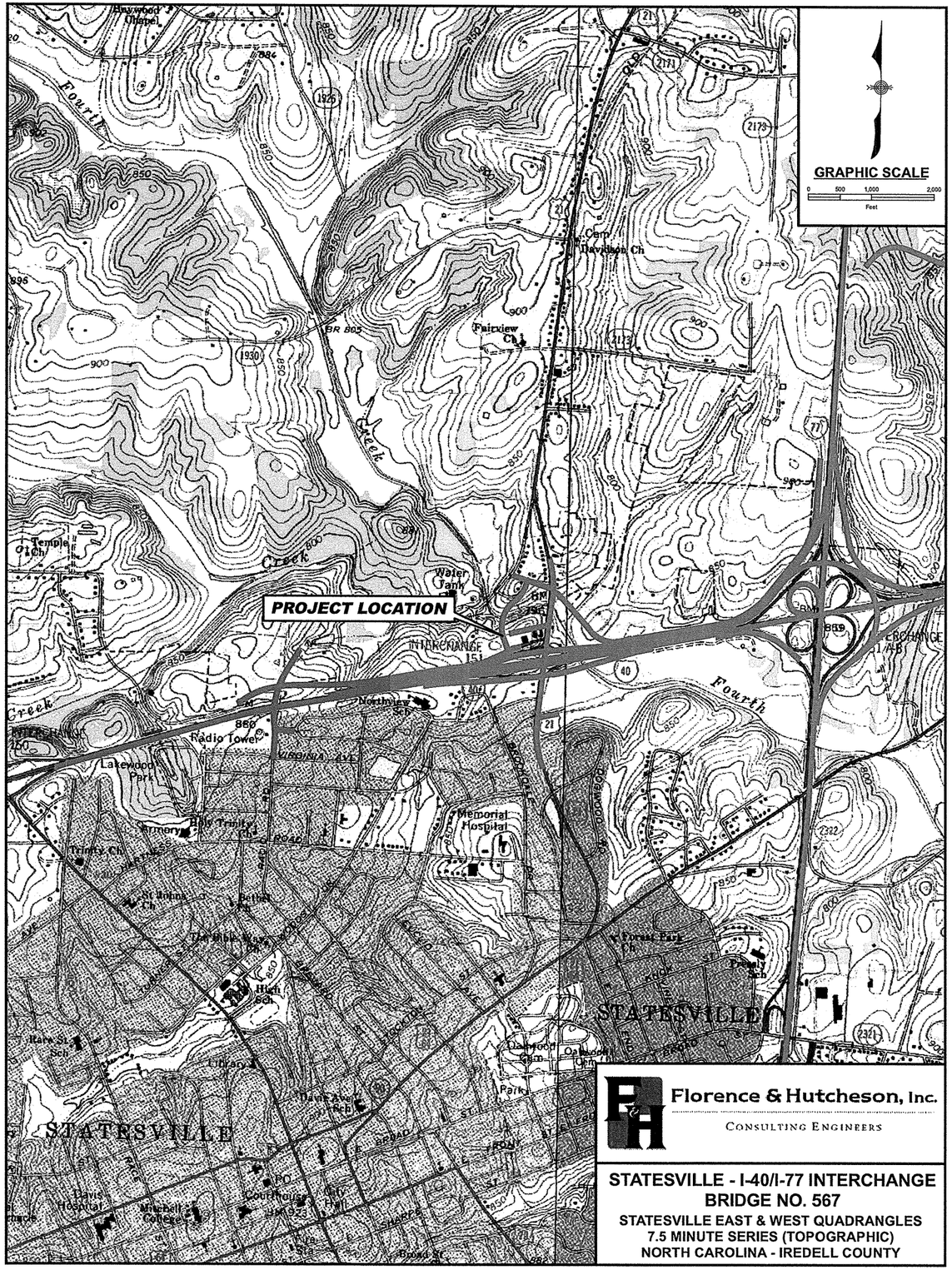
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #31
8' NAIL IN BASE OF 20" SYCAMORE
350' LEFT STA. 17+22 -Y8- ELEVATION: 795.01 FT.

NOTES:

REVISED 09/23/09

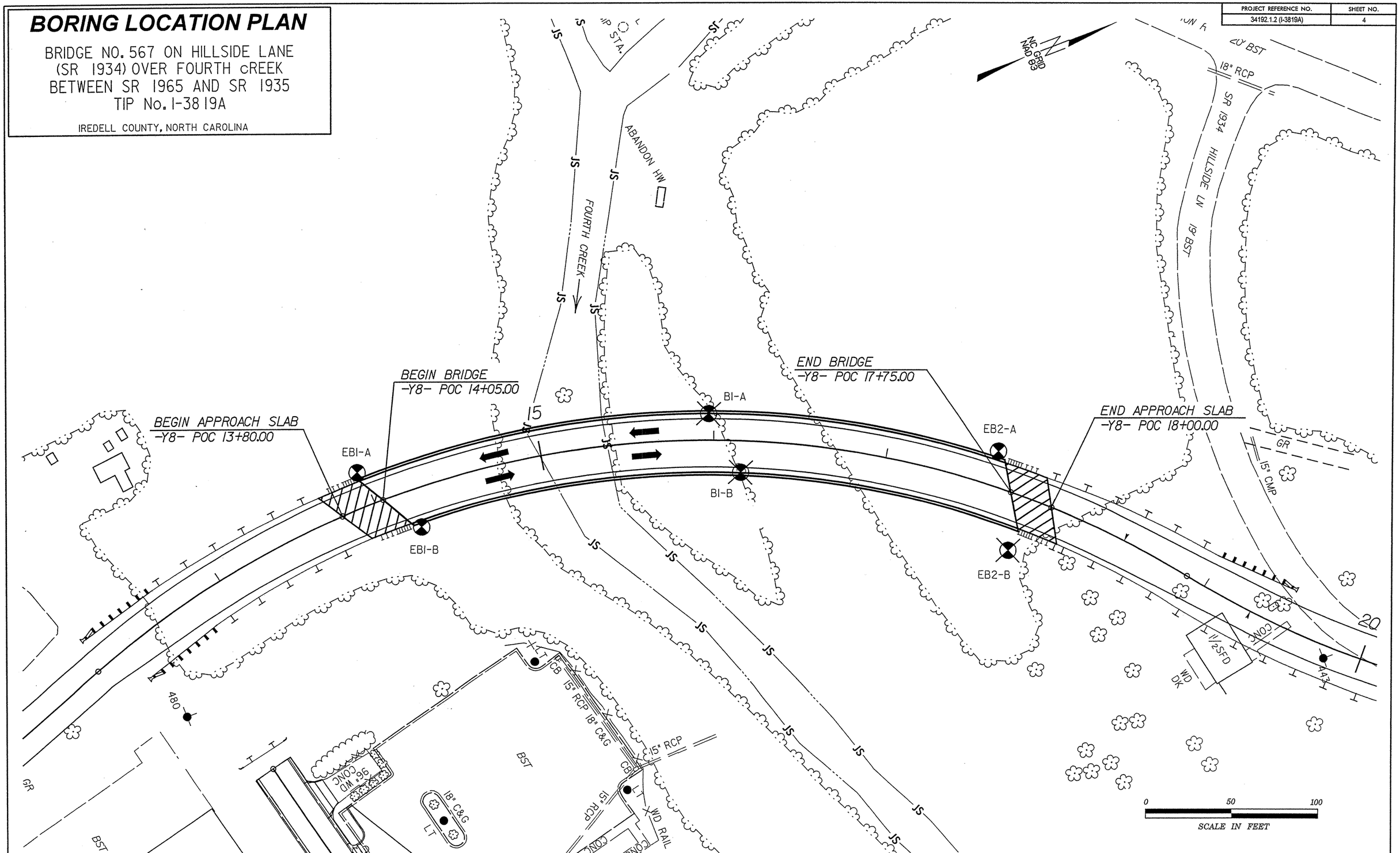

GRAPHIC SCALE
0 500 1,000 2,000
Feet
PROJECT LOCATION
Fourth
Creek
Davidson Ch
Fairview Ch
Temple Ch
Water Tank
INTERCHANGE 151
Northview Sch
Radio Tower
Lakewood Park
Memorial Hospital
Trinity Ch
St Johns Ch
High Sch
Library
Davis Hospital
Mitchell College
Courthouse
City Hall
STATESVILLE
Forest Park Ch
Presley Sch
Oakwood Cem
Park
Broad St
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS
STATESVILLE - I-40/I-77 INTERCHANGE
BRIDGE NO. 567
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

BRIDGE NO. 567 ON HILLSIDE LANE
(SR 1934) OVER FOURTH CREEK
BETWEEN SR 1965 AND SR 1935
TIP No. I-3819A

IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4

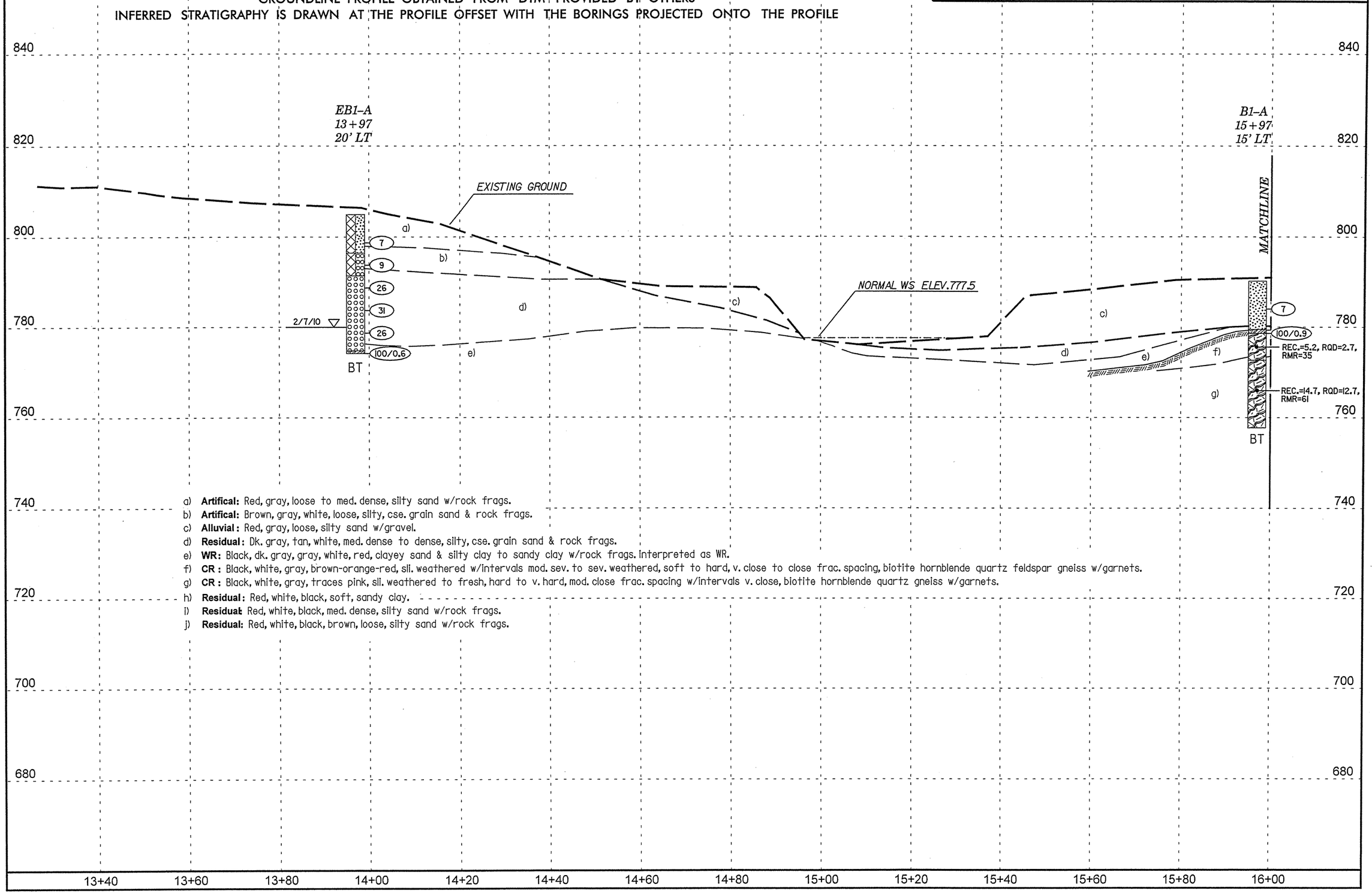


GENERALIZED SUBSURFACE PROFILE 20' Lt. of –Y8–

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5
PROFILE	



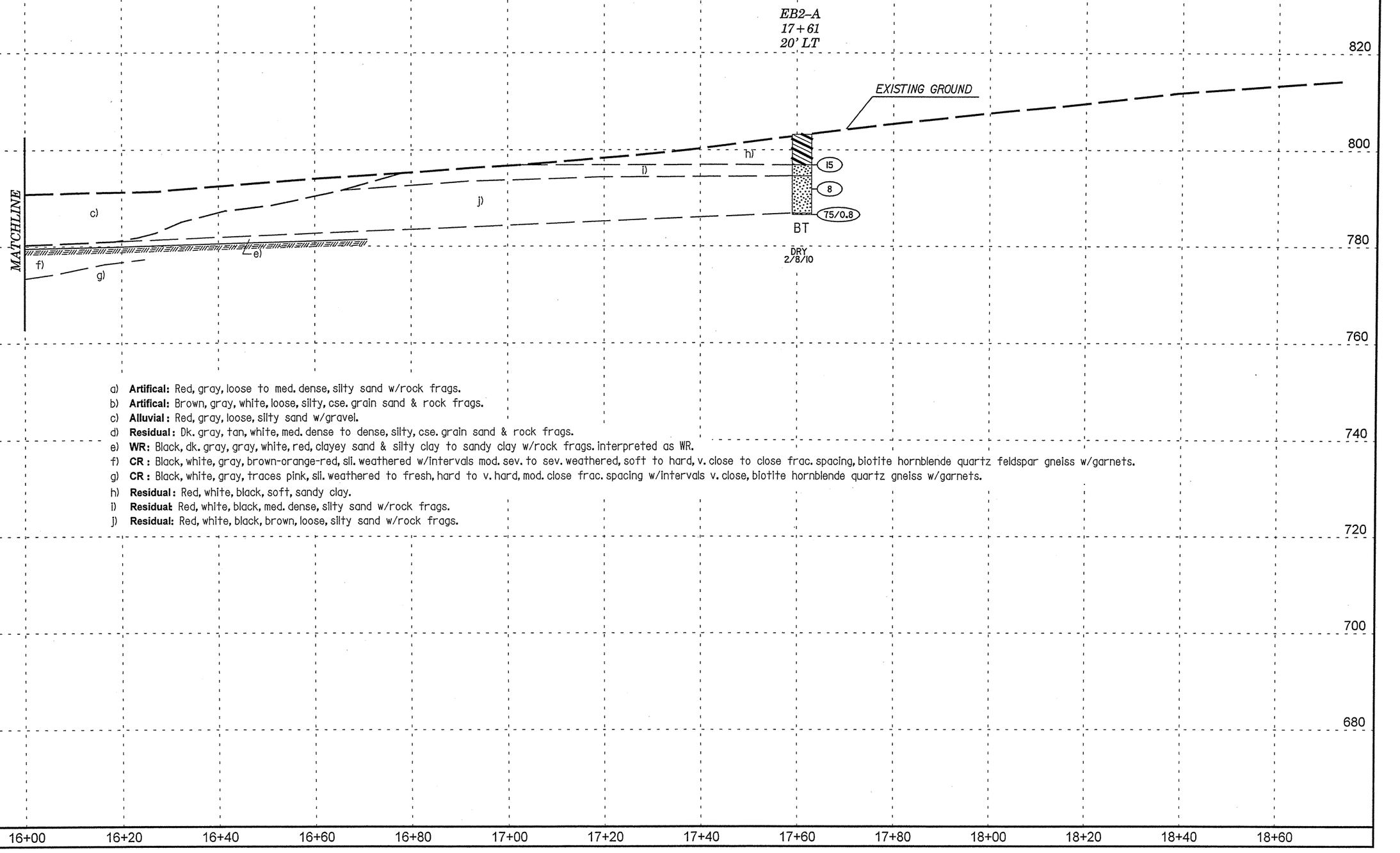
a) **Artifical:** Red, gray, loose to med. dense, silty sand w/rock frags.
b) **Artifical:** Brown, gray, white, loose, silty, cse. grain sand & rock frags.
c) **Alluvial:** Red, gray, loose, silty sand w/gravel.
d) **Residual:** Dk. gray, tan, white, med. dense to dense, silty, cse. grain sand & rock frags.
e) **WR:** Black, dk. gray, gray, white, red, clayey sand & silty clay to sandy clay w/rock frags. interpreted as WR.
f) **CR:** Black, white, gray, brown-orange-red, sli. weathered w/intervals mod. sev. to sev. weathered, soft to hard, v. close to close frac. spacing, biotite hornblende quartz feldspar gneiss w/garnets.
g) **CR:** Black, white, gray, traces pink, sli. weathered to fresh, hard to v. hard, mod. close frac. spacing w/intervals v. close, biotite hornblende quartz gneiss w/garnets.
h) **Residual:** Red, white, black, soft, sandy clay.
i) **Residual:** Red, white, black, med. dense, silty sand w/rock frags.
j) **Residual:** Red, white, black, brown, loose, silty sand w/rock frags.

GENERALIZED SUBSURFACE PROFILE 20' Lt. of –Y8–

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE

0 20 40
FEET
VE = NONE

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	6
PROFILE	



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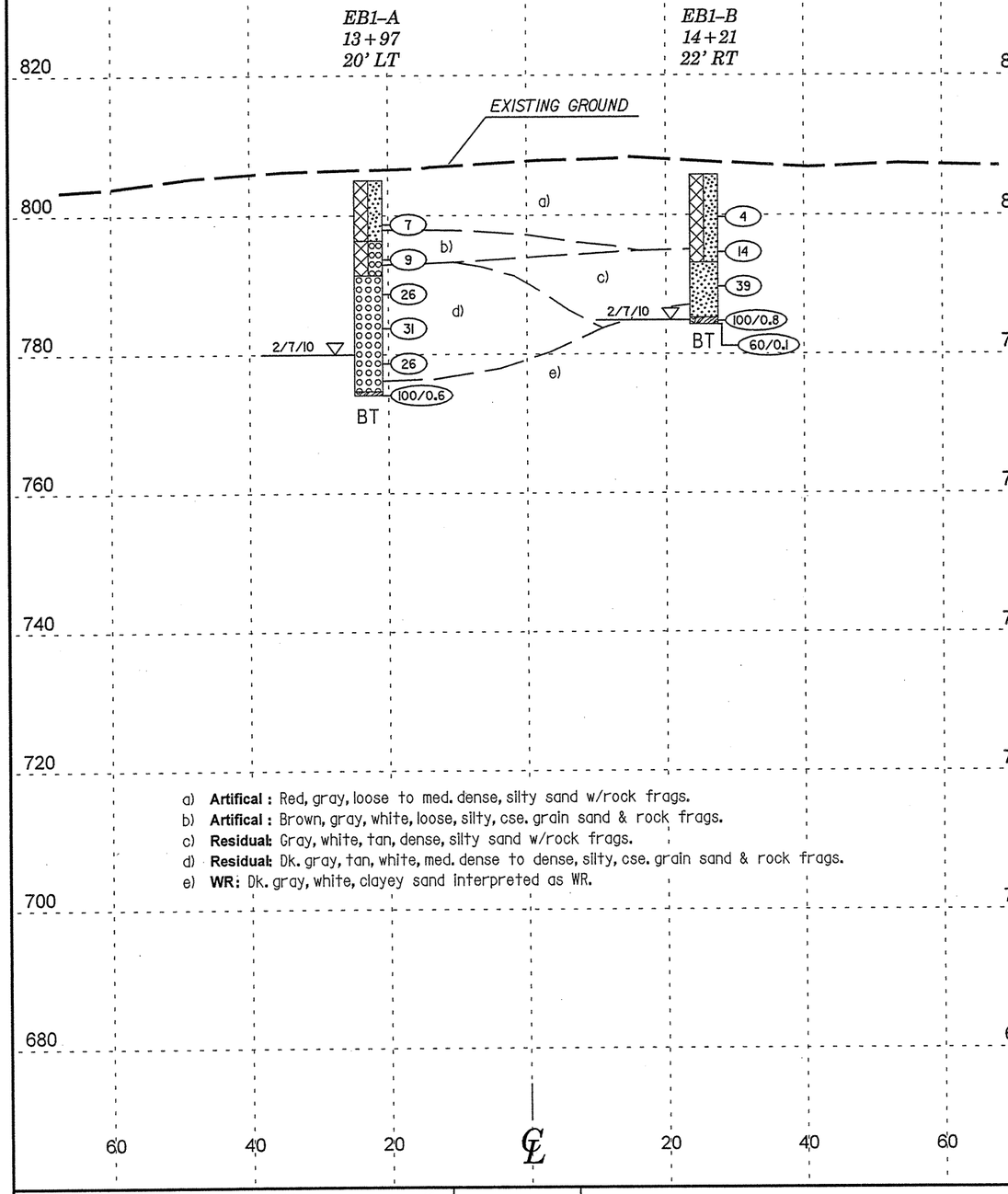
e) **WR:** Black, dk. gray, gray, white, red, clayey sand & silty clay to sandy clay w/rock frags. interpreted as WR.
f) **CR:** Black, white, gray, brown-orange-red, sli. weathered w/intervals mod. sev. to sev. weathered, soft to hard, v. close to close frac. spacing, biotite hornblende quartz feldspar gneiss w/garnets.
g) **CR:** Black, white, gray, traces pink, sli. weathered to fresh, hard to v. hard, mod. close frac. spacing w/intervals v. close, biotite hornblende quartz gneiss w/garnets.
h) **Residual:** Red, white, black, soft, sandy clay.
i) **Residual:** Red, white, black, med. dense, silty sand w/rock frags.
j) **Residual:** Red, white, black, brown, loose, silty sand w/rock frags.

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	7

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

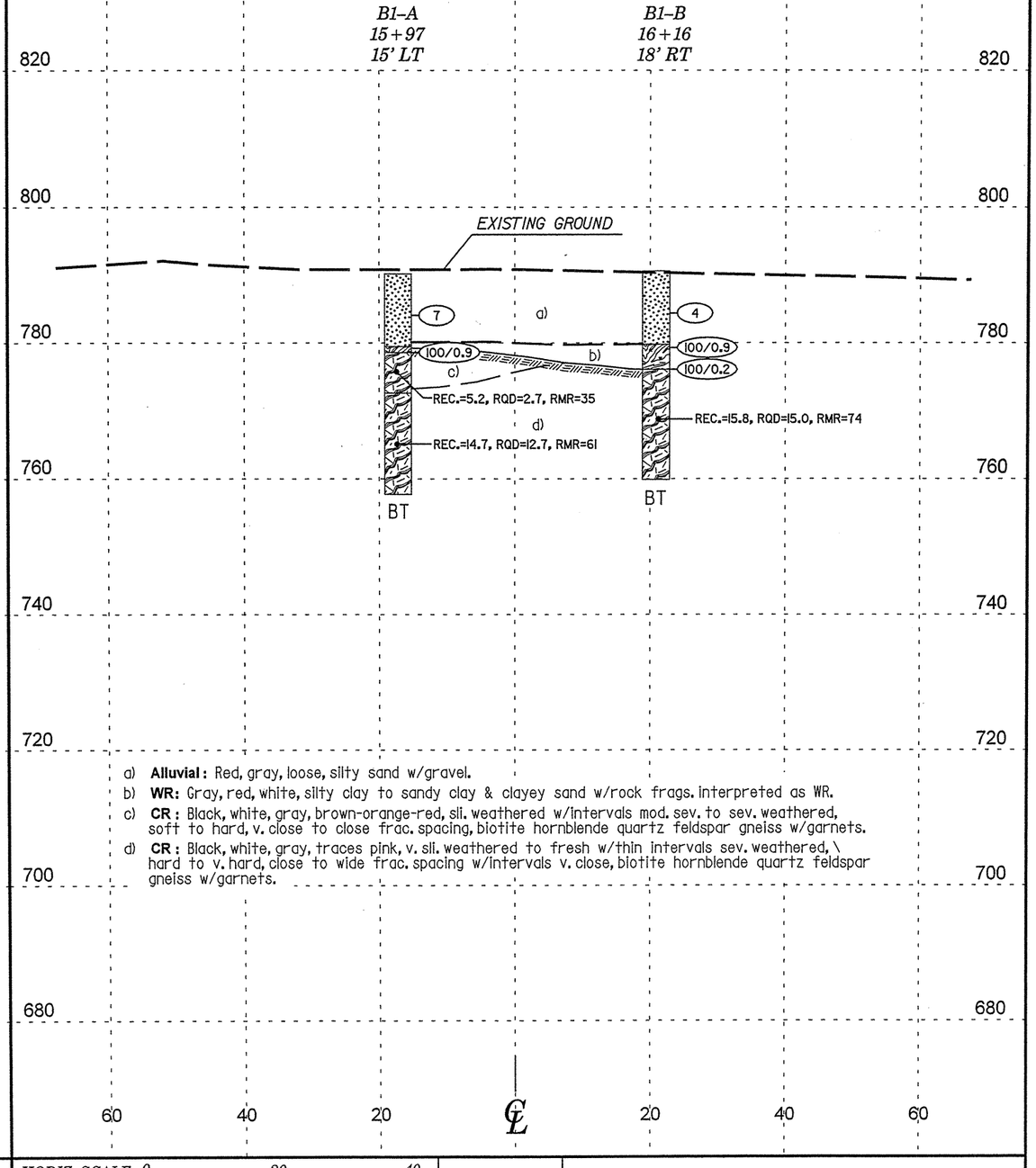
GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Artifical :** Red, gray, loose to med. dense, silty sand w/rock frags.
b) **Artifical :** Brown, gray, white, loose, silty, cse. grain sand & rock frags.
c) **Residual:** Gray, white, tan, dense, silty sand w/rock frags.
d) **Residual:** Dk. gray, tan, white, med. dense to dense, silty, cse. grain sand & rock frags.
e) **WR:** Dk. gray, white, clayey sand interpreted as WR.

HORIZ. SCALE (FEET) 0 20 40 | VE = NONE | **END BENT 1 CROSS SECTION**



a) **Alluvial :** Red, gray, loose, silty sand w/gravel.
b) **WR:** Gray, red, white, silty clay to sandy clay & clayey sand w/rock frags. interpreted as WR.
c) **CR :** Black, white, gray, brown-orange-red, sli. weathered w/intervals mod. sev. to sev. weathered, soft to hard, v. close to close frac. spacing, biotite hornblende quartz feldspar gneiss w/garnets.
d) **CR :** Black, white, gray, traces pink, v. sli. weathered to fresh w/thin intervals sev. weathered, \ hard to v. hard, close to wide frac. spacing w/intervals v. close, biotite hornblende quartz feldspar gneiss w/garnets.

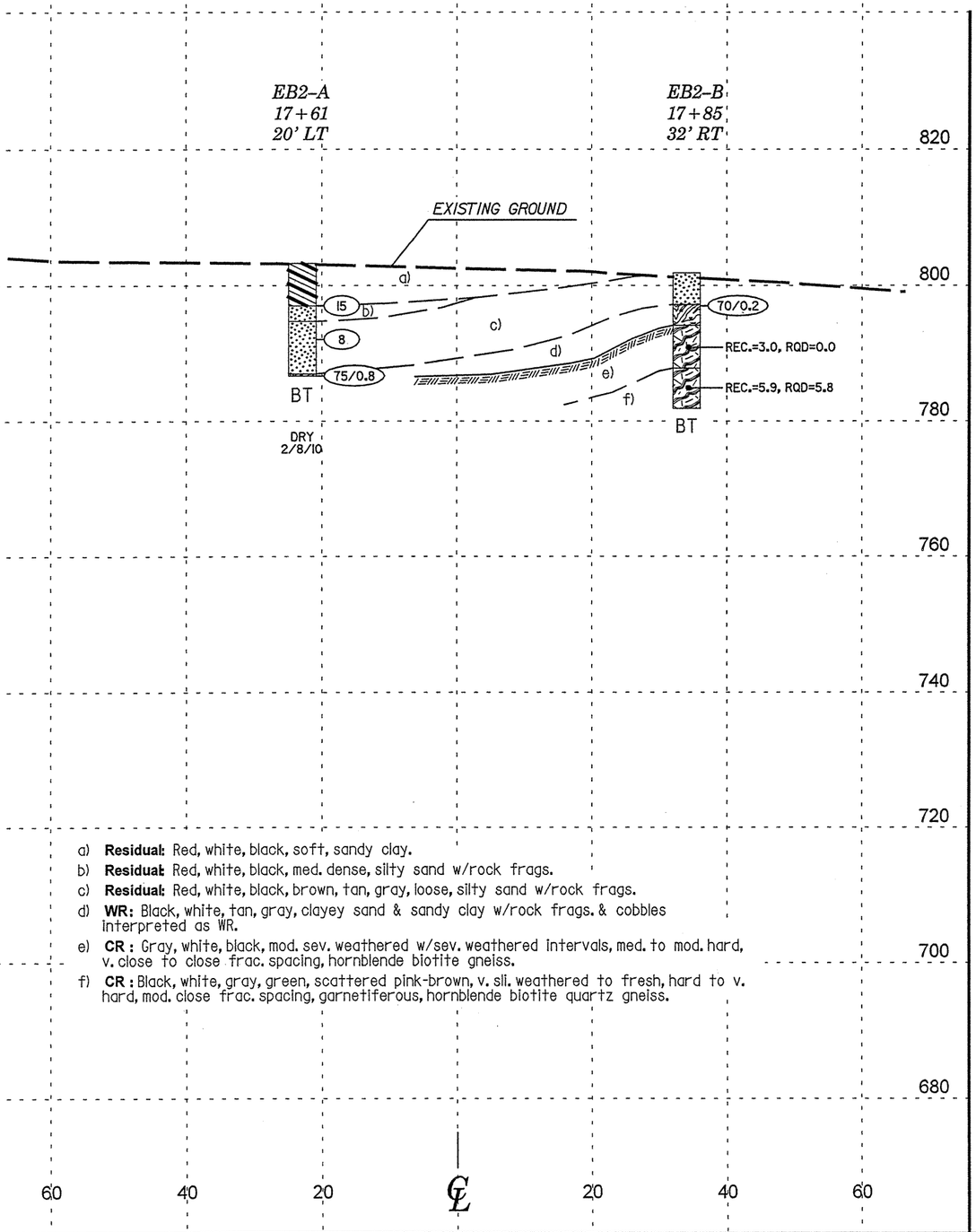
HORIZ. SCALE (FEET) 0 20 40 | VE = NONE | **BENT 1 CROSS SECTION**

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	8

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN AT CROSS SECTIONS WITH THE BORINGS PROJECTED ONTO THE CROSS SECTIONS



a) **Residual:** Red, white, black, soft, sandy clay.

b) **Residual:** Red, white, black, med. dense, silty sand w/rock frags.

c) **Residual:** Red, white, black, brown, tan, gray, loose, silty sand w/rock frags.

d) **WR:** Black, white, tan, gray, clayey sand & sandy clay w/rock frags. & cobbles interpreted as WR.

e) **CR :** Gray, white, black, mod. sev. weathered w/sev. weathered intervals, med. to mod. hard, v. close to close frac. spacing, hornblende biotite gneiss.

f) **CR :** Black, white, gray, green, scattered pink-brown, v. sli. weathered to fresh, hard to v. hard, mod. close frac. spacing, garnetiferous, hornblende biotite quartz gneiss.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 2 CROSS SECTION	HORIZ. SCALE (FEET) 0 20	VE =

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 13+97	**OFFSET** 20 ft LT	**ALIGNMENT** -Y8-	**0 HR.** 25.0
COLLAR ELEV. 805.0 ft	**TOTAL DEPTH** 30.9 ft	**NORTHING** 754,619	**EASTING** 1,443,094	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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)
805										805.0 GROUND SURFACE 0.0
										RESIDUAL Red, gray, loose, silty sand w/rock frags. (A-2-4).
800	799.7	5.3	4	4	3	7		M		796.4 8.6
										Brown, gray, white, loose, silty, cse. grain sand & rock frags. (A-1-b).
795	794.7	10.3	4	4	5	9		M		791.4 13.6
										Dark gray, tan, white, med. dense to dense, silty, cse. grain sand & rock frags. (A-1-b).
790	789.7	15.3	7	12	14	26		M		
785	784.7	20.3	15	20	11	31	SS-2	M		
780	779.7	25.3	9	12	14	26		M		
775	774.7	30.3	100	60/0.1		60/0.1		M		774.7 30.3 774.1 30.9 **WEATHERED ROCK** Dark gray, white, clayey sand, interpreted as WR. Boring Terminated with Standard Penetration Test Refusal at Elevation 774.1 ft on Crystalline Rock (Gneiss).
770										
765										
760										
755										
750										
745										
740										
735										
730										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 14+21	**OFFSET** 22 ft RT	**ALIGNMENT** -Y8-	**0 HR.** 21.0
COLLAR ELEV. 805.8 ft	**TOTAL DEPTH** 21.6 ft	**NORTHING** 754,642	**EASTING** 1,443,136	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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)
805										805.8 GROUND SURFACE 0.0
										RESIDUAL Red, loose to med. dense, silty, sand w/rock frags. (A-2-4).
800	800.7	5.1	1	1	3	4		M		
795	795.7	10.1	2	5	9	14		M		793.2 12.6
										Gray, white, tan, dense, silty sand w/rock frags. (A-2-4).
790	790.7	15.1	17	20	19	39		M		
785	785.7	20.1	10	43	57/0.3	100/0.8 60/0.1		M		785.2 20.6 784.2 21.6 **WEATHERED ROCK** Dark gray & white, clayey sand, interpreted as WR. Boring Terminated with Standard Penetration Test Refusal at Elevation 784.2 ft on Crystalline Rock (Gneiss).
780	784.3	21.5	60/0.1					M		
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 15+97	**OFFSET** 15 ft LT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 790.2 ft	**TOTAL DEPTH** 32.5 ft	**NORTHING** 754,820	**EASTING** 1,443,136	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**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)
										790.2	0.0
										GROUND SURFACE	
										ALLUVIAL	
										Red, gray, loose, silty sand w/gravel (A-2-4).	
	785.0	5.2	1	3	4	7		M			
	780.0	10.2								779.5	10.7
			5	40	60/0.4	100/0.9		M		778.6	11.6
							RS-1			WEATHERED ROCK	
										Red, gray, silty clay to sandy clay w/rock frags., interpreted as WR.	
										CRYSTALLINE ROCK	
										Biotite gneiss w/weathered intervals	
										772.6	17.6
										Biotite gneiss	
										757.7	32.5
										Boring Terminated at Elevation 757.7 ft in Crystalline Rock (Gneiss).	

NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

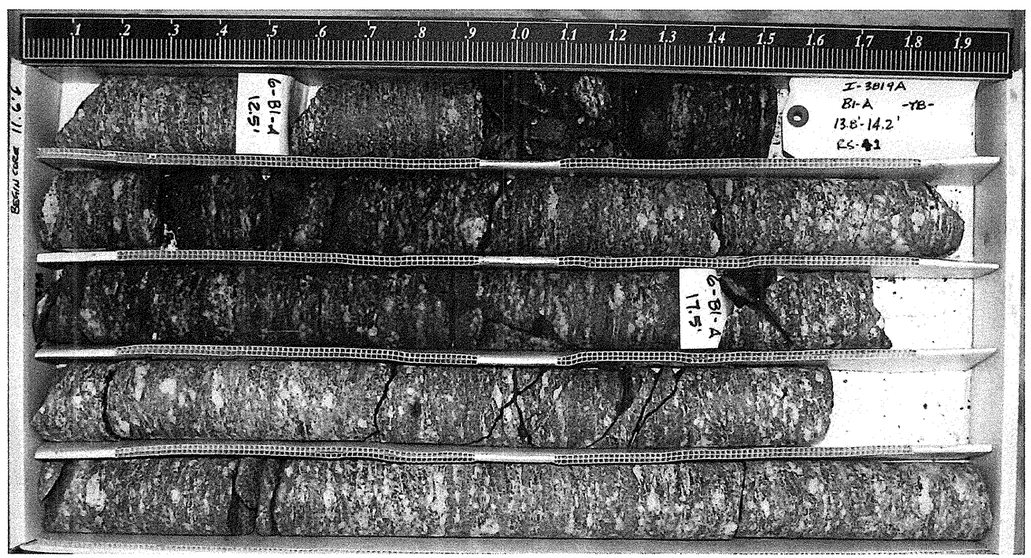
PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 15+97	**OFFSET** 15 ft LT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 790.2 ft	**TOTAL DEPTH** 32.5 ft	**NORTHING** 754,820	**EASTING** 1,443,136	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 20.9 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)
778.6											Begin Coring @ 11.6 ft	
	778.6	11.6	0.9	0:32/0.9	(0.4)	(0.4)		(5.2)	(2.7)		778.6	11.6
	777.7	12.5	5.0	0:46	44%	44%		87%	45%		**CRYSTALLINE ROCK**	
				0:40							Black, white, gray, brown-orange-red, sli. weathered w/intervals mod. sev. to sev. weathered, soft to hard, v. close to close frac. spacing, biotite hornblende quartz feldspar gneiss w/garnets.	
775				1:00	(4.7)	(2.3)	RS-1				19 0°-10° fracs. w/iron stain; 9 35°-55° fracs. w/iron stain & traces clay	
	772.7	17.5		1:03	94%	46%					772.6	17.6
			5.0	0:57				(14.7)	(12.7)		Uniaxial compressive strength= 1072 KSF	
770				0:54	(5.0)	(3.3)		99%	85%		R1=4, R2=8, R3=10, R4=6, R5=7, RMR=35	
				1:02	100%	66%					Rock Type E	
	767.7	22.5		0:58							Black, white, gray, traces pink, sli. weathered to fresh, hard to v. hard, mod. close frac. spacing w/intervals v. close (18.5'-19.1' & 19.8'-20.0'), biotite hornblende quartz gneiss w/garnets.	
			5.0	1:15							12 0°-10° fracs., some w/iron stain; 7 20°-40° fracs., some w/iron stain	
765				1:16								
				1:42	(5.0)	(4.9)					Uniaxial compressive strength=1667 KSF	
				1:55	100%	98%					R1=7, R2=17, R3=10, R4=20, R5=7, RMR=61	
	762.7	27.5		1:39							Rock Type E	
			5.0	2:04								
760				1:54								
				1:38	(4.8)	(4.5)						
				1:47	96%	90%						
	757.7	32.5		1:32							757.7	32.5
				1:53							Boring Terminated at Elevation 757.7 ft in Crystalline Rock (Gneiss).	
755				1:49								

NCDOT CORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

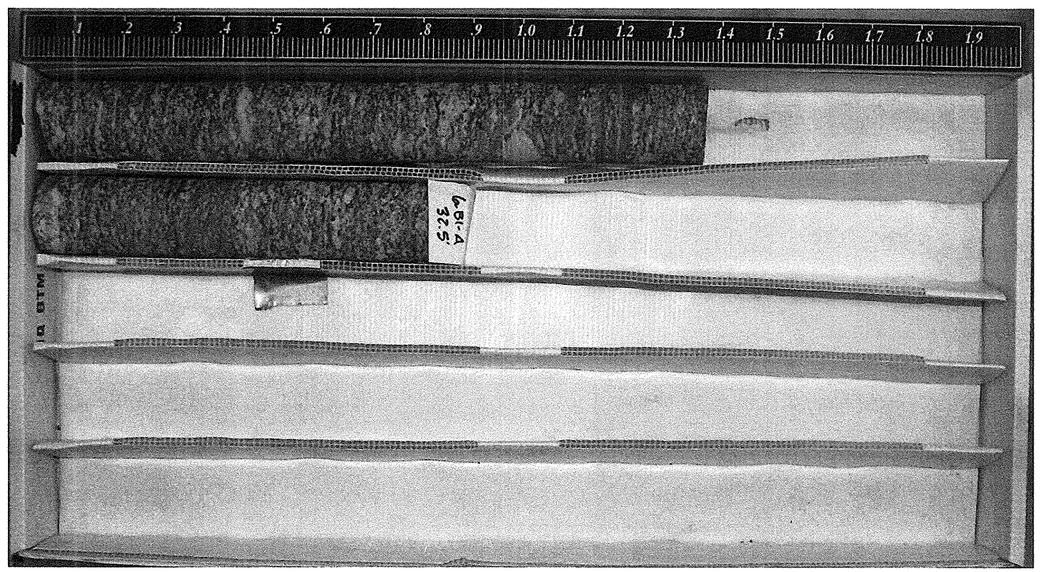
CORE PHOTOGRAPHIC RECORD

Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935



Boring B1-A – Station 15+97 @ 15' Lt. Box 1 of 3

Boring B1-A – Station 15+97 @ 15' Lt. Box 2 of 3



Boring B1-A – Station 15+97 @ 15' Lt. Box 3 of 3

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 16+16	**OFFSET** 18 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 790.6 ft	**TOTAL DEPTH** 30.7 ft	**NORTHING** 754,825	**EASTING** 1,443,174	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**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)
795											
790										790.6 GROUND SURFACE	0.0
										ALLUVIAL Red, loose, silty sand (A-2-4).	
785	785.3	5.3	2	2	2	4		M			
780	780.3	10.3	10	100/0.4		100/0.9		M		779.8	10.8
	776.3	14.3	100/0.2			100/0.2	RS-2	M		**WEATHERED ROCK** Gray & white, clayey sand w/rock frags., interpreted as WR. 776.1	14.5
775										**CRYSTALLINE ROCK** Gneiss	
770											
765											
760										759.9	30.7
										Boring Terminated at Elevation 759.9 ft in Crystalline Rock (Gneiss).	
755											
750											
745											
740											
735											
730											
725											
720											
715											

NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

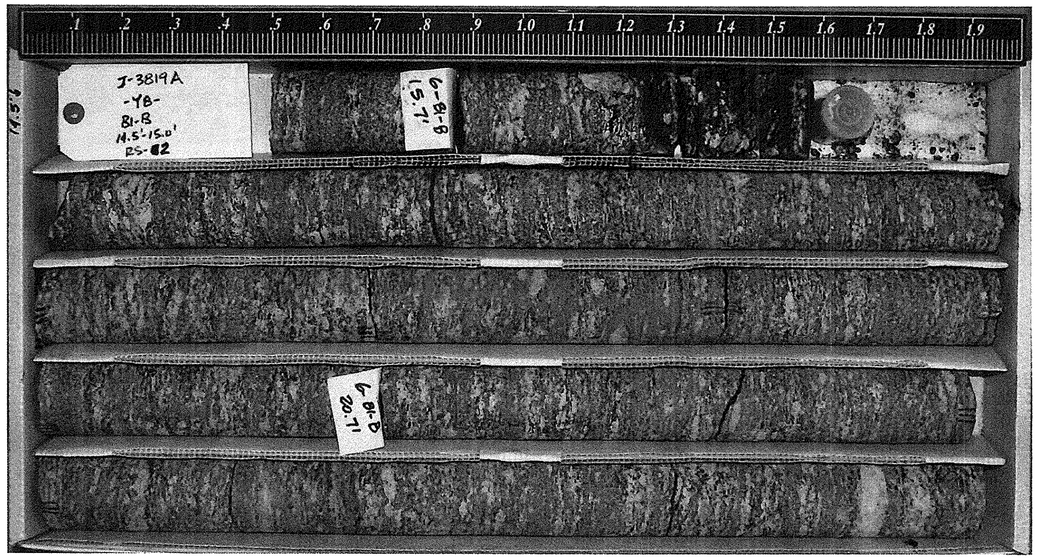
PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 16+16	**OFFSET** 18 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 790.6 ft	**TOTAL DEPTH** 30.7 ft	**NORTHING** 754,825	**EASTING** 1,443,174	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 16.2 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)
776.1												
775	776.1 774.6	14.5 15.7	1.2	2:28/1.2	(1.0) 83%	(0.8) 67%	RS-2	(15.8) 98%	(15.0) 93%		Begin Coring @ 14.5 ft	
			5.0	1:48 1:45 1:58 2:23 2:17	(5.0) 100%	(4.5) 90%					776.1 **CRYSTALLINE ROCK** Gray, black, white, traces pink, v. slight to fresh weathering w/intervals sev. weathered (15.9'-16.2'), hard to v. hard, close to wide frac. spacing, biotite hornblende quartz feldspar gneiss w/garnets. 5 0°-10° fracs.; 5 20°-30° fracs., some w/iron stain	14.5
770	769.9	20.7									Uniaxial compressive strength=1667 KSF R1=7, R2=20, R3=20, R4=20, R5=7, RMR=74 Rock Type E	
			5.0	2:23 2:28 2:23 3:06 2:54	(5.0) 100%	(4.9) 98%						
765	764.9	25.7										
			5.0	2:35 3:22 3:03 3:58 4:00	(4.8) 96%	(4.8) 96%						
760	759.9	30.7									759.9	30.7
											Boring Terminated at Elevation 759.9 ft in Crystalline Rock (Gneiss).	
755												
750												
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												

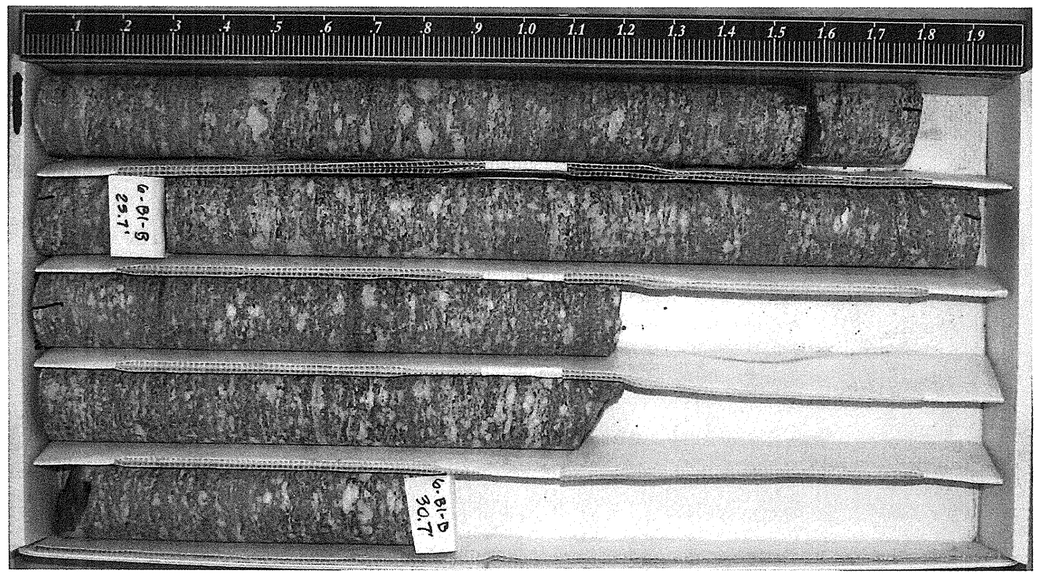
NCDOT CORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935



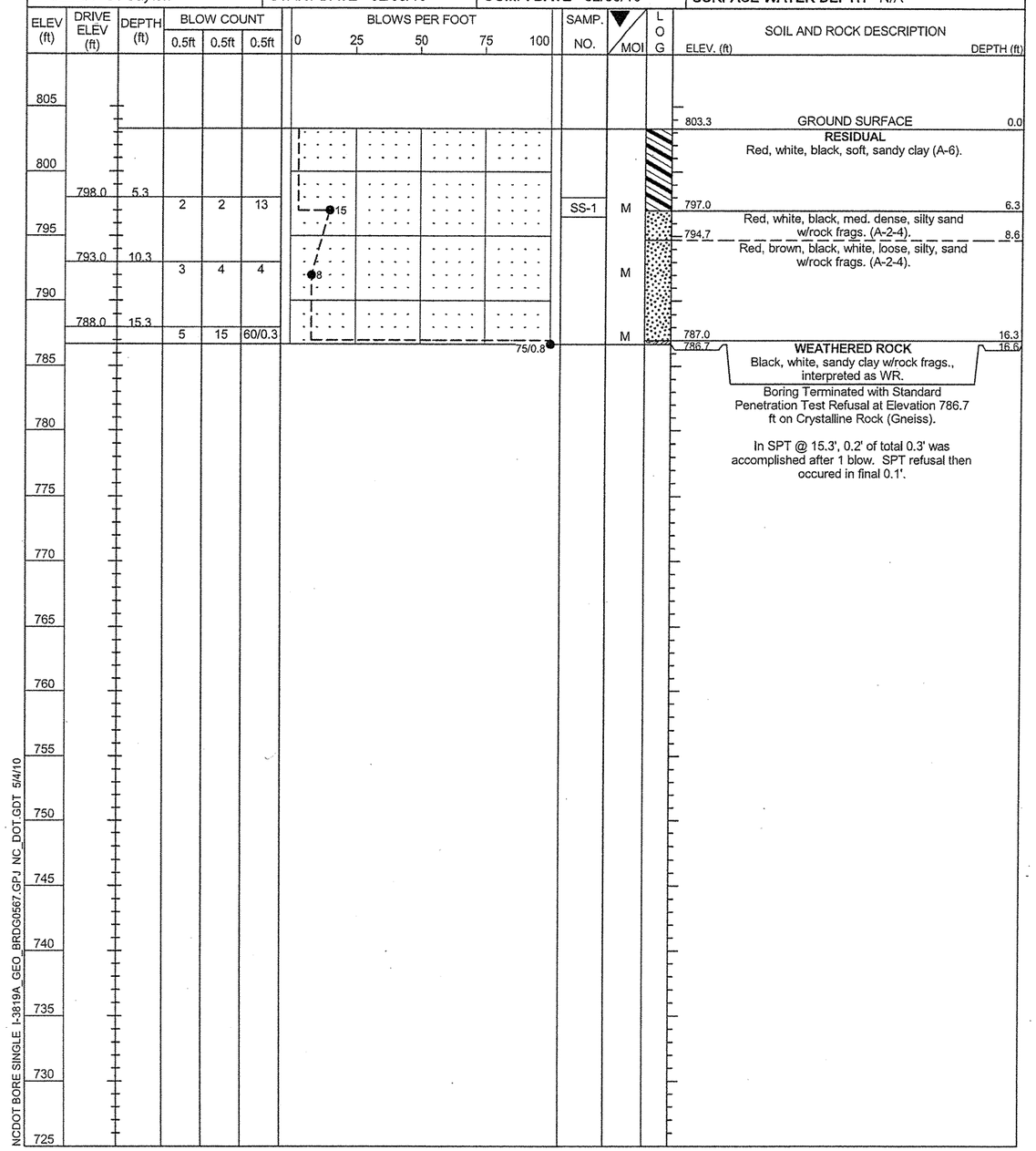
Boring B1-B – Station 16+16 @ 18' Rt. Box 1 of 2



Boring B1-B – Station 16+16 @ 18' Rt. Box 2 of 2

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+61	**OFFSET** 20 ft LT	**ALIGNMENT** -Y8-	**0 HR.** Dry
COLLAR ELEV. 803.3 ft	**TOTAL DEPTH** 16.6 ft	**NORTHING** 754,969	**EASTING** 1,443,216	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER B. Cayton	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A	



NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 17+85	**OFFSET** 32 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 801.9 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 754,953	**EASTING** 1,443,271	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**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)
805										
										801.9 GROUND SURFACE 0.0
800										**RESIDUAL** Gray, white, tan, red, loose, silty sand w/rock frags. (A-2-4).
	797.2	4.7	70/0.2			70/0.2		M		797.2 4.7
795										**WEATHERED ROCK** Gray, white, tan, clayey sand w/rock frags. & cobbles, interpreted as WR. 794.1 7.8
										CRYSTALLINE ROCK Honblende gneiss w/weathered intervals
790										
										787.8 14.1
785										Hornblende gneiss
										781.9 20.0
780										Boring Terminated at Elevation 781.9 ft in Crystalline Rock (Gneiss).
										Note: Initially set up at 17+85, 22' Rt. and augered 1' to refusal.
775										Note: Moved to 17+85, 25' Rt. and augered 2' to refusal.
										Note: Moved to 17+85, 32' Rt. and augered to 4.7' and perfomed SPT. Suspected boulder, augered to 7.8'. Still in boulder.
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** J. Conci	
SITE DESCRIPTION Bridge No. 567 on Hillside Lane (SR 1934) Over Fourth Creek Between SR 1965 and SR 1935				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 17+85	**OFFSET** 32 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 801.9 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 754,953	**EASTING** 1,443,271	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic	
DRILLER D. Hertter	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 12.2 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
794.1											ELEV. (ft) DEPTH (ft)
	794.1	7.8	2.2	1:32/1.2	(1.2)	(0.0)		(3.0)	(0.0)		Begin Coring @ 7.8 ft
	791.9	10.0		1:48	55%	0%		48%	0%		794.1 **CRYSTALLINE ROCK** 7.8
790			5.0	1:52	(2.7)	(0.9)					Gray, white, black, mod. sev. weathered w/sev. weathered intervals, med. hard to mod. hard, v. close to close frac. spacing, hornblende biotite gneiss.
				1:56	54%	18%					1 90° frac. w/clay infill (1/16"); 1 50° frac. w/clay infill (1/32"); 33+ 0° fracs.
				1:43							787.8 14.1
	786.9	15.0		2:01				(5.9)	(5.8)		Black, white, gray, green, scattered pink-brown, v. sli. weathered to fresh,
785			5.0	2:04	(5.0)	(4.9)		100%	98%		hard to v. hard, mod. close frac. spacing, garnetiferous, hornblende biotite quartz gneiss.
				2:23	100%	98%					2 0°-20° fracs. w/rough walls
	781.9	20.0		2:28							781.9 20.0
780				2:24							Boring Terminated at Elevation 781.9 ft in Crystalline Rock (Gneiss).
				2:37							Note: Initially set up at 17+85, 22' Rt. and augered 1' to refusal.
775				2:35							Note: Moved to 17+85, 25' Rt. and augered 2' to refusal.
											Note: Moved to 17+85, 32' Rt. and augered to 4.7' and perfomed SPT. Suspected boulder, augered to 7.8'. Still in boulder.
770											
765											
760											
755											
750											
745											
740											
735											
730											
725											
720											
715											

NCDOT CORE SINGLE I-3819A_GEO_BRDG0567.GPJ NC_DOT.GDT 5/4/10

CORE PHOTOGRAPHIC RECORD

Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935

Boring EB2-B – Station 17+85 @ 32' Rt. Box 1 of 1

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Retained No. 60	Percent Passing No.200	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
EB2-A	SS-1	5.3'-6.8'	A-2-4(0)	15	81.1	59.6	48.3	29.6	36.2	31.5	18.4	13.8	35	NP	NP	N/A
EB1-A	SS-2	20.3'-21.8'	A-1-b(0)	31	68.6	40.3	68.4	14.1	54.0	28.8	13.3	3.9	32	NP	NP	N/A
Bed Sample 1	S-1	SURFACE	A-1-b(0)	N/A	80.4	39.2	80.4	3.9	75.6	20.3	3.6	0.5	19	NP	NP	N/A
Bank Sample 1	S-2	SURFACE	A-2-4(0)	N/A	99.9	73.7	64.0	5.9	63.9	31.3	3.9	1.0	20	NP	NP	N/A
Bank Sample 2	S-3	SURFACE	A-2-4(0)	N/A	98.8	79.3	42.8	19.6	42.2	40.5	9.4	7.9	26	NP	NP	N/A

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: I-3819A
F.A. NO.: 34192.1.1
COUNTY: Iredell
Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935

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)	Splitting Tensile Strength (PSI)	Remarks
RS-1	B1-A	13.8-14.2	Gneiss	CZab/CZbg	46%	0.324	0.164	172	7,445			sli. weathered
RS-2	B1-B	14.5-15.0	Gneiss	CZab/CZbg	67%	0.321	0.165	173	11,576			v. sli. weathered to fresh

F&H, CERT. No. 102-0603

Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34192.1.2 TIP: I-3819A COUNTY: IREDELL

DESCRIPTION(1): Bridge No. 567 on Hillside Ln. (SR 1934) over Fourth Ck. Between SR 1965 and SR 1935

EXISTING BRIDGE

Information from: Field Inspection ____ Microfilm ____ (reel ____ pos: ____)
Other (explain) No existing bridge at this location

Bridge No.: n/a Length: n/a Total Bents: n/a Bents in Channel: n/a Bents in Floodplain: n/a
Foundation Type: n/a

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: n/a

Interior Bents: n/a

Channel Bed: n/a

Channel Bank: n/a

EXISTING SCOUR PROTECTION

Type(3): n/a

Extent(4): n/a

Effectiveness(5): n/a

Obstructions(6): n/a

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 structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): clay, silt, fine to coarse sand, gravels, cobbles, boulders, possible outcrop, some old rip-rap

Channel Bank Material(8): fine sand on North bank (point bar), sand, silt, clay on South bank (cut-bank)

Channel Bank Cover(9): cobbles, boulders, grass, shrubs, trees, old rip-rap

Floodplain Width(10): 100 ft.

Floodplain Cover(11): grass, shrubs, trees

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

Channel Migration Tendency(13): Southward migration possible along cut-bank (South side)

Observations and Other Comments: Floodplain has significant deposits of fine sand from recent flood. Took site photos if needed for report.

Reported by: Brett Smith (Brett Smith) **Date:** 2/19/2010

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

	BENTS B1										
Along -L-	788.0										

Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Unit agrees with the Hydraulics Unit's theoretical scour as indicated above.

DSE determined by: William F. Goforth, P.G. **Date:** 5/4/2010

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	bank	bank	bed				
Sample No.	1	2	1				
Retained #4	100	100	91.7				
Passed #10	99.9	98.8	80.4				
Passed #40	73.7	79.3	60.8				
Passed #200	5.9	19.6	3.9				
Coarse Sand	63.9	42.2	75.6				
Fine Sand	31.3	40.5	20.3				
Silt	3.9	9.4	3.6				
Clay	1	7.9	0.5				
LL	20	26	19				
PI	NP	NP	NP				
AASHTO	A-2-4(0)	A-2-4(0)	A-1-b(0)				
Station	16+08	16+08	16+08				
Offset	105' RT	130'RT	85' RT				
Depth		surface	surface				

SITE PHOTOGRAPHIC RECORD

Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935

EB1-A Looking Northeast Toward B1-A

EB2-B Looking Southwest Toward B1-B

B1-A Looking Northeast Toward EB2-A

B1-B Looking Southwest Toward EB1-B

SITE PHOTOGRAPHIC RECORD

Bridge No. 567 on Hillside Lane (SR 1934) over Fourth Creek Between SR 1965 and SR 1935

EB1-B Looking West Toward EB1-A

B1-A Looking East Toward B1-B

EB2-B Looking West Toward EB2-A

CONTENTS:

Title Sheet	Sheet 1
NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheet 2
Site Vicinity Map	Sheet 3
Boring Location Plan	Sheet 4
Generalized Subsurface Profile Along -L-	Sheet 5
Generalized Subsurface Cross Section Through End Bent No. 1	Sheet 6
Generalized Subsurface Cross Section Through End Bent No. 2	Sheet 7
Test Boring Logs	Sheets 8 - 10
Summary of Laboratory Test Data	Sheet 11
Site Photographs	Sheets 12 - 15

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34192.1.2* F.A. PROJ. *IMS-40-2(124)*

COUNTY *IREDELL*

PROJECT DESCRIPTION *STATESVILLE – I-40/I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR2003 (RADIO ROAD) TO SR2158 (OLD MOCKSVILLE ROAD) & I-77 FROM SOUTH OF SR2321 (E. BROAD STREET) TO SOUTH OF SR2171 (JANE SOWER ROAD)*

SITE DESCRIPTION *BRIDGE No. 563 ON I-40 (-L-) OVER US 21 (-Y4-)*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-3819A	1	15

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34192.1.2	IMS-40-2(124)	P.E.
		R/W & UTIL.

CAUTION NOTICE

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

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

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For Letting

PERSONNEL

A. RIGGS

N. BRADLEY

R. NORWOOD

S. LOW

P. PHELPS

T. PEREZ

INVESTIGATED BY *S&ME, INC.*

CHECKED BY *A.F. RIGGS, JR.*

SUBMITTED BY *S&ME, INC.*

DATE *MARCH 22, 2010*

NORTH CAROLINA PROFESSIONAL SEAL 14155 ENGINEER ALBERT F. RIGGS, JR. 3/29/10

DRAWN BY: *T. PEREZ*

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.

ID: I-3819A

CONTRACT: 34192.1.2

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2	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 #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			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 SOILS				
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 / DPT 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-550X
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3-1/4" H.S.A.

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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.

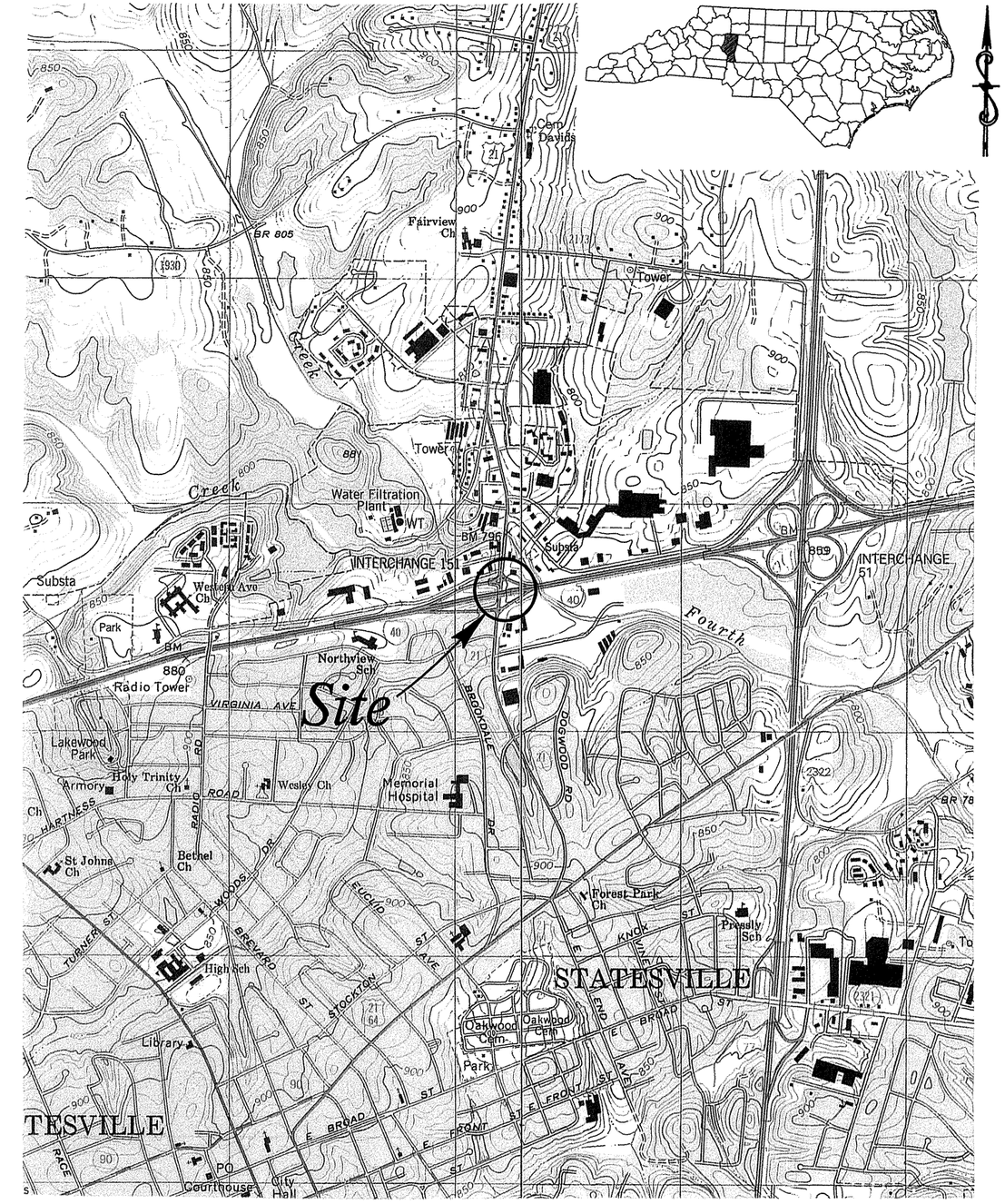
BENCH MARK: BY4-131 NCDOT Traverse Station Rebar & Cap Stamped "BY4-131" Located at Station 29+19.54 -BY4-
ELEVATION: 790.37 FT.

BENCH MARK: BY4-130 NCDOT Traverse Station Rebar & Cap Stamped "BY4-130" Located at Station 24+07.07 -BY4-
ELEVATION: 799.81 FT.

NOTES:
- SPT LAB SAMPLE

REVISED 09/23/09

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
I-3819A	34192.1.2	3	15



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SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	MARCH 2010
JOB NO.	1051-10-046

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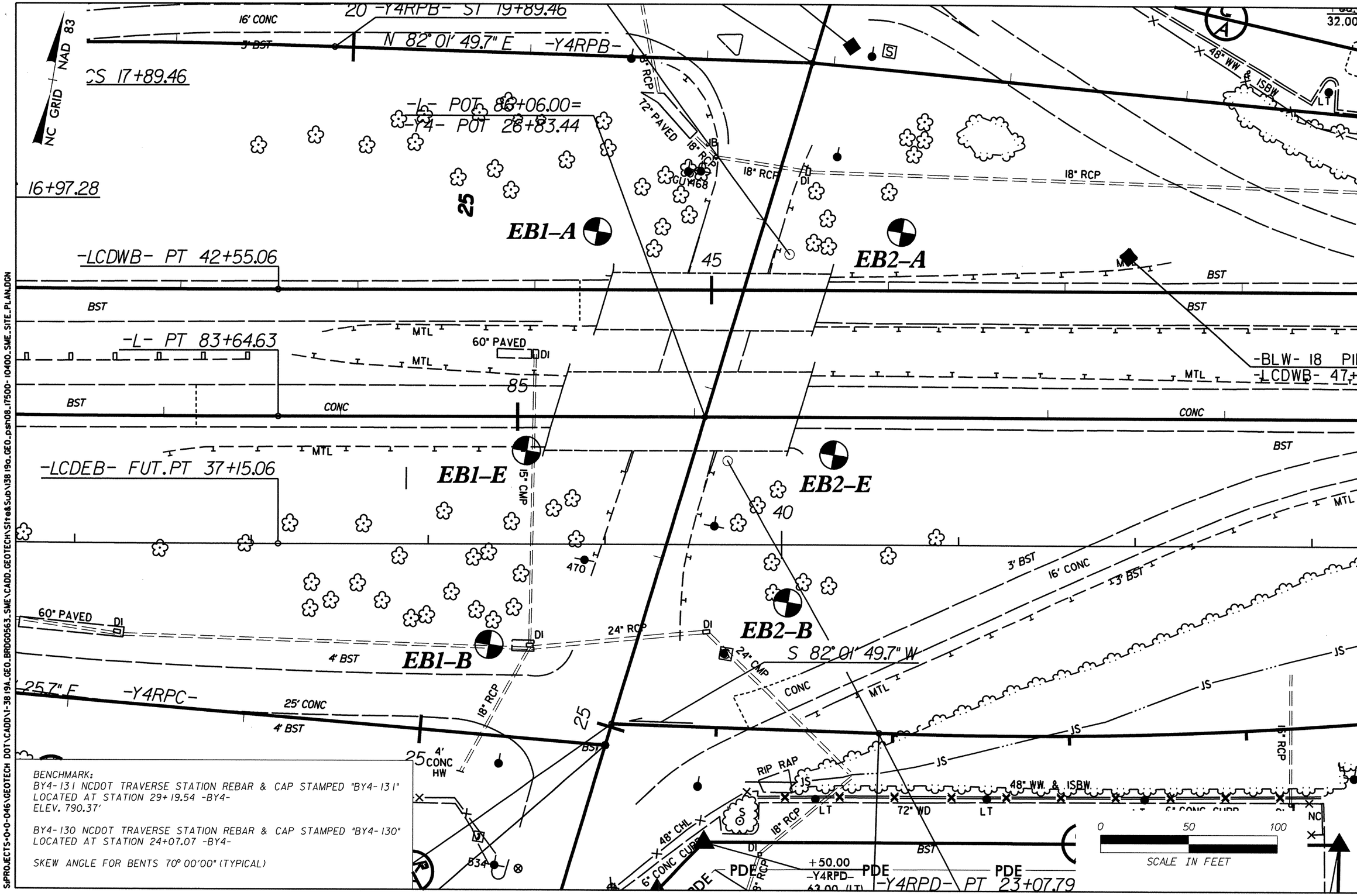
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

SITE VICINITY MAP

BRIDGE No. 563 ON I-40 (-L-)
OVER US 21 (-Y4-)
STATE PROJECT NO. 34192.1.2 TIP NO. I-3819A
FEDERAL I.D. NO. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA



BENCHMARK:
BY4-131 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-131"
LOCATED AT STATION 29+19.54 -BY4-
ELEV. 790.37'

BY4-130 NCDOT TRAVERSE STATION REBAR & CAP STAMPED "BY4-130"
LOCATED AT STATION 24+07.07 -BY4-

SKEW ANGLE FOR BENTS 70° 00'00" (TYPICAL)

S:\PROJECTS\0\0-046\GEOTECH DOT\CADD\I-3819A_GEO_BRDG0563_SME\CADD_GEOTECH\Site&Sub\I3819a_GEO_psh08_17500-10400_SME_SITE_PLAN.DGN

SCALE:	1" = 50'
DATE:	OCTOBER 2009
JOB NO.	1051-10-046
APPROVED BY:	AFR
DRAWN BY:	TRP
SHEET	4

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ENGINEERING TESTING

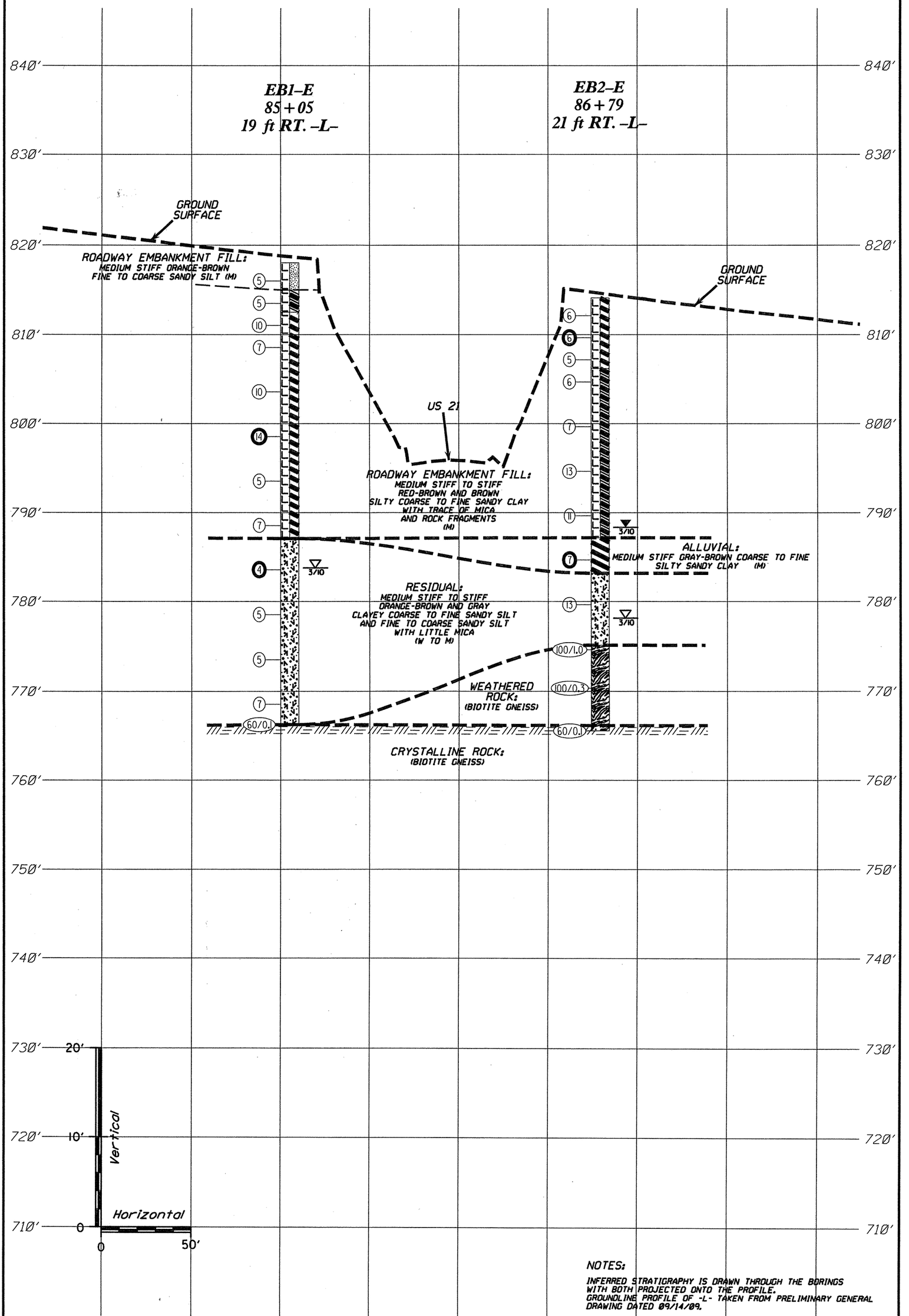
BORING LOCATION PLAN

BRIDGE No. 563 on I-40 (-L-)
OVER US 21 (-Y4-)
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

S:PROJECTS/2010 / 10-046/GEOTECH DOT/CADD/I-3819A/I-3819A_GEO_BRDG0563_SME/CADD_GEOTECH/SITE&SUB/I3819A_GEO_BRDG0563_PROFILE.DGN

GENERALIZED SUBSURFACE PROFILE ALONG -L-

TO US-21 ← → TO I-77



NOTES:

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE. GROUNDLINE PROFILE OF -L- TAKEN FROM PRELIMINARY GENERAL DRAWING DATED 09/14/09.

GENERALIZED SUBSURFACE PROFILE ALONG -L-

BRIDGE No. 563 ON I-40 (-L-)
OVER US 21 (-Y4-)
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

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SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	MARCH 2010	DRAWN BY:	TRP
JOB NO.	1051-10-046	SHEET	5

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 1

℄ -L-

EB1–A
85+45
105 ft LT. –L–

EB1–E
85+05
19 ft RT. –L–

EB1–B
84+84
129 ft RT. –L–

830′ 820′ 810′ 800′ 790′ 780′ 770′ 760′ 750′

PAVEMENT SURFACE

GROUND SURFACE

A

ROADWAY EMBANKMENT FILL:
SOFT TO STIFF RED-BROWN
SILTY FINE TO COARSE SANDY CLAY
WITH TRACE OF MICA
AND 1-INCH DIAMETER ROCK FRAGMENTS

DENSE GRAY CLAYEY SILTY FINE TO COARSE SAND (M)

WEATHERED ROCK:
(BIOTITE GNEISS)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

RESIDUAL:
MEDIUM STIFF TO VERY STIFF
ORANGE-BROWN AND BROWN-GRAY
FINE TO COARSE SANDY SILT
WITH LITTLE MICA
(M TO W)

B

WEATHERED ROCK:
(BIOTITE GNEISS)

7 3 6 6 30 100/0.9 100/0.9 60/0.0 3/10

5 5 10 7 10 14 5 7 4 5 5 7 60/0.1 3 7 4 4 7 100/0.8 60/0.0 3/10

20′ Vertical 10′

Horizontal 0 30′

A ROADWAY EMBANKMENT FILL: MEDIUM STIFF ORANGE-BROWN FINE TO COARSE SANDY SILT (M)

B ALLUVIAL: MEDIUM STIFF GRAY SILTY FINE TO COARSE SANDY CLAY (M)

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY: AFR
DRAWN BY: TRP
FIGURE 6

SCALE: (V) 1" = 10' (H) 1" = 30'
DATE: MARCH 2010
JOB NO. 1051-10-046

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GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 1
BRIDGE No. 563 on I-40 (-L-)
OVER US 21 (-Y4-)
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

S:\PROJECTS\10-046\GEOTECH DOT\CADD\I-3819A\I-3819A_GEO_BRDG0563_SME\CADD_GEOTECH\Site&Sub\I3819_GEO_BRDG0563_SME_XSC.DGN

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 2

℄ -L-

EB2–A
87+17
105 ft LT. –L–

EB2–E
86+79
21 ft RT. –L–

EB2–B
86+53
105 ft RT. –L–

830′ 820′ 810′ 800′ 790′ 780′ 770′ 760′ 750′

PAVEMENT SURFACE

PAVEMENT SURFACE

GROUND SURFACE

GROUND SURFACE

ROADWAY EMBANKMENT FILL:
SOFT TO VERY SOFT
RED-BROWN AND ORANGE-BROWN
SILTY FINE TO COARSE SANDY CLAY
AND FINE TO COARSE SANDY SILT
WITH TRACE OF MICA
(M)

ALLUVIAL:
MEDIUM STIFF TO STIFF
GRAY-BROWN SILTY COARSE TO FINE SANDY CLAY
(M TO W)

RESIDUAL:
STIFF GRAY
FINE TO COARSE SANDY SILT
WITH LITTLE MICA
(M)

RESIDUAL:
BROWN SILTY
COARSE TO FINE SAND
WITH TRACE OF MICA
(SAT.)

WEATHERED ROCK:
(BIOTITE GNEISS)

CRYSTALLINE ROCK:
(BIOTITE GNEISS)

19 4 3 5 12 6 4 10 60/0.1

6 6 5 6 7 13 11 7 13 100/1.0 100/0.3 60/0.1

6 5 11 13 23 100/0.8 60/0.1

3/10

20′ Vertical 10′

Horizontal 0 30′

NOTES:
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION.
GROUNDLINE AT CROSS SECTON TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/07/10.

APPROVED BY:	AFR
DRAWN BY:	TRP
FIGURE	7
SCALE:	(V) 1" = 10' (H) 1" = 30'
DATE:	MARCH 2010
JOB NO.	105 I-10-046

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ENVIRONMENTAL SERVICES
ENGINEERING TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 2
BRIDGE No. 563 on I-40 (-L-)
OVER US 21 (-Y4-)
TIP No. I-3819A STATE PROJECT No. 34192.1.2 FEDERAL I.D. IMS-40-2(124)
IREDELL COUNTY, NORTH CAROLINA

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 85+45	**OFFSET** 105 ft LT	**ALIGNMENT** -L-	**0 HR.** 29.0
COLLAR ELEV. 815.5 ft	**TOTAL DEPTH** 30.1 ft	**NORTHING** 754,131	**EASTING** 1,443,714	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/08/10	**COMP. DATE** 03/08/10	**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))
820										
815	815.5	0.0								GROUND SURFACE
	814.5	1.0	4	3	4	7		M		**ROADWAY EMBANKMENT** Brown Fine to Coarse Sandy Silt with 1" Diameter Rock Fragments
	812.5	3.0								Red-Brown Silty Fine to Coarse Sandy Clay
810	812.0	3.5	1	2	1	3		M		
	809.5	6.0	2	3	3	6	SS-1	36% M		
805	807.0	8.5	2	3	3	6		M		
	803.5	12.0								**RESIDUAL** Brown-Gray Fine to Coarse Sandy Silt
800	802.0	13.5	3	7	23	30		M		
	799.5	16.0								Gray Clayey Silty Fine to Coarse Sand
795	797.0	18.5	13	17	16	33	SS-2	M		
	793.5	22.0								**WEATHERED ROCK** (Biotite Gneiss)
790	792.0	23.5	50	50/0.4		100/0.9				
	787.0	28.5								
785	785.4	30.1	9	91/0.4		100/0.9				
			60/0.0			60/0.0				
780										
775										
770										
765										
760										
755										
750										
745										
740										

Boring Terminated with Standard Penetration Test Refusal at Elevation 785.4 ft on Crystalline Rock (Biotite Gneiss)

1) Advanced 3-1/4" HSA to 30.1 feet.

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB1-E	**STATION** 85+05	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** 34.3
COLLAR ELEV. 818.1 ft	**TOTAL DEPTH** 51.8 ft	**NORTHING** 754,003	**EASTING** 1,443,696	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/09/10	**COMP. DATE** 03/09/10	**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))
820										
	818.1	0.0								GROUND SURFACE
	817.1	1.0	2	2	3	5		M		**ROADWAY EMBANKMENT** Orange-Brown Fine to Coarse Sandy Silt
815	815.1	3.0								Red-Brown Fine to Coarse Sandy Silty Clay
	814.6	3.5	2	2	3	5		M		
	812.6	5.5								Red-Brown Silty Coarse to Fine Sandy Clay with Trace of Mica and Rock Fragments
	812.1	6.0	3	4	6	10		M		
810	809.6	8.5	3	3	4	7		M		
	804.6	13.5	3	4	6	10		M		
805	799.6	18.5	4	6	8	14	SS-3	29% M		
	794.6	23.5	2	2	3	5		M		
800	789.6	28.5	3	4	3	7		M		
	787.1	31.0								**RESIDUAL** Orange-Brown Clayey Coarse to Fine Sandy Silt with Little Mica
795	784.6	33.5	1	2	2	4	SS-4	67% W		
	779.6	38.5	1	2	3	5		M		
790	774.6	43.5	2	2	3	5		M		
	769.6	48.5	2	2	5	7		M		
785	766.3	51.8	60/0.1			60/0.1				
780										
775										
770										
765										
760										
755										
750										
745										
740										

Boring Terminated with Standard Penetration Test Refusal at Elevation 766.3 ft on Crystalline Rock (Biotite Gneiss)

1) Advanced 3-1/4" HSA to 51.7 feet.

NCDOT BORE DOUBLE I-3819A BRDG00563.GPJ NC_DOT.GDT 03/23/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 84+84	**OFFSET** 129 ft RT	**ALIGNMENT** -L-	**0 HR.** 12.7
COLLAR ELEV. 789.4 ft	**TOTAL DEPTH** 23.5 ft	**NORTHING** 753,891	**EASTING** 1,443,693	**24 HR.** 1.4
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/09/10	**COMP. DATE** 03/09/10	**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)
790										
	789.4									789.4 GROUND SURFACE 0.0
	788.4	1.0	3	2	1	3		M		**ROADWAY EMBANKMENT** Red-Brown Fine to Coarse Sandy Silty Clay
785	785.9	3.5	2	3	4	7	SS-5	20% M		786.4 3.0 **ALLUVIAL** Gray Silty Coarse to Fine Sandy Clay 5.5
	783.4	6.0	2	2	2	4		M		**RESIDUAL** Gray and Brown Fine to Coarse Sandy Silt with Little Mica
780	780.9	8.5	1	2	2	4		M		
	775.9	13.5	3	3	4	7		M		
775										
	771.4	18.0								**WEATHERED ROCK** (Biotite Gneiss)
770	770.9	18.5	21	79/0.3		100/0.3				
	766.4	23.0								
	765.9	23.5	60/0.0			60/0.0				**CRYSTALLINE ROCK** (Biotite Gneiss)
765										Boring Terminated with Standard Penetration Test Refusal at Elevation 765.9 ft in Crystalline Rock (Biotite Gneiss)
760										1) Advanced 3-1/4" HSA to 23.5 feet.
755										
750										
745										
740										
735										
730										
725										
720										
715										
710										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 87+17	**OFFSET** 105 ft LT	**ALIGNMENT** -L-	**0 HR.** 31.0
COLLAR ELEV. 811.6 ft	**TOTAL DEPTH** 33.6 ft	**NORTHING** 754,161	**EASTING** 1,443,883	**24 HR.** 23.6
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/08/10	**COMP. DATE** 03/08/10	**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
815										
	811.6									811.6 GROUND SURFACE 0.0
	810.6	1.0	5	15	4	19		M		**ROADWAY EMBANKMENT** Red-Brown Silty Coarse to Fine Sandy Clay with 1/2" Diameter Rock Fragments
810	808.1	3.5	2	1	3	4	SS-6	23% M		806.1 5.5 Red-Brown Fine Sandy Silt With Trace of Mica
	805.6	6.0	1	2	1	3		M		
805	803.1	8.5	2	2	3	5		M		
800	798.1	13.5	4	5	7	12		M		
795	793.1	18.5	3	2	4	6	SS-7	22% M		794.6 17.0 Dark Brown Silty Fine to Coarse Sandy Clay
790	788.1	23.5	2	2	2	4		M		
785	783.1	28.5	2	3	7	10		M		784.6 27.0 **RESIDUAL** Gray Fine to Coarse Sandy Silt with Little Mica
780										779.1 32.5
	778.1	33.5	60/0.1			60/0.1				778.0 33.6 **CRYSTALLINE ROCK** (Biotite Gneiss)
775										Boring Terminated with Standard Penetration Test Refusal at Elevation 778.0 ft in Crystalline Rock (Biotite Gneiss)
770										1) Advanced 3-1/4" HSA to 33.5 feet.
765										
760										
755										
750										
745										
740										
735										

NCDOT BORE DOUBLE I-3819A BRDG00563.GPJ NC_DOT.GDT 03/23/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB2-E	**STATION** 86+79	**OFFSET** 21 ft RT	**ALIGNMENT** -L-	**0 HR.** 36.0
COLLAR ELEV. 814.2 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** 754,030	**EASTING** 1,443,867	**24 HR.** 25.8
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/09/10	**COMP. DATE** 03/09/10	**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)
815										
	813.2	1.0	3	3	3	6		M		814.2 GROUND SURFACE 0.0
810	810.7	3.5	2	2	4	6	SS-8	23% M		**ROADWAY EMBANKMENT** Brown and Red-Brown Silty Coarse to Fine Sandy Clay
	808.2	6.0	2	2	3	5		M		806.2 8.0
805	805.7	8.5	2	2	4	6		M		Red-Brown and Brown Fine to Coarse Sandy Silty Clay
800	800.7	13.5	2	2	5	7		M		
795	795.7	18.5	4	5	8	13		M		
790	790.7	23.5	4	4	7	11		M		787.2 27.0
785	785.7	28.5	2	3	4	7	SS-9	34% M		**ALLUVIAL** Gray-Brown Silty Coarse to Fine Sandy Clay
	780.7	33.5	4	5	8	13		M		783.2 31.0
780	775.7	38.5	6	94/0.5		100/1.0				**RESIDUAL** Gray Fine to Coarse Sandy Silt with Little Mica
775	770.7	43.5	100/0.3			100/0.3				775.2 39.0
770	765.7	48.5	60/0.1			60/0.1				**WEATHERED ROCK** (Biotite Gneiss)
765										766.2 48.0
760										765.6 **CRYSTALLINE ROCK** (Biotite Gneiss) 48.6
755										Boring Terminated with Standard Penetration Test Refusal at Elevation 765.6 ft in Crystalline Rock (Biotite Gneiss)
750										1) Advanced 3-1/4" HSA to 48.5 feet.
745										
740										
735										

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** N.Bradley	
SITE DESCRIPTION Bridge No. 563 on I-40 (-L-) over US 21				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 86+53	**OFFSET** 105 ft RT	**ALIGNMENT** -L-	**0 HR.** 12.5
COLLAR ELEV. 792.5 ft	**TOTAL DEPTH** 23.6 ft	**NORTHING** 753,943	**EASTING** 1,443,856	**24 HR.** 8.0
DRILL MACHINE CME-550X	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic	
DRILLER R.Norwood	**START DATE** 03/09/10	**COMP. DATE** 03/09/10	**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
795										
	791.5	1.0	3	3	3	6		M		792.5 GROUND SURFACE 0.0
790	789.0	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** Red-Brown Fine to Coarse Sandy Clay
	786.5	6.0	3	5	6	11	SS-10	23% M		789.5 3.0
785	784.0	8.5	4	6	7	13		W		Orange-Brown Fine to Coarse Sandy Silt with Trace of Mica
780	779.0	13.5	6	9	14	23	SS-11	Sat.		787.0 5.5
775	774.0	18.5	20	80/0.3		100/0.8				**ALLUVIAL** Gray Silty Coarse to Fine Sandy Clay
770	769.0	23.5	60/0.1			60/0.1				780.5 12.0
765										**RESIDUAL** Brown Silty Coarse to Fine Sand with Trace of Mica
760										773.5 19.0
755										**WEATHERED ROCK** (Biotite Gneiss)
750										769.5 23.0
745										768.9 23.6 **CRYSTALLINE ROCK** (Biotite Gneiss)
740										Boring Terminated with Standard Penetration Test Refusal at Elevation 768.9 ft in Crystalline Rock (Biotite Gneiss)
735										1) Advanced 3-1/4" HSA to 23.5 feet.
730										
725										
720										
715										

NCDOT BORE DOUBLE I-3819A BRDG00563.GPJ NC_DOT.GDT 03/23/10

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	1051-10-046	Date Report	3/19/2010
State Project No.:	34192.1.2 County: Iredell	Date Tested	3/17 - 3/19/10
Federal ID No.:	IMS-40-2(124) TIP No. I-3819A		
Project Name:	Bridge No. 563 on I-40 over US 21		
Client Name:	NCDOT Client Address: Raleigh, North Carolina		

Boring No.	Sample No.	Sample Depth (ft)	AASHTO Classification	Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Organic Content %	Moisture Content %
				10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay					
EB1-A	SS-1	6.0 - 7.5	A-7-5 (19)	97	84	80	68.2	65.2	18	15	13	54	58	30	28	ND	35.5
EB1-A	SS-2	18.5 - 20.0	A-1-b (0)	58	42	35	19.7	15.9	39	34	19	8	27	24	3	ND	ND
EB1-E	SS-3	18.5 - 20	A-7-5 (18)	100	94	90	76.1	69.7	10	20	28	42	58	38	20	ND	28.6
EB1-E	SS-4	33.5 - 35.0	A-5 (0)	98	84	76	49.5	41.0	22	36	32	10	41	39	2	ND	67.0
EB1-B	SS-5	3.5 - 5	A-7-6 (8)	96	84	73	48.0	44.7	24	29	9	38	43	18	25	ND	20.3
EB2-A	SS-6	3.5 - 5.0	A-7-6 (10)	99	88	80	62.0	59.0	19	21	16	44	41	21	20	ND	22.9
EB2-A	SS-7	18.5 - 20.0	A-6 (6)	100	84	76	57.6	54.1	24	22	16	38	36	21	15	ND	22.2
EB2-E	SS-8	3.5 - 5.0	A-7-6 (19)	100	91	84	67.9	64.0	16	20	15	49	53	24	29	ND	22.7
EB2-E	SS-9	28.5 - 30.0	A-7-6 (20)	100	91	83	61.4	57.5	17	26	10	47	64	29	35	ND	34.0
EB2-B	SS-10	8.5 - 10	A-7-6 (7)	100	93	85	49.3	43.5	15	42	12	31	42	19	23	ND	23.0
EB2-B	SS-11	13.5 - 15.0	A-2-4 (0)	99	73	61	26.5	16.7	38	45	15	2	39	34	5	ND	ND

References / Comments / Deviations: **ND=Not Determined.**

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Abner F. Riggs, Jr., P.E.	Senior Engineer
Technician Name:	*Signature*	*Certification #*	*Technical Responsibility:*	*Position*

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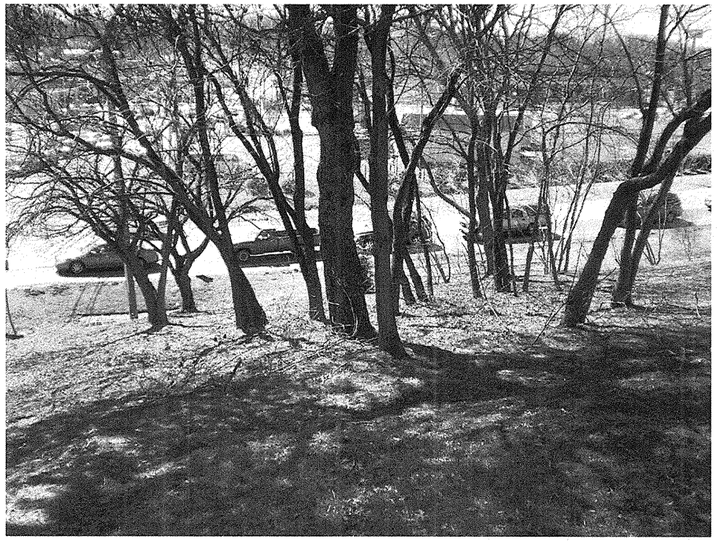
Photograph No. 1:
This photograph was taken from the west approach along the centerline of the -L- alignment, looking east.

Photograph No. 2:
This photograph was taken from the left side of the -L- alignment, at the toe of the embankment, looking south, across proposed End Bent No. 1.

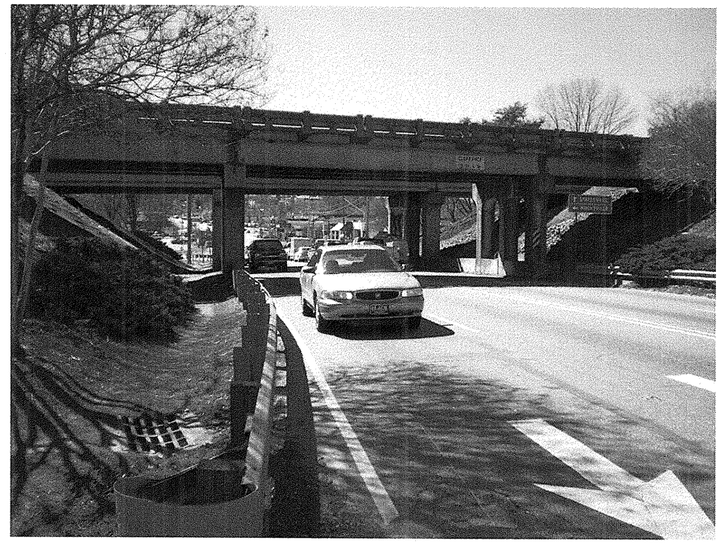
Photograph No. 3:
This photograph was taken from the left side of the -L- alignment, at the top of the embankment, looking south, across proposed End Bent No. 1.

Photograph No. 4:
This photograph was taken from near the centerline of the -L- alignment, at the top of the embankment, looking north, across proposed End Bent No. 1.



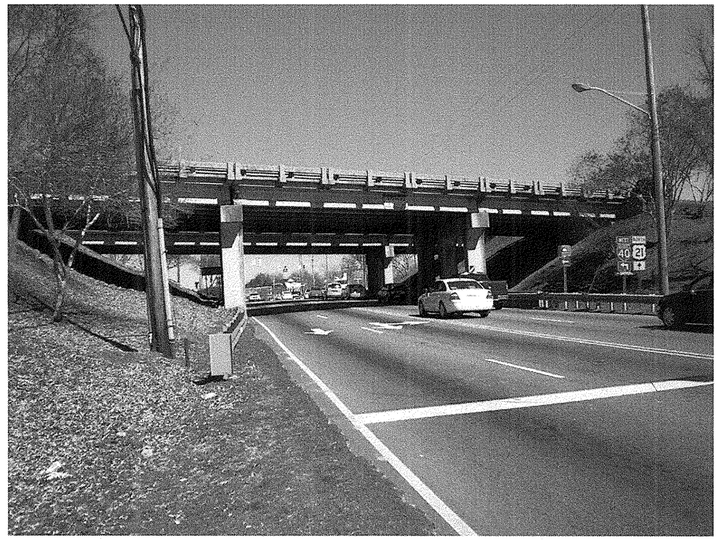
Photograph No. 5:
This photograph was taken from near the centerline of the -L- alignment, at the top of the embankment, looking south, across proposed End Bent No. 1.

Photograph No. 6:
This photograph was taken from the right side of the -L- alignment, at the toe of the embankment, looking north, across proposed End Bent No. 1.

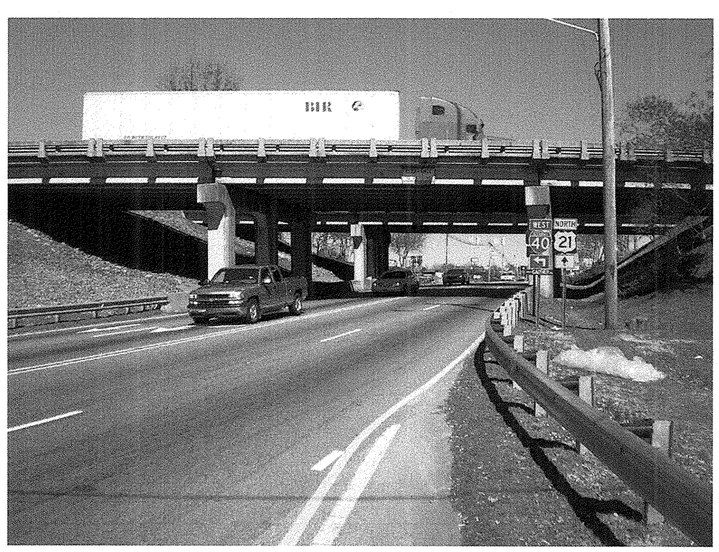


Photograph No. 7:
This photograph was taken from the left side of the -L- alignment, east of US 21, looking south, along US 21.

Photograph No. 8:
This photograph was taken from the left side of the -L- alignment, west of US 21, looking south, along US 21.



Photograph No. 9:
This photograph was taken from the right side of the -L- alignment, west of US 21, looking north, along US 21.



Photograph No. 10:
This photograph was taken from the right side of the -L- alignment, east of US 21, looking north, along US 21.

Photograph No. 11:
This photograph was taken from the left side of the -L- alignment, at the toe of the embankment, looking south, across proposed End Bent No. 2.

Photograph No. 12:
This photograph was taken from the left side of the -L- alignment, at the top of the embankment, looking south, across proposed End Bent No. 2.

Photograph No. 13:
This photograph was taken from near the centerline of the -L- alignment, at the top of the embankment, looking north, across proposed End Bent No. 2.

Photograph No. 14:
This photograph was taken from near the centerline of the -L- alignment, at the top of the embankment, looking south, across proposed End Bent No. 2.

Photograph No. 15:
This photograph was taken from the right side of the -L- alignment, at the toe of the embankment, looking north, across proposed End Bent No. 2.

Photograph No. 16:
This photograph was taken from the east approach along the centerline of the -L- alignment, looking west.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34192.1.2 (I-3819A)	1	17

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34192.1.2 (I-3819A) F.A. PROJ. IMS-40-2(124)

COUNTY IREDELL

PROJECT DESCRIPTION STATESVILLE - I-40 /I-77 INTERCHANGE INCLUDING I-40 FROM WEST OF SR 2003 (RADIO RD.) TO SR 2158 (OLD MOCKSVILLE RD.) & I-77 FROM SOUTH OF SR 2321 (E. BROAD STREET) TO SOUTH OF SR 2171 (JANE SOWER RD.)

SITE DESCRIPTION BRIDGE NO. 562 ON RADIO ROAD (SR 2003) OVER I-40 BETWEEN NORTH CAROLINA AVENUE AND MUSEUM RD.

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	LOCATION MAP
4	SITE PLAN
5, 6	CROSS SECTIONS
7-14	BORE LOG REPORTS
15	SOIL TEST RESULTS
16, 17	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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

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For Letting

PROJECT: 34192.1.2

ID: I-3819A

PERSONNEL

S. PROVANCE

M. GRAGG

B. SMITH

J. CONCI

S. GOWER

INVESTIGATED BY F&H

CHECKED BY S. WASHER

SUBMITTED BY F&H

DATE 5/21/2010

NORTH CAROLINA PROFESSIONAL SEAL 036026 ENGINEER SHANNON PROVANCE 5-21-10

DRAWN BY: W. SHUECRAFT/T. RIDEOUT

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.
34192.1.2 (I-3819A)	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 #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		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 SOILS				
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 LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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, OPT, 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
- [x] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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
- [ ] _____

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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.

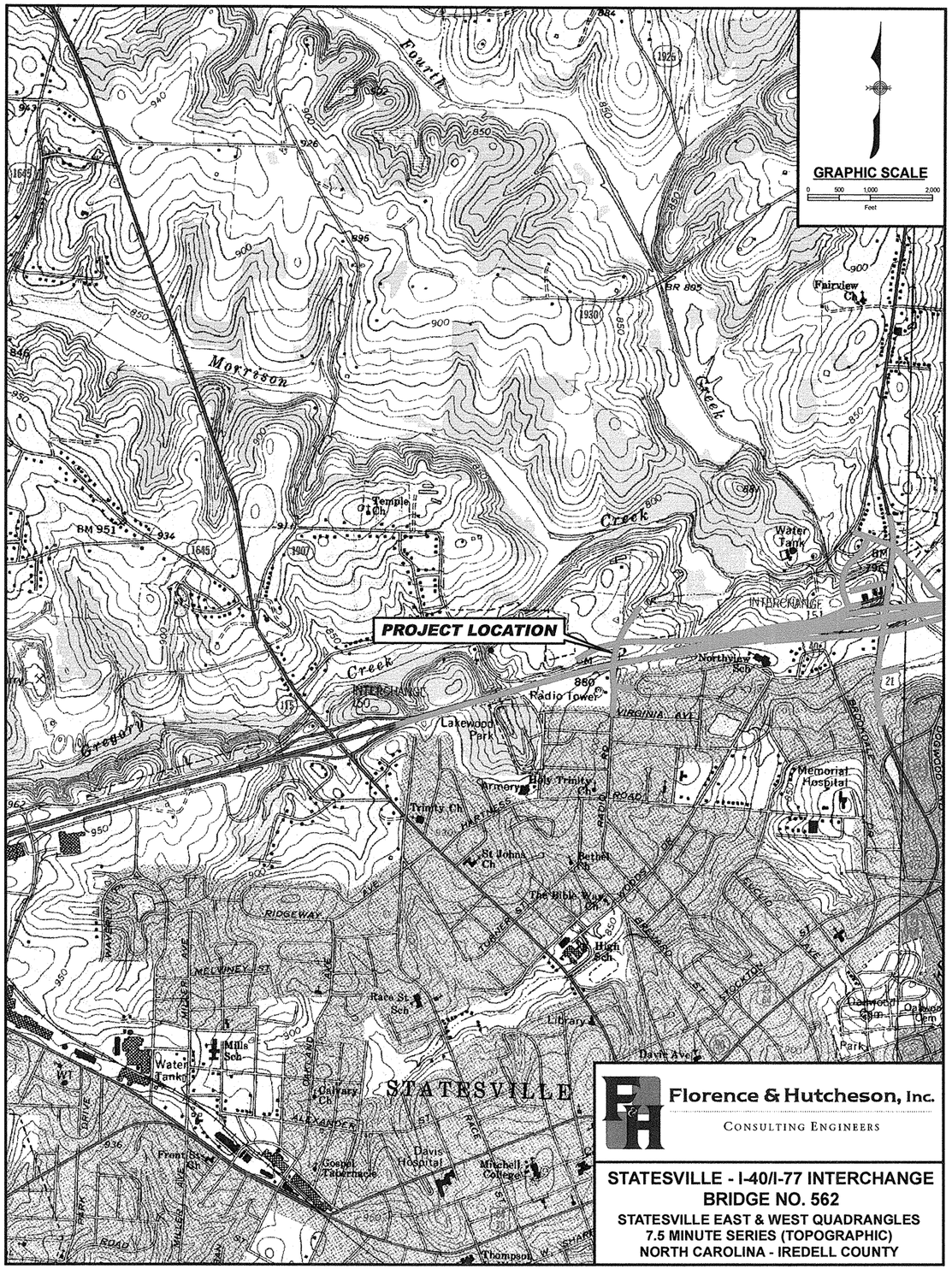
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #2
NCGS MONUMENT 'GRAY' BY1 STA. 18+30 18' RIGHT
-Y1- STA. 19+47.54 49.87' RIGHT ELEVATION: 902.04 FT.

NOTES:

REVISED 09/23/09



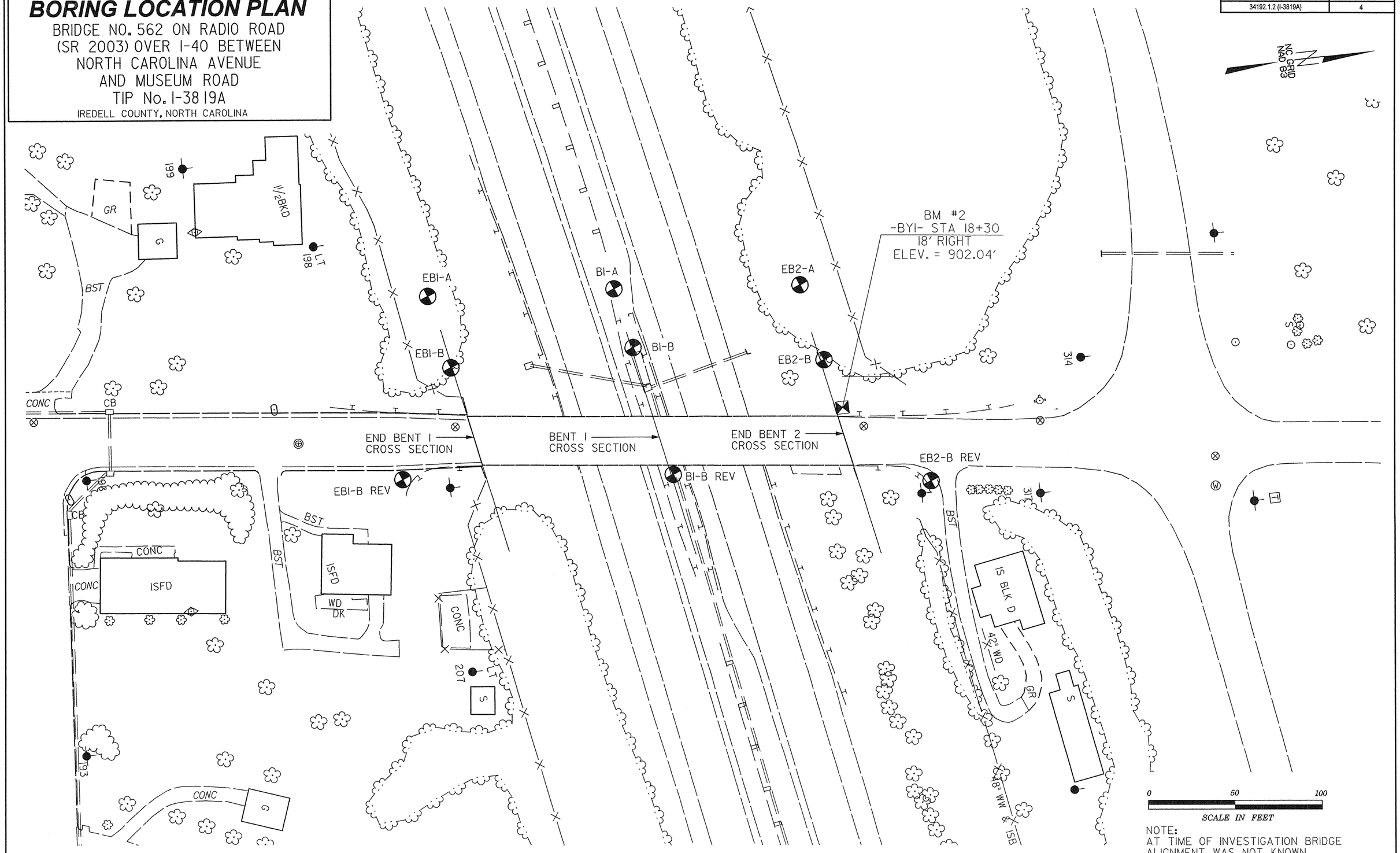
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

STATESVILLE - I-40/I-77 INTERCHANGE
BRIDGE NO. 562
STATESVILLE EAST & WEST QUADRANGLES
7.5 MINUTE SERIES (TOPOGRAPHIC)
NORTH CAROLINA - IREDELL COUNTY

BORING LOCATION PLAN

BRIDGE NO. 562 ON RADIO ROAD
(SR 2003) OVER I-40 BETWEEN
NORTH CAROLINA AVENUE
AND MUSEUM ROAD
TIP No. I-3819A
IREDELL COUNTY, NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
34192.1.2 (I-3819A)	4



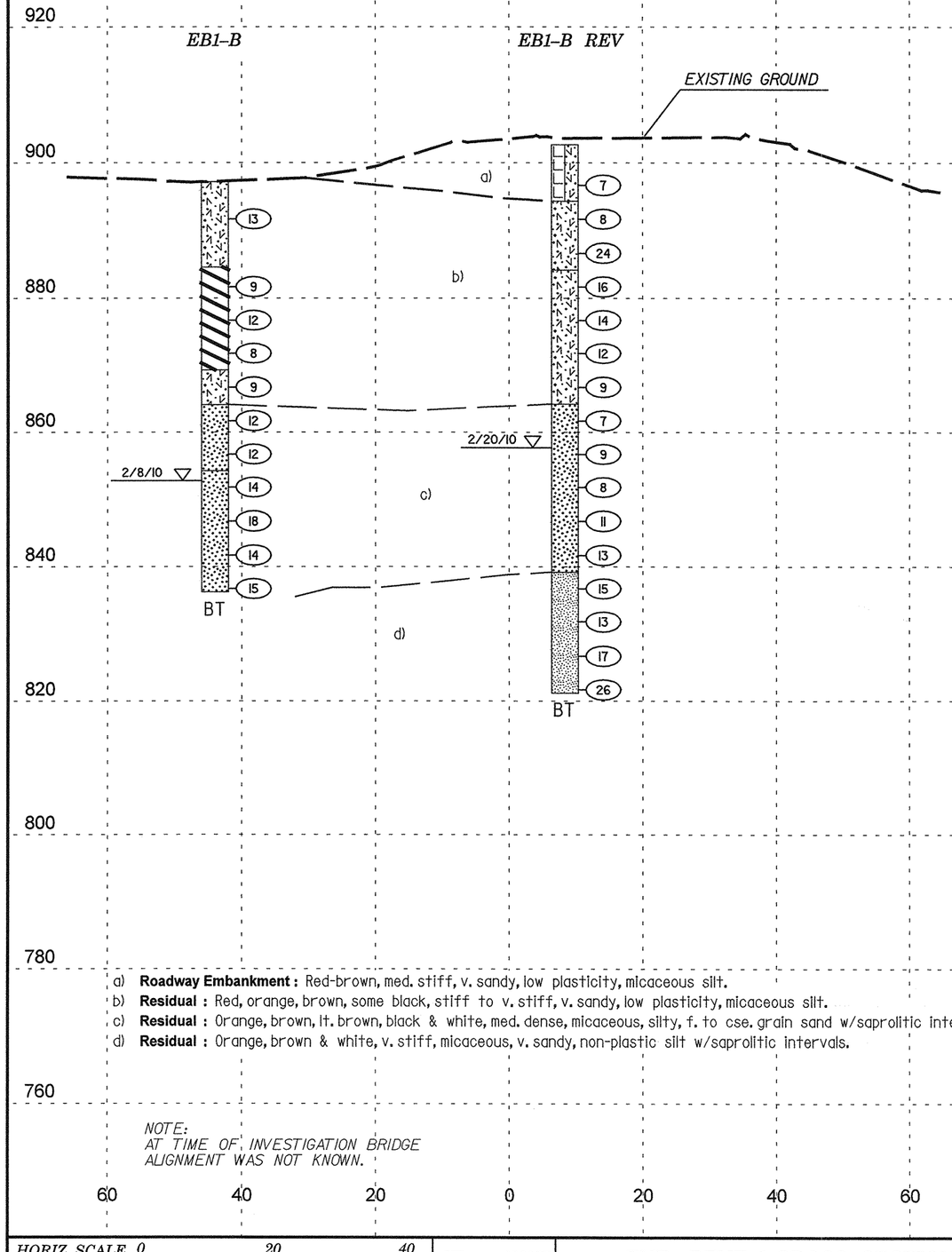
NOTE:
AT TIME OF INVESTIGATION BRIDGE ALIGNMENT WAS NOT KNOWN.

PROJECT REFERENCE NO.	SHEET
34192.1.2 (I-3819A)	5

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN ALONG CROSS SECTIONS AS DEPICTED ON PLAN VIEW

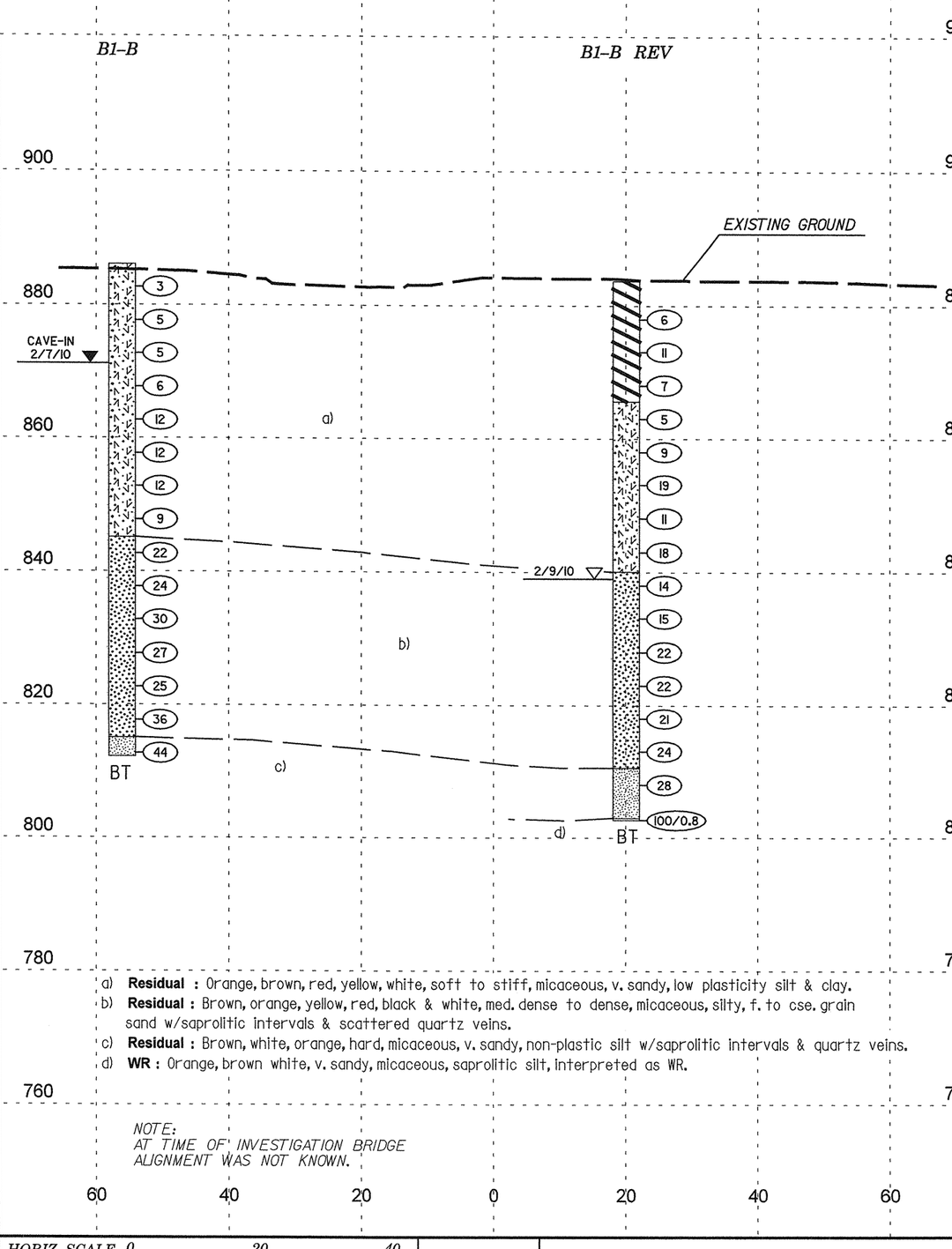


a) **Roadway Embankment :** Red-brown, med. stiff, v. sandy, low plasticity, micaceous silt.
b) **Residual :** Red, orange, brown, some black, stiff to v. stiff, v. sandy, low plasticity, micaceous silt.
c) **Residual :** Orange, brown, lt. brown, black & white, med. dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals.
d) **Residual :** Orange, brown & white, v. stiff, micaceous, v. sandy, non-plastic silt w/saprolitic intervals.

NOTE:
AT TIME OF INVESTIGATION BRIDGE ALIGNMENT WAS NOT KNOWN.

60 40 20 0 20 40 60

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 1 CROSS SECTION



a) **Residual :** Orange, brown, red, yellow, white, soft to stiff, micaceous, v. sandy, low plasticity silt & clay.
b) **Residual :** Brown, orange, yellow, red, black & white, med. dense to dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals & scattered quartz veins.
c) **Residual :** Brown, white, orange, hard, micaceous, v. sandy, non-plastic silt w/saprolitic intervals & quartz veins.
d) **WR :** Orange, brown white, v. sandy, micaceous, saprolitic silt, interpreted as WR.

NOTE:
AT TIME OF INVESTIGATION BRIDGE ALIGNMENT WAS NOT KNOWN.

60 40 20 0 20 40 60

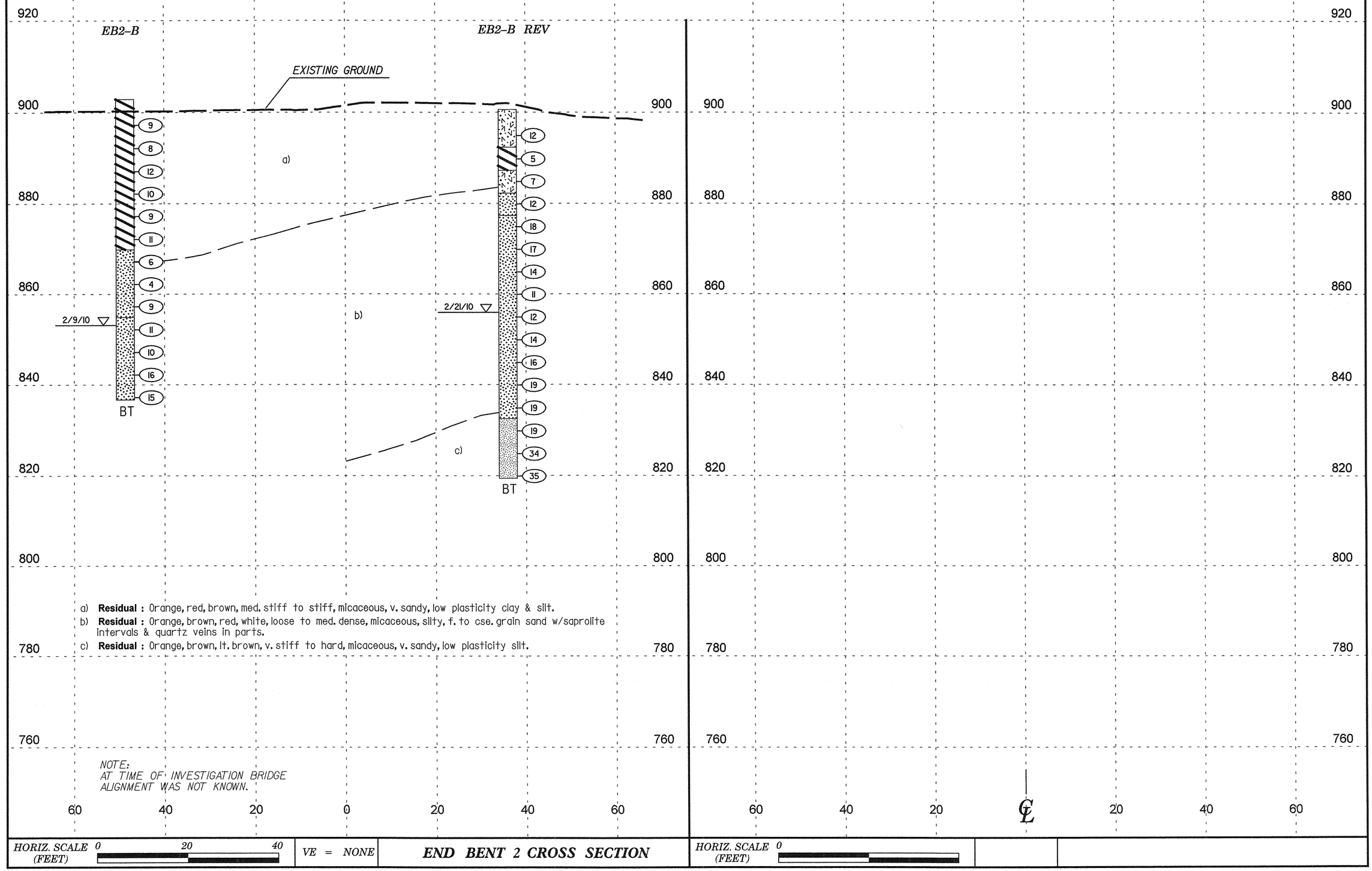
HORIZ. SCALE (FEET) 0 20 40	VE = NONE	BENT 1 CROSS SECTION

PROJECT REFERENCE NO.	SHEET
I-3819A	6

GENERALIZED SUBSURFACE CROSS SECTIONS ALONG END BENTS / BENTS

GROUNDLINE PROFILE OBTAINED FROM DTM PROVIDED BY OTHERS

INFERRED STRATIGRAPHY IS DRAWN ALONG CROSS SECTIONS AS DEPICTED ON PLAN VIEW



a) **Residual :** Orange, red, brown, med. stiff to stiff, micaceous, v. sandy, low plasticity clay & silt.

b) **Residual :** Orange, brown, red, white, loose to med. dense, micaceous, silty, f. to cse. grain sand w/saprolite intervals & quartz veins in parts.

c) **Residual :** Orange, brown, lt. brown, v. stiff to hard, micaceous, v. sandy, low plasticity silt.

NOTE:
AT TIME OF INVESTIGATION BRIDGE ALIGNMENT WAS NOT KNOWN.

HORIZ. SCALE (FEET) 0 20 40	VE = NONE	END BENT 2 CROSS SECTION	HORIZ. SCALE (FEET) 0

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 44.5
COLLAR ELEV. 897.2 ft	**TOTAL DEPTH** 61.0 ft	**NORTHING** 753,223	**EASTING** 1,439,485	**24 HR.** Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/08/10	**COMP. DATE** 02/08/10	**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)
900										897.2 GROUND SURFACE 0.0
895	892.7	4.5	4	6	7	13		M		**RESIDUAL** Orange, brown, red, stiff, v. sandy, low plasticity, micaceous silt (A-5).
890	882.7	14.5	3	4	5	9		M		884.6 12.6 Red, orange, brown, stiff, v. sandy, low plasticity, micaceous clay (A-7-5).
885	877.7	19.5	2	5	7	12	SS-1	24%		
880	872.7	24.5	3	3	5	8		M		869.2 28.0 Orange, brown, red, some black, stiff, v. sandy, low plasticity, micaceous silt (A-5).
875	867.7	29.5	2	4	5	9		M		864.1 33.1 Brown, orange, black & white, med. dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals (A-2-4).
870	862.7	34.5	3	5	7	12		M		
865	857.7	39.5	3	4	8	12		M		
860	852.7	44.5	3	5	9	14		W		
855	847.7	49.5	4	8	10	18		W		
850	842.7	54.5	3	5	9	14		W		
845	837.7	59.5	3	5	10	15		W		836.2 61.0 Boring Terminated at Elevation 836.2 ft in Residual Soil (A-2-4). Boring collapsed after drilling. Other Samples: ST-1 (9.5 - 11.5)
840										
835										
830										
825										
820										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 45.9
COLLAR ELEV. 899.1 ft	**TOTAL DEPTH** 70.9 ft	**NORTHING** 753,215	**EASTING** 1,439,442	**24 HR.** 38.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/07/10	**COMP. DATE** 02/08/10	**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)
900										899.1 GROUND SURFACE 0.0
895	894.7	4.4	3	4	5	9		M		**RESIDUAL** Red, orange, med. stiff to stiff, v. sandy, low plasticity, micaceous silt w/root frags. (A-5).
890	889.7	9.4	3	4	3	7		M		886.1 13.0 Red, orange, brown, w/white, stiff, v. sandy, low plasticity clay w/mica & trace root frags. (A-7-5).
885	884.7	14.4	4	5	6	11		M		
880	879.7	19.4	4	5	6	11		M		
875	874.7	24.4	3	5	6	11		M		873.1 26.0 Orange, brown, red, stiff, v. sandy, low plasticity, micaceous silt (A-5).
870	869.7	29.4	3	5	5	10		M		866.1 33.0 Red, orange, brown, white, med. dense, silty, f. to cse. grain sand w/mica (A-2-4).
865	864.7	34.4	3	5	7	12		M		
860	859.7	39.4	3	5	8	13		M		
855	854.7	44.4	4	6	7	13		M		856.4 42.7 Brown, orange, white & black, med. dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals (A-2-4).
850	849.7	49.4	4	8	9	17		W		
845	844.7	54.4	3	6	9	15		W		
840	839.7	59.4	4	6	10	16		W		
835	834.7	64.4	3	4	8	12		W		831.2 67.9 Green to dk. green, v. stiff, silty, non-plastic saprolitic silt w/mica & f. to cse. grain quartz sand (A-4). 828.2 70.9 Boring Terminated at Elevation 828.2 ft in Residual Soil (A-4).
830	829.7	69.4	5	8	15	23		W		
825										
820										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.			**GROUND WTR (ft)**
BORING NO. EB1-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 45.0
COLLAR ELEV. 902.7 ft	**TOTAL DEPTH** 81.5 ft	**NORTHING** 753,188	**EASTING** 1,439,545	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/20/10	**COMP. DATE** 02/20/10	**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
905										ELEV. (ft) DEPTH (ft)
										902.7 — 0.0 GROUND SURFACE
900										**ROADWAY EMBANKMENT** Red, brown, med. stiff, v. sandy, low plasticity, micaceous silt (A-5).
	897.7	5.0	1	3	4	7		M		
895	892.7	10.0	1	3	5	8		M		894.4 — 8.3 **RESIDUAL** Red, brown, orange, light brown, stiff to v. stiff, micaceous, v. sandy, low plasticity silt (A-5).
890	887.7	15.0	5	10	14	24		M		
885	882.7	20.0	4	7	9	16		M		
880	877.7	25.0	3	5	9	14		M		
875	872.7	30.0	3	6	6	12		M		
870	867.7	35.0	2	4	5	9		M		
865	862.7	40.0	2	3	4	7		M		
860	857.7	45.0	2	3	6	9		W		
855	852.7	50.0	2	3	5	8		W		
850	847.7	55.0	4	5	6	11	SS-3	W		
845	842.7	60.0	3	5	8	13		W		
840	837.7	65.0	3	6	9	15		W		839.2 — 63.5 Orange, brown & white, v. stiff, micaceous, v. sandy, non-plastic silt w/saprolitic zones (A-4).
835	832.7	70.0	3	6	7	13	SS-4	30%		
830	827.7	75.0	4	7	10	17		W		
825										864.2 — 38.5 Light brown, orange, brown, white, med. dense, micaceous, silty, f. to cse. grain sand (A-2-4).

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.			**GROUND WTR (ft)**
BORING NO. EB1-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 45.0
COLLAR ELEV. 902.7 ft	**TOTAL DEPTH** 81.5 ft	**NORTHING** 753,188	**EASTING** 1,439,545	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/20/10	**COMP. DATE** 02/20/10	**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
825						Match Line				ELEV. (ft) DEPTH (ft)
	822.7	80.0	7	12	14	26		W		Orange, brown & white, v. stiff, micaceous, v. sandy, non-plastic silt w/saprolitic zones (A-4). *(continued)*
820										821.2 — 81.5 Boring Terminated at Elevation 821.2 ft in Residual Soils (A-4).
										Boring backfilled immediately upon completion.
815										
810										
805										
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 32.4
COLLAR ELEV. 885.1 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 753,329	**EASTING** 1,439,485	**24 HR.** 15.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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
890										ELEV. (ft) DEPTH (ft)
885										885.1 GROUND SURFACE 0.0
880	882.7	2.4	3	1	2	3		M		**RESIDUAL** Red, dk. red, brown, yellow, dk. brown, gray, black & white, soft to stiff, micaceous, v. sandy, low plasticity silt w/scattered saprolitic intervals (A-5).
875	877.7	7.4	1	1	4	5		M		
870	872.7	12.4	2	2	3	5		M		
865	867.7	17.4	1	2	4	6		M		
860	862.7	22.4	3	4	8	12	SS-2	36%		
855	857.7	27.4	2	5	7	12		M		
850	852.7	32.4	4	5	7	12		W		
845	847.7	37.4	2	4	5	9		W		
840	842.7	42.4	5	10	12	22		W		844.1 41.0 Brown, orange, red, yellow, black, white, med. dense to dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals & scattered quartz veins (A-2-4).
835	837.7	47.4	4	9	15	24		W		
830	832.7	52.4	6	15	15	30		W		
825	827.7	57.4	5	10	17	27		W		
820	822.7	62.4	5	9	16	25		W		
815	817.7	67.4	7	14	22	36		W		814.0 71.1 Brown w/white, hard, micaceous, v. sandy, non-plastic silt w/saprolitic intervals & quartz veins (A-4).
810	812.7	72.4	4	18	26	44		W		811.2 73.9

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 32.4
COLLAR ELEV. 885.1 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 753,329	**EASTING** 1,439,485	**24 HR.** 15.0 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/06/10	**COMP. DATE** 02/06/10	**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
810						Match Line				ELEV. (ft) DEPTH (ft)
805										Boring Terminated at Elevation 811.2 ft in Residual Soil (A-4).
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 34.3
COLLAR ELEV. 885.6 ft	**TOTAL DEPTH** 76.6 ft	**NORTHING** 753,322	**EASTING** 1,439,451	**24 HR.** 23.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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
890										ELEV. (ft) DEPTH (ft)
885										885.6 GROUND SURFACE 0.0
	881.3	4.3	1	1	2	3		M		**RESIDUAL** Brown, orange, red, white, black, soft to stiff, v. sandy, low plasticity, micaceous silt w/scattered saprolitic intervals & quartz veins (A-5).
880	876.3	9.3	1	2	3	5		M		
875	871.3	14.3	2	4	6	10		M		
870	866.3	19.3	1	3	4	7		M		
865	861.3	24.3	2	4	6	10		M		
860	856.3	29.3	2	4	7	11		M		
855	851.3	34.3	3	4	7	11		W		
850	846.3	39.3	3	7	10	17		W		
845	841.3	44.3	5	11	12	23		W		
840	836.3	49.3	6	7	12	19		W		
835	831.3	54.3	6	8	14	22		W		
830	826.3	59.3	5	11	17	28		W		
825	821.3	64.3	7	14	14	28		W		
820	816.3	69.3	6	12	15	27		W		
815	811.3	74.3								847.9 37.7
810			15	32	68/0.2	100/0.7		W		Red, brown, orange, black & white, med. dense, silty, f. to cse. grain sand w/saprolitic intervals, mica & traces quartz veins (A-2-4).
										817.9 67.7
										Orange, brown, red & white, v. stiff, non-plastic, silty, micaceous saprolitic silt w/trace quartz veins (A-4).
										810.8 74.8

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 34.3
COLLAR ELEV. 885.6 ft	**TOTAL DEPTH** 76.6 ft	**NORTHING** 753,322	**EASTING** 1,439,451	**24 HR.** 23.0
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/07/10	**COMP. DATE** 02/07/10	**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
810						Match Line				ELEV. (ft) DEPTH (ft)
	809.1	76.5	60/0.1			60/0.1	D			809.1 76.5 **WEATHERED ROCK** Brown & white, saprolitic silt, interpreted as WR. *(continued)*
805										809.0 76.6 **CRYSTALLINE ROCK** SPT refusal @ 76.6', interpreted as CR (Gneiss).
800										Boring Terminated with Standard Penetration Test Refusal at Elevation 809.0 ft in Crystalline Rock (Gneiss).
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.			**GROUND WTR (ft)**
BORING NO. B1-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A — **0 HR.** 44.7
COLLAR ELEV. 883.7 ft	**TOTAL DEPTH** 81.0 ft	**NORTHING** 753,343	**EASTING** 1,439,560 — **24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Gower	**START DATE** 02/09/10	**COMP. DATE** 02/09/10	**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)
885										883.7 GROUND SURFACE 0.0
										RESIDUAL Orange, brown, red w/some white, med. stiff to stiff, micaceous, v. sandy, low plasticity clay (A-7-5).
880	879.0	4.7								
			2	2	4	6		M		
875	874.0	9.7								
			2	4	7	11		M		
870	869.0	14.7								
			1	3	4	7		M		
865	864.0	19.7								865.6 18.1
			1	2	3	5		M		Orange, brown, white, med. stiff to v. stiff, micaceous, v. sandy, low plasticity silt (A-5).
860	859.0	24.7								
			2	3	6	9		M		
855	854.0	29.7								
			2	3	16	19		M		
850	849.0	34.7								
			2	4	7	11		M		
845	844.0	39.7								
			5	7	11	18		M		
840	839.0	44.7								840.1 43.6
			3	5	9	14		W		Orange, brown, white, yellow, med. dense, micaceous, silty, f. to cse. grain sand, saprolitic in intervals (A-2-4).
835	834.0	49.7								
			4	7	8	15		W		
830	829.0	54.7								
			5	9	13	22		W		
825	824.0	59.7								
			5	10	12	22		W		
820	819.0	64.7								
			5	10	11	21		W		
815	814.0	69.7								
			5	12	12	24		W		
810	809.0	74.7								810.5 73.2
			8	11	17	28		W		Orange, brown, white, v. stiff, micaceous, v. sandy, non-plastic silt w/saprolitic intervals (A-4).
805										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.			**GROUND WTR (ft)**
BORING NO. B1-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A — **0 HR.** 44.7
COLLAR ELEV. 883.7 ft	**TOTAL DEPTH** 81.0 ft	**NORTHING** 753,343	**EASTING** 1,439,560 — **24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Gower	**START DATE** 02/09/10	**COMP. DATE** 02/09/10	**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)
805						Match Line				
	804.0	79.7								
			15	40	100/0.3	100/0.8		W		803.0 80.7
										802.7 81.0 **WEATHERED ROCK** Orange, bown & white, v. sandy, micaceous saprolitic silt, interpreted as WR.
800										Boring Terminated at Elevation 802.7 ft in Weathered Rock (Gneiss).
795										Boring backfilled immediately upon completion.
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										
735										
730										
725										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 49.7
COLLAR ELEV. 902.9 ft	**TOTAL DEPTH** 66.2 ft	**NORTHING** 753,437	**EASTING** 1,439,505	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/09/10	**COMP. DATE** 02/09/10	**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)
905										902.9 GROUND SURFACE 0.0
900										**RESIDUAL** Red, orange, brown, stiff, micaceous, v. sandy, low plasticity clay (A-7-5).
	898.2	4.7								
895			2	4	5	9		M		
	893.2	9.7								
890			2	3	5	8		M		
	888.2	14.7								
885			3	5	7	12		M		
	883.2	19.7								
880			3	4	6	10		M		
	878.2	24.7								
875			3	4	5	9		M		
	873.2	29.7								
870			6	4	7	11		M		
	868.2	34.7								869.9 33.0
865			2	2	4	6		M		Brown, orange, white, loose to med. dense, micaceous, silty, f. to cse. grain sand w/saprolitic intervals & quartz veins (A-2-4).
	863.2	39.7								
860			2	1	3	4		M		
	858.2	44.7								
855			2	4	5	9		M		
	853.2	49.7						▽		
850			2	4	7	11		W		
	848.2	54.7								
845			2	4	6	10		W		
	843.2	59.7								
840			3	6	10	16		W		
	838.2	64.7								
			2	5	10	15		W		836.7 66.2
835										Boring Terminated at Elevation 836.7 ft in Residual Soils (A-2-4).
830										
825										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 49.7
COLLAR ELEV. 899.6 ft	**TOTAL DEPTH** 86.2 ft	**NORTHING** 753,429	**EASTING** 1,439,461	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/04/10	**COMP. DATE** 02/07/10	**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
900										ELEV. (ft) 899.6 — GROUND SURFACE — DEPTH (ft) 0.0
										RESIDUAL
										Red, dk. red, maroon, orange, brown, yellow, stiff, silty to v. sandy, low plasticity, micaceous clay w/trace pyrite (A-7-5).
895	894.9	4.7								
			3	5	6	11		M		
890	889.9	9.7								
			3	6	7	13		M		
885	884.9	14.7								
			4	6	8	14		M		
880	879.9	19.7								
			5	7	8	15		M		
875	874.9	24.7								
			1	4	7	11		M		
870	869.9	29.7								
			4	6	8	14		M		
865	864.9	34.7								866.4 — 33.2
			2	4	6	10		M		Orange, brown, red, yellow w/scattered black & white, med. dense, silty, micaceous, f. to cse. grain sand (A-2-4).
860	859.9	39.7								
			3	6	7	13		D		
855	854.9	44.7								
			2	4	6	10		M		
850	849.9	49.7						▽		
			2	5	8	13		W		
845	844.9	54.7								
			3	6	10	16		W		
840	839.9	59.7								
			4	6	8	14		W		
835	834.9	64.7								
			2	6	5	11		W		
830	829.9	69.7								831.3 — 68.3
			16	23	39	62		M		Orange, brown, yellow, white, green & black, stiff to hard, micaceous saprolitic silt w/rock frags. & quartz veins (A-4).
825	824.9	74.7								
			3	5	8	13		W		
820										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 49.7
COLLAR ELEV. 899.6 ft	**TOTAL DEPTH** 86.2 ft	**NORTHING** 753,429	**EASTING** 1,439,461	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/04/10	**COMP. DATE** 02/07/10	**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
820						Match Line				ELEV. (ft) DEPTH (ft)
	819.9	79.7	10	28	35	63		W		Orange, brown, yellow, white, green & black, stiff to hard, micaceous saprolitic silt w/rock frags. & quartz veins (A-4). *(continued)*
815	814.9	84.7								
			5	16	32	48		W		813.4 — 86.2
810										Boring Terminated at Elevation 813.4 ft in Residual Soils (A-4).
										Poor SPT recovery 64.7'-66.2'.
805										
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										
740										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB2-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 44.7
COLLAR ELEV. 900.6 ft	**TOTAL DEPTH** 81.2 ft	**NORTHING** 753,490	**EASTING** 1,439,581	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/20/10	**COMP. DATE** 02/21/10	**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)
905										
900										900.6 GROUND SURFACE 0.0
										RESIDUAL
										Red, brown, stiff, micaceous, v. sandy, low plasticity silt (A-5).
895	895.9	4.7	3	5	7	12		M		
										892.4 8.2
890	890.9	9.7	2	2	3	5		M		Orange, brown, med. stiff, micaceous, v. sandy, low plasticity clay (A-7-5).
										887.4 13.2
885	885.9	14.7	2	3	4	7		M		Orange, brown, med. stiff, micaceous, v. sandy, low plasticity silt (A-5).
										882.3 18.3
880	880.9	19.7	3	5	7	12		M		Brown, orange, med. dense, micaceous, silty, f. to cse. grain sand (A-2-4).
										877.3 23.3
875	875.9	24.7	5	7	11	18		M		Red, brown, lt. brown, orange, med. dense, micaceous, silty, f. to cse. grain sand (A-2-4).
870	870.9	29.7	5	6	11	17		M		
865	865.9	34.7	3	6	8	14		M		
860	860.9	39.7	2	5	6	11	SS-5	M		
855	855.9	44.7	2	4	8	12		W		
850	850.9	49.7	3	5	9	14		W		
845	845.9	54.7	3	7	9	16		W		
840	840.9	59.7	4	7	12	19		Sat.		
835	835.9	64.7	4	7	12	19		W		
830	830.9	69.7	3	7	12	19		W		832.6 68.0
										Orange, brown, lt. brown, v. stiff to hard, micaceous, v. sandy, low plasticity silt (A-4).
825	825.9	74.7	4	17	17					

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34192.1.2	**ID.** I-3819A	**COUNTY** Iredell	**GEOLOGIST** B. Smith	
SITE DESCRIPTION Bridge No. 562 on Radio Road (SR 2003) Over I-40 Between North Carolina Avenue and Museum Rd.				**GROUND WTR (ft)**
BORING NO. EB2-B REV	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** N/A	**0 HR.** 44.7
COLLAR ELEV. 900.6 ft	**TOTAL DEPTH** 81.2 ft	**NORTHING** 753,490	**EASTING** 1,439,581	**24 HR.** FIAD
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER S. Gower	**START DATE** 02/20/10	**COMP. DATE** 02/21/10	**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)
825						Match Line				
						34	SS-6	31%		Orange, brown, lt. brown, v. stiff to hard, micaceous, v. sandy, low plasticity silt (A-4). *(continued)*
820	820.9	79.7	6	14	21	35		W		819.4 81.2
										Boring Terminated at Elevation 819.4 ft in Residual Soils (A-4).
815										Boring backfilled immediately upon completion.
810										
805										
800										
795										
790										
785										
780										
775										
770										
765										
760										
755										
750										
745										

NCDOT BORE SINGLE I-3819A_GEO_BRDG0562.GPJ NC_DOT.GDT 5/18/10

STATE PROJECT NO.: 34192.1.2
TIP NO.: I-3819A
COUNTY: IREDELL
SITE DESC.: Bridge No. 562 on Radio Rd. (SR 2003) over I-40 Between North Carolina Ave. and Museum Rd.

SUMMARY OF SOIL CLASSIFICATIONS AND GRADATIONS

Boring No.	Sample No.	Depth Interval (ft.)	AASHTO Class.	N	Percent Passing No.10	Percent Passing No.40	Percent Passing No.200	Percent Retained No. 60	SOIL MORTAR				LL	PI	PL	Percent Moisture
									Coarse Sand	Fine Sand	Silt	Clay				
EB1-B	ST-1	9.5'-10.4' **	A-5(1)	N/A	99.2	79.2	43.1	33.0	32.5	27.9	30.8	8.8	43	8	35	33.8
EB1-B	SS-1	19.5'-21.0'	A-7-5(2)	12	98.8	82.1	39.5	30.5	29.7	35.9	28.4	6.0	45	15	30	24.4
B1-B	SS-2	22.4'-23.9'	A-5(0)	12	94.7	73.6	38.6	34.9	31.3	33.1	26.4	9.2	41	6	35	36.1
EB1-B REV	SS-3	55.0'-56.5'	A-2-4(0)	11	95.9	74.2	33.5	35.6	32.8	37.5	20.7	9.0	38	10	28	26.0
EB1-B REV	SS-4	70.0'-71.5'	A-4(0)	13	97.6	76.0	37.3	33.1	31.4	34.5	26.1	8.0	36	NP	NP	29.6
EB2-B REV	SS-5	39.7'-41.2'	A-2-4(0)	11	97.8	77.1	33.4	32.5	31.1	40.5	21.4	7.1	36	NP	NP	31.3
EB2-B REV	SS-6	74.7'-76.2'	A-4(0)	34	99.0	76.7	36.5	33.0	32.3	35.3	23.5	8.9	32	4	28	31.3

F&H, CERT. No. 102-0603

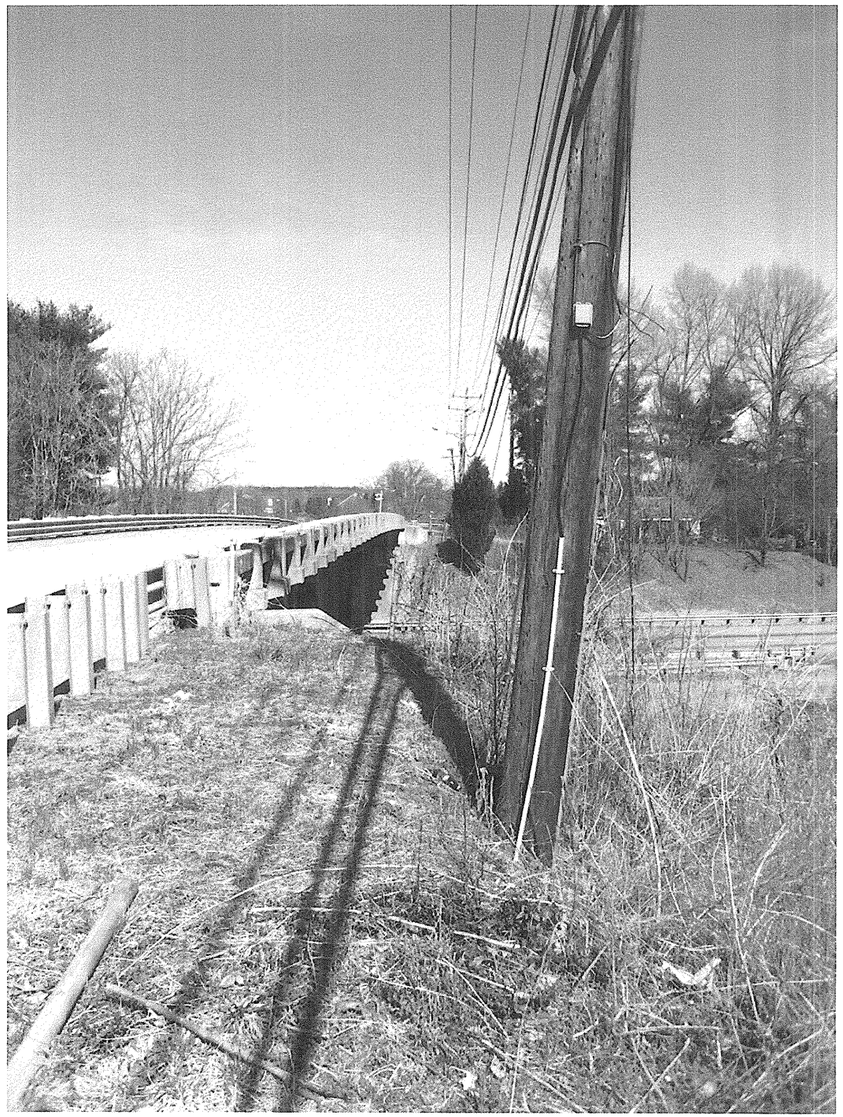
Aundrey Ligon, CERT. No. 102-01-0603

Michael Garrison, CERT. No. 102-02-0603

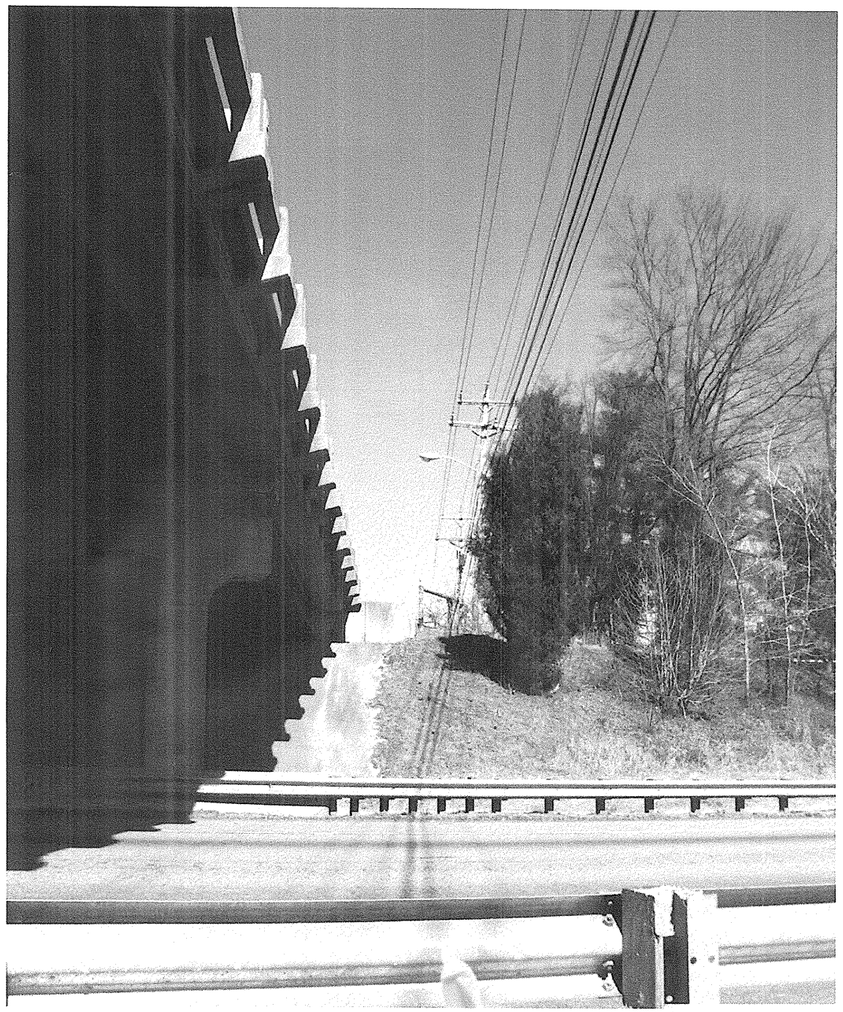
** OF THE 2.0' SAMPLE TAKEN, ONLY 0.9' WAS TESTED

SITE PHOTOGRAPHIC RECORD

Bridge No. 562 on Radio Road (SR 2003) over I-40 Between North Carolina Avenue and Museum Road



EB1-B REV Looking North Toward B1-B REV

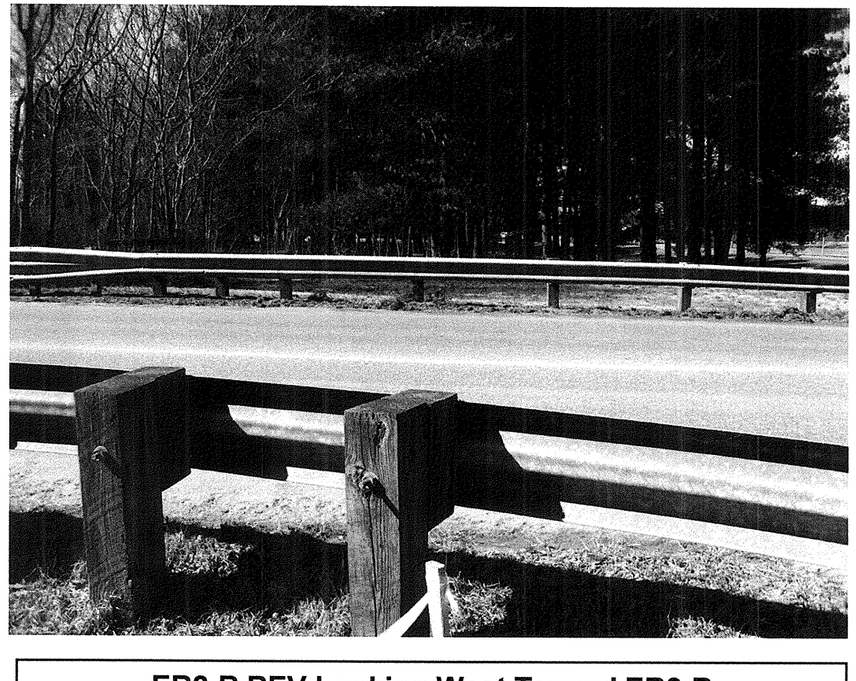


B1-B REV Looking North Toward EB2-B REV

SITE PHOTOGRAPHIC RECORD

Bridge No. 562 on Radio Road (SR 2003) over I-40 Between North Carolina Avenue and Museum Road

EB1-B REV Looking West Toward EB1-B



EB2-B REV Looking West Toward EB2-B

B1-B REV Looking West Toward B1-B