| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 18 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *NHF-0918(93)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *BRIDGE ON -Y4CD- OVER SMITH CREEK BETWEEN US-158 AND US-421 /I-40 BUS.*

SITE DESCRIPTION

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SUBMITTED BY *C. B. LITTLE*

DATE *SEPTEMBER 2013*

NORTH CAROLINA LICENSED SEAL 1098 GEOLOGIST ROGER Q CALLAWAY

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*PROJECT: 34839.1.1*

*ID: U-2579B*

| PROJECT REFERENCE NO. | SHEET NO. |
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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<br>A-3 | A-4, A-5<br>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<br>A-7-6 | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING<br>#10<br>#40<br>#200 | 50 MX<br>30 MX<br>15 MX | 50 MX<br>25 MX | 51 MN<br>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<br>PLASTIC INDEX | 6 MX | | NP | 40 MX<br>10 MX | 41 MN<br>10 MX | 40 MX<br>10 MN | 41 MN<br>11 MN | 40 MX<br>10 MX | 41 MN<br>10 MX | 40 MX<br>11 MN | 41 MN<br>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 | | |
| | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE |
| OM — OPTIMUM MOISTURE<br>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, SPT CMT, 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NO/NQ
- [ ] -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:
STRATIGRAPHY SHOWN THROUGH BORINGS

CAR = CASING ADVANCER REFUSAL

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 60 120

FEET

NORTH

WOODROW H. CHILDRESS JR.
GINA CHILDRESS

GREGORY FULLER

SAMUEL L. THOMASON
ALLISON THOMASON

NCDOT

DAVID L. DEMATTE
MICHAL E. DEMATTE

PENNSTON CORP.

BERDINA SMITH

JOHN R. CROTTS
GLADYS L. CROTTS

SANDRA F. SHREVE

FLORINE SMITH SYKES

JOHN W. DAVIS III

PENNSTON CORP.

-Y4RPA- STA.13+73.64
BEGIN -Y4RPA- PAVEMENT
END -Y4CD- PAVEMENT

-T5- 455 PINC 12+25.32
ELEV=825.22
NAIL SET

-T5- 454 PINC 9+91.29
ELEV=825.9
12"SPIKE SET

-BL- POT 163+63.48 =
-T5- POT 14+43.94
(NOT SET)

-Y4CD-
PCC Sta. 36+33.44

W.P. #1
STA. 31+61.71 -Y4CD-

W.P. #2
STA. 32+65.49 -Y4CD-

W.P. #3
STA. 33+68.09 -Y4CD-

W.P. #4
STA. 34+71.26 -Y4CD-

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

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

-BL-48 PINC 162+97.05
(-L-STA. 627+25.59, 13.67 LT)

-BL-49 PINC 167+61.96=
(-L-STA. 631+88.92, 3.03 RT)

-T5- 456 PINC 15+75.94
ELEV=825.39
NAIL SET

CHORD

-Y4RPA-

-Y4CD-

-L-

-RW-

-SS-

-W/LT-

-GR-

-HTR-

-SCRUB-

-18" RCP-

-24" RCP-

-12" RCP-

-18" VC-

-20' SANITARY SEWER EASEMENT-

-EXISTING R/W-

-20' DRAINAGE EASEMENT PB 33 PG 115-

-400' TAPER LT. LANE-

-8' TAPER-

-FOUNDATION-

N 58° 21' 58.1" W

N 64° 20' 17.0" W

S 37° 54' 13.1" W

S 18° 00' 41.9" W

S 11° 52' 56.1" W

N 62° 26' 26.8" W

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |

Bridge on -Y4CD- over Smith Creek between US-158 and US-421 /I-40 Bus.
Profle along -Y4CD-

0 100 200
FEET
VE = 5:1

## BRIDGE HYDRAULIC DATA

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 2400 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 830.7 | FT |
| BASE DISCHARGE | = 2700 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 831.2 | FT |
| OVERTOPPING DISCHARGE | = 74300 | CFS |
| OVERTOPPING FREQUENCY | = 500 | YRS |
| OVERTOPPING ELEVATION | = 865.0 | FT |

## BORING DESCRIPTIONS

- (A) ALLUVIAL, BLACK WET SOFT MED PLASTIC CLAYEY FINE SAND AND SILT (A-4)
- (B) RESIDUAL, BROWN TO BEIGE WET LOOSE TO DENSE SILTY SAND (A-2)
- (C) RESIDUAL, TAN TO LIGHT BROWN WET MED DENSE TO DENSE SILTY SAND W/LITTLE MICA (A-2)
- (D) WEATHERED ROCK, SEVERELY- WEATHERED CRYSTALLINE ROCK
- (E) FRESH, VERY HARD OFF WHITE MOD CLOSE SPACED FRACTURES IN GNEISS PROBABLY DERIVED FROM SEDIMENTARY ROCK AREAS OF GRANITIC TEXTURE MAY BE THE RESULT OF ANATEXIS. HIGHLY VARIABLE TEXTURE IN THIS UNIT. R1: 7, R2: 19, R3: 20, R4: 12, R5: 0, RMR = 62 FAIR ROCK, ROCK CLASS II, ROCK TYPE E.
- (F) HARD FRESH GREY-GREEN MODERATELY CLOSE SPACED FRACTURES IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. R1: 7, R2: 20, R3: 20, R4: 20, R5: 4, RMR = 71 GOOD ROCK, ROCK CLASS II, ROCK TYPE E.
- (G) HARD FRESH GREY-GREEN MOD CLOSE SPACED FRACTURES IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE GENERALLY CONTORTED, MORE REGULAR TOWARDS BASE. R1: 7, R2: 20, R3: 20, R4: 20, R5: 4, RMR = 71 GOOD ROCK, ROCK CLASS II, ROCK TYPE E.
- (H) HARD FRESH- GREY-GREEN MOD CLOSE SPACED FRACTURES IN QUARTZ-BIOTITE GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE FAIRLY REGULAR. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76 GOOD ROCK, ROCK CLASS II, ROCK TYPE E.
- (I) ALLUVIAL, GRAY WET SOFT TO MED STIFF, SANDY SILTY CLAY (A-7)
- (J) RESIDUAL, TAN WET MEDIUM DENSE CLAYEY SILTY SAND (A-2)
- (K) RESIDUAL, PINK AND WHITE WET VERY DENSE TO MEDIUM DENSE CLAYEY SILTY SAND (WEATHERED FROM COARSE GRANITIC GNEISS) (A-2)
- (L) RESIDUAL, BROWNISH GREEN MOIST STIFF CLAYEY SANDY SILT (A-5)
- (M) RESIDUAL, PINK AND WHITE MOIST MEDIUM DENSE CLAYEY SILTY SAND (A-2)
- (N) ALLUVIAL, BROWN WET SOFT SANDY SILTY CLAY W/ ROOT MAT AT SURFACE, SANDY AT BASE (A-6)

(+)2.56947

EXISTING GROUND

RED, MOIST, STIFF, MED PLASTIC SILTY, SANDY CLAY W/LITTLE MICA (A-7)

EB1-B
31+61 -Y4CD-
8 RT
ELEV. = 838.4'

RED MOIST TO WET LOOSE TO MED DENSE SILTY SAND W/SOME MICA (A-2)

BLACK AND WHITE MOIST TO WET MED DENSE TO VERY DENSE SILTY SAND (A-2)

SEV. WEATH. CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR NM 05/13

WEATHERED ROCK

B1-B
32+64 -Y4CD-
8 RT
ELEV. = 824.3'

ALLUVIAL 05/13

RESIDUAL

REC. = 68% RQD = 62%
REC. = 97% RQD = 97%
REC. = 100% RQD = 94%
REC. = 100% RQD. = 98%

BT

B2-B
33+64 -Y4CD-
8 RT
ELEV. = 825.3'

ALLUVIAL 11/12

RESIDUAL

WEATHERED ROCK
SEV. WEATH. CRYSTALLINE ROCK (PINK AND WHITE, MOIST, SAPROLITIC WEATHERING OF GRANITIC GNEISS)

BT

EB2-B
34+58 -Y4CD-
4 RT
ELEV. = 826.0'

ALLUVIAL 11/12

RESIDUAL
TAN AND WHITE WET LOOSE TO VERY DENSE SILTY FINE SAND W/ LITTLE TO SOME MICA (A-2-4, A-2-5)

WEATHERED SEVERELY WEATHERED CRYSTALLINE ROCK
ROCK (TAN, WET MICACEOUS QUARTZ MICA SCHIST)

RESIDUAL
TAN AND WHITE, WET VERY DENSE, SILTY SAND (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(TAN, WET MICACEOUS QUARTZ MICA SCHIST)

BT

920 910 900 890 880 870 860 850 840 830 820 810 800 790 780 770 760 750 740

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 5 |
| | SECTION THROUGH EB1 STA. 31+61.71 -Y4CD- SKEW=110°48'27.2" | |

# -Y4CD-

EB1-A
31+72 -Y4CD-
22 LT
ELEV.=837.8'

EB1-B
31+61 -Y4CD-
8 RT
ELEV.=838.4'

EXISTING GROUND

RED WET STIFF MED PLASTIC SANDY SILTY CLAY W/LITTLE MICA (A-7)

RESIDUAL

RESIDUAL

RED-MOIST STIFF MED PLASTIC SILTY SANDY CLAY W/LITTLE MICA (A-7)

RED MOIST TO WET LOOSE TO MED DENSE SILTY SAND W/SOME MICA (A-2)

RED BROWN WET LOOSE TO MED DENSE SILTY SAND W/ SOME MICA (A-2)

BLACK & WHITE MOIST TO WET MED DENSE TO VERY DENSE SILTY SAND (A-2)

TAN & WHITE WET VERY DENSE SILTY SAND W/SOME MICA AND ROCK FRAGMENTS (A-1)

SEVERELY WEATHERED CRYSTALLINE ROCK

WEATHERED ROCK

TAN AND BROWN WET VERY DENSE TO MED DENSE SILTY SAND W/ SOME MICA (A-2)

CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR NM 0513

CAR NM 0513

870 860 850 840 830 820 810 800 790 780

50 40 30 20 10 0 10 20 30 40 50

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 6 |
| | SECTION THROUGH B1<br>STA. 32+65.49 -Y4CD-<br>SKEW=110°21'00.7" | |

# -Y4CD-

B1-A
32+73 -Y4CD-
22 LT
ELEV.=824.4'

B1-B
32+64 -Y4CD-
8 RT
ELEV.=824.3'

EXISTING GROUND

840 830 820 810 800 790 780 770 760

ALLUVIAL — 05/13

BLACK & BROWN WET SOFT TO MED STIFF SILTY CLAY W/TRACE MICA ORGANIC RICH AT SURFACE (A-7)

(5)

RESIDUAL

LIGHT BROWN WET LOOSE SAND W/SOME MICA TO HIGHLY MICACEOUS (A-2)

(7) (5) (4) (9) (14)

TAN & WHITE WET LOOSE TO MED DENSE SILTY FINE SAND HIGHLY MICACEOUS (A-2)

WEATHERED ROCK — 100/.7

SEVERELY WEATHERED CRYSTALLINE ROCK

VERY SLI. WEATH. VERY HARD LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MOD. CLOSE SPACED FRACTURES. GARNETS AND ALUMINO-SILICATE MINERALS COMMON. REMNANT BEDDING FEATURES.
R1: 7, R2: 13, R3: 20, R4: 20, R5: 0, RMR=60
FAIR ROCK, ROCK CLASS III, ROCK TYPE E.

REC.=86%
RQD.=62%

VERY SLI. WEATH. VERY HARD LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MOD. CLOSE SPACED FRACTURES. ALUMINO-SILICATE MINERALS COMMON. REMNANT STEEP BEDDING FEATURES.
R1: 7, R2: 17, R3: 20, R4: 20, R5: 4, RMR=68
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=100%
RQD.=78%

FRESH VERY HARD LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MOD. CLOSE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES.
R1: 7, R2: 20, R3: 20, R4: 20, R5: 4, RMR=71
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=98%
REC.=91%

FRESH VERY HARD LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR=76
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=98%
REC.=94%

FRESH VERY HARD LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO VERY WIDE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR=76
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=98%
REC.=92%

BT

ALLUVIAL — 05/13

BLACK WET SOFT MED PLASTIC CLAYEY FINE SAND AND SILT (A-4)

(2) (7) (13) (37) (18) (38)

RESIDUAL

BROWN TO BEIGE WET LOOSE TO DENSE SILTY SAND (A-2)

TAN TO LIGHT BROWN WET MED DENSE TO DENSE SILTY SAND W/ LITTLE MICA (A-2)

WEATHERED ROCK — 100/.4

REC.=68%
RQD.=69%

FRESH VERY HARD OFF WHITE MOD. CLOSE SPACED FRACTURES IN GNEISS. PROBABLY DERIVED FROM SEDIMENTARY ROCK, AREAS OF GRANITIC TEXTURE MAY BE THE RESULT OF ANATEXIS. HIGHLY VARIABLE TEXTURE IN THIS UNIT.
R1: 7, R2: 13, R3: 20, R4: 12, R5: 0, RMR=62
FAIR ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=97%
RQD.=97%

HARD FRESH GREY-GREEN MOD. CLOSE SPACED FRACTURES IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS.
R1: 7, R2: 20, R3: 20, R4: 20, R5: 4, RMR=71
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=100%
RQD.=94%

HARD FRESH GREY-GREEN MOD. CLOSE SPACED FRACTURES IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE GENERALLY CONTORTED, MORE REGULAR TOWARDS BASE.
R1: 7, R2: 20, R3: 20, R4: 20, R5: 4, RMR=71
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

REC.=100%
RQD.=98%

HARD FRESH GREY-GREEN MOD. CLOSE SPACED FRACTURES IN QUARTZ - BIOTITE GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE FAIRLY REGULAR.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR=76
GOOD ROCK, ROCK CLASS II, ROCK TYPE E.

BT

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 7 |

SECTION THROUGH B2
STA. 33+68.09 -Y4CD-
SKEW=109°53'52.8"

0 10 20
FEET

# -Y4CD-

SS-21
SS-22
SS-23
SS-24
SS-25
SS-26

**B2-A**
33+75 -Y4CD-
20 LT
ELEV. = 825.5'

**B2-B**
33+64 -Y4CD-
8 RT
ELEV. = 825.3'

EXISTING GROUND

GRAY & TAN MOIST TO WET MED PLASTIC SOFT CLAY (A-7-6) (PI=17) — 2
ALLUVIAL
11/12
GRAY VERY LOOSE WET CLAYEY SAND (A-2-4) — 2
RESIDUAL
16
17
20
20
25
32
25
28
51
34
40
65
BT

WHITE AND GRAY MOIST TO WET MEDIUM DENSE TO VERY DENSE, CLAYEY SILTY SAND (A-2-4)

2
ALLUVIAL
11/12
GRAY WET SOFT TO MED STIFF SANDY SILTY CLAY (A-7)
5
RESIDUAL
TAN WET MEDIUM DENSE CLAYEY SILTY SAND (A-2)
12
12
51
PINK & WHITE WET VERY DENSE TO MEDIUM DENSE CLAYEY SILTY SAND (A-2)
22
20
9
BROWNISH GREEN MOIST STIFF CLAYEY SANDY SILT (A-5)
26
26
PINK & WHITE MOIST MEDIUM DENSE CLAYEY SILTY SAND (A-2)
24
100/1
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK (PINK AND WHITE MOIST SAPROLITIC WEATHERING OF GRANITIC GNEISS)
100/.9
102/1
100/.8
BT

830 820 810 800 790 780 770 760 750

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 8 |
| SECTION THROUGH EB2<br>STA. 34+71.26 -Y4CD-<br>SKEW=109°26'35.8" | |

0 10 20
FEET

# -Y4CD-

SS-13
SS-14
SS-15
SS-16
SS-17

EB2-A
34+77 -Y4CD-
22 LT
ELEV.=825.5'

EB2-B
34+58 -Y4CD-
4 RT
ELEV.=826.0'

EXISTING GROUND

ALLUVIAL
GRAY WET MED STIFF SANDY SILTY CLAY WITH ROOT MAT AT TOP SAND AND GRAVEL AT BASE (A-6)

11/12

WHITE MOIST MEDIUM DENSE SAND WITH GRAVEL SIZED FRAGMENTS OF QUARTZ (A-1-b)

RESIDUAL

TAN WHITE MOIST LOOSE TO VERY DENSE SILTY SAND W/LITTLE TO SOME MICA (A-2-5, A-2-4)

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK (TAN MOIST HARD SCHIST)

BT

ALLUVIAL
BROWN WET SOFT SANDY SILTY CLAY ROOT MAT AT SURFACE SANDY AT BASE (A-6)

11/12

RESIDUAL

TAN AND WHITE WET LOOSE TO VERY DENSE SILTY FINE SAND W/LITTLE TO SOME MICA (A-2-4, A-2-5)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK (TAN WET MICACEOUS QUARTZ MICA SCHIST)

RESIDUAL
TAN & WHITE WET V DENSE SILTY SAND (A-2)

SEVERELY WEATHERED CRYSTALLINE ROCK (TAN WET MICACEOUS QUARTZ MICA SCHIST)

BT

840 830 820 810 800 790 780 770 760

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 31+72 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4CD- — **0 HR.** NM |
| **COLLAR ELEV.** 837.8 ft | **TOTAL DEPTH** 40.9 ft | **NORTHING** 863,366 | **EASTING** 1,666,523 — **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 05/23/13 | **COMP. DATE** 05/23/13 | **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 | | | | | | | | | | |
| | | | | | | | | | | 837.8 GROUND SURFACE 0.0 |
| 835 | 834.8 | 3.0 | 4 | 6 | 6 | 12 | | W | | **RESIDUAL** 0 - 10' RESIDUAL, RED, WET, STIFF MED PLASTIC SANDY SILTY CLAY W/ LITTLE MICA 35% COARSE SAND, (20% QUARTZ, 15% MICA), 20% FINE SAND, 45% SILT - CLAY, "CAP CLAY" (A-7) |
| 830 | 831.2 | 6.6 | 3 | 5 | 4 | 9 | | W | | 827.8 10.0 |
| 825 | 826.2 | 11.6 | 3 | 3 | 4 | 7 | | W | | **RESIDUAL** 10' - 25' RESIDUAL, RED BROWN, WET, LOOSE TO MED DENSE SILTY SAND W/ SOME MICA 55% SAND, (30% MICA, 25% QUARTZ), 35% FINE SAND, 10% SILT CLAY, NON PLASTIC. HIGHLY WEATHERED SCHIST OR GNEISS (A-2) |
| 820 | 821.2 | 16.6 | 2 | 4 | 7 | 11 | | W | | |
| 815 | | | | | | | | | | 812.8 25.0 |
| 810 | 811.2 | 26.6 | 25 | 39 | 14 | 53 | | W | | **RESIDUAL** 25' - 28' MIX OF RESIDUAL SOIL AND COARSE GRAVEL-SIZED ROCK FRAGMENTS. TAN AND WHITE, WET VERY DENSE SILTY SAND W/ SOME MICA; COARSE SAND 50% ,(MICA 25%, QUARTZ 25%), FINE SAND 30%, SILT CLAY 20%, WEATHERED QUART FELDSPAR MICA GNEISS (A-1) |
| | 809.7 | 28.1 | 35 | 42 | 46 | 88 | | W | | 809.8 28.0 |
| 805 | 804.7 | 33.1 | 21 | 34 | 57 | 91 | | W | | **RESIDUAL** 28' - 40.9' RESIDUAL, TAN AND BROWN, WET, VERY DENSE TO MED DENSE SILTY SAND W/ SOME MICA. COARSE SAND 80%, (QUARTZ 30%, FELDSPAR 20%, MICA 30%, 20% FINE SAND AND SILT. NON PLASTIC. PROBABLY DERIVED FROM GRANITIC GNEISS. (A-2) |
| 800 | 799.7 | 38.1 | 5 | 9 | 13 | 22 | | | | 796.9 40.9 |
| | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 796.9 ft on crystalline rock |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 31+61 | **OFFSET** 8 ft RT | **ALIGNMENT** -Y4CD- — **0 HR.** NM |
| **COLLAR ELEV.** 838.4 ft | **TOTAL DEPTH** 30.1 ft | **NORTHING** 863,380 | **EASTING** 1,666,494 — **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 05/23/13 | **COMP. DATE** 05/23/13 | **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 | | | | | | | | | | |
| | | | | | | | | | | 838.4 GROUND SURFACE 0.0 |
| 835 | 836.0 | 2.4 | 4 | 4 | 4 | 8 | | M | | **RESIDUAL** 0 - 5' RESIDUAL, RED, MOIST, STIFF MED PLASTIC SILTY SANDY CLAY W/ LITTLE MICA; 25% COARSE SAND, ( 15% MICA, 10% QUARTZ), 75% SILT-CLAY (A-7) |
| 830 | 831.0 | 7.4 | 5 | 5 | 5 | 10 | | W | | 833.4 5.0 |
| 825 | 826.0 | 12.4 | 4 | 3 | 4 | 7 | | M | | **RESIDUAL** 5' - 15' RESIDUAL, RED, MOIST TO WET, LOOSE TO MED DENSE SILTY SAND W/ SOME MICA 80% COARSE SAND, (20% MICA, 60% QUARTZ), 20% SILT-CLAY, NON PLASTIC (A-2) |
| 820 | 821.0 | 17.4 | 38 | 38 | 44 | 82 | | M | | 823.4 15.0 |
| 815 | 815.8 | 22.6 | 13 | 9 | 13 | 22 | | M | | **RESIDUAL** 15' - 27.6' RESIDUAL BLACK AND WHITE MOIST TO WET MED DENSE TO VERY DENSE SILTY SAND. 80% SAND, (MOSTLY QUARTZ, SOME FELDSPAR), 20% SILT-CLAY, NO MICA. NON PLASTIC. WEATHERED FROM GRANITIC GNEISS. IRON STAINED AT BASE (A-2) |
| 810 | 810.8 | 27.6 | 100/.4 | | | 100/.4 | | M | | 810.8 27.6 |
| | | | | | | | | | | **WEATHERED ROCK** 27.6' - 30.1' SEVERELY WEATHERED CRYSTALLINE ROCK |
| | | | | | | | | | | 808.3 30.1 |
| | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 808.3 ft on crystalline rock |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| WBS 34839.1.1 | TIP U-2579B | COUNTY FORSYTH | GEOLOGIST Murray, C. C. | |
| SITE DESCRIPTION Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | GROUND WTR (ft) |
| BORING NO. B1-A | STATION 32+73 | OFFSET 22 ft LT | ALIGNMENT -Y4CD- | 0 HR. 3.0 |
| COLLAR ELEV. 824.4 ft | TOTAL DEPTH 58.5 ft | NORTHING 863,266 | EASTING 1,666,514 | 24 HR. 4.0 |
| DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013 | | DRILL METHOD NW Casing W/SPT & Core | HAMMER TYPE Automatic | |
| DRILLER Estep, J. E. | START DATE 05/21/13 | COMP. DATE 05/21/13 | 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 | | | | | | | | | | 824.4 GROUND SURFACE | 0.0 |
| 820 | | | | | | | | | | **ALLUVIAL** 0 - 11.5' ALLUVIAL, BLACK AND BROWN, WET SOFT TO MED STIFF SILTY CLAY, W/ TRACE MICA, ORGANIC RICH AT SURFACE (A-7) | |
| 815 | 817.8 | 6.6 | 0 | 2 | 3 | 5 | | W | | | |
| 810 | 812.8 | 11.6 | 1 | 2 | 5 | 7 | | W | | 812.9 | 11.5 |
| 805 | 807.8 | 16.6 | 2 | 2 | 3 | 5 | | W | | **RESIDUAL** 11.5' - 25' RESIDUAL, LIGHT BROWN, WET, LOOSE SAND W/ SOME MICA TO HIGHLY MICACEOUS (60% MICA, 40% QUARTZ, NON PLASTIC) (A-2) | |
| 800 | 802.8 | 21.6 | 0 | 2 | 2 | 4 | | W | | | |
| 795 | 797.8 | 26.6 | 3 | 4 | 5 | 9 | | W | | 799.4 | 25.0 |
| 790 | 792.8 | 31.6 | 13 | 6 | 8 | 14 | | W | | **RESIDUAL** 25' - 37' RESIDUAL, TAN AND WHITE, WET, LOOSE TO MED DENSE SILTY FINE SAND, HIGHLY MICACEOUS (40% WEATHERED FELDSPAR, 20% QUARTZ, 40% FINE MICA. HIGHLY WEATHERED INTRUSIVE OR GNEISS) (A-2) | |
| 785 | 786.8 | 37.6 | 62 | 38/.2 | | 100/.7 | | M | | 787.4 | 37.0 |
| 780 | | | | | | | | | | **WEATHERED ROCK** 37' - 38.5' SEVERELY WEATHERED CRYSTALLINE ROCK (BROWN WET SILTY SAND, HIGHLY MICACEOUS, HIGHLY WEATHERED GNEISS) (A-2) | 785.9 38.5 |
| 775 | | | | | | | | | | **CRYSTALLINE ROCK** GRAY GREEN PARAGNEISS | 781.7 42.7 |
| 770 | | | | | | | | | | **CRYSTALLINE ROCK** GRAY GREEN PARAGNEISS | 779.9 44.5 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRAY GREEN PARAGNEISS | 775.5 48.9 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRAY GREEN PARAGNEISS | 770.7 53.7 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRAY GREEN PARAGNEISS | 765.9 58.5 |
| | | | | | | | | | | Boring Terminated at Elevation 765.9 ft in crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| WBS 34839.1.1 | TIP U-2579B | COUNTY FORSYTH | GEOLOGIST Murray, C. C. | |
| SITE DESCRIPTION Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | GROUND WTR (ft) |
| BORING NO. B1-A | STATION 32+73 | OFFSET 22 ft LT | ALIGNMENT -Y4CD- | 0 HR. 3.0 |
| COLLAR ELEV. 824.4 ft | TOTAL DEPTH 58.5 ft | NORTHING 863,266 | EASTING 1,666,514 | 24 HR. 4.0 |
| DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013 | | DRILL METHOD NW Casing W/SPT & Core | HAMMER TYPE Automatic | |
| DRILLER Estep, J. E. | START DATE 05/21/13 | COMP. DATE 05/21/13 | SURFACE WATER DEPTH N/A | |
| CORE SIZE NO/NQ | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 785.91 | | | | | | | | | | | Begin Coring @ 38.5 ft | |
| 785 | 785.9 | 38.5 | 4.2 | | (3.6) 86% | (2.6) 62% | | (3.6) 86% | (2.6) 62% | | 785.9 **CRYSTALLINE ROCK** 38.5' - 42.7' VERY SLIGHTLY WEATHERED, VERY HARD, LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MODERATELY CLOSE SPACED FRACTURES. GARNETS AND ALUMINO-SILICATE MINERALS COMMON. REMNANT BEDDING FEATURES. R1: 7, R2: 13, R3: 20, R4: 20, R5:0 RMR=60, FAIR ROCK, ROCK CLASS III, ROCK TYPE E. | |
| | 781.7 | 42.7 | | | | | | | | | 781.7 | 42.7 |
| 780 | 779.9 | 44.5 | 1.8 | | (1.8) 100% | (1.4) 78% | | (1.8) 100% | (1.4) 78% | | 779.9 | 44.5 |
| | | | 4.4 | | (4.3) 98% | (4.0) 91% | | (4.3) 98% | (4.0) 91% | | **CRYSTALLINE ROCK** 42.7' - 44.5' VERY SLIGHTLY WEATHERED, VERY HARD, LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MODERATELY CLOSE SPACED FRACTURES. ALUMINO-SILICATE MINERALS COMMON. REMNANT STEEP BEDDING FEATURES. R1: 7, R2: 17, R3: 20, R4: 20, R5: 4 RMR=68, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. | |
| 775 | 775.5 | 48.9 | 4.8 | | (4.7) 98% | (4.5) 94% | | (4.7) 98% | (4.5) 94% | | 775.5 | 48.9 |
| 770 | 770.7 | 53.7 | 4.8 | | (4.7) 98% | (4.4) 92% | | (4.7) 98% | (4.4) 92% | | 770.7 | 53.7 |
| | 765.9 | 58.5 | | | | | | | | | **CRYSTALLINE ROCK** 44.5' - 48.9' FRESH, VERY HARD, LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO MODERATELY CLOSE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES. R1: 7, R2: 20, R3: 20, R4: 20, R5: 4 RMR=71, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. | |
| | | | | | | | | | | | 765.9 **CRYSTALLINE ROCK** 48.9' - 53.7' FRESH, VERY HARD, LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR=76, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. | 58.5 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 53.7' - 58.5' FRESH, VERY HARD, LIGHT GRAY-GREEN PARAGNEISS, WITH WIDE TO VERY WIDE SPACED FRACTURES. GARNET AND ALUMINO-SILICATE MINERALS COMMON. REMNANT CONTORTED BEDDING FEATURES. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR=76, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. | |
| | | | | | | | | | | | Boring Terminated at Elevation 765.9 ft in crystalline rock | |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| WBS 34839.1.1 | TIP U-2579B | COUNTY FORSYTH | GEOLOGIST Murray, C. C. | |
| SITE DESCRIPTION Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | GROUND WTR (ft) |
| BORING NO. B1-B | STATION 32+64 | OFFSET 8 ft RT | ALIGNMENT -Y4CD- | 0 HR. 3.0 |
| COLLAR ELEV. 824.3 ft | TOTAL DEPTH 53.1 ft | NORTHING 863,277 | EASTING 1,666,485 | 24 HR. 3.0 |
| DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013 | | DRILL METHOD NW Casing W/SPT & Core | HAMMER TYPE Automatic | |
| DRILLER Estep, J. E. | START DATE 05/21/13 | COMP. DATE 05/21/13 | 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 | | | | | | | | | | 824.3 GROUND SURFACE 0.0 |
| 820 | 817.9 | 6.4 | 1 | 1 | 1 | 2 | | M | | **ALLUVIAL** 0 - 10' ALLUVIAL, BLACK, WET SOFT MED PLASTIC CLAYEY FINE SAND AND SILT (BLACK SOIL, BUT DOES NOT APPEAR TO BE ORGANIC RICH) (A-4) |
| 815 | 812.9 | 11.4 | 3 | 3 | 4 | 7 | | W | | 814.3 10.0 **RESIDUAL** 10' - 25' RESIDUAL, BROWN TO BEIGE, WET, LOOSE TO DENSE SILTY SAND (FELDSPAR 60% QUARTZ 25%, COARSE SAND SILT CLAY 10% NON PLASTIC, NO MICA) (A-2) |
| 810 | 807.9 | 16.4 | 5 | 5 | 8 | 13 | | W | | |
| 805 | 802.9 | 21.4 | 18 | 17 | 20 | 37 | | W | | 799.3 25.0 **RESIDUAL** 25' - 35' RESIDUAL, TAN TO LIGHT BROWN, WET, MED DENSE TO DENSE SILTY SAND W/ LITTLE MICA (WEATHERED FELDSPARS 50%, QUARTZ 30%, MICA 15%. WEATHERED FELDSPARS GO TO SILT OR FINE SAND. ORIGIN PROBABLY HIGHLY WEATHERED INTRUSIVE) (A-2) |
| 800 | 797.9 | 26.4 | 5 | 9 | 9 | 18 | | W | | |
| 795 | 792.9 | 31.4 | 33 | 20 | 18 | 38 | | M | | |
| 790 | 787.9 | 36.4 | 100/.4 | | | 100/.4 | | M | | 789.3 35.0 **WEATHERED ROCK** 35' - 38' SEVERELY WEATHERED CRYSTALLINE ROCK 786.3 38.0 **CRYSTALLINE ROCK** PARAGNEISS 784.1 40.2 **CRYSTALLINE ROCK** PARAGNEISS 780.8 43.5 **CRYSTALLINE ROCK** PARAGNEISS 776.0 48.3 **CRYSTALLINE ROCK** PARAGNEISS 771.2 53.1 Boring Terminated at Elevation 771.2 ft in crystalline rock |
| 785 | | | | | | | | | | |
| 780 | | | | | | | | | | |
| 775 | | | | | | | | | | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| WBS 34839.1.1 | TIP U-2579B | COUNTY FORSYTH | GEOLOGIST Murray, C. C. | |
| SITE DESCRIPTION Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | GROUND WTR (ft) |
| BORING NO. B1-B | STATION 32+64 | OFFSET 8 ft RT | ALIGNMENT -Y4CD- | 0 HR. 3.0 |
| COLLAR ELEV. 824.3 ft | TOTAL DEPTH 53.1 ft | NORTHING 863,277 | EASTING 1,666,485 | 24 HR. 3.0 |
| DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013 | | DRILL METHOD NW Casing W/SPT & Core | HAMMER TYPE Automatic | |
| DRILLER Estep, J. E. | START DATE 05/21/13 | COMP. DATE 05/21/13 | SURFACE WATER DEPTH N/A | |
| CORE SIZE NO/NQ | TOTAL RUN 15.1 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)) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 786.3 | | | | | | | | | | | Begin Coring @ 38.0 ft |
| 785 | 786.3 785.6 | 38.0 38.7 | 0.7 | | (0.7) 100% | (0.5) 71% | | (1.5) 68% | (1.3) 59% | 786.3 784.1 | **CRYSTALLINE ROCK** 38.0' - 40.2' FRESH, VERY HARD, OFF WHITE, MODERATELY CLOSE SPACED FRACTURES IN GNEISS. PROBABLY DERIVED FROM SEDIMENTARY ROCK, AREAS OF GRANITIC TEXTURE MAY BE THE RESULT OF ANATEXIS. HIGHLY VARIABLE TEXTURE IN THIS UNIT. R1: 7, R2: 13, R3: 20, R4: 12, R5: 0 RMR=52, FAIR ROCK, ROCK CLASS II, ROCK TYPE E. |
| | | | 4.8 | | (4.3) 90% | (4.1) 85% | | (3.2) 97% | (3.2) 97% | | |
| 780 | 780.8 | 43.5 | 4.8 | | (4.8) 100% | (4.5) 94% | | (4.8) 100% | (4.5) 94% | 780.8 | **CRYSTALLINE ROCK** 40.2' - 43.5' HARD, FRESH, GREY-GREEN, MODERATELY CLOSE SPACED FRACTURES, IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. R1: 7, R2: 20, R3: 20, R4: 20, R5: 4 RMR=71, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. |
| 775 | 776.0 | 48.3 | 4.8 | | (4.8) 100% | (4.7) 98% | | (4.8) 100% | (4.7) 98% | 776.0 | **CRYSTALLINE ROCK** 43.5' - 48.3' HARD, FRESH, GREY-GREEN, MODERATELY CLOSE SPACED FRACTURES, IN GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE GENERALLY CONTORTED, MORE REGULAR TOWARDS BASE. R1: 7, R2: 20, R3: 20, R4: 20, R5: 4 RMR=71, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. |
| | 771.2 | 53.1 | | | | | | | | 771.2 | **CRYSTALLINE ROCK** 48.3' - 53.1' HARD, FRESH, GREY-GREEN, MODERATELY CLOSE SPACED FRACTURES, IN QUARTZ - BIOTITE GNEISS WITH APPARENT REMNANT BEDDING; PARAGNEISS. BEDDING FEATURES ARE FAIRLY REGULAR. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR=76, GOOD ROCK, ROCK CLASS II, ROCK TYPE E. Boring Terminated at Elevation 771.2 ft in crystalline rock |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 33+75 | **OFFSET** 20 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** NM |
| **COLLAR ELEV.** 825.5 ft | **TOTAL DEPTH** 70.9 ft | **NORTHING** 863,164 | **EASTING** 1,666,502 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 11/08/12 | **COMP. DATE** 11/14/12 | **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) |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | 825.5 GROUND SURFACE 0.0 |
| | 822.5 | 3.0 | 1 | 1 | 1 | 2 | SS-21 | W | | **ALLUVIAL** 0 - 10' ALLUVIAL, GRAY AND TAN, MOIST TO WET MED PLASTIC (PI=17) SOFT CLAY (A-7-6) |
| 820 | | | | | | | | | | 818.5 7.0 |
| | 817.5 | 8.0 | 1 | 1 | 1 | 2 | SS-22 | W | | **ALLUVIAL** 7' - 10' ALLUVIAL, GRAY VERY LOOSE WET CLAYEY SAND (A-2-4) |
| 815 | | | | | | | | | | 815.5 10.0 |
| | 812.5 | 13.0 | 3 | 6 | 10 | 16 | SS-23 | M | | **RESIDUAL** 10' - 70.9' RESIDUAL, WHITE AND GRAY, MOIST TO WET, MEDIUM DENSE TO VERY DENSE, CLAYEY SILTY SAND (WEATHERED FROM COARSE GRANITIC GNEISS) (A-2-4) |
| 810 | | | | | | | | | | |
| | 807.5 | 18.0 | 5 | 7 | 10 | 17 | SS-24 | M | | |
| 805 | | | | | | | | | | |
| | 802.5 | 23.0 | 4 | 8 | 12 | 20 | | M | | |
| 800 | | | | | | | | | | |
| | 797.5 | 28.0 | 4 | 8 | 12 | 20 | SS-25 | M | | |
| 795 | | | | | | | | | | |
| | 792.5 | 33.0 | 5 | 10 | 15 | 25 | | M | | |
| 790 | | | | | | | | | | |
| | 787.5 | 38.0 | 7 | 13 | 19 | 32 | | M | | |
| 785 | | | | | | | | | | |
| | 782.5 | 43.0 | 9 | 11 | 14 | 25 | SS-26 | M | | |
| 780 | | | | | | | | | | |
| | 777.5 | 48.0 | 6 | 12 | 17 | 29 | | M | | |
| 775 | | | | | | | | | | |
| | 772.5 | 53.0 | 12 | 20 | 31 | 51 | | M | | |
| 770 | | | | | | | | | | |
| | 766.1 | 59.4 | 11 | 16 | 18 | 34 | | M | | |
| 765 | | | | | | | | | | |
| | 761.1 | 64.4 | 14 | 17 | 23 | 40 | | M | | |
| 760 | | | | | | | | | | |
| | 756.1 | 69.4 | 16 | 26 | 39 | 65 | | M | | 754.6 70.9 |
| 755 | | | | | | | | | | Boring Terminated at Elevation 754.6 ft in clayey silty sand |

NCDOT BORE DOUBLE U2579B_GEO_BH_BRDG33+15 67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 33+64 | **OFFSET** 8 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 825.3 ft | **TOTAL DEPTH** 74.9 ft | **NORTHING** 863,178 | **EASTING** 1,666,476 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 11/13/12 | **COMP. DATE** 11/13/12 | **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) |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | 825.3 GROUND SURFACE 0.0 |
| | 822.1 | 3.2 | 1 | 1 | 1 | 2 | | W | | **ALLUVIAL** 0 - 11' ALLUVIAL, GRAY, WET, SOFT TO MED STIFF, SANDY SILTY CLAY (A-7) |
| 820 | 817.1 | 8.2 | 0 | 3 | 2 | 5 | | W | | 814.3 11.0 |
| 815 | 812.1 | 13.2 | 3 | 6 | 6 | 12 | | W | | **RESIDUAL** 11' - 23.5' RESIDUAL, TAN, WET, MEDIUM DENSE, CLAYEY SILTY SAND (A-2) |
| 810 | 807.1 | 18.2 | 2 | 5 | 7 | 12 | | W | | 801.8 23.5 |
| 805 | 802.1 | 23.2 | 6 | 16 | 35 | 51 | | W | | **RESIDUAL** 23.5' - 38' RESIDUAL, PINK AND WHITE, WET, VERY DENSE TO MEDIUM DENSE, CLAYEY SILTY SAND (WEATHERED FROM COARSE GRANITIC GNEISS) (A-2) |
| 800 | 797.1 | 28.2 | 6 | 9 | 13 | 22 | | W | | |
| 795 | 792.1 | 33.2 | 4 | 9 | 11 | 20 | | W | | |
| 790 | 787.1 | 38.2 | 5 | 3 | 6 | 9 | | M | | 787.3 38.0 **RESIDUAL** 38' - 43' RESIDUAL, BROWNISH GREEN, MOIST, STIFF CLAYEY SANDY SILT (A-5) |
| 785 | 782.1 | 43.2 | 25 | 16 | 10 | 26 | | M | | 782.3 43.0 **RESIDUAL** 43' - 59.1' RESIDUAL, PINK AND WHITE, MOIST, MEDIUM DENSE, CLAYEY SILTY SAND; (SAPROLITIC WEATHERING OF SYNTECTIC GRANITE) (A-2) |
| 780 | 777.1 | 48.2 | 8 | 13 | 13 | 26 | | M | | |
| 775 | 772.1 | 53.2 | 9 | 10 | 14 | 24 | | M | | |
| 770 | 766.7 | 58.6 | 9 | 19 | 81/.5 | 100/1" | | M | | 766.2 59.1 **WEATHERED ROCK** 59' - 74.9' SEVERELY WEATHERED CRYSTALLINE ROCK (PINK AND WHITE, MOIST. SAPROLITIC WEATHERING OF GRANITIC GNEISS) |
| 765 | 761.7 | 63.6 | 22 | 34 | 66/.4 | 100/.9 | | M | | |
| 760 | 756.7 | 68.6 | 15 | 29 | 73 | 102/1" | | M | | |
| 755 | 751.7 | 73.6 | 39 | 42 | 58/.3 | 100/.8 | | M | | 750.4 74.9 |



| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 33+64 | **OFFSET** 8 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 825.3 ft | **TOTAL DEPTH** 74.9 ft | **NORTHING** 863,178 | **EASTING** 1,666,476 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 11/13/12 | **COMP. DATE** 11/13/12 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 750 | | | | | | Match Line | | | | Boring Terminated at Elevation 750.4 ft in severely weathered crystalline rock |



NCDOT BORE DOUBLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/5/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 34+77 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** NM |
| **COLLAR ELEV.** 825.5 ft | **TOTAL DEPTH** 61.7 ft | **NORTHING** 863,062 | **EASTING** 1,666,494 | **24 HR.** 5.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 11/01/12 | **COMP. DATE** 11/01/12 | **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 | | | | | | | | | | 825.5 GROUND SURFACE 0.0 |
| | 823.3 | 2.2 | 2 | 3 | 2 | 5 | | M | | **ALLUVIAL** 0 - 10' ALLUVIAL, GRAY, WET MED STIFF SANDY SILTY CLAY WITH ROOT MAT AT TOP, SAND AND GRAVEL AT BASE (A-6) |
| 820 | 818.3 | 7.2 | 1 | 2 | 2 | 4 | | M | | 815.5 10.0 |
| 815 | 813.3 | 12.2 | 9 | 14 | 10 | 24 | SS-13 | M | | **RESIDUAL** 10' - 14' RESIDUAL, WHITE, MOIST MEDIUM DENSE, SAND WITH GRAVEL SIZED FRAGMENTS OF QUARTZ (A-1-b) 811.5 14.0 |
| 810 | 808.3 | 17.2 | 1 | 2 | 3 | 5 | SS-14 | M | | **RESIDUAL** 14' - 51.5' RESIDUAL, TAN WHITE, MOIST, LOOSE TO VERY DENSE, SILTY SAND W/ LITTLE TO SOME MICA (WEATHERED QUARTZ MICA SCHIST) (A-2-5, A-2-4) |
| 805 | 803.3 | 22.2 | 1 | 2 | 5 | 7 | SS-15 | M | | |
| 800 | 798.3 | 27.2 | 2 | 3 | 4 | 7 | | M | | |
| 795 | 793.3 | 32.2 | 4 | 6 | 7 | 13 | SS-16 | M | | |
| 790 | 786.9 | 38.6 | 7 | 10 | 18 | 28 | SS-17 | M | | |
| 785 | 781.9 | 43.6 | 11 | 23 | 23 | 46 | | M | | |
| 780 | 776.9 | 48.6 | 16 | 27 | 34 | 61 | | M | | |
| 775 | 774.5 | 51.0 | 16 | 45 | 55/.4 | 100/.9 | | M | | 774.0 51.5 |
| 770 | 769.5 | 56.0 | 31 | 69/.4 | | 100/.9 | | M | | **WEATHERED ROCK** 50' - 61.7' SEVERELY WEATHERED CRYSTALLINE ROCK (TAN, MOIST, HARD, SCHIST) |
| 765 | 764.5 | 61.0 | 58 | 42/.2 | | 100/.7 | | M | | 763.8 61.7 |
| | | | | | | | | | | Boring Terminated at Elevation 763.8 ft in severely weathered crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/9/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over Smith Creek between US-158 and US-421 / I-40 Bus. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 34+58 | **OFFSET** 4 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 826.0 ft | **TOTAL DEPTH** 61.0 ft | **NORTHING** 863,084 | **EASTING** 1,666,470 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 11/06/12 | **COMP. DATE** 11/06/12 | **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 | | | | | | | | | | 826.0 GROUND SURFACE 0.0 |
| | | | | | | | | W | | **ALLUVIAL** 0 - 10' ALLUVIAL, BROWN, WET, SOFT, SANDY SILTY CLAY. ROOT MAT AT SURFACE, SANDY AT BASE (A-6) |
| 820 | 817.6 | 8.4 | 2 | 1 | 2 | 3 | | W | | 816.0 10.0 |
| 815 | 812.6 | 13.4 | 0 | 2 | 5 | 7 | | W | | **RESIDUAL** 10' - 48.9' RESIDUAL, TAN AND WHITE, WET, LOOSE TO VERY DENSE SILTY FINE SAND W/ LITTLE TO SOME MICA (A-2-4, A-2-5) |
| 810 | 807.6 | 18.4 | 1 | 2 | 2 | 4 | | W | | |
| 805 | 802.6 | 23.4 | 3 | 3 | 3 | 6 | | W | | |
| 800 | 797.6 | 28.4 | 1 | 2 | 4 | 6 | | W | | |
| 795 | 792.6 | 33.4 | 4 | 6 | 10 | 16 | | W | | |
| 790 | 787.6 | 38.4 | 10 | 18 | 30 | 48 | | W | | |
| 785 | 782.6 | 43.4 | 4 | 17 | 46 | 63 | | W | | |
| 780 | 777.6 | 48.4 | 15 | 49 | 51/.4 | 100/.9 | | W | | 777.1 48.9 |
| 775 | 771.2 | 54.8 | 38 | 30 | 35 | 65 | | W | | **WEATHERED ROCK** 48.9' - 53' SEVERELY WEATHERED CRYSTALLINE ROCK (TAN, WET, MICACEOUS QUARTZ MICA SCHIST) 773.0 53.0 |
| 770 | 766.2 | 59.8 | 25 | 45 | 55/.2 | 100/.7 | | W | | **RESIDUAL** 53' - 57' RESIDUAL, TAN AND WHITE, WET, VERY DENSE, SILTY SAND (A-2) 769.0 57.0 |
| 765 | | | | | | | | | | **WEATHERED ROCK** 57' - 61' SEVERELY WEATHERED CRYSTALLINE ROCK (TAN, WET MICACEOUS QUARTZ MICA SCHIST) 765.0 61.0 |
| | | | | | | | | | | Boring Terminated at Elevation 765.0 ft in severely weathered crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG33+15.67-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 9/9/13

# *TEST RESULTS*

*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: FORSYTH*
*SITE DESCRIPTION: BRIDGE ON -Y4CD- OVER SMITH CREEK BETWEEN US-158 AND US-421 / I-40 BUS.*



**SOIL SAMPLE RESULTS**

| *SAMPLE NO.* | *OFFSET* | *STATION* | *DEPTH INTERVAL* | *AASHTO CLASS* | *N* | *L.L.* | *P.I.* | *% BY WEIGHT* | | | | *% PASSING SIEVES* | | | *% MOISTURE* | *% ORGANIC* | *UNIT WT. (d)* | *VOID RATIO* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *C. SAND* | *F. SAND* | *SILT* | *CLAY* | *10* | *40* | *200* | | | | |
| | | **B2-A** | | | | | | | | | | | | | | | | |
| SS-21 | 20.0 LT. | 33+75 -Y4CD- | 3.00-4.50 | A-7-6(12) | 2 | 44 | 17 | 6.2 | 26.4 | 31.2 | 36.2 | 100 | 98 | 73 | | | | |
| SS-22 | 20.0 LT. | 33+75 -Y4CD- | 8.00-9.50 | A-2-4(0) | 2 | 24 | NP | 49.3 | 31.8 | 6.8 | 12.1 | 90 | 60 | 20 | | | | |
| SS-23 | 20.0 LT. | 33+75 -Y4CD- | 13.00-14.50 | A-2-4(0) | 16 | 40 | NP | 25.8 | 47.3 | 16.9 | 10.1 | 95 | 86 | 33 | | | | |
| SS-24 | 20.0 LT. | 33+75 -Y4CD- | 18.00-19.50 | A-2-4(0) | 17 | 38 | NP | 34.8 | 44.3 | 14.9 | 6.0 | 100 | 87 | 27 | | | | |
| SS-25 | 20.0 LT. | 33+75 -Y4CD- | 28.00-29.50 | A-2-4(0) | 20 | 35 | NP | 30.6 | 45.9 | 15.5 | 8.0 | 94 | 79 | 27 | | | | |
| SS-26 | 20.0 LT. | 33+75 -Y4CD- | 43.00-44.50 | A-2-4(0) | 25 | 34 | NP | 38.6 | 35.2 | 16.1 | 10.1 | 92 | 71 | 28 | | | | |
| | | **EB2-A** | | | | | | | | | | | | | | | | |
| SS-13 | 22.0 LT. | 34+77 -Y4CD- | 12.20-13.70 | A-1-b(0) | 24 | 26 | NP | 64.6 | 18.9 | 10.5 | 6.0 | 55 | 26 | 11 | | | | |
| SS-14 | 22.0 LT. | 34+77 -Y4CD- | 17.20-18.70 | A-2-5(0) | 5 | 43 | NP | 34.6 | 42.7 | 14.7 | 8.0 | 92 | 73 | 27 | | | | |
| SS-15 | 22.0 LT. | 34+77 -Y4CD- | 22.20-23.70 | A-2-5(0) | 7 | 43 | 2 | 38.0 | 35.8 | 20.1 | 6.0 | 91 | 66 | 31 | | | | |
| SS-16 | 22.0 LT. | 34+77 -Y4CD- | 32.20-33.70 | A-2-4(0) | 13 | 39 | NP | 46.9 | 31.0 | 14.1 | 8.0 | 82 | 55 | 22 | | | | |
| SS-17 | 22.0 LT. | 34+77 -Y4CD- | 38.60-40.10 | A-2-5(0) | 28 | 43 | NP | 34.6 | 44.3 | 13.1 | 8.0 | 93 | 77 | 24 | | | | |

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on –Y4CD- over Smith Creek
between US-158 and US-421 / I-40 Bus.

B1-A

SHEET 16

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on –Y4CD- over Smith Creek
between US-158 and US-421 / I-40 Bus.

B1-B

SHEET 17

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 18 |

# Aerial Photo

0 60 120

FEET

30

35

NORTH

-BL- POT 163+63.48 =

-Y4CD-
PCC Sta. 36+33.44

EB1-A

B1-A

B2-A

EB2-A

EB1-B

B1-B

B2-B

EB2-B

-BL-48 PINC 162+97.05
(-L-STA. 627+25.59, 13.67 LT)

S 3° 54' 13.1" W

S 18° 00' 41.9" W

-BL-49 PINC 167+61.96=
(-L-STA. 631+88.92, 3.03 RT)

N 62° 26' 26.8" W

SMITH CREEK

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 18 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *NHF-0918(93)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *BRIDGE ON -Y4CD- OVER I-40 BUS /US-421 BETWEEN SR 4309 AND SR 4315*

SITE DESCRIPTION

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
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| 17 | CORE PHOTOGRAPH |
| 18 | SITE PHOTOGRAPH |


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PERSONNEL

*J. E. ESTEP*

*M. R. MOORE*

*C. C. MURRAY*

INVESTIGATED BY *R. Q. CALLAWAY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *NOVEMBER 2013*

NORTH CAROLINA LICENSED SEAL 1098 GEOLOGIST ROGER Q CALLAWAY 11/8/2013

DRAWN BY: *C. E. BURRIS*

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*PROJECT: 34839.1.1*

*ID: U-2579B*

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34839.1.1 (U-2579B) | 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-4, A-5 | |
| | 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [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
- [X] CASING [X] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NX
- [ ] -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: BL-52 STA BL 178+48.41
N 861914.1300 E 1666379.8520
ELEVATION: 893.60 FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 50 100

FEET

NORTH

-BL-52

-Y4CD- POC STA. 46+60.01

-Y4WB- POT STA. 90+06.05

-Y4CD- POC STA. 46+87.16

-Y4- POT STA. 90+08.91

-Y4CD- POC STA. 47+14.31

-Y4EB- POT STA. 90+11.82

-Y4LPA-

-Y4WB-

-Y4EB-

-Y4LPD-

-Y4CD-

-Y4LPB-

-L-

F

DOROTHY A. BAKER

TOWN OF KERNERSVILLE
FORSYTH COUNTY

60"WM&ISBW

30" CMP

42" RCP

4" HDPE

EXISTING R/W

W.E.852.7 POND

W.E.865.5 POND

SCRUB

REX LANIER PEDDYCORD
FAYE G. PEDDYCORD
DB 0770 PG 0482
DB 2059 PG 3356
DB 1772 PG 1342
DB 1535 PG 0368

PIPE END BROKEN AND RUSTED

EB1-A
EB1-D
EB1-C
EB1-B

B1-A
B1-C
B1-B

EB2-A
EB2-C
EB2-B

W.P. #1
STA. 45+75.19 -Y4CD-

W.P. #2
STA. 46+87.16 -Y4CD-

W.P. #3
STA. 47+91.89 -Y4CD-

S 14° 12' 34.9" E

S 35° 04' 18.1" W

45 01 640 50 10 90 645

WD DOCK

ISLOCD

HTR

GAZ

18" CMP

60" CHL

48" CHL

MTL CANOPY

BST

REX LANIER PEDDYCORD
FAYE GARDNER PEDDYCORD
DB 1660 PG 3583
PB 18 PG 97

48" SELEC

EIP

BK WALL

36" CONC

NORTH CAROLINA DEPARTMENT
OF TRANSPORTATION
DB 2666 PG 2563

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |
| BRIDGE OVER I-40 BUS /US-421 BETWEEN SR 4309 AND SR 4315 PROFILE ALONG -Y4CD- | |

0 100 200
FEET
VE = 5:1

-Y4CD- STA 46+87.16
-Y4- STA 90+08.91

-Y4CD- STA 46+60.01
-Y4WB- STA 90+06.05

-Y4CD- STA 47+14.31
-Y4EB- STA 90+11.82

(+)2.5694%

(+)2.5694%

(-)3.9666%

924.9
924.9

EXISTING GROUND

SS-12-7
SS-12-8
SS-12-9

B1-C
46+96 -Y4CD-
8 LT

ROADWAY EMBANKMENT
COARSE STONE AND BOULDERS WITH MED DENSE GRAY WET SAND (A-1)

ROADWAY EMBANKMENT
RED ORANGE TAN, MOIST TO WET STIFF LOW PLASTIC SANDY CLAY WITH SOME MICA (A-7-5)

SS-12-13

EB2-C
47+90 -Y4CD-
10 LT

ALLUVIAL
BROWN, GRAY, BLACK MOIST MED STIFF LOW PLASTIC SANDY CLAY W/ORGANICS AND LITTLE MICA (A-7-5)

ALLUVIAL
BLACK AND TAN WET SOFT LOW PLASTIC SANDY SILT (A-5)

EB1-C
45+44 -Y4CD-
9 LT
ELEV. = 856.6'

ALLUVIAL
LIGHT GRAY WET QUARTZ-FELDSPAR SAND W/TRACE ORGANICS (A-2-4)

RED TO GRAY MOIST TO WET STIFF TO VERY STIFF MOIST TO WET MED TO LOW PLASTIC SILTY SANDY CLAY W/ WOOD FRAGS AT 34.7' LITTLE TO HIGH MICA (A-7-5)

(PI = 21)

POND

AR

CRYSTALLINE ROCK

RESIDUAL
TAN BROWN GREEN LOOSE TO DENSE WET TO SAT. SILTY SAND W/TRACE TO SOME MICA (A-2-4)

RESIDUAL
WHITE, GREEN-BROWN, GRAY LOOSE TO MED DENSE WET SILTY SAND WITH SOME TO HIGHLY MICACEOUS (A-2-5)

RESIDUAL
GRAY SAT. T STIFF MED PLASTIC SILTY CLAY W/LITTLE MICA (A-7-5)

RESIDUAL
WHITE GRAY BROWN PINK WET MED TO VERY DENSE SAND WITH TRACE TO SOME MICA (A-2-4)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

BT
CAVED
0913

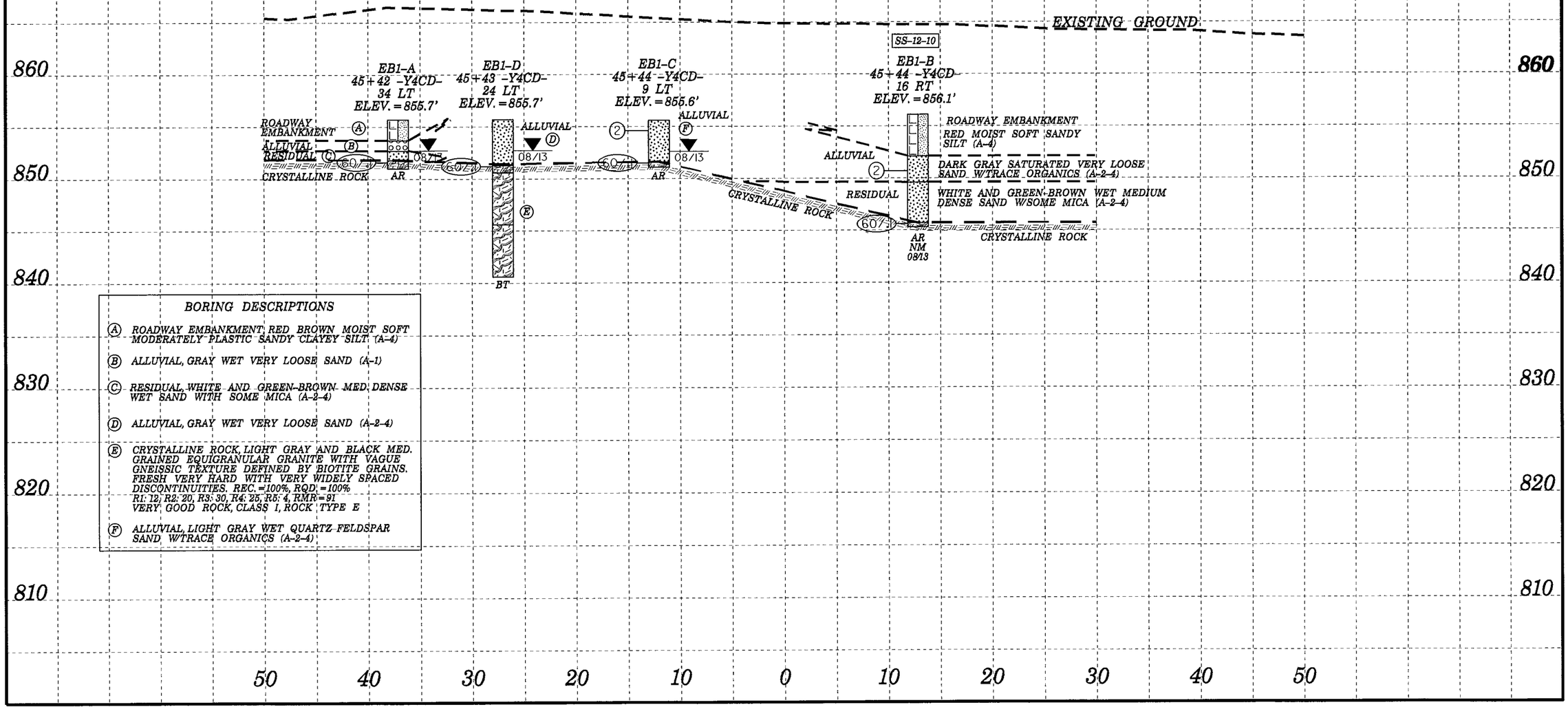
970 960 950 940 930 920 910 900 890 880 870 860 850 840 830 820 810 800 790

40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 5 |
| SECTION THROUGH EB-1<br>STA. 45+75.19 -Y4CD-<br>SKEW = 84°17'26" | |

0 10 20
FEET

# -Y4CD-




## BORING DESCRIPTIONS

(A) ROADWAY EMBANKMENT: RED BROWN MOIST SOFT MODERATELY PLASTIC SANDY CLAYEY SILT (A-4)

(B) ALLUVIAL, GRAY WET VERY LOOSE SAND (A-1)

(C) RESIDUAL, WHITE AND GREEN-BROWN MED. DENSE WET SAND WITH SOME MICA (A-2-4)

(D) ALLUVIAL, GRAY WET VERY LOOSE SAND (A-2-4)

(E) CRYSTALLINE ROCK, LIGHT GRAY AND BLACK MED. GRAINED EQUIGRANULAR GRANITE WITH VAGUE GNEISSIC TEXTURE DEFINED BY BIOTITE GRAINS. FRESH VERY HARD WITH VERY WIDELY SPACED DISCONTINUITIES. REC. =100%, RQD. =100%
R1: 12, R2: 20, R3: 30, R4: 25, R5: 4, RMR = 91
VERY GOOD ROCK, CLASS I, ROCK TYPE E

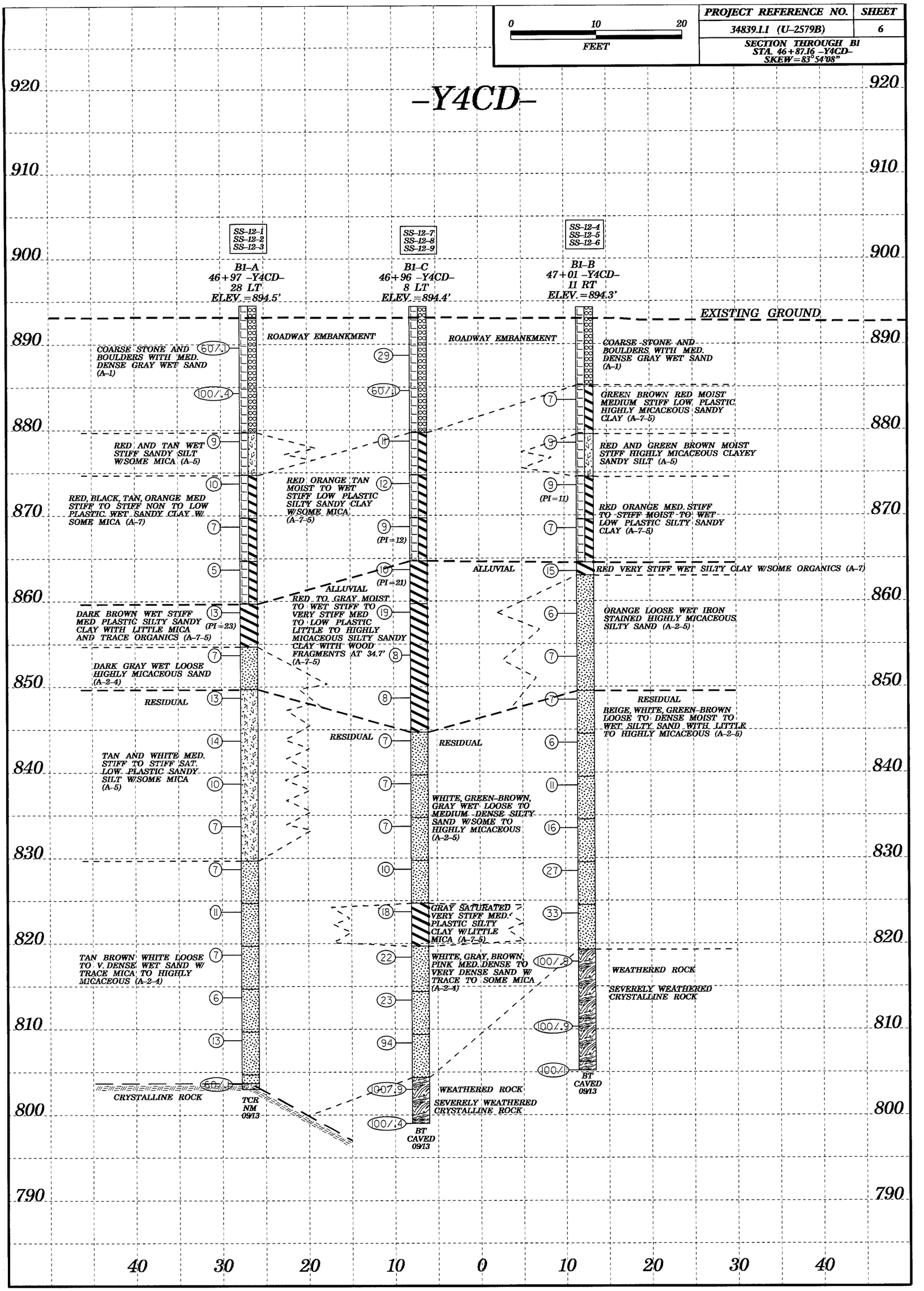
(F) ALLUVIAL, LIGHT GRAY WET QUARTZ FELDSPAR SAND W/TRACE ORGANICS (A-2-4)

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 6 |

0 10 20
FEET

SECTION THROUGH B1
STA. 46+87.16 –Y4CD–
SKEW=83°54'08"

# –Y4CD–

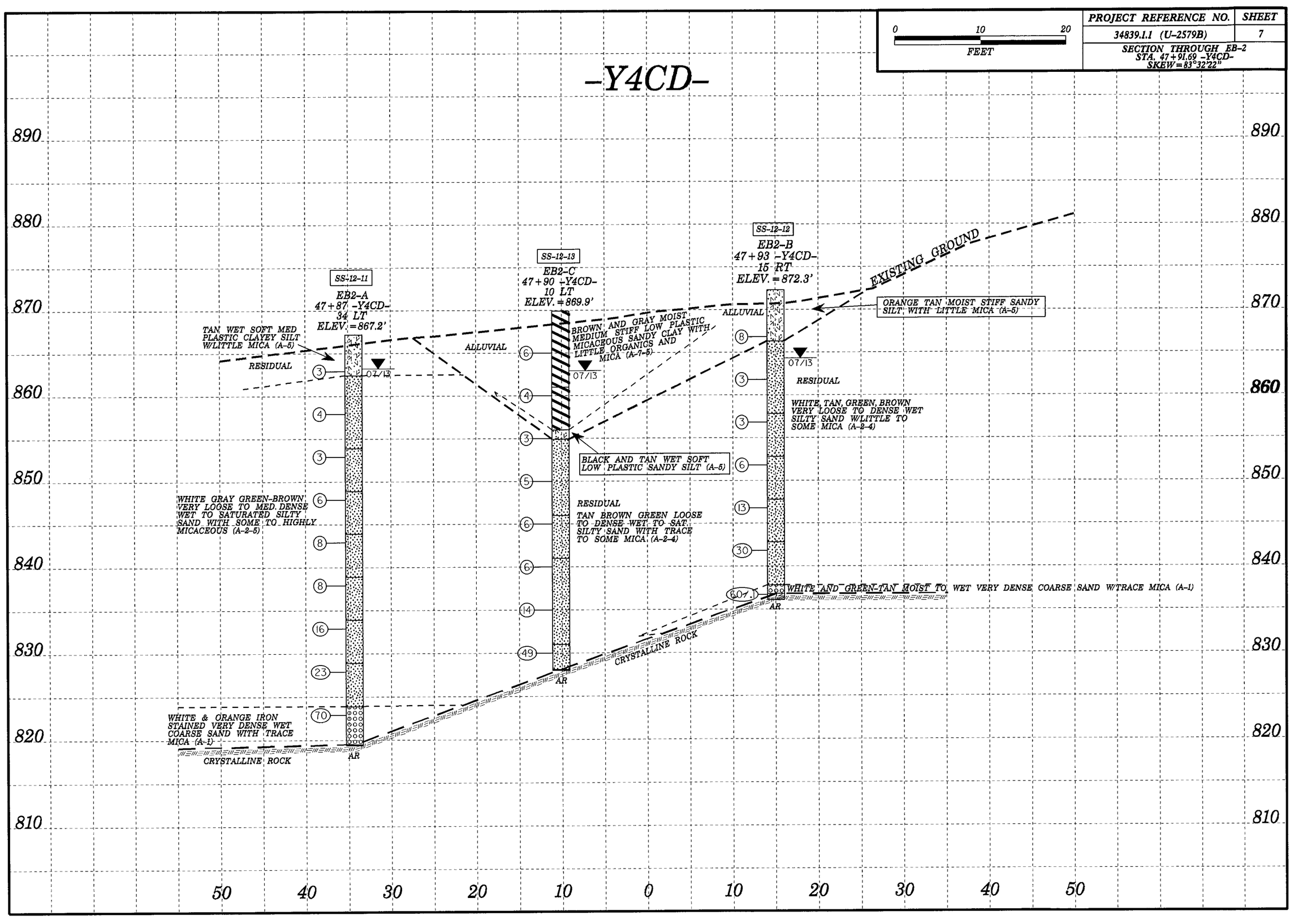


| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 7 |

SECTION THROUGH EB-2
STA. 47+91.69 -Y4CD-
SKEW=83°32'22"

0 10 20
FEET

# -Y4CD-



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 45+42 | **OFFSET** 34 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 855.7 ft | **TOTAL DEPTH** 4.7 ft | **NORTHING** 862,005 | **EASTING** 1,666,354 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 08/07/13 | **COMP. DATE** 08/07/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 860 | | | | | | | | | | | |
| | | | | | | | | | | 855.7 GROUND SURFACE | 0.0 |
| 855 | | | | | | | | | | **ROADWAY EMBANKMENT** | |
| | | | | | | | | | | 853.7 0 - 2' EMBANKMENT, RED BROWN, MOIST, SOFT, MODERATELY PLASTIC, SANDY CLAYEY SILT | 2.0 |
| | | | | | | | | | | 852.7 | 3.0 |
| | | | | | | | | | | 851.8 **ALLUVIAL** 2' - 3' ALLUVIAL, GRAY, WET, VERY LOOSE, NON PLASTIC, SAND. | 3.9 |
| | 851.7 | 4.0 | 60/.1 | | | 60/.1 | | | | 851.0 **RESIDUAL** 3' - 3.9' RESIDUAL, WHITE AND GREEN-BROWN MED DENSE WET SAND WITH SOME MICA | 4.7 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 3.9' - 4.7' CRYSTALLINE ROCK. SPT REFUSAL AT TOP, AUGER REFUSAL AT BASE. NO SAMPLE RECOVERED. | |
| | | | | | | | | | | Boring Terminated at Elevation 851.0 ft in crystalline rock | |

NCDOT BORE DOUBLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-D | **STATION** 45+43 | **OFFSET** 24 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 855.7 ft | **TOTAL DEPTH** 15.1 ft | **NORTHING** 862,006 | **EASTING** 1,666,344 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/14/13 | **COMP. DATE** 08/14/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 855.7 GROUND SURFACE | 0.0 |
| | | | | | | | | | | **ALLUVIAL** 0-3.9' ALLUVIAL, GRAY, WET, VERY LOOSE, NON PLASTIC SAND. | |
| | 851.8 | 3.9 | 2 | 60/.1 | | 60/.1 | | W | | 851.4 | 4.3 |
| | | | | | | | | | | 851.3 **CRYSTALLINE ROCK** 4.3' - 4.4' SPT REFUSAL. POSSIBLY GRAY CEMENTED SAND. | 4.4 |
| | | | | | | | | | | 850.6 **CRYSTALLINE ROCK** 4.4' - 5.1' CORED ROCK | 5.1 |
| | | | | | | | | | | 845.6 **CRYSTALLINE ROCK** 5.1' - 10.1' CORED ROCK | 10.1 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 10.1' - 15.1' CORED ROCK | |
| | | | | | | | | | | 840.6 | 15.1 |
| | | | | | | | | | | Boring Terminated at Elevation 840.6 ft in crystalline rock | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-D | **STATION** 45+43 | **OFFSET** 24 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 855.7 ft | **TOTAL DEPTH** 15.1 ft | **NORTHING** 862,006 | **EASTING** 1,666,344 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/14/13 | **COMP. DATE** 08/14/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO / NQ | **TOTAL RUN** 10.7 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 851.29 | | | | | | | | | | | Begin Coring @ 4.4 ft | |
| 850 | 851.3 | 4.4 | 0.7 | | (0.6) 86% | (0.6) 86% | | (0.6) 86% | (0.6) 86% | | 851.3 **CRYSTALLINE ROCK** 4.4' - 5.1' LIGHT GRAY AND BLACK, MEDIUM GRAINED, EQUIGRANULAR GRANITE WITH VAGUE GNEISSIC TEXTURE DEFINED BY BIOTITE GRAINS. FRESH, VERY HARD, WITH VERY WIDELY SPACED DISCONTINUITIES. R1: 12, R2: 20, R3: 30, R4: 25, R5: 4 RMR = 91, VERY GOOD ROCK, CLASS I ROCK TYPE E | 4.4 |
| | 850.6 | 5.1 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 850.6 | 5.1 |
| 845 | 845.6 | 10.1 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 845.6 **CRYSTALLINE ROCK** 5.1' - 10.1' LIGHT GRAY AND BLACK, MEDIUM GRAINED, EQUIGRANULAR GRANITE WITH VAGUE GNEISSIC TEXTURE DEFINED BY BIOTITE GRAINS. FRESH, VERY HARD, WITH VERY WIDELY SPACED DISCONTINUITIES. R1: 12, R2: 20, R3: 30, R4: 25, R5: 4 RMR = 91, VERY GOOD ROCK, CLASS I ROCK TYPE E | 10.1 |
| | 840.6 | 15.1 | | | | | | | | | 840.6 **CRYSTALLINE ROCK** 10.1' - 15.1' LIGHT GRAY AND BLACK, MEDIUM GRAINED, EQUIGRANULAR GRANITE WITH VAGUE GNEISSIC TEXTURE DEFINED BY BIOTITE GRAINS. FRESH, VERY HARD, WITH VERY WIDELY SPACED DISCONTINUITIES. R1: 12, R2: 20, R3: 30, R4: 25, R5: 4 RMR = 91, VERY GOOD ROCK, CLASS I ROCK TYPE E | 15.1 |
| | | | | | | | | | | | Boring Terminated at Elevation 840.6 ft in crystalline rock | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-C | **STATION** 45+44 | **OFFSET** 9 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 855.6 ft | **TOTAL DEPTH** 4.5 ft | **NORTHING** 862,007 | **EASTING** 1,666,329 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/07/13 | **COMP. DATE** 08/07/13 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 860 | | | | | | | | | | |
| 855 | 855.6 | 0.0 | 2 | 1 | 1 | 2 | | M | | 855.6 GROUND SURFACE 0.0<br>**ALLUVIAL**<br>0' - 4' ALLUVIAL, LIGHT GRAY, WET, NON PLASTIC, SLIGHTLY ORGANIC QUARTZ-FELDSPAR SAND. 80% SAND SIZE, 20% SILT AND FINE SAND. |
| | 851.6 | 4.0 | 60/.1 | | | 60/.1 | | | | 851.6 4.0<br>851.1 4.5<br>**CRYSTALLINE ROCK**<br>4' -4.5' CRYSTALLINE ROCK. SPT REFUSAL AT TOP, AUGER REFUSAL AT BASE. RETURNED SAMPLE LOOKS LIKE SANDSTONE, OR CEMENT, BUT DOES NOT REACT WITH ACID. CLAY CEMENTED SANDSTONE.<br>Boring Terminated at Elevation 851.1 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/19/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 45+44 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 856.1 ft | **TOTAL DEPTH** 10.8 ft | **NORTHING** 862,012 | **EASTING** 1,666,304 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/07/13 | **COMP. DATE** 08/07/13 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 860 | | | | | | | | | | |
| 855 | 851.7 | 4.4 | 1 | 1 | 1 | 2 | SS-12-10 | W | | 856.1 GROUND SURFACE 0.0<br>**ROADWAY EMBANKMENT**<br>0' - 4' EMBANKMENT, RED, MOIST SOFT, SANDY SILT. SPILL AT TOE OF SLOPE.<br>852.1 4.0<br>**ALLUVIAL**<br>4' - 6.5' ALLUVIAL, DARK GRAY, SATURATED, VERY LOOSE, NON PLASTIC SLIGHTLY ORGANIC SAND.<br>849.6 6.5 |
| 850 | 846.7 | 9.4 | 5 | 25 | 60/.1 | 60/.1 | | W | | **RESIDUAL**<br>6.5' - 10.4' RESIDUAL, WHITE AND GREEN-BROWN, WET, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. 30% QUARTZ GRAINS, 30% MICA, 30% FELDSPAR, 10% FINES. GOOD REMNANT ROCK TEXTURE, WEATHERED GRANITE GNEISS.<br>845.7 10.4<br>845.3 10.8<br>**CRYSTALLINE ROCK**<br>10.4' - 10.8' ROCK. SPT REFUSAL AT TOP, AUGER REFUSAL AT BASE.<br>Boring Terminated at Elevation 845.3 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 46+97 | **OFFSET** 28 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** Caved |
| **COLLAR ELEV.** 894.5 ft | **TOTAL DEPTH** 91.5 ft | **NORTHING** 861,853 | **EASTING** 1,666,320 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 09/09/13 | **COMP. DATE** 09/09/13 | **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)) |
|---|---|---|---|---|---|---|---|---|---|---|
| 895 | | | | | | | | | | 894.5 / 0.0 GROUND SURFACE |
| 890 | 889.7 | 4.8 | 60/.1 | | | 60/.1 | | | | **ROADWAY EMBANKMENT** 0' - 14.8' FIELD LOG REPORTS BOULDERS AND COBBLES. NO SAMPLE RECOVERED |
| 885 | 884.7 | 9.8 | 100/.4 | | | 100/.4 | | | | |
| 880 | 879.7 | 14.8 | 2 | 3 | 6 | 9 | SS-12-1 | M | | 879.7 / 14.8 **ROADWAY EMBANKMENT** 14.8'- 19.8' FILL, RED AND TAN, WET,STIFF, SLIGHTLY PLASTIC, MICACEOUS SANDY SILT. 30% MICA, 40% QUARTZ, 30% FINE SAND AND SILT. |
| 875 | 874.7 | 19.8 | 2 | 5 | 5 | 10 | | M | | 874.7 / 19.8 **ROADWAY EMBANKMENT** 19.8' - 24.8' FILL, RED, BLACK AND TAN, WET, STIFF, SLIGHTLY PLASTIC, MICACEOUS SANDY CLAY. 50% QUARTZ - FELDSPAR SAND, 30% MICA SAND, 20% FINE SAND AND SILT |
| 870 | 869.7 | 24.8 | 1 | 2 | 5 | 7 | | W | | 869.7 / 24.8 **ROADWAY EMBANKMENT** 24.8' - 29.8' FILL, RED ORANGE, WET, MEDIUM STIFF, SLIGHTLY PLASTIC, MICACEOUS SANDY CLAY WITH SMALL SOIL CLODS. 40% QUARTZ-FELDSPAR SAND, 30% MICA SAND, 30% FINE SAND AND SILT. |
| 865 | 864.7 | 29.8 | 2 | 2 | 3 | 5 | | W | | 864.7 / 29.8 |
| 860 | 859.7 | 34.8 | 3 | 9 | 4 | 13 | SS-12-2 | | | 859.7 / 34.8 **ROADWAY EMBANKMENT** 29.8' - 34.8' FILL, RED ORANGE, WET, MEDIUM STIFF, NON PLASTIC, MICACEOUS SANDY CLAY. 40% QUARTZ-FELDSPAR SAND, 30% MICA SAND, 30% FINE SAND AND SILT. |
| 855 | 854.7 | 39.8 | 3 | 3 | 4 | 7 | | W | | 854.7 / 39.8 **ALLUVIAL** 34.8' - 39.8' ALLUVIAL, DARK BROWN, WET, STIFF, SLIGHTLY PLASTIC, SLIGHTLY SANDY CLAY WITH FINE ROOTS. 40% SAND, 15% MICA, 45% SILT, CLAY AND FINE SAND. |
| 850 | 849.7 | 44.8 | 6 | 6 | 7 | 13 | | | | 849.7 / 44.8 **ALLUVIAL** 39.8' - 44.8' ALLUVIAL, DARK GRAY, WET, LOOSE, NON PLASTIC, MICACEOUS SAND. MICA 50%, QUARTZ- FELDSPAR |
| 845 | 844.7 | 49.8 | 3 | 7 | 7 | 14 | | | | **RESIDUAL** 44.8' - 59.8' NO SAMPLE COLLECTED, PRESUMED RESIDUAL |
| 840 | 839.7 | 54.8 | 3 | 4 | 6 | 10 | | | | |
| 835 | 834.7 | 59.8 | 1 | 3 | 4 | 7 | SS-12-3 | W | | 834.7 / 59.8 **RESIDUAL** 59.8' - 64.8' RESIDUAL, LIGHT TAN AND WHITE, MEDIUM STIFF, SATURATED, SLIGHTLY PLASTIC, MICACEOUS SANDY SILT. 35% QUARTZ, 65% FINE SAND, PROBABLY HIGHLY WEATHERED GNEISS. |
| 830 | 829.7 | 64.8 | 1 | 2 | 5 | 7 | | W | | 829.7 / 64.8 **RESIDUAL** 64.8' - 69.8' RESIDUAL, TAN AND WHITE, WET, LOOSE, NON PLASTIC, SLIGHTLY MICACEOUS SAND. 35% QUARTZ SAND, 60% FINE SAND, 5% MICA. |
| 825 | 824.7 | 69.8 | 2 | 4 | 7 | 11 | | W | | 824.7 / 69.8 **RESIDUAL** 69.8' -74.8' RESIDUAL, TAN AND GREENISH BROWN, WET, MED DENSE TO LOOSE NON PLASTIC MICACEOUS SAND. 30% QUARTZ, 15% MICA, 55% SILT AND FINE SAND. |
| 820 | 819.7 | 74.8 | 2 | 3 | 4 | 7 | | W | | 819.7 / 74.8 |
| 815 | | | | | | | | | | |



| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 46+97 | **OFFSET** 28 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** Caved |
| **COLLAR ELEV.** 894.5 ft | **TOTAL DEPTH** 91.5 ft | **NORTHING** 861,853 | **EASTING** 1,666,320 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 09/09/13 | **COMP. DATE** 09/09/13 | **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 | 814.7 | 79.8 | 2 | 2 | 4 | 6 | | W | | 814.7 / 79.8 **RESIDUAL** 74.8' - 79.8' RESIDUAL, TAN, WHITE AND GREEN-BROWN, WET, LOOSE, NON PLASTIC, MICACEOUS SAND. 30% QUARTZ, 45% MICA, 25% FINE SAND AND SILT. *(continued)* |
| 810 | 809.7 | 84.8 | 3 | 3 | 10 | 13 | | W | | 809.7 / 84.8 **RESIDUAL** 79.8' - 84.8' RESIDUAL, WHITE AND GREEN-BROWN, LOOSE, NON PLASTIC, MICACEOUS SAND. 30% QUARTZ, 20% FELDSPAR, 40% MICA, 10% FINE SAND AND SILT. |
| 805 | 804.7 | 89.8 | 9 | 89 | 60/.1 | 60/.1 | | W | | 804.7 / 89.8 **RESIDUAL** 84.8' - 89.8' RESIDUAL, LIGHT BROWN, WET, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. 20% QUARTZ, 60% FELDSPAR AS FINE SAND, 20% MICA. GOOD REMNANT TEXTURE; HIGHLY WEATHERED MEDIUM GRAIN GRANITE. |
| | | | | | | | | | | 803.7 / 90.8 **RESIDUAL** 89.8' - 90.8' RESIDUAL, BROWN AND WHITE, MOIST, VERY DENSE, NON PLASTIC, SAND. 30 5 QUARTZ, 30% FELDSPAR, 30% PLAGIOCLASE, 10% MICA. VERY GOOD REMNANT TEXTURE. HIGHLY WEATHERED GRANITE. |
| | | | | | | | | | | 803.0 / 91.5 **CRYSTALLINE ROCK** Boring Terminated at Elevation 803.0 ft in crystalline rock |

Match Line

NCDOT BORE DOUBLE U2579B_GEO_BRDG46+87.16-Y4CD- FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-C | **STATION** 46+96 | **OFFSET** 8 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** N/A |
| **COLLAR ELEV.** 894.4 ft | **TOTAL DEPTH** 95.4 ft | **NORTHING** 861,858 | **EASTING** 1,666,301 | **24 HR.** Caved |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 09/08/13 | **COMP. DATE** 09/08/13 | **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) |
| 895 | | | | | | | | | | 894.4 GROUND SURFACE 0.0 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** 0' - 14.7' PAVEMENT, ROADBASE, AND COARSE STONE FILL. "BOULDERS AND COBBLES" WET, NON PLASTIC, SANDY. |
| 890 | 889.7 | 4.7 | 7 | 10 | 19 | 29 | | M | | |
| 885 | 884.7 | 9.7 | 60/.1 | | | 60/.1 | | | | |
| 880 | 879.7 | 14.7 | 3 | 5 | 6 | 11 | | M | | 879.7 14.7 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** 14.7' - 19.7' EMBANKMENT, RED ORANGE, AND LIGHT TAN, MOIST, STIFF, SLIGHTLY PLASTIC,SILTY MICACEOUS SANDY CLAY. 20% QUARTZ GRAINS AND ROCK FRAGMENTS, 60% FINE MICA, 20% SILT AND CLAY. |
| 875 | 874.7 | 19.7 | 2 | 6 | 6 | 12 | | M | | 874.7 19.7 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** 19.7' - 24.7' EMBANKMENT, RED, WET, STIFF, SLIGHTLY PLASTIC, MICACEOUS, SILTY SANDY CLAY. 50% QUARTZ SAND, 20% MICA, 30% SILT CLAY. |
| 870 | 869.7 | 24.7 | 3 | 4 | 5 | 9 | SS-12-7 | M | | 869.7 24.7 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** 24.7' - 29.7' EMBANKMENT, RED ORANGE, WET, STIFF, MICACEOUS SANDY CLAY. CONTAINS RED CLODS. MICA CONTENT VARIABLE. |
| 865 | 864.7 | 29.7 | 3 | 4 | 6 | 10 | SS-12-8 | W | | 864.7 29.7 |
| 860 | 859.7 | 34.7 | 13 | 9 | 10 | 19 | | W | | **ALLUVIAL** 29.7' - 34.7' ALLUVIAL, ORIGINAL LAND SURFACE. TOPSOIL, RED, MOIST, STIFF, MODERATELYY PLASTIC, MICACEOUS SANDY CLAY. 30% QUARTZ, 15% MICA, 55% SILT-CLAY. |
| 855 | 854.7 | 39.7 | 5 | 4 | 4 | 8 | | W | | 858.2 36.2 |
| | | | | | | | | | | 34.7' - 36.2' N=19 MEDIUM DENSE, WOOD. 39.7' - 41.2 NO SAMPLE |
| 850 | 849.7 | 44.7 | 4 | 3 | 5 | 8 | | W | | 849.7 44.7 |
| | | | | | | | | | | **ALLUVIAL** 44.7' - 49.7' ALLUVIUM, GRAY, WET, STIFF, SLIGHTLY PLASTIC, HIGHLY MICACEOUS, SILTY SANDY CLAY. 60% MICA, 40% QUARTZ SAND. WITH WOOD FRAGMENTS. |
| 845 | 844.7 | 49.7 | 2 | 2 | 5 | 7 | SS-12-9 | W | | 844.7 49.7 |
| | | | | | | | | | | **RESIDUAL** 49.7' - 54.7' RESIDUAL , WHITE AND GRAY, WET, LOOSE, NON PLASTIC, MICACEOUS SAND. 40% QUARTZ-FELDSPAR, 40% MICA, 20% SILT-CLAY. VAGUE REMNANT TEXTURE |
| 840 | 839.7 | 54.7 | 3 | 3 | 4 | 7 | | W | | 839.7 54.7 |
| | | | | | | | | | | **RESIDUAL** 54.7' - 59.7' RESIDUAL, WHITE AND GREEN-BROWN, WET, LOOSE, VERY MICACEOUS SAND. 30% QUARTZ, 30% FELDSPAR, 30% MICA, 10% SILT. HIGHLY WEATHERED GRANITIC GNEISSS. VAGUE REMNANT TEXTURE |
| 835 | 834.7 | 59.7 | 2 | 3 | 4 | 7 | | W | | 834.7 59.7 |
| | | | | | | | | | | **RESIDUAL** 59.7' - 64.7' RESIDUAL, WHITE AND GREEN BROWN, WET, NON PLASTIC MICACEOUS SAND. 40% QUARTZ, 30% FELDSPAR, 20% MICA, 10% FINE SAND. |
| 830 | 829.7 | 64.7 | 3 | 4 | 6 | 10 | | W | | 829.7 64.7 |
| | | | | | | | | | | **RESIDUAL** 64.7' - 69.7' RESIDUAL, WHITE AND GREEN-BROWN, WET, LOOSE, NON PLASTIC MICACEOUS SAND. 30 % QUARTZ, 20% FELDSPAR, 40% MICA, 10% FINE SAND AND SILT. |
| 825 | 824.7 | 69.7 | 8 | 8 | 10 | 18 | | W | | 824.7 69.7 |
| 820 | 819.4 | 75.0 | 8 | 10 | 12 | 22 | | W | | 819.7 74.7 |
| 815 | | | | | | | | | | **RESIDUAL** 69.7' - 74.7' RESIDUAL, GRAY, |

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-C | **STATION** 46+96 | **OFFSET** 8 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** N/A |
| **COLLAR ELEV.** 894.4 ft | **TOTAL DEPTH** 95.4 ft | **NORTHING** 861,858 | **EASTING** 1,666,301 | **24 HR.** Caved |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 09/08/13 | **COMP. DATE** 09/08/13 | **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 | | | | | | Match Line | | | | |
| | 814.4 | 80.0 | 7 | 9 | 14 | 23 | | W | | 814.4 SATURATED, VERY STIFF, PLASTIC, MICACEOUS SILT -CLAY. SAMPLE IS WITHOUT STRUCTURE, STICKY. ATYPICAL. 80.0 |
| 810 | 809.4 | 85.0 | 18 | 29 | 65 | 94 | | | | **RESIDUAL** 74.7' - 80' RESIDUAL WHITE AND GRAY-BROWN, WET, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. 30% QUARTZ, 30% FELDSPAR, 30% PLAGIOCLASE, 10% MICA. GOOD REMNANT ROCK TEXTURE WITH A TRACE OF PINK FELDSPAR. *(continued)* 809.4 85.0 |
| 805 | 804.4 | 90.0 | 22 | 44 | 56/.4 | 100/.9 | | | | 804.4 90.0 |
| 800 | 799.4 | 95.0 | 100/.4 | | | 100/.4 | | | | **RESIDUAL** 80' - 85' RESIDUAL, WHITE, PINK AND GRAY-BROWN, WET, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. 30% QUARTZ, 30% FELDSPAR, 30% PLAGIOCLASE, 10% MICA. GOOD REMNANT TEXTURE, HIGHLY WEATHERED GRANITE GNEISS. 799.4 95.0 799.0 95.4 |
| | | | | | | | | | | **RESIDUAL** 85' - 90' RESIDUAL, WHITE AND GREEN-BROWN WET, VERY DENSE NON PLASTIC, MICACEOUS SAND. 30% QUARTZ, 25% FELDSPAR, 20% PLAGIOCLASE, 25% MICA. GOOD REMNANT ROCK TEXTURE. |
| | | | | | | | | | | **WEATHERED ROCK** WEATHERED ROCK, NO SAMPLE |
| | | | | | | | | | | **WEATHERED ROCK** 95' RESIDUAL, WHITE, PINK AND GRAY BROWN, MOIST, WEATHERED ROCK. NON PLASTIC. GRANITE GNEISS WITH PINK FELDSPARS. |
| | | | | | | | | | | Boring Terminated at Elevation 799.0 ft in severely weathered crystalline rock |

NCDOT BORE DOUBLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 47+01 | **OFFSET** 11 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** N/A |
| **COLLAR ELEV.** 894.3 ft | **TOTAL DEPTH** 89.1 ft | **NORTHING** 861,856 | **EASTING** 1,666,281 | **24 HR.** Caved |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 09/07/13 | **COMP. DATE** 09/07/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 895 | | | | | | | | | | 894.3 GROUND SURFACE | 0.0 |
| 890 | | | | | | | | | | **ROADWAY EMBANKMENT** 0' - 9.1' EMBANKMENT. DARK GRAY, WET, CRUSHED GRANITIC ROCK, NON PLASTIC, FINE FRACTION IS SAND | |
| 885 | 884.5 | 9.8 | 3 | 3 | 4 | 7 | | M | | 885.2 | 9.1 |
| 880 | 879.5 | 14.8 | 2 | 4 | 5 | 9 | | M | | **ROADWAY EMBANKMENT** 9.1' - 14.8' EMBANKMENT, GREEN BROWN AND RED, MOIST MEDIUM STIFF, SLIGHTLY PLASTIC, SANDY CLAY. MIXTURE OF SMALL SAPROLITE CLODS AND SAND. 40% MICA, 20% SAND, 20% FINE SAND AND SILT, 20% CLODS. 879.5 | 14.8 |
| 875 | 874.5 | 19.8 | 2 | 3 | 6 | 9 | SS-12-4 | M | | **ROADWAY EMBANKMENT** 14.8' - 19.8' EMBANKMENT, RED AND GREEN BROWN, MOIST, STIFF, NON PLASTIC, HIGHLY MICACEOUS CLAYEY SANDY SILT. 60% MICA, 20% QUARTZ GRAINS, 20% SILT AND FINE SAND. 874.5 | 19.8 |
| 870 | 869.5 | 24.8 | 2 | 3 | 4 | 7 | | M | | **ROADWAY EMBANKMENT** 19.8' - 24.8' RED ORANGE, MOIST STIFF, SLIGHTLY PLASTIC, MICACEOUS SILTY SANDY CLAY. 45% MICA, 15% QUARTZ GRAINS, 40% SILT, FINE SAND AND CLAY. 869.5 | 24.8 |
| 865 | 864.5 | 29.8 | 4 | 7 | 8 | 15 | | M | | **ROADWAY EMBANKMENT** 24.8' - 29.8' EMBANKMENT, RED ORANGE, WET, MEDIUM STIFF, SLIGHTLY PLASTIC, MICACEOUS CLAYEY SILTY SANDY CLAY. 50% QUARTZ-FELDSPAR SAND, 10% MICA, 40% CLAY, SILT, AND FINE SAND. 864.5 | 29.8 |
| 860 | 859.5 | 34.8 | 3 | 2 | 4 | 6 | | M | | **ALLUVIAL** 29.8' - 31.3' ALLUVIAL / LAND SURFACE; WOOD, LEAVES AND RED SILTY CLAY. WET, STIFF, SLIGHTLY PLASTIC CLAYEY SANDY SILT. 863.0 | 31.3 |
| 855 | 854.5 | 39.8 | 2 | 3 | 4 | 7 | SS-12-5 | M | | 31.3' - 39.8' NO SAMPLE 854.5 | 39.8 |
| 850 | 849.5 | 44.8 | 3 | 3 | 4 | 7 | | M | | **ALLUVIAL** 39.8' - 44.8' ALLUVIAL, ORANGE, IRON STAINED, WET, LOOSE, NON PLASTIC, MICACEOUS SAND. 60% MICA, 20% QUARTZ, 20% FINE SAND AND SILT. NO REMNANT TEXTURE. 849.5 | 44.8 |
| 845 | 844.5 | 49.8 | 2 | 2 | 4 | 6 | | M | | **RESIDUAL** 44.8' - 49.8' RESIDUAL, BEIGE AND GREEN-BROWN, WET, LOOSE, NON PLASTIC, QUARTZ MICA SAND. HIGHLY WEATHERED GRANITIC INTRUSIVE, 30% QUARTZ, 30% FELDSPAR, 15% MICA, 25% DIGESTED PLAGIOCLASE AS FINE SILT-SAND. 844.5 | 49.8 |
| 840 | 839.5 | 54.8 | 4 | 5 | 6 | 11 | | M | | **RESIDUAL** 49.8' - 54.8' RESIDUAL, OFFWHITE AND GREEN BROWN, WET, LOOSE, NON PLASTIC, QUARTZ-MICA SAND. 30% QUARTZ, 20% FELDSPAR, 15% MICA, 35% FINE SAND AND SILT. POOR REMNANT TEXTURE 839.5 | 54.8 |
| 835 | 834.5 | 59.8 | 3 | 6 | 10 | 16 | SS-12-6 | M | | **RESIDUAL** 54.8' - 59.8' OFFWHITE AND GREEN-BROWN, WET, MED. DENSE, NON PLASTIC, QUARTZ MICA SAND. 30% QUARTZ, 25% FELDSPAR, 15% MICA, 30% FINE SAND AND SILT. HIGHLY WEATHERED FINE GRAINED GRANITE 834.5 | 59.8 |
| 830 | 829.5 | 64.8 | 2 | 12 | 15 | 27 | | M | | **RESIDUAL** 59.8' - 64.8' RESIDUAL, OFFWHITE AND GREEN-BROWN WET, MEDIUM DENSE, NON PLASTIC, QUARTZ MICA SAND. 30% QUARTZ, 25% FELDSPAR, 20% MICA, (GREEN BROWN), 25% SILT AND FINE 829.5 | 64.8 |
| 825 | 824.5 | 69.8 | 12 | 18 | 15 | 33 | | M | | | |
| 820 | 819.3 | 75.0 | 19 | 38 | 64/.4 | 100/.9 | | M | | | |
| 815 | | | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 47+01 | **OFFSET** 11 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** N/A |
| **COLLAR ELEV.** 894.3 ft | **TOTAL DEPTH** 89.1 ft | **NORTHING** 861,856 | **EASTING** 1,666,281 | **24 HR.** Caved |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 09/07/13 | **COMP. DATE** 09/07/13 | **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 | | | | | | Match Line | | | | |
| 810 | 811.2 | 83.1 | 48 | 62/.4 | | 100/.9 | | M | | SAND. **RESIDUAL** 64.8' - 69.8' RESIDUAL, WHITE AND GREEN BROWN,WET, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND.40% QUARTZ, 30% MICA, 20% FELDSPAR, 10% SILT AND FINE SAND. 811.2 — 83.1 |
| | 806.2 | 88.1 | 26 | 74/.5 | | 100/1 | | | | **RESIDUAL** 69.8' - 75' RESIDUAL, MOIST, DENSE WHITE AND GREEN-BROWN, MICACEOUS SAND. 35% MICA, 35% QUARTZ, 35% MINE SAND AND SILT. NO REMNANT TEXTURE 806.2 — 88.1 **WEATHERED ROCK** 75' - 83.1 WEATHERED ROCK, OFFWHITE AND GREEN BROWN, WET, MICACEOUS, 30% QUARTZ, 30% FELDSPAR, 20% PLAGIOCLASE, 20% MICA. GOOD REMNANT TEXTURE *(continued)* 805.2 — 89.1 **WEATHERED ROCK** 83.1' - 88.1 WEATHERED ROCK. WET, WHITE AND GREEN BROWN MICACEOUS SAND. QUARTZ 30%, FELDSPAR 30%, PLAGIOCLASE 20%, MICA 20%. GOOD REMNANT TEXTURE. **WEATHERED ROCK** 88.1' - 89.1' WEATHERED ROCK, WHITE AND BLACK, MOIST, MICACEOUS QUARTZ SAND. GOOD REMNANT TEXTURE. WEATHERED GRANITE. Boring Terminated at Elevation 805.2 ft in severely weathered crystalline rock |

NCDOT BORE DOUBLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 47+87 | **OFFSET** 34 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** 9.6 |
| **COLLAR ELEV.** 867.2 ft | **TOTAL DEPTH** 47.8 ft | **NORTHING** 861,763 | **EASTING** 1,666,309 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 07/03/13 | **COMP. DATE** 07/03/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 870 | | | | | | | | | | 867.2 GROUND SURFACE | 0.0 |
| 865 | 863.9 | 3.3 | 3 | 2 | 1 | 3 | | M | | **RESIDUAL** 0' - 4.8' RESIDUAL, TAN, WET, SOFT, MODERATELY PLASTIC, CLAYEY SILT. TOP SOIL UNDER DENSE WOODS. 60% QUARTZ, 15% MICA, 25% SILT-CLAY. NO REMNANT ROCK STRUCTURE. 862.4 | 4.8 |
| 860 | 858.9 | 8.3 | 2 | 2 | 2 | 4 | SS-12-11 | M | | **RESIDUAL** 4.8' - 13.3' RESIDUAL, GREEN-GRAY AND WHITE, WET, VERY LOOSE TO LOOSE, SLIGHTLY PLASTIC, MICACEOUS SAND. 30% QUARTZ, 20% MICA, 30% FELDSPAR, 20% FINE SAND AND SILT. 853.9 | 13.3 |
| 855 | 853.9 | 13.3 | 2 | 1 | 2 | 3 | | W | | **RESIDUAL** 13.3' - 18.3' RESIDUAL, WHITE AND GREEN-GRAY, WET, VERY LOOSE, NON PLASTIC MICACEOUS SAND. 35% QUARTZ, 30% MICA, 20% FELDSPAR, 15% SILT AND FINE SAND. VAGUE REMNANT STRUCTURE. 848.9 | 18.3 |
| 850 | 848.9 | 18.3 | 2 | 2 | 4 | 6 | | W | | **RESIDUAL** 18.3' - 23.3' RESIDUAL, LIGHT TAN AND GREEN-GRAY, SATURATED, LOOSE, NON PLASTIC, HIGHLY MICACEOUS SAND. 40% MICA, 30% QUARTZ, 20% FELDSPAR, 10% SILT-SAND. NO STRUCTURE. LOOKS LIKE BLOW-BACK 843.9 | 23.3 |
| 845 | 843.9 | 23.3 | 3 | 4 | 4 | 8 | | W | | **RESIDUAL** 23.3' - 28.3' RESIDUAL, GREENISH TAN, SATURATED, LOOSE, NON PLASTIC MICACEOUS SAND. 80% MEDIUM GRAINED QUARTZ, 20% MICA. NO RESIDUAL TEXTURE. LOOKS LIKE BLOW-BACK 838.9 | 28.3 |
| 840 | 838.9 | 28.3 | 2 | 3 | 5 | 8 | | W | | **RESIDUAL** 28.3' - 33.3' RESIDUAL, OFFWHITE AND GREENISH TAN, SATURATED, LOOSE, NON PLASTIC, FINE GRAINED SAND. 30% QUARTZ, 30% MICA, 40% SILT AND FINE GRAINED SAND. NO REMNANT ROCK TEXTURE. LOOKS LIKE PLUG OR BLOW-BACK 833.9 | 33.3 |
| 835 | 833.9 | 33.3 | 6 | 7 | 9 | 16 | | W | | **RESIDUAL** 33.3' - 38.3' RESIDUAL, WET, WHITE AND GREEN-BROWN, MEDIUM DENSE, NON PLASTIC MICACEOUS SAND. 30% QUARTZ, 20% MICA, 30% FELDSPAR, 30% FINE SAND AND SILT. VAGUE REMNANT ROCK TEXTURE. 828.9 | 38.3 |
| 830 | 828.9 | 38.3 | 9 | 11 | 12 | 23 | | W | | **RESIDUAL** 38.3' - 43.3' RESIDUAL, WET, GREEN-BROWN, MEDIUM DENSE, NON PLASTIC MICACEOUS SAND. 30% QUARTZ, 25% MICA, 45% FINE SAND AND SILT. NO REMNANT TEXTURE. LOOKS LIKE BLOW-BACK OR PLUG. 823.9 | 43.3 |
| 825 | 823.9 | 43.3 | 11 | 28 | 42 | 70 | | W | | **RESIDUAL** 43.3' - 47.7' RESIDUAL, WET, IRON STAIN ORANGE AND WHITE, VERY DENSE, NON PLASTIC, COARSE SAND. WETHERED GRANITE WITH GOOD REMNANT TEXTURE. 30% QUARTZ, 30% FELDSPAR, 30% PLAGIOCLASE, 10% MICA. 819.5 | 47.7 |
| 820 | | | | | | | | | | 819.4 **CRYSTALLINE ROCK** 47.7' - 47.8' SPT REFUSAL. | 47.8 |

Boring Terminated at Elevation 819.4 ft in crystalline rock

NCDOT BORE SINGLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-C | **STATION** 47+90 | **OFFSET** 10 ft LT | **ALIGNMENT** -Y4CD- | **0 HR.** N/A |
| **COLLAR ELEV.** 869.9 ft | **TOTAL DEPTH** 41.9 ft | **NORTHING** 861,765 | **EASTING** 1,666,285 | **24 HR.** 7.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 07/03/13 | **COMP. DATE** 07/03/13 | **SURFACE WATER DEPTH** N/A | |

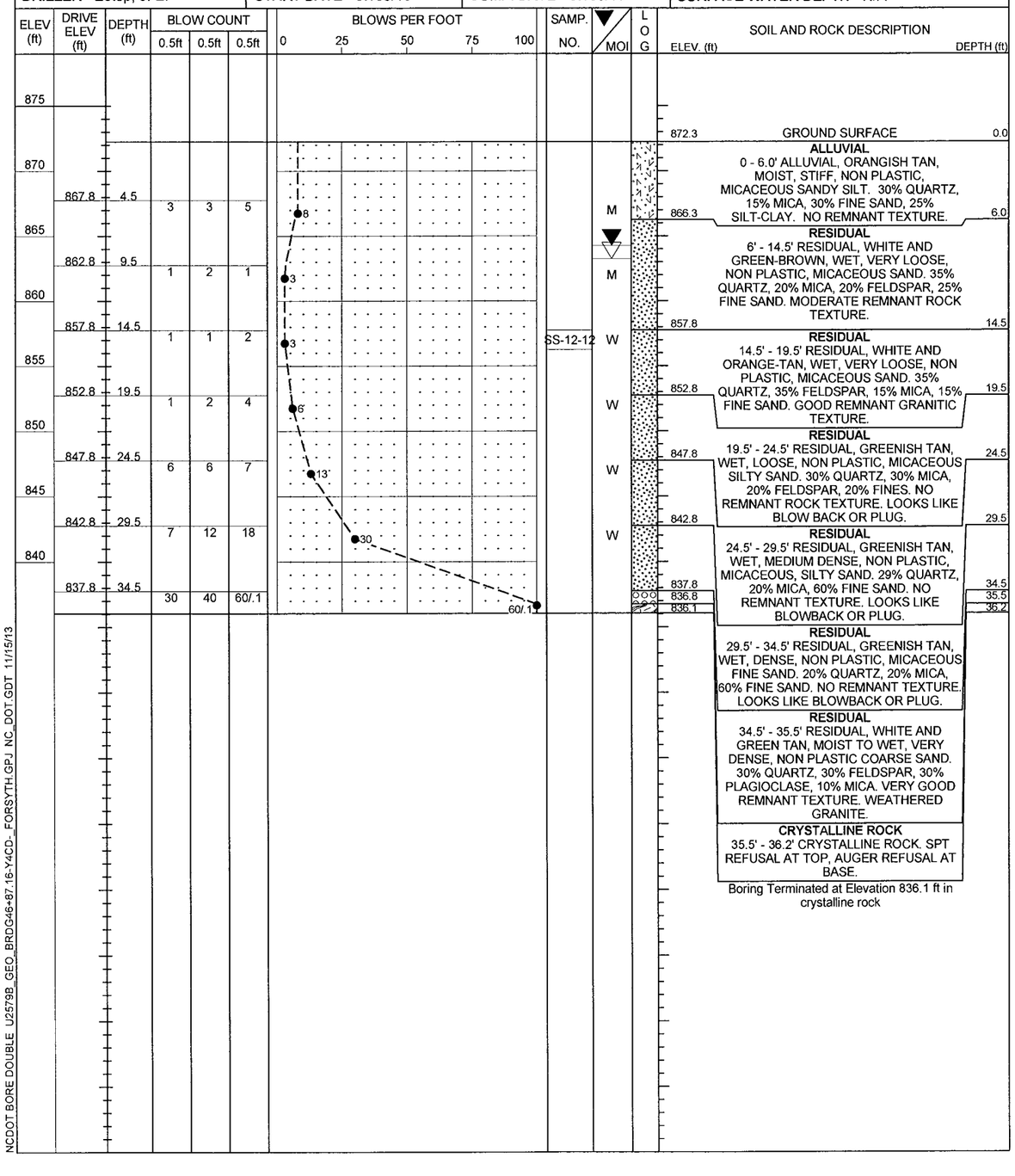
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 870 | | | | | | | | | | 869.9 GROUND SURFACE | 0.0 |
| 865 | 866.0 | 3.9 | 3 | 4 | 2 | 6 | | M | | **ALLUVIAL** 0' - 8.9' RESIDUAL, BROWN AND GRAY, MOIST, MEDIUM STIFF, SLIGHTLY PLASTIC, MICACEOUS SANDY CLAY. TOPSOIL, WITH ROOTS, 861.0 | 8.9 |
| 860 | 861.0 | 8.9 | 2 | 2 | 2 | 4 | | W | | **ALLUVIAL** 8.9' - 13.9' ALLUVIAL, BROWN, MOIST, SOFT SLIGHTLY PLASTIC, SILTY SANDY CLAY. CONTAINS ROOTS, NO REMNANT STRUCTURE. 856.0 | 13.9 |
| 855 | 856.0 | 13.9 | 2 | 2 | 1 | 3 | | W | | **ALLUVIAL** 13.9' - 15' ALLUVIAL, BLACK AND TAN, WET, SOFT, SLIGHTLY PLASTIC, SANDY SILT. NO REMNANT TEXTURE. PROBABLY PLUG MATERIAL OR BLOW BACK. WAY TOO DEEP FOR ALLUVIUM OR TOP SOIL IN THIS REGION. 854.9 | 15.0 |
| 850 | 851.0 | 18.9 | 2 | 2 | 3 | 5 | | W | | **RESIDUAL** 15' - 23.9' RESIDUAL, SATURATED, LIGHT TAN, LOOSE, NON PLASTIC MICACEOUS SAND. 30% QUARTZ, 30% FELDSPAR, 30% PLAGIOCLASE, 10% MICA, VAGUE, REMNANT ROCK TEXTURE. 846.0 | 23.9 |
| 845 | 846.0 | 23.9 | 2 | 3 | 3 | 6 | SS-12-13 | W | | **RESIDUAL** 23.9' - 28.9' RESIDUAL, BEIGE AND GREENISH BROWN, SATURATED, LOOSE, NON PLASTIC, MICACEOUS SAND. FAIRLY GOOD REMNANT GRANITIC TEXTURE. 841.0 | 28.9 |
| 840 | 841.0 | 28.9 | 1 | 2 | 4 | 6 | | W | | MISSING SAMPLE 836.0 | 33.9 |
| 835 | 836.0 | 33.9 | 4 | 5 | 9 | 14 | | W | | **RESIDUAL** 33.9' - 38.9' RESIDUAL, LIGHT TAN, SATURATED, LOOSE, SLIGHTLY PLASTIC, MICACEOUS SAND AND SILT. 40% QUARTZ, 30% MICA, 30% FINE SAND AND SILT, MAYBE A LITTLE CLAY. NO REMNANT TEXTURE, MAY BE BLOWBACK OR PLUG. 831.0 | 38.9 |
| 830 | 831.0 | 38.9 | 12 | 20 | 29 | 49 | | W | | **RESIDUAL** 38.9' - 41.8' RESIDUAL, TAN AND GREEN BROWN, WET, VERY DENSE, MICACEOUS SAND. 25% QUARTZ, 20% MICA, 25% FELDSPAR, 30% FINE SAND. MODERATELY WELL PRESERVED REMNANT TEXTURE. 828.1 | 41.8 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 41.8' -41.9' CRYSTALLINE ROCK, AUGER REFUSAL. 828.0 | 41.9 |

Boring Terminated at Elevation 828.0 ft in crystalline rock

NCDOT BORE SINGLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315 | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 47+93 | **OFFSET** 15 ft RT | **ALIGNMENT** -Y4CD- | **0 HR.** 9.0 |
| **COLLAR ELEV.** 872.3 ft | **TOTAL DEPTH** 36.2 ft | **NORTHING** 861,767 | **EASTING** 1,666,260 | **24 HR.** 8.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 07/03/13 | **COMP. DATE** 07/03/13 | **SURFACE WATER DEPTH** N/A | |




NCDOT BORE DOUBLE U2579B_GEO_BRDG46+87.16-Y4CD-_FORSYTH.GPJ NC_DOT.GDT 11/15/13

# TEST RESULTS



*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: Forsyth*
*SITE DESCRIPTION: Bridge on -Y4CD- over I-40 Bus / US-421 between SR 4309 and SR 4315*

**SOIL SAMPLE RESULTS**

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS | N | L.L. | P.I. | % BY WEIGHT | | | | % PASSING SIEVES | | | % | % | UNIT | VOID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | MOISTURE | ORGANIC | WT. (d) | RATIO |
| | | **EB1-B** | | | | | | | | | | | | | | | | |
| SS-12-10 | 16 RT. | 45+44 -Y4CD- | 4.40-5.90 | A-2-4(0) | 2 | 23 | NP | 50.3 | 27.4 | 11.2 | 11.1 | 99 | 65 | 26 | | | | |
| | | **B1-A** | | | | | | | | | | | | | | | | |
| SS-12-1 | 28 LT. | 46+97 -Y4CD- | 14.80-16.30 | A-5(0) | 9 | 43 | NP | 27.4 | 40.5 | 20.0 | 12.2 | 96 | 81 | 36 | | | | |
| SS-12-2 | 28 LT. | 46+97 -Y4CD- | 34.80-36.30 | A-7-5(9) | 13 | 55 | 23 | 29.6 | 19.0 | 10.8 | 40.5 | 97 | 78 | 52 | | | | |
| SS-12-3 | 28 LT. | 46+97 -Y4CD- | 59.80-61.30 | A-5(0) | 7 | 42 | 5 | 31.4 | 32.8 | 25.6 | 10.1 | 100 | 78 | 44 | | | | |
| | | **B1-B** | | | | | | | | | | | | | | | | |
| SS-12-4 | 11 RT. | 47+01 -Y4CD- | 19.80-21.30 | A-7-5(4) | 9 | 51 | 11 | 30.2 | 26.7 | 16.7 | 26.3 | 100 | 80 | 48 | | | | |
| SS-12-5 | 11 RT. | 47+01 -Y4CD- | 39.80-41.30 | A-2-5(0) | 7 | 54 | NP | 44.8 | 37.1 | 12.1 | 6.1 | 100 | 74 | 22 | | | | |
| SS-12-6 | 11 RT. | 47+01 -Y4CD- | 59.80-61.30 | A-2-4(0) | 16 | 40 | NP | 47.8 | 34.4 | 12.7 | 5.1 | 100 | 74 | 22 | | | | |
| | | **B1-C** | | | | | | | | | | | | | | | | |
| SS-12-7 | 8 LT. | 46+96 -Y4CD- | 24.70-26.20 | A-7-5(5) | 9 | 50 | 12 | 26.3 | 27.6 | 17.7 | 28.4 | 100 | 83 | 51 | | | | |
| SS-12-8 | 8 LT. | 46+96 -Y4CD- | 29.70-31.20 | A-7-5(12) | 10 | 60 | 21 | 25.1 | 18.8 | 15.5 | 40.5 | 100 | 83 | 60 | | | | |
| SS-12-9 | 8 LT. | 46+96 -Y4CD- | 49.70-51.20 | A-2-5(0) | 7 | 44 | NP | 47.4 | 31.2 | 13.3 | 8.1 | 98 | 68 | 24 | | | | |
| | | **EB2-A** | | | | | | | | | | | | | | | | |
| SS-12-11 | 34 LT. | 47+87 -Y4CD- | 8.30-9.80 | A-2-5(0) | 4 | 57 | NP | 48 | 31.8 | 12.1 | 8.1 | 100 | 71 | 25 | | | | |
| | | **EB2-B** | | | | | | | | | | | | | | | | |
| SS-12-12 | 15 RT. | 47+93 -Y4CD- | 14.50-16.0 | A-2-5(0) | 3 | 44 | NP | 41.5 | 31.4 | 16.9 | 10.1 | 98 | 71 | 33 | | | | |
| | | **EB2-C** | | | | | | | | | | | | | | | | |
| SS-12-13 | 10 LT. | 47+90 -Y4CD- | 23.90-25.40 | A-2-4(0) | 6 | 37 | NP | 47.2 | 32.6 | 14.1 | 6.1 | 100 | 71 | 24 | | | | |

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on -Y4CD- over I-40 Bus / US-421
between SR 4309 and SR 4315

EB1-D

SHEET 17

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 18 |

# Aerial Photo

0 50 100
FEET

NORTH

-BL-52
-Y4CD- POC STA. 46+60.01
-Y4WB- POT STA. 90+06.05
-Y4LPA-
-Y4WB-
-Y4-
-Y4LPD-
-Y4EB-
TOWN OF KERNERSVILLE
FORSYTH COUNTY
-Y4CD- POC STA. 46+87.16
-Y4- POT STA. 90+08.91
-Y4CD- POC STA. 47+14.31
-Y4EB- POT STA. 90+11.82
45
50
01
90
EB1-A
EB1-D
EB1-C
EB1-B
B1-A
B1-C
B1-B
EB2-A
EB2-C
EB2-B
-Y4LPA-
-Y4LPD-
-Y4CD-
S 14° 12' 34.9" E
640
645
S 35° 04' 18.1" W
-L-
-Y4LPB-

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 27 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34839.1.1 (U-2579B) F.A. PROJ. NHF-0918(93)

COUNTY FORSYTH

PROJECT DESCRIPTION BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 /I-40 BUS.

SITE DESCRIPTION

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|---|---|
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PERSONNEL

J. E. ESTEP

C. C. MURRAY

M. R. MOORE

INVESTIGATED BY R. Q. CALLAWAY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE JULY 2013

NORTH CAROLINA LICENSED SEAL 1098 GEOLOGIST ROGER Q CALLAWAY 7/15/2013

PROJECT: 34839.1.1

ID: U-2579B

DRAWN BY: C. E. BURRIS

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34839.1.1 (U-2579B) | 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-7-5, A-7-6) | A-1, A-2, A-3 | A-4, A-5, A-6, A-7 | |
| | A-1-a | A-1-b | | A-2-4 | A-2-5 | A-2-6 | A-2-7 | | | | | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING #10 | 50 MX | | | | | | | | | | | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT |
| #40 | 30 MX | 50 MX | 51 MN | | | | | | | | | | | |
| #200 | 15 MX | 25 MX | 10 MX | 35 MX | 35 MX | 35 MX | 35 MX | 36 MN | 36 MN | 36 MN | 36 MN | | | |
| LIQUID LIMIT | 6 MX | | 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 MX | 11 MN | 10 MX | 10 MX | 11 MX | 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [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
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B_____
- [X] -N NO/NQ
- [ ] -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 IN 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: T5-455
N 863259.4980 E 1666569.1391
ELEVATION: 825.22 FT.

NOTES:
CAR = CASING ADVANCER REFUSAL

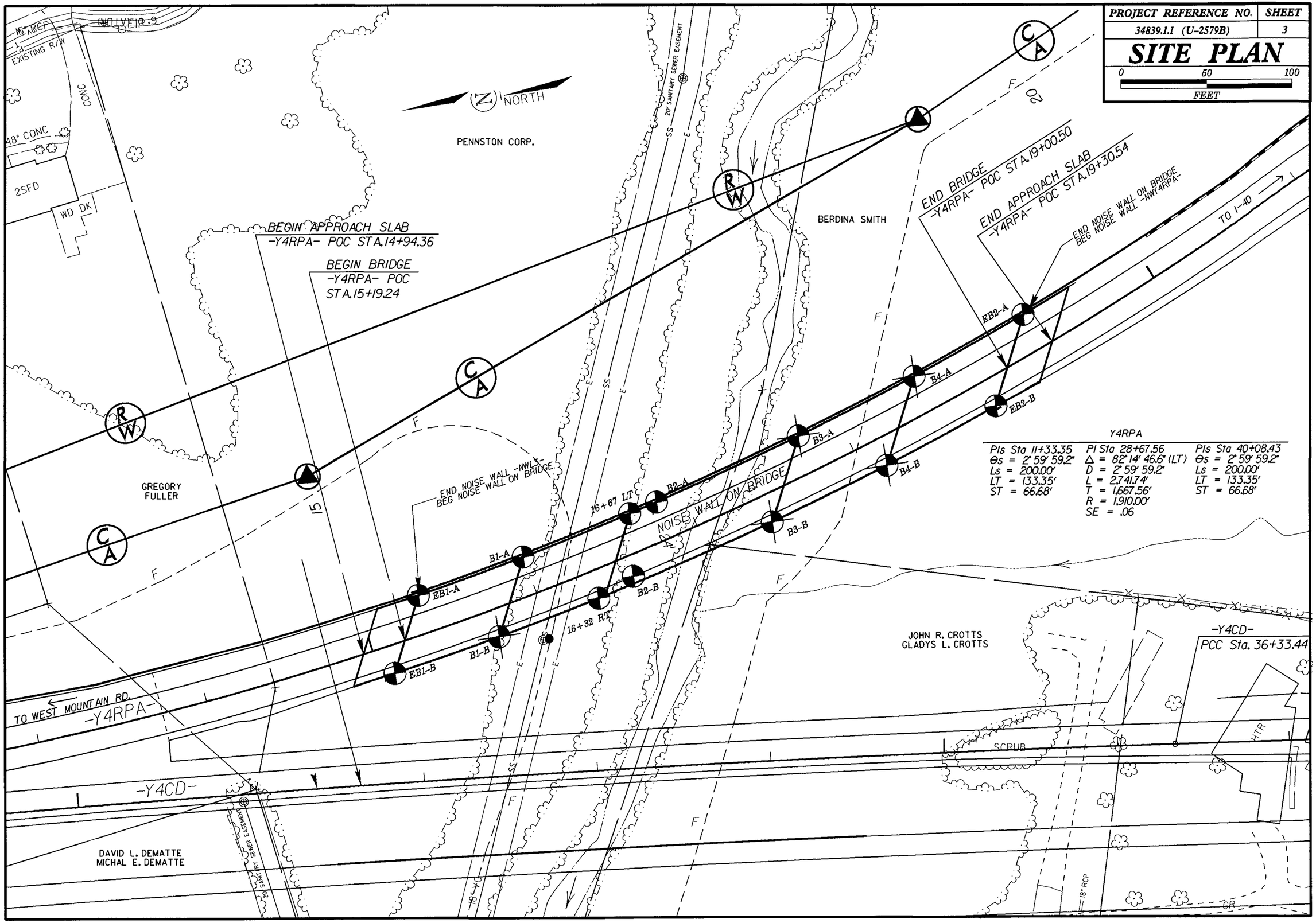
STRATIGRAPHY SHOWN THROUGH BORINGS

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 50 100
FEET




Y4RPA

| PIs Sta 11+33.35 | PI Sta 28+67.56 | PIs Sta 40+08.43 |
|---|---|---|
| Θs = 2° 59' 59.2" | Δ = 82° 14' 46.6" (LT) | Θs = 2° 59' 59.2" |
| Ls = 200.00' | D = 2° 59' 59.2" | Ls = 200.00' |
| LT = 133.35' | L = 2,741.74' | LT = 133.35' |
| ST = 66.68' | T = 1,667.56' | ST = 66.68' |
| | R = 1,910.00' | |
| | SE = .06 | |

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |
| BRIDGE 17+10 -Y4RPA- (SMITH CREEK) PROFILE ALONG -Y4RPA- VE = 5:1 | |

0 100 200
FEET

# -Y4RPA-

## PERFORMANCE TABLE

| FREQUENCY | Q | EXIST ELEV | PROP ELEV |
|---|---|---|---|
| 10 YR | 1600 | 829.5 | 829.4 |
| 50 YR | 2400 | 830.6 | 830.8 |
| 100 YR | 2700 | 831.0 | 831.3 |
| 500 YR | 4300 | 832.8 | 833.4 |
| FEMA 100 YR | 2340 | W/FW = 830.9 | |
| | | W/O FW = 830.6 | |

PI = 14+50.00
EL = 878.78'
K = 189
VC = 300'
SSD = 83'

PI = 10+90.00
EL = 871.65'
K = 230
VC = 180'

(+)3.982%
(+)0.398%
(+)0.882%

CL STA 17+10 -Y4RPA-
2@65' PS GIRDER (45"), 1@105 MBT (63"),
2@72.5' PS GIRDER (54") (OAL = 380')
SKEW = 130°
GP EL = 879.82

EXISTING GROUND

-BED MATERIALS: SAND, SILT, COBBLES
-THERE WERE NO DWELLINGS OR STRUCTURES OBSERVED IN THE 100 YR FLOOD PLAIN
-DEBRIS POTENTIAL: LOW

### BORING DESCRIPTIONS

(P) FRESH, HARD, GRAY PARAGNEISS WITH WIDE SPACED FRACTURES. REMNANT BEDDING FROM 1 INCH SCALE TO FOOT THICKNESS. MOSTLY APPEARS FINING UPWARD. ALL BREAKS ARE MACHINE BREAKS ON REMNANT BEDDING BOUNDARIES.
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I ROCK TYPE E.

(Q) FRESH, VERY HARD, PARAGNEISS. ANATECTIC GRANITE OR PARAGNEISS FROM COARSE SEDIMENT. WIDE SPACED FRACTURES
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I ROCK TYPE E.

(R) ALLUVIAL, BLACK, TO GRAY, WET, SOFT, SANDY SILTY CLAY W/ROOT MAT AT SURFACE (A-6)

(S) ALLUVIAL, GRAY, WET, VERY LOOSE, SILTY SAND W/PEA GRAVEL (A-2-4)

(T) RESIDUAL, GREENISH GRAY AND WHITE, WET, LOOSE, SILTY, SAND (A-2-4)

### BORING DESCRIPTIONS

(A) ALLUVIAL, RED-BROWN, MOIST, VERY SOFT, SANDY SILTY CLAY (A-7)

(B) RESIDUAL, TAN AND WHITE, MOIST, VERY LOOSE TO LOOSE CLAYEY SILTY SAND WITH A LITTLE MICA (A-2-4)

(C) CRYSTALLINE ROCK, PARAGNEISS

(D) PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT.
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

(E) PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT.
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

(F) PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT.
RMR = 81, R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 98%

(G) ALLUVIAL, GRAY WET LOOSE FINE QUARTZ SAND (A-2-4)

(H) RESIDUAL, GREEN-GRAY & WHITE LOOSE WET CLAYEY SILTY SAND, W/SOME MICA (A-2-4)

(I) RESIDUAL, TAN & WHITE LOOSE TO MED DENSE WET SILTY SAND (A-2-4)

(J) RESIDUAL, GREEN-BROWN MED. DENSE MOIST TO WET SILTY SAND W/SOME MICA (A-2-4)

(K) RESIDUAL, BROWN, GREEN & WHITE MED. DENSE WET SILTY SAND W/SOME MICA (A-2-4)

(L) RESIDUAL, GREEN-BROWN WET VERY DENSE SILTY SAND (A-2-4)

(M) ALLUVIAL, GRAY, WET, VERY LOOSE TO MED. DENSE, CLAYEY SILTY SAND W/LITTLE MICA & PEA GRAVEL AT BASE (A-2-4)

(N) GRAY WHITE & TAN VARIABLE LOOSE TO VERY DENSE MOIST SILTY SAND W/LITTLE MICA (A-2-4)

EB1-B
15+08 -Y4RPA-
16 RT

B1-B
15+71 -Y4RPA-
16 RT

EB2-B
16+66 -Y4RPA-
12 RT

B3-B
17+40 -Y4RPA-
16 RT

B4-B
18+13 -Y4RPA-
16 RT

EB2-B
18+84 -Y4RPA-
16 RT

RS-9

RS-8

SS 201
SS 202
SS 203
SS 204
SS 205

SS-7
SS-8
SS-9
SS-10
RS-8

100 YR SCOUR

500 YR SCOUR

RESIDUAL
RED & TAN STIFF MOIST SILTY SANDY CLAY (A-7-6)

RED & TAN TO OLIVE-TAN-WHITE LOOSE TO MED. DENSE MOIST SILTY SAND W/LITTLE MICA (A-2-4)

WEATHERED ROCK
SEV. WEATH. CRYSTALLINE ROCK
CRYSTALLINE ROCK
CAR

CRYSTALLINE ROCK, (SPT REFUSAL)

WEATHERED ROCK
SEV. WEATH. CRYSTALLINE ROCK

ALLUVIAL
BLACK, GRAY, WET, SOFT TO VERY SOFT, SILTY SANDY CLAY W/ROOT MAT AND ORGANIC LAYER AT TOP (A-6)

RESIDUAL
RED-ORANGE, WET, MEDIUM DENSE, SILTY SAND (A-2-4)

GREENISH GREY WET VERY DENSE SILTY SAND (A-2-4)

CRYSTALLINE ROCK

CAR

BT

### BORING DESCRIPTIONS

(U) RESIDUAL, TAN AND WHITE, MOIST, DENSE TO MEDIUM DENSE, SILTY SAND (A-2-4)

(V) WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK (PRESUMABLY WEATHERED ROCK, GRADING TO REFUSAL)

(W) GRAY FRESH HARD PARAGNEISS WITH WIDE SPACED FRACTURES LOWER ZONE POSSIBLY IRON OXIDE GOSSAN
R1 = 7, R2 = 8, R3 = 10, R4 = 6, R5 = 4, RMR = 35
VERY POOR ROCK, CLASS IV, ROCK TYPE E
REC. = 59% RQD. = 41%

(X) RESIDUAL, ORANGE, MOIST, DENSE, SILTY SAND (A-2-4)

(Y) RESIDUAL, ORANGE, MOIST, VERY DENSE, CLAYEY SILTY SAND (A-2-4)

(Z) MIXTURE OF GRAY AND RUSTY BROWN, FRESH TO SEVERELY WEATHERED, HARD TO SOFT PARAGNEISS, CLOSELY SPACED FRACTURES, POOR ROCK, CLASS IV, ROCK TYPE E
RMR = 26, R1 = 7, R2 = 3, R3 = 10, R4 = 6, R5 = 0
REC. = 68% RQD. = 15%

AA GRAY, FRESH, HARD PARAGNEISS, WITH WIDE SPACED FRACTURES.
RMR = 81, R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

BB GRAY, LIGHT RED IN PLACE, HARD, FRESH, WIDE SPACED FRACTURES, SLIGHTLY MICACEOUS PARAGNEISS. ORIGINAL BEDDING HAS BEEN FOLDED.
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

CC PINK AND WHITE, THIN REMNANT BEDS, HARD, FRESH, WIDE SPACED FRACTURES, SLIGHTLY MICACEOUS PARAGNEISS. BREAKS ALONG BEDDING ARE MACHINE BREAKS.
RMR = 81, R1 = 12, R2 = 20, R3 = 26, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

DD WHITE TO PURPLE, FRESH, HARD PARAGNEISS, WELL BEDDED OR FOLIATED, MOST BREAKS ARE MACHINE BREAKS ON BIOTITE LAYERS. ORIGINAL ROCK MAY HAVE BEEN COARSE SEDIMENT.
RMR = 81, R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4
VERY GOOD ROCK, CLASS I. ROCK TYPE E.
REC. = 100% RQD. = 100%

920 910 900 890 880 870 860 850 840 830 820 810 800 790 780 770 760 750

11 12 13 14 15 16 17 18 19 20 21 22 23

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 5 |
| SECTION THROUGH EB1<br>STA. 15+17.98 -Y4RPA-<br>SKEW=127°03'23" | |

0 10 20
FEET

# -Y4RPA-

SS-70
SS-71
SS-72
SS-73
SS-74
SS-75
SS-76

**EB1-A**
15+35 -Y4RPA-
22 LT
ELEV. = 840.00'

**EB1-B**
15+08 -Y4RPA-
16 RT
ELEV. = 836.5'

EXISTING GROUND

(PI=21) 16 — RESIDUAL
RED & TAN VERY STIFF TO STIFF MOIST MED. PLASTIC SILTY SANDY CLAY (A-7-6, A-7-5)

(PI=20) 11

11 — WHITE & TAN MED. DENSE MOIST CLAYEY SILTY SAND (A-1-a)

7 — 01/13

100/.4

9
9 — TAN LOOSE TO DENSE WET SILTY SAND W/ LITTLE TO SOME MICA W/WEATHERED ROCK LAYER AT 25.0' (A-2-4, A-2-5)
17
32
38
27

AR

CRYSTALLINE ROCK

RESIDUAL
RED & TAN STIFF MOIST SILTY SANDY CLAY (A-7-6)

12
8 — 01/13
18
8

RED & TAN TO OLIVE-TAN-WHITE LOOSE TO MED. DENSE MOIST SILTY SAND W/LITTLE MICA (A-2-4)

13
20
23
27

100/.7 — WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

CAR

CRYSTALLINE ROCK

860 850 840 830 820 810 800 790 780 770

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 6 |

SECTION THROUGH B1
STA. 15+90.00 -Y4RPA-
SKEW=128°27'20"

0 10 20
FEET

# -Y4RPA-

850 840 830 820 810 800 790 780 770 760

SS-64
SS-65
SS-66
SS-67
SS-68
SS-69

B1-A
16+00 -Y4RPA-
22 LT
ELEV. = 825.1'

EXISTING GROUND

ALLUVIAL

01/13

TAN AND GRAY WET VERY SOFT SANDY SILTY CLAY (A-7)

(1) (3) (4) (5) (8) (12) 01/13 (13) (55) (48)

TAN & WHITE TO OLIVE-TAN-WHITE VERY LOOSE TO MED. DENSE MOIST TO WET SILTY SAND W/TRACE TO SOME MICA (A-2-5)

OLIVE-TAN-WHITE DENSE TO VERY DENSE MOIST SILTY SAND W/TRACE TO LITTLE MICA (A-2-4)

CRYSTALLINE ROCK
(SPT REFUSAL)
60/.1

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
100/.2

CRYSTALLINE ROCK
(SPT REFUSAL)
60/.1

BT

RS-9

B1-B
15+71 -Y4RPA-
16 RT
ELEV. = 826.5'

ALLUVIAL

RED-BROWN MOIST VERY SOFT SANDY SILTY CLAY (A-7)

(3) 01/13 (5) (4) (7) (6) (8) (7)

RESIDUAL
TAN AND WHITE MOIST VERY LOOSE TO LOOSE CLAYEY SILTY SAND WITH A LITTLE MICA (A-2-4)

CRYSTALLINE ROCK

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 98%

REC. = 100%, RQD. = 100%
PARAGNEISS, VERY HARD FRESH WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT

R1 = 12
R2 = 20
R3 = 25
R4 = 20
R5 = 4
RMR = 81

BT

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 7 |

SECTION THROUGH B2
STA. 16+65.00 -Y4RPA-
SKEW=129°50'02"

0 10 20
FEET

# -Y4RPA-

SS-206
SS-207
SS-208
SS-209
SS-210

B2-A
16+84 -Y4RPA-
22 LT
ELEV. = 825.3'

SS-201
SS-202
SS-203
SS-204
SS-205

B2-B
16+55 -Y4RPA-
12 RT
ELEV. = 824.8'

EXISTING GROUND

ALLUVIAL
(1) BROWN VERY SOFT WET CLAYEY SANDY SILT W/ TRACE IRON STAINING (A-4)
04/13
(6) GRAY LOOSE WET SILTY CLAYEY SAND W/SOME MICA (A-2-4)

RESIDUAL
(6) GREEN-BROWN LOOSE WET HIGHLY MICACEOUS CLAYEY SILTY SAND (A-2-4)
(9) BROWN MED STIFF TO STIFF WET CLAYEY SANDY SILT W/ SOME MICA (A-4)
(7)
(11)
(37) GREEN & WHITE DENSE WET CLAYEY SILTY SAND W/QUARTZ FELDSPAR GRAVEL (A-1-a)
(30)
(34) BROWN AND WHITE DENSE TO VERY DENSE SILTY SAND W/SOME MICA (A-2-4)
(66)
(32)
WEATHERED ROCK (100/.9) SEVERELY WEATHERED CRYSTALLINE ROCK
(100/.5) BT

ALLUVIAL
(4) GRAY WET LOOSE FINE QUARTZ SAND (A-2-4)
(5)

RESIDUAL
(4) GREEN-GRAY & WHITE LOOSE WET CLAYEY SILTY SAND W/SOME MICA (A-2-4)
(7)
04/13
(11) TAN & WHITE LOOSE TO MED DENSE WET SILTY SAND (A-2-4)
(10)
(9)
(15) GREEN-BROWN MED DENSE MOIST TO WET SILTY SAND W/SOME MICA (A-2-4)
(21)
(25) BROWN, GREEN & WHITE MED. DENSE WET SILTY SAND W/SOME MICA (A-2-4)
(96) GREEN-BROWN WET VERY DENSE SILTY SAND (A-2-4)
(50/.1) CRYSTALLINE ROCK (SPT REFUSAL)
WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK
(100/1) BT

850 840 830 820 810 800 790 780 770 760

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 8 |
| SECTION THROUGH B3<br>STA. 17+60.00 -Y4RPA-<br>SKEW=131°30'00" | |

0 10 20
FEET

# -Y4RPA-

SS-11
SS-12
RS-3

**B3-A**
17+75 -Y4RPA-
22 LT.
ELEV. = 826.5'

RS-8

**B3-B**
17+40 -Y4RPA-
16 RT.
ELEV. = 826.3'

EXISTING GROUND
ALLUVIAL

2
10/12
10/12

4
TAN WET VERY LOOSE TO MED. DENSE SILTY SAND W/ROOT MAT AT SURFACE PEA GRAVEL AT BASE (A-2-4)

19

RESIDUAL

16
TAN TO WHITE MOIST MEDIUM DENSE TO DENSE SILTY SAND W/TRACE MICA (A-2-4)

21

67
TAN TO WHITE MOIST VERY DENSE SILTY SAND W/TRACE MICA (A-2-4)

87

50/.1

CRYSTALLINE ROCK
PARAGNEISS (SPT REFUSAL)

60/.1

REC. = 100%
RQD. = 100%
SLIGHTLY MICACEOUS PARAGNEISS REMNANT BEDDING WELL DEVELOPED, APPEARS TO HAVE BEEN SAND LAYERS. FRESH HARD VERY WIDE TO WIDE SPACED FRACTURES
R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4, RMR = 81
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100%
RQD. = 100%

BT

ALLUVIAL

3
11X/2
10/12

1

ALLUVIAL
GRAY WET VERY LOOSE TO MED. DENSE CLAYEY SILTY SAND W/LITTLE MICA & PEA GRAVEL AT BASE (A-2-4)

44

RESIDUAL
GRAY WHITE AND TAN VARIABLE LOOSE, TO VERY DENSE MOIST SILTY SAND W/LITTLE MICA (A-2-4)

9

28

51

31

36

CRYSTALLINE ROCK
PARAGNEISS

60/.1

60/.1

R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4, RMR = 81
REC. = 100%, REC. = 100%
FRESH HARD GRAY PARAGNEISS WITH WIDE SPACED FRACTURES REMNANT BEDDING FROM INCH SCALE TO FOOT THICKNESS. MOSTLY APPEARS FINING UPWARD. ALL BREAKS ARE MACHINE BREAKS ON REMNANT BEDDING BOUNDARIES.
VERY GOOD ROCK, CLASS I, ROCK TYPE E

R1 = 12, R2 = 20, R3 = 25, R4 = 20, R5 = 4, RMR = 81
REC. = 100%, REC. = 100%
FRESH VERY HARD PARAGNEISS ANATECTIC GRANITE OR PARAGNEISS FROM COARSE SEDIMENT. WIDE SPACED FRACTURES
VERY GOOD ROCK, CLASS I, ROCK TYPE E

BT

850 840 830 820 810 800 790 780 770 760

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 9 |

SECTION THROUGH B4
STA. 18+30.00 -Y4RPA-
SKEW=132° 41'11"

0 10 20
FEET

# -Y4RPA-

**B4-A**
18+51 -Y4RPA-
22 LT.
ELEV. = 825.9'

SS-5
SS-6
RS-1

**B4-B**
18+13 -Y4RPA-
16 RT.
ELEV. = 825.5'

SS-7
SS-8
SS-9
SS-10
RS-2

EXISTING GROUND

ALLUVIAL
(3) 10/12 10/12 — BLACK TO GRAY WET SOFT SANDY SILTY CLAY W/ROOT MAT AT SURFACE (A-6)

(4) GRAY AND TAN WET VERY LOOSE SILTY SAND W/GRAVEL (A-2-4)

RESIDUAL
(31) GRAY-GREEN AND WHITE WET DENSE SILTY SAND WITH TRACE MICA (A-2-4)

WEATHERED ROCK (50/.1) — SEVERELY WEATHERED CRYSTALLINE ROCK

GRAY, GREEN, RED FOLIATED PARAGNEISS, MODERATELY SEVERELY WEATHERED MOD. HARD WITH CLOSE FRACTURE SPACING
R1=7, R2=3, R3=5, R4=0, R5=4, RMR=19
VERY POOR ROCK, CLASS V, ROCK TYPE E

CRYSTALLINE ROCK
REC.=17%
RQD.=0%

(100/.9) — SEVERELY WEATHERED CRYSTALLINE ROCK (PARAGNEISS)

WEATHERED ROCK
GRAY GREEN RED FOLIATED PARAGNEISS. CALC SILICATE PRESENT, GRADING TO MARBLE IN PART. CRYSTALINE FRESH, MODERATELY HARD, WIDELY SPACED FRACTURES
VERY GOOD ROCK, CLASS I, ROCK TYPE E

GREENISH GRAY RED AND WHITE FOLIATED PARAGNEISS MICACEOUS INTERVALS ALTERNATE WITH MARBLE INTERVALS, CRYSTALLINE FRESH MOD. HARD WIDELY SPACED FRACTURES
VERY GOOD ROCK, CLASS I, ROCK TYPE E

GREENISH GRAY AND WHITE FOLIATED PARAGNEISS, MICACEOUS MARBLE IN PART
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC.=100%
RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81

REC.=100%
RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81

REC.=100%
RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81

BT

ALLUVIAL
(3) 10/12 — BLACK TO GRAY WET SOFT SANDY SILTY CLAY W/ROOT MAT AT SURFACE (A-6)

(3) GRAY WET VERY LOOSE SILTY SAND W/PEA GRAVEL (A-2-4)

RESIDUAL
(6) GREENISH GRAY AND WHITE WET LOOSE SILTY SAND (A-2-4)

(34) TAN AND WHITE MOIST DENSE TO MEDIUM DENSE, SILTY SAND (A-2-4)

(15) SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK
REC.=53% RQD.=41%
R1=7, R2=8, R3=10, R4=6, R5=4, RMR=35
GRAY FRESH HARD PARAGNEISS WITH WIDE SPACED FRACTURES LOWER ZONE POSSIBLY IRON OXIDE GOSSAN
VERY POOR ROCK, CLASS IV, ROCK TYPE E

RESIDUAL
(32) ORANGE MOIST DENSE SILTY SAND (A-2-4)
(SPT REFUSAL)

CRYSTALLINE ROCK
RESIDUAL
ORANGE MOIST VERY DENSE CLAYEY SILTY SAND (A-2-4)

CRYSTALLINE ROCK (60/.1)
(SPT REFUSAL)
REC.=68% RQD.=15%
R1=7, R2=3, R3=10, R4=6, R5=0, RMR=26
MIXTURE OF GRAY & RUSTY BROWN FRESH TO SEVERELY WEATHERED HARD TO SOFT PARAGNEISS CLOSELY SPACED FRACTURES
POOR ROCK, CLASS IV, ROCK TYPE E

REC.=100%, RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81
GRAY FRESH HARD PARAGNEISS WITH WIDE SPACED FRACTURES
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC.=100%, RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81
GRAY LIGHT RED IN PLACE, HARD FRESH WIDE SPACED FRACTURES SLIGHTLY MICACEOUS PARAGNEISS. ORIGINAL BEDDING HAS BEEN FOLDED
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC.=100%, RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81
PINK & WHITE THIN REMNANT BEDS HARD FRESH WIDE SPACED FRACTURES SLIGHTLY MICACEOUS PARAGNEISS. BREAKS ALONG BEDDING ARE MACHINE BREAKS
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC.=100%, RQD.=100%
R1=12, R2=20, R3=25, R4=20, R5=4, RMR=81
WHITE TO PURPLE FRESH HARD PARAGNEISS WELL BEDDED OR FOLIATED MOST BREAKS ARE MACHINE BREAKS ON BIOTITE LAYERS. ORIGINAL ROCKS MAY HAVE BEEN COARSE SEDIMENT
VERY GOOD ROCK, CLASS I, ROCK TYPE E

BT

850 840 830 820 810 800 790 780 770 760

50 40 30 20 10 0 10 20 30 40 50

| 0 | 10 | 20 |
|---|---|---|
| FEET | | |

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 10 |

SECTION THROUGH EB2
STA. 19+02.38 -Y4RPA-
SKEW=133°54'07"

# -Y4RPA-

SS-1
SS-2
SS-3
SS-4

**EB2-A**
19+24 -Y4RPA-
22 LT.
ELEV. = 825.9'

ALLUVIAL
(5) (PI=12)
10/12
10/12
BLACK GREY AND TAN WET SOFT TO MED. STIFF SILTY SANDY CLAY W/TRACE MICA AND ORGANICS (A-6)

RESIDUAL
(8)
GREY TO LIGHT GREENISH LOOSE MOIST SILTY SAND (A-2-4)

(58)
OLIVE GREY VERY DENSE MOIST SILTY SAND (A-2-4)

100/.6
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

50/.1
CRYSTALLINE ROCK

60/.1
CAR

**EB2-B**
18+84 -Y4RPA-
16 RT.
ELEV. = 826.1'

EXISTING GROUND

ALLUVIAL
(2)
10/12
BLACK GRAY WET SOFT TO VERY SOFT, SILTY SANDY CLAY W/ROOT MAT AND ORGANIC LAYER AT TOP (A-6)

(5)
RESIDUAL
(14)
RED-ORANGE WET MEDIUM DENSE SILTY SAND (A-2-4)

(89)
GREENISH GREY WET VERY DENSE SILTY SAND (A-2-4)

(63)
CRYSTALLINE ROCK

CAR

850 840 830 820 810 800 790 780 770 760

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 15+35 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** NM |
| **COLLAR ELEV.** 840.0 ft | **TOTAL DEPTH** 57.7 ft | **NORTHING** 863,328 | **EASTING** 1,666,604 | **24 HR.** 22.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/07/13 | **COMP. DATE** 01/08/13 | **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 | | | | | | | | | | 840.0 GROUND SURFACE 0.0 |
| | 836.0 | 4.0 | 4 | 7 | 9 | 16 | SS-70 | M | | **RESIDUAL** RED & TAN VERY STIFF TO STIFF MOIST MED. PLASTIC (PI=21, PI=20)SILTY SANDY CLAY (A-7-6, A-7-5) |
| 835 | | | | | | | | | | |
| | 831.0 | 9.0 | 3 | 5 | 6 | 11 | SS-71 | M | | |
| 830 | | | | | | | | | | |
| | 826.0 | 14.0 | 3 | 6 | 5 | 11 | SS-72 | M | | 826.0 14.0 **RESIDUAL** WHITE & TAN MED. DENSE MOIST CLAYEY SILTY SAND (A-1-a) 822.0 18.0 |
| 825 | | | | | | | | | | |
| | 821.0 | 19.0 | 2 | 3 | 4 | 7 | SS-73 | W | | **RESIDUAL** TAN LOOSE TO DENSE WET SILTY SAND W/ LITTLE TO SOME MICA W/ WEATHERED ROCK LAYER AT 25.0' (A-2-4, A-2-5) |
| 820 | | | | | | | | | | |
| | 816.0 | 24.0 | 1 | 2 | 100/.4 | 100/.4 | | W | | |
| 815 | | | | | | | | | | |
| | 811.0 | 29.0 | 7 | 4 | 5 | 9 | SS-74 | W | | |
| 810 | | | | | | | | | | |
| | 806.0 | 34.0 | 2 | 3 | 6 | 9 | SS-75 | W | | |
| 805 | | | | | | | | | | |
| | 801.0 | 39.0 | 3 | 6 | 11 | 17 | | W | | |
| 800 | | | | | | | | | | |
| | 796.0 | 44.0 | 3 | 4 | 28 | 32 | | W | | |
| 795 | | | | | | | | | | |
| | 791.0 | 49.0 | 14 | 16 | 22 | 38 | | W | | |
| 790 | | | | | | | | | | |
| | 786.0 | 54.0 | 11 | 6 | 21 | 27 | SS-76 | W | | |
| 785 | | | | | | | | | | 782.3 57.7 Boring Terminated by Auger Refusal at Elevation 782.3 ft on crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 15+08 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** NM |
| **COLLAR ELEV.** 836.5 ft | **TOTAL DEPTH** 49.9 ft | **NORTHING** 863,348 | **EASTING** 1,666,562 | **24 HR.** 20.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/17/13 | **COMP. DATE** 01/22/13 | **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 | | | | | | | | | | |
| | | | | | | | | | | 836.5 GROUND SURFACE 0.0 |
| 835 | | | | | | | | | | **RESIDUAL** RED & TAN STIFF MOIST SILTY SANDY CLAY (A-7-6) |
| 830 | 829.3 | 7.2 | 2 | 4 | 8 | 12 | | M | | 829.5 7.0 |
| 825 | 824.3 | 12.2 | 4 | 5 | 3 | 8 | | M | | **RESIDUAL** RED & TAN TO OLIVE-TAN-WHITE LOOSE TO MED. DENSE MOIST SILTY SAND W/ LITTLE MICA (A-2-4) |
| 820 | 819.3 | 17.2 | 5 | 9 | 9 | 18 | | M | | |
| 815 | 814.3 | 22.2 | 4 | 4 | 4 | 8 | | M | | |
| 810 | 809.3 | 27.2 | 4 | 6 | 7 | 13 | | M | | |
| 805 | 804.3 | 32.2 | 11 | 11 | 9 | 20 | | M | | |
| 800 | 798.9 | 37.6 | 6 | 9 | 14 | 23 | | M | | |
| 795 | 793.9 | 42.6 | 15 | 15 | 12 | 27 | | M | | |
| 790 | 788.9 | 47.6 | 58 | 42/.2 | | 100/.7 | | | | 789.5 47.0 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK 786.6 49.9 Boring Terminated with Casing Advancer Refusal at Elevation 786.6 ft on crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 16+00 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 1.0 |
| **COLLAR ELEV.** 825.1 ft | **TOTAL DEPTH** 58.3 ft | **NORTHING** 863,265 | **EASTING** 1,666,617 | **24 HR.** 31.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 01/04/13 | **COMP. DATE** 01/07/13 | **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) |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | 825.1 GROUND SURFACE 0.0 |
| | 822.3 | 2.8 | 1 | 0 | 1 | 1 | | W | | **ALLUVIAL** TAN AND GRAY, WET, VERY SOFT, SANDY SILTY CLAY (A-7) |
| 820 | | | | | | | | | | 820.1 5.0 |
| | 817.3 | 7.8 | 1 | 2 | 1 | 3 | SS-64 | W | | **RESIDUAL** TAN & WHITE TO OLIVE-TAN-WHITE VERY LOOSE TO MED. DENSE MOIST TO WET SILTY SAND W/ TRACE TO SOME MICA (A-2-5) |
| 815 | | | | | | | | | | |
| | 812.3 | 12.8 | 1 | 2 | 2 | 4 | SS-65 | W | | |
| 810 | | | | | | | | | | |
| | 807.3 | 17.8 | 1 | 2 | 3 | 5 | | W | | |
| 805 | | | | | | | | | | |
| | 802.3 | 22.8 | 2 | 3 | 5 | 8 | SS-66 | M | | |
| 800 | | | | | | | | | | |
| | 797.3 | 27.8 | 5 | 6 | 6 | 12 | SS-67 | M | | |
| 795 | | | | | | | | | | |
| | 792.3 | 32.8 | 2 | 5 | 8 | 13 | | M | | 790.1 35.0 |
| 790 | | | | | | | | | | **RESIDUAL** OLIVE-TAN-WHITE DENSE TO VERY DENSE MOIST SILTY SAND W/ TRACE TO LITTLE MICA (A-2-4) |
| | 787.3 | 37.8 | 8 | 24 | 31 | 55 | SS-68 | M | | |
| 785 | | | | | | | | | | |
| | 781.9 | 43.2 | 14 | 24 | 24 | 48 | SS-69 | M | | 780.1 45.0 |
| 780 | | | | | | | | | | **CRYSTALLINE ROCK** (SPT REFUSAL) |
| | 776.9 | 48.2 | 60/.1 | | | 60/.1 | | | | 775.1 50.0 |
| 775 | | | | | | | | | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| | 771.9 | 53.2 | 100/.2 | | | 100/.2 | | | | 771.1 54.0 |
| 770 | | | | | | | | | | **CRYSTALLINE ROCK** (SPT REFUSAL) |
| | 766.9 | 58.2 | 60/.1 | | | 60/.1 | | | | 766.8 58.3 |
| | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 766.8 ft in crystalline rock |

NCDOT BORE DOUBLE_U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 15+71 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 826.5 ft | **TOTAL DEPTH** 49.5 ft | **NORTHING** 863,285 | **EASTING** 1,666,574 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/23/13 | **COMP. DATE** 01/23/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 826.5 GROUND SURFACE | 0.0 |
| | 823.8 | 2.7 | 2 | 2 | 1 | 3 | | M | | 824.5 **ALLUVIAL** RED-BROWN, MOIST, VERY SOFT, SANDY SILTY CLAY (A-7) | 2.0 |
| | 818.8 | 7.7 | 4 | 3 | 2 | 5 | | M | | **RESIDUAL** TAN AND WHITE, MOIST, VERY LOOSE TO LOOSE CLAYEY SILTY SAND WITH A LITTLE MICA (A-2-4) | |
| | 813.8 | 12.7 | 1 | 2 | 2 | 4 | | M | | | |
| | 808.8 | 17.7 | 2 | 3 | 4 | 7 | | M | | | |
| | 803.8 | 22.7 | 2 | 3 | 3 | 6 | | M | | | |
| | 798.8 | 27.7 | 3 | 4 | 4 | 8 | | M | | | |
| | 793.8 | 32.7 | 4 | 3 | 4 | 7 | | M | | | |
| | | | | | | | RS-9 | | | 789.5 | 37.0 |
| | | | | | | | | | | 788.9 **CRYSTALLINE ROCK** PARAGNEISS (DIFFICULT DRILLING, THEN CASING REFUSAL) | 37.6 |
| | | | | | | | | | | 787.0 **CRYSTALLINE ROCK** PARAGNEISS | 39.5 |
| | | | | | | | | | | 782.0 **CRYSTALLINE ROCK** PARAGNEISS | 44.5 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 777.0 | 49.5 |
| | | | | | | | | | | Boring Terminated at Elevation 777.0 ft in paragneiss | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 15+71 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 826.5 ft | **TOTAL DEPTH** 49.5 ft | **NORTHING** 863,285 | **EASTING** 1,666,574 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/23/13 | **COMP. DATE** 01/23/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 11.9 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 788.9 | | | | | | | | | | | Begin Coring @ 37.6 ft | |
| | 788.9 | 37.6 | 1.9 | | (1.9) 100% | (1.9) 100% | | (1.9) 100% | (1.9) 100% | | 788.9 **CRYSTALLINE ROCK** PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 37.6 |
| 785 | 787.0 | 39.5 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 787.0 | 39.5 |
| | 782.0 | 44.5 | 5.0 | | (4.9) 98% | (4.9) 98% | RS-9 | (5.0) 100% | (4.9) 98% | | 782.0 **CRYSTALLINE ROCK** PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 44.5 |
| 780 | 777.0 | 49.5 | | | | | | | | | 777.0 **CRYSTALLINE ROCK** PARAGNEISS, VERY HARD, FRESH, WIDELY SPACED FRACTURES. ROCK RETAINS REMNANT BEDDING FEATURES, COARSE GRAINED METASEDIMENT. 0.1' ROCK LEFT IN HOLE. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 49.5 |
| | | | | | | | | | | | Boring Terminated at Elevation 777.0 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 16+84 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 2.5 |
| **COLLAR ELEV.** 825.3 ft | **TOTAL DEPTH** 63.6 ft | **NORTHING** 863,184 | **EASTING** 1,666,636 | **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 04/18/13 | **COMP. DATE** 04/18/13 | **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) |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | 825.3 GROUND SURFACE 0.0 |
| | 822.6 | 2.7 | 0 | 0 | 1 | 1 | SS-206 | W | | **ALLUVIAL** BROWN VERY SOFT WET CLAYEY SANDY SILT W/ TRACE IRON STAINING (A-4) |
| 820 | | | | | | | | | | 820.3 5.0 |
| | 817.6 | 7.7 | 1 | 2 | 4 | 6 | | W | | **ALLUVIAL** GRAY LOOSE WET SILTY CLAYEY SAND W/ SOME MICA 60% QUARTZ, 20% MICA, 20% SILTY-CLAY (A-2-4) |
| 815 | | | | | | | | | | 814.3 11.0 |
| | 812.6 | 12.7 | 3 | 2 | 4 | 6 | SS-207 | W | | **RESIDUAL** GREEN-BROWN LOOSE WET HIGHLY MICACEOUS CLAYEY SILTY SAND 20% FELDSPAR, 40% FINE MICA, 40% SILTY-CLAY (A-2-4) |
| 810 | | | | | | | | | | 810.3 15.0 |
| | 807.6 | 17.7 | 2 | 3 | 6 | 9 | SS-208 | W | | **RESIDUAL** BROWN MED STIFF TO STIFF WET CLAYEY SANDY SILT W/ SOME MICA 40% QUARTZ, 40% FELDSPAR, 20% FINE MICA AND SILT CLAY WEATHERED GRANITIC GNEISS (A-4) |
| 805 | | | | | | | | | | |
| | 802.6 | 22.7 | 2 | 3 | 4 | 7 | | W | | |
| 800 | | | | | | | | | | |
| | 797.6 | 27.7 | 4 | 4 | 7 | 11 | | W | | |
| 795 | | | | | | | | | | 795.3 30.0 |
| | 792.6 | 32.7 | 12 | 21 | 16 | 37 | SS-209 | W | | **RESIDUAL** GREEN & WHITE DENSE WET CLAYEY SILTY SAND W/ QUARTZ FELDSPAR GRAVEL (A-1-a) MAY BE FAULT. |
| 790 | | | | | | | | | | 790.3 35.0 |
| | 787.6 | 37.7 | 3 | 11 | 19 | 30 | | W | | **RESIDUAL** BROWN AND WHITE DENSE TO VERY DENSE SILTY SAND W/ SOME MICA 30% FELDSPAR, 40% QUARTZ, 30% FINE MICA AND SILTY CLAY (A-2-4). METAVOLCANIC GNEISS. |
| 785 | | | | | | | | | | |
| | 782.6 | 42.7 | 8 | 14 | 20 | 34 | | W | | |
| 780 | | | | | | | | | | |
| | 777.6 | 47.7 | 20 | 27 | 39 | 66 | SS-210 | W | | |
| 775 | | | | | | | | | | |
| | 772.6 | 52.7 | 10 | 10 | 22 | 32 | | W | | |
| 770 | | | | | | | | | | |
| | 767.2 | 58.1 | 21 | 52 | 46/.4 | 100/.9 | | W | | 766.7 58.6 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| 765 | | | | | | | | | | |
| | 762.2 | 63.1 | 100/.5 | | | 100/.5 | | W | | 761.7 63.6 Boring Terminated at Elevation 761.7 ft in severely weathered crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 16+55 | **OFFSET** 12 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** NM |
| **COLLAR ELEV.** 824.8 ft | **TOTAL DEPTH** 64.0 ft | **NORTHING** 863,204 | **EASTING** 1,666,596 | **24 HR.** 20.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 04/17/13 | **COMP. DATE** 04/17/13 | **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 | | | | | | | | | | 824.8 GROUND SURFACE 0.0 |
| | 822.2 | 2.6 | 1 | 2 | 2 | 4 | | W | | **ALLUVIAL** GRAY WET LOOSE FINE QUARTZ SAND (A-2-4) |
| 820 | | | | | | | | | | |
| | 817.2 | 7.6 | 2 | 2 | 3 | 5 | | W | | |
| 815 | | | | | | | | | | 814.2 10.6 |
| | 812.2 | 12.6 | 2 | 1 | 3 | 4 | SS-201 | W | | **RESIDUAL** GREEN-GRAY & WHITE LOOSE WET CLAYEY SILTY SAND W/ SOME MICA (A-2-4) 40% FELDSPAR, 20% MICA, 20% QUARTZ, 20% SILTY-CLAY |
| 810 | | | | | | | | | | |
| | 807.2 | 17.6 | 2 | 3 | 4 | 7 | | W | | |
| 805 | | | | | | | | | | 804.8 20.0 |
| | 802.2 | 22.6 | 2 | 4 | 7 | 11 | | W | | **RESIDUAL** TAN & WHITE LOOSE TO MED DENSE WET SILTY SAND (A-2-4) 60% FELDSPAR, 15% QUARTZ, 35% SILTY-CLAY. HIGHLY WEATHERED META-VOLCANIC GNEISS. |
| 800 | | | | | | | | | | |
| | 797.2 | 27.6 | 3 | 4 | 6 | 10 | SS-202 | W | | |
| 795 | | | | | | | | | | |
| | 792.2 | 32.6 | 3 | 4 | 5 | 9 | | W | | |
| 790 | | | | | | | | | | 789.8 35.0 |
| | 787.2 | 37.6 | 3 | 6 | 9 | 15 | | W | | **RESIDUAL** GREEN-BROWN MED DENSE MOIST TO WET SILTY SAND W/ SOME MICA (A-2-4) 40% FELDSPAR, 20% QUARTZ, 40% SILTY-CLAY AND FINE MICA. COARSE GRANITIC GNEISS. |
| 785 | | | | | | | | | | |
| | 782.2 | 42.6 | 4 | 8 | 13 | 21 | SS-203 | W | | |
| 780 | | | | | | | | | | 779.8 45.0 |
| | 777.2 | 47.6 | 3 | 10 | 15 | 25 | | W | | **RESIDUAL** BROWN, GREEN & WHITE MED. DENSE WET SILTY SAND W/ SOME MICA (A-2-4) 40% FELDSPAR, 30% FINE MICA, 30% SILTY CLAY. GNEISS AFTER META-VOLCANIC |
| 775 | | | | | | | | | | 774.8 50.0 |
| | 772.2 | 52.6 | 19 | 36 | 60 | 96 | SS-204 | W | | **RESIDUAL** GREEN-BROWN WET VERY DENSE SILTY SAND (A-2-4) 30% FELDSPAR, 20% QUARTZ |
| 770 | | | | | | | | | | |
| | 766.8 | 58.0 | 65 | 60/.1 | | 60/.1 | | | | 766.8 58.0 |
| 765 | | | | | | | | | | 766.3 58.5 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK 765.8 59.0 |
| | 761.8 | 63.0 | 33 | 67/.5 | | 100/1 | SS-205 | | | **CRYSTALLINE ROCK** (SPT REFUSAL) 760.8 64.0 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (LIGHT GREEN, WET, SLIGHTLY PLASTIC CLAY AND SILTY SAND. 30% FINE QUARTZ, 70% SILT-CLAY. SILT-CLAY IS SLIGHTLY STICKY. SIMILAR TO 30' - 35' B2-A.) Boring Terminated at Elevation 760.8 ft in severely weathered crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B3-A | **STATION** 17+75 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 826.5 ft | **TOTAL DEPTH** 55.1 ft | **NORTHING** 863,098 | **EASTING** 1,666,662 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/18/12 | **COMP. DATE** 10/18/12 | **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<br>ELEV. (ft) / DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 830 | | | | | | | | | | 826.5 — GROUND SURFACE — 0.0 |
| 825 | 824.5 | 2.0 | 0 | 1 | 1 | 2 | | W | | **ALLUVIAL**<br>TAN, WET, VERY LOOSE TO MED. DENSE, SILTY SAND W/ ROOT MAT AT SURFACE, PEA GRAVEL AT BASE (A-2-4) |
| 820 | 819.5 | 7.0 | 0 | 2 | 2 | 4 | SS-11 | W | | |
| 815 | 814.5 | 12.0 | 9 | 10 | 9 | 19 | | M | | 811.5 — 15.0 |
| 810 | 809.5 | 17.0 | 5 | 7 | 9 | 16 | SS-12 | M | | **RESIDUAL**<br>TAN TO WHITE, MOIST, MEDIUM DENSE TO DENSE, SILTY SAND W/ TRACE MICA (A-2-4) |
| 805 | 804.5 | 22.0 | 9 | 11 | 10 | 21 | | M | | |
| 800 | 799.5 | 27.0 | 9 | 16 | 51 | 67 | | M | | 799.5 — 27.0 |
| 795 | 794.5 | 32.0 | 45 | 45 | 42 | 67 | | M | | **RESIDUAL**<br>TAN TO WHITE, MOIST, VERY DENSE, SILTY SAND W/ TRACE MICA (A-2-4) |
| 790 | 789.5 | 37.0 | 33 | 60/.1 | | 60/.1 | | | | 789.0 — 37.5 |
| 785 | 783.0 | 43.5 | 60/.1 | | | 60/.1 | RS-3 | | | **CRYSTALLINE ROCK**<br>PARAGNEISS (SPT REFUSAL) |
| 780 | | | | | | | | | | 779.6 — 46.9 |
| 775 | | | | | | | | | | **CRYSTALLINE ROCK**<br>PARAGNEISS<br>776.4 — 50.1<br>**CRYSTALLINE ROCK**<br>PARAGNEISS<br>771.4 — 55.1<br>Boring Terminated at Elevation 771.4 ft in paragneiss |

NCDOT BORE SINGLE U25798_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B3-A | **STATION** 17+75 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 826.5 ft | **TOTAL DEPTH** 55.1 ft | **NORTHING** 863,098 | **EASTING** 1,666,662 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/18/12 | **COMP. DATE** 10/18/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 8.2 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<br>ELEV. (ft) / DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 779.6 | | | | | | | | | | | Begin Coring @ 46.9 ft |
| | 779.6 | 46.9 | 3.2 | | (3.2) 100% | (3.2) 100% | | (3.2) 100% | (3.2) 100% | | 779.6 — **CRYSTALLINE ROCK** — 46.9<br>SLIGHTLY MICACEOUS, PARAGNEISS. REMNANT BEDDING WELL DEVELOPED, APPEARS TO HAVE BEEN SAND LAYERS. FRESH, HARD, VERY WIDE TO WIDE SPACED FRACTURES.<br>RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. |
| | 776.4 | 50.1 | | | | | | | | | 776.4 — 50.1 |
| 775 | | | 5.0 | | (5.0) 100% | (5.0) 100% | RS-3 | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK**<br>SLIGHTLY MICACEOUS, PARAGNEISS. REMNANT BEDDING WELL DEVELOPED, APPEARS TO HAVE BEEN SAND LAYERS. FRESH, HARD, VERY WIDE TO WIDE SPACED FRACTURES.<br>RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. |
| | 771.4 | 55.1 | | | | | | | | | 771.4 — 55.1<br>Boring Terminated at Elevation 771.4 ft in paragneiss |

NCDOT CORE SINGLE U25798_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B3-B | **STATION** 17+40 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 826.3 ft | **TOTAL DEPTH** 61.8 ft | **NORTHING** 863,120 | **EASTING** 1,666,615 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/18/12 | **COMP. DATE** 10/31/12 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 830 | | | | | | | | | | 826.3 GROUND SURFACE 0.0 |
| 825 | 824.3 | 2.0 | 2 | 1 | 2 | 3 | | Wr | | **ALLUVIAL** GRAY, WET, VERY LOOSE TO MED. DENSE, CLAYEY SILTY SAND W/ LITTLE MICA & PEA GRAVEL AT BASE (A-2-4) |
| 820 | 819.3 | 7.0 | 2 | 1 | 0 | 1 | | W | | |
| 815 | 814.3 | 12.0 | 8 | 7 | 7 | 14 | | W | | 813.3 13.0 **RESIDUAL** GRAY, WHITE AND TAN, VARIABLE; LOOSE, TO VERY DENSE, MOIST, SILTY SAND W/ LITTLE MICA (A-2-4) |
| 810 | 809.3 | 17.0 | 5 | 4 | 5 | 9 | | M | | |
| 805 | 804.3 | 22.0 | 4 | 10 | 18 | 28 | | M | | |
| 800 | 799.3 | 27.0 | 12 | 22 | 29 | 51 | | M | | |
| 795 | 794.3 | 32.0 | 7 | 9 | 22 | 31 | | M | | |
| 790 | 789.3 | 37.0 | 8 | 15 | 21 | 36 | | M | | 786.3 40.0 **CRYSTALLINE ROCK** PARAGNEISS (SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE) |
| 785 | 783.3 | 43.0 | 55 | 60/.1 | | 60/.1 | | | | |
| 780 | 778.3 | 48.0 | 41 | 60/.1 | | 60/.1 | | | | |
| 775 | | | | | | | | | | 774.4 51.9 **CRYSTALLINE ROCK** PARAGNEISS |
| 770 | | | | | | | RS-8 | | | 769.9 56.4 **CRYSTALLINE ROCK** PARAGNEISS |
| 765 | | | | | | | | | | 764.5 61.8 Boring Terminated at Elevation 764.5 ft in paragneiss |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B3-B | **STATION** 17+40 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 826.3 ft | **TOTAL DEPTH** 61.8 ft | **NORTHING** 863,120 | **EASTING** 1,666,615 | **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/18/12 | **COMP. DATE** 10/31/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 9.9 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 774.4 | | | | | | | | | | | Begin Coring @ 51.9 ft |
| | 774.4 | 51.9 | 4.5 | | (4.5) 100% | (4.5) 100% | | (4.5) 100% | (4.5) 100% | | 774.4 **CRYSTALLINE ROCK** FRESH, HARD, GRAY PARAGNEISS WITH WIDE SPACED FRACTURES. REMNANT BEDDING FROM INCH SCALE TO FOOT THICKNESS. MOSTLY APPEARS FINING UPWARD. ALL BREAKS ARE MACHINE BREAKS ON REMNANT BEDDING BOUNDARIES. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. 51.9 |
| 770 | 769.9 | 56.4 | | | | | | | | | 769.9 56.4 |
| | | | 5.4 | | (5.4) 100% | (5.4) 100% | RS-8 | (5.4) 100% | (5.4) 100% | | **CRYSTALLINE ROCK** FRESH, VERY HARD, PARAGNEISS. ANATECTIC GRANITE OR PARAGNEISS FROM COARSE SEDIMENT. WIDE SPACED FRACTURES RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. |
| 765 | 764.5 | 61.8 | | | | | | | | | 764.5 61.8 Boring Terminated at Elevation 764.5 ft in paragneiss |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B4-A | **STATION** 18+51 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 825.9 ft | **TOTAL DEPTH** 45.2 ft | **NORTHING** 863,027 | **EASTING** 1,666,686 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/11/12 | **COMP. DATE** 10/12/12 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 825.9 GROUND SURFACE | 0.0 |
| | 823.9 | 2.0 | 0 | 1 | 2 | 3 | | W | | **ALLUVIAL** BLACK TO GRAY, WET, SOFT, SANDY SILTY CLAY W/ ROOT MAT AT SURFACE (A-6) | |
| | | | | | | | | | | 820.9 | 5.0 |
| | 818.9 | 7.0 | 3 | 1 | 3 | 4 | SS-5 | W | | **ALLUVIAL** GRAY AND TAN, WET, VERY LOOSE, SILTY SAND W/ GRAVEL (A-2-4) | |
| | | | | | | | | | | 814.9 | 11.0 |
| | 813.9 | 12.0 | 6 | 17 | 14 | 31 | | W | | **RESIDUAL** GRAY-GREEN AND WHITE, WET, DENSE, SILTY SAND WITH TRACE MICA (A-2-4) | |
| | | | | | | | | | | 808.9 | 17.0 |
| | 808.9 | 17.0 | 15 | 85 | 60/.1 | 60/.1 | SS-6 | M | | 807.9 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK | 18.0 |
| | | | | | | | | | | 807.5 **CRYSTALLINE ROCK** (SPT REFUSAL) | 18.4 |
| | 800.9 | 25.0 | 17 | 31 | 69/.4 | 100/.9 | | M | | **CRYSTALLINE ROCK** PARAGNEISS 800.9 | 25.0 |
| | | | | | | | | | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (PARAGNEISS) | |
| | | | | | | | | | | 796.1 | 29.8 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 790.7 | 35.2 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 785.7 | 40.2 |
| | | | | | | | RS-1 | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 780.7 | 45.2 |
| | | | | | | | | | | Boring Terminated at Elevation 780.7 ft in paragneiss | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B4-A | **STATION** 18+51 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 825.9 ft | **TOTAL DEPTH** 45.2 ft | **NORTHING** 863,027 | **EASTING** 1,666,686 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/11/12 | **COMP. DATE** 10/12/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 22.0 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 807.5 | | | | | | | | | | | Begin Coring @ 18.4 ft | |
| | 807.5 | 18.4 | 1.6 | | (0.5) 31% | (0.0) 0% | | (1.1) 17% | (0.0) 0% | | 807.5 **CRYSTALLINE ROCK** GRAY, GREEN, RED FOLIATED PARAGNEISS, MODERATELY SEVERELY WEATHERED, MODERATELY HARD, WITH CLOSE FRACTURE SPACING RMR=19, R1=7, R2=3, R3=5, R4=0, R5=4 VERY POOR ROCK, CLASS V. ROCK TYPE E | 18.4 |
| 805 | 805.9 | 20.0 | 5.0 | | (0.6) 12% | (0.0) 0% | | | | | 800.9 | 25.0 |
| 800 | 800.9 | 25.0 | | N=100/.9 | | | | | | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (PARAGNEISS) | |
| | 796.1 | 29.8 | 5.4 | | (5.4) 100% | (5.4) 100% | | (5.4) 100% | (5.4) 100% | | 796.1 | 29.8 |
| 795 | | | | | | | | | | | **CRYSTALLINE ROCK** GRAY, GREEN, RED, FOLIATED PARAGNEISS. CALC SILICATE PRESENT, GRADING TO MARBLE IN PART. CRYSTALLINE, FRESH, MODERATELY HARD, WIDELY SPACED FRACTURES. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | |
| 790 | 790.7 | 35.2 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 790.7 | 35.2 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** GREENISH GRAY, RED, AND WHITE, FOLIATED PARAGNEISS. MICACEOUS INTERVALS ALTERNATE WITH MARBLE INTERVALS. CRYSTALLINE, FRESH, MODERATELY HARD, WIDELY SPACED FRACTURES. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | |
| 785 | 785.7 | 40.2 | 5.0 | | (5.0) 100% | (5.0) 100% | RS-1 | (5.0) 100% | (5.0) 100% | | 785.7 | 40.2 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** GREENISH GRAY AND WHITE, FOLIATED PARAGNEISS. MICACEOUS, MARBLE IN PART. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | |
| | 780.7 | 45.2 | | | | | | | | | 780.7 | 45.2 |
| | | | | | | | | | | | Boring Terminated at Elevation 780.7 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B4-B | **STATION** 18+13 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 825.5 ft | **TOTAL DEPTH** 59.8 ft | **NORTHING** 863,050 | **EASTING** 1,666,637 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/16/12 | **COMP. DATE** 10/16/12 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 825.5 | 0.0 |
| | | | | | | | | | | **GROUND SURFACE** | |
| | 823.5 | 2.0 | 0 | 1 | 2 | 3 | | W | | **ALLUVIAL** BLACK TO GRAY, WET, SOFT, SANDY SILTY CLAY W/ ROOT MAT AT SURFACE (A-6) | |
| | | | | | | | | | | 818.5 | 7.0 |
| | 818.5 | 7.0 | 0 | 1 | 2 | 3 | | W | | **ALLUVIAL** GRAY, WET, VERY LOOSE, SILTY SAND W/ PEA GRAVEL (A-2-4) | |
| | | | | | | | | | | 816.5 | 9.0 |
| | 813.5 | 12.0 | 1 | 2 | 4 | 6 | SS-7 | W | | **RESIDUAL** GREENISH GRAY AND WHITE, WET, LOOSE, SILTY SAND (A-2-4) | |
| | 808.5 | 17.0 | 5 | 14 | 20 | 34 | SS-8 | M | | 808.0 | 17.5 |
| | 803.5 | 22.0 | 13 | 8 | 7 | 15 | SS-9 | M | | **RESIDUAL** TAN AND WHITE, MOIST, DENSE TO MEDIUM DENSE, SILTY SAND (A-2-4) | |
| | | | | | | | | | | 801.5 | 24.0 |
| | | | | | | | | | | 800.4 | 25.1 |
| | | | | | | | | | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (PRESUMABLY WEATHERED ROCK, GRADING TO REFUSAL) | |
| | 795.5 | 30.0 | 8 | 15 | 17 | 32 | SS-10 | W | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 795.5 | 30.0 |
| | | | | | | | | | | **RESIDUAL** ORANGE, MOIST, DENSE, SILTY SAND (A-2-4) (POSSIBLY GOSSAN) | |
| | | | | | | | | | | 792.3 | 33.2 |
| | | | | | | | | | | 791.5 | 34.0 |
| | | | | | | | | | | **CRYSTALLINE ROCK** (SPT REFUSAL, ADVANCE WITH DIFFICULTY) | |
| | 788.8 | 36.7 | 10 | 50 | 60/.1 | 60/.1 | | M | | **RESIDUAL** ORANGE, MOIST, VERY DENSE, CLAYEY SILTY SAND (A-2-4) | |
| | | | | | | | | | | 787.8 | 37.7 |
| | | | | | | | | | | 786.1 | 39.4 |
| | | | | | | | | | | **CRYSTALLINE ROCK** (SPT REFUSAL. ADVANCE WITH DIFFICULTY) | |
| | | | | | | | | | | 782.7 | 42.8 |
| | | | | | | | | | | 780.7 | 44.8 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 775.7 | 49.8 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | RS-2 | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 770.7 | 54.8 |
| | | | | | | | | | | **CRYSTALLINE ROCK** PARAGNEISS | |
| | | | | | | | | | | 765.7 | 59.8 |
| | | | | | | | | | | Boring Terminated at Elevation 765.7 ft in paragneiss | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B4-B | **STATION** 18+13 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 825.5 ft | **TOTAL DEPTH** 59.8 ft | **NORTHING** 863,050 | **EASTING** 1,666,637 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 10/16/12 | **COMP. DATE** 10/16/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 25.3 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 800.4 | | | | | | | | | | | Begin Coring @ 25.1 ft | |
| 800 | 800.4 | 25.1 | 4.9 | | (2.6) 53% | (2.0) 41% | | (2.6) 53% | (2.0) 41% | | 800.4 | 25.1 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** GRAY FRESH, HARD PARAGNEISS WITH WIDE SPACED FRACTURES. CORE LOSS FROM 27' TO 28' AND 29' TO 30'. LOWER ZONE POSSIBLY IRON OXIDE GOSSAN. | |
| 795 | 795.5 | 30.0 | | N=32 | | | SS-10 | | | | 795.5 RMR=35, R1=7, R2=8, R3=10, R4=6, R5=4 VERY POOR ROCK, CLASS IV. ROCK TYPE E. | 30.0 |
| | | | | | | | | | | | **RESIDUAL** | |
| | | | | | | | | | | | 792.3 | 33.2 |
| | | | | | | | | | | | 791.5 **CRYSTALLINE ROCK** (SPT REFUSAL, ADVANCE WITH DIFFICULTY) | 34.0 |
| 790 | | | | | | | | | | | **RESIDUAL** | |
| | | | | | | | | | | | 787.8 | 37.7 |
| | 786.1 | 39.4 | | N=60/.1 | | | | | | | **CRYSTALLINE ROCK** (SPT REFUSAL. ADVANCE WITH DIFFICULTY) | 39.4 |
| 785 | | | 3.4 | | (2.3) 68% | (0.5) 15% | | (2.3) 68% | (0.5) 15% | | **CRYSTALLINE ROCK** MIXTURE OF GRAY AND RUSTY BROWN, FRESH TO SEVERELY WEATHERED, HARD TO SOFT PARAGNEISS, CLOSELY SPACED FRACTURES. | |
| | 782.7 | 42.8 | | | | | | | | | 782.7 RMR=26, R1=7, R2=3, R3=10, R4=6, R5=0 POOR ROCK, CLASS IV. ROCK TYPE E. | 42.8 |
| | 780.7 | 44.8 | 2.0 | | (2.0) 100% | (2.0) 100% | | (2.0) 100% | (2.0) 100% | | 780.7 **CRYSTALLINE ROCK** GRAY, FRESH, HARD PARAGNEISS, WITH WIDE SPACED FRACTURES. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 44.8 |
| 780 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** | |
| | 775.7 | 49.8 | | | | | | | | | 775.7 GRAY, LIGHT RED IN PLACE, HARD, FRESH, WIDE SPACED FRACTURES, SLIGHTLY MICACEOUS PARAGNEISS. ORIGINAL BEDDING HAS BEEN FOLDED. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 49.8 |
| 775 | | | 5.0 | | (5.0) 100% | (5.0) 100% | RS-2 | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** | |
| | 770.7 | 54.8 | | | | | | | | | 770.7 PINK AND WHITE, THIN REMNANT BEDS, HARD, FRESH, WIDE SPACED FRACTURES, SLIGHTLY MICACEOUS PARAGNEISS. BREAKS ALONG BEDDING ARE MACHINE BREAKS. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 54.8 |
| 770 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** | |
| | 765.7 | 59.8 | | | | | | | | | 765.7 WHITE TO PURPLE, FRESH, HARD PARAGNEISS, WELL BEDDED OR FOLIATED, MOST BREAKS ARE MACHINE BREAKS ON BIOTITE LAYERS. ORIGINAL ROCK MAY HAVE BEEN COARSE SEDIMENT. RMR=81, R1=12, R2=20, R3=25, R4=20, R5=4 VERY GOOD ROCK, CLASS I. ROCK TYPE E. | 59.8 |
| | | | | | | | | | | | Boring Terminated at Elevation 765.7 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 19+24 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- **0 HR.** 2.0 |
| **COLLAR ELEV.** 825.9 ft | **TOTAL DEPTH** 29.9 ft | **NORTHING** 862,959 | **EASTING** 1,666,711 **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 10/11/12 | **COMP. DATE** 10/11/12 | **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) |
| 825.9 | | 0.0 | | | | | | | | GROUND SURFACE |
| | 824.1 | 1.8 | 0 | 1 | 4 | 5 | SS-1 | W | | **ALLUVIAL** BLACK, GREY AND TAN, WET, SOFT TO MED. STIFF, (PI=12) SILTY SANDY CLAY W/ TRACE MICA AND ORGANICS (A-6) |
| 819.9 | | 6.0 | | | | | | | | |
| | 819.1 | 6.8 | 3 | 3 | 5 | 8 | SS-2 | M | | **RESIDUAL** GREY TO LIGHT GREENISH, LOOSE, MOIST SILTY SAND (A-2-4) |
| 814.1 | | 11.8 | | | | | | | | |
| | 814.1 | 11.8 | 11 | 19 | 39 | 58 | SS-3 | M | | **RESIDUAL** OLIVE GREY, VERY DENSE, MOIST SILTY SAND (A-2-4) |
| 808.6 | | 17.3 | | | | | | | | |
| | 809.1 | 16.8 | 59 | 80 | 20/.1 | 100/.6 | SS-4 | M | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| 802.9 | | 23.0 | | | | | | | | |
| | 802.6 | 23.3 | 60/.1 | | | 60/.1 | | | | **CRYSTALLINE ROCK** (SPT REFUSAL, ADVANCING WITH GREAT DIFFICULTY) |
| 796.0 | | 29.9 | | | | | | | | |
| | 797.6 | 28.3 | 60/.1 | | | 60/.1 | | | | Boring Terminated with Casing Advancer Refusal at Elevation 796.0 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 18+84 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- **0 HR.** 3.0 |
| **COLLAR ELEV.** 826.1 ft | **TOTAL DEPTH** 28.0 ft | **NORTHING** 862,982 | **EASTING** 1,666,661 **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 10/11/12 | **COMP. DATE** 10/11/12 | **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) |
| 826.1 | | 0.0 | | | | | | | | GROUND SURFACE |
| | 823.2 | 2.9 | 0 | 1 | 1 | 2 | | W | | **ALLUVIAL** BLACK, GRAY, WET, SOFT TO VERY SOFT, SILTY SANDY CLAY W/ ROOT MAT AND ORGANIC LAYER AT TOP (A-6) |
| 815.1 | | 11.0 | | | | | | | | |
| | 818.2 | 7.9 | 0 | 2 | 3 | 5 | | W | | **RESIDUAL** RED-ORANGE, WET, MEDIUM DENSE, SILTY SAND (A-2-4) (HIGHLY WEATHERED, IRON STAINED, CRYSTALLINE ROCK) |
| 807.1 | | 19.0 | | | | | | | | |
| | 813.2 | 12.9 | 1 | 5 | 9 | 14 | | W | | **RESIDUAL** GREENISH GREY, WET, VERY DENSE, SILTY SAND (A-2-4) (HIGHLY WEATHERED CRYSTALLINE ROCK) |
| 800.1 | | 26.0 | | | | | | | | |
| | 808.2 | 17.9 | 3 | 16 | 73 | 89 | | W | | **CRYSTALLINE ROCK** (ADVANCE WITH GREAT DIFFICULTY) |
| 798.1 | | 28.0 | | | | | | | | |
| | 801.7 | 24.4 | 5 | 12 | 51 | 63 | | W | | Boring Terminated with Casing Advancer Refusal at Elevation 798.1 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** 1667 LT | **STATION** 16+67 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPA- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 825.1 ft | **TOTAL DEPTH** 59.4 ft | **NORTHING** 863,200 | **EASTING** 1,666,632 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/02/13 | **COMP. DATE** 01/03/13 | **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) |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | 825.1 GROUND SURFACE 0.0 |
| | 822.2 | 2.9 | 1 | 2 | 2 | 4 | SS-57 | W | | **ALLUVIAL** GRAY AND TAN, MOIST TO WET, LOOSE, CLAYEY SILTY SAND W/ ROOT MAT AT SURFACE (A-2-4) |
| 820 | | | | | | | | | | 818.1 7.0 |
| | 817.2 | 7.9 | 1 | 2 | 1 | 3 | SS-58 | W | | **RESIDUAL** TAN AND GREENISH GRAY, WET, VERY LOOSE TO LOOSE, SILTY SAND W/ LITTLE MICA (A-2-5) |
| 815 | | | | | | | | | | |
| | 812.2 | 12.9 | 1 | 3 | 3 | 6 | | W | | 810.1 15.0 |
| 810 | | | | | | | | | | **RESIDUAL** TAN, WHITE AND OLIVE, WET, MED. DENSE, SILTY SAND (A-2-5, A-2-4) |
| | 807.2 | 17.9 | 2 | 4 | 7 | 11 | SS-59 | W | | |
| 805 | | | | | | | | | | |
| | 802.2 | 22.9 | 3 | 9 | 10 | 19 | SS-60 | W | | |
| 800 | | | | | | | | | | |
| 795 | | | | | | | | | | |
| | 792.2 | 32.9 | 2 | 3 | 9 | 12 | SS-61 | M | | |
| 790 | | | | | | | | | | 788.1 37.0 |
| | 787.2 | 37.9 | 5 | 10 | 12 | 22 | SS-62 | M | | **RESIDUAL** TAN AND WHITE MED. DENSE MOIST SILTY SAND (A-2-6) |
| 785 | | | | | | | | | | 783.5 41.6 |
| | 782.2 | 42.9 | 21 | 41 | 59/.4 | 100/.9 | | M | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| 780 | | | | | | | | | | 780.6 44.5 |
| | 776.7 | 48.4 | 23 | 37 | 57 | 94 | SS-63 | M | | **RESIDUAL** TAN AND WHITE VERY DENSE MOIST SILTY SAND (A-2-4) |
| 775 | | | | | | | | | | |
| | 771.7 | 53.4 | 18 | 32 | 58 | 90 | | | | |
| 770 | | | | | | | | | | |
| | 766.7 | 58.4 | 45 | 55/.5 | | 100 | | | | 766.7 58.4 |
| | | | | | | | | | | 765.7 59.4 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| | | | | | | | | | | Boring Terminated at Elevation 765.7 ft in severely weathered crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BOREHOLE REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPA- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** 1632 RT | **STATION** 16+32 | **OFFSET** 16 ft RT | **ALIGNMENT** -Y4RPA- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 824.8 ft | **TOTAL DEPTH** 61.4 ft | **NORTHING** 863,225 | **EASTING** 1,666,587 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 01/09/13 | **COMP. DATE** 01/09/13 | **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 | | | | | | | | | | 824.8 GROUND SURFACE 0.0 |
| | 821.8 | 3.0 | 2 | 1 | 0 | 1 | | W | | **ALLUVIAL** TAN-GRAY, WET, LOOSE TO VERY LOOSE, CLAYEY SILTY SAND. ROOT MAT AT SURFACE, GRAVEL AT LOWER CONTACT (A-2-4) |
| 820 | | | | | | | | | | |
| | 816.8 | 8.0 | 2 | 2 | 3 | 5 | | W | | 814.3 10.5 |
| 815 | | | | | | | | | | **RESIDUAL** TAN, WET, VERY LOOSE, SILTY SAND W/ LITTLE MICA (A-2-5) |
| | 811.8 | 13.0 | 0 | 1 | 2 | 3 | | W | | |
| 810 | | | | | | | | | | 809.8 15.0 |
| | 806.8 | 18.0 | 1 | 4 | 7 | 11 | | W | | **RESIDUAL** TAN, OLIVE, WHITE WET TO MOIST, MEDIUM DENSE TO DENSE , SILTY SAND WITH A LITTLE MICA (A-2-4) |
| 805 | | | | | | | | | | |
| | 801.8 | 23.0 | 6 | 6 | 7 | 13 | | W | | |
| 800 | | | | | | | | | | |
| | 796.8 | 28.0 | 3 | 7 | 10 | 17 | | M | | |
| 795 | | | | | | | | | | |
| | 791.8 | 33.0 | 8 | 12 | 13 | 25 | | M | | |
| 790 | | | | | | | | | | |
| | 786.8 | 38.0 | 7 | 14 | 21 | 35 | | M | | |
| 785 | | | | | | | | | | |
| | 781.4 | 43.4 | 9 | 12 | 16 | 28 | | M | | 779.8 45.0 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK |
| 780 | | | | | | | | | | |
| | 776.4 | 48.4 | 29 | 45 | 55/.4 | 100/.9 | | M | | |
| 775 | | | | | | | | | | |
| | 771.4 | 53.4 | 39 | 59 | 41.3 | 100/.8 | | M | | |
| 770 | | | | | | | | | | |
| | 766.4 | 58.4 | 46 | 54/.5 | | 100 | | M | | 764.8 60.0 |
| 765 | | | | | | | | | | 763.4 61.4 **CRYSTALLINE ROCK** |
| | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 763.4 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG_1710Y4RPA_FORSYTH.GPJ NC_DOT.GDT 7/15/13

PROJECT: 34839.1.1 (U-2579B)
COUNTY: FORSYTH
SITE DESCRIPTION: 17+10 -Y4RPA- BRIDGE OVER HARMON MILL (SMITH'S CREEK) ON FUTURE I-74 BETWEEN I-40 AND SR 2377

# TEST RESULTS



## SOIL SAMPLE RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS | N | L.L. | P.I. | % BY WEIGHT C. SAND | % BY WEIGHT F. SAND | % BY WEIGHT SILT | % BY WEIGHT CLAY | % PASSING SIEVES 10 | % PASSING SIEVES 40 | % PASSING SIEVES 200 | % MOISTURE | % ORGANIC | UNIT WT. (d) | VOID RATIO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **EB1-A** | | | | | | | | | | | | | | | | |
| SS-70 | 22 LT. | 15+35 -Y4RPA- | 4.00-5.50 | A-7-6(8) | 16 | 48 | 21 | 22.9 | 28.6 | 18.0 | 30.5 | 98 | 86 | 51 | | | | |
| SS-71 | 22 LT. | 15+35 -Y4RPA- | 9.00-10.50 | A-7-5(9) | 11 | 51 | 20 | 19.3 | 27.0 | 17.2 | 36.5 | 97 | 88 | 56 | | | | |
| SS-72 | 22 LT. | 15+35 -Y4RPA- | 14.00-15.50 | A-1-a(0) | 11 | 33 | 4 | 55.0 | 19.5 | 15.3 | 10.2 | 45 | 25 | 13 | | | | |
| SS-73 | 22 LT. | 15+35 -Y4RPA- | 19.00-20.50 | A-2-5(0) | 7 | 49 | NP | 48.5 | 30.5 | 17.0 | 4.1 | 89 | 58 | 21 | | | | |
| SS-74 | 22 LT. | 15+35 -Y4RPA- | 29.00-30.50 | A-2-4(0) | 9 | 38 | 5 | 28.4 | 39.8 | 23.7 | 8.1 | 88 | 74 | 35 | | | | |
| SS-75 | 22 LT. | 15+35 -Y4RPA- | 34.00-35.50 | A-2-5(0) | 9 | 44 | NP | 18.9 | 51.4 | 21.6 | 8.1 | 95 | 88 | 35 | | | | |
| SS-76 | 22 LT. | 15+35 -Y4RPA- | 54.00-55.50 | A-2-4(0) | 27 | 32 | NP | 34.3 | 42.8 | 16.8 | 6.1 | 94 | 77 | 28 | | | | |
| | | **B1-A** | | | | | | | | | | | | | | | | |
| SS-64 | 22 LT. | 16+00 -Y4RPA- | 7.80-9.30 | A-2-5(0) | 3 | 53 | NP | 40.2 | 43.2 | 12.4 | 4.1 | 95 | 76 | 20 | | | | |
| SS-65 | 22 LT. | 16+00 -Y4RPA- | 12.80-14.30 | A-2-5(0) | 4 | 50 | NP | 31.3 | 45.5 | 19.2 | 4.1 | 95 | 81 | 27 | | | | |
| SS-66 | 22 LT. | 16+00 -Y4RPA- | 22.80-24.30 | A-2-5(0) | 8 | 44 | NP | 32.3 | 47.1 | 16.5 | 4.1 | 97 | 82 | 25 | | | | |
| SS-67 | 22 LT. | 16+00 -Y4RPA- | 27.80-29.30 | A-2-5(0) | 12 | 41 | NP | 42.4 | 38.4 | 15.1 | 4.1 | 91 | 69 | 21 | | | | |
| SS-68 | 22 LT. | 16+00 -Y4RPA- | 37.80-39.30 | A-2-4(0) | 55 | 34 | NP | 40.8 | 38.8 | 18.4 | 2.0 | 87 | 67 | 22 | | | | |
| SS-69 | 22 LT. | 16+00 -Y4RPA- | 43.20-44.70 | A-2-4(0) | 48 | 32 | NP | 41.0 | 45.7 | 11.3 | 2.0 | 90 | 70 | 16 | | | | |
| | | **B2-A** | | | | | | | | | | | | | | | | |
| SS-206 | 22 LT. | 16+84 -Y4RPA- | 2.70-4.20 | A-4(0) | 1 | 25 | 6 | 20.2 | 43.3 | 14.3 | 22.2 | 100 | 95 | 40 | | | | |
| SS-207 | 22 LT. | 16+84 -Y4RPA- | 12.70-14.20 | A-2-4(0) | 6 | 37 | 5 | 30.4 | 39.3 | 18.1 | 12.1 | 98 | 83 | 35 | | | | |
| SS-208 | 22 LT. | 16+84 -Y4RPA- | 17.70-19.20 | A-4(0) | 9 | 37 | 8 | 32.1 | 36.1 | 21.8 | 10.1 | 100 | 81 | 40 | | | | |
| SS-209 | 22 LT. | 16+84 -Y4RPA- | 32.70-34.20 | A-1-a(0) | 37 | 23 | NP | 54.2 | 23.4 | 12.3 | 10.1 | 48 | 29 | 13 | | | | |
| SS-210 | 22 LT. | 16+84 -Y4RPA- | 47.70-49.20 | A-2-4(0) | 66 | 34 | NP | 40.7 | 38.5 | 16.7 | 4.0 | 93 | 71 | 23 | | | | |
| | | **B2-B** | | | | | | | | | | | | | | | | |
| SS-201 | 12 RT. | 16+55 -Y4RPA- | 12.60-14.10 | A-2-4(0) | 4 | 35 | NP | 26.8 | 49.8 | 13.3 | 10.1 | 100 | 87 | 31 | | | | |
| SS-202 | 12 RT. | 16+55 -Y4RPA- | 27.60-29.10 | A-2-4(0) | 10 | 37 | NP | 31.5 | 44.0 | 16.5 | 8.1 | 93 | 78 | 29 | | | | |
| SS-203 | 12 RT. | 16+55 -Y4RPA- | 42.60-44.10 | A-2-4(0) | 21 | 34 | NP | 34.5 | 38.7 | 18.8 | 8.1 | 95 | 75 | 33 | | | | |
| SS-204 | 12 RT. | 16+55 -Y4RPA- | 47.60-49.10 | A-2-4(0) | 25 | 32 | NP | 31.7 | 48.2 | 16.1 | 4.0 | 100 | 87 | 28 | | | | |
| SS-205 | 12 RT. | 16+55 -Y4RPA- | 63.00-64.00 | A-2-4(0) | 100 | 31 | 9 | 43.3 | 26.6 | 15.9 | 14.1 | 82 | 58 | 29 | | | | |
| | | **B3-A** | | | | | | | | | | | | | | | | |
| SS-11 | 22 LT. | 17+75 -Y4RPA- | 7.00-8.50 | A-2-4(0) | 4 | 28 | NP | 56.3 | 27.2 | 10.5 | 6.0 | 98 | 64 | 18 | | | | |
| SS-12 | 22 LT. | 17+75 -Y4RPA- | 17.00-18.50 | A-2-4(0) | 16 | 37 | NP | 41.6 | 39.8 | 16.5 | 2.0 | 97 | 72 | 23 | | | | |
| | | **B4-A** | | | | | | | | | | | | | | | | |
| SS-5 | 22 LT. | 18+51 -Y4RPA- | 7.00-8.50 | A-2-4(0) | 4 | 29 | NP | 51.9 | 33.6 | 8.5 | 6.0 | 91 | 62 | 16 | | | | |
| SS-6 | 22 LT. | 18+51 -Y4RPA- | 17.00-18.00 | A-2-4(0) | 100 | 37 | NP | 45.2 | 37.6 | 13.1 | 4.0 | 97 | 70 | 21 | | | | |
| | | **B4-B** | | | | | | | | | | | | | | | | |
| SS-7 | 16 RT. | 18+13 -Y4RPA- | 12.00-13.50 | A-2-4(0) | 6 | 31 | NP | 41.8 | 35.0 | 19.1 | 4.0 | 90 | 67 | 26 | | | | |
| SS-8 | 16 RT. | 18+13 -Y4RPA- | 17.00-18.50 | A-2-4(0) | 34 | 35 | NP | 49.2 | 34.0 | 16.7 | 0.0 | 93 | 63 | 20 | | | | |
| SS-9 | 16 RT. | 18+13 -Y4RPA- | 22.00-23.50 | A-2-4(0) | 15 | 34 | 2 | 45.8 | 30.2 | 19.9 | 4.0 | 87 | 59 | 26 | | | | |
| SS-10 | 16 RT. | 18+13 -Y4RPA- | 30.00-31.50 | A-2-4(0) | 32 | 25 | NP | 34.4 | 44.8 | 18.7 | 2.0 | 93 | 80 | 26 | | | | |
| | | **EB2-A** | | | | | | | | | | | | | | | | |
| SS-1 | 22 LT. | 19+24 -Y4RPA- | 1.80-3.30 | A-6(1) | 5 | 31 | 12 | 38.0 | 23.2 | 16.7 | 22.0 | 96 | 72 | 40 | | | | |
| SS-2 | 22 LT. | 19+24 -Y4RPA- | 6.80-8.30 | A-2-4(0) | 8 | 29 | NP | 39.0 | 41.8 | 15.1 | 4.0 | 81 | 66 | 21 | | | | |
| SS-3 | 22 LT. | 19+24 -Y4RPA- | 11.80-13.30 | A-2-4(0) | 58 | 26 | NP | 44.4 | 37.4 | 16.1 | 2.0 | 88 | 64 | 21 | | | | |
| SS-4 | 22 LT. | 19+24 -Y4RPA- | 16.80-17.80 | A-2-4(0) | 100+ | 30 | NP | 47.8 | 36.2 | 13.9 | 2.0 | 94 | 66 | 19 | | | | |
| | | **16+67 LT** | | | | | | | | | | | | | | | | |
| SS-57 | 22 LT. | 16+67 -Y4RPA- | 2.90-4.40 | A-2-4(0) | 4 | 24 | NP | 22.3 | 59.1 | 9.4 | 9.1 | 100 | 98 | 23 | | | | |
| SS-58 | 22 LT. | 16+67 -Y4RPA- | 7.90-9.40 | A-2-5(0) | 3 | 47 | NP | 31.5 | 39.6 | 20.8 | 8.1 | 100 | 83 | 34 | | | | |
| SS-59 | 22 LT. | 16+67 -Y4RPA- | 17.90-19.40 | A-2-5(0) | 11 | 48 | NP | 28.0 | 44.1 | 21.8 | 6.1 | 100 | 93 | 33 | | | | |
| SS-60 | 22 LT. | 16+67 -Y4RPA- | 22.90-24.40 | A-2-4(0) | 19 | 40 | 3 | 37.6 | 33.1 | 23.2 | 6.1 | 92 | 72 | 31 | | | | |
| SS-61 | 22 LT. | 16+67 -Y4RPA- | 32.90-34.40 | A-2-4(0) | 12 | 39 | NP | 34.1 | 38.2 | 21.6 | 6.1 | 96 | 77 | 33 | | | | |
| SS-62 | 22 LT. | 16+67 -Y4RPA- | 37.90-39.40 | A-2-6(0) | 22 | 35 | 11 | 38.2 | 30.7 | 23.0 | 8.1 | 90 | 71 | 32 | | | | |
| SS-63 | 22 LT. | 16+67 -Y4RPA- | 48.40-49.90 | A-2-4(0) | 94 | 31 | NP | 33.9 | 42.0 | 18.0 | 6.1 | 94 | 79 | 27 | | | | |

## ROCK SAMPLE RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | RQD | UNIT WT (pcf) | Q(ksf) | E(MPsi) |
|---|---|---|---|---|---|---|---|
| | | **B1-B** | | | | | |
| RS-9 | 16 RT. | 15+71 -Y4RPA- | 43.5-43.9 | 100% | 167.1 | 1142 | 6.07 |
| | | **B3-A** | | | | | |
| RS-3 | 22 LT. | 17+75 -Y4RPA- | 50.75-51.15 | 100% | 171.1 | 1452 | 6.96 |
| | | **B3-B** | | | | | |
| RS-8 | 16 RT. | 17+40 -Y4RPA- | 56.7-57.3 | 100% | 174.1 | 766 | 3.00 |
| | | **B4-A** | | | | | |
| RS-1 | 22 LT. | 18+51 -Y4RPA- | 42.0-42.4 | 100% | 177.6 | 940 | 11.58 |
| | | **B4-B** | | | | | |
| RS-2 | 16 RT. | 18+13 -Y4RPA- | 50.6-51.1 | 100% | 167.3 | 979.2 | 1.512 |

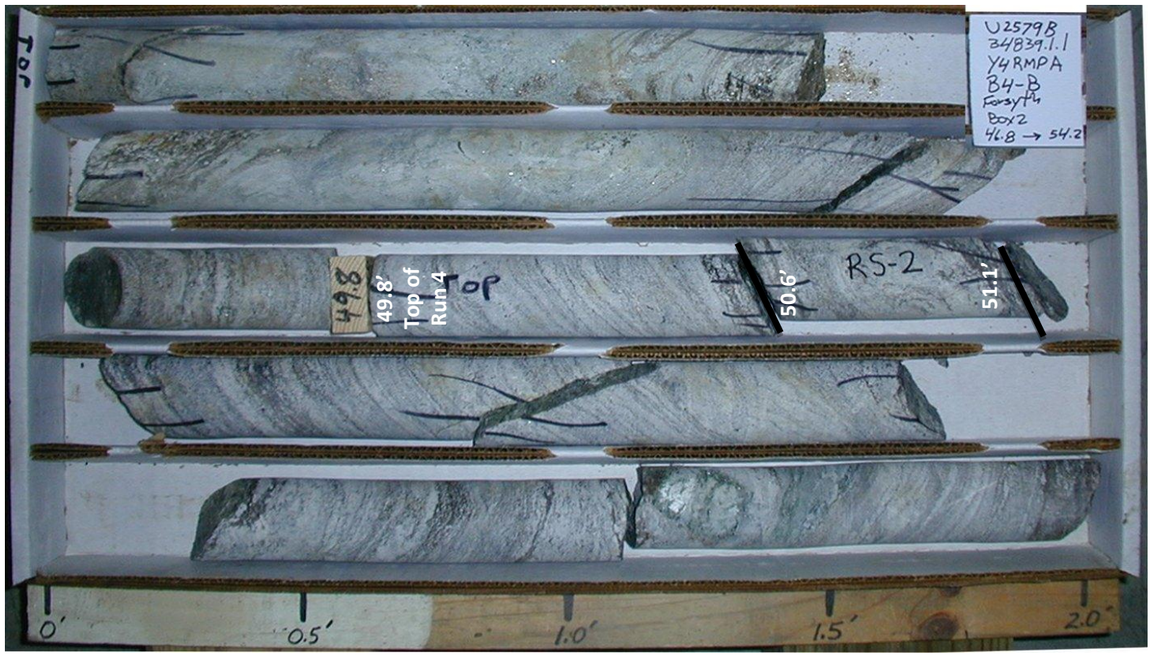
PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: 17+10 -Y4RPA- Bridge over Harmon Mill (Smith's Creek)
on future I-74 between I-40 and SR 2377

46.9
Top of
Run 1
50.1'
Top of
Run 2
50.75'
RS-3
51.15'
U-2579B
34839.1.1
Y4 RMPA
B3A Box 1/1
Forsyth
46.9—55.1
55.1'
End of
Boring
0'
0.5'
1.0'
1.5'
2.0'

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: 17+10 -Y4RPA- Bridge over Harmon Mill (Smith's Creek)
on future I-74 between I-40 and SR 2377

Project: 34839.1.1 (U-2579B)
DESCRIPTION: 17+10 -Y4RPA- Bridge over Harmon Mill (Smith's Creek)
on future I-74 between I-40 and SR 2377

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: 17+10 -Y4RPA- Bridge over Harmon Mill (Smith's Creek)
on future I-74 between I-40 and SR 2377



| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 27 |

# Aerial Photo

0 50 100

FEET

NORTH

TO I-40

TO WEST MOUNTAIN RD.

-Y4RPA-

-Y4CD-

EB2-A

B4-A

EB2-B

B3-A

B4-B

B2-A

16+67 LT

B3-B

B1-A

EB1-A

B2-B

16+32 RT

B1-B

EB1-B

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 23 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34839.1.1 (U-2579B) F.A. PROJ. NHF-0918(93)

COUNTY FORSYTH

PROJECT DESCRIPTION BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US-158 AND US-421 /I-40 BUS.

SITE DESCRIPTION

PROJECT: 34839.1.1

ID: U-2579B

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
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PERSONNEL

C. C. MURRAY

J. E. ESTEP

M. R. MOORE

INVESTIGATED BY R. Q. CALLAWAY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE SEPTEMBER 2013

NORTH CAROLINA LICENSED SEAL 1098 GEOLOGIST ROGER Q CALLAWAY 10/07/2013

DRAWN BY: C. E. BURRIS

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34839.1.1 (U-2579B) | 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NO/NQ
- [ ] -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 FELOSPARS 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: T5-457 STA T5 18+56.87
N 863586.4093 E 1666033.3947
ELEVATION: 825.26 FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

DBR = DRAG BIT REFUSAL

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 60 120

FEET

SKEW=102°00'00"

GRADE TO DRAIN WITH COMBINATION OF CUT AND FILL

OBLITERATE AND GRADE TO DRAIN

-BY12-533

-T5- 457
ELEV.=825.26

HARMON MILL (SMITH) CREEK

N 51° 27' 03.0" W

WORK POINT #1
STA. 25+39.30 -Y4RPBD-

WORK POINT #2
STA. 26+20.00 -Y4RPBD-

WORK POINT #3
STA. 27+00.00 -Y4RPBD-

WORK POINT #4
STA. 27+80.70 -Y4RPBD-

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

-Y4RPBD-

S 29° 30' 54.6" W

N 62° 00' 48.0" W

PUMP STATION RD 12' BST

SCRUB

PROPOSED OVERHEAD SIGN SUPPORT LOCATION

-Y4RPBD- ST Sta. 23+25.35

S 41° 51' 12.3" W

S 32° 36' 09.3" W

-T4- A409
ELEV.=824.32

-T4- A410
ELEV.=822.02

-T4- A411
-T5- B311
ELEV.=822.14

S 74° 46' 15.9" W

-T4- A412
ELEV.=821.67

-T5- 458
ELEV.=823.31

-Y4RPB- POT Sta. 10+00.00
-Y4RPBD- POT Sta. 30+50.00 (12' RT)

NORTH

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |

BRIDGE OVER HARMON MILL CREEK BETWEEN US-158 & US-421/I-40 BUS. PROFILE ALONG -Y4RPBD-

0 100 200 FEET

VE = 5:1

PI = 19+50.00
EL = 858.25'
K = 156
VC = 1,120'

872.45
872.45

(+)3.0700%

EXISTING GROUND

EB1-B
25+35 -Y4RPBD-
23 RT
ELEV. = 823.0'

B1-B
26+16 -Y4RPBD-
22 RT
ELEV. = 823.7'

B2-B
26+95 -Y4RPBD-
22 RT
ELEV. = 823.1'

SS-56
RS-5

SS-56

EB2-B
27+75 -Y4RPBD-
22 RT
ELEV. = 827.2'

BM #9

RESIDUAL

ALLUVIAL

WEATHERED ROCK

CRYSTALLINE ROCK

DBR

BT

RESIDUAL GRAY AND WHITE WET LOOSE TO MEDIUM DENSE MICACEOUS CLAYEY SAND (A-2-4)

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK
REC. = 100%, RQD. = 100%

REC. = 100%
RQD. = 100%

## BORING DESCRIPTIONS

(A) ALLUVIAL, VERY LIGHT TAN MED STIFF MEDIUM PLASTIC FINE SANDY CLAY WITH VERY FINE MICA (A-7)

(B) ALLUVIAL GRAVEL

(C) RESIDUAL, LIGHT GREENISH TAN WET VERY LOOSE HIGHLY MICACEOUS SAND (A-2)

(D) RESIDUAL, BROWN AND WHITE WET DENSE COARSE SAND (A-2)

(E) SEVERELY WEATHERED CRYSTALLINE ROCK

(F) ALLUVIAL, BROWN WET LOOSE CLAYEY SAND WITH SOME MICA (A-2)

(G) ALLUVIAL, GRAY WET VERY LOOSE CLAYEY SAND WITH SOME MICA (A-2)

(H) RESIDUAL, GRAY WET MED DENSE TO DENSE SAND WITH SOME MICA (A-2)

(I) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. INTERVAL IS LESS THAN FOOT, SO FRACTURE SPACING EXTRAPOLATED. REC. = 89% RQD = 89% R1: 7, R2: 17, R3: 25, R4: 20, R5: 4, RMR = 73 GOOD ROCK, CLASS II, ROCK TYPE E

(J) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND AND GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(K) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND & GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING. VARIABLE GRAINSIZE R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS. II, ROCK TYPE E

(L) FRESH HARD GRAY OR BLACK PARAGNEISS WITH WIDELY SPACED FRACTURES. UPPER HALF APPEARS TO BE GRANULAR, LOWER HALF IS BLACK AND MASSIVE. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(M) ALLUVIAL, TAN WET VERY LOOSE TO LOOSE SILTY CLAYEY SAND WITH TRACE MICA (A-2-4)

(N) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. REC. = 100%, RQD = 100% R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(P) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(Q) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(R) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. CHAOTIC BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(S) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. CHAOTIC BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E

(T) ALLUVIAL, RED BROWN WET MEDIUM STIFF LOW PLASTIC SANDY CLAYEY SILT (A-4)

(U) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. INCLINED BANDING, LOWER HALF CHAOTIC. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76 GOOD ROCK, CLASS II, ROCK TYPE E

(V) FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE. BOTTOM 2' MIX OF LIGHT GRAY AND DARK GRAY ROCK, INDICATE SOME FOLDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76 GOOD ROCK, CLASS II, ROCK TYPE E

## BRIDGE HYDRAULIC DATA

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 2400 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 828.3 | FT |
| BASE DISCHARGE | = 2700 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 828.7 | FT |
| OVERTOPPING DISCHARGE | = 4300 | CFS |
| OVERTOPPING FREQUENCY | = 500 | YRS |
| OVERTOPPING ELEVATION | = 850.0 | FT |

BM #9
R/R SPIKE SET IN PAVEMENT
OF RACHEL ST @
INTERSECTION OF GERRY ST
- Y4RPBD - STA. 28+35.4684 93.517' LT
N = 862499.9813
E = 1665570.9813
ELEV. = 899.76'

910 900 890 880 870 860 850 840 830 820 810 800 790 780 770 760 750 740 730

20 21 22 23 24 25 26 27 28 29 30 31 32 33

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U2579B) | 5 |

SECTION THROUGH EB1
STA. 25+39.30 –Y4RPBD–
SKEW=102°00'00"

0 10 20
FEET

# –Y4RPBD–

EB1–A
25+44 –Y4RPBD–
17 LT
ELEV. = 824.0'

EB1–B
25+35 –Y4RPBD–
23 RT.
ELEV. = 823.0'

EXISTING GROUND

ALLUVIAL

BROWN WET MED STIFF LOW PLASTIC SANDY SILTY CLAY (A-7)

(5)

BROWN WET LOOSE SAND W/GRAVEL (A-1)

RESIDUAL

WEATHERED ROCK (100/.4)

CRYSTALLINE ROCK

DBR NM 04/17/13

GRAY AND WHITE MOIST MED. DENSE SAND (A-2)

SEVERELY WEATHERED CRYSTALLINE ROCK

ALLUVIAL

(7)

04/13

VERY LIGHT TAN MED STIFF MEDIUM PLASTIC FINE SANDY CLAY W/ VERY FINE MICA (A-7)

GRAVEL

(2)

LIGHT GREENISH TAN WET VERY LOOSE HIGHLY MICACEOUS SAND (A-2)

RESIDUAL

(43)

BROWN AND WHITE WET DENSE COARSE SAND (A-2)

SEVERELY WEATHERED CRYSTALLINE ROCK

DBR 04/17/13

CRYSTALLINE ROCK

860 850 840 830 820 810 800 790 780 770

50 40 30 20 10 0 10 20 30 40 50

| 0 | 10 | 20 |
|---|---|---|
| FEET | | |

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U2579B) | 6 |

SECTION THROUGH B1
STA. 26+20.00 –Y4RPBD–
SKEW=102°00'00"

# –Y4RPBD–

860 850 840 830 820 810 800 790 780 770

B1–A
26+23 –Y4RPBD–
16 LT
ELEV. = 822.9'

EXISTING GROUND

ALLUVIAL (11) 04/13

RED AND BROWN MOIST MED DENSE CLAYEY SAND (A–2)

(5) RESIDUAL

GRAY WET LOOSE SAND (A–2)

WEATHERED ROCK (GW)

SEV. WEATHERED CRYSTALLINE ROCK

(SPT REFUSAL AT TOP, DRAG BIT REFUSAL AT BASE)

CRYSTALLINE ROCK

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING, SOMEWHAT CONTORTED IN UPPER 2 FEET.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION, HORIZONTAL BANDING, SOME DEFINED BY BIOTITE BANDS.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION. CONTORTED BANDING, HORIZONTAL TO SUB HORIZONTAL, DEFINED BY BIOTITE CONTENT AND GRAIN SIZE.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

BT

B1–B
26+15 –Y4RPBD–
22 RT
ELEV. = 823.7'

ALLUVIAL (4) 04/13

BROWN WET LOOSE CLAYEY SAND WITH SOME MICA (A–2)

(1) GRAY WET VERY LOOSE CLAYEY SAND WITH SOME MICA (A–2)

(19) GRAY WET MED DENSE TO DENSE SAND WITH SOME MICA (A–2)

RESIDUAL

REC. = 89%, RQD. = 89%

CRYSTALLINE ROCK

REC. = 100%
RQD. = 100%

FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. INTERVAL IS LESS THAN FOOT, SO FRACTURE SPACING EXTRAPOLATED.
R1: 7, R2: 17, R3: 25, R4: 20, R5: 4, RMR = 73
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND AND GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND AND GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING. GRAINSIZE IS VARIABLE.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

FRESH, HARD, GRAY, OR BLACK, PARAGNEISS WITH WIDELY SPACED FRACTURES. UPPER HALF APPEARS TO BE GRANULAR, LOWER HALF IS BLACK AND MASSIVE.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

BT

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U2579B) | 7 |

SECTION THROUGH B2
STA. 27+00.00 –Y4RPBD–
SKEW=102°00'00"

0 10 20
FEET

# –Y4RPBD–

860 850 840 830 820 810 800 790 780 770

RS-4
B2-A
27+30 –Y4RPBD–
16 LT
ELEV. = 823.5'

SS-56
RS-5
B2-B
26+95 –Y4RPBD–
22 RT
ELEV. = 823.1'

EXISTING GROUND

ALLUVIAL
GRAY-TAN WET VERY SOFT MED PLASTIC SANDY SILTY CLAY (A-7)

12/12

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. APPROXIMATELY 50% BLACK AND 50% LIGHT GRAY SECTION. LIGHT GRAY MAY EXHIBIT CONTORTED BANDING.
R1: 7, R2: 13, R3: 25, R4: 20, R5: 4, RMR = 69
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 78%
RQD. = 56%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. APPROXIMATELY 50% BLACK AND 50% LIGHT GRAY SECTION. LIGHT GRAY MAY EXHIBIT CONTORTED BANDING, BLACK IS GENERALLY MASSIVE.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. MOSTLY LIGHT GRAY RHYTHMICALLY BANDED.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. MOSTLY LIGHT GRAY AND MOSTLY RATHER CONTORTED BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

BT

ALLUVIAL

CRYSTALLINE ROCK

ALLUVIAL
TAN WET VERY LOOSE TO LOOSE SILTY CLAYEY SAND WITH TRACE MICA (A-2-4)

12/12

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ–FELDSPAR–MICA GNEISS.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ–FELDSPAR–MICA GNEISS. CONSISTENT HORIZONTAL BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ–FELDSPAR–MICA GNEISS. BANDING BECOMES CHAOTIC TOWARD BASE.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ–FELDSPAR–MICA GNEISS. CHAOTIC BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ–FELDSPAR–MICA GNEISS. CHAOTIC BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

BT

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U2579B) | 8 |

SECTION THROUGH EB2
STA. 27+80.70 –Y4RPBD–
SKEW=102°00'00"

0 10 20
FEET

# –Y4RPBD–

860 850 840 830 820 810 800 790 780

SS-54
EB2-A
27+84 –Y4RPBD–
17 LT
ELEV. = 831.1'

SS-55
EB2-B
27+75 –Y4RPBD–
22 RT
ELEV. = 827.2'

EXISTING GROUND
RED BROWN MOIST MED STIFF LOW PLASTIC SANDY CLAYEY SILT (A-4)

ALLUVIAL

7

RESIDUAL

TAN WET MED DENSE TO VERY DENSE CLAYEY SAND (A-2-4)

6

ALLUVIAL
RED BROWN WET MEDIUM STIFF LOW PLASTIC SANDY CLAYEY SILT (A-4)

RESIDUAL

GRAY AND WHITE WET LOOSE TO MEDIUM DENSE MICACEOUS CLAYEY SAND (A-2-4)

10

WEATHERED ROCK

CRYSTALLINE ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ-FELDSPAR-MICA GNEISS. CHAOTIC BANDING.
R1: 7, R2: 17, R3: 25, R4: 20, R5: 4, RMR = 73
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100% RQD. = 100%

REC. = 88%
RQD. = 78%

VERY SLIGHTLY WEATHERED HARD GRAY PARAGNEISS W/WIDELY SPACED FRACTURES. HAS INTERVALS FROM 12' TO 14' THAT ARE SCHISTOSE, AND IRON STAINED.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. LIGHT INTERVALS ARE MIXED WITH DARK GRAY INTERVALS INDICATING FOLDS AND INCLINED BANDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

BT
NM
12/17/12

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE QUARTZ-FELDSPAR-MICA GNEISS. INCLINED BANDING, LOWER HALF CHAOTIC.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

FRESH HARD GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE. BOTTOM 2' MIX OF LIGHT GRAY AND DARK GRAY ROCK, INDICATE SOME FOLDING.
R1: 7, R2: 20, R3: 25, R4: 20, R5: 4, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E

BT
NM
12/17/12

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 25+44 | **OFFSET** 17 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** NM |
| **COLLAR ELEV.** 824.0 ft | **TOTAL DEPTH** 10.5 ft | **NORTHING** 863,654 | **EASTING** 1,665,966 **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 04/17/13 | **COMP. DATE** 04/17/13 | **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 | | | | | | | | | | 824.0 GROUND SURFACE | 0.0 |
| | | | | | | | | | | **ALLUVIAL** 0' - 5' ALLUVIAL, BROWN WET MED STIFF LOW PLASTIC SANDY SILTY CLAY (A-7) | |
| 820 | 820.8 | 3.2 | 2 | 2 | 3 | 5 | | W | | 819.0 | 5.0 |
| | | | | | | | | | | **ALLUVIAL** 5' - 8' ALLUVIAL, BROWN, WET, LOOSE, NON PLASTIC, SAND W/ GRAVEL (A-1) | |
| 815 | 815.8 | 8.2 | 18 | 8 | 100/.4 | 100/.4 | | W | | 816.0 | 8.0 |
| | | | | | | | | | | 814.8 **RESIDUAL** 8' - 9.2' RESIDUAL, GRAY AND WHITE MOIST MEDIUM DENSE NON PLASTIC SAND (A-2) | 9.2 |
| | | | | | | | | | | 813.5 **WEATHERED ROCK** 9.2'-10.5' SEVERELY WEATHERED CRYSTALLINE ROCK | 10.5 |
| | | | | | | | | | | Boring Terminated by Tri-Wing Drag Bit Refusal at Elevation 813.5 ft on crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 25+35 | **OFFSET** 23 ft RT | **ALIGNMENT** -Y4RPBD- **0 HR.** 4.0 |
| **COLLAR ELEV.** 823.0 ft | **TOTAL DEPTH** 18.1 ft | **NORTHING** 863,681 | **EASTING** 1,665,936 **24 HR.** 5.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 04/17/13 | **COMP. DATE** 04/17/13 | **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 | | | | | | | | | | 823.0 GROUND SURFACE | 0.0 |
| | | | | | | | | | | **ALLUVIAL** 0 - 7' ALLUVIAL, VERY LIGHT TAN MED STIFF MEDIUM PLASTIC FINE SANDY CLAY W/ VERY FINE MICA (A-7) | |
| 820 | 820.0 | 3.0 | 1 | 3 | 4 | 7 | | M | | 816.0 | 7.0 |
| | | | | | | | | | | 815.5 **ALLUVIAL** 7' - 7.5' ALLUVIAL GRAVEL | 7.5 |
| 815 | 815.0 | 8.0 | 1 | 1 | 1 | 2 | | W | | **RESIDUAL** 7.5' - 11.8' RESIDUAL, LIGHT GREENISH TAN, WET, VERY LOOSE, NON PLASTIC HIGHLY MICACEOUS SAND 40% MICA, 40% FINE QUARTZ SAND, 20% SILT-CLAY (A-2) | |
| 810 | 809.9 | 13.1 | 14 | 18 | 25 | 43 | | W | | 811.2 | 11.8 |
| | | | | | | | | | | 808.0 | 15.0 |
| 805 | | | | | | | | | | 805.9 **RESIDUAL** 11.8' - 15' RESIDUAL, BROWN AND WHITE, WET, DENSE, NON PLASTIC COARSE SAND. HIGHLY WEATHERED FELDSPAR, BIOTITE, QUARTZ GRANITIC GNEISS (A-2) | 17.1 |
| | | | | | | | | | | 804.9 **WEATHERED ROCK** 15' - 17.1' SEVERELY WEATHERED CRYSTALLINE ROCK | 18.1 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 17.1' - 18.1' CRYSTALLINE ROCK: PRESUMED SPT REFUSAL AT TOP, DRAG BIT REFUSAL AT BASE. | |
| | | | | | | | | | | Boring Terminated by Tri-Wing Drag Bit Refusal at Elevation 804.9 ft on crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 26+23 | **OFFSET** 16 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** NM |
| **COLLAR ELEV.** 822.9 ft | **TOTAL DEPTH** 29.6 ft | **NORTHING** 863,586 | **EASTING** 1,665,926 **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 04/16/13 | **COMP. DATE** 04/16/13 | **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 | | | | | | | | | | 822.9 GROUND SURFACE | 0.0 |
| 820 | 820.0 | 2.9 | 1 | 2 | 9 | 11 | | M | | **ALLUVIAL** 0 - 9' ALLUVIAL, RED AND BROWN MOIST MED DENSE NON PLASTIC CLAYEY SAND. COARSE FRACTION 70% CONTAINS QUARTZ AND MICA, FINE FRACTION 30%; SILT - CLAY (A-2) | |
| 815 | 815.0 | 7.9 | 1 | 2 | 3 | 5 | | M | | 813.9 **RESIDUAL** 9' - 12" GRAY WET LOOSE SAND (A-2) | 9.0 |
| 810 | 810.0 | 12.9 | 60/.1 | | | 60/.1 | | W | | 810.9 | 12.0 |
| | | | | | | | | | | 810.0 **WEATHERED ROCK** 12' - 12.9' SEVERELY WEATHERED CRYSTALLINE ROCK | 12.9 |
| 805 | | | | | | | | | | 806.8 **CRYSTALLINE ROCK** 12.9' - 16.1 CRYSTALLINE ROCK (SPT REFUSAL AT TOP, DRAG BIT REFUSAL AT BASE) | 16.1 |
| | | | | | | | | | | 803.3 **CRYSTALLINE ROCK** 16.1' - 19.6' CRYSTALLINE ROCK; PARAGNEISS | 19.6 |
| 800 | | | | | | | | | | 798.3 **CRYSTALLINE ROCK** 19.6' - 24.6' CRYSTALLINE ROCK; PARAGNEISS | 24.6 |
| 795 | | | | | | | | | | 793.3 **CRYSTALLINE ROCK** 24.6' - 29.6' CRYSTALLINE ROCK; PARAGNEISS | 29.6 |
| | | | | | | | | | | Boring Terminated at Elevation 793.3 ft in paragneiss | |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/19/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 26+23 | **OFFSET** 16 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** NM |
| **COLLAR ELEV.** 822.9 ft | **TOTAL DEPTH** 29.6 ft | **NORTHING** 863,586 | **EASTING** 1,665,926 **24 HR.** 4.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 04/16/13 | **COMP. DATE** 04/16/13 | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 13.5 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 806.79 | | | | | | | | | | | Begin Coring @ 16.1 ft | |
| 805 | 806.8 | 16.1 | 3.5 | | (3.5) 100% | (3.5) 100% | | (3.5) 100% | (3.5) 100% | | 806.8 **CRYSTALLINE ROCK** 16.1' - 19.6' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING, SOMEWHAT CONTORTED IN UPPER 2 FEET. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 16.1 |
| | 803.3 | 19.6 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 803.3 | 19.6 |
| 800 | 798.3 | 24.6 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 798.3 **CRYSTALLINE ROCK** 19.6' - 24.6' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION, HORIZONTAL BANDING, SOME DEFINED BY BIOTITE BANDS. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 24.6 |
| 795 | 793.3 | 29.6 | | | | | | | | | 793.3 **CRYSTALLINE ROCK** 24.6' - 29.6' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SEDIMENTARY SECTION. GNEISS FROM SEDIMENTARY SECTION. CONTORTED BANDING, HORIZONTAL TO SUB HORIZONTAL, DEFINED BY BIOTITE CONTENT AND GRAIN SIZE. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 29.6 |
| | | | | | | | | | | | Boring Terminated at Elevation 793.3 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/19/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 26+15 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 823.7 ft | **TOTAL DEPTH** 34.7 ft | **NORTHING** 863,611 | **EASTING** 1,665,897 | **24 HR.** 5.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 04/16/13 | **COMP. DATE** 04/16/13 | **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 | | | | | | | | | | 823.7 GROUND SURFACE | 0.0 |
| 820 | 820.7 | 3.0 | 3 | 2 | 2 | 4 | | W | | **ALLUVIAL** 0' - 7' ALLUVIAL,BROWN WET LOOSE CLAYEY SAND W/ SOME MICA. COARSE FRACTION IS 70% OF SAMPLE, 70% QUARTZ, 30% MICA. 30% SILT CLAY. NON PLASTIC (A-2) | |
| 815 | 815.7 | 8.0 | 1 | 1 | 0 | 1 | | W | | 816.7 **ALLUVIAL** 7' - 13' ALLUVIAL, GRAY WET VERY LOOSE CLAYEY SAND W/ SOME MICA. 70% COARSE, 30% FINE SAND AND SILT-CLAY. COARSE FRACTION IS 70% QUARTZ, 30% MICA (A-2) | 7.0 13.0 |
| 810 | 810.7 | 13.0 | 6 | 9 | 10 | 19 | | W | | **RESIDUAL** 13' - 18.5' RESIDUAL GRAY WET MED DENSE TO DENSE SAND W/ SOME MICA 30% QUARTZ, 30% MICA. SALT AND PEPPER TEXTURE. FINE GRAINED (A-2) | |
| 805 | 805.7 | 18.0 | 20 | 60/.1 | | 60/.1 | | | | 805.2 804.9 804.0 **CRYSTALLINE ROCK** 18.5' -18.8' CRYSTALLINE ROCK. (SPT REFUSAL AT TOP, DRAGBIT REFUSAL AT BASE) | 18.5 18.8 19.7 |
| 800 | | | | | | | | | | 799.0 **CRYSTALLINE ROCK** 18.8' - 19.7' GRAY PARAGNEISS | 24.7 |
| 795 | | | | | | | | | | **CRYSTALLINE ROCK** 19.7' - 24.7' GRAY PARAGNEISS | |
| 790 | | | | | | | | | | 794.0 **CRYSTALLINE ROCK** 24.7' - 29.7' GRAY PARAGNEISS | 29.7 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 27.7' - 34.7' GRAY PARAGNEISS | |
| | | | | | | | | | | 789.0 | 34.7 |

Boring Terminated at Elevation 789.0 ft in paragneiss

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 26+15 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 823.7 ft | **TOTAL DEPTH** 34.7 ft | **NORTHING** 863,611 | **EASTING** 1,665,897 | **24 HR.** 5.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 04/16/13 | **COMP. DATE** 04/16/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 15.9 ft | | | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. % | STRATA RQD (ft) % | LOG | DESCRIPTION AND REMARKS ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 804.92 | | | | | | | | | | | Begin Coring @ 18.8 ft | |
| | 804.9 804.0 | 18.8 19.7 | 0.9 | | (0.8) 89% | (0.8) 89% | | (0.8) 89% | (0.8) 89% | | 804.9 804.0 **CRYSTALLINE ROCK** 18.8' - 19.7. FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. INTERVAL IS LESS THAN FOOT, SO FRACTURE SPACING EXTRAPOLATED. R1: 7, R2: 17, R3: 25, R4: 20, R5: 4 RMR = 73, GOOD ROCK, CLASS II ROCK TYPE E | 18.8 19.7 |
| 800 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 799.0 | 24.7 | | | | | | | | | 799.0 **CRYSTALLINE ROCK** 19.7' - 24.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND AND GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 24.7 |
| 795 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 794.0 | 29.7 | | | | | | | | | 794.0 **CRYSTALLINE ROCK** 24.7' - 29.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. GNEISS FROM SAND AND GRAVEL SEDIMENTARY SECTION. GENERALLY HORIZONTAL BANDING. GRAINSIZE IS VARIABLE. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 29.7 |
| 790 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 789.0 | 34.7 | | | | | | | | | 789.0 **CRYSTALLINE ROCK** 27.7' - 34.7' FRESH, HARD, GRAY, OR BLACK, PARAGNEISS WITH WIDELY SPACED FRACTURES. UPPER HALF APPEARS TO BE GRANULAR, LOWER HALF IS BLACK AND MASSIVE. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 34.7 |

Boring Terminated at Elevation 789.0 ft in paragneiss

NCDOT CORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 27+30 | **OFFSET** 16 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 823.5 ft | **TOTAL DEPTH** 25.8 ft | **NORTHING** 863,493 | **EASTING** 1,665,874 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **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 | | | | | | | | | | 823.5 GROUND SURFACE | 0.0 |
| 820 | 820.5 | 3.0 | 1 | 0 | 1 | 1 | | W | | **ALLUVIAL** 0 - 5' ALLUVIAL, GRAY-TAN WET VERY SOFT MED PLASTIC SANDY SILTY CLAY (A-7) | |
| | | | | | | | | | | 818.5 | 5.0 |
| | | | | | | | | | | 818.1 **WEATHERED ROCK** 5' -5.4' SEVERELY WEATHERED CRYSTALLINE ROCK | 5.4 |
| 815 | | | | | | | | | | **CRYSTALLINE ROCK** 5.4' - 10.8' ALTERNATING LAYERS OF WHITE AND BLACK PARAGNEISS | |
| | | | | | | | | | | 812.7 | 10.8 |
| 810 | | | | | | | RS-4 | | | **CRYSTALLINE ROCK** 10.8' - 15.8' ALTERNATING BLACK AND WHITE LAYERS OF PARAGNEISS | |
| | | | | | | | | | | 807.7 | 15.8 |
| 805 | | | | | | | | | | **CRYSTALLINE ROCK** 15.8' - 20.8' BANDED LIGHT GRAY PARAGNEISS | |
| | | | | | | | | | | 802.7 | 20.8 |
| 800 | | | | | | | | | | **CRYSTALLINE ROCK** 20.8' - 25.8' LIGHT GRAY PARAGNEISS | |
| | | | | | | | | | | 797.7 | 25.8 |
| | | | | | | | | | | Boring Terminated at Elevation 797.7 ft in paragneiss | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 27+30 | **OFFSET** 16 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 823.5 ft | **TOTAL DEPTH** 25.8 ft | **NORTHING** 863,493 | **EASTING** 1,665,874 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 19.4 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 818.13 | | | | | | | | | | | Begin Coring @ 5.4 ft | |
| 815 | 818.1 | 5.4 | 4.4 | | (4.2) 95% | (3.0) 68% | | (4.2) 78% | (3.0) 56% | | 818.1 **CRYSTALLINE ROCK** 5.4' - 10.8' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. APPROXIMATELY 50% BLACK AND 50% LIGHT GRAY SECTION. LIGHT GRAY MAY EXHIBIT CONTORTED BANDING. R1: 7, R2: 13, R3: 25, R4: 20, R5: 4 RMR = 69, GOOD ROCK, CLASS II ROCK TYPE E | 5.4 |
| | 813.7 | 9.8 | | | | | | | | | | |
| | 812.7 | 10.8 | | | | | | | | | 812.7 | 10.8 |
| 810 | | | 5.0 | | (5.0) 100% | (5.0) 100% | RS-4 | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 10.8' - 15.8' FRESH, HARD, GRAY PARAGNESISS WITH WIDELY SPACED FRACTURES. APPROXIMATELY 50% BLACK AND 50% LIGHT GRAY SECTION. LIGHT GRAY MAY EXHIBIT CONTORTED BANDING, BLACK IS GENERALLY MASSIVE. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | |
| | 807.7 | 15.8 | | | | | | | | | 807.7 | 15.8 |
| 805 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 802.7 | 20.8 | | | | | | | | | 802.7 | 20.8 |
| 800 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 15.8' - 20.8' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. MOSTLY LIGHT GRAY RHYTHMICALLY BANDED. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | |
| | 797.7 | 25.8 | | | | | | | | | 797.7 | 25.8 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 20.8' - 25.8' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. MOSTLY LIGHT GRAY AND MOSTLY RATHER CONTORTED BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | |
| | | | | | | | | | | | Boring Terminated at Elevation 797.7 ft in paragneiss | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 26+95 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 823.1 ft | **TOTAL DEPTH** 29.7 ft | **NORTHING** 863,542 | **EASTING** 1,665,858 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **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 | | | | | | | | | | 823.1 GROUND SURFACE | 0.0 |
| | 821.1 | 2.0 | 1 | 0 | 1 | 1 | | W | | ALLUVIAL<br>0 - 6.5' ALLUVIAL, TAN WET VERY LOOSE TO LOOSE NON PLASTIC SILTY CLAYEY SAND W/ TRACE MICA (A-2-4) | |
| 820 | 818.1 | 5.0 | 2 | 2 | 2 | 4 | SS-56 | W | | 816.6 | 6.5 |
| 815 | | | | | | | | | | 816.3 WEATHERED ROCK<br>6.5' - 6.8' SEVERELY WEATHERED CRYSTALLINE ROCK | 6.8 |
| | | | | | | | RS-5 | | | 813.4 CRYSTALLINE ROCK<br>6.8' - 9.7' LIGHT GRAY BANDED PARAGNEISS | 9.7 |
| 810 | | | | | | | | | | 808.4 CRYSTALLINE ROCK<br>9.7' - 14.7' LIGHT GRAY BANDED PARAGNEISS | 14.7 |
| 805 | | | | | | | | | | 803.4 CRYSTALLINE ROCK<br>14.7' - 19.7' LIGHT GRAY BANDED PARAGNEISS | 19.7 |
| 800 | | | | | | | | | | CRYSTALLINE ROCK<br>19.7' - 24.7' LIGHT GRAY BANDED PARAGNEISS | |
| | | | | | | | | | | 798.4 CRYSTALLINE ROCK<br>24.7' - 29.7' LIGHT GRAY BANDED PARAGNEISS | 24.7 |
| 795 | | | | | | | | | | 793.4 Boring Terminated at Elevation 793.4 ft in paragneiss | 29.7 |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 26+95 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 823.1 ft | **TOTAL DEPTH** 29.7 ft | **NORTHING** 863,542 | **EASTING** 1,665,858 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 22.9 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 816.3 | | | | | | | | | | | Begin Coring @ 6.8 ft | |
| 815 | 816.3 | 6.8 | 2.9 | | (2.9) 100% | (2.9) 100% | | (2.9) 100% | (2.9) 100% | | 816.3 CRYSTALLINE ROCK<br>6.8' - 9.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E | 6.8 |
| | 813.4 | 9.7 | 5.0 | | (5.0) 100% | (5.0) 100% | RS-5 | (5.0) 100% | (5.0) 100% | | 813.4 | 9.7 |
| 810 | 808.4 | 14.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 808.4 CRYSTALLINE ROCK<br>9.7' - 14.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CONSISTENT HORIZONTAL BANDING.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E | 14.7 |
| 805 | 803.4 | 19.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 803.4 | 19.7 |
| 800 | 798.4 | 24.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 798.4 CRYSTALLINE ROCK<br>14.7' - 19.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. BANDING BECOMES CHAOTIC TOWARD BASE.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E | 24.7 |
| 795 | 793.4 | 29.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 793.4 CRYSTALLINE ROCK<br>19.7' - 24.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CHAOTIC BANDING<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E | 29.7 |
| | | | | | | | | | | | CRYSTALLINE ROCK<br>24.7' - 29.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CHAOTIC BANDING.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E | |
| | | | | | | | | | | | Boring Terminated at Elevation 793.4 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 26+95 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 823.1 ft | **TOTAL DEPTH** 29.7 ft | **NORTHING** 863,542 | **EASTING** 1,665,858 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **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<br>ELEV. (ft) — DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 825 | | | | | | | | | | 823.1 — GROUND SURFACE — 0.0 |
| | 821.1 | 2.0 | 1 | 0 | 1 | 1 | | W | | **ALLUVIAL**<br>0 - 6.5' ALLUVIAL, TAN WET VERY LOOSE TO LOOSE NON PLASTIC SILTY CLAYEY SAND W/ TRACE MICA (A-2-4) |
| 820 | 818.1 | 5.0 | 2 | 2 | 2 | 4 | SS-56 | W | | 816.6 — 6.5 |
| 815 | | | | | | | RS-5 | | | 816.3 — 6.8<br>**WEATHERED ROCK**<br>6.5' - 6.8' SEVERELY WEATHERED CRYSTALLINE ROCK<br>813.4 — 9.7<br>**CRYSTALLINE ROCK**<br>6.8' - 9.7' LIGHT GRAY BANDED PARAGNEISS |
| 810 | | | | | | | | | | 808.4 — 14.7<br>**CRYSTALLINE ROCK**<br>9.7' - 14.7' LIGHT GRAY BANDED PARAGNEISS |
| 805 | | | | | | | | | | 803.4 — 19.7<br>**CRYSTALLINE ROCK**<br>14.7' - 19.7' LIGHT GRAY BANDED PARAGNEISS |
| 800 | | | | | | | | | | 798.4 — 24.7<br>**CRYSTALLINE ROCK**<br>19.7' - 24.7' LIGHT GRAY BANDED PARAGNEISS |
| 795 | | | | | | | | | | 793.4 — 29.7<br>**CRYSTALLINE ROCK**<br>24.7' - 29.7' LIGHT GRAY BANDED PARAGNEISS<br>Boring Terminated at Elevation 793.4 ft in paragneiss |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 26+95 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 823.1 ft | **TOTAL DEPTH** 29.7 ft | **NORTHING** 863,542 | **EASTING** 1,665,858 | **24 HR.** 3.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/18/12 | **COMP. DATE** 12/18/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 22.9 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<br>ELEV. (ft) — DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 816.3 | | | | | | | | | | | Begin Coring @ 6.8 ft |
| 815 | 816.3 | 6.8 | 2.9 | | (2.9) 100% | (2.9) 100% | | (2.9) 100% | (2.9) 100% | | 816.3 — 6.8<br>**CRYSTALLINE ROCK**<br>6.8' - 9.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E |
| | 813.4 | 9.7 | 5.0 | | (5.0) 100% | (5.0) 100% | RS-5 | (5.0) 100% | (5.0) 100% | | 813.4 — 9.7<br>**CRYSTALLINE ROCK**<br>9.7' - 14.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CONSISTENT HORIZONTAL BANDING.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E |
| 810 | 808.4 | 14.7 | | | | | | | | | 808.4 — 14.7 |
| 805 | 803.4 | 19.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 803.4 — 19.7<br>**CRYSTALLINE ROCK**<br>14.7' - 19.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. BANDING BECOMES CHAOTIC TOWARD BASE.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E |
| 800 | 798.4 | 24.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 798.4 — 24.7 |
| 795 | 793.4 | 29.7 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 793.4 — 29.7<br>**CRYSTALLINE ROCK**<br>19.7' - 24.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CHAOTIC BANDING<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E<br>**CRYSTALLINE ROCK**<br>24.7' - 29.7' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CHAOTIC BANDING.<br>R1: 7, R2: 20, R3: 25, R4: 20, R5: 4<br>RMR = 76, GOOD ROCK, CLASS II<br>ROCK TYPE E<br>Boring Terminated at Elevation 793.4 ft in paragneiss |

NCDOT CORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 27+84 | **OFFSET** 17 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 831.1 ft | **TOTAL DEPTH** 19.4 ft | **NORTHING** 863,445 | **EASTING** 1,665,848 | **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/17/12 | **COMP. DATE** 12/17/12 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 831.1 GROUND SURFACE | 0.0 |
| | 829.3 | 1.8 | 2 | 3 | 4 | | SS-54 | W | | **ALLUVIAL** 829.1 0 - 2' ALLUVIAL, RED BROWN MOIST MED STIFF LOW PLASTIC SANDY CLAYEY SILT (A-4) | 2.0 |
| | 824.3 | 6.8 | 12 | 59 | 60/.1 | 60/.1 | | | | **RESIDUAL** 2' - 7.8' RESIDUAL, TAN WET MED DENSE TO VERY DENSE NON PLASTIC CLAYEY SAND (A-2-4) 823.3 | 7.8 |
| | | | | | | | | | | 823.1 **CRYSTALLINE ROCK** 7.8' - 8.0' (SPT REFUSAL AT TOP, CASING ADVANCER REFUSAL AT BASE) 821.7 | 8.0 / 9.4 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 8' - 9.4' LIGHT GRAY BANDED PARAGNEISS 816.7 | 14.4 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 9.4' - 14.4' LIGHT GRAY BANDED PARAGNEISS 811.7 | 19.4 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 14.4' - 19.4' LIGHT GRAY BANDED PARAGNEISS | |
| | | | | | | | | | | Boring Terminated at Elevation 811.7 ft in paragneiss | |

NCDOT BORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 27+84 | **OFFSET** 17 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 5.0 |
| **COLLAR ELEV.** 831.1 ft | **TOTAL DEPTH** 19.4 ft | **NORTHING** 863,445 | **EASTING** 1,665,848 | **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/17/12 | **COMP. DATE** 12/17/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 823.12 | | | | | | | | | | | Begin Coring @ 8.0 ft | |
| | 823.1 | 8.0 | 1.4 | | (1.4) 100% | (1.4) 100% | | (1.4) 100% | (1.4) 100% | | 823.1 **CRYSTALLINE ROCK** | 8.0 |
| | 821.7 | 9.4 | 5.0 | | (4.4) 88% | (3.9) 78% | | (4.4) 88% | (3.9) 78% | | 821.7 8' - 9.4' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. CHAOTIC BANDING. R1: 7, R2: 17, R3: 25, R4: 20, R5: 4 RMR = 73, GOOD ROCK, CLASS II ROCK TYPE E | 9.4 |
| | 816.7 | 14.4 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 816.7 **CRYSTALLINE ROCK** 9.4' - 14.4' VERY SLIGHTLY WEATHERED, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS INTERVALS FROM 12' TO 14' THAT ARE SCHISTOSE, AND IRON STAINED. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 14.4 |
| | 811.7 | 19.4 | | | | | | | | | 811.7 **CRYSTALLINE ROCK** 14.4' - 19.4' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. LIGHT INTERVALS ARE MIXED WITH DARK GRAY INTERVALS, INDICATING FOLDS AND INCLINED BANDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 19.4 |
| | | | | | | | | | | | Boring Terminated at Elevation 811.7 ft in paragneiss | |

NCDOT CORE SINGLE U2579B_GEO_BRDG_26+60-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 9/17/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 27+75 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 827.2 ft | **TOTAL DEPTH** 19.5 ft | **NORTHING** 863,472 | **EASTING** 1,665,818 | **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/17/12 | **COMP. DATE** 12/17/12 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 830 | | | | | | | | | | 827.2 GROUND SURFACE | 0.0 |
| 825 | 825.5 | 1.7 | 2 | 2 | 4 | 6 | | W | | **ALLUVIAL** 0 - 4.1' ALLUVIAL, RED BROWN WET MEDIUM STIFF LOW PLASTIC SANDY CLAYEY SILT (A-4) 823.1 | 4.1 |
| 820 | 820.5 | 6.7 | 2 | 2 | 8 | 10 | SS-55 | W | | **RESIDUAL** 4.1' - 8.5' RESIDUAL, GRAY AND WHITE WET LOOSE TO MEDIUM DENSE NON PLASTIC MICACEOUS CLAYEY SAND (A-2-4) 818.7 | 8.5 |
| 815 | | | | | | | | | | **WEATHERED ROCK** 8.5' -9.6' SEVERELY WEATHERED CRYSTALLINE ROCK 817.6 | 9.6 |
| 810 | | | | | | | | | | **CRYSTALLINE ROCK** 9.6' - 14.5' LIGHT GRAY BANDED PARAGNEISS 812.7 | 14.5 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 14.5' - 19.5' LIGHT GRAY BANDED PARAGNEISS 807.7 | 19.5 |
| | | | | | | | | | | Boring Terminated at Elevation 807.7 ft in paragneiss | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS. | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 27+75 | **OFFSET** 22 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 3.0 |
| **COLLAR ELEV.** 827.2 ft | **TOTAL DEPTH** 19.5 ft | **NORTHING** 863,472 | **EASTING** 1,665,818 | **24 HR.** NM |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 12/17/12 | **COMP. DATE** 12/17/12 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 9.9 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 817.64 | | | | | | | | | | | Begin Coring @ 9.6 ft | |
| 815 | 817.6 | 9.6 | 4.9 | | (4.9) 100% | (4.9) 100% | | (4.9) 100% | (4.9) 100% | | 817.6 **CRYSTALLINE ROCK** 9.6' - 14.5' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE, QUARTZ - FELDSPAR - MICA GNEISS. INCLINED BANDING, LOWER HALF CHAOTIC. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 9.6 |
| 810 | 812.7 | 14.5 | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 812.7 | 14.5 |
| | 807.7 | 19.5 | | | | | | | | | 807.7 **CRYSTALLINE ROCK** 14.5' - 19.5' FRESH, HARD, GRAY PARAGNEISS WITH WIDELY SPACED FRACTURES. HAS LIGHT GRAY GRANULAR APPEARANCE. BOTTOM 2' MIX OF LIGHT GRAY AND DARK GRAY ROCK, INDICATE SOME FOLDING. R1: 7, R2: 20, R3: 25, R4: 20, R5: 4 RMR = 76, GOOD ROCK, CLASS II ROCK TYPE E | 19.5 |
| | | | | | | | | | | | Boring Terminated at Elevation 807.7 ft in paragneiss | |

# *TEST RESULTS*

*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: FORSYTH*
*SITE DESCRIPTION: BRIDGE ON -Y4RPBD- OVER HARMON MILL (SMITH) CREEK BETWEEN US 158 AND US 421 / I-40 BUS.*



**SOIL SAMPLE RESULTS**

| *SAMPLE NO.* | *OFFSET* | *STATION* | *DEPTH INTERVAL* | *AASHTO CLASS* | *N* | *L.L.* | *P.I.* | *% BY WEIGHT* | | | | *% PASSING SIEVES* | | | *% MOISTURE* | *% ORGANIC* | *UNIT WT. (d)* | *VOID RATIO* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *C. SAND* | *F. SAND* | *SILT* | *CLAY* | *10* | *40* | *200* | | | | |
| | | **B2-B** | | | | | | | | | | | | | | | | |
| SS-56 | 22 RT. | 26+95 -Y4RPBD- | 5.00-6.50 | A-2-4(0) | 4 | 22 | NP | 20.3 | 52.4 | 11.3 | 16.0 | 99 | 93 | 34 | | | | |
| | | **EB2-A** | | | | | | | | | | | | | | | | |
| SS-54 | 17 LT. | 27+84 -Y4RPBD- | 1.80-3.30 | A-2-4(0) | 7 | 29 | NP | 51.6 | 23.5 | 8.9 | 16.0 | 89 | 57 | 24 | | | | |
| | | **EB2-B** | | | | | | | | | | | | | | | | |
| SS-55 | 22 RT. | 27+75 -Y4RPBD- | 6.70-8.20 | A-2-4(0) | 10 | 40 | NP | 48.1 | 35.7 | 6.1 | 10.0 | 96 | 69 | 19 | | | | |

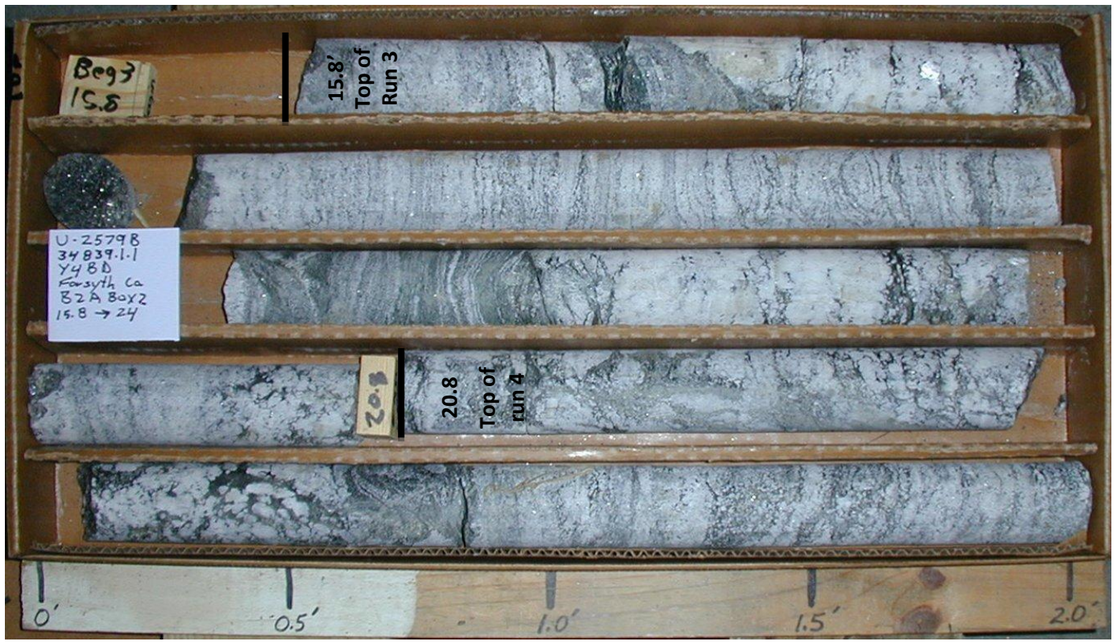
**ROCK SAMPLE RESULTS**

| *SAMPLE NO.* | *OFFSET* | *STATION* | *DEPTH INTERVAL* | *RQD* | *UNIT WT (pcf)* | Q(ksf) | E(MPsi) |
|---|---|---|---|---|---|---|---|
| | | **B2-A** | | | | | |
| RS-4 | 16 LT. | 27+30 -Y4RPBD- | 13.1-13.5 | 100% | 170.4 | 1140.48 | 6.55 |
| | | **B2-B** | | | | | |
| RS-5 | 22 RT. | 26+95 -Y4RPBD- | 10.0-10.45 | 100% | 172.3 | 1474.56 | 3.41 |

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on –Y4RPBD- over Harmon Mill (Smith) Creek between US-158 and US-421 / I-40 Bus.

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on –Y4RPBD- over Harmon Mill (Smith) Creek between US-158 and US-421 / I-40 Bus.

5.4'
Top of
Run 1
10.8
10.8
Top of
Run 2
13.1
RS-4
13.55
U-2579B
34839.1.1
Y4BD
Forsyth Co
B2-A Box1
5.4 → 15.8
0'
0.5'
1.0'
1.5'
2.0'


Beg?
15.8
15.8'
Top of
Run 3
U-2579B
34839.1.1
Y4BD
Forsyth Co
B2A Box2
15.8 → 24
20.8
20.8
Top of
run 4
0'
0.5'
1.0'
1.5'
2.0'

25.8
End of
Boring
U-2579B
34839.1.1
Y4BD
Forsyth Co
B2A Box3
24 - 25.8
0'
0.5'
1.0'
1.5'
2.0'

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on –Y4RPBD- over Harmon Mill (Smith) Creek between US- 158 and US-421 / I-40 Bus.

8.0'
Top of
Run 1
9.4'
Top of
Run 2
U-2579B
34839.1.1
Y48D
Forsyth Co.
EB2A Box 1
8.0' → 14.4
0'
0.5'
1.0'
1.5'
2.0'

14.4'
Top of
Run 3
16.4'
RS-7
16.8'
19.4'
Bottom
of
Boring
U2579B
34839.1.1
Y48D
Forsyth Co.
EB2-A Box 2
14.4' → 19.4'
END
0'
0.5'
1.0'
1.5'
2.0'

9.6'
Top of
Run 1
9.55'
10.0'
RS-6
U-2579B
34839.1.1
Y4BD
Forsyth Co.
EB2-B Box1
6.8 → 14.5
0'
0.5'
1.0'
1.5'
2.0'

14.5'
Top of
Run 2
U-2579B
34839.1.1
Y4BD
Forsyth Co.
EB2-B Box2
14.5 → 19.5
19.5'
Bottom
of
Boring
0'
0.5'
1.0'
1.5'
2.0'

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 23 |

# Aerial Photo

0 60 120

FEET

25

30

HARMON MILL (SMITH) CREEK

N 51° 27' 03.0" W

-BY12-533

-T5- 457
ELEV.=825.26

EB1-A

B1-A

B2-A

EB2-A

S 29° 30' 54.6" W

EB1-B

B1-B

B2-B

EB2-B

N 62° 00' 48.0" W

-Y4RPBD- ST Sta. 23+25.35

S 41° 51' 12.3" W

S 32° 36' 09.3" W

S 84° 44' 25.1" W

-T5- 458
ELEV.=823.31

-T4- A409
ELEV.=824.32

-T4- A410
ELEV.=822.02

-T4- A411
-T5- B411
ELEV.=822.14

S 14° 46' 16.9" W

-T4- A412
ELEV.=821.67

-Y4RPB- POT Sta. 10+00.00

-Y4RPBD- POT Sta. 30+50.00 (12' RT)

N NORTH

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 14 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *NHF-0918(93)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *WINSTON-SALEM NORTHERN BELTWAY (EASTERN SECTION, FUTURE I-74) BETWEEN US 158& US 421 / I-40 BUS.*

SITE DESCRIPTION *BRIDGE ON RAMP BD OVER US-421 /I-40 BUS. BETWEEN WINSTON-SALEM NORTHERN BELTWAY AND US-421 /I-40 BUS.*

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| SHEET | DESCRIPTION |
|---|---|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4 | PROFILE |
| 5-7 | CROSS SECTIONS |
| 8-11 | BORE LOG AND CORE REPORTS |
| 12-13 | CORE PHOTOGRAPHS |
| 14 | AERIAL PHOTOGRAPH |


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PERSONNEL

*J. E. ESTEP*

*M. R. MOORE*

*C. C. MURRAY*

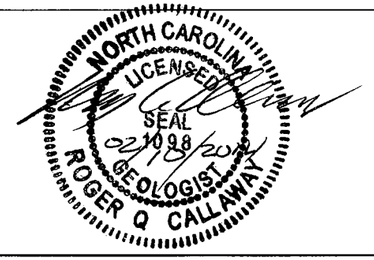
*C. L. SMITH*

INVESTIGATED BY *R. Q. CALLAWAY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *FEBRUARY 2014*




PROJECT: 34839.1.1

ID: U-2579B

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. |
|---|---|
| 34839.1.1 (U-2579B) | 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<br>A-3 | A-4, A-5<br>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<br>A-7-6 | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING<br># 10<br># 40<br># 200 | 50 MX<br>30 MX<br>15 MX | 50 MX<br>25 MX | 51 MN<br>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<br>PLASTIC INDEX | 6 MX | | NP | 40 MX<br>10 MX | 41 MN<br>10 MX | 40 MX<br>11 MN | 41 MN<br>11 MN | 40 MX<br>10 MX | 41 MN<br>10 MX | 40 MX<br>11 MN | 41 MN<br>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<br>LOOSE<br>MEDIUM DENSE<br>DENSE<br>VERY DENSE | <4<br>4 TO 10<br>10 TO 30<br>30 TO 50<br>>50 | N/A |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT<br>SOFT<br>MEDIUM STIFF<br>STIFF<br>VERY STIFF<br>HARD | <2<br>2 TO 4<br>4 TO 8<br>8 TO 15<br>15 TO 30<br>>30 | <0.25<br>0.25 TO 0.50<br>0.5 TO 1.0<br>1 TO 2<br>2 TO 4<br>>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<br>PLASTIC RANGE (PI)<br>PL — PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE |
| OM — OPTIMUM MOISTURE<br>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 CMT / 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [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
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B_____
- [N] -N NX
- [ ] -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, SANOSTONE, 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 FELOSPARS 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 FELOSPARS 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: BY15-539 N 862048.5470 E 1665285.3270 ELEV.=900.48'
BY17-555 N 861000.6910 E 1665374.5580 ELEV.=923.08'
ELEVATION: FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

CAR=CASING ADVANCER REFUSAL

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 60 120

FEET

S 25° 43' 25.1" E

EXISTING R/W

-BY15-538

-Y4LPB-

REX LANIER PEDDYCORD
FAYE GARDNER PEDDYCORD
DB 1660 PG 3583
PB 18 PG 20

-Y4RPBD- POC STA 43+79.19
-Y4WB- POT STA 98+14.65

N 85° 54' 19.6" W

N 88° 02' 28.9" W

-Y4WB-

-Y4-

-Y4EB-

NC D.O.T.
(FORMERLY - GRIFFIN FAMILY PRESERVATION TRUST)
DB 2666 PG 2563

EXISTING R/W

R/W MON

-Y4RPBD-

EB1-A

B1-A

EB2-A

EB1-B

B1-B

EB2-B

-Y4RPBD- POC STA 44+08.64
-Y4- POT STA 98+02.89

-BY15-539

-Y6-POT STA 48+48.20

CAROL S. DEBUSK
SUE S. ROUTH
NO RECORDED DEED
PB 37 PG 46

-BY16-

-Y4RPBD- POC STA 44+38.39
-Y4EB- POT STA 97+90.41

TOWN OF KERNERSVILLE
FORSYTH COUNTY
R/W MON
EXISTING R/W

CAROL S. DEBUSK
SUE S. ROUTH
DB 915 PG 488

-Y4APC-

NORTH

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |

BRIDGE ON RAMP BD OVER US-421 / I-40 BUS.
PROFILE ALONG -Y4RPBD-

0 50 100
FEET
VE = 5:1

930
920
910
900
890
880
870
860
850

41 42 43 44 45 46 47

-Y4RPBD- STA 43+79.9
-Y4WB- STA 98+14.65

-Y4RPBD- STA 44+08.64
-Y4- STA 98+02.89

-Y4RPBD- STA 44+38.39
-Y4EB- STA 97+90.41

EXISTING GROUND

EB1-B
42+71 -Y4RPBD-
11 RT.
ELEV. = 901.2'

ROADWAY EMBANKMENT
CONTACT BETWEEN EMBANKMENT AND RESIDUAL. RESIDUAL IS LIGHT TAN-BROWN, MOIST, STIFF, VERY MICACEOUS SAND (A-4)

RESIDUAL
TAN, MOIST, STIFF, SLIGHTLY PLASTIC MICACEOUS SAND. RELICT FELDSPAR MICA GNEISS TEXTURE. (A-4)

WHITE AND BROWN, MOIST, SLIGHTLY PLASTIC, STIFF, MIX OF FELDSPAR PORPHYRY WITH NO MICA, AND MICACEOUS GNEISS. (A-4)

LIGHT BROWN, MOIST, VERY STIFF, NON PLASTIC, MICACEOUS SILTY SAND. (A-4)

GREEN BROWN AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS, SILTY SAND. (A-2)

BRONZE AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, SLIGHTLY MICACEOUS SAND. GNEISS RELICT TEXTURE. (A-2)

DARK GRAY AND GREEN-BROWN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. SLIGHTLY FOLIATED, WITH QUARTZ NEEDLES. (A-2)

BROWN AND BLACK, MOIST, MEDIUM DENSE, NON PLASTIC MICACEOUS SAND, COARSE FELDSPAR GNEISS. (A-2)

GREENISH TAN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. NO RELICT TEXTURE. (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK (WHITE AND GREEN-BROWN TO GRAY, MOIST, VERY DENSE, NON PLASTIC, MICACEOUS SAND)

CRYSTALLINE ROCK

AB
NM
06/01/13

B1-B
44+16 -Y4RPBD-
12 RT
ELEV. = 889.2'

RESIDUAL
ASPHALT OVER GREEN BROWN AND WHITE, MOIST, STIFF, NON PLASTIC, MICACEOUS SILTY SAND. (A-4)

GRN-BRN & WHITE, MOIST, MED. DENSE, MICA SAND, NO RELICT TEXTURE, PROBABLY FELDSPAR GNEISS. (A-2)

08/13

SEVERELY WEATHERED CRYSTALLINE ROCK
(SPT REFUSAL)

GRN-BRN PINK BLK WHITE MOIST DENSE, MICA SAND. (A-2)

WEATHERED ROCK

CRYSTALLINE ROCK

REC. = 100%
RQD. = 66%

REC. = 100%
RQD. = 100%

BLACK & WHITE, MED. GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH HARD WIDELY SPACED FRACTURES EXCEPT AT 21.0' AND 23.0' R1: 4, R2: 20, R3: 20, R4: 20, R5: 4, RMR = 61 GOOD ROCK, ROCK TYPE C

REC. = 100%
RQD. = 100%

BLACK AND WHITE MED. GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH HARD WIDELY SPACED FRACTURES. R1: 4, R2: 20, R3: 25, R4: 25, R5: 4, RMR = 78 GOOD ROCK, ROCK TYPE C

REC. = 100%
RQD. = 100%

BT

EB2-B
45+71 -Y4RPBD-
22.5 RT.
ELEV. = 916.8'

RESIDUAL
RED-ORANGE DRY MEDIUM STIFF, VERY PLASTIC SANDY CLAY. (A-7)

RED-ORANGE MOIST, STIFF, MODERATELY PLASTIC CLAYEY MICACWOUS SAND. RELICT PORPHYRY TEXTURE. (A-7)

BEIGE OR GREEN-BROWN, MOIST, STIFF, NON PLASTIC, SILTY SAND. MIX OF WEATHERED GNEISS AND WEATHERED FELSIC WITH OR WITHOUT MICA. (A-4)

06/13

BEIGE, MOIST, STIFF, NON PLASTIC, SLIGHTLY MICACEOUS, SANDY SILT. RELICT PORHYRYTIC TEXTURE. (A-4)

GRAY AND BROWN, MOIST, MED. DENSE, COARSE MICACEOUS SAND (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

TCR
CAVED
06/19/13

CRYSTALLINE ROCK

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 5 |

0 10 20 FEET

SECTION THROUGH EB1
STA. 42+78.64 -Y4RPBD-
SKEW = 108°-34'-27"

# -Y4RPBD-

920 910 900 890 880 870 860 850 840

**EB1-A**
42+83 -Y4RPBD-
21 LT
ELEV. = 900.7'

RESIDUAL

ASPHALT OVER WHITE AND GREEN-TAN, MOIST, STIFF, MODERATELY PLASTIC FELDSPAR MICA SAND, WITH A CROSS-CUTTING CLAYEY VEIN. (A-6) — 10

TAN, MOIST, STIFF, MODERATELY PLASTIC, MICACEOUS SAND. GOOD RELICT TEXTURE (A-6) — 10

GREENISH TAN, MOIST, STIFF, SLIGHTLY PLASTIC SILTY MICACEOUS SAND. FINE GRAINED QUARTZ-MICA-FELDSPAR GOOD RELICT TEXTURE (A-4) — 14

IRON STAIN ORANGE, PLUS WHITE, MOIST, STIFF, PLASTIC, SILTY CLAY, NO MICA. WEATHERED DIKE, GOOD RELICT TEXTURE (A-7) — 10

OFF-WHITE PLUS GREEN TAN, MOIST, MED DENSE, PLASTIC, FINELY MICACEOUS SAND. GOOD RELICT TEXTURE (A-2) — 12

RED AND YELLOW, MOIST TO WET, MEDIUM STIFF, HIGHLY PLASTIC, SILTY CLAY; NO MICA (A-7) — 7

LIMONITE YELLOW ORANGE, WET, STIFF, HIGHLY PLASTIC, SILTY SANDY CLAY WITH QUARTZ VEINLETS. (A-6) — 8 — ▽ 06/13

WHITE AND TAN, WET, MEDIUM DENSE, MODERATELY PLASTIC, HIGHLY WEATHERED MODERATELY COARSE GRANITE. GOOD RELICT TEXTURE (A-2) — 10

YELLOW BROWN, WET, VERY STIFF, HIGHLY PLASTIC, SILTY CLAY, NO MICA. GOOD RELICT TEXTURE (A-7) — 15

YELLOW-ORANGE DENSE CLAY PLUS SAND & ROCK FRAGMENTS. CLAY IS PLASTIC, NO MICA. (A-2) — 43

CAR
NM
06/05/13

CRYSTALLINE ROCK — 100/3

**EB1-B**
42+71 -Y4RPBD-
11 RT
ELEV. = 901.2'

EXISTING GROUND

ROADWAY EMBANKMENT
CONTACT BETWEEN EMBANKMENT AND RESIDUAL. RESIDUAL IS LIGHT TAN-BROWN, MOIST, STIFF, VERY MICACEOUS SAND (A-4) — 13

RESIDUAL

TAN, MOIST, STIFF, SLIGHTLY PLASTIC, MICACEOUS SAND. RELICT FELDSPAR MICA GNEISS TEXTURE. (A-4) — 10

WHITE AND BROWN, MOIST, SLIGHTLY PLASTIC, STIFF, MIX. OF FELDSPAR PORPHYRY WITH NO MICA, AND MICACEOUS GNEISS. (A-4) — 12

LIGHT BROWN, MOIST, VERY STIFF, NON PLASTIC, MICACEOUS SILTY SAND. (A-4) — 16

GREEN BROWN AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS, SILTY SAND (A-2) — 12

BRONZE AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, SLIGHTLY MICACEOUS SAND. GNEISS RELICT TEXTURE. (A-2) — 16

DARK GRAY AND GREEN-BROWN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. SLIGHTLY FOLIATED, WITH QUARTZ NEEDLES. (A-2) — 16 — ▽ 06/13

BROWN AND BLACK, MOIST, MEDIUM DENSE, NON PLASTIC MICACEOUS SAND. COARSE FELDSPAR GNEISS. (A-2) — 12

GREENISH TAN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. NO RELICT TEXTURE, (A-2) — 19

WEATHERED ROCK
(WHITE AND GREEN-BROWN TO GRAY, MOIST, VERY DENSE- NON PLASTIC, MICACEOUS SAND) — 99

SEVERELY WEATHERED CRYSTALLINE ROCK — 100/3

AR
NM
06/01/13

50 40 30 20 10 0 10 20 30 40 50

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 6 |
| | SECTION THROUGH B1<br>STA. 44+08.64 -Y4RPBD-<br>SKEW=114°-10'-28" | |

# -YRRPBD-

920 910 900 890 880 870 860 850 840 830

B1-A
44+30 -Y4RPBD-
20 LT
ELEV. = 889.4'

B1-B
44+16 -Y4RPBD-
12 RT
ELEV. = 889.2'

EXISTING GROUND

RESIDUAL
ASPHALT OVER GREEN BROWN AND WHITE, MOIST, STIFF, NON PLASTIC, MICACEOUS SANDY SILT (A-4)

GREEN BROWN AND WHITE, MOIST, STIFF, NON PLASTIC, MICACEOUS SILTY SAND (A-4)

WHITE AND IRON STAINED, MOIST, LOOSE, SLIGHTLY PLASTIC, SILTY SAND (A-2)

WHITE & IRON STAINED DRY MED. DENSE NON PLASTIC QUARTZ-FLEDSPAR GOOD RELICT PORPHYRY TEXTURE (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(SPT REFUSAL)

CRYSTALLINE ROCK

BLACK AND WHITE FOLDED COARSE GRAINED QUARTZ-BIOTITE GNEISS FROM SEDIMENT, MOSTLY, FRESH, HARD, WIDELY SPACED FRACTURES, SLIGHTLY WEATHERED ZONE AT 26' TO 27'
R1: 4 R2: 13 R3: 20 R4: 20 R5: 4 RMR 61, GOOD ROCK, ROCK TYPE C

REC. = 93%
RQD. = 70%

BLACK AND WHITE, FOLDED COARSE GRAINED QUARTZ-BIOTITE GNEISS, FROM SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES.
R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C

REC. = 100%
RQD. = 100%

BT
NM
08/28/13

RESIDUAL
ASPHALT OVER GREEN BROWN AND WHITE, MOIST, STIFF, NON PLASTIC, MICACEOUS SILTY SAND (A-4)

GREEN BROWN AND WHITE, MOIST, MEDIUM-DENSE, MICACEOUS SAND, NO RELICT TEXTURE. PROBABLY FELDSPAR GNEISS (A-2)

08/13

GREEN BROWN, PINK, BLACK, WHITE, MOIST, DENSE, MICACEOUS SAND. QUARTZ- BIOTITE, MICA, FELDSPAR GNEISS, AFTER PORPHYRY (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(SPT REFUSAL)

CRYSTALLINE ROCK

BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES, EXCEPT AT 21.0' AND 23.0'.
R1: 4 R2: 13 R3: 20 R4: 20 R5: 4 RMR 61, GOOD ROCK, ROCK TYPE C

REC. = 100%
RQD. = 66%

BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C

REC. = 100%
RQD. = 100%

BT

50 40 30 20 10 0 10 20 30 40 50

| 0 | 10 | 20 |
|---|---|---|
| FEET | | |

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 7 |
| SECTION THROUGH EB2<br>STA. 45+58.64 -Y4RPBD-<br>SKEW = 120°38'-11" | |

# -YRRPBD-

950 940 930 920 910 900 890 880 870 860

EB2-A
45+93 -Y4RPBD-
16 LT.
ELEV. = 915.5'

EB2-B
45+71 -Y4RPBD-
22.5 RT.
ELEV. = 916.8'

EXISTING GROUND

(6) RESIDUAL
RED, MOIST, MEDIUM STIFF, MODERATELY PLASTIC, MICACEOUS SILTY SANDY CLAY (A-7)

(8) RED AND BROWN, WET LOOSE, NON PLASTIC, MICACEOUS SILTY CLAYEY SAND (A-2)

(8) RED BROWN, MOIST, STIFF, NON PLASTIC, MICACEOUS SAND. (A-4)

06/13

(12) BROWN-GREEN UNOXIDISED, MOIST, STIFF, NON PLASTIC, MICACEOUS SAND. (A-4)

(13) GREEN-BROWN TO BRONZE MOIST, MED DENSE TO DENSE NON PLASTIC MICACEOUS SAND (A-2)

(50/4") (SPT REFUSAL)

TCR
NM
06/19/13

(6) RESIDUAL
RED-ORANGE DRY, MEDIUM STIFF, VERY PLASTIC SANDY CLAY (A-7)

(10) RED-ORANGE MOIST, STIFF, MODERATELY PLASTIC CLAYEY MICACEOUS SAND. RELICT PORPHYRY TEXTURE. (A-7)

(9) BEIGE OR GREEN-BROWN, MOIST, STIFF, NON PLASTIC, SILTY SAND. MIX OF WEATHERED GNEISS AND WEATHERED FELSIC WITH OR WITHOUT MICA. (A-4)

06/13

(8) BEIGE, MOIST, STIFF, NON PLASTIC, SLIGHTLY MICACEOUS, SANDY, SILT. RELICT PORHYRYTIC TEXTURE. (A-4)

(27) GRAY AND BROWN, MOIST, MED. DENSE, COARSE MICACEOUS SAND. (A-2)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

TCR
CAVED
06/19/13

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 42+83 | **OFFSET** 21 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 37.0 |
| **COLLAR ELEV.** 900.7 ft | **TOTAL DEPTH** 50.3 ft | **NORTHING** 862,055 | **EASTING** 1,665,487 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/05/13 | **COMP. DATE** 06/05/13 | **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 | | | | | | | | | | 900.7 GROUND SURFACE 0.0 |
| | | | | | | | | | | **RESIDUAL** 0' - 8.7' RESIDUAL, ASPHALT OVER WHITE AND GREEN-TAN, MOIST, STIFF, MODERATELY PLASTIC FELDSPAR MICA SAND, WITH A CROSS-CUTTING CLAYEY VEIN. |
| | 897.0 | 3.7 | 4 | 5 | 5 | 10 | | M | | 892.0 8.7 |
| 895 | | | | | | | | | | **RESIDUAL** 8.7' - 13.7' RESIDUAL, TAN, MOIST, STIFF, MODERATELY PLASTIC, MICACEOUS SAND. 30% MICA, 10% QUARTZ, 30% WEATHERED FELDSPAR, 30% SILT-CLAY FINES. GOOD RELICT TEXTURE |
| | 892.0 | 8.7 | 3 | 4 | 6 | 10 | | D | | 887.0 13.7 |
| 890 | | | | | | | | | | **RESIDUAL** 13.7' - 18.7' GREENISH TAN, MOIST, STIFF, SLIGHTLY PLASTIC SILTY MICACEOUS SAND. FINE GRAINED QUARTZ-MICA-FELDSPAR. 30% SILT, 70% FINE SAND. GOOD RELICT TEXTURE |
| | 887.0 | 13.7 | 4 | 7 | 7 | 14 | | D | | 882.0 18.7 |
| 885 | | | | | | | | | | **RESIDUAL** 18.7' - 23.7' IRON STAIN ORANGE, PLUS WHITE, MOIST, STIFF, PLASTIC, SILTY CLAY. NO MICA. WEATHERED DIKE? GOOD RELICT TEXTURE |
| | 882.0 | 18.7 | 3 | 4 | 6 | 10 | | D | | 877.0 23.7 |
| 880 | | | | | | | | | | **RESIDUAL** 23.7' - 28.7' OFF-WHITE PLUS GREEN TAN, MOIST, MEDIUM DENSE, PLASTIC, FINELY MICACEOUS SAND. GOOD RELICT TEXTURE |
| | 877.0 | 23.7 | 3 | 4 | 8 | 12 | | M | | 872.0 28.7 |
| 875 | | | | | | | | | | **RESIDUAL** 28.7' - 33.7' RED AND YELLOW, MOIST TO WET, MEDIUM STIFF, HIGHLY PLASTIC, SILTY CLAY; NO MICA |
| | 872.0 | 28.7 | 2 | 2 | 5 | 7 | | W | | 867.0 33.7 |
| 870 | | | | | | | | | | **RESIDUAL** 33.7' - 38.7' LIMONITE YELLOW ORANGE, WET, MEDIUM STIFF, HIGHLY PLASTIC, SILTY SANDY CLAY WITH QUARTZ VEINLETS. |
| | 867.0 | 33.7 | 3 | 3 | 5 | 8 | | W | | 862.0 38.7 |
| 865 | | | | | | | | ▽ | | **RESIDUAL** 38.7' - 43.7 WHITE AND TAN, WET, MEDIUM DENSE, MODERATELY PLASTIC, HIGHLY WEATHERED MODERATELY COARSE GRANITE. GOOD RELICT TEXTURE |
| | 862.0 | 38.7 | 5 | 5 | 5 | 10 | | W | | 857.0 43.7 |
| 860 | | | | | | | | | | **RESIDUAL** 43.7' - 48.7' YELLOW BROWN, WET, VERY STIFF, HIGHLY PLASTIC, SILTY CLAY; NO MICA. GOOD RELICT TEXTURE |
| | 857.0 | 43.7 | 3 | 5 | 10 | 15 | | W | | 852.0 48.7 |
| 855 | | | | | | | | | | **RESIDUAL** 48.7' - 50.2 YELLOW-ORANGE CLAY PLUS SAND AND ROCK FRAGMENTS. CLAY IS PLASTIC, NO MICA. |
| | 852.0 | 48.7 | 18 | 13 | 30 | 43 | | | | 850.5 50.2 |
| | | | | | | | | | | 850.4 50.3 **CRYSTALLINE ROCK** 50.3' - 50.3' ROCK. ROLLERCONE REFUSAL. |
| | | | | | | | | | | Boring Terminated at Elevation 850.4 ft ON |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG44+08.64-Y4RPBD-_STR15.GPJ NC_DOT.GDT 2/6/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 42+71 | **OFFSET** 11 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 33.5 |
| **COLLAR ELEV.** 901.2 ft | **TOTAL DEPTH** 54.2 ft | **NORTHING** 862,058 | **EASTING** 1,665,453 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Smith, C. L. | **START DATE** 06/11/13 | **COMP. DATE** 06/11/13 | **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 | | | | | | | | | | 901.2 GROUND SURFACE 0.0 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** 0.0' - 4.5' CONTACT BETWEEN EMBANKMENT AND RESIDUAL. RESIDUAL IS LIGHT TAN-BROWN, MOIST, STIFF, VERY MICACEOUS SAND. 15% QUARTZ, 50% COARSE MICA, 35% SILT FINES |
| | 898.2 | 3.0 | 4 | 7 | 6 | 13 | | D | | 896.7 4.5 |
| 895 | | | | | | | | | | **RESIDUAL** 4.5'- 13.0' RESIDUAL, TAN, MOIST, STIFF, SLIGHTLY PLASTIC, MICACEOUS SAND. 15% QUARTZ, 30% WEATHERED FELDSPAR, 40% MICA. RELICT FELDSPAR MICA GNEISS TEXTURE. |
| | 893.2 | 8.0 | 5 | 4 | 6 | 10 | | D | | 888.2 13.0 |
| 890 | | | | | | | | | | **RESIDUAL** 13.0' - 18.0' RESIDUAL, WHITE AND BROWN, MOIST, SLIGHTLY PLASTIC, STIFF, MIX OF FELDSPAR PORPHYRY WITH NO MICA, AND MICACEOUS GNEISS. |
| | 888.2 | 13.0 | 2 | 5 | 7 | 12 | | D | | 883.2 18.0 |
| 885 | | | | | | | | | | **RESIDUAL** 18.0' - 23.0' RESIDUAL, LIGHT BROWN, MOIST, VERY STIFF, NON PLASTIC, MICACEOUS SILTY SAND. 10% QUARTZ, 40% MICA, 50% SILT-CLAY. |
| | 883.2 | 18.0 | 3 | 7 | 9 | 16 | | M | | 878.2 23.0 |
| 880 | | | | | | | | | | **RESIDUAL** 23.0' - 28.0' GREEN BROWN AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS, SILTY SAND. 10% QUARTZ, 50% MICA, 40% SILT-CLAY. |
| | 878.2 | 23.0 | 4 | 5 | 7 | 12 | | M | | 873.2 28.0 |
| 875 | | | | | | | | | | **RESIDUAL** 28.0' - 33.0' BRONZE AND WHITE, MOIST, MEDIUM DENSE, NON PLASTIC, SLIGHTLY MICACEOUS SAND. 15% QUARTZ, 40% FELDSPAR, 15% MICA, 30% FINES. gNEISS RELICT TEXTURE. |
| | 873.2 | 28.0 | 3 | 7 | 9 | 16 | | ▽ M | | 868.2 33.0 |
| 870 | | | | | | | | | | **RESIDUAL** 33.0' - 38.0' DARK GRAY AND GREEN-BROWN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. 40% FELDSPAR, 20% QUARTZ, 20% MICA, 20% SILT-CLAY. SLIGHTLY FOLIATED, WITH QUARTZ NEEDLES. |
| | 868.2 | 33.0 | 3 | 7 | 9 | 16 | | W | | 863.2 38.0 |
| 865 | | | | | | | | | | **RESIDUAL** 38.0' - 43.0' BROWN AND BLACK, MOIST, MEDIUM DENSE, NON PLASTIC MICACEOUS SAND. 20% QUARTZ, 50% FELDSPAR, 20% MICA. COARSE FELDSPAR GNEISS. |
| | 863.2 | 38.0 | 3 | 5 | 7 | 12 | | W | | 858.2 43.0 |
| 860 | | | | | | | | | | **RESIDUAL** 43.0' - 48.0' RESIDUAL, GREENISH TAN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND. NO RELICT TEXTURE; BAG OF SAND. |
| | 858.2 | 43.0 | 7 | 8 | 11 | 19 | | W | | 853.2 48.0 |
| 855 | | | | | | | | | | **WEATHERED ROCK** 48.0' - 53.0' RESIDUAL, WHITE AND GREEN-BROWN, MOIST, VERY DENSE, NON PLASTIC, MICACEOUS SAND. 15% QUARTZ, 40% FELDSPAR, 20% MICA, 20% FINES. WEATHERED ROCK |
| | 853.2 | 48.0 | 31 | 51 | 48 | | | W | | 848.2 53.0 |
| 850 | | | | | | | | | | **WEATHERED ROCK** 53.0' - 54.1' WHITE GRAY, AND DARK GRAY, MOIST, VERY DENSE, NON PLASTIC, MICACEOUS SAND. 40% FELDSPAR, 15% MICA, SOME BIOTITE, 15% QUARTZ, 30% FINESAND AND SILT. WEATHERED ROCK |
| | 848.2 | 53.0 | 100/.3 | | | 100/.3 | | D | | 847.1 54.1 847.0 54.2 **CRYSTALLINE ROCK** 54.1' - 54.2 CRYSTALLINE ROCK, ROLLERCONE REFUSAL |
| | | | | | | | | | | Boring Terminated at Elevation 847.0 ft ON |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG44+08.64-Y4RPBD-_STR15.GPJ NC_DOT.GDT 2/6/14

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 44+30 | **OFFSET** 20 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** N/A |
| **COLLAR ELEV.** 889.4 ft | **TOTAL DEPTH** 44.6 ft | **NORTHING** 861,916 | **EASTING** 1,665,529 **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 08/28/13 | **COMP. DATE** 08/28/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 890 | | | | | | | | | | 889.4 GROUND SURFACE | 0.0 |
| | 886.6 | 2.8 | 3 | 4 | 5 | 9 | | M | | **RESIDUAL** 0.0' - 7.8' RESIDUAL, ASPHALT OVER GREEN BROWN AND WHITE, MOIST, MEDIUM STIFF, NON PLASTIC, MICACEOUS SANDY SILT.20% FINE MICA, 40% WEATHERED FELDSPAR, 20% QUARTZ, 20% FINES. | |
| 885 | | | | | | | | | | 881.6 | 7.8 |
| | 881.6 | 7.8 | 2 | 3 | 5 | 8 | | M | | **RESIDUAL** 7.8' - 12.8' RESIDUAL, GREEN BROWN AND WHITE, MOIST, MEDIUM STIFF, NON PLASTIC, MICACEOUS SILTY SAND. 20% MICA, 20% QUARTZ, 40% WEATHERED FELDSPAR, 20% FINE SILT AND SAND. | |
| 880 | | | | | | | | | | 876.6 | 12.8 |
| | 876.6 | 12.8 | 2 | 3 | 6 | 9 | | M | | **RESIDUAL** 12.8' - 17.8' RESIDUAL, WHITE AND IRON STAIN, MOIST, LOOSE, SLIGHTLY PLASTIC, SILTY SAND. 20% MICA, SOME FINE, 20% QUARTZ, 40% FELDSPAR, SOME WEATHERED, 20% SILT-CLAY. | |
| 875 | | | | | | | | | | 871.6 | 17.8 |
| | 871.6 | 17.8 | 4 | 11 | 15 | 26 | | M | | 869.4 | 20.0 |
| 870 | | | | | | | | | | **RESIDUAL** 17.8' - 20' RESIDUAL, WHITE AND IRON STAINED, DRY, MEDIUM DENSE, NON PLASTIC, QUARTZ - FLEDSPAR, SAND. 20% QUARTZ, 60% FELDSPAR, (SOME WEATHERED TO KAOLIN), GOOD RELICT PORPHYRY TEXTURE. | |
| | 866.6 | 22.8 | 60/.1 | | | 60/.1 | | M | | 866.6 | 22.8 |
| 865 | | | | | | | | | | 864.1 | 25.3 |
| | | | | | | | | | | **WEATHERED ROCK** 20' - 22.8' WEATHERED ROCK | |
| 860 | | | | | | | | | | 859.8 | 29.6 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 22.8' - 25.3' SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE. | |
| 855 | | | | | | | | | | 854.8 | 34.6 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 25.3' - 29.6' CORED ROCK | |
| | | | | | | | | | | **CRYSTALLINE ROCK** 29.6' - 34.6' CORED ROCK | |
| 850 | | | | | | | | | | 849.8 | 39.6 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 34.6' - 39.6' CORED ROCK | |
| | | | | | | | | | | **CRYSTALLINE ROCK** 39.6' - 44.6' CORED ROCK | |
| 845 | | | | | | | | | | 844.8 | 44.6 |
| | | | | | | | | | | Boring Terminated at Elevation 844.8 ft ON | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 44+30 | **OFFSET** 20 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** N/A |
| **COLLAR ELEV.** 889.4 ft | **TOTAL DEPTH** 44.6 ft | **NORTHING** 861,916 | **EASTING** 1,665,529 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 08/28/13 | **COMP. DATE** 08/28/13 | | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NO/NQ | **TOTAL RUN** 19.3 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 864.09 | | | | | | | | | | | Begin Coring @ 25.3 ft | |
| | 864.1 | 25.3 | 4.3 | | (4.0) 93% | (3.0) 70% | | (4.0) 93% | (3.0) 70% | | 864.1 **CRYSTALLINE ROCK** 25.3' - 29.6' BLACK AND WHITE, FOLDED, COARSE GRAINED, QUARTZ-BIOTITE GNEISS FROM SEDIMENT. MOSTLY, FRESH, HARD, WIDELY SPACED FRACTURES. SLIGHTLY WEATHERED ZONE AT 26' TO 27' R1: 4 R2: 13 R3: 20 R4: 20 R5: 4 RMR 61, GOOD ROCK, ROCK TYPE C | 25.3 |
| 860 | 859.8 | 29.6 | | | | | | | | | 859.8 | 29.6 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | 854.8 **CRYSTALLINE ROCK** 29.6' - 34.6' BLACK AND WHITE, FOLDED COARSE GRAINED QUARTZ-BIOTITE GNEISS, FROM SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES. R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | 34.6 |
| 855 | 854.8 | 34.6 | | | | | | | | | 849.8 | 39.6 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 34.6' - 39.6' BLACK AND WHITE, FOLDED COARSE GRAINED Q UARTZ BIOTITE GNEISS FROM SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | |
| 850 | 849.8 | 39.6 | | | | | | | | | 844.8 | 44.6 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 39.6' - 44.6' BLACK AND WHITE, FOLDED COARSE GRAINED Q UARTZ BIOTITE GNEISS FROM SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | |
| 845 | 844.8 | 44.6 | | | | | | | | | Boring Terminated at Elevation 844.8 ft ON | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 44+16 | **OFFSET** 12 ft RT | **ALIGNMENT** -Y4RPBD- — **0 HR.** N/A |
| **COLLAR ELEV.** 889.2 ft | **TOTAL DEPTH** 39.5 ft | **NORTHING** 861,918 | **EASTING** 1,665,494 — **24 HR.** 12.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/02/13 | **COMP. DATE** 08/02/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 890 | | | | | | | | | | 889.2 GROUND SURFACE | 0.0 |
| | 886.3 | 2.9 | 3 | 4 | 5 | 9 | | M | | **RESIDUAL** 0.0' - 7.9' RESIDUAL, ASPHALT OVER GREEN BROWN AND WHITE, MOIST, MEDIUM STIFF, NON PLASTIC, MICACEOUS SILTY SAND. 20% MICA, SOME FINE, 20% QUARTZ, 40% FELDSPAR, SOME ALTERED TO KAOLIN, 20% FINES. | |
| 885 | | | | | | | | | | 881.3 | 7.9 |
| | 881.3 | 7.9 | 2 | 5 | 6 | 11 | | M | | **RESIDUAL** 7.9' - 12.9' RESIDUAL, GREEN BROWN AND WHITE, MOIST, MEDIUM DENSE, MICACEOUS SAND. NO RELICT TEXTURE. PROBABLY FELDSPAR GNEISS. | |
| 880 | | | | | | | | | | 876.3 | 12.9 |
| | 876.3 | 12.9 | 5 | 9 | 29 | 38 | | M | | **RESIDUAL** 12.9' - 15', RESIDUAL, GREEN BROWN, PINK, PLACK, WHITE, MOIST, DENSE, MICACEOUS SAND. QUARTZ- BIOTITE, MICA, FELDSPAR GNEISS, AFTER PORPHYRY. | |
| 875 | | | | | | | | | | 874.2 | 15.0 |
| | 871.3 | 17.9 | 100/.3 | | | 100/.3 | | | | 870.7 | 18.5 |
| 870 | | | | | | | | | | 868.2 | 21.0 |
| | | | | | | | | | | **WEATHERED ROCK** 15' - 18.5' WEATHERED ROCK | |
| 865 | | | | | | | | | | 864.7 | 24.5 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 18.5' - 21.0' CRYSTALLINE ROCK; SPT REFUSAL AT TOP, ROLLERCONE REFUSAL AT BASE | |
| 860 | | | | | | | | | | 859.7 | 29.5 |
| | | | | | | | | | | **CRYSTALLINE ROCK** 21.0' - 24.5 CORED ROCK | |
| 855 | | | | | | | | | | **CRYSTALLINE ROCK** 24.5' - 29.5' CORED ROCK | |
| | | | | | | | | | | 854.7 | 34.5 |
| 850 | | | | | | | | | | **CRYSTALLINE ROCK** 29.5' - 34.5' CORED ROCK | |
| | | | | | | | | | | **CRYSTALLINE ROCK** 34.5' - 39.5' CORED ROCK | |
| | | | | | | | | | | 849.7 | 39.5 |
| | | | | | | | | | | Boring Terminated at Elevation 849.7 ft ON | |

NCDOT BORE SINGLE U2579B_GEO_BH_BRDG44+08.64-Y4RPBD-_STR15.GPJ NC_DOT.GDT 2/6/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 44+16 | **OFFSET** 12 ft RT | **ALIGNMENT** -Y4RPBD- — **0 HR.** N/A |
| **COLLAR ELEV.** 889.2 ft | **TOTAL DEPTH** 39.5 ft | **NORTHING** 861,918 | **EASTING** 1,665,494 — **24 HR.** 12.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 08/02/13 | **COMP. DATE** 08/02/13 | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NO/NQ | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 868.17 | | | | | | | | | | | Begin Coring @ 21.0 ft | |
| | 868.2 | 21.0 | 3.5 | | (3.5) 100% | (2.3) 66% | | (3.5) 100% | (2.3) 66% | | 868.2 **CRYSTALLINE ROCK** 21.0' - 24.5' BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES, EXCEPT AT 21.0' AND 23.0'. R1: 4 R2: 13 R3: 20 R4: 20 R5: 4 RMR 61, GOOD ROCK, ROCK TYPE C | 21.0 |
| 865 | 864.7 | 24.5 | | | | | | | | | 864.7 | 24.5 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 24.5' - 29.5' BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES. R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | |
| 860 | 859.7 | 29.5 | | | | | | | | | 859.7 | 29.5 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 29.5' - 34.5' BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | |
| 855 | 854.7 | 34.5 | | | | | | | | | 854.7 | 34.5 |
| | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | **CRYSTALLINE ROCK** 34.5' - 39.5' BLACK AND WHITE, MEDIUM GRAINED QUARTZ BIOTITE GNEISS FROM THINLY BEDDED SEDIMENT. FRESH, HARD, WIDELY SPACED FRACTURES R1: 4 R2: 20 R3: 25 R4: 25 R5: 4 RMR 78, GOOD ROCK, ROCK TYPE C | |
| 850 | 849.7 | 39.5 | | | | | | | | | 849.7 | 39.5 |
| | | | | | | | | | | | Boring Terminated at Elevation 849.7 ft ON | |

NCDOT CORE SINGLE U2579B_GEO_BH_BRDG44+08.64-Y4RPBD-_STR15.GPJ NC_DOT.GDT 2/6/14

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 45+93 | **OFFSET** 16 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 16.0 |
| **COLLAR ELEV.** 915.5 ft | **TOTAL DEPTH** 29.8 ft | **NORTHING** 861,768 | **EASTING** 1,665,591 | **24 HR.** N/A |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/19/13 | **COMP. DATE** 06/19/13 | **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) |
| 915 | 915.5 | 0.0 | | | | | | | | GROUND SURFACE |
| | 913.5 | 2.0 | 3 | 3 | 3 | 6 | | M | | **RESIDUAL** 0.0' - 7.0' RESIDUAL, RED, MOIST, MEDIUM STIFF, MODERATELY PLASTIC, MICACEOUS SILTY SANDY CLAY. 20% FINE MICA, 80% SILT-CLAY |
| | 908.5 | 7.0 | 3 | 4 | 4 | 8 | | M | | **RESIDUAL** 7.0' - 12.0' RESIDUAL, RED AND BROWN, WET, LOOSE, NON PLASTIC, MICACEOUS SILTY CLAYEY SAND. 30% QUARTZ, 30% MICA, 40% SILT-CLAY. NO RELICT TEXTURE SURVIVED SAMPLE COLLECTION |
| | 903.5 | 12.0 | 3 | 4 | 4 | 8 | | M | | |
| | 898.5 | 17.0 | 2 | 5 | 7 | 12 | | M | | **RESIDUAL** 12.0' - 17.0' RESIDUAL, RED BROWN, MOIST, MEDIUM STIFF, NON PLASTIC, MICACEOUS SAND. 15% QUARTZ,20% MICA,65% SILT-CLAY. |
| | 893.5 | 22.0 | 4 | 4 | 9 | 13 | | M | | **RESIDUAL** 17.0' - 22.0' RESIDUAL, BROWN - GREEN UNOXIDISED, MOIST, STIFF, NON PLASTIC, MICACEOUS SAND. 40% MICA, 10% QUARTZ, 50% SILT-CLAY |
| | 888.5 | 27.0 | 5 | 25 | 60/.1 | 60/.1 | | M | | **RESIDUAL** 22.0' - 27.0' RESIDUAL, GREEN-BROWN, MOIST, MEDIUM DENSE NON PLASTIC MICACEOUS SAND. 60% MICA, 5% MANGANESE OXIDE, 30% SILT-CLAY. |
| | 887.5 | 28.0 | | | | | | | | **RESIDUAL** 27.0' - 28.0' RESIDUAL, BRONZE COLORED, MOIST, DENSE, NON PLASTIC MICACEOUS SAND, JUST ABOVE ROCK LINE. |
| | 885.7 | 29.8 | | | | | | | | **CRYSTALLINE ROCK** 28.0' - 29.8' ROCK. SPT REFUSAL AT TOP, ROLLERCONE REFUSAL AT BASE. |
| | | | | | | | | | | Boring Terminated at Elevation 885.7 ft ON |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

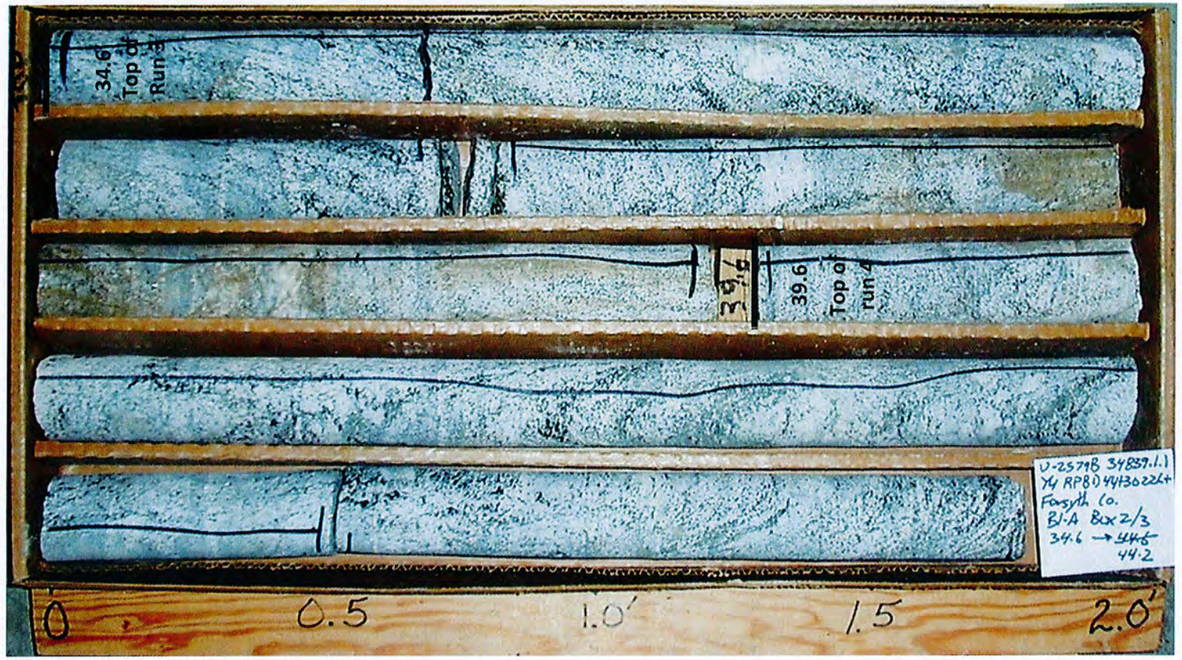
| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** STR 15 BRIDGE ON RAMP OVER US421/I-40 BUS (W/S NORTH BELT, EAST SECT BTW US156&US421) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 45+71 | **OFFSET** 23 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 15.0 |
| **COLLAR ELEV.** 916.8 ft | **TOTAL DEPTH** 26.9 ft | **NORTHING** 861,770 | **EASTING** 1,665,547 | **24 HR.** Caved |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ SPT | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/19/13 | **COMP. DATE** 06/19/13 | **SURFACE WATER DEPTH** N/A | |

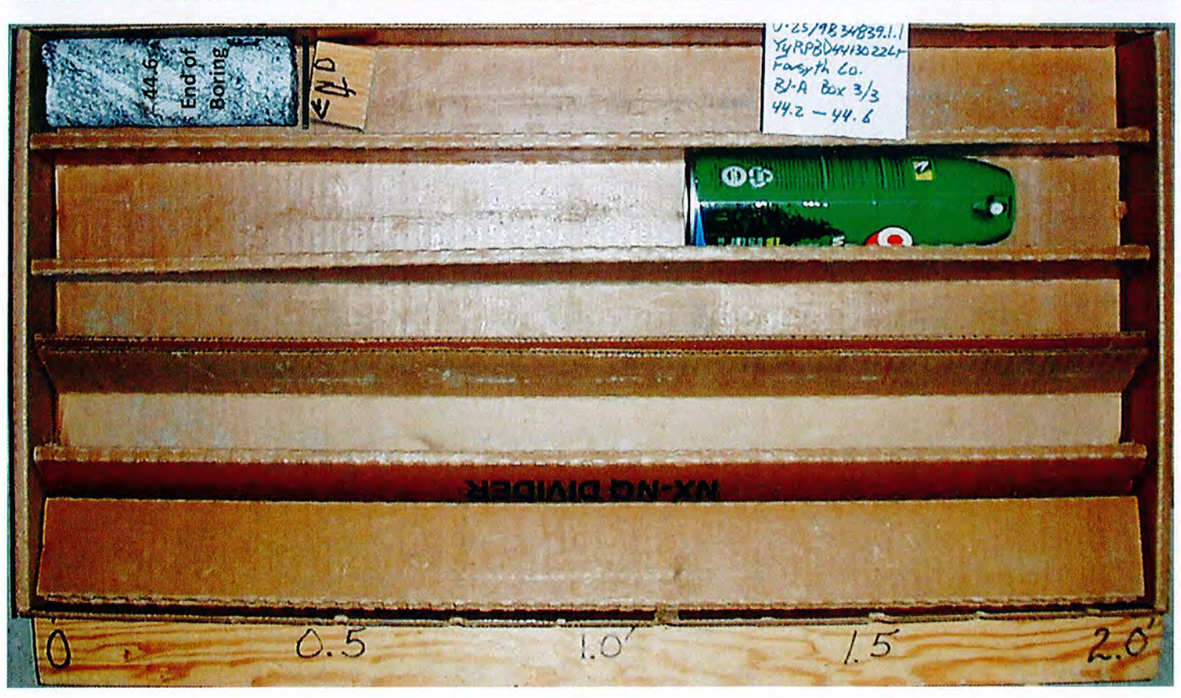
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | ELEV. (ft) DEPTH (ft) |
| 915 | 916.8 | 0.0 | | | | | | | | GROUND SURFACE |
| | 915.0 | 1.8 | 3 | 3 | 3 | 6 | | M | | **RESIDUAL** 0.0' - 6.8' RESIDUAL, RED-ORANGE DRY, MEDIUM STIFF, VERY PLASTIC SANDY CLAY. 15% QUARTZ, 85% SILT-CLAY |
| | 910.0 | 6.8 | 4 | 4 | 6 | 10 | | M | | **RESIDUAL** 6.8' - 11.8' RESIDUAL, RED-ORANGE MOIST, STIFF, MODERATELY PLASTIC CLAYEY MICACWOUS SAND. 15% QUARTZ, 15% MICA, 15% FELDSPAR, 55% SILT-CLAY. RELICT PORPHYRY TEXTURE. |
| | 905.0 | 11.8 | 2 | 4 | 5 | 9 | | M | | |
| | 900.0 | 16.8 | 2 | 3 | 5 | 8 | | M | | **RESIDUAL** 11.8' - 16.8' RESIDUAL, BEIGE OR GREEN-BROWN, MOIST, STIFF, NON PLASTIC, SILTY SAND. MIX OF WEATHERED GNEISS AND WEATHERED FELSIC WITH OR WITHOUT MICA. |
| | 895.0 | 21.8 | 11 | 9 | 18 | 27 | | M | | **RESIDUAL** 16.8' - 21.8' BEIGE, MOIST, STIFF, NON PLASTIC, SLIGHTLY MICACEOUS, SANDY SILT. RELICT PORHYRYTIC TEXTURE. |
| | 893.5 | 23.3 | | | | | | | | **RESIDUAL** 21.8' - 23.3' RESIDUAL, GRAY AND BROWN, MOIST, DENSE, COARSE MICACEOUS SAND. WEATHERED SCHIST. |
| | 890.0 | 26.8 | | | | | | | | **WEATHERED ROCK** 23.3' - 26.8' WEATHERED ROCK, |
| | 889.9 | 26.9 | | | | | | | | **CRYSTALLINE ROCK** 26.8' ROLLERCONE REFUSAL. CRYSTALLINE ROCK. |
| | | | | | | | | | | Boring Terminated at Elevation 889.9 ft ON |

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over US-421 / I-40 Bus.
between Winston-Salem Northern Beltway
and US-421 / I-40 Bus.

B1-A

SHEET 12

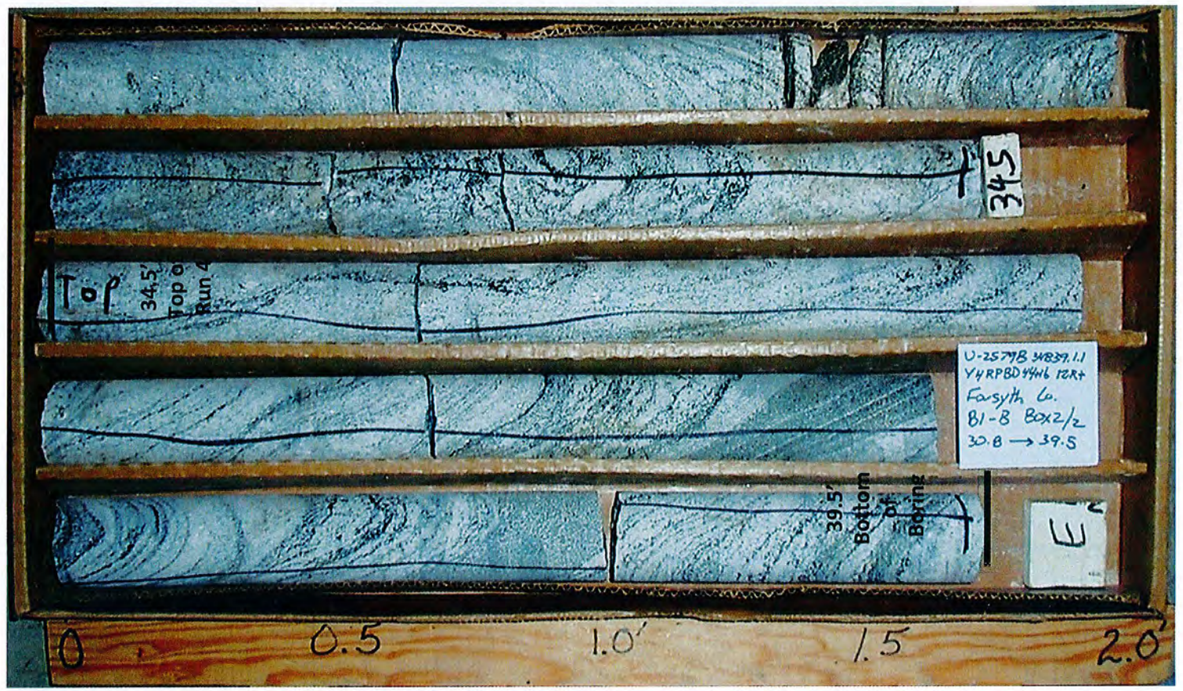


PROJECT: 34839.1.1 (U-2579)
DESCRIPTION: Bridge on Ramp BD over US-421 / I-40 Bus.
between Winston-Salem Northern Beltway
and US-421 / I-40 Bus.

B1-B

SHEET 13



| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 14 |

# Aerial Photo

0 60 120
FEET

S 25° 43' 25.1" E
-BY15-538
-Y4LPB-
-Y4RPBD- POC STA.43+79.19
-Y4WB- POT STA.98+14.65
N 85°54'19.6" W
N 88°02'28.9" W
-Y4WB-
-Y4EB-
-Y4RPBD-
EB1-A
EB1-B
B1-A
B1-B
EB2-A
EB2-B
-Y4RPBD- POC STA.44+08.64
-Y4- POT STA.98+02.89
-BY15-539
-Y6- POT STA.48+48.20
-BY16-
-Y4RPBD- POC STA.44+38.39
-Y4EB- POT STA.97+90.41
-Y4RPC-
NORTH
95
45
100
25

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 23 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *NHF-0918(93)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *BRIDGE ON RAMP BD OVER WINSTON-SALEM NORTHERN BELTWAY BETWEEN WINSTON-SALEM NORTHERN BELTWAY AND US-421/I-40 BUS.*

SITE DESCRIPTION

ID: U-2579B

PROJECT: 34839.1.1

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4 | PROFILE |
| 5-8 | CROSS SECTIONS |
| 9-15 | BORE LOG AND CORE REPORTS |
| 16 | SOIL TEST RESULTS |
| 17-22 | CORE PHOTOGRAPHS |
| 23 | AERIAL PHOTOGRAPH |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PERSONNEL

*C. C. MURRAY*

*J. E. ESTEP*

*M. R. MOORE*

INVESTIGATED BY *R. Q. CALLAWAY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *NOVEMBER 2013*

NORTH CAROLINA LICENSED SEAL 1098 GEOLOGIST ROGER Q CALLAWAY

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. |
|---|---|
| 34839.1.1 (U-2579B) | 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-7-5, A-7-6) | A-1, A-2 A-3 | A-4, A-5 A-6, A-7 | |
| | A-1-a | A-1-b | | A-2-4 | A-2-5 | A-2-6 | A-2-7 | | | | | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING #10 | 50 MX | | | | | | | | | | | | | |
| #40 | 30 MX | 50 MX | 51 MN | | | | | | | | | | | |
| #200 | 15 MX | 25 MX | 10 MX | 35 MX | 35 MX | 35 MX | 35 MX | 36 MN | 36 MN | 36 MN | 36 MN | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT |
| LIQUID LIMIT | 6 MX | | NP | 40 MX | 41 MN | 40 MX | 41 MN | 40 MX | 41 MN | 40 MX | 41 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | | HIGHLY ORGANIC SOILS |
| PLASTIC INDEX | | | | 10 MX | 10 MX | 11 MN | 11 MN | 10 MX | 10 MX | 11 MN | 11 MN | | | |
| GROUP INDEX | 0 | | 0 | 0 | | 4 MX | | 8 MX | 12 MX | 16 MX | No MX | | | |
| USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. GRAVEL, AND SAND | | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | | | | SILTY SOILS | | CLAYEY 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 | | |
| | - 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 |
|---|---|---|
| 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NX
- [ ] -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 FELOSPARS 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 FELOSPARS 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: BL-53 STA. BL 183+88.23
N 861472.3289 E 1666069.6751
ELEVATION: 925.28 FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

CAR = CASING ADVANCER REFUSAL

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 60 120
FEET

-Y4LPD-
-Y4CD- POC STA.53+77.69
-Y4RPBD- POC STA.54+16.42
-BL-53
-Y4CD-
-L- POC STA.52+94.28
-Y4RPBD- POC STA.649+19.78
-L- PT Sta. 649+60.9565
-L- POT STA.651+54.57
-L- POC STA.23+67.72
-Y4RPC-
-Y5DET-
-Y4CD- PT Sta. 53+84.13
-Y4CD- POC STA.55+70.84
-Y5DET- POC STA.22+50.51
-Y4CD- POT STA.57+01.14
-Y5- POC STA.27+33.16
-BL-54
-Y5-
-Y4RPBD-

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

NORTH
NC D.O.T. (FORMERLY - GRIFFIN FAMILY PRESERVATION TRUST)
NCDOT (GRIFFIN FAMILY PRESERVATION TRUST) ASBM
NCDOT LEROY G. DEBUSK CAROL DEBUSK
NCDOT DONALD L. PEDDYCORD BETTY W. PEDDYCORD
MABEL HAM
ALBERT RAY LONG
BOBBY F. GORDON BETSY GORDON

20' BST
CONC CURB
BST
ISFD
2SFD
MTL GATE
SELEC
OBLITERATE AND GRADE TO DRAIN
SCRUB
SBKD
20' CONC
72" WD
72" CHL
48" WW
4' P.S.
6" DI
15" RCP
12" RCP
SR 2687 HASTINGS MILL RD
50
55
65
15
20
25

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |

BRIDGE ON -Y4RPBD- WINSTON-SALEM NORTHERN BELTWAY (STRUCTURE 16)
PROFILE ALONG -Y4RPBD-

0 50 100
FEET
VE = 5:1

# -Y4RPBD-

## BORING DESCRIPTIONS

(A) SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 100%, RQD. = 100%
R1 = 4, R2 = 20, R3 = 20, R4 = 20, R5 = 7, RMR = 71, GOOD ROCK, CLASS II, ROCK TYPE E

(B) ALTERNATING INTERVALS OF FRESH HARD WIDELY FRACTURED AND SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. WEATHERING AND LOSS OF RQD SEEMS TO FOLLOW FRACTURES AT 9.0' AND 12.5'
R1 = 4, R2 = 17, R3 = 25, R4 = 20, R5 = 7, RMR = 73, GOOD ROCK, CLASS II, ROCK TYPE E

(C) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. INTERVAL OF ALTERATION AT 16.7'. WIDELY SPACED FRACTURES FROM 16.9' ON DOWN.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(D) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(E) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(F) SLIGHTLY WEATHERED MODERATELY HARD CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 95%, RQD. = 95%
R1 = 4, R2 = 20, R3 = 20, R4 = 20, R5 = 7, RMR = 71, GOOD ROCK, CLASS II, ROCK TYPE E

(G) VERY SLIGHTLY WEATHERED HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. TOP 2' SHOWS SIGNS OF SLIGHT WEATHERING. WEATHERING DECREASES RAPIDLY WITH DEPTH.
R1 = 4, R2 = 13, R3 = 20, R4 = 20, R5 = 7, RMR = 64, GOOD ROCK, CLASS II, ROCK TYPE E

## BORING DESCRIPTIONS

(H) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
R1 = 4, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(I) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(J) FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(K) FRESH - VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

(L) FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

-Y4RPBD- STA 52+94.28
-L- STA 649+19.78

PI = 53+90.00
EL = 963.86'
K = 250
VC = 1,680'

-Y4RPBD- STA 54+16.42
-Y4CD- STA 53+77.69

(+)3.0700%
(-)3.6445%

949.58
949.58

980 970 960 950 940 930 920 910 900

50 51 52 53 54 55 56 57

EXISTING GROUND

RS-6
EB2-B
54+77 -Y4RPBD-
15 RT
ELEV. = 938.1'

RESIDUAL
RED BROWN MOIST MEDIUM DENSE SILTY SAND (A-2-4)
12
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
60/.1
06/13
CRYSTALLINE ROCK (SPT REFUSAL)
FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES.
REC. = 92%, RQD. = 92%
R1 = 7, R2 = 17, R3 = 25, R4 = 20, R5 = 7, RMR = 76
GOOD ROCK, CLASS II, ROCK TYPE E
FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89
VERY GOOD ROCK, CLASS I, ROCK TYPE E
FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86
VERY GOOD ROCK, CLASS I, ROCK TYPE E
FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86
VERY GOOD ROCK, CLASS I, ROCK TYPE E
FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86
VERY GOOD ROCK, CLASS I, ROCK TYPE E
REC. = 100% RQD. = 100%
BT

RS-4
B2-B
53+85 -Y4RPBD-
19 RT
ELEV. = 934.0'
RESIDUAL
RED BROWN MOIST DENSE SILTY SAND (A-2-4)
32
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
100/.3
(F)
(G)
REC. = 96% RQD. = 72%
06/13
(H) REC. = 100% RQD. = 100%
(I) REC. = 100% RQD. = 100%
(J) REC. = 100% RQD. = 100%
(K) REC. = 100% RQD. = 100%
(L) REC. = 100% RQD. = 100%
BT

RS-2
B1-B
52+99 -Y4RPBD-
19 RT
ELEV. = 928.8'
RESIDUAL
BROWN MOIST MED. DENSE MICACEOUS SAND (A-2-4)
22
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
CRYSTALLINE ROCK
(A)
06/13
(B) REC. = 100% RQD. = 80%
(C) REC. = 96% RQD. = 80%
(D) REC. = 100% RQD. = 100%
(E) REC. = 100% RQD. = 100%
BT

EB1-B
51+76 -Y4RPBD-
18 RT
ELEV. = 920.4'
RESIDUAL
BLACK AND WHITE MOIST MED. DENSE SAND WITH LITTLE MICA (A-2-4)
13
100/.9
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
60/.1
CRYSTALLINE ROCK
BLACK AND WHITE GRANITE GNEISS. BIOTITE DEFINES GNEISSIC TEXTURE.
CAR
DRY
052813

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 5 |
| | SECTION THROUGH EB1<br>STA. 51+68.03 -Y4RPBD-<br>SKEW=65°15'37" | |

# -Y4RPBD-

960 950 940 930 920 910 900 890 880 870

EB1-A
51+58 -Y4RPBD-
22 LT
ELEV. = 920.3'

EB1-B
51+76 -Y4RPBD-
18 RT
ELEV. = 920.4'

EXISTING GROUND

ASPHALT OVER RESIDUAL

RESIDUAL

BLACK AND WHITE MOIST MEDIUM DENSE SAND WITH LITTLE MICA (A-2-4)

RESIDUAL

(12)

(13)

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

WEATHERED ROCK

60/.1

100/.9

60/.1

CRYSTALLINE ROCK

(SPT REFUSAL AT TOP, ROLLERCONE REFUSAL AT BASE)

CRYSTALLINE ROCK

BLACK AND WHITE GRANITE GNEISS BIOTITE DEFINES GNEISSIC TEXTURE.

CAR
DRY
06/28/13

CAR
DRY
06/28/13

50 40 30 20 10 0 10 20 30 40 50

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 6 |
| | SECTION THROUGH B1<br>STA. 52+94.28 -Y4RPBD-<br>SKEW=70°41'56" | |

# -Y4RPBD-

970 960 950 940 930 920 910 900 890 880

RS-1

B1-A
52+88 -Y4RPBD-
19 LT
ELEV. = 929.0'

RS-2

B1-B
52+99 -Y4RPBD-
12 RT
ELEV. = 928.8'

EXISTING GROUND

RESIDUAL
WHITE AND BLACK MOIST DENSE CLAYEY SAND WITH LITTLE MICA (A-2-4)

30

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK (GRANITE GNEISS)

100/0

CRYSTALLINE ROCK

SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 78%, RQD. = 78% R1 = 4, R2 = 17, R3 = 10, R4 = 12, R5 = 7, RMR = 60 FAIR ROCK, CLASS III, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 25, R4 = 25, R5 = 7, RMR = 84 VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. CROSSCUT BY UNMETAMORPHOSED COARSER GRAIN GRANITE DYKE AT 16.3, WITH NO CLAY ALTERATION. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89 VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

06/13
REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

BT

22

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 100%, RQD. = 100% R1 = 4, R2 = 20, R3 = 20, R4 = 20, R5 = 7, RMR = 71, GOOD ROCK, CLASS II, ROCK TYPE E

ALTERNATING INTERVALS OF FRESH HARD WIDELY FRACTURED AND SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. WEATHERING AND LOSS OF RQD SEEMS TO FOLLOW FRACTURES AT 9.0' AND 12.5'. R1 = 4, R2 = 17, R3 = 25, R4 = 20, R5 = 7, RMR = 73, GOOD ROCK, CLASS II, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. INTERVAL OF ALTERATION AT 15.7' WIDELY SPACED FRACTURES FROM 15.9' ON DOWN. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89, VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

06/13
REC. = 100%
RQD. = 80%

REC. = 96%
RQD. = 80%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

BT

50 40 30 20 10 0 10 20 30 40 50

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 7 |
| SECTION THROUGH B2<br>STA. 53+81.28 -Y4RPBD-<br>SKEW=74°26'49" | |

0 10 20
FEET

# -Y4RPBD-

970 960 950 940 930 920 910 900 890 880

RS-3
B2-A
53+76 -Y4RPBD-
19 LT
ELEV. = 934.6'

RS-4
B2-B
53+85 -Y4RPBD-
13 RT
ELEV. = 934.0'

EXISTING GROUND

RED MOIST MEDIUM DENSE SLIGHTLY PLASTIC SILTY SAND, FINE REMNANT BIOTITE AND QUARTZ GRAINS PREVALENT (A-2-4)
11
RESIDUAL

RESIDUAL
32
RED BROWN MOIST DENSE SILTY SAND, REMNANT QUARTZ, BIOTITE AND FELDSPAR GRAINS (A-2-4)

SEVERELY WEATHERED CRYSTALLINE ROCK
100/.2
06/13
WEATHERED ROCK CRYSTALLINE ROCK
100/.3
06/13
SEVERELY WEATHERED CRYSTALLINE ROCK

SLIGHTLY WEATHERED MODERATELY HARD MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 100%, RQD. = 100%, R1 = 4, R2 = 20, R3 = 20, R4 = 25, R5 = 7, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. TOP .5' SHOWS SIGNS OF SLIGHT WEATHERING. R1 = 4, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 86 VERY GOOD ROCK, CLASS I, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
REC. = 100%
RQD. = 100%

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
REC. = 100%
RQD. = 100%

BT

REC. = 96%
RQD. = 72%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

REC. = 100%
RQD. = 100%

BT

SLIGHTLY WEATHERED MODERATELY HARD CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. REC. = 95%, RQD. = 95%, R1 = 4, R2 = 20, R3 = 20, R4 = 20 R5 = 7, RMR = 71, GOOD ROCK, CLASS II, ROCK TYPE E

VERY SLIGHTLY WEATHERED HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. TOP 2' SHOWS SIGNS OF SLIGHT WEATHERING. WEATHERING DECREASES RAPIDLY WITH DEPTH. R1 = 4, R2 = 18, R3 = 20, R4 = 20, R5 = 7, RMR = 64, GOOD ROCK, CLASS II, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 4, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89 VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

50 40 30 20 10 0 10 20 30 40 50

| 0 10 20 FEET | PROJECT REFERENCE NO. | SHEET |
|---|---|---|
| | 34839.1.1 (U-2579B) | 8 |
| | SECTION THROUGH EB2 STA. 54+74.28 –Y4RPBD– SKEW=78°27'12" | |

# –Y4RPBD–

970 960 950 940 930 920 910 900 890 880

RS-5

EB2-A
54+69 –Y4RPBD–
25 LT
ELEV. = 936.5'

RESIDUAL — RED BROWN MOIST MEDIUM DENSE SILTY SAND WITH REMNANT QUARTZ AND BIOTITE. (A-2-4)

007.3

SEVERELY WEATHERED CRYSTALLINE ROCK (GRANITE GNEISS)

06/7

CRYSTALLINE ROCK

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%, WIDELY SPACED FRACTURES. REC. = 90%, RQD. = 90%, R1 = 7, R2 = 17, R3 = 10, R4 = 20, R5 = 7, RMR = 61, GOOD ROCK, CLASS II, ROCK TYPE E

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK, FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%, VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25 R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

BT

RS-6

EB2-B
54+77 –Y4RPBD–
15 RT
ELEV. = 938.1'

EXISTING GROUND

RESIDUAL — RED BROWN MOIST MEDIUM DENSE SILTY SAND (A-2-4)

12

SEVERELY WEATHERED CRYSTALLINE ROCK

50/5"

06/13

(SPT REFUSAL)

FRESH HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1 = 7, R2 = 17, R3 = 25, R4 = 20, R5 = 7, RMR = 76, GOOD ROCK, CLASS II, ROCK TYPE E, REC. = 92%, RQD. = 92%

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 7, RMR = 89 VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100% RQD. = 100%

FRESH VERY HARD LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1 = 7, R2 = 20, R3 = 30, R4 = 25, R5 = 4, RMR = 86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

BT

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 51+58 | **OFFSET** 22 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 2.0 |
| **COLLAR ELEV.** 920.3 ft | **TOTAL DEPTH** 12.9 ft | **NORTHING** 861,348 | **EASTING** 1,665,950 | **24 HR.** Dry |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ Advancer | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/27/13 | **COMP. DATE** 06/27/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 925 | | | | | | | | | | |
| 920 | | | | | | | | | | 920.3 GROUND SURFACE 0.0 |
| | 918.4 | 1.9 | 4 | 4 | 8 | 12 | | M | | **RESIDUAL** 0 - 5' RESIDUAL, BLACK AND WHITE SALT AND PEPPER, MOIST, MEDIUM DENSE, NON PLASTIC, SAND WITH LITTLE MICA. (PINK FELDSPAR 20%, CLEAR QUARTZ 30%, BLACK BIOTITE 20% WHITE PLAGIOCLASE 30% RESIDUAL WEATHERING IS DISAGGREGATING MINERAL STRUCTURE) (A-2-4) |
| 915 | 913.4 | 6.9 | 60/.1 | | | 60/.1 | | | | 915.3 5.0<br>913.4 6.9<br>**WEATHERED ROCK** 5' - 6.9' WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK |
| 910 | | | | | | | | | | 907.4 12.9<br>**CRYSTALLINE ROCK** 6.9' - 12.9' SPT REFUSAL AT TOP, ROLLERCONE REFUSAL AT BASE. DRILLED WITH DIFFICULTY. |
| | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 907.4 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 51+76 | **OFFSET** 18 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 10.0 |
| **COLLAR ELEV.** 920.4 ft | **TOTAL DEPTH** 13.6 ft | **NORTHING** 861,305 | **EASTING** 1,665,940 | **24 HR.** Dry |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing w/ Advancer | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/27/13 | **COMP. DATE** 06/27/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 925 | | | | | | | | | | |
| 920 | | | | | | | | | | 920.4 GROUND SURFACE 0.0 |
| | 918.8 | 1.6 | 3 | 5 | 8 | 13 | | M | | **RESIDUAL** 0 - 5' RESIDUAL, BLACK AND WHITE SALT AND PEPPER, MOIST, MEDIUM DENSE, NON PLASTIC, SAND WITH LITTLE MICA. (WEATHERED GRANITE, 20% PINK FELDSPAR, 20% BLACK BIOTITE, 25% CLEAR QUARTZ, 35% WHITE PLAGIOCLASE) (A-2-4) |
| 915 | 913.8 | 6.6 | 44 | 56/.4 | | 100/.9 | | M | | 915.4 5.0<br>911.4 9.0<br>**WEATHERED ROCK** 5' - 9' WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK (TRANSITION TO ROCK. INTERMITTANT HARD PLACES. BOTTOM LIMIT UNCERTAIN) |
| 910 | 908.8 | 11.6 | 60/.1 | | | 60/.1 | | | | 906.8 13.6<br>**CRYSTALLINE ROCK** 9' - 13' CRYSTALLINE ROCK. BLACK AND WHITE GRANITE GNEISS. BIOTITE DEFINES GNEISSIC TEXTURE. |
| | | | | | | | | | | Boring Terminated with Casing Advancer Refusal at Elevation 906.8 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 52+88 | **OFFSET** 19 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** 11.0 |
| **COLLAR ELEV.** 929.0 ft | **TOTAL DEPTH** 28.7 ft | **NORTHING** 861,271 | **EASTING** 1,666,053 **24 HR.** 11.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/20/13 | **COMP. DATE** 06/20/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 930 | | | | | | | | | | 929.0 GROUND SURFACE | 0.0 |
| | 926.0 | 3.0 | 3 | 15 | 15 | 30 | | M | | **RESIDUAL** 0' - 5' RESIDUAL, WHITE AND BLACK MOIST, DENSE, NON PLASTIC, CLAYEY SAND WITH LITTLE MICA (35% QUARTZ, 15% BIOTITE, 25% FELDSPAR, 25% RED CLAY. ALL MINERALS DISAGGREGATED) (A-2-4) 924.0 | 5.0 |
| 925 | | | | | | | | | | | |
| | 921.0 | 8.0 | 100/.4 | | | 100/.4 | RS-1 | M | | **WEATHERED ROCK** 5' - 8.4' WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK (BLACK AND WHITE SALT AND PEPPER WEATHERED GRANITE GNEISS) 920.6 919.7 | 8.4 9.3 |
| 920 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 914.7 | 14.3 |
| 915 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 909.9 | 19.1 |
| 910 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 905.1 | 23.9 |
| 905 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 900.3 | 28.7 |
| | | | | | | | | | | Boring Terminated at Elevation 900.3 ft in crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/19/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-A | **STATION** 52+88 | **OFFSET** 19 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** 11.0 |
| **COLLAR ELEV.** 929.0 ft | **TOTAL DEPTH** 28.7 ft | **NORTHING** 861,271 | **EASTING** 1,666,053 **24 HR.** 11.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/20/13 | **COMP. DATE** 06/20/13 | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NX | **TOTAL RUN** 20.3 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 920.61 | | | | | | | | | | | Begin Coring @ 8.4 ft | |
| 920 | 920.6 | 8.4 | 0.9 | | (0.7) 78% | (0.7) 78% | | (0.7) 78% | (0.7) 78% | | 920.6 **CRYSTALLINE ROCK** | 8.4 |
| | 919.7 | 9.3 | 5.0 | | (5.0) 100% | (5.0) 100% | RS-1 | (5.0) 100% | (5.0) 100% | | 919.7 8.4' - 9.3' SLIGHTLY WEATHERED, MODERATELY HARD, MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. R1: 4, R2: 17 R3: 10, R4: 12, R5: 7, RMR=50, FAIR ROCK, CLASS III, ROCK TYPE E | 9.3 |
| 915 | 914.7 | 14.3 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 914.7 **CRYSTALLINE ROCK** 9.3' - 14.3' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1: 7, R2: 20 R3: 25, R4: 25, R5:7, RMR=84, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 14.3 |
| 910 | 909.9 | 19.1 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 909.9 **CRYSTALLINE ROCK** 14.3' - 19.1' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. CROSSCUT BY UNMETAMORPHOSED COARSER GRAIN GRANITE DYKE AT 16.3, WITH NO CLAY ALTERATION. R1: 7, R2: 20 R3: 30, R4: 25, R5:7, RMR=89, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 19.1 |
| 905 | 905.1 | 23.9 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 905.1 **CRYSTALLINE ROCK** 19.1' - 23.9' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 23.9 |
| | 900.3 | 28.7 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 900.3 **CRYSTALLINE ROCK** 23.9' - 28.7' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 28.7 |
| | | | | | | | | | | | Boring Terminated at Elevation 900.3 ft in crystalline rock | |

NCDOT CORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/19/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 52+99 | **OFFSET** 12 ft RT | **ALIGNMENT** -Y4RPBD- **0 HR.** 12.0 |
| **COLLAR ELEV.** 928.8 ft | **TOTAL DEPTH** 28.5 ft | **NORTHING** 861,239 | **EASTING** 1,666,046 **24 HR.** 11.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/20/13 | **COMP. DATE** 06/21/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 930 | | | | | | | | | | 928.8 GROUND SURFACE | 0.0 |
| | 926.9 | 1.9 | 2 | 10 | 12 | 22 | | M | | **RESIDUAL** 0' - 4' BROWN, MOIST, MEDIUM DENSE, NON PLASTIC, MICACEOUS SAND (A-2-4) 924.8 | 4.0 |
| 925 | | | | | | | | | | **WEATHERED ROCK** 4' - 7.9' SEVERELY WEATHERED CRYSTALLINE ROCK | |
| | | | | | | | | | | 920.9 | 7.9 |
| 920 | | | | | | | | | | 919.9 **CRYSTALLINE ROCK** GRANITE GNEISS | 8.9 |
| | | | | | | | RS-2 | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 915 | | | | | | | | | | 914.9 | 13.9 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 910 | | | | | | | | | | 909.9 | 18.9 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 905 | | | | | | | | | | 905.1 | 23.7 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 900.3 | 28.5 |
| | | | | | | | | | | Boring Terminated at Elevation 900.3 ft in crystalline rock | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** B1-B | **STATION** 52+99 | **OFFSET** 12 ft RT | **ALIGNMENT** -Y4RPBD- **0 HR.** 12.0 |
| **COLLAR ELEV.** 928.8 ft | **TOTAL DEPTH** 28.5 ft | **NORTHING** 861,239 | **EASTING** 1,666,046 **24 HR.** 11.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/20/13 | **COMP. DATE** 06/21/13 | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NX | **TOTAL RUN** 20.6 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 920.87 | | | | | | | | | | | Begin Coring @ 7.9 ft | |
| 920 | 920.9 | 7.9 | 1.0 | | (1.0) 100% | (1.0) 100% | | (1.0) 100% | (1.0) 100% | | 920.9 **CRYSTALLINE ROCK** | |
| | 919.9 | 8.9 | 5.0 | | (5.0) 100% | (4.0) 80% | RS-2 | (5.0) 100% | (4.0) 80% | | 919.9 7.9' - 8.9' SLIGHTLY WEATHERED, MODERATELY HARD, MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. R1: 4, R2: 20 R3: 20, R4: 20, R5: 7, RMR=71, GOOD ROCK, CLASS II, ROCK TYPE E | 8.9 |
| 915 | 914.9 | 13.9 | | | | | | | | | 914.9 | 13.9 |
| | | | 5.0 | | (4.8) 96% | (4.0) 80% | | (4.8) 96% | (4.0) 80% | | **CRYSTALLINE ROCK** 8.9' - 13.9' ALTERNATING INTERVALS OF FRESH HARD WIDELY FRACTURED AND SLIGHTLY WEATHERED, MODERATELY HARD, MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. WEATHERING AND LOSS OF RQD SEEMS TO FOLLOW FRACTURES AT 9.0' AND 12.5' R1: 4, R2: 17 R3: 25, R4: 20, R5: 7, RMR=73, GOOD ROCK, CLASS II, ROCK TYPE E | |
| 910 | 909.9 | 18.9 | | | | | | | | | 909.9 | 18.9 |
| | | | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | **CRYSTALLINE ROCK** 13.9' - 18.9' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. INTERVAL OF ALTERATION AT 15.7'. WIDELY SPACED FRACTURES FROM 16.9' ON DOWN. R1: 7, R2: 20 R3: 30, R4: 25, R5: 7, RMR=89, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| 905 | 905.1 | 23.7 | | | | | | | | | 905.1 | 23.7 |
| | | | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | **CRYSTALLINE ROCK** 18.9' - 23.7' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | 900.3 | 28.5 | | | | | | | | | 900.3 | 28.5 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 23.7' - 28.5' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDE TO VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | | | | | | | | | | | Boring Terminated at Elevation 900.3 ft in crystalline rock | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 53+76 | **OFFSET** 19 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 934.6 ft | **TOTAL DEPTH** 32.2 ft | **NORTHING** 861,227 | **EASTING** 1,666,127 | **24 HR.** 7.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/25/13 | **COMP. DATE** 06/25/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 935 | | | | | | | | | | 934.6 GROUND SURFACE | 0.0 |
| | 932.8 | 1.8 | | | | | | | | **RESIDUAL** 0' - 5.5 RESIDUAL, RED, MOIST, MEDIUM DENSE, SLIGHTLY PLASTIC, SILTY SAND. FINE REMNANT BIOTITE AND QUARTZ GRAINS PREVALENT (A-2-4) 929.1 | 5.5 |
| 930 | | | 4 | 5 | 6 | 11 | | M | | **WEATHERED ROCK** 5.5' - 7.8' SEVERELY WEATHERED CRYSTALLINE ROCK 926.8 | 7.8 |
| | 927.8 | 6.8 | 100/.2 | | | 100/.2 | | | | 925.6 | 9.0 |
| 925 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 920.8 | 13.8 |
| 920 | | | | | | | RS-3 | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 915 | | | | | | | | | | 916.0 | 18.6 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 910 | | | | | | | | | | 911.2 | 23.4 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 905 | | | | | | | | | | 906.4 | 28.2 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 902.4 | 32.2 |
| | | | | | | | | | | Boring Terminated at Elevation 902.4 ft in crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/19/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-A | **STATION** 53+76 | **OFFSET** 19 ft LT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 934.6 ft | **TOTAL DEPTH** 32.2 ft | **NORTHING** 861,227 | **EASTING** 1,666,127 | **24 HR.** 7.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/25/13 | **COMP. DATE** 06/25/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NX | **TOTAL RUN** 24.4 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 ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 926.75 | | | | | | | | | | | Begin Coring @ 7.8 ft | |
| | 926.8 | 7.8 | 1.2 | | (1.2) 100% | (1.2) 100% | | (1.2) 100% | (1.2) 100% | | 926.8 | 7.8 |
| 925 | 925.6 | 9.0 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 925.6 | 9.0 |
| | 920.8 | 13.8 | 4.8 | | (4.8) 100% | (4.8) 100% | RS-3 | (4.8) 100% | (4.8) 100% | | 920.8 | 13.8 |
| 920 | | | | | | | | | | | | |
| | 916.0 | 18.6 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 916.0 | 18.6 |
| 915 | | | | | | | | | | | | |
| | 911.2 | 23.4 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 911.2 | 23.4 |
| 910 | | | | | | | | | | | | |
| | 906.4 | 28.2 | 4.0 | | (4.0) 100% | (4.0) 100% | | (4.0) 100% | (4.0) 100% | | 906.4 | 28.2 |
| 905 | | | | | | | | | | | | |
| | 902.4 | 32.2 | | | | | | | | | 902.4 | 32.2 |

**CRYSTALLINE ROCK**
7.8' -9.0' SLIGHTLY WEATHERED, MODERATELY HARD, MODERATELY CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY.
R1: 4, R2: 20 R3: 20, R4: 25, R5: 7,
RMR=76, GOOD ROCK, CLASS II, ROCK TYPE E

**CRYSTALLINE ROCK**
9.0' -13.8' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. TOP .5' SHOWS SIGNS OF SLIGHT WEATHERING.
R1: 4, R2: 20 R3: 30, R4: 25, R5: 7,
RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

**CRYSTALLINE ROCK**
13.8' -18.6' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1: 7, R2: 20 R3: 30, R4: 25, R5: 4,
RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

**CRYSTALLINE ROCK**
18.6' -23.4' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1: 7, R2: 20 R3: 30, R4: 25, R5: 4,
RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

**CRYSTALLINE ROCK**
23.4' -28.2' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1: 7, R2: 20 R3: 30, R4: 25, R5: 4,
RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

**CRYSTALLINE ROCK**
28.2' -32.2' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES.
R1: 7, R2: 20 R3: 30, R4: 25, R5: 4,
RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

Boring Terminated at Elevation 902.4 ft in crystalline rock

NCDOT CORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/19/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 53+85 | **OFFSET** 13 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 10.0 |
| **COLLAR ELEV.** 934.0 ft | **TOTAL DEPTH** 33.9 ft | **NORTHING** 861,195 | **EASTING** 1,666,120 | **24 HR.** 13.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/25/13 | **COMP. DATE** 06/25/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 935 | | | | | | | | | | 934.0 GROUND SURFACE | 0.0 |
| | 932.3 | 1.7 | 3 | 11 | 21 | 32 | | M | | **RESIDUAL** 0 - 5.0' RESIDUAL, RED BROWN, MOIST, DENSE, NON PLASTIC SILTY SAND. REMNANT QUARTZ, BIOTITE AND FELDSPAR GRAINS (A-2-4) 929.0 | 5.0 |
| 930 | | | | | | | | | | **WEATHERED ROCK** 5' - 7.8' SEVERELY WEATHERED CRYSTALLINE ROCK 926.2 | 7.8 |
| | 927.3 | 6.7 | 100/.3 | | | 100/.3 | | | | 925.2 | 8.8 |
| 925 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 920.2 | 13.8 |
| 920 | | | | | | | RS-4 | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 915.4 | 18.6 |
| 915 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 910.6 | 23.4 |
| 910 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 907.2 | 26.8 |
| 905 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS 905.0 | 29.0 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 900.1 | 33.9 |
| | | | | | | | | | | Boring Terminated at Elevation 900.1 ft in crystalline rock | |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** B2-B | **STATION** 53+85 | **OFFSET** 13 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** 10.0 |
| **COLLAR ELEV.** 934.0 ft | **TOTAL DEPTH** 33.9 ft | **NORTHING** 861,195 | **EASTING** 1,666,120 | **24 HR.** 13.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/25/13 | **COMP. DATE** 06/25/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NX | **TOTAL RUN** 26.1 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 926.21 | | | | | | | | | | | Begin Coring @ 7.8 ft | |
| 925 | 926.2 | 7.8 | 1.0 | | (1.0) 95% | (1.0) 95% | | (1.0) 95% | (1.0) 95% | | 926.2 | 7.8 |
| | 925.2 | 8.8 | 5.0 | | (4.8) 96% | (3.6) 72% | | (4.8) 96% | (3.6) 72% | | 925.2 **CRYSTALLINE ROCK** 7.8' - 8.8' SLIGHTLY WEATHERED, MODERATELY HARD, CLOSELY FRACTURED GRANITIC GNEISS. PLAGIOCLASE IS DULL. WEATHERED RIND OF GRANITE BODY. R1: 4, R2: 20 R3: 20, R4: 20, R5: 7, RMR=71, GOOD ROCK, CLASS II, ROCK TYPE E | 8.8 |
| 920 | 920.2 | 13.8 | 4.8 | | (4.8) 100% | (4.8) 100% | RS-4 | (4.8) 100% | (4.8) 100% | | 920.2 **CRYSTALLINE ROCK** 8.8' - 13.8' VERY SLIGHTLY WEATHERED, HARD, LIGHT GRAY GRANITE GNEISS: PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. MODERATELY CLOSE SPACED FRACTURES. TOP 2' SHOWS SIGNS OF SLIGHT WEATHERING. WEATHERING DECREASES RAPIDLY WITH DEPTH. R1: 4, R2: 13 R3: 20, R4: 20, R5: 7, RMR=64, GOOD ROCK, CLASS II, ROCK TYPE E | 13.8 |
| 915 | 915.4 | 18.6 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 915.4 | 18.6 |
| 910 | 910.6 | 23.4 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 910.6 **CRYSTALLINE ROCK** 13.8' - 18.6' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 4, R2: 20 R3: 30, R4: 25, R5: 7, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 23.4 |
| | 907.2 | 26.8 | 3.4 | | (3.4) 100% | (3.4) 100% | | (3.4) 100% | (3.4) 100% | | 907.2 | 26.8 |
| 905 | 905.0 | 29.0 | 2.2 | | (2.2) 100% | (2.2) 100% | | (2.2) 100% | (2.2) 100% | | 905.0 | 29.0 |
| | | | 4.9 | | (4.9) 100% | (4.9) 100% | | (4.9) 100% | (4.9) 100% | | **CRYSTALLINE ROCK** 18.6' - 23.4' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 7, RMR=89, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | 900.1 | 33.9 | | | | | | | | | 900.1 | 33.9 |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 23.4' - 26.8' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 26.8' - 29' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | | | | | | | | | | | **CRYSTALLINE ROCK** 29' - 33.9' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | |
| | | | | | | | | | | | Boring Terminated at Elevation 900.1 ft in crystalline rock | |

NCDOT CORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 54+69 | **OFFSET** 25 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** 6.0 |
| **COLLAR ELEV.** 936.5 ft | **TOTAL DEPTH** 24.9 ft | **NORTHING** 861,192 | **EASTING** 1,666,212 **24 HR.** 3.7 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/27/13 | **COMP. DATE** 06/27/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 940 | | | | | | | | | | | |
| | | | | | | | | | | 936.5 GROUND SURFACE | 0.0 |
| 935 | 934.3 | 2.2 | | 100/.3 | | 100/.3 | | | | 934.5 **RESIDUAL** 0' - 2' RED BROWN MOIST MEDIUM DENSE NON PLASTIC SILTY SAND, WITH REMNANT QUARTZ AND BIOTITE (A-2-4) | 2.0 |
| | | | | | | | | | | 932.6 | 3.9 |
| | | | | | | | RS-5 | | | 931.6 **WEATHERED ROCK** 2' - 3.9' SEVERELY WEATHERED CRYSTALLINE ROCK AFTER LIGHT COLORED GRANITE GNEISS. | 4.9 |
| 930 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 926.6 | 9.9 |
| 925 | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| | | | | | | | | | | 921.6 **CRYSTALLINE ROCK** GRANITE GNEISS | 14.9 |
| 920 | | | | | | | | | | | |
| | | | | | | | | | | 916.6 **CRYSTALLINE ROCK** GRANITE GNEISS | 19.9 |
| 915 | | | | | | | | | | | |
| | | | | | | | | | | 911.6 Boring Terminated at Elevation 911.6 ft in crystalline rock | 24.9 |

NCDOT BORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 54+69 | **OFFSET** 25 ft LT | **ALIGNMENT** -Y4RPBD- **0 HR.** 6.0 |
| **COLLAR ELEV.** 936.5 ft | **TOTAL DEPTH** 24.9 ft | **NORTHING** 861,192 | **EASTING** 1,666,212 **24 HR.** 3.7 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic |
| **DRILLER** Estep, J. E. | **START DATE** 06/27/13 | **COMP. DATE** 06/27/13 | **SURFACE WATER DEPTH** N/A |
| **CORE SIZE** NX | **TOTAL RUN** 21.0 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 932.63 | | | | | | | | | | | Begin Coring @ 3.9 ft | |
| | 932.6 | 3.9 | 1.0 | | (0.9) 90% | (0.9) 90% | | (0.9) 90% | (0.9) 90% | | 932.6 **CRYSTALLINE ROCK** 3.9' - 4.9' FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 17 R3: 10, R4: 20, R5: 7, RMR=61, GOOD ROCK, CLASS II, ROCK TYPE E | 3.9 |
| 930 | 931.6 | 4.9 | 5.0 | | (5.0) 100% | (5.0) 100% | RS-5 | (5.0) 100% | (5.0) 100% | | 931.6 | 4.9 |
| | 926.6 | 9.9 | | | | | | | | | 926.6 **CRYSTALLINE ROCK** 4.9' - 9.9' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 9.9 |
| 925 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 921.6 | 14.9 | | | | | | | | | 921.6 **CRYSTALLINE ROCK** 9.9' - 14.9' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 14.9 |
| 920 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 916.6 | 19.9 | | | | | | | | | 916.6 **CRYSTALLINE ROCK** 14.9' - 19.9' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 19.9 |
| 915 | | | 5.0 | | (5.0) 100% | (5.0) 100% | | (5.0) 100% | (5.0) 100% | | | |
| | 911.6 | 24.9 | | | | | | | | | 911.6 **CRYSTALLINE ROCK** 19.9' - 24.9' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 24.9 |
| | | | | | | | | | | | Boring Terminated at Elevation 911.6 ft in crystalline rock | |

NCDOT CORE SINGLE U2579B_GEO_BRDG52+94.28-Y4RPBD-_FORSYTH.GPJ NC_DOT.GDT 11/18/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 54+77 | **OFFSET** 15 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 938.1 ft | **TOTAL DEPTH** 29.6 ft | **NORTHING** 861,152 | **EASTING** 1,666,203 | **24 HR.** 8.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/26/13 | **COMP. DATE** 06/26/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 940 | | | | | | | | | | 938.1 GROUND SURFACE | 0.0 |
| | 936.0 | 2.1 | 4 | 6 | 6 | 12 | | M | | **RESIDUAL** 0 - 4.6 RESIDUAL, RED BROWN, MOIST, MEDIUM DENSE, NON PLASTIC SILTY SAND (A-2-4) | |
| 935 | | | | | | | | | | 933.5 | 4.6 |
| | 931.0 | 7.1 | 60/.1 | | | 60/.1 | | | | **WEATHERED ROCK** 4.6' - 7.1' SEVERELY WEATHERED CRYSTALLINE ROCK | |
| 930 | | | | | | | | | | 931.0 | 7.1 |
| | | | | | | | RS-6 | | | 930.0 **CRYSTALLINE ROCK** 7.1' - 8.1' CRYSTALLINE ROCK (SPT REFUSAL) | 8.1 |
| | | | | | | | | | | 928.7 **CRYSTALLINE ROCK** GRANITE GNEISS | 9.4 |
| 925 | | | | | | | | | | 923.9 **CRYSTALLINE ROCK** GRANITE GNEISS | 14.2 |
| | | | | | | | | | | **CRYSTALLINE ROCK** GRANITE GNEISS | |
| 920 | | | | | | | | | | 919.1 **CRYSTALLINE ROCK** GRANITE GNEISS | 19.0 |
| | | | | | | | | | | 915.4 **CRYSTALLINE ROCK** GRANITE GNEISS | 22.7 |
| 915 | | | | | | | | | | 913.3 **CRYSTALLINE ROCK** GRANITE GNEISS | 24.8 |
| | | | | | | | | | | 908.5 | 29.6 |
| 910 | | | | | | | | | | Boring Terminated at Elevation 908.5 ft in crystalline rock | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** Bridge on -Y4RPBD- Winston-Salem Northern Beltway 52+94.28 over -L- 649+19.78 (Structure 16) | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 54+77 | **OFFSET** 15 ft RT | **ALIGNMENT** -Y4RPBD- | **0 HR.** NM |
| **COLLAR ELEV.** 938.1 ft | **TOTAL DEPTH** 29.6 ft | **NORTHING** 861,152 | **EASTING** 1,666,203 | **24 HR.** 8.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 82% 01/09/2013 | | **DRILL METHOD** NW Casing W/SPT & Core | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/26/13 | **COMP. DATE** 06/26/13 | **SURFACE WATER DEPTH** N/A | |
| **CORE SIZE** NX | **TOTAL RUN** 21.5 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 930.4 | | | | | | | | | | | Begin Coring @ 8.1 ft | |
| | 930.0 | 8.1 | 1.3 | | (1.2) 92% | (1.2) 92% | RS-6 | (1.2) 92% | (1.2) 92% | | 930.0 **CRYSTALLINE ROCK** 8.1' - 9.4" FRESH, HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. WIDELY SPACED FRACTURES. R1: 7, R2: 17 R3: 25, R4: 20, R5: 7, RMR=76, GOOD ROCK, CLASS II, ROCK TYPE E | 8.1 |
| | 928.7 | 9.4 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 928.7 | 9.4 |
| 925 | 923.9 | 14.2 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 923.9 **CRYSTALLINE ROCK** 9.4' -14.2' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 7, RMR=89, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 14.2 |
| 920 | 919.1 | 19.0 | 3.7 | | (3.7) 100% | (3.7) 100% | | (3.7) 100% | (3.7) 100% | | 919.1 **CRYSTALLINE ROCK** 14.2' - 19' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 19.0 |
| 915 | 915.4 | 22.7 | 2.1 | | (2.1) 100% | (2.1) 100% | | (2.1) 100% | (2.1) 100% | | 915.4 **CRYSTALLINE ROCK** 19.0' - 22.7' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 22.7 |
| | 913.3 | 24.8 | 4.8 | | (4.8) 100% | (4.8) 100% | | (4.8) 100% | (4.8) 100% | | 913.3 **CRYSTALLINE ROCK** 22.7' - 24.8' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 24.8 |
| 910 | 908.5 | 29.6 | | | | | | | | | 908.5 **CRYSTALLINE ROCK** 24.8' - 29.6' FRESH, VERY HARD, LIGHT GRAY GRANITE GNEISS. PINK FELDSPAR 25%, CLEAR QUARTZ 30%, WHITE PLAGIOCLASE 30%, BLACK BIOTITE 15%. VERY WIDELY SPACED FRACTURES. R1: 7, R2: 20 R3: 30, R4: 25, R5: 4, RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E | 29.6 |
| | | | | | | | | | | | Boring Terminated at Elevation 908.5 ft in crystalline rock | |

# *TEST RESULTS*

*PROJECT: 34839.1.1 (U-2579B)*

*COUNTY: FORSYTH*

*SITE DESCRIPTION: BRIDGE ON RAMP BD OVER WINSTON-SALEM NORTHERN BELTWAY BETWEEN WINSTON-SALEM NORTHERN BELTWAY AND US-421 / I-40 BUS.*

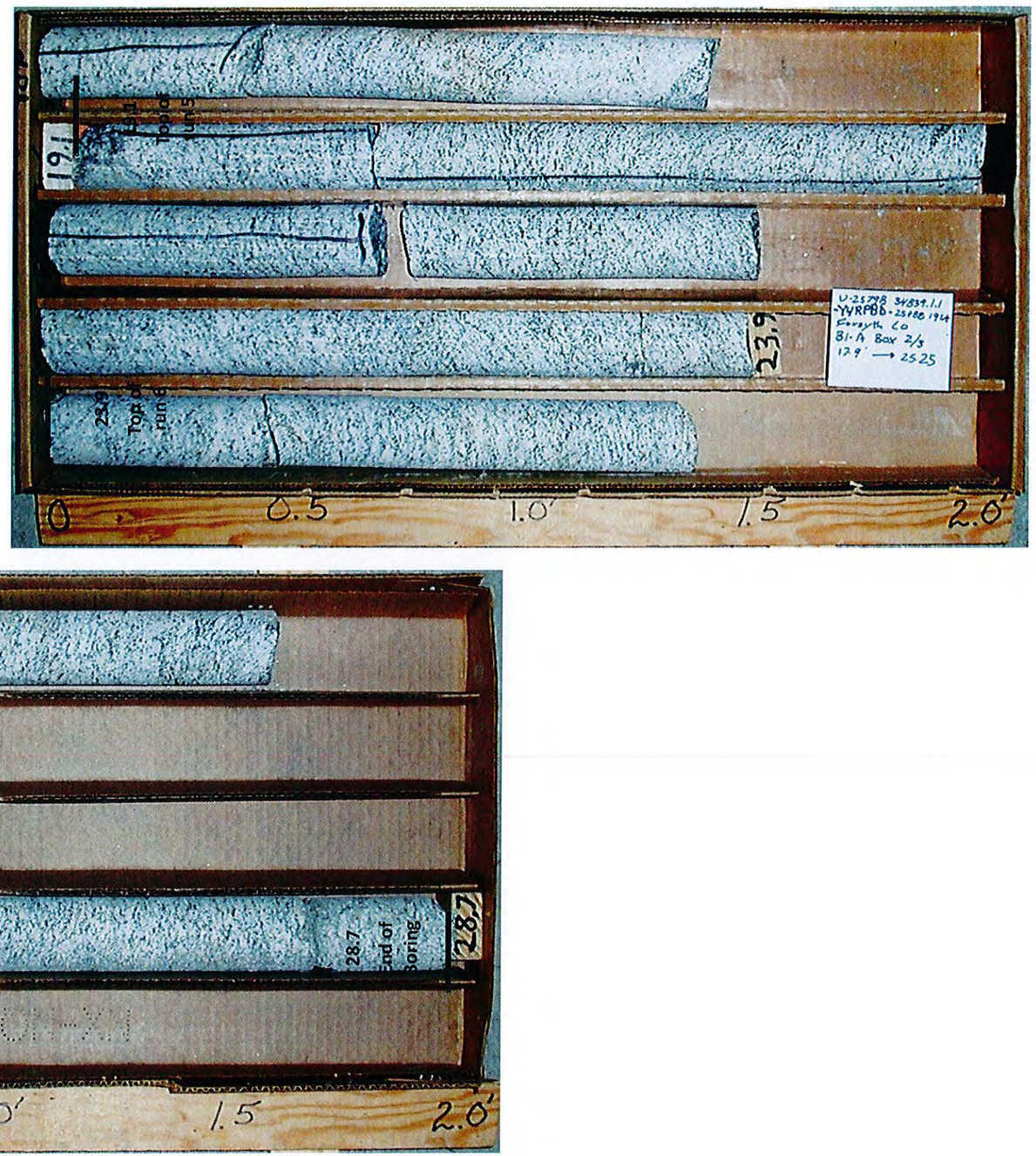


**ROCK SAMPLE RESULTS**

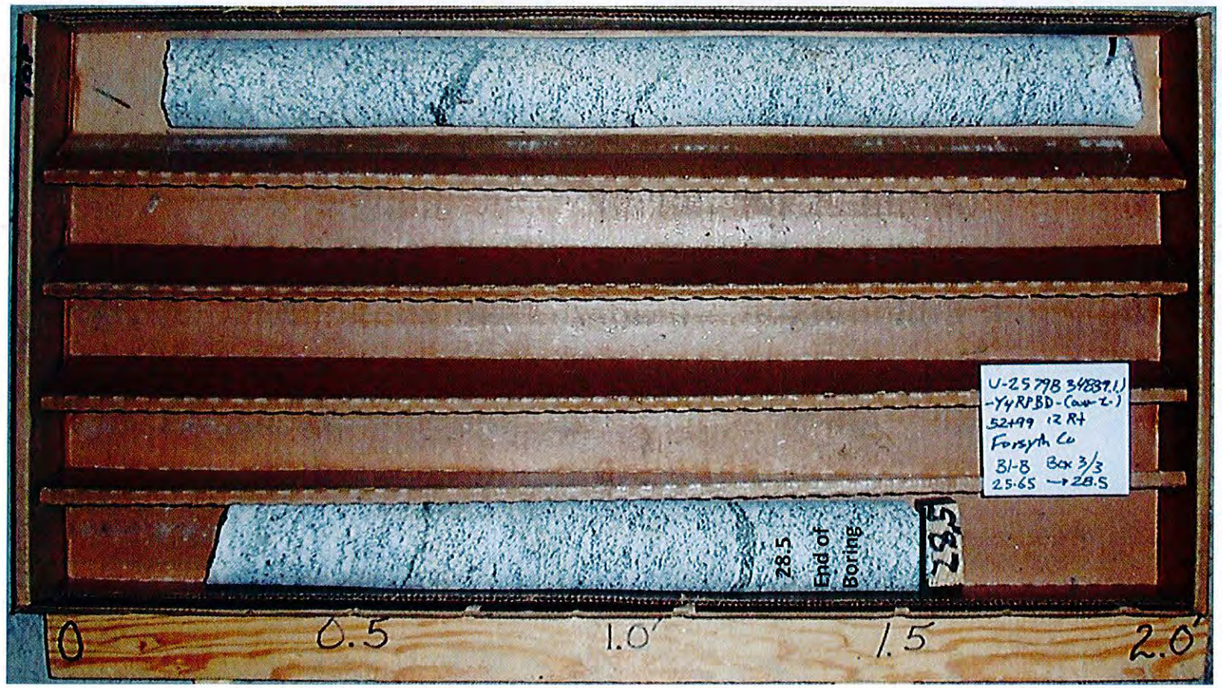
| *SAMPLE NO.* | *OFFSET* | *STATION* | *DEPTH INTERVAL* | *RQD* | *UNIT WT (pcf)* | Q(ksf) | E(MPsi) |
|---|---|---|---|---|---|---|---|
| | | **B1-A** | | | | | |
| RS-1 | 19 LT. | 52+88 -Y4RPBD- | 9.30-9.73 | 78% | 166.1 | 770.40 | 0.627 |
| | | **B1-B** | | | | | |
| RS-2 | 12 RT. | 52+99 -Y4RPBD- | 10.50-10.95 | 80% | 162.8 | 470.88 | 0.1377 |
| | | **B2-A** | | | | | |
| RS-3 | 19 LT. | 53+76 -Y4RPBD- | 14.55-15.05 | 100% | 168.7 | 1494.72 | 4.46 |
| | | **B2-B** | | | | | |
| RS-4 | 13 RT. | 53+85 -Y4RPBD- | 14.50-15.00 | 100% | 169.2 | 917.28 | 1.978 |
| | | **EB2-A** | | | | | |
| RS-5 | 25 LT. | 54+69 -Y4RPBD- | 4.45-4.90 | 90% | 167.3 | 940.32 | 1.035 |
| | | **EB2-B** | | | | | |
| RS-6 | 15 RT. | 54+77 -Y4RPBD- | 8.60-9.05 | 92% | 168.7 | 1274.40 | 2.62 |

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.

B1-A

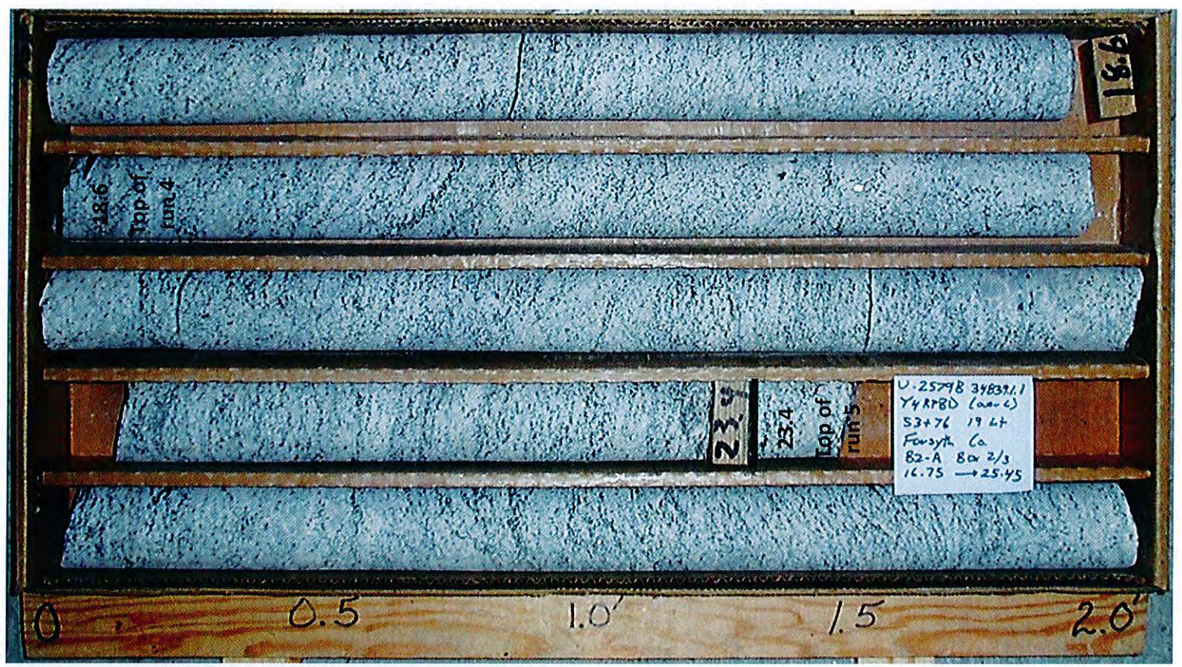


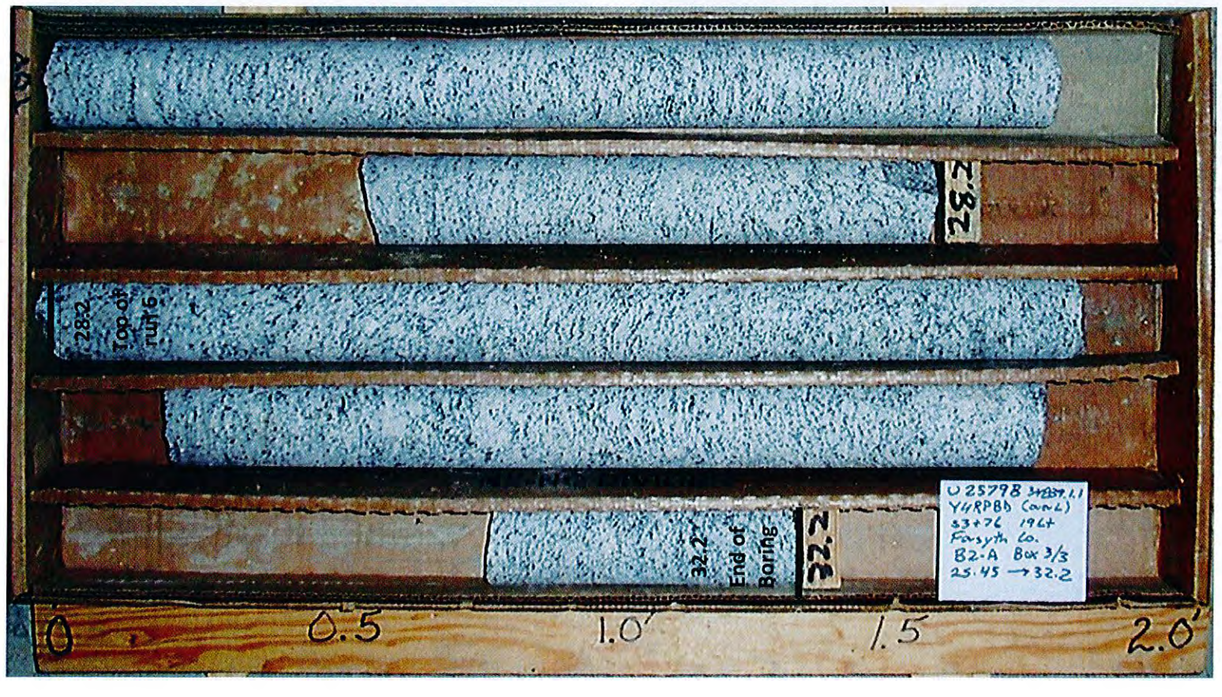
PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.



PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.

B2-A

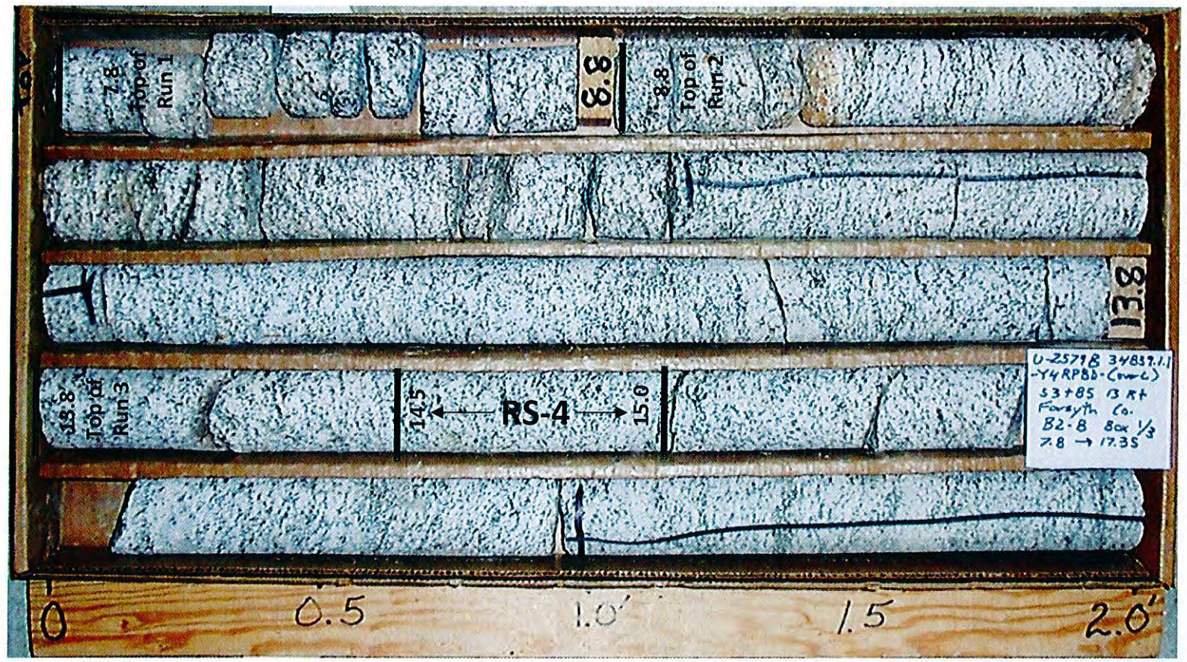


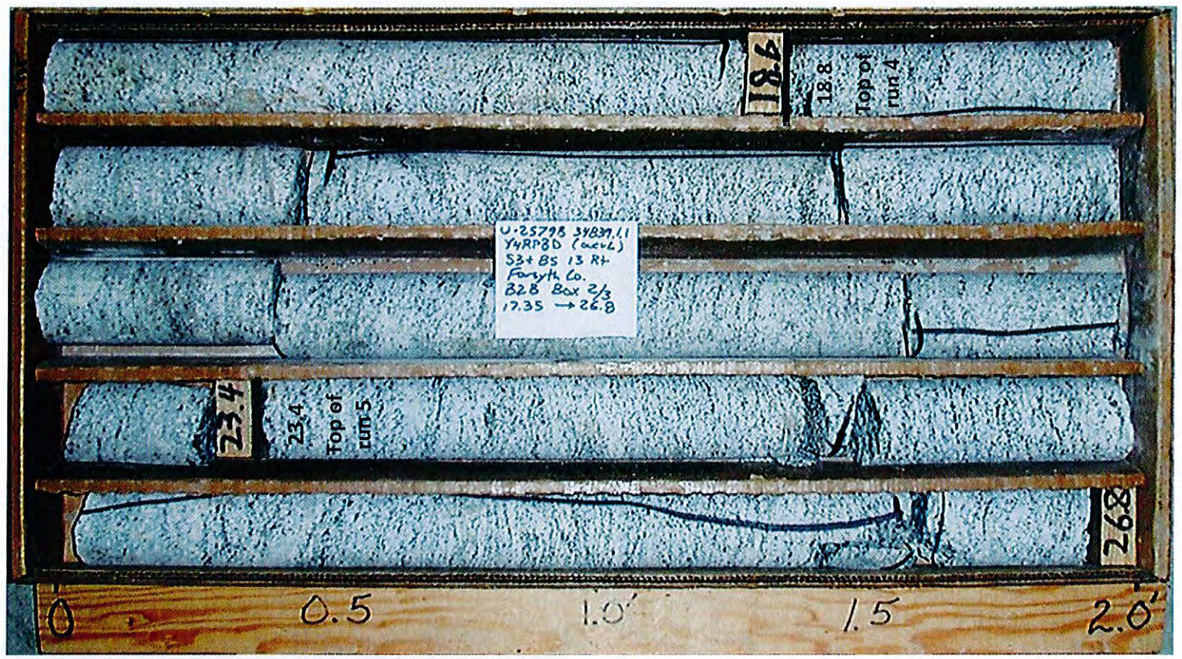



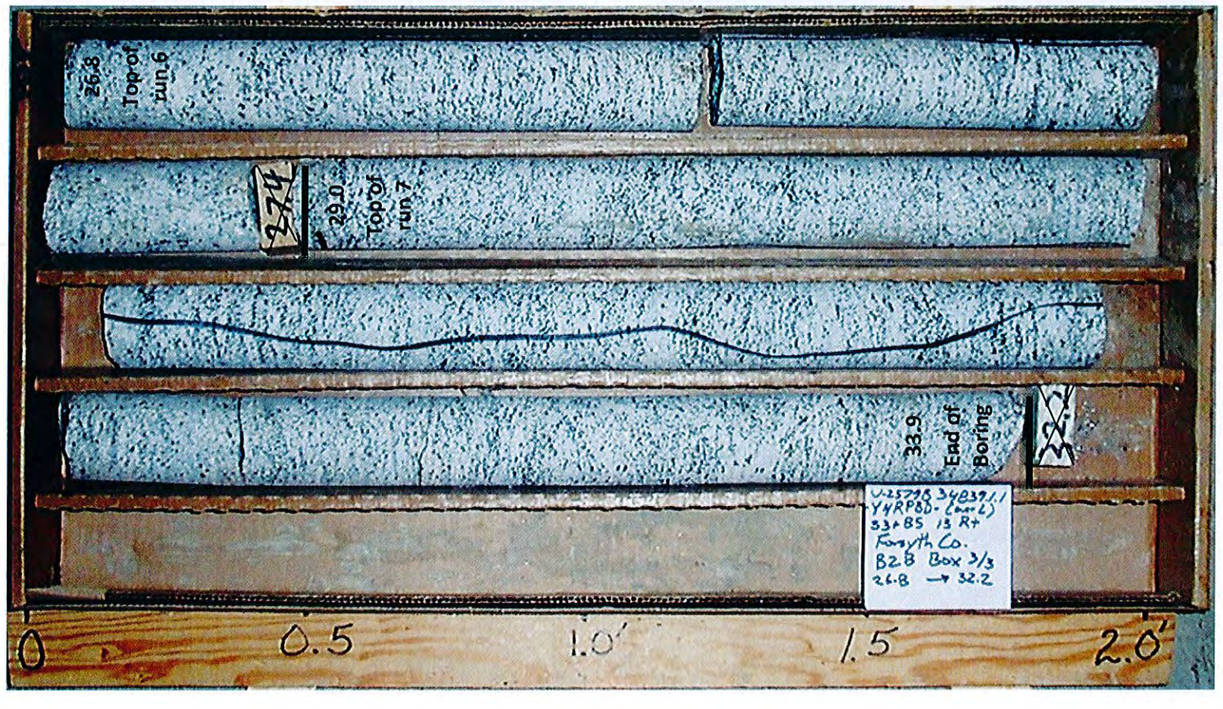
PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.

B2-B





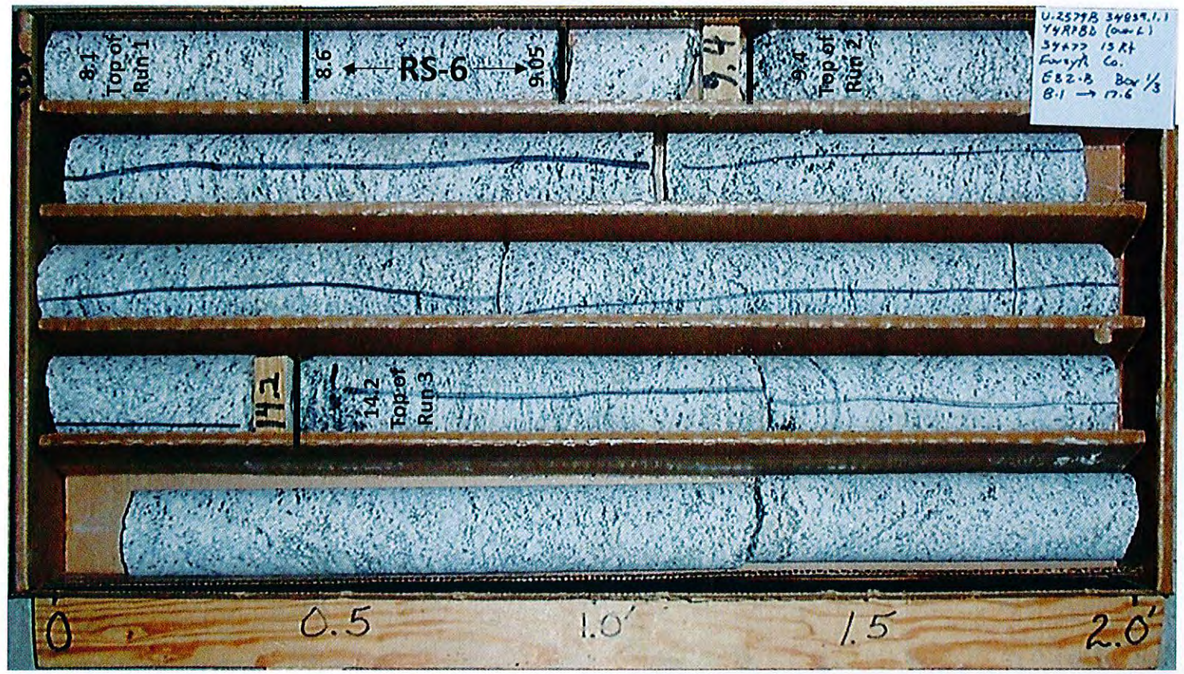
PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.

EB2-A

PROJECT: 34839.1.1 (U-2579B)
DESCRIPTION: Bridge on Ramp BD over Winston-Salem Northern Beltway between Winston-Salem Northern Beltway and US-421 / I-40 Bus.

EB2-B





| PROJECT REFERENCE NO. | SHEET |
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| 34839.1.1 (U-2579B) | 23 |

# Aerial Photo

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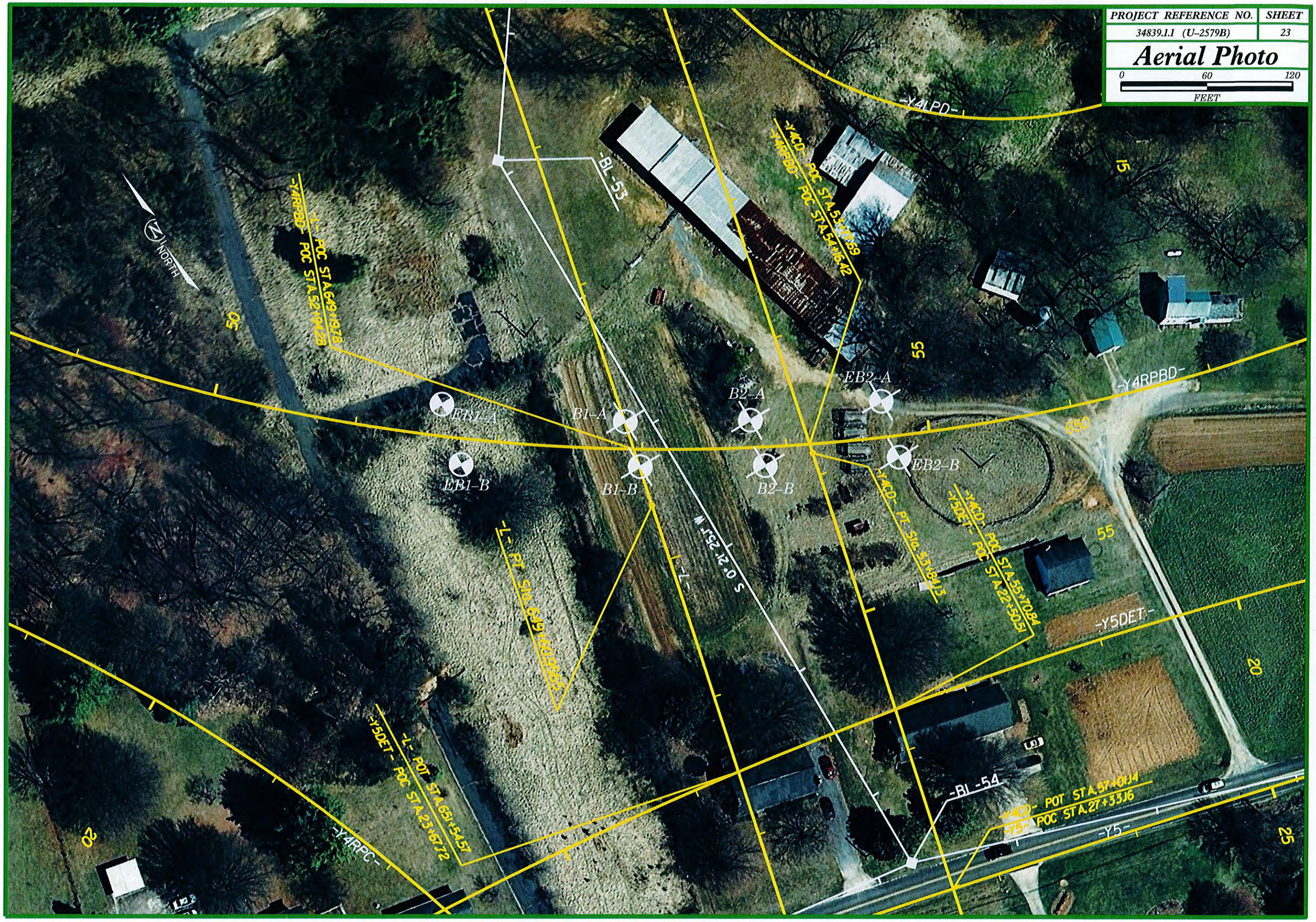

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 10 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34839.1.1 (U-2579B) F.A. PROJ. NHF-0918(93)

COUNTY FORSYTH

PROJECT DESCRIPTION BRIDGE ON SR 2657 (HASTINGS HILL RD.) BETWEEN SR 4393 & SR 2632 OVER -Y4RPD- (WINSTON-SALEM NORTHERN BELTWAY)

SITE DESCRIPTION

ID: U-2579B

PROJECT: 34839.1.1

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
| 1 | TITLE SHEET |
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| 3 | SITE PLAN |
| 4 | PROFILE |
| 5-6 | CROSS SECTIONS |
| 7-8 | BORE LOGS |
| 9 | SOIL TEST RESULTS |
| 10 | AERIAL PHOTOGRAPH |


## 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. E. ESTEP

C. C. MURRAY

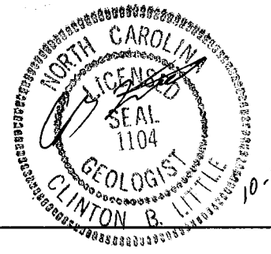
M. R. MOORE

INVESTIGATED BY C. B. LITTLE

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE OCTOBER 2013




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. |
|---|---|
| 34839.1.1 (U-2579B) | 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<br>A-3 | A-4, A-5<br>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<br>A-7-6 | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING<br>#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 | |
| | LOOSE | 4 TO 10 | |
| | MEDIUM DENSE | 10 TO 30 | N/A |
| | 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 / 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
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - 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
- [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: BYI7 - 554 STA. BYI7 17+68.11
N 860684.2984
E 1666736.5504 ELEVATION: 941.16 FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

REVISED 09/23/09

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

0 50 100

FEET

N NORTH

-Y5-PC Sta. 21+41.22

-BY17-554

IMOGENE L. ELAM
DB 1011 PG 944
DB 1368 PG 1653
PB 28 PG 193

ALBERT RAY LONG & WIFE
JANICE LAWSON LONG
DB 930 PG 137

BOBBY F. GORDON & WIFE
BETSY GORDON
DB 1177 PG 1598

-Y5 +52.82 74.09

-Y4RPD-

W.P. #2
STA. 24+13.87 -Y5-

EB1-A

EB1-B

EB2-A

EB2-B

W.P. #1
STA. 22+94.62 -Y5-

N 74° 11' 15.1" W

SR 2687 HASTINGS HILL RD 22' BST

-Y5-

N 11° 37' 38.9" W

-Y4RPD- CS Sta. 26+03.54

BEG NOISE WALL -NW Y4RPBD1-

-Y5- POC STA. 23+59.12

-Y4RPD- POC STA. 23+71.54

-Y5DET-

REX LANIER PEDDYCORD
FAYE G. PEDDYCORD
DB 0770 PG 0482
DB 2059 PG 3356
DB 1772 PG 1342
DB 1535 PG 0368

STEPHEN MICHAEL PEDDYCORD
MELODY MYERS PEDDYCORD
DB 2603 PG 2115

NC D.O.T.
(FORMERLY -
DONALD L. PEDDYCORD
BETTY W. PEDDYCORD)
DB 2700 PG 3508

2SBKD

ISBKD

WD DK

48" BK

9" CONC

20' CONC

12" RCP

15" RCP

72" CHL

10' BST

W/LT

WD RAIL

GR

F C

S

20

25

15

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |
| BRIDGE ON SR 2657 OVER -Y4RPD- PROFILE ALONG -Y5- VE = 5:1 | |

0 50 100
FEET

PI = 23+78.00
EL = 961.36'
K = 88
VC = 568'

(+)3.0101%
(-)3.4477%

956.70
956.70

EB1-A
23+13 -Y5-
23 LT

SS-2
EB2-A
24+20 -Y5-
7 LT

RED MED. STIFF MOIST SANDY SILTY CLAY (A-7-6)

ROADWAY EMBANKMENT

EXISTING GROUND

(PI = 27)

RESIDUAL

TAN TO GRAY-WHITE MED. TO V. DENSE MOIST SILTY SAND (A-2-4)

21
24
100/.8
100/.3

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK (GNEISS)

CRYSTALLINE ROCK (GNEISS)

AR

RED MED. STIFF MOIST HIGHLY PLASTIC SANDY CLAY (A-7-6)

5

RESIDUAL

RED STIFF TO HARD SANDY SILTY CLAY (A-6)

SEV. WEATH. CRYSTALLINE ROCK (GNEISS)

WEATHERED ROCK

AR
FIAD
08/13

CRYSTALLINE ROCK (GNEISS)

980 970 960 950 940 930 920 910 900 890

21 22 23 24 25 26 27

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 5 |
| SECTION THROUGH EB1<br>STA. 22+94.62 -Y5-<br>SKEW=128°37'57" | |

0 10 20
FEET

# -Y5-

980 970 960 950 940 930 920 910 900 890

50 40 30 20 10 0 10 20 30 40 50

SS-3

EB1-A
23+13 -Y5-
23 LT
ELEV.=936.7'

EB1-B
22+84 -Y5-
14 RT
ELEV.=938.5'

EXISTING GROUND

ROADWAY EMBANKMENT RED AND BROWN MED. STIFF MOIST SANDY SILTY CLAY (A-7-6)

21 RESIDUAL
TAN TO GRAY-WHITE MED. TO V. DENSE MOIST SILTY SAND (A-2-4)

24

100/.8 WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK (GNEISS)

100/.3 06/13
AR

CRYSTALLINE ROCK
(GNEISS)

27 RESIDUAL
GREEN AND WHITE MED. DENSE
DRY CLAYEY SAND (A-2-4)

100/.4

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK
W/V. DENSE SOIL SEAMS

100/.8

100/.4
AR
FIAD
06/13

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 6 |
| SECTION THROUGH EB2<br>STA. 24+13.87 -Y5-<br>SKEW=129°12'06" | |

0 10 20
FEET

# -Y5-

SS-2
EB2-A
24+20 -Y5-
7' LT
ELEV.=936.2'

SS-1
EB2-B
23+98 -Y5-
19' RT
ELEV.=936.7'

EXISTING GROUND

ROADWAY EMBANKMENT
RED, MED. STIFF MOIST HIGHLY PLASTIC SANDY CLAY (A-7-6)

(PI=27)
(5)

RESIDUAL
RED STIFF TO HARD SANDY SILTY CLAY (A-6)

WEATHERED ROCK
SEV. WEATH. CRYSTALLINE ROCK (GNEISS)

AR
RIAD
0613

CRYSTALLINE ROCK (GNEISS)

(PI=18)
(9)

RESIDUAL
RED-TAN MED. STIFF TO HARD MED. PLASTIC MOIST SANDY CLAY (A-7-6)

60/.1

06/13

CRYSTALLINE ROCK (GNEISS)

60/.1
AR

980 970 960 950 940 930 920 910 900 890

50 40 30 20 10 0 10 20 30 40 50

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y5- (Hasting Hill Rd.) OVER -Y4RPD- | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-A | **STATION** 23+13 | **OFFSET** 23 ft LT | **ALIGNMENT** -Y5- | **0 HR.** 18.0 |
| **COLLAR ELEV.** 936.7 ft | **TOTAL DEPTH** 20.2 ft | **NORTHING** 860,753 | **EASTING** 1,666,483 | **24 HR.** 18.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 80% 11/28/11 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/04/13 | **COMP. DATE** 06/04/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 936.7 | GROUND SURFACE 0.0 |
| | 933.0 | 3.7 | 6 | 4 | 17 | 21 | | M | | 934.7 | **ROADWAY EMBANKMENT** RED MED. STIFF MOIST SANDY SILTY CLAY (A-7-6) 2.0 |
| | 928.0 | 8.7 | 2 | 14 | 10 | 24 | | M | | | **RESIDUAL** TAN TO GRAY-WHITE MED. TO V. DENSE MOIST SILTY SAND (A-2-4) |
| | 923.0 | 13.7 | 6 | 51 | 49/.3 | 100/.8 | | W | | 923.7 | 13.0 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (GNEISS) |
| | 918.0 | 18.7 | 100/.3 | | | 100/.3 | | W | | 916.5 | 20.2 Boring Terminated by Auger Refusal at Elevation 916.5 ft on crystalline rock |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y5- (Hasting Hill Rd.) OVER -Y4RPD- | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB1-B | **STATION** 22+84 | **OFFSET** 14 ft RT | **ALIGNMENT** -Y5- | **0 HR.** N/M |
| **COLLAR ELEV.** 938.5 ft | **TOTAL DEPTH** 22.1 ft | **NORTHING** 860,781 | **EASTING** 1,666,521 | **24 HR.** FIAD |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 80% 11/28/11 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/04/13 | **COMP. DATE** 06/04/13 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 938.5 | GROUND SURFACE 0.0 |
| | 934.9 | 3.6 | 9 | 14 | 13 | 27 | SS-3 | D | | 936.5 | **ROADWAY EMBANKMENT** BROWN MED. STIFF MOIST SANDY SILTY CLAY (A-7-6) 2.0 |
| | 929.9 | 8.6 | 4 | 100/.4 | | 100/.4 | | D | | | **RESIDUAL** GREEN & WHITE MED. DENSE DRY CLAYEY SAND (A-2-4) |
| | 924.9 | 13.6 | 16 | 33 | 67/.3 | 100/.8 | | D | | 929.5 | 9.0 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK W/ V. DENSE SOIL SEAMS |
| | 919.9 | 18.6 | 9 | 3 | 100/.4 | 100/.4 | | W | | 916.4 | 22.1 Boring Terminated by Auger Refusal at Elevation 916.4 ft on crystalline rock |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y5- (Hasting Hill Rd.) OVER -Y4RPD- | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-A | **STATION** 24+20 | **OFFSET** 7 ft LT | **ALIGNMENT** -Y5- | **0 HR.** Dry |
| **COLLAR ELEV.** 936.2 ft | **TOTAL DEPTH** 8.2 ft | **NORTHING** 860,796 | **EASTING** 1,666,384 | **24 HR.** FIAD |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 80% 11/28/11 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/04/13 | **COMP. DATE** 06/04/13 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 940 | | | | | | | | | | ELEV. (ft) DEPTH (ft) |
| | | | | | | | | | | 936.2 GROUND SURFACE 0.0 |
| 935 | | | | | | | | | | **ROADWAY EMBANKMENT** RED MED. STIFF MOIST HIGHLY PLASTIC (PI=27) SANDY CLAY (A-7-6) |
| | 932.5 | 3.7 | 3 | 2 | 3 | 5 | SS-2 | M | | 931.2 5.0 |
| 930 | | | | | | | | | | **RESIDUAL** RED STIFF TO HARD SANDY SILTY CLAY (A-6) |
| | | | | | | | | | | 928.9 7.3 |
| | | | | | | | | | | 928.0 8.2 |
| | | | | | | | | | | **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (GNEISS) |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 928.0 ft on crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG23+59.12-Y5-FORSYTH.GPJ NC_DOT.GDT 10/16/13



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **WBS** 34839.1.1 | **TIP** U-2579B | **COUNTY** FORSYTH | **GEOLOGIST** Murray, C. C. | |
| **SITE DESCRIPTION** BRIDGE ON -Y5- (Hasting Hill Rd.) OVER -Y4RPD- | | | | **GROUND WTR (ft)** |
| **BORING NO.** EB2-B | **STATION** 23+98 | **OFFSET** 19 ft RT | **ALIGNMENT** -Y5- | **0 HR.** 11.0 |
| **COLLAR ELEV.** 936.7 ft | **TOTAL DEPTH** 14.1 ft | **NORTHING** 860,815 | **EASTING** 1,666,412 | **24 HR.** 11.0 |
| **DRILL RIG/HAMMER EFF./DATE** HFO0066 CME-550 80% 11/28/11 | | **DRILL METHOD** H.S. Augers | **HAMMER TYPE** Automatic | |
| **DRILLER** Estep, J. E. | **START DATE** 06/04/13 | **COMP. DATE** 06/04/13 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 940 | | | | | | | | | | ELEV. (ft) DEPTH (ft) |
| | | | | | | | | | | 936.7 GROUND SURFACE 0.0 |
| 935 | | | | | | | | | | **RESIDUAL** RED-TAN MED. STIFF TO HARD MED PLASTIC (PI=18) MOIST SANDY CLAY (A-7-6) |
| | 932.8 | 3.9 | 2 | 4 | 5 | 9 | SS-1 | M | | |
| 930 | 927.8 | 8.9 | 5 | 45 | 60/.1 | 60/.1 | | M | | 926.8 9.9 |
| 925 | | | | | | | | | | **CRYSTALLINE ROCK** (GNEISS) |
| | 922.8 | 13.9 | 60/.1 | | | 60/.1 | | | | 922.6 14.1 |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 922.6 ft in crystalline rock |

NCDOT BORE SINGLE U2579B_GEO_BRDG23+59.12-Y5-FORSYTH.GPJ NC_DOT.GDT 10/16/13

# *TEST RESULTS*



*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: FORSYTH*
*SITE DESCRIPTION: BRIDGE ON SR 2657 (HASTINGS HILL RD.) BETWEEN SR 4393 AND SR 2632 OVER -Y4RPD- (WINSTON-SALEM NORTHERN BELTWAY)*

**SOIL SAMPLE RESULTS**

| *SAMPLE NO.* | *OFFSET* | *STATION* | *DEPTH INTERVAL* | *AASHTO CLASS* | *N* | *L.L.* | *P.I.* | *% BY WEIGHT* | | | | *% PASSING SIEVES* | | | *% MOISTURE* | *% ORGANIC* | *UNIT WT. (d)* | *VOID RATIO* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *C. SAND* | *F. SAND* | *SILT* | *CLAY* | *10* | *40* | *200* | | | | |
| | | **EB1-B** | | | | | | | | | | | | | | | | |
| SS-3 | 14.0 RT. | 22+84 -Y5- | 3.60-5.10 | A-2-4(0) | 27 | 34 | NP | 41.0 | 38.7 | 4.1 | 16.2 | 100 | 80 | 25 | | | | |
| | | **EB2-A** | | | | | | | | | | | | | | | | |
| SS-2 | 7.0 LT. | 24+20 -Y5- | 3.70-5.20 | A-7-6(12) | 5 | 52 | 27 | 30.0 | 18.9 | 4.5 | 46.7 | 100 | 81 | 54 | | | | |
| | | **EB2-B** | | | | | | | | | | | | | | | | |
| SS-1 | 19.0 RT. | 23+98 -Y5- | 3.90-5.40 | A-7-6(2) | 9 | 42 | 18 | 39.6 | 25.6 | 2.4 | 32.5 | 100 | 77 | 38 | | | | |

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 10 |

# Aerial Photo

0 50 100

FEET

-Y5-PC Sta. 21+41.22

-BY17-554

20

-Y5-

N 74° 11' 15.5" W

-Y5-

EB1-A

EB1-B

W.P. #1
STA. 22+94.62 -Y5-

-Y4RPD-

25

W.P. #2
STA. 24+13.87 -Y5-

EB2-A

EB2-B

N 71° 37' 38.9" W

15

-Y4RPD- CS Sta. 26+01.54

-Y4RPD-

20

-Y5DET-

-Y5- POC STA.23+59.12
-Y4RPD- POC STA.23+71.54

| STATE | STATE PROJECT REFERENCE NO. | NO. | SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 7 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *HPPNHF 0918 (46)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *WINSTON-SALEM NORTHERN BELTWAY (EASTERN SECTION) FROM US 158 TO I-40 BUSINESS/US 421*

SITE DESCRIPTION *RETAINING WALL #1 END OF RCBC TO STA. 47+75 -Y4WB-RT*

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4 | PROFILE |
| 5,6 | BORE LOG |
| 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*

*A. C. SMITH*

*M. L. SMITH*

INVESTIGATED BY *J. E. BEVERLY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *DECEMBER, 2008*

NORTH CAROLINA LICENSED GEOLOGIST SEAL 1101 CLINTON B. LITTLE 12-2-08

PROJECT: 34839.1.1

ID: U-2579B

DRAWN BY: *J. E. ROLFSMEYER*

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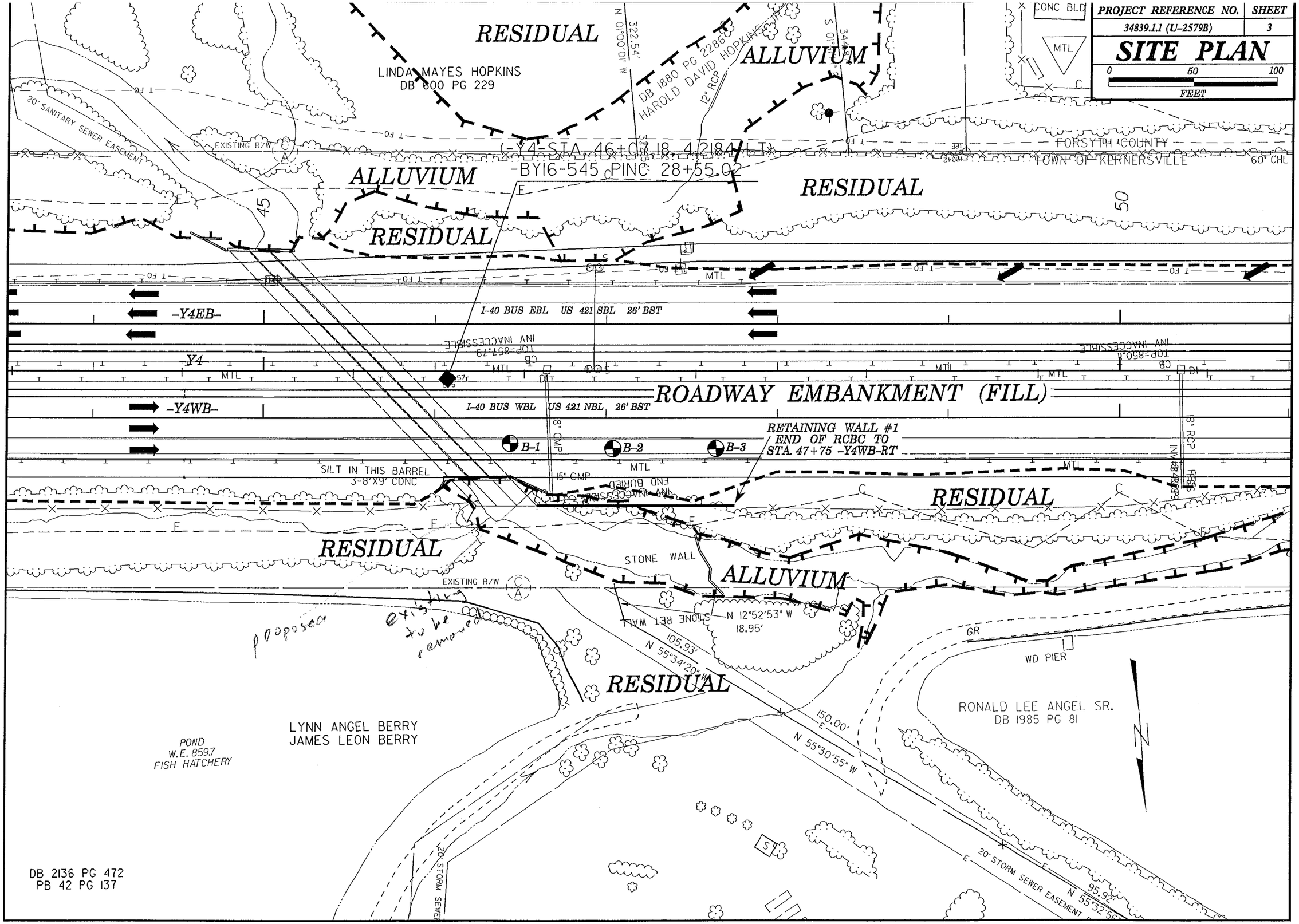
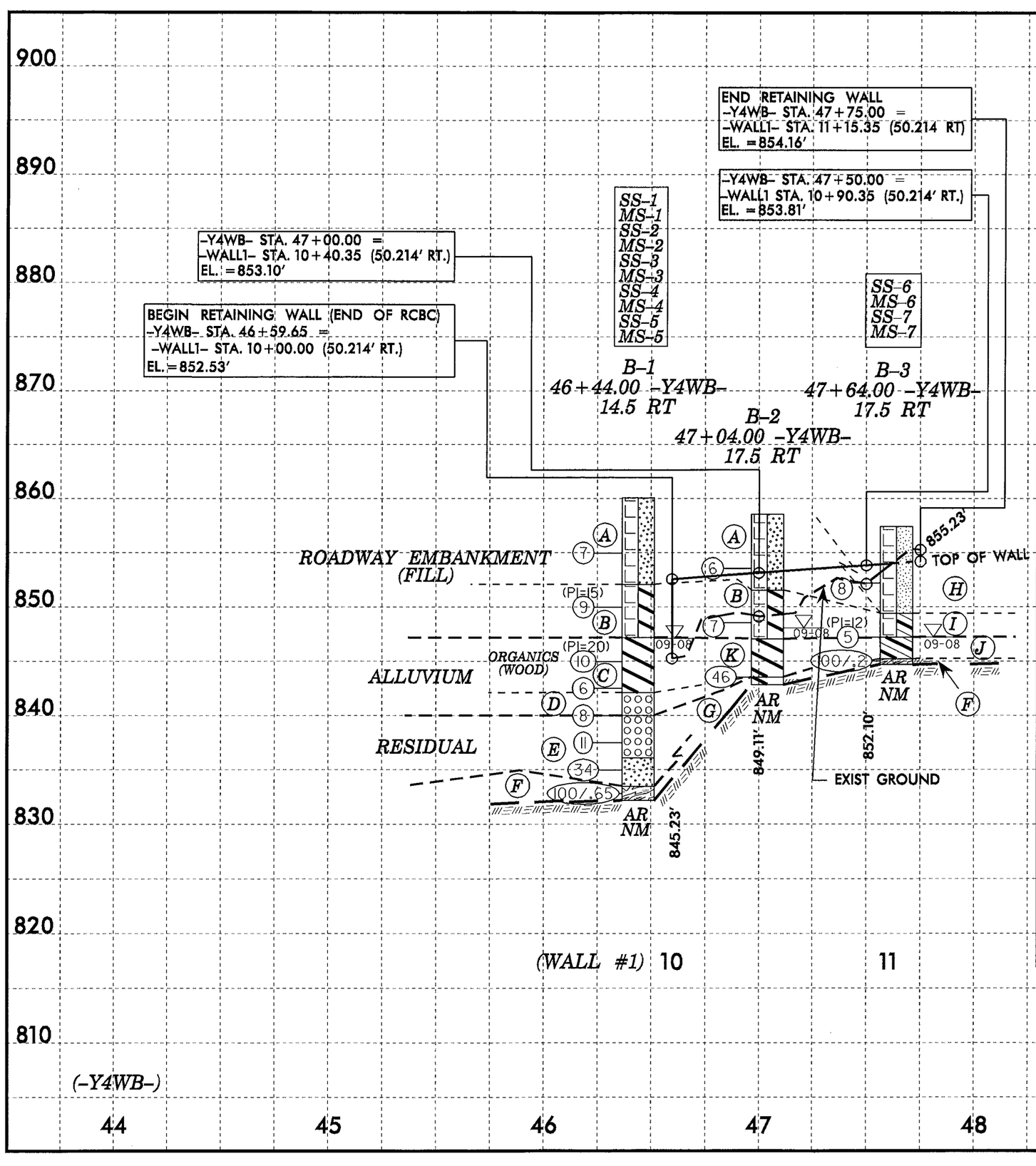

PROJECT REFERENCE NO.
34839.1.1 (U-2579B)
SHEET
3
SITE PLAN
0
50
100
FEET
RESIDUAL
ALLUVIUM
LINDA MAYES HOPKINS
DB 800 PG 229
DB 1880 PG 2286
HAROLD DAVID HOPKINS JR.
12" RCP
CONC BLD
MTL
20' SANITARY SEWER EASEMENT
EXISTING R/W
(-Y4-STA. 46+07.18, 4.2184 LT)
-BY16-545 PINC 28+55.02
FORSYTH COUNTY
TOWN OF KERNERSVILLE
60" CHL
45
50
-Y4EB-
I-40 BUS EBL US 421 SBL 26' BST
-Y4
-Y4WB-
I-40 BUS WBL US 421 NBL 26' BST
ROADWAY EMBANKMENT (FILL)
RETAINING WALL #1
END OF RCBC TO
STA. 47+75 -Y4WB-RT
B-1
B-2
B-3
SILT IN THIS BARREL
3-8'X9' CONC
15" CMP
8" CMP
18" RCP
STONE WALL
STONE RET WALL
N 12°52'53" W
18.95'
105.93'
N 55°34'20" W
150.00'
N 55°30'55" W
GR
WD PIER
RONALD LEE ANGEL SR.
DB 1985 PG 81
LYNN ANGEL BERRY
JAMES LEON BERRY
POND
W.E. 859.7
FISH HATCHERY
proposed
existing to be removed
20' STORM SEWER EASEMENT
95.92'
N 55°32'56"
DB 2136 PG 472
PB 42 PG 137

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U2579B) | 4 |
| RETAINING WALL #1 END OF RCBC TO STA. 47+75 –Y4WB–RT | |

0 50 100 FEET




(A) *RED–BRN–GRAY–WHITE LOOSE MOIST MICA. CLAYEY SAND (A–2–5) TO (A–2) ROCK FRAGS. 3.0'–4.0' (ROADWAY EMBANKMENT)*

(B) *RED–BRN TO GRAY STIFF TO MED. STIFF MOIST MICA. SILTY SANDY CLAY (A–7–5) (ROADWAY EMBANKMENT)*

(C) *RED–BRN–GRAY STIFF TO MED. STIFF MOIST TO WET MICA. MED. (PI=20) PLASTIC SILTY. SANDY CLAY (A–7–6) W/ORGANICS (WOOD) IN (ALLUVIUM)*

(D) *GRAY LOOSE MOIST V. MICA. SAND (A–1–B) W/QUARTZ GRAVEL (18.0–19.1) (ALLUVIUM)*

(E) *GRAY MED. DENSE MOIST V. MICA. SAND (A–1) TO TAN–ORANGE–WHITE DENSE MOIST MICA. SAND (A–2–4) (RESIDUAL)*

(F) *WEATHERED ROCK, SEV. WEATHERED, NON–CRYSTALLINE ROCK*

(G) *RED–BRN–GRAY MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A–7) (W/RK FRAGS) (RESIDUAL)*

(H) *RED–BRN–TAN MED STIFF. TO STIFF MOIST MICA. CLAYEY SANDY SILT (A–4) ROCK @ 6.8 (ROADWAY EMBANKMENT)*

(I) *GRAY MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A–6) (ROADWAY EMBANKMENT)*

(J) *GRAY MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A–6) (ALLUVIUM)*

(K) *RED–BRN–GRAY SOFT TO MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A–7) (W/DENSE GRAVEL @ 14.5) (ALLUVIUM)*

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT



| | | | |
|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #1 END OF RCBC TO STA. 47+75 -Y4WB-RT | | | **GROUND WTR (ft)** |
| **BORING NO.** B-1 | **STATION** 46+44 | **OFFSET** 15ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** 13.0 |
| **COLLAR ELEV.** 860.1 ft | **TOTAL DEPTH** 27.9 ft | **NORTHING** 861,572 | **EASTING** 1,670,650 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/18/08 | **COMP. DATE** 09/18/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 27.9 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 | SOIL AND ROCK DESCRIPTION | ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | GROUND SURFACE | 860.1 | 0.0 |
| | 856.0 | 4.1 | 1 | 3 | 4 | 7 | SS-1 | 19% M | | **ROADWAY EMBANKMENT** RED-BRN-GRAY-WHITE LOOSE MOIST MICA. CLAYEY SAND (A-2-5) ROCK FRAGS. @ 3.5' | 852.1 | 8.0 |
| | 851.0 | 9.1 | 2 | 4 | 5 | 9 | SS-2 | 27% M | | **ROADWAY EMBANKMENT** RED-BRN STIFF MOIST MICA. LOW (PI=15) PLASTIC SILTY SANDY CLAY (A-7-5) | 847.2 | 12.9 |
| | 846.0 | 14.1 | 4 | 5 | 5 | 10 | | M | | **ALLUVIAL** RED-BRN-GRAY STIFF TO MED. STIFF MOIST TO WET MICA. MED. (PI=20) PLASTIC SILTY SANDY CLAY (A-7-6) W/ORGANICS (WOOD) | 842.1 | 18.0 |
| | 843.5 | 16.6 | 1 | 2 | 4 | 6 | SS-3 | 41% M | | **ALLUVIAL** GRAY LOOSE MOIST V. MICA. SAND (A-1-B) W/QUARTZ GRAVEL (18.0-19.1) | 840.0 | 20.1 |
| | 841.0 | 19.1 | 3 | 4 | 4 | 8 | SS-4 | 15% M | | **RESIDUAL** GRAY LOOSE TO MED. DENSE MOIST V. MICA. SAND (A-1) | 836.1 | 24.0 |
| | 838.5 | 21.6 | 3 | 4 | 7 | 11 | | M | | **RESIDUAL** TAN-ORANGE-WHITE DENSE MOIST MICA. SAND (A-2-4) | 833.5 | 26.6 |
| | 836.0 | 24.1 | 2 | 12 | 22 | 34 | SS-5 | 16% M | | **WEATHERED ROCK** SEV. WEATHERED, NON-CRYSTALLINE ROCK | 832.2 | 27.9 |
| | 833.5 | 26.6 | 70 | 30/.15 | | 100/.65 | | M | | Boring Terminated by Auger Refusal at Elevation 832.2 ft ON NON-CRYSTALLINE ROCK | | |

NCDOT BORE SINGLE U2579B_GEO_BH_RWALS_FORSYTH_REV100402.GPJ NC_DOT.GDT 02/05/10



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #1 END OF RCBC TO STA. 47+75 -Y4WB-RT | | | **GROUND WTR (ft)** |
| **BORING NO.** B-2 | **STATION** 47+04 | **OFFSET** 18ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** 10.5 |
| **COLLAR ELEV.** 858.5 ft | **TOTAL DEPTH** 15.7 ft | **NORTHING** 861,579 | **EASTING** 1,670,590 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/18/08 | **COMP. DATE** 09/18/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 15.7 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | GROUND SURFACE | 858.5 | 0.0 |
| | 854.5 | 4.0 | 2 | 3 | 3 | 6 | | M | | **ROADWAY EMBANKMENT** RED-BRN-GRAY-WHITE LOOSE MOIST MICA. CLAYEY SAND (A-2) ROCK IN FILL (3.0-4.0) | 851.5 | 7.0 |
| | 849.5 | 9.0 | 2 | 3 | 4 | 7 | | M | | **ROADWAY EMBANKMENT** RED-BRN MED. STIFF MOIST MICA. SILTY SANDY CLAY (A-7) | 847.0 | 11.5 |
| | 844.5 | 14.0 | 2 | 40 | 6 | 46 | | M | | **ALLUVIAL** RED-BRN-GRAY SOFT TO MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A-7) (W/DENSE GRAVEL @ 14.5) | 843.5 | 15.0 |
| | | | | | | | | | | **RESIDUAL** RED-BRN-GRAY MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A-7) (W/RK FRAGS) | 842.8 | 15.7 |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 842.8 ft ON NON-CRYSTALLINE ROCK | | |

NCDOT BORE SINGLE U2579B_GEO_BH_RWALS_FORSYTH_REV100402.GPJ NC_DOT.GDT 02/05/10

SHEET 6

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

SHEET

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #1 END OF RCBC TO STA. 47+75 -Y4WB-RT | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-3 | **STATION** 47+64 | **OFFSET** 18ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** 10.2 |
| **COLLAR ELEV.** 857.4 ft | **TOTAL DEPTH** 12.7 ft | **NORTHING** 861,584 | **EASTING** 1,670,530 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | | **HAMMER TYPE** Automatic |
| **START DATE** 09/18/08 | **COMP. DATE** 09/18/08 | **SURFACE WATER DEPTH** N/A | | **DEPTH TO ROCK** 12.7 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) |
| 860 | | | | | | | | | | 857.4 GROUND SURFACE 0.0 |
| 855 | 853.2 | 4.2 | 1 | 3 | 5 | 8 | SS-6 | 23% M | | **ROADWAY EMBANKMENT** RED-BRN-TAN MED STIFF. TO STIFF MOIST MICA. CLAYEY SANDY SILT (A-4) ROCK @ 6.8 |
| 850 | 848.2 | 9.2 | 4 | 3 | 2 | 5 | SS-7 | 23% M | | 849.4 8.0 **ROADWAY EMBANKMENT** GRAY MED. STIFF MOIST TO WET MICA. LOW (PI=12) PLASTIC SILTY SANDY CLAY (A-6) 847.2 10.2 |
| 845 | 845.7 | 11.7 | 1 | 100/.2 | | 100/.2 | | | | 845.2 12.2 **ALLUVIAL** GRAY MED. STIFF MOIST TO WET MICA. SILTY SANDY CLAY (A-6) 844.7 12.7 **WEATHERED ROCK** SEV. WEATHERED, NON-CRYSTALLINE ROCK Boring Terminated by Auger Refusal at Elevation 844.7 ft ON NON-CRYSTALLINE ROCK |
| 840 | | | | | | | | | | |
| 835 | | | | | | | | | | |
| 830 | | | | | | | | | | |
| 825 | | | | | | | | | | |
| 820 | | | | | | | | | | |
| 815 | | | | | | | | | | |
| 810 | | | | | | | | | | |
| 805 | | | | | | | | | | |
| 800 | | | | | | | | | | |
| 795 | | | | | | | | | | |
| 790 | | | | | | | | | | |
| 785 | | | | | | | | | | |
| 780 | | | | | | | | | | |

NCDOT BORE SINGLE U2579B_GEO_BH_RWALS_FORSYTH_REV100402.GPJ NC_DOT.GDT 02/05/10

# TEST RESULTS

*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: FORSYTH*
*SITE DESCRIPTION: RETAINING WALL #1 END OF RCBC TO STA. 47+75 -Y4WB-RT*

**SOIL SAMPLE RESULTS**

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS | N | L.L. | P.I. | % BY WEIGHT C. SAND | F. SAND | SILT | CLAY | % PASSING SIEVES 10 | 40 | 200 | % MOISTURE | % ORGANIC | UNIT WT. (d) | VOID RATIO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RET. WALL 1** | | **(B-1)** | | | | | | | | | | | | | | | | |
| SS-1 | 14.5 RT | 46+44 | 4.60-5.60 | A-2-5(0) | 7 | 42 | 10 | 39.2 | 32.9 | 9.6 | 18.3 | 87 | 66 | 29 | 18.8 | | | |
| SS-2 | 14.5 RT | 46+44 | 9.60-10.60 | A-7-5(4) | 9 | 48 | 15 | 30.7 | 27.2 | 13.6 | 28.5 | 100 | 80 | 47 | 26.6 | | | |
| SS-3 | 14.5 RT | 46+44 | 17.10-18.10 | A-7-6(13) | 6 | 46 | 20 | 12.2 | 17.1 | 24.0 | 46.7 | 90 | 84 | 67 | 41.4 | | | |
| SS-4 | 14.5 RT | 46+44 | 19.60-20.60 | A-1-b(0) | 8 | 38 | NP | 52.8 | 37.6 | 3.5 | 6.1 | 67 | 44 | 9 | 14.8 | | | |
| SS-5 | 14.5 RT | 46+44 | 24.60-25.60 | A-2-4(0) | 34 | 35 | NP | 53.3 | 36.4 | 6.3 | 4.1 | 88 | 57 | 13 | 15.6 | | | |
| | | **(B-3)** | | | | | | | | | | | | | | | | |
| SS-6 | 17.5 RT | 47+64 | 4.70-5.70 | A-4(0) | 8 | 40 | 6 | 33.5 | 32.7 | 13.4 | 20.3 | 94 | 75 | 36 | 22.5 | | | |
| SS-7 | 17.5 RT | 47+64 | 9.70-10.70 | A-6(1) | 5 | 30 | 12 | 39.0 | 26.6 | 10.0 | 24.4 | 95 | 70 | 36 | 22.7 | | | |

**ROCK SAMPLE RESULTS**

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | RQD | UNIT WT | Q(MPa) (MPsi) | E(MPa) (MPsi) |
|---|---|---|---|---|---|---|---|

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | 34839.1.1 (U-2579B) | 1 | 8 |

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

# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34839.1.1 (U-2579B)* F.A. PROJ. *HPPNHF 0918 (46)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *WINSTON-SALEM NORTHERN BELTWAY (EASTERN SECTION) FROM US 158 TO I-40 BUSINESS/US 421*

SITE DESCRIPTION *RETAINING WALL #2 STA. 50+50 -Y4WB- TO STA. 55+50 -Y4WB-*

PROJECT: 34839.1.1

ID: U-2579B

## CONTENTS


| SHEET | DESCRIPTION |
|---|---|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4 | PROFILE |
| 5-7 | BORE LOGS |
| 8 | 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. L. SMITH*

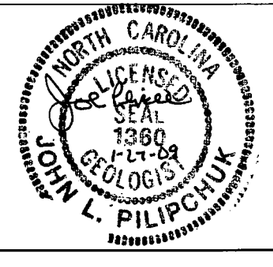
*A. C. SMITH*

INVESTIGATED BY *J. E. BEVERLY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *DECEMBER, 2008*




DRAWN BY: *J. E. ROLFSMEYER*

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| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 3 |

# SITE PLAN

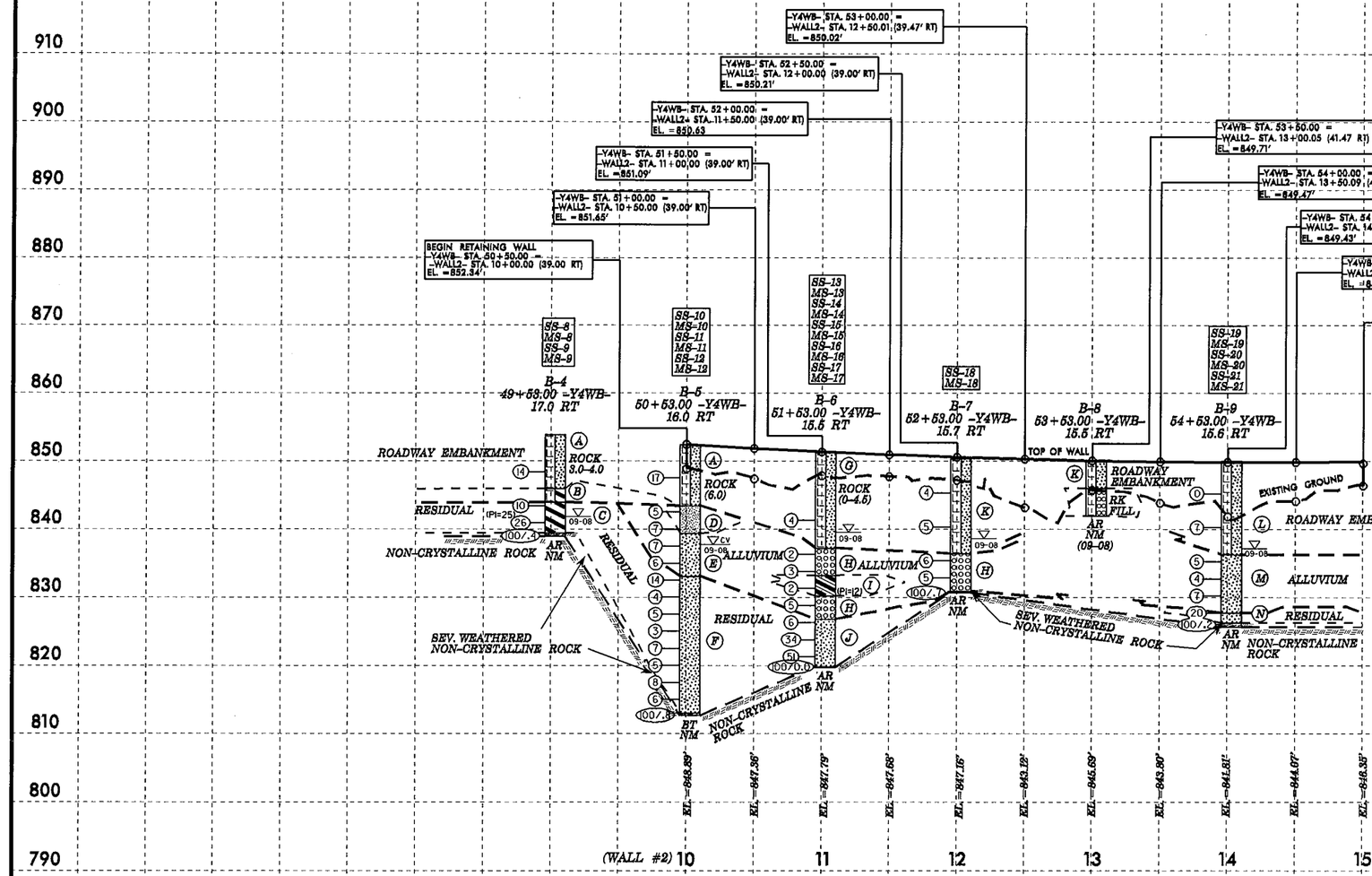
0 50 100

FEET

96" CHL&3SBW
CONC BLD
MTL
HAROLD D. CRANFILL
PATTIE CRANFILL
JERRY M. PEGRAM
NANCY B. PEGRAM
FORSYTH COUNTY
TOWN OF KERNERSVILLE
60" CHL
50
55
RESIDUAL
ALLUVIUM
RESIDUAL
24" RCP
I-40 BUS EBL US 421 SBL 26' BST -Y4EB- N 85° 33' 45.8" W
ROADWAY EMBANKMENT (FILL)
-Y4- N 85° 33' 45.8" W
I-40 BUS WBL US 421 NBL 26' BST -Y4WB- N 85° 33' 45.8" W
18" RCP
B-4
B-5
B-6
B-7
B-8
B-9
RESIDUAL
ALLUVIUM
RESIDUAL
RETAINING WALL #2
STA. 50+50 -Y4WB- TO STA. 55+50 -Y4WB-
WD PIER
PIER
DAM
DAM
POND
W.E. 847.2
FISH HATCHERY
RONALD LEE ANGEL SR.
POND
W.E. 843.4
FISH HATCHERY
RONALD LEE ANGEL SR.
20' STORM

| PROJECT REFERENCE NO. | SHEET |
|---|---|
| 34839.1.1 (U-2579B) | 4 |
| RETAINING WALL #2 STA. 50+50 -Y4WB- TO STA. 55+50 -Y4WB- | |

0 100 200 FEET




## BORING DESCRIPTIONS

- (A) TAN-ORANGE-GRAY MED. DENSE TO LOOSE MOIST MICA SILTY CLAYEY SAND (A-2-4) (ROADWAY EMBANKMENT)
- (B) TAN-ORANGE STIFF MOIST MICA SANDY CLAY (A-7-6) ROCK IN FILL (ROADWAY EMBANKMENT)
- (C) TAN-ORANGE-GRAY-WHITE STIFF TO V. STIFF MOIST MED. (PI=25) PLASTIC SANDY CLAY (A-7) (RESIDUAL)
- (D) GRAY MED. STIFF MOIST MICA, CLAYEY SANDY SILT (A-4) (ALLUVIUM)
- (E) TAN-ORANGE-GRAY-WHITE LOOSE MOIST TO WET CLAYEY SAND (A-2-4) (ALLUVIUM)
- (F) GRAY-TAN-ORANGE LOOSE TO MED. DENSE MOIST SAND (A-2-4) (RESIDUAL)
- (G) TAN-ORANGE-GRAY TO RED BRN. LOOSE MOIST MICA, SILTY CLAYEY SAND (A-2-4) ROCK IN (ROADWAY EMBANKMENT)
- (H) GRAY TO V. LOOSE TO LOOSE SATURATED TO MOIST SAND (A-1-B) (ALLUVIUM)
- (I) GRAY SOFT MOIST SILTY SANDY CLAY (A-6) (ALLUVIUM)
- (J) TAN-ORANGE-BRN TO TAN-ORANGE-GRAY-WHITE LOOSE TO VERY DENSE MOIST MICA SAND (A-2-5) & SILTY SAND (A-2-4) (RESIDUAL)
- (K) RED-BRN LOOSE MOIST MICA CLAYEY SILTY SAND (A-2-5) AND SILTY CLAYEY SAND (A-2-4) (ROADWAY EMBANKMENT)
- (L) GRAY-RED-BRN V. LOOSE TO LOOSE MOIST MICA, SILTY CLAYEY SAND (A-2-4) (ROADWAY EMBANKMENT)
- (M) GRAY TO GRAY-WHITE LOOSE SAT. TO DRY SILTY CLAYEY SAND (A-2-4) TO SAND (A-2-4) (ALLUVIUM)
- (N) GRAY-WHITE MED. DENSE DRY SAND (A-2) (RESIDUAL)

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

SHEET

| | | | |
|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | **GROUND WTR (ft)** |
| **BORING NO.** B-8 | **STATION** 53+53 | **OFFSET** 16ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** Dry |
| **COLLAR ELEV.** 850.0 ft | **TOTAL DEPTH** 8.1 ft | **NORTHING** 861,627 | **EASTING** 1,669,943 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/19/08 | **COMP. DATE** 09/19/08 | **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 850.0 GROUND SURFACE | 0.0 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** RED-BRN LOOSE MOIST MICA.CLAYEY SILTY SAND (A-2) | |
| | | | | | | | | | | 846.0 | 4.0 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** ROCK FILL(4.0-8.1) | |
| | | | | | | | | | | 841.9 | 8.1 |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 841.9 ft ON ROCK FILL | |



SHEET 7

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | **GROUND WTR (ft)** |
| **BORING NO.** B-9 | **STATION** 54+53 | **OFFSET** 16ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** 12.9 |
| **COLLAR ELEV.** 850.0 ft | **TOTAL DEPTH** 24.4 ft | **NORTHING** 861,635 | **EASTING** 1,669,843 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/19/08 | **COMP. DATE** 09/19/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 24.4 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 850.0 GROUND SURFACE | 0.0 |
| | 846.2 | 3.8 | 0 | 0 | 0 | 0 | | M | | **ROADWAY EMBANKMENT** GRAY-RED-BRN LOOSE MOIST MICA. SILTY CLAYEY SAND (A-2-4) | |
| | 841.2 | 8.8 | 4 | 3 | 4 | 7 | SS-19 | 30% M | | | |
| | 836.2 | 13.8 | 2 | 2 | 3 | 5 | SS-20 | 40% M | | 836.2 | 13.8 |
| | 833.7 | 16.3 | 2 | 2 | 2 | 4 | SS-21 | 31% Sat. | | **ALLUVIAL** GRAY TO GRAY-WHITE LOOSE SAT. TO DRY SILTY CLAYEY SAND (A-2-4) TO SAND (A-2-4) | |
| | 831.2 | 18.8 | 4 | 3 | 4 | 7 | | Sat. | | | |
| | 828.7 | 21.3 | 2 | 5 | 15 | 20 | | D | | 827.7 | 22.3 |
| | 826.2 | 23.8 | 100/.2 | | | 100/.2 | | | | 826.2 **RESIDUAL** GRAY-WHITE MED. DENSE DRY SAND (A-2) | 23.8 |
| | | | | | | | | | | 825.6 **WEATHERED ROCK** SEV. WEATHERED, NON-CRYSTALLINE ROCK | 24.4 |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 825.6 ft ON NON-CRYSTALLINE ROCK | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-4 | **STATION** 49+53 | **OFFSET** 17ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** 12.1 |
| **COLLAR ELEV.** 853.9 ft | **TOTAL DEPTH** 15.0 ft | **NORTHING** 861,598 | **EASTING** 1,670,342 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/18/08 | **COMP. DATE** 09/18/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 15.0 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 855 | | | | | | | | | | 853.9 GROUND SURFACE | 0.0 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** TAN-ORANGE-GRAY MED. DENSE MOIST MICA. SILTY CLAYEY SAND (A-2-4) ROCK IN FILL (3.0-4.0) | |
| 850 | 849.4 | 4.5 | 4 | 5 | 9 | 14 | SS-8 | 19% M | | | |
| | | | | | | | | | | 845.9 | 8.0 |
| 845 | 844.4 | 9.5 | 15 | 5 | 5 | 10 | SS-9 | 46% M | | 843.9 **ROADWAY EMBANKMENT** TAN-ORANGE STIFF MOIST MICA. SANDY CLAY (A-7-6) ROCK IN FILL | 10.0 |
| | 841.9 | 12.0 | 10 | 15 | 11 | 26 | | | | **RESIDUAL** TAN-ORANGE-GRAY-WHITE STIFF TO V. STIFF MOIST MED. (PI=25) PLASTIC SANDY CLAY (A-7) | |
| 840 | 839.4 | 14.5 | 100/.4 | | | 100/.4 | | D | | 839.4 838.9 **WEATHERED ROCK** SEV. WEATHERED, NON-CRYSTALLINE ROCK | 14.5 15.0 |
| 835 | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 838.9 ft ON NON-CRYSTALLINE ROCK | |
| 830 | | | | | | | | | | | |
| 825 | | | | | | | | | | | |
| 820 | | | | | | | | | | | |
| 815 | | | | | | | | | | | |
| 810 | | | | | | | | | | | |
| 805 | | | | | | | | | | | |
| 800 | | | | | | | | | | | |
| 795 | | | | | | | | | | | |
| 790 | | | | | | | | | | | |
| 785 | | | | | | | | | | | |
| 780 | | | | | | | | | | | |
| 775 | | | | | | | | | | | |

NCDOT BORE SINGLE U2579B_GEO_BH_RWALS_FORSYTH_REV100402.GPJ NC_DOT.GDT 02/05/10



# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 34839.1.1 | **ID.** U2579B | **COUNTY** FORSYTH | | **GEOLOGIST** Stickney, J. K. |
| **SITE DESCRIPTION** RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-5 | **STATION** 50+53 | **OFFSET** 16ft RT | **ALIGNMENT** -Y4WB- | **0 HR.** CV@14.7 |
| **COLLAR ELEV.** 852.4 ft | **TOTAL DEPTH** 39.7 ft | **NORTHING** 861,605 | **EASTING** 1,670,242 | **24 HR.** NM |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** H.S. Augers | | **HAMMER TYPE** Automatic | |
| **START DATE** 09/18/08 | **COMP. DATE** 09/18/08 | **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 |
| | | | | | | | | | | **ROADWAY EMBANKMENT** TAN-ORANGE-GRAY MED. DENSE TO LOOSE MOIST MICA. SILTY CLAYEY SAND (A-2) ROCK IN FILL (3.0-4.0) AND @ 6.0 | |
| 850 | 848.5 | 3.9 | 6 | 11 | 6 | 17 | | | | | |
| | | | | | | | | | | 843.4 | 9.0 |
| 845 | 843.5 | 8.9 | 3 | 2 | 3 | 5 | SS-10 | 18% M | | **ALLUVIAL** GRAY MED. STIFF MOIST MICA. CLAYEY SANDY SILT (A-4) | |
| | 841.0 | 11.4 | 2 | 3 | 4 | 7 | | M | | 839.4 | 13.0 |
| 840 | 838.5 | 13.9 | 4 | 4 | 3 | 7 | SS-11 | 20% M | | **ALLUVIAL** TAN-ORANGE-GRAY-WHITE LOOSE MOIST TO WET CLAYEY SAND (A-2-4) | |
| | 836.0 | 16.4 | 5 | 3 | 3 | 6 | | M | | 833.0 | 19.4 |
| 835 | 833.5 | 18.9 | 7 | 8 | 6 | 14 | SS-12 | 45% M | | **RESIDUAL** GRAY-TAN-ORANGE LOOSE TO MED. DENSE MOIST SAND | |
| | 831.0 | 21.4 | 0 | 1 | 3 | 4 | | M | | | |
| 830 | 828.5 | 23.9 | 2 | 2 | 3 | 5 | | M | | | |
| | 826.0 | 26.4 | 1 | 1 | 2 | 3 | | M | | | |
| 825 | 823.5 | 28.9 | 2 | 3 | 4 | 7 | | M | | | |
| | 821.0 | 31.4 | 2 | 2 | 3 | 5 | | M | | | |
| 820 | 818.5 | 33.9 | 2 | 3 | 5 | 8 | | M | | | |
| | 816.0 | 36.4 | 1 | 3 | 3 | 6 | | M | | | |
| 815 | 813.5 | 38.9 | 6 | 94/.3 | 0 | 100/.8 | | M | | 813.0 812.7 **WEATHERED ROCK** SEV. WEATHERED, NON-CRYSTALLINE ROCK | 39.4 39.7 |
| 810 | | | | | | | | | | Boring Terminated at Elevation 812.7 ft IN SEV. WEATHERED, NON-CRYSTALLINE ROCK | |
| 805 | | | | | | | | | | | |
| 800 | | | | | | | | | | | |
| 795 | | | | | | | | | | | |
| 790 | | | | | | | | | | | |
| 785 | | | | | | | | | | | |
| 780 | | | | | | | | | | | |
| 775 | | | | | | | | | | | |

NCDOT BORE SINGLE U2579B_GEO_BH_RWALS_FORSYTH_REV100402.GPJ NC_DOT.GDT 02/05/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| PROJECT NO. 34839.1.1 | ID. U2579B | COUNTY FORSYTH | GEOLOGIST Stickney, J. K. | |
| SITE DESCRIPTION RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | | GROUND WTR (ft) |
| BORING NO. B-6 | STATION 51+53 | OFFSET 16ft RT | ALIGNMENT -Y4WB- | 0 HR. 11.7 |
| COLLAR ELEV. 851.2 ft | TOTAL DEPTH 31.5 ft | NORTHING 861,612 | EASTING 1,670,142 | 24 HR. NM |
| DRILL MACHINE CME-550X | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | |
| START DATE 09/19/08 | COMP. DATE 09/19/08 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 31.5 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | GROUND SURFACE | 851.2 | 0.0 |
| | 847.3 | 3.9 | 0 | 0 | 0 | 0 | | | | **ROADWAY EMBANKMENT** TAN-ORANGE-GRAY TO RED BRN. LOOSE MOIST MICA. SILTY CLAYEY SAND (A-2-4) ROCK IN FILL (0-4.5) | | |
| | | | | | | BLOW COUNT NOT REPRESENTATIVE DUE TO ROCK 4.5' TO TOP OF DRIVE | | | | | | |
| | 842.3 | 8.9 | 2 | 2 | 2 | 4 | SS-13 | 12% M | | | | |
| | 837.3 | 13.9 | 1 | 1 | 1 | 2 | SS-14 | 25% Sat. | | **ALLUVIAL** GRAY V. LOOSE SATURATED SAND (A-1-B) | 837.2 | 14.0 |
| | 834.8 | 16.4 | 1 | 2 | 1 | 3 | | | | | 833.2 | 18.0 |
| | 832.3 | 18.9 | 3 | 1 | 1 | 2 | SS-15 | 31% M | | **ALLUVIAL** GRAY SOFT MOIST LOW (PI=12) PLASTIC SILTY SANDY CLAY (A-6) | 830.2 | 21.0 |
| | 829.8 | 21.4 | 0 | 1 | 4 | 5 | | Sat. | | **ALLUVIAL** GRAY LOOSE SATURATED SAND (A-1) | 826.8 | 24.4 |
| | 827.3 | 23.9 | 0 | 1 | 5 | 6 | SS-16 | 39% M | | **RESIDUAL** TAN-ORANGE-BRN TO TAN-ORANGE-GRAY-WHITE LOOSE TO VERY DENSE MOIST MICA. SAND (A-2-5) & SILTY SAND (A-2-4) | | |
| | 824.8 | 26.4 | 5 | 15 | 19 | 34 | SS-17 | 17% M | | | | |
| | 822.3 | 28.9 | 5 | 8 | 43 | 51 | | M | | | | |
| | 819.8 | 31.4 | 100/0 | | | 100/0.0 | | | | **NON-CRYSTALLINE ROCK** HARD NON-CRYSTALLINE ROCK | 819.8 / 819.7 | 31.4 / 31.5 |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 819.7 ft ON NON-CRYSTALLINE ROCK | | |





# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| PROJECT NO. 34839.1.1 | ID. U2579B | COUNTY FORSYTH | GEOLOGIST Stickney, J. K. | |
| SITE DESCRIPTION RETAINING WALL #2 STA. 50+50 TO 55+50 -Y4WB-RT | | | | GROUND WTR (ft) |
| BORING NO. B-7 | STATION 52+53 | OFFSET 16ft RT | ALIGNMENT -Y4WB- | 0 HR. 11.8 |
| COLLAR ELEV. 850.4 ft | TOTAL DEPTH 19.7 ft | NORTHING 861,620 | EASTING 1,670,043 | 24 HR. NM |
| DRILL MACHINE CME-550X | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | |
| START DATE 09/19/08 | COMP. DATE 09/19/08 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 19.7 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | GROUND SURFACE | 850.4 | 0.0 |
| | 846.4 | 4.0 | 1 | 2 | 2 | 4 | SS-18 | 23% M | | **ROADWAY EMBANKMENT** RED-BRN LOOSE MOIST MICA. CLAYEY SILTY SAND (A-2-5) AND SILTY CLAYEY SAND (A-2-4) | | |
| | 841.4 | 9.0 | 1 | 2 | 3 | 5 | | M | | | 836.4 | 14.0 |
| | 836.4 | 14.0 | 3 | 2 | 4 | 6 | | M | | **ALLUVIAL** GRAY LOOSE MOIST SAND (A-1) | 830.9 | 19.5 |
| | 833.9 | 16.5 | 2 | 2 | 3 | 5 | | M | | | 830.7 | 19.7 |
| | 831.4 | 19.0 | 1 | 99/.2 | | 100/.7 | | | | **WEATHERED ROCK** SEV. WEATHERED , NON-CRYSTALLINE ROCK | | |
| | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 830.7 ft ON NON-CRYSTALLINE ROCK | | |

# TEST RESULTS

*PROJECT: 34839.1.1 (U-2579B)*
*COUNTY: FORSYTH*
*SITE DESCRIPTION: RETAINING WALL #2 STA. 50+50 TO STA. 55+50 -Y4WB-RT*

**SOIL SAMPLE RESULTS**

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS | N | L.L. | P.I. | % BY WEIGHT C. SAND | F. SAND | SILT | CLAY | % PASSING SIEVES 10 | 40 | 200 | % MOISTURE | % ORGANIC | UNIT WT. (d) | VOID RATIO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RET. WALL 2** | | **(B-4)** | | | | | | | | | | | | | | | | |
| SS-8 | 17 RT | 49+53 | 5.00-6.00 | A-2-4(0) | 14 | 32 | 10 | 33.3 | 33.3 | 11.0 | 22.4 | 92 | 74 | 35 | 19.0 | | | |
| SS-9 | 17 RT | 49+53 | 10.00-11.00 | A-7-6(6) | 10 | 51 | 25 | 37.2 | 24.0 | 6.3 | 32.5 | 100 | 75 | 42 | 46.1 | | | |
| | | **(B-5)** | | | | | | | | | | | | | | | | |
| SS-10 | 16 RT | 50+53 | 9.40-10.40 | A-4(0) | 5 | 24 | 7 | 34.1 | 26.2 | 17.3 | 22.4 | 94 | 73 | 41 | 17.6 | | | |
| SS-11 | 16 RT | 50+53 | 14.40-15.40 | A-2-4(0) | 7 | 23 | 3 | 56.1 | 24.8 | 4.9 | 14.2 | 89 | 56 | 19 | 19.9 | | | |
| SS-12 | 16 RT | 50+53 | 19.40-20.40 | A-2-4(0) | 14 | 38 | NP | 54.5 | 30.9 | 6.5 | 8.1 | 84 | 52 | 16 | 44.9 | | | |
| | | **(B-6)** | | | | | | | | | | | | | | | | |
| SS-13 | 15.5 RT | 51+53 | 9.40-10.40 | A-2-4(0) | 4 | 30 | 4 | 32.1 | 42.5 | 11.2 | 14.2 | 87 | 73 | 26 | 11.6 | | | |
| SS-14 | 15.5 RT | 51+53 | 14.40-15.40 | A-1-b(0) | 2 | 23 | NP | 67.3 | 21.3 | 3.3 | 8.1 | 76 | 34 | 10 | 25.1 | | | |
| SS-15 | 15.5 RT | 51+53 | 19.40-20.40 | A-6(2) | 2 | 36 | 12 | 22.4 | 37.4 | 15.9 | 24.4 | 99 | 86 | 45 | 31.4 | | | |
| SS-16 | 15.5 RT | 51+53 | 24.40-25.40 | A-2-5(0) | 6 | 44 | NP | 35.4 | 50.4 | 8.1 | 6.1 | 98 | 80 | 20 | 39.3 | | | |
| SS-17 | 15.5 RT | 51+53 | 26.90-27.90 | A-2-4(0) | 34 | 30 | NP | 49.8 | 36.0 | 10.2 | 4.1 | 93 | 63 | 18 | 16.5 | | | |
| | | **(B-7)** | | | | | | | | | | | | | | | | |
| SS-18 | 15.7 RT | 52+53 | 4.50-5.50 | A-2-5(0) | 4 | 44 | 3 | 37.4 | 35.6 | 14.8 | 12.2 | 99 | 76 | 32 | 23.3 | | | |
| | | **(B-9)** | | | | | | | | | | | | | | | | |
| SS-19 | 15.7 RT | 52+53 | 9.30-10.30 | A-2-4(0) | 7 | 37 | 7 | 32.7 | 36.8 | 12.2 | 18.3 | 95 | 78 | 34 | 30.1 | | | |
| SS-20 | 15.6 RT | 54+53 | 14.30-15.30 | A-2-4(0) | 5 | 24 | NP | 14.6 | 61.2 | 10.0 | 14.2 | 98 | 94 | 29 | 40.4 | | | |
| SS-21 | 15.6 RT | 54+53 | 16.80-17.80 | A-2-4(0) | 4 | 23 | NP | 47.8 | 43.7 | 2.4 | 6.1 | 96 | 66 | 12 | 30.5 | | | |

**ROCK SAMPLE RESULTS**

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | RQD | UNIT WT | Q(MPa) (MPsi) | E(MPa) (MPsi) |
|---|---|---|---|---|---|---|---|