STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33548.1.1 (B-4201)	1	16

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *33548.1.1 (B-4201)* F.A. PROJ. *BRSTP-3168(1)*

COUNTY *MECKLENBURG*

PROJECT DESCRIPTION *BRIDGE OVER IRVIN'S CREEK ON SR 3168 (SAM NEWELL RD.) BETWEEN US 74 AND SR 3156*

SITE DESCRIPTION *BRIDGE #38 ON SR 3168 (SAM NEWELL RD.) OVER IRVIN'S CREEK*

ID: B-4201

PROJECT: 33548.1.1

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CAUTION NOTICE

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

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

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PERSONNEL

J. K. STICKNEY

C. L. SMITH

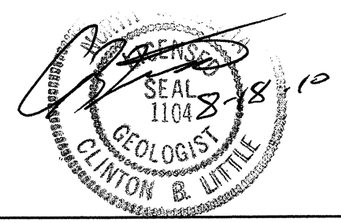
A. C. SMITH

INVESTIGATED BY *J. E. BEVERLY*

CHECKED BY *C. B. LITTLE*

SUBMITTED BY *C. B. LITTLE*

DATE *AUGUST, 2010*



DRAWN BY: *J. E. ROLFSMEYER*

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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.
33548.1.1 (B-4201)	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 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [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
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16 TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B_____
- [X] -N X
- [ ] -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: BM2: BL STA. 12+53 96' RT. RR SPIKE IN 10" OAK

ELEVATION: 620.86 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
33548.1.1 (B-4201)	3

SITE PLAN

0 50 100
FEET

-L- PT Sta. 18+97.63'

-BL- PINC 13+77.79

BL-4

N 11° 10' 26.5" W

N 8° 27' 53.7" W

N 7° 18' 12.3" W

SAM NEWELL ROAD SR-3168 34' PAVED

TO US 74

TO SR 3156

BOARD OF EDUCATION
CHARLOTTE MECKLENBURG
DB 6615 PG 648

EVERETTE N. HAIGLER
GERALDINE HAIGLER
DB 1781 PG 281
DB 1914 PG 511

USGS STREAM GAGE

USGS STREAM GAGING STATION

USGS BENCHMARK
+57.28
33.18'
204HLZ 1969

CHARLOTTE-MECKLENBURG
BENCHMARK IRVIN-5

BM #2
-BL- STA 12+53
96 RIGHT
ELEV. 620.86'

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

SEAT ELEV. 624.87'

S 72°00'33" E 189.89'

IRVINS CREEK

ABANDONED LINE

UNABLE TO LOCATE MANHOLE

LAKEVIEW CIR 17' PAVED

MTL GATE

CHL BALL STOP

NC GRID NAD 83

ISBKD

GR

WOOD & STEEL FOOT BRIDGE

CONC & STEEL

PK NAIL

CONC WW

CONC MON

43" ELM

20

25

PROJECT REFERENCE NO.	SHEET
33548.1.1 (B-4201)	4

PROFILE BRIDGE #38 ON SR 3168 (SAM NEWELL RD.) OVER IRVIN'S CREEK SKEW ANGLE=113°00'00"

0 50 100 FEET

BM2 ELEVATION = 620.86
N 516931 E 1488021
-BL- STATION 12+53.96' RIGHT
-L- STATION 21+87.29 83.17' RIGHT
RR SPIKE IN 10" OAK

GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 5/10/2010. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

PI = 22+30.00
EL = 626.96'
VC = 230'
K = 50 (DS > 35 mph)

PI = 19+90.00
EL = 629.27'
VC = 180'
K = 63 (DS > 35 mph)

BEGIN GRADE -L- STA. 19+00.00
ELEV. = 632.70'
INCLUDES 3" RESURFACING

END GRADE -L- STA. 24+50.00
ELEV. = 634.88'
INCLUDES 3" RESURFACING

℄ -L- STA. 22+60.00
PROP. 1 @ 30', 1 @ 60'
24" CORED SLAB
ELEV. = 628.76'
SKEW = 113°

RS-1
RS-2
RS-3
B1-A
22+53.00-L-
18.0' LT

SS-1
SS-2
EB2-A
23+15.00-L-
24.0' LT

SS-3
SS-4
EB1-A
22+28.00-L-
27.0' LT

(-)3.8111%
(-)0.9625%
(-)0.9625%
(+)3.6000%

ROADWAY EMBANKMENT
TAN-BRN MED. DENSE MOIST CLAYEY SILTY SAND (A-2-4) (W/ROCK BITS)

ALLUVIUM
TAN-BRN MED. DENSE MOIST CLAYEY SAND (A-2-4) (W/QUARTZ BITS)

RESIDUAL
TAN-BRN DENSE MOIST CLAYEY SAND (A-2-4) (W/QUARTZ BITS)

RESIDUAL, GRAY-WHITE DENSE TO V. DENSE MOIST SILTY SAND (A-1-b)

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR

GRAY SLI. WEATHERED METAVOLCANIC ROCK

GRAY FRESH METAVOLCANIC ROCK

BT

ALLUVIUM
TAN-BRN LOOSE TO V. LOOSE MOIST CLAYEY SAND (A-2)

NWSEL=614.3 (12/1/09)

RESIDUAL
BRN-GRN DENSE MOIST SILTY CLAYEY SAND (A-1-b) (W/ROCK BITS)

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR NM 7/21/10

BORING DESCRIPTION
(A) RIP RAP W/SAND (NO SPT DUE TO RIP RAP)

660 650 640 630 620 610 600 590 580

19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00

0	10	20
FEET		

PROJECT REFERENCE NO.	SHEET
33548.1.1 (B-4201)	5

SECTION THRU END BENT ONE
STA. 22+15-L-
SKEW ANGLE = 113 00' 00"

650 640 630 620 610 600 590 580 570 560

SS-3
SS-4
EB1-A
22+28.00-L-
27.0' LT
620.8

GROUND SURFACE

SS-5
EB1-B
22+00.00-L-
36.0' RT
620.4

ALLUVIUM
TAN-BRN MED. DENSE MOIST
CLAYEY SAND (A-2-4) (W/ QUARTZ BITS)

18

07/10

RESIDUAL
TAN-BRN DENSE MOIST CLAYEY SAND (A-2-4)
(W/ QUARTZ BITS)

74

GRAY-WHITE DENSE TO V. DENSE
MOIST SILTY SAND (A-1-b)

SEVERELY WEATHERED CRYSTALLINE ROCK

100/.1

CAR

CRYSTALLINE ROCK

TAN-BRN-GRAY MED. DENSE
CLAYEY SAND (A-2-4)

26

ALLUVIUM

TAN-BRN-GRAY MED. DENSE
CLAYEY SAND (A-2-4)

SEVERELY WEATHERED
CRYSTALLINE ROCK

CAR
NM
7/23/10

60 50 40 30 20 10 0 10 20 30 40 50 60

PROJECT REFERENCE NO.	SHEET
33548.1.1 (B-4201)	6

SECTION THRU BENT ONE
STA. 22+45-L-
SKEW ANGLE = 113° 00' 00"

0 10 20
FEET

650 640 630 620 610 600 590 580 570 560

RS-1
RS-2
RS-3

B1-A
22+53.00-L-
18.0' LT
616.6

RS-4
RS-5
RS-6

B1-B
22+30.00-L-
36.0' RT
619.0

GROUND SURFACE

RIP RAP W/SAND
(NO SPT DUE TO RIP RAP)

ALLUVIUM

07/10

TAN-BRN-GRAY MED. DENSE MOIST
CLAYEY SAND (A-2)

ALLUVIUM

100/.9

RESIDUAL
SEVERELY WEATHERED
CRYSTALLINE ROCK

CRYSTALLINE ROCK

METAVOLCANIC ROCK GRAY SLI. WEATHERED
MODERATELY HARD TO HARD
FRACTURE SPACING IS V. CLOSE

GRANITE GRAY FRESH V. HARD
W/GRAY METAVOLCANIC ROCK
FRACTURE SPACING IS CLOSE TO WIDE

METAVOLCANIC ROCK GRAY FRESH
HARD TO V. HARD FRACTURE SPACING
IS V. CLOSE TO WIDE

METAVOLCANIC ROCK GRAY FRESH V. HARD
FRACTURE SPACING IS MODERATELY WIDE

BT

BT
NM
7/23/10

60 50 40 30 20 10 0 10 20 30 40 50 60

PROJECT REFERENCE NO.	SHEET
33548.1.1 (B-4201)	7

SECTION THRU END BENT TWO
STA. 23+05-L-
SKEW ANGLE = 113 00' 00"

0 10 20
FEET

650 640 630 620 610 600 590 580 570 560

SS-1
SS-2

EB2-A
23+15.00-L-
24.0' LT
628.3

GROUND SURFACE

ROADWAY EMBANKMENT

(N) TAN-BRN MED. DENSE MOIST CLAYEY SILTY SAND (A-2-4) (W/ ROCK BITS)

ALLUVIUM

(3) TAN-BRN LOOSE TO V. LOOSE MOIST CLAYEY SAND (A-2)

RESIDUAL

(36) BRN-GRN DENSE MOIST SILTY CLAYEY SAND (A-1-b) (W/ ROCK BITS)

(427.2) SEVERELY WEATHERED CRYSTALLINE ROCK

CAR
NM
7/21/10

CRYSTALLINE ROCK

EB2-B
22+78.00-L-
43.0' RT
620.7

ALLUVIUM
TAN-BRN-GRAY V. LOOSE MOIST CLAYEY SAND (A-2)

(0)

SEVERELY WEATHERED CRYSTALLINE ROCK

(100/.3)

CAR
NM
7/23/10

60 50 40 30 20 10 0 10 20 30 40 50 60

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

SHEET

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 22+28	**OFFSET** 27 ft LT	**ALIGNMENT** -L-	**0 HR.** 6.0
COLLAR ELEV. 620.8 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 516,957	**EASTING** 1,487,906	**24 HR.** 5.1
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/21/10	**COMP. DATE** 07/21/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
625										
620										620.8 GROUND SURFACE 0.0
										ALLUVIAL TAN-BRN MED. DENSE MOIST CLAYEY SAND (A-2-4) (W/ QUARTZ BITS)
615	616.1	4.7	3	7	11	18	SS-3	M		613.9 6.9
	611.1	9.7								612.8 8.0 **RESIDUAL** TAN-BRN DENSE MOIST CLAYEY SAND (A-2-4) (W/ QUARTZ BITS)
610			31	21	53	74	SS-4	M		**RESIDUAL** GRAY-WHITE DENSE TO V. DENSE MOIST SILTY SAND (A-1-b)
605	606.1	14.7	100/.1			100/.1				606.1 14.7 605.7 15.1 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
600										Boring Terminated with Casing Advancer Refusal at Elevation 605.7 ft on crystalline rock
595										
590										
585										
580										
575										
570										
565										
560										
555										
550										
545										

NCDOT BORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

SHEET
8

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 22+00	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.2
COLLAR ELEV. 620.4 ft	**TOTAL DEPTH** 9.2 ft	**NORTHING** 516,937	**EASTING** 1,487,972	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/22/10	**COMP. DATE** 07/22/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
625										
620										620.4 GROUND SURFACE 0.0
										ALLUVIAL TAN-BRN-GRAY MED. DENSE CLAYEY SAND (A-2-4)
615	615.9	4.5	2	9	17	26	SS-5	M		615.4 5.0 614.3 6.1 **RESIDUAL** TAN-BRN-GRAY MED. DENSE CLAYEY SAND (A-2-4)
610										611.2 9.2 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
605										Boring Terminated with Casing Advancer Refusal at Elevation 611.2 ft on crystalline rock
600										
595										
590										
585										
580										
575										
570										
565										
560										
555										
550										
545										

NCDOT BORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+53	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** 0.0 surface
COLLAR ELEV. 616.6 ft	**TOTAL DEPTH** 34.1 ft	**NORTHING** 516,983	**EASTING** 1,487,912	**24 HR.** 2.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT & Core		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/20/10	**COMP. DATE** 07/20/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
620										616.6 GROUND SURFACE 0.0
615										**ALLUVIAL** RIP RAP W/ SAND (NO SPT DUE TO RIP RAP)
610										610.5 6.1 **CRYSTALLINE ROCK** GRAY SLI. WEATHERED METAVOLCANIC ROCK
605										
600							RS-1			603.4 13.2 **CRYSTALLINE ROCK** GRAY FRESH METAVOLCANIC ROCK
595										
590							RS-2			
585										
580							RS-3			582.5 34.1 Boring Terminated at Elevation 582.5 ft in crystalline rock
575										
570										
565										
560										
555										
550										
545										
540										

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NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+53	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** 0.0 surface
COLLAR ELEV. 616.6 ft	**TOTAL DEPTH** 34.1 ft	**NORTHING** 516,983	**EASTING** 1,487,912	**24 HR.** 2.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT & Core		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/20/10	**COMP. DATE** 07/20/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 28.0 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
610.5											ELEV. (ft) DEPTH (ft)
	610.5	6.1	3.0		(3.0) 100%	(0.0) 0%		(6.6) 93%	(0.0) 0%		Begin Coring @ 6.1 ft
	607.5	9.1									610.5 6.1 **CRYSTALLINE ROCK** METAVOLCANIC ROCK GRAY SLI. WEATHERED MODERATELY HARD TO HARD FRACTURE SPACING IS V. CLOSE
605			5.0		(4.4) 88%	(0.9) 18%					
	602.5	14.1					RS-1				603.4 13.2 **CRYSTALLINE ROCK** METAVOLCANIC ROCK GRAY FRESH HARD TO V. HARD FRACTURE SPACING IS V. CLOSE TO WIDE
600			5.0		(4.6) 92%	(1.5) 30%		(19.5) 93%	(14.0) 67%		
	597.5	19.1									
595			5.0		(4.3) 86%	(3.2) 64%					
	592.5	24.1					RS-2				
590			5.0		(5.0) 100%	(3.6) 72%					
	587.5	29.1									
585			5.0		(4.8) 96%	(4.8) 96%					
	582.5	34.1					RS-3				582.5 34.1 Boring Terminated at Elevation 582.5 ft in crystalline rock
580											
575											
570											
565											
560											
555											
550											
545											
540											
535											

NCDOT CORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+30	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.3
COLLAR ELEV. 619.0 ft	**TOTAL DEPTH** 26.9 ft	**NORTHING** 516,967	**EASTING** 1,487,968	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT & Core		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/22/10	**COMP. DATE** 07/22/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
620										619.0 GROUND SURFACE 0.0
										ALLUVIAL TAN-BRN-GRAY MED. DENSE MOIST CLAYEY SAND (A-2)
615	614.6	4.4	7	19	81/.4	100/.9				613.6 5.4
							RS-4			612.9 6.1 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
610										**CRYSTALLINE ROCK** GRAY FRESH GRANITE W/ SOME METAVOLCANIC ROCK
605										
600							RS-5			
595										594.9 24.1 **CRYSTALLINE ROCK** GRAY FRESH METAVOLCANIC ROCK
							RS-6			592.1 26.9 Boring Terminated at Elevation 592.1 ft in crystalline rock
590										
585										
580										
575										
570										
565										
560										
555										
550										
545										
540										

NCDOT BORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 10

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+30	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.3
COLLAR ELEV. 619.0 ft	**TOTAL DEPTH** 26.9 ft	**NORTHING** 516,967	**EASTING** 1,487,968	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT & Core		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/22/10	**COMP. DATE** 07/22/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 20.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
612.9											ELEV. (ft) DEPTH (ft)
	612.9	6.1	3.7		(3.7) 100%	(2.5) 68%		(17.4) 97%	(12.7) 71%		Begin Coring @ 6.1 ft
610	609.2	9.8					RS-4				612.9 6.1 **CRYSTALLINE ROCK** GRANITE GRAY FRESH V. HARD W/ GRAY METAVOLCANIC ROCK FRACTURE SPACING CLOSE TO WIDE
			5.0		(5.0) 100%	(2.6) 52%					
605	604.2	14.8									
			5.0		(5.0) 100%	(4.7) 94%					
600	599.2	19.8					RS-5				
			5.0		(4.8) 96%	(3.7) 74%					
595	594.2	24.8									594.9 24.1 **CRYSTALLINE ROCK** METAVOLCANIC ROCK GRAY FRESH V. HARD FRACTURE SPACING IS MODERATELY WIDE
	592.1	26.9	2.1		(1.7) 81%	(1.7) 81%	RS-6	(2.8) 100%	(2.5) 89%		592.1 26.9 Boring Terminated at Elevation 592.1 ft in crystalline rock
590											
585											
580											
575											
570											
565											
560											
555											
550											
545											
540											
535											

NCDOT CORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 23+15	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.CV@8 DRY**
COLLAR ELEV. 628.3 ft	**TOTAL DEPTH** 22.6 ft	**NORTHING** 517,044	**EASTING** 1,487,898	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/20/10	**COMP. DATE** 07/20/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
630										628.3 GROUND SURFACE 0.0
	624.3	4.0	6	5	6	11	SS-1	M		**ROADWAY EMBANKMENT** TAN-BRN MED. DENSE MOIST CLAYEY SILTY SAND (A-2-4) (W/ ROCK BITS)
625										622.3 6.0
	619.3	9.0	0	1	2	3				**ALLUVIAL** TAN-BRN LOOSE TO V. LOOSE MOIST CLAYEY SAND (A-2)
620										615.6 12.7
	614.3	14.0	10	15	21	36	SS-2	M		**RESIDUAL** BRN-GRN DENSE MOIST SILTY CLAYEY SAND (A-1-b) (W/ ROCK BITS)
615										609.3 19.0
	609.3	19.0	57	42/.2				D		**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
610										605.7 22.6
										Boring Terminated with Casing Advancer Refusal at Elevation 605.7 ft on crystalline rock
605										
600										
595										
590										
585										
580										
575										
570										
565										
560										
555										
550										

NCDOT BORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33548.1.1	**ID.** B-4201	**COUNTY** MECKLENBURG	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge #38 on SR 3168 (Sam Newell Rd.) over Irvin's Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 22+78	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.2
COLLAR ELEV. 620.7 ft	**TOTAL DEPTH** 10.8 ft	**NORTHING** 517,016	**EASTING** 1,487,969	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer w/ SPT		**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 07/22/10	**COMP. DATE** 07/22/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
625										620.7 GROUND SURFACE 0.0
										ALLUVIAL TAN-BRN-GRAY V. LOOSE MOIST CLAYEY SAND (A-2)
620										614.2 6.5
	616.1	4.6	0	0	0	0		M		**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
615										609.9 10.8
	611.1	9.6	100/.3			100/.3				Boring Terminated with Casing Advancer Refusal at Elevation 609.9 ft on crystalline rock
610										
605										
600										
595										
590										
585										
580										
575										
570										
565										
560										
555										
550										
545										

NCDOT BORE SINGLE B4201_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 08/04/10

TEST RESULTS

PROJECT: 33548.1.1 (B-4201)
COUNTY: MECKLENBURG
SITE DESCRIPTION: BRIDGE #38 ON SR 3168 (SAM NEWELL RD.) OVER IRVIN'S CREEK

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
		EB1-A																
SS-3	27 LT	22+28-L-	5.2-6.2	A-2-4(0)	18	28	9	58.5	18	7.2	16.4	84	46	23				
SS-4	27 LT	22+28-L-	10.2-11.2	A-1-b(0)	74	25	4	56	20	15.7	8.2	52	27	15				
		EB1-B																
SS-5	36 RT	22+00-L-	5.0-6.0	A-2-4(0)	26	27	10	60.9	15.5	7.2	16.4	65	34	17				
		EB2-A																
SS-1	24 LT	23+15-L-	4.5-5.5	A-2-4(0)	11	28	4	48.1	22.3	17.4	12.3	79	50	28				
SS-2	24 LT	23+15-L-	14.5-15.5	A-1-b(0)	36	25	3	59.1	20.4	10.2	10.2	72	37	18				

ROCK SAMPLE RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	RQD	UNIT WT (pcf)	Q(ksf)	E(MPsi)
		B1-A					
RS-1	18' LT	22+53-L-	13.2-13.7	18%	177.4	3384	11.76
RS-2	18' LT	22+53-L-	22.4-23.0	64%	177.7	1182.24	11.16
RS-3	18' LT	22+53-L-	33.1-33.8	96%	188.2	6393.6	20.4
		B1-B					
RS-4	36' RT	22+30-L-	7.1-7.7	68%	176.7	2635.2	10.03
RS-5	36' RT	22+30-L-	19.0-19.6	94%	179	861.12	10.16
RS-6	36' RT	22+30-L-	26.2-26.7	81%	183.5	1625.76	12.07

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33548.1.1 TIP: B-4201 COUNTY: Mecklenburg

DESCRIPTION(1): Bridge #38 on SR 3156 (Sam Newell Rd.) over Irvin's Creek

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) ____

Bridge No.: 38 Length: 36 Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
Foundation Type: Bridge deck on I-Beams with concrete vertical abutments

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Minor, at End Bent Two (north end)

Interior Bents: N/A

Channel Bed: None observed

Channel Bank: Minor undercutting, banks slope gently

EXISTING SCOUR PROTECTION

Type(3): Rip Rap

Extent(4): On downstream side of EB1 and at fill slope on downstream side of EB2

Effectiveness(5): Good

Obstructions(6): None at time of drilling

DESIGN INFORMATION

Channel Bed Material(7): Rock

Channel Bank Material(8): Silty clayey sand (A-2-4, A-1-b) Ref. SS-3 & SS-4

Channel Bank Cover(9): Trees and shrubs

Floodplain Width(10): Approximately 250'

Floodplain Cover(11): Grass, trees and shrubs

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

Channel Migration Tendency(13): Slight, to north

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

Bent One, left	609										
Bent One, right	611.5										

Comparison of DSE to Hydraulics Unit theoretical scour:
Hydraulics 100YR theoretical is elev. 601' at B-1. 500YR is elev. 595'
Adjusted due to presence of bedrock in the scour zone.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

See Sheet # 12 for "Soil Test Results"

Template Revised 02/07/06

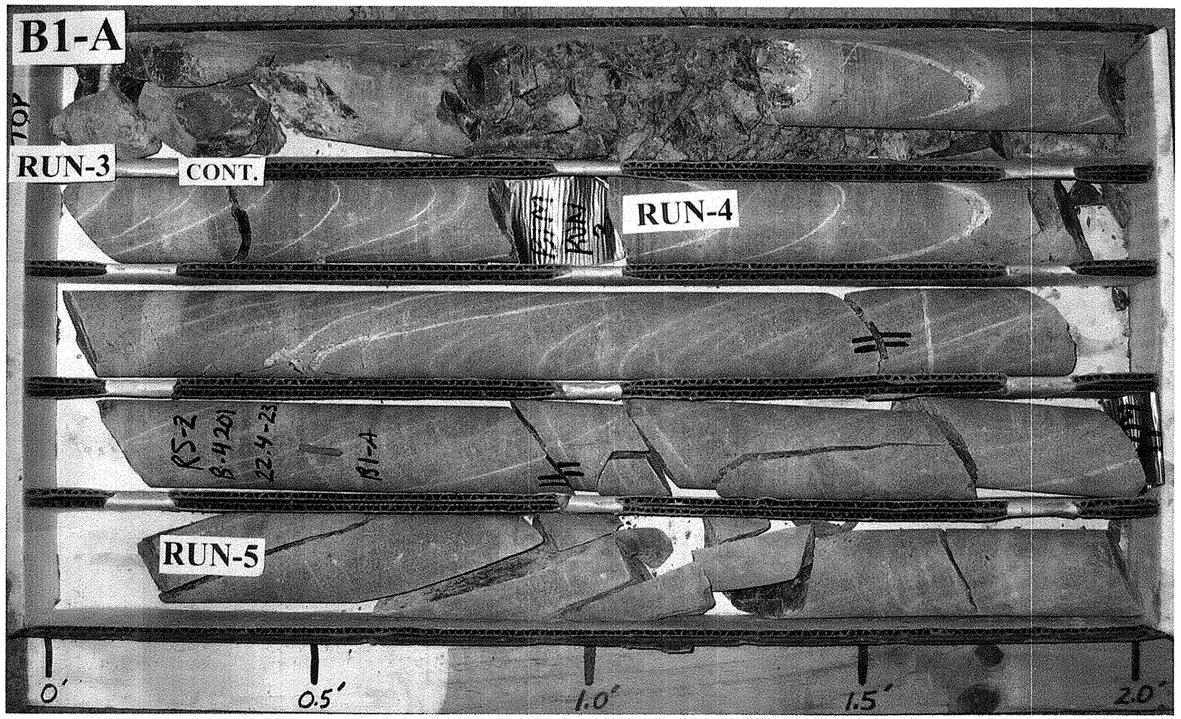
Reported by: JKS / JEB / CBL **Date:** 8/11/2010

INSTRUCTIONS

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

33548.1.1 (B-4201)
MECKLENBURG COUNTY
BRIDGE #38 ON SR 3168 (SAM NEWELL RD.) OVER IRVIN'S CREEK

ROCK CORE PHOTOS



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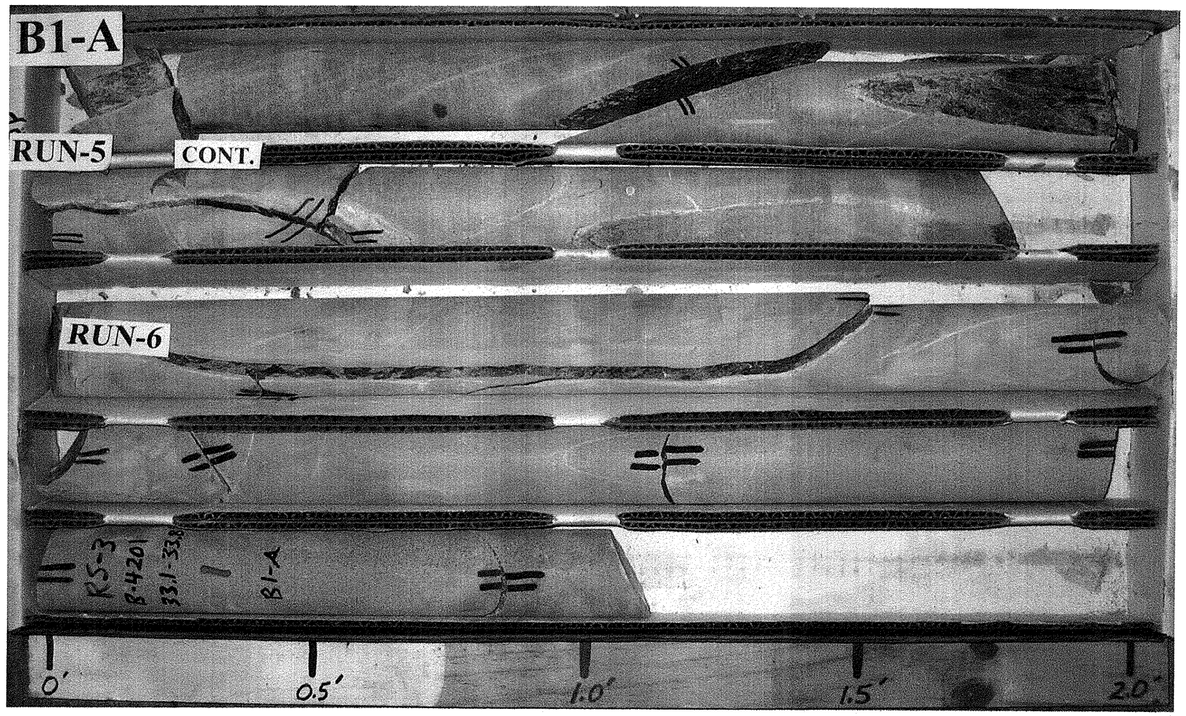

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ROCK CORE PHOTOS