STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.39	1	15

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GASTON*

SITE DESCRIPTION *BRIDGE NO. 60 ON SR 1103 OVER SOUTH FORK CROWDER'S CREEK*

REFERENCE: N/A

PROJECT: 17BP.12.R.39

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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) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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DRAWN BY *T.T. WALKER*

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SUBMITTED BY *E.N. WILLIAMS*

DATE *JUNE 2016*

NORTH CAROLINA PROFESSIONAL SEAL 26962 ENGINEER ERIC N. WILLIAMS

DocuSigned by:
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A0B874F1197848B...
SIGNATURE

7/13/2016
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.39	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 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	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.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES 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 WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 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 WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

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:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-550X
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N X

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. 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, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD 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 FOOT
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 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, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

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

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

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

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

BENCH MARK: BM #1: RR SPIKE IN 16" POPLAR -L- STA. 15+85.71, 51.53' LT

ELEVATION: 672.68 FEET

NOTES:

F.I.A.D.= FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
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SITE PLAN

0 60 120

FEET

SKEW = 90 DEGREES

PROJECT REFERENCE NO.	SHEET NO.
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PROFILE BORINGS PROJECTED ALONG -L-

0 10 20
FEET
VE = 1:1

EB1-B
13+41
12.3' RT

B1-B
13+82
18.5' RT

B2-B
14+41
16' RT

EB2-B
14+75
12.2' RT

SS-8

RS-1

S. FORK CROWDER'S CREEK

WATER SURFACE

Ground Surface

Roadway Embankment: Loose, Tan and Orange Moist, Sandy Silty CLAY (A-6)

ALLUVIAL: Medium Stiff, Tan-Brown, Moist, Sandy Silty CLAY from 18.5'-21.5' and Some Mica

Residual: Medium Dense, Yellow, Moist, Clayey Silty Fine SAND (A-2) with Some Mica

Residual: Hard, Crystalline Rock (GRANITE)

Weathered Rock (GRANITE)

Crystalline Rock (GRANITE)

Alluvial: Very Loose to Loose, Gray, Moist, Clayey Silty SAND (A-2) with Quartz Gravel and Some Mica

Residual: Loose, Brown-Tan, Moist, Silty Clayey Fine SAND (A-2) with Some Mica

Tan-Brown, Moist, Fine Sandy Silty CLAY (A-7) with Some Mica and Quartz Rock

Fine Sandy Clayey SILT (A-4) with Some Mica and Quartz Rock

Crystalline Rock: Gray-Black-White, Moderately Close to Wide Thickly Bedded, Fine Grained Weakly Foliated Granitic Rock

REC=92%, RQD=75%

Qu=15.5 ksi, GSI=75

Roadway Embankment: Very Soft, Tan-Orange, Moist, Sandy Silty CLAY (A-7)

Alluvial: Soft, Clayey Fine Brown, Moist, Sandy SILT (A-4)

Residual: Very Dense, Tan-Brown-Yellow, Mica

Very Loose to Very Dense, Tan-Brown-Gray-White, Clayey Silty SAND (A-2) with Some Mica

Weathered Rock (GRANITE)

(A) Residual: Very Dense, Gray-White, Silty SAND (A-2) with Some Mica

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 6/22/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

680 670 660 650 640 630 620 610 600

13+50 14+00 14+50

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.39	5

SECTION THROUGH END BENT 1
STA. 13+41
SKEW=90 DEGREES

0 10 20
FEET
VE = 1:1

EB1-A
13+41
12' LT

EB1-B
13+41
12.3' RT

℄

SS-8

Ground Surface

Roadway Embankment:

Loose, (4) (8) Tan-Orange-Yellow, Moist, Sandy CLAY (A-6) (5) (5) Silty

04/16

Alluvial: (9) Loose, Gray, Moist, Clayey (A-2) with Gravel (7)

04/16

Silty SAND Layers from 20.2'-21.2'

Very Soft, (WOH) Fine Sandy (8)

Alluvial:
Tan and Brown, Moist, Silty CLAY (A-7) with Quartz Gravel from 18.5'-21.5'

Residual:

Loose to Dense, Red, (34) (14) (46) SAND (A-2)

Orange, Tan, and Yellow, (29) with Some Mica

Moist, Clayey Silty Fine (100/0.1)

BT

Gray-White (GRANITE) Crystalline Rock (GRANITE)

Weathered Rock: (100/0.3)

BT

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 6/02/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

700 680 660 640 620 600 580 560 540 520

40 30 20 10 0 10 20 30 40

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.39	6

SECTION THROUGH BENT 1
STA. 13+83
SKEW=90 DEGREES

0 10 20
FEET
VE = 1:1

B1-A
13+83
7' LT

℄

B1-B
13+82
18.5' RT

700
680
660
640
620
600
580
560
540
520

Ground Surface

Alluvial:

Very Soft to Medium Stiff, Tan-Brown, Moist, Sandy Silt with Some Mica

Loose, Brown, Clayey Fine SAND (A-2)

Tan, Moist, Silty with Some Mica

Residual:

Loose to Medium Dense, Gray to Brown, Clayey Silty SAND (A-2) and Some Mica with Quartz Rock

Hard, Fine Tan-Brown, Moist, Sandy Silty-CLAY (A-7) with Some Mica

Weathered Rock (GRANITE)

Crystalline Rock (GRANITE)

	B1-A	B1-B
1	8	
2		04/16 CLAY (A-7)
4	8	4
5		9
8		Tan, Moist, Silty with Some Mica
20	28	
28	100/0.4	39
	100/0.2	100/0.4
	100/0.2	100/0.4
	100/0.1 BT	100/0.2 BT

04/16

40 30 20 10 0 10 20 30 40

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 6022016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.39	7

SECTION THROUGH BENT 2
STA. 14+41
SKEW=90 DEGREES

0 10 20
FEET
VE = 1:1

B2-A
14+42
6.5' LT

B2-B
14+41
16' RT

℄

RS-1

Ground Surface

Alluvial:

Very Loose to Loose, (2) (9) Tan-Brown, Silty Clayey SAND (A-2)

(2) (3) Moist, Fine 04/16

(15) 04/16 (14) (8) Residual:

Medium Stiff to Hard, SILT (A-4) with Some Mica

Tan-Brown-Yellow, and Quartz Rock

(67) (100/0.9) Moist, Fine Clayey Crystalline Rock:

Gray-Black-White, Fresh Hard, Moderately Close to Wide Fracture Space, Thickly Bedded, Fine Grained Weakly Foliated Granitic Rock

REC=92%, RQD=75%
Qu=15.5 ksi, GSI=75

(100/0.4) (100/0.3) Weathered Rock (GRANITE)

(A) (44)

(100/0.1) BT

Crystalline Rock (GRANITE)

BT

(A) Dense, Gray-White, Moist, Silty SAND (A-2)

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 6/22/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

700 680 660 640 620 600 580 560 540 520

40 30 20 10 0 10 20 30 40

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.39	8

SECTION THROUGH END BENT 2
STA. 14+77
SKEW=90 DEGREES

0 10 20
FEET
VE = 1:1

EB2-A
14+77
13.5' LT

℄

EB2-B
14+75
12.2' RT

SS-11
SS-12

Ground Surface

Roadway Embankment:
Very Soft, Tan and Orange, Moist, Silty CLAY (A-7)

WOH WOH

1 2

ALLUVIAL:
Very Soft, Brown, Moist, Clayey Fine with Some Mica

3 2 2 Sandy SILT (A-4)

2 5

Residual:
Very Loose to Very Dense Tan-Brown-Gray-White, Moist, with Some Mica

3 3 Clayey Silty SAND (A-2)

6 7

14 47

Stiff to Hard, Moist, Fine SILT (A-4) Tan-Brown, Sandy Clayey

20 56

52 100/0.9

48 100/0.8

Weathered Rock (GRANITE)

100/0.7 77

100/0.6

BT FIAD

BT FIAD

Residual:
Very Dense, Gray-White, Moist, Silty SAND (A-2) with Some Mica

700 680 660 640 620 600 580 560 540 520

40 30 20 10 0 10 20 30 40

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 6/22/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 13+41	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.6
COLLAR ELEV. 672.0 ft	**TOTAL DEPTH** 43.8 ft	**NORTHING** 524,773	**EASTING** 1,325,312	**24 HR.** 16.5
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/21/16	**COMP. DATE** 04/21/16	**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)
675										672.0 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Tan-Orange-Yellow, Sandy Silty CLAY (A-6)	
670	666.8	5.2	1	2	2	4		M			
665	661.8	10.2	2	3	5	8		M			
660	656.8	15.2	4	4	5	9		M		656.8 **ALLUVIAL** Gray, Clayey Silty SAND (A-2) with Gravel Layer from (20.2'-21.2')	15.2
655	651.8	20.2	6	4	3	7		M		650.2 **RESIDUAL** Red, Orange, Tan, and Yellow, Clayey Silty Fine SAND (A-2) with Some Mica	21.8
650	646.8	25.2	7	15	19	34		M			
645	641.8	30.2	4	5	9	14		M			
640	636.8	35.2	11	19	27	46		M			
635	631.8	40.2	100/0.3			100/0.3				634.0 **WEATHERED ROCK** Gray-White (GRANITE)	38.0
630										628.2 Boring Terminated with Casing Advancer Refusal at Elevation 628.2 ft on Crystalline Rock (GRANITE)	43.8

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 13+41	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.1
COLLAR ELEV. 671.8 ft	**TOTAL DEPTH** 30.2 ft	**NORTHING** 524,759	**EASTING** 1,325,332	**24 HR.** 12.0
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/21/16	**COMP. DATE** 04/21/16	**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
675										671.8 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT Tan and Orange, Sandy Silty CLAY (A-6)
670	666.8	5.0	1	2	3	5	SS-8	M		
665	661.8	10.0	1	2	3	5		M		
660	656.8	15.0	WOH	WOH	WOH	0		M		656.8 **ALLUVIAL** Tan and Brown, Fine Sandy Silty CLAY (A-7) with Quartz Gravel from 18.5'-21.5' 15.0
655	651.8	20.0	8	6	2	8		M		649.8 **RESIDUAL** Red, Orange, Tan, and Yellow, Clayey Silty Fine SAND (A-2) with Some Mica 22.0
650	646.8	25.0	9	16	13	29		M		644.3 27.5
645	641.7	30.1	100/0.1			100/0.1				641.8 **WEATHERED ROCK** Gray-White (GRANITE) 30.0
										641.6 **CRYSTALLINE ROCK** (GRANITE) 30.2
										Boring Terminated with Casing Advancer Refusal at Elevation 641.6 ft on Crystalline Rock (GRANITE)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 13+83	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.9
COLLAR ELEV. 661.9 ft	**TOTAL DEPTH** 44.3 ft	**NORTHING** 524,805	**EASTING** 1,325,340	**24 HR.** 17.0
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/22/16	**COMP. DATE** 04/22/16	**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)
665										
										661.9 GROUND SURFACE 0.0
660										**ALLUVIAL** Tan-Brown, Sandy Silty CLAY (A-7) with Some Mica
	656.9	5.0	0	0	1	1		M		
655										
	651.9	10.0	3	2	2	4		M		
650										
	646.9	15.0	2	3	5	8		M		646.4 15.5 **RESIDUAL** Gray, Clayey Silty SAND (A-2) with Quartz Rock
645										
	641.9	20.0	8	8	12	20		M		
640										
	636.9	25.0	3	9	19	28		M		635.0 26.9 **WEATHERED ROCK** (GRANITE)
635										
	631.9	30.0	100/0.4			100/0.4				
630										
	627.7	34.2	100/0.2			100/0.2				
625										
	622.7	39.2	100/0.2			100/0.2				
620										
	617.7	44.2	100/0.1			100/0.1				618.2 43.7 617.6 44.3 **CRYSTALLINE ROCK** (GRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 617.6 ft in Crystalline Rock (GRANITE)

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 13+82	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** 6.8
COLLAR ELEV. 662.8 ft	**TOTAL DEPTH** 47.2 ft	**NORTHING** 524,789	**EASTING** 1,325,361	**24 HR.** 7.0
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/20/16	**COMP. DATE** 04/20/16	**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
665										
										662.8 GROUND SURFACE 0.0
660										**ALLUVIAL** Tan-Brown, Sandy Silty CLAY (A-7) with Some Mica
	657.5	5.3	0	1	1	2		M		
655										
	652.5	10.3	3	4	4	8		M		653.3 9.5 Gray, Clayey Silty SAND (A-2) with Quartz Rock
650										
	647.5	15.3	2	2	2	4		M		647.5 15.3 **RESIDUAL** Brown-Tan, Silty Clayey Fine SAND (A-2) with Some Mica
645										
	642.5	20.3	1	2	3	5		M		
640										
	637.5	25.3	2	4	5	9		M		633.5 29.3 Tan-Brown, Fine Sandy Silty CLAY (A-7) with Some Mica
635										
	632.5	30.3	9	18	21	39		M		627.5 35.3 **WEATHERED ROCK** (GRANITE)
630										
	627.5	35.3	100/0.4			100/0.4				
625										
	622.5	40.3	100/0.4			100/0.4				
620										
	618.3	44.5	100/0.2			100/0.2				615.6 47.2 Boring Terminated with Casing Advancer Refusal at Elevation 615.6 ft on Crystalline Rock (GRANITE)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 14+42	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 11.4
COLLAR ELEV. 661.8 ft	**TOTAL DEPTH** 44.3 ft	**NORTHING** 524,853	**EASTING** 1,325,374	**24 HR.** 17.1
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/25/16	**COMP. DATE** 04/25/16	**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)
										661.8	0.0
										GROUND SURFACE	
665											
660										**ALLUVIAL** Tan-Brown, Silty Clayey Fine SAND (A-2)	
	656.7	5.1	0	1	1	2		M			
655											
	651.7	10.1	2	2	7	9		M		648.7	13.1
650										**RESIDUAL** Tan-Brown-Yellow, Fine Sandy Clayey SILT (A-4)	
	646.7	15.1	7	7	8	15		M			
645											
	641.7	20.1	7	6	8	14		M			
640											
	636.7	25.1	2	4	4	8		M			
635											
	631.7	30.1	100/0.4			100/0.4				632.4	29.4
630										**WEATHERED ROCK** Gray-White (GRANITE)	
	626.7	35.1	100/0.3			100/0.3					
625										623.8	38.0
	622.6	39.2	10	9	35	44		M		**RESIDUAL** Gray-White, Silty SAND (A-2)	
620										621.1	40.7
	617.6	44.2	100/0.1			100/0.1				**WEATHERED ROCK** (GRANITE)	
										617.6	44.2
										617.5 **CRYSTALLINE ROCK**	44.3
										Boring Terminated with Standard Penetration Test Refusal at Elevation 617.5 ft on Crystalline Rock (GRANITE)	

NCDOT BORE DOUBLE SF350060_GEO_BH_BRDG0060.GPJ NC_DOT.GDT 6/22/16

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 14+41	**OFFSET** 16 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.3
COLLAR ELEV. 662.3 ft	**TOTAL DEPTH** 37.8 ft	**NORTHING** 524,839	**EASTING** 1,325,392	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/21/16	**COMP. DATE** 04/21/16	**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)
										662.3	0.0
										GROUND SURFACE	
										ALLUVIAL	
										Tan-Brown, Silty Clayey Fine SAND (A-2)	
	656.9	5.4	1	1	1	2					
	651.9	10.4	1	1	2	3					
	646.9	15.4	19	32	35	67				647.5	14.8
										RESIDUAL	
										Tan-Brown-Yellow, Fine Sandy Clayey SILT (A-4) with Some Mica and Quartz Rock	
	641.9	20.4	13	87/0.4		100/0.9				641.4	20.9
										WEATHERED ROCK (GRANITE)	
										639.9	22.4
										CRYSTALLINE ROCK (GRANITE)	
							RS-1				
										624.5	37.8
										Boring Terminated at Elevation 624.5 ft in Crystalline Rock (GRANITE)	

NCDOT BORE DOUBLE SF350060_GEO_BH_BRDG0060.GPJ NC_DOT.GDT 6/22/16

GEOTECHNICAL BORING REPORT
CORE LOG

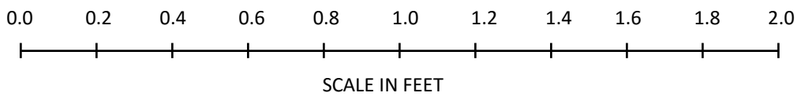
WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 14+41	**OFFSET** 16 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.3
COLLAR ELEV. 662.3 ft	**TOTAL DEPTH** 37.8 ft	**NORTHING** 524,839	**EASTING** 1,325,392	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/21/16	**COMP. DATE** 04/21/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE N/A	**TOTAL RUN** 15.4 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)
639.9											Begin Coring @ 22.4 ft	
	639.9	22.4	2.7	1:33/0.7 1:33/1.0 1:33/1.0	(2.1) 78%	(2.1) 78%		(14.2) 92%	(11.6) 75%		639.9 **CRYSTALLINE ROCK**	22.4
	637.2	25.1									Gray-Black-White, Fresh Hard, Moderately Close to Wide Fracture Space, Thickly Bedded, Fine Grained Weakly Foliated Granitic Rock	
635			5.0	1:15/1.0 1:15/1.0 1:15/1.0 1:15/1.0 1:15/1.0	(4.4) 88%	(3.5) 70%	RS-1				Qu=17.5 ksi GSI=75	
	632.2	30.1										
630			5.0	1:23/1.0 1:23/1.0 1:23/1.0 1:23/1.0 1:23/1.0	(5.0) 100%	(3.8) 76%						
	627.2	35.1										
625	624.5	37.8	2.7	1:30/1.0 1:30/1.0 1:30/0.7	(2.7) 100%	(2.2) 81%					624.5	37.8
											Boring Terminated at Elevation 624.5 ft in Crystalline Rock (GRANITE)	

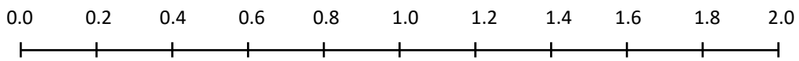
NCDOT CORE DOUBLE SF350060_GEO_BH_BRDG0060.GPJ NC_DOT.GDT 6/22/16

CORE PHOTOGRAPHS: Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek, B2-B 14+41, 16' RT

Begin
22.4 feet



SCALE IN FEET



SCALE IN FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 14+77	**OFFSET** 14 ft LT	**ALIGNMENT** -L-	**0 HR.** 17.0
COLLAR ELEV. 671.9 ft	**TOTAL DEPTH** 60.5 ft	**NORTHING** 524,886	**EASTING** 1,325,388	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/26/16	**COMP. DATE** 04/26/16	**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)
										671.9	0.0
										GROUND SURFACE	
										ROADWAY EMBANKMENT	
										Tan and Orange, Sandy Silty CLAY (A-7)	
	667.0	4.9	WOH	WOH	WOH	0		M			
	662.0	9.9	WOH	WOH	1	1	SS-11	M		662.0	9.9
										ALLUVIAL	
										Brown, Clayey Fine Sandy SILT (A-4) with Some Mica	
	657.0	14.9	1	1	2	3	SS-12	M			
	652.0	19.9	1	1	1	2		M			
	647.0	24.9	1	1	2	3		M		647.0	24.9
										RESIDUAL	
										Tan-Brown-Gray, Clayey Silty SAND (A-2) with Some Mica	
	642.0	29.9	2	2	4	6		M			
										639.4	32.5
										Tan-Brown, Fine Sandy Clayey SILT (A-4)	
	637.0	34.9	3	5	9	14		M			
	632.0	39.9	6	9	11	20		M			
	627.0	44.9	11	22	30	52		M			
										623.4	48.5
										Gray-White, Silty Fine SAND (A-2) with Some Mica	
	622.0	49.9	28	22	26	48		M			
	617.0	54.9	61	39/0.2		100/0.7				617.0	54.9
										WEATHERED ROCK (GRANITE)	
	612.0	59.9	77	23/0.1		100/0.6				611.4	60.5
										Boring Terminated at Elevation 611.4 ft in Weathered Rock (GRANITE)	

WBS 17BP.12.R.39	**TIP** SF-350060	**COUNTY** GASTON	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 60 on SR 1103 over S. Fork Crowder's Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+75	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 17.2
COLLAR ELEV. 671.9 ft	**TOTAL DEPTH** 56.6 ft	**NORTHING** 524,869	**EASTING** 1,325,408	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFC0070 CME-45C 84% 05/15/2015		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Moore, M.R.	**START DATE** 04/22/16	**COMP. DATE** 04/22/16	**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)
										671.9	0.0
										GROUND SURFACE	
										ROADWAY EMBANKMENT	
										Tan-Orange, Sandy Silty CLAY (A-7)	
	666.8	5.1	WOH	WOH	WOH	0		M			
	661.8	10.1	0	1	1	2		M		661.3	10.6
										ALLUVIAL	
										Brown, Clayey Fine Sandy SILT (A-4)	
	656.8	15.1	2	1	1	2		M			
	651.8	20.1	2	1	4	5		M		653.7	18.2
										RESIDUAL	
										Tan-Brown-Gray-White, Clayey Silty SAND (A-2) with Some Mica	
	646.8	25.1	2	1	2	3		M			
	641.8	30.1	2	3	4	7		M			
	636.8	35.1	10	19	28	47		M			
	631.8	40.1	17	30	26	56		M		629.7	42.2
										WEATHERED ROCK (GRANITE)	
	626.8	45.1	40	60/0.4		100/0.9					
	621.8	50.1	52	48/0.3		100/0.8					
	616.8	55.1	2	12	65	77				617.4	54.5
										RESIDUAL	
										Gray-White, Silty SAND (A-2) with Some Mica	56.6
										615.3	
										Boring Terminated at Elevation 615.3 ft in Very Dense SAND	

PROJ. NO. - N/A
ID NO. - 17BP.12.R.39
COUNTY - GASTON

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-8	**12.3' RT**	**13+41**	**5.5-6.5**	**A-6(9)**	**40**	**11**	**6.6**	**30.4**	**32.7**	**30.2**	**100**	**96**	**75**	**-**	**-**

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-11	**13.5' LT**	**14+77**	**10.4-11.4**	**A-4(4)**	**30**	**7**	**8.9**	**28.6**	**38.4**	**24.2**	**100**	**96**	**72**	**-**	**-**
SS-12	**13.5' LT**	**14+77**	**15.4-16.4**	**A-4(0)**	**23**	**3**	**10.7**	**46.3**	**24.9**	**18.1**	**100**	**98**	**54**	**-**	**-**