REFERENCE: R-2307B

PROJECT: 37944

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2307B	1	71

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *CATAWBA*

PROJECT DESCRIPTION *BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN*

SITE DESCRIPTION *STA. 471+87.16 -L-*

CONTENTS

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.

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 THE 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.

NOTES:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. 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.

PERSONNEL

L. CAMPOS

J. WILLIAMSON

M. HAYES

M. BHUIYAN

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *S. LANEY*

SUBMITTED BY *L. CAMPOS*

DATE *SEPTEMBER 2018*

S&ME

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

NORTH CAROLINA PROFESSIONAL SEAL 037845 ENGINEER LUIS A. CAMPOS

DocuSigned by:
Luis Campos

9/26/2018

SIGNATURE | DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	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 ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE 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, 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 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:
- [X] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-550X
- [X] CME-45B

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 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.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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 #5 N 680429.4, E 1420827.7 ELEV. 777.19
BM #6 N 681243.9, E 1424254.0 ELEV. 779.16
ELEVATION: FEET

NOTES:

FIAD = FILLED IN AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

STRUCTURE

- INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities
- BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets
- VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
- BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity
- DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
- LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

DECREASING INTERLOCKING OF ROCK PIECES ⇩

SURFACE CONDITIONS

VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

90			N/A	N/A
80				
70				
60				
50				
40				
30				
20				
10				
N/A	N/A			

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

COMPOSITION AND STRUCTURE

- **A.** *Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.*
- **B.** *Sandstone with thin interlayers of siltstone*
- **C.** *Sandstone and siltstone in similar amounts*
- **D.** *Siltstone or silty shale with sandstone layers*
- **E.** *Weak siltstone or clayey shale with sandstone layers*
- **C, D, E,** and **G** - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to **F** and **H.**
- **F.** *Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure*
- **G.** *Undisturbed silty or clayey shale with or without a few very thin sandstone layers* → **H.** ***Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.***

→ Means deformation after tectonic disturbance

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

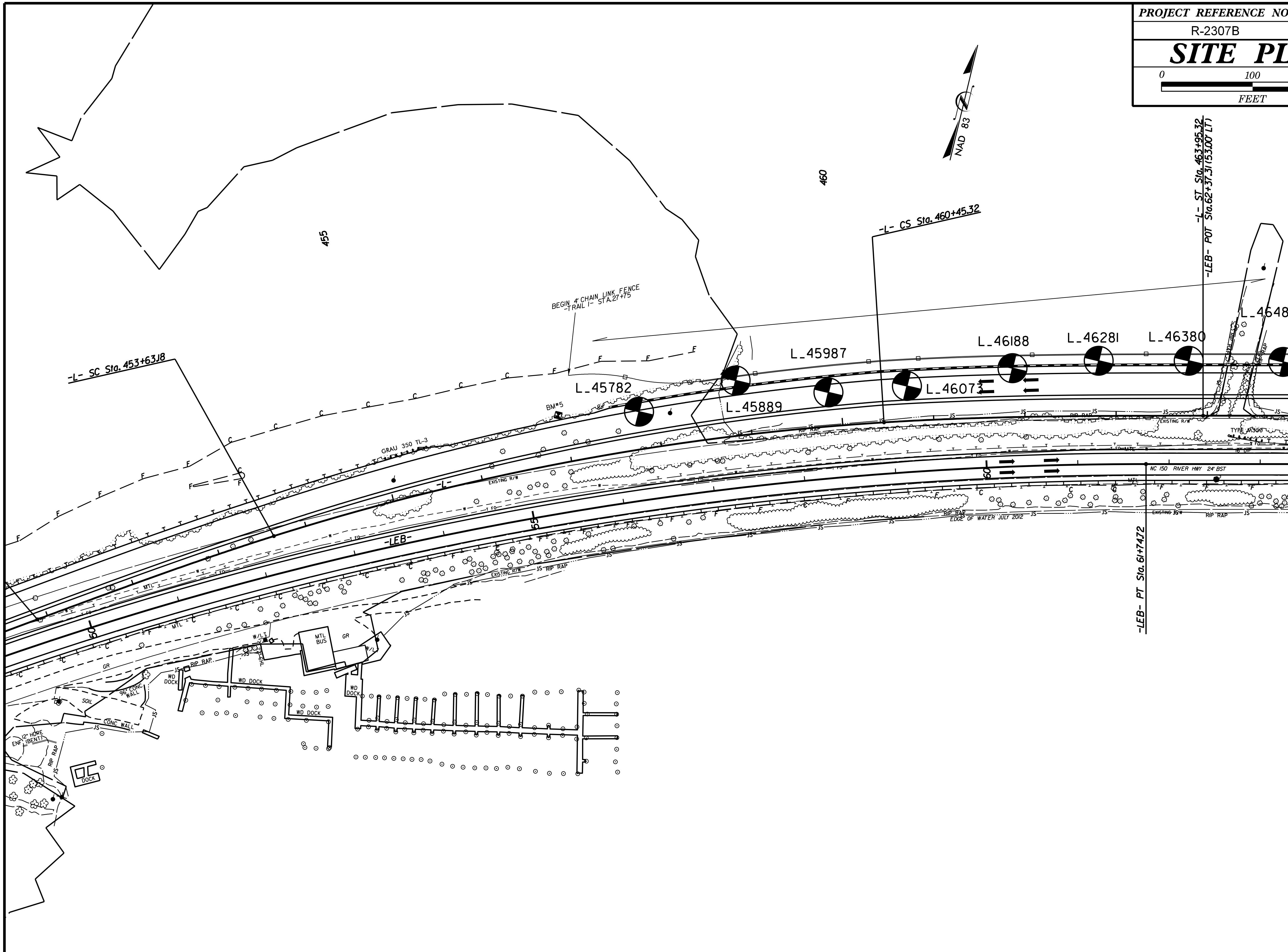
VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
70				
60	A			
50		B	C	D E
40				
30				F
20				
		G		H 10

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	3

SITE PLAN

0 100 200
FEET



PROJECT REFERENCE NO.	SHEET NO.
R-2307B	4

SITE PLAN

0 100 200

FEET

SKEW = 90°

NAD 83

LAKE NORMAN
DUKE ENERGY CAROLINAS LLC
DB 00C0 PG 2006

ENERGY CAROLINAS LLC
DB 1620 PG 232

465 470 475

BEGIN APPROACH SLAB
-L- STA 465+55 +/-

BEGIN BRIDGE
-L- STA 465+80 +/-

END BENT 1 LINE

BENT 1 LINE

BENT 2 LINE

BENT 3 LINE

BENT 4 LINE

BENT 5 LINE

BENT 6 LINE

BENT 7 LINE

BENT 8 LINE

END BENT 2 LINE

END BRIDGE
-L- STA 477+95 +/-

END APPROACH SLAB
-L- STA 478+20 +/-

EBI-A BI-A B2-A B3-A(I) B4-A B5-A B6-A B7-A B8-A EB2-A

EBI-B BI-B B2-B B3-B B4-B B5-B B6-B B7-B(I) B8-B EB2-B

70' (TYP)
+49.51
4.73'

+87.53

+55.32

USGS "20 JAS"
ELEV= 775.72'

EDGE OF WATER JULY 2012

-L-

-LEB-

CONC

16" +/- INSULATED WATERLINE
ATTACHED TO BRIDGE

EXISTING R/W

16" DIP

TYPE B-77

RIP RAP

JS

R2307C-3

R2307C-4

LAKE NORMAN
CATAWBA RIVER

LAKE NORMAN
DUKE ENERGY CAROLINAS LLC
DB 00C0 PG 2006

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	5

SITE PLAN

0 100 200

FEET

NAD 83

480 485 490

-L- TS Sta. 479+95.32=
-LEB- POT Sta. 78+37.31 (53.00' LT)

-L- SC Sta. 482+05.32

-L- CS Sta. 489+38.25

-DRWI- PC

-DRWI- POT Sta. 10+00.00

-L- ST Sta. 490+88.25

-DRWI- PC Sta

-L- POC Sta. 494+16.72 =
-YI- POT Sta. 10+10.68
-DRWI- PT Sta. 13+08.55

BEGIN 1'-6" CURB
-LEB- STA. 87+15

BEGIN 1'-6" CURB
-L- STA. 488+78

L_47894 L_47998 L_48108 L_48210 L_48283 L_48377 L_48504 L_48582 L_48700 L_48786

LAKE NORMAN

EDGE OF WATER AUGUST 2015

EDGE OF WATER JULY 2012

EXISTING R/W

RIP RAP

FIBER OPTIC MARKER

-LEB- PC Sta. 80+30.79

-LEB- CS Sta. 84+38.51

-LEB- SC Sta. 85+88.51

-LEB- ST Sta. 90+08.08 =
-LEB- POT Sta. 491+72.95 (23.50 RT)

-LEB- CS Sta. 88+58.02

-YI- PC Sta. 10+33.50

-YI- POT Sta. 15+62

-YI- PT S

WD DOCK

WD SLIP

CONC

48' WD RAIL

WD

25FD

25BKD

6" BST CURB

BST PA

CB

CONC F

W/LT

ATTENUATOR

BM#6

30" C&G

8" PVC

42" BST

SB 3069

18" CMP

15" CONC

MARINER POINTE LN

23' BST

24" C&G

CB UNKNOWN SIZE / TYPE

END CONSTRUC
-YI- STA. 13+10.0

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	6

PROFILE PROJECTED ALONG –L–

Ⓐ ARTIFICIAL FILL, RED, BROWN, MOIST, MEDIUM STIFF SANDY SILT, TRACE MICA

Ⓑ ALLUVIAL, BROWN, SATURATED, SOFT TO VERY SOFT SANDY SILT, TRACE MICA

Ⓒ RESIDUAL, RED, WET, SOFT TO STIFF SANDY CLAY, TRACE MICA

Ⓓ RED, TAN, GRAY, WET, STIFF SANDY SILT, TRACE MICA

Ⓔ BROWN, GRAY, WET, VERY STIFF SANDY SILT, TRACE MICA

Ⓕ ALLUVIAL, DARK GRAY, WET, MEDIUM STIFF SANDY CLAY, TRACE ORGANIC MATTER

Ⓖ RESIDUAL, BROWN, ORANGE, TAN, RED, GRAY, MOIST TO SAT, MEDIUM STIFF TO VERY STIFF, SILT, SANDY SILT AND CLAY, TRACE MICA

Ⓗ ALLUVIAL, GRAY, SATURATED, VERY LOOSE TO MEDIUM DENSE SILTY SAND AND SAND

Ⓘ ALLUVIAL, RED, BROWN, WET, VERY SOFT SANDY SILT, TRACE MICA

Ⓙ ROADWAY EMBANKMENT, GRAY, BROWN, SATURATED, SOFT TO MEDIUM STIFF CLAY, TRACE MICA

–L–
50 FT LEFT

NOTE: EXISTING GROUND SURFACE PROFILE OF –L– 50 FT LEFT TAKEN FROM ELECTRONIC TIN FILE 'r2307b ls tin.tin' DATED 3/26/18. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	7

PROFILE PROJECTED ALONG –L–

Ⓐ RESIDUAL, GRAY, RED, BROWN, TAN, MOIST TO WET, MEDIUM STIFF TO HARD, SANDY SILT AND CLAY, TRACE MICA

Ⓑ BROWN, MOIST, LOOSE TO VERY DENSE SILTY SAND, TRACE MICA

Ⓒ WEATHERED ROCK, BIOTITE GNEISS

Ⓓ ALLUVIAL, BROWN, SATURATED, VERY LOOSE SILTY SAND

Ⓔ RESIDUAL, GRAY, TAN, SATURATED, VERY DENSE SILTY SAND

Ⓕ WEATHERED ROCK, BIOTITE GNEISS

Ⓖ CRYSTALLINE ROCK, GRAY, VERY SLIGHTLY TO MODERATELY WEATHERED, MODERATELY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING, BIOTITE GNEISS

Ⓗ ALLUVIAL, REDDISH BROWN, GRAY, TAN, SATURATED, VERY LOOSE TO MEDIUM DENSE SILTY SAND, SAND AND GRAVEL

Ⓘ ALLUVIAL, REDDISH BROWN, BLACK, WET, MEDIUM STIFF TO STIFF SANDY CLAY, TRACE ORGANIC MATTER

Ⓙ RESIDUAL, TAN, MOIST, MEDIUM DENSE, SILTY SAND, TRACE MICA

Ⓚ RESIDUAL, TAN, BROWN, WET, DENSE SILTY SAND, TRACE MICA

Ⓛ RESIDUAL, TAN, BROWN, MOIST, VERY DENSE SILTY SAND, TRACE MICA

Ⓜ ROADWAY EMBANKMENT, RED, BROWN, WET TO SATURATED, MEDIUM STIFF TO STIFF, SANDY SILT AND SILTY CLAY, TRACE MICA, TRACE GRAVEL

Ⓝ BROWN, MOIST, STIFF SANDY SILT, TRACE MICA

Ⓞ BROWN, MOIST TO WET, LOOSE TO VERY DENSE, SILTY SAND AND SAND, TRACE MICA

NOTE: EXISTING GROUND SURFACE PROFILE OF –L– 50 FT LEFT TAKEN FROM ELECTRONIC TIN FILE 'r2307b ls tin.tin' DATED 3/26/18. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	8

PROFILE PROJECTED ALONG –L–

0 100 200
FEET
VE = 5

BEGIN BRIDGE
–L– STA. 465+80 +/–

END BRIDGE
–L– STA. 477+95 +/–

12.0' MIN. REQUIRED VERTICAL CLEARANCE OVER FULL POND

WATER SURFACE

MIN. LOW BEAM ELEV. REQUIRED = 772.00'

FULL POND ELEV. = 760.00' PER DUKE ENERGY

'B' SIDE

EB1–B
465+92.00
24' LT

RS-2
B1–B
466+97.00
20' LT

RS-4
B2–B
468+46.00
24' LT

RS-6
B3–B
469+89.00
16' LT

RS-8
B4–B
471+32.00
27' LT

RS-10
B5–B
472+63.00
28' LT

RS-12
B6–B
473+90.00
23' LT

RS-14
B7–B (1)
475+23.00
29' LT

RS-16
B8–B
476+46.00
16' LT

EB2–B
477+92.00
28' LT

ROADWAY EMBANKMENT, RIP RAP

BOULDER

ALLUVIAL, TAN BROWN, WET TO SATURATED, VERY SOFT TO MEDIUM STIFF SANDY SILT, TRACE MICA

EXISTING GROUND

ALLUVIAL, GRAY, BROWN, TAN, SATURATED, VERY SOFT TO SOFT, SANDY SILT AND SILT, TRACE MICA

RESIDUAL, TAN, ORANGE, BROWN, WET TO SATURATED, SOFT TO STIFF, SANDY SILT TRACE MICA

RESIDUAL, GRAY, TAN, BROWN, MOIST TO SATURATED, LOOSE TO DENSE, SILTY SAND, SAND AND GRAVEL, TRACE MICA

WEATHERED ROCK, BIOTITE GNEISS

CRYSTALLINE ROCK, GRAY, BROWN, TAN, PINK, WHITE, BLACK FRESH TO VERY SEVERLY WEATHERED, VERY HARD TO VERY SOFT, VERY CLOSE TO VERY WIDE FRACTURE SPACING, BIOTITE GNEISS

REC=100%
RQD=41%
GSI=55–70

REC=100%
RQD=60%
GSI=70–75

REC=71%
RQD=11%
GSI=55–70

REC=67%
RQD=27%
GSI=70–75

REC=84%
RQD=43%
GSI=70–80

REC=84%
RQD=79%
GSI=90–95

REC=42%
RQD=15%
GSI=60–70

REC=97%
RQD=89%
GSI=80–90

REC=96%
RQD=82%
GSI=75–85

REC=100%
RQD=72%
GSI=80–90

REC=98%
RQD=98%
GSI=95–100

REC=71%
RQD=38%
GSI=65–75

REC=95%
RQD=77%
GSI=75–90

BT

(A) RESIDUAL, RED, BROWN, TAN, WET TO SATURATED, MEDIUM STIFF SANDY SILT AND SILTY CLAY, TRACE MICA

(B) RESIDUAL, BROWN, TAN, GRAY, WET TO SATURATED, VERY LOOSE TO VERY DENSE SILTY SAND AND SAND, TRACE MICA

(C) CRYSTALLINE ROCK, DARK GRAY, MODERATELY TO SEVERLY WEATHERED, MODERATELY HARD TO SOFT, CLOSE FRACTURE SPACING, BIOTITE GNEISS

(D) ALLUVIAL, BROWN, GRAY, SATURATED, VERY LOOSE TO MEDIUM DENSE SILTY SAND, CLAYEY SAND, SAND, AND COBBLES TRACE MICA

(E) ALLUVIAL, BROWN, BLACK, WET, MEDIUM STIFF SANDY CLAY, TRACE ORGANIC MATTER

(F) RESIDUAL, GRAY, BROWN, MOIST, VERY DENSE, SILTY SAND, TRACE MICA

(G) ALLUVIAL, BROWN, SATURATED, VERY LOOSE SILTY SAND, TRACE MICA, TRACE ORGANIC MATTER

(H) ROADWAY EMBANKMENT, GRAY, MOIST MEDIUM DENSE SILTY SAND, TRACE MICA

(I) ROADWAY EMBANKMENT, RED, BROWN, MOIST TO SATURATED, SOFT TO STIFF, SILTY CLAY, TRACE MICA

–L–
50 FT LEFT

NOTE: EXISTING GROUND SURFACE PROFILE OF –L– 50 FT LEFT TAKEN FROM ELECTRONIC TIN FILE 'r2307b ls tin.tin' DATED 3/26/18. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

$$$$$$SYSTIME$$$$$$
$$$$$$SYSNAME$$$$$$

800 790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640 630 620 610 600

465+00 466+00 467+00 468+00 469+00 470+00 471+00 472+00 473+00 474+00 475+00 476+00 477+00 478+00 479+00

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	9

PROFILE PROJECTED ALONG –L–

Ⓐ	ROADWAY EMBANKMENT, RED, BROWN, WET TO SATURATED, MEDIUM STIFF TO STIFF, SANDY SILT AND SILTY CLAY, TRACE MICA, TRACE GRAVEL
Ⓑ	RESIDUAL, BROWN, GRAY, TAN, RED, ORANGE, MOIST TO WET, MEDIUM STIFF TO VERY STIFF, SILTY CLAY, CLAY, SANDY CLAY AND SANDY SILT, TRACE MICA
Ⓒ	RESIDUAL, GRAY, TAN, BROWN, ORANGE, WHITE, MOIST TO SATURATED, VERY LOOSE TO VERY DENSE SILTY SAND AND SAND, TRACE MICA
Ⓓ	ALLUVIAL, RED, BROWN, WET SOFT CLAY, TRACE MICA
Ⓔ	ALLUVIAL, BROWN, SATURATED, VERY LOOSE, SILTY SAND, TRACE MICA
Ⓕ	ALLUVIAL, BROWN, SATURATED, VERY SOFT, SANDY SILT, TRACE MICA
Ⓖ	ROADWAY EMBANKMENT, RIP RAP
Ⓗ	ORANGE, TAN, WET TO SATURATED, SOFT TO STIFF SANDY SILT, TRACE MICA
Ⓘ	TAN, BROWN, WET, VERY STIFF SANDY SILT, TRACE MICA
Ⓙ	TAN, BROWN, WET MEDIUM STIFF TO STIFF SANDY SILT, TRACE MICA
Ⓚ	ROADWAY EMBANKMENT, BROWN, SAT, MEDIUM STIFF, SANDY SILT, TRACE MICA

–L–

50 FT LEFT

NOTE: EXISTING GROUND SURFACE PROFILE OF –L– 50 FT LEFT TAKEN FROM ELECTRONIC TIN FILE 'r2307b ls tin.tin' DATED 3/26/18. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2307B	10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

℄

790 780 770 760 750 740 730 720 710 700 690 680

Ⓐ ALLUVIAL, BROWN, SAT., LOOSE, SILTY FINE SAND WITH TRACE MICA

WATER SURFACE 760.0'

EXISTING GROUND

ARTIFICIAL FILL, RIP RAP

RESIDUAL, GRAY, BROWN, RED AND TAN, MOIST TO SAT., MED. STIFF TO STIFF, SANDY SILT, SILTY CLAY AND CLAY WITH TRACE MICA

RESIDUAL, GRAY AND BROWN, SAT., LOOSE TO VERY DENSE, SILTY FINE SAND WITH TRACE ROCK FRAGMENTS AND MICA

WEATHERED ROCK, (BIOTITE GNEISS)

CRYSTALLINE ROCK, (BIOTITE GNEISS)

ROADWAY EMBANKMENT

EB1–A
465 + 82
64' LT
–L–

6 11 100/0.3 6 11 7 65 63 10 60/0.0 60/0.0 60/0.0 60/0.0 BT

EB1–B
465 + 92
24' LT
–L–

4 8 8 7 7 8 6 19 28 60/0.0 100/0.6 100/0.4 60/0.0 BT

REC = 100%
RQD = 60%
GSI = 70–75

REC = 71%
RQD = 11%
GSI = 55–70

CRYSTALLINE ROCK, GRAY AND BROWN, MODERATELY TO VERY SEVERELY WEATHERED, VERY SOFT TO MODERATELY HARD, BIOTITE GNEISS

466 + 00.00

–℄–

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

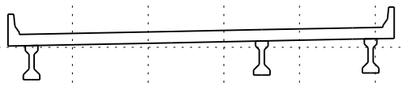
6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2307B	11

0 5 10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650



WATER SURFACE 760.0'

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT	UNCONFINED COMP. STRENGTH, PSI
RS-1	70' LT	467+08	33.5-33.85	BIOTITE GNEISS	175.0	16,553
RS-2	20' LT	466+97	58.45-58.8	BIOTITE GNEISS	160.2	2,145

RS-2
B1–B
466+97
20' LT
–L–

RS-1
B1–A
467+08
70' LT
–L–

EXISTING GROUND

Ⓐ WEATHERED ROCK, (BIOTITE GNEISS)
Ⓑ CRYSTALLINE ROCK (BIOTITE GNEISS)

ALLUVIAL, TAN, BROWN, SATURATED VERY SOFT TO MEDIUM STIFF SANDY SILT, TRACE MICA

ALLUVIAL, TAN, BROWN, WET TO SATURATED, VERY LOOSE SILTY SAND, TRACE MICA

RESIDUAL, TAN, BROWN, GRAY, WET TO SATURATED, LOOSE TO VERY DENSE SILTY SAND, TRACE MICA

RESIDUAL, TAN, GRAY, WET, VERY STIFF TO HARD SANDY SILT, TRACE MICA

WEATHERED ROCK, (BIOTITE GNEISS)

CRYSTALLINE ROCK, GRAY AND TAN, FRESH TO VERY SEVERELY WEATHERED, MEDIUM HARD TO HARD, MODERATELY CLOSE TO WIDE, BIOTITE GNEISS

RS-1: REC = 97%, RQD = 93%, GSI = 90–100

RS-2: REC = 67%, RQD = 27%, GSI = 70–75

467+00.00

–℄–

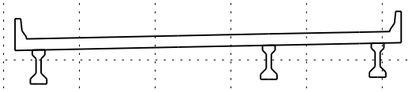
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2307B	12

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640



℄

WATER SURFACE 760.0'

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT	UNCONFINED COMP. STRENGTH, PSI
RS-3	74' LT	468+45	36.4-36.75	BIOTITE GNEISS	159.2	13,452
RS-4	24' LT	468+46	53.9-54.25	BIOTITE GNEISS	169.1	16,043

RS-3
B2-A
468+45
74' LT
-L-

RS-4
B2-B
468+46
24' LT
-L-

EXISTING GROUND

REDDISH, BROWN, SATURATED, VERY LOOSE TO LOOSE SILTY SAND AND SAND, TRACE ORGANICS

WEATHERED ROCK, (BIOTITE GNEISS)

ALLUVIAL, REDDISH, BROWN, BLACK, WET, MEDIUM STIFF TO STIFF, SANDY CLAY AND SANDY SILT, TRACE ORGANIC MATTER

RESIDUAL, GRAY, BROWN, SATURATED, VERY LOOSE TO DENSE SILTY SAND

RS-3
REC = 68%
RQD = 39%
GSI = 30–40

REC = 98%
RQD = 98%
GSI = 80–90

BT

RS-4
REC = 84%
RQD = 43%
GSI = 70–80

REC = 84%
RQD = 79%
GSI = 90–95

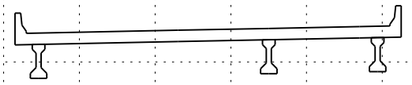
BT

CRYSTALLINE ROCK, GRAY, TAN, BROWN, BLACK, WHITE, PINK, FRESH TO VERY SEVERELY WEATHERED, MEDIUM HARD TO VERY HARD, MODERATELY CLOSE TO VERY WIDE, BIOTITE GNEISS

468+50.00

-℄-

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$



WATER SURFACE 760.0'

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT	UNCONFINED COMP. STRENGTH, PSI
RS-5	63' LT	469+80	36.4-36.75	BIOTITE GNEISS	159.2	13,452
RS-6	16' LT	469+89	53.9-54.25	BIOTITE GNEISS	169.1	16,043

EXISTING GROUND

B3-A(1)
469+83
73' LT
-L-

RS-5
B3-A
469+80
63' LT
-L-

RS-6
B3-B
469+89
16' LT
-L-

ALLUVIAL, GRAY, BROWN, BLACK, SATURATED, VERY LOOSE TO MEDIUM DENSE SILTY SAND, SAND AND CLAYEY SAND, TRACE MICA, TRACE ORGANIC MATTER

WOH
5
14
29
50/0.5
50/0.9
50/0.0

WOH
WOH
WOH
7
63
50/0.0

WEATHERED ROCK, (BIOTITE GNEISS)

RESIDUAL, GRAY, BROWN, SATURATED, VERY DENSE SAND

RS-5
REC = 99%
RQD = 97%
GSI = 90-95

RS-6
REC = 42%
RQD = 15%
GSI = 60-70

REC = 99%
RQD = 97%
GSI = 75-85

REC = 97%
RQD = 89%
GSI = 80-90

CRYSTALLINE ROCK, GRAY, BLACK, WHITE, TAN, BROWN, FRESH TO MODERATELY WEATHERED, MODERATELY HARD TO VERY HARD, MODERATELY CLOSE TO CLOSE, BIOTITE GNEISS

BT
BT
BT

470+00.00
-L-

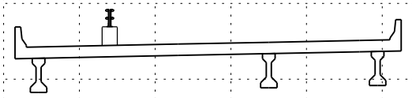
710 700 690 680 670 660 650 640 630

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2307B	14

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

℄



▼ WATER SURFACE 760.0'

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT³	UNCONFINED COMP. STRENGTH, PSI
RS-7	70' LT	471+23	36.4-36.75	BIOTITE GNEISS	159.2	13,452
RS-8	27' LT	471+32	53.9-54.25	BIOTITE GNEISS	169.1	16,043

Ⓐ ALLUVIAL, GRAY, BROWN, BLACK, WET TO SATURATED, VERY SOFT TO VERY STIFF SILT AND SANDY CLAY, TRACE ORGANIC MATTER

Ⓑ ALLUVIAL, GRAY, BROWN, WET TO SATURATED, VERY LOOSE TO MEDIUM DENSE SAND AND GRAVEL

700 690 680 670 660 650 640 630 620

RS-7
B4–A
471+23
70' LT
–L–

RS-8
B4–B
471+32
27' LT
–L–

EXISTING GROUND

Ⓐ WOR
Ⓑ 14
17
100/0.6
50/0.0
28
100/0.4
50/0.0
RS–8

RESIDUAL, TAN, MOIST, MEDIUM DENSE SILTY SAND, TRACE MICA

WEATHERED ROCK, (BIOTITE GNEISS)

RS–7

REC = 94%
RQD = 71%
GSI = 75–85

BT

REC = 96%
RQD = 82%
GSI = 75–85

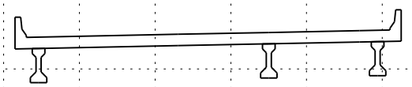
BT

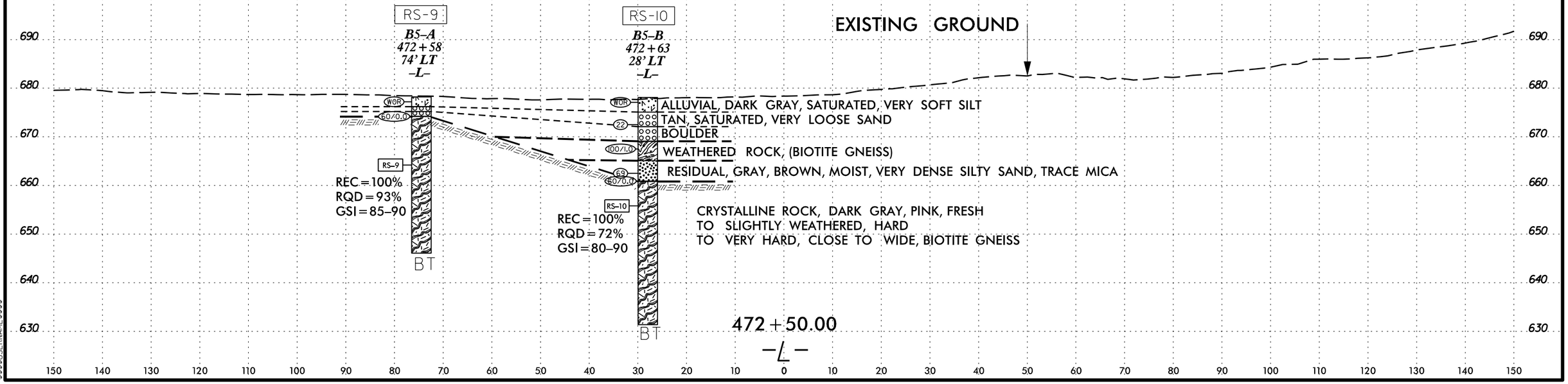
CRYSTALLINE ROCK, GRAY, BROWN, WHITE, FRESH TO MODERATELY WEATHERED, MODERATELY HARD TO VERY HARD, CLOSE TO WIDE, BIOTITE GNEISS

471+50.00

–℄–

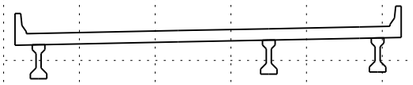
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150





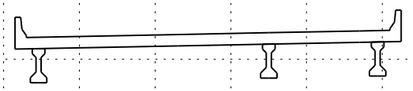
ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT³	UNCONFINED COMP. STRENGTH, PSI
RS-9	74' LT	472+58	36.4-36.75	BIOTITE GNEISS	159.2	13,452
RS-10	28' LT	472+63	53.9-54.25	BIOTITE GNEISS	169.1	16,043



ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT^3	UNCONFINED COMP. STRENGTH, PSI
RS- 11	64' LT	473+91	36. 4- 36. 75	BIOTITE GNEISS	159. 2	13, 452
RS- 12	23' LT	473+90	53. 9- 54. 25	BIOTITE GNEISS	169. 1	16, 043



6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2307B	17

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT^3	UNCONFINED COMP. STRENGTH, PSI
RS- 13	62' LT	475+24	36. 4- 36. 75	BIOTITE GNEISS	159. 2	13, 452
RS- 14	24' LT	475+25	53. 9- 54. 25	BIOTITE GNEISS	169. 1	16, 043

$$$$SYSTIME$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$USERNAME$$$$

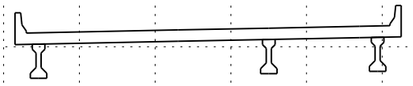
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2307B	18

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

℄

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640



▼ WATER SURFACE 760.0'

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT. LB/FT³	UNCONFINED COMP. STRENGTH, PSI
RS-15	67' LT	476+52	36.4-36.75	BIOTITE GNEISS	159.2	13,452
RS-16	16' LT	476+46	53.9-54.25	BIOTITE GNEISS	169.1	16,043

RS-16
B8–B
476+46
16' LT
–L–

RS-15
B8–A
476+52
67' LT
–L–

EXISTING GROUND

WOH 4 4 6 4 10 16 34 100/0.2 60/0.1

BROWN, SATURATED, VERY LOOSE, SILTY SAND, TRACE ORGANIC MATTER

SILT, TRACE MICA

BROWN, WET, MEDIUM DENSE SAND

RS-16

CRYSTALLINE ROCK, BROWN, TAN, GRAY, WHITE, FRESH TO MODERATELY WEATHERED, MODERATELY HARD TO VERY HARD, MODERATELY CLOSE TO WIDE, BIOTITE GNEISS

REC = 95%
RQD = 77%
GSI = 75–90

BT

4 3 1 7 10 100/0.3 100/0.7 100/0.4 60/0.0

ALLUVIAL, BROWN, TAN, SATURATED TO WET, VERY SOFT TO STIFF, SANDY SILT, TRACE MICA

RESIDUAL, TAN, SATURATED TO WET, SOFT TO MEDIUM STIFF, SANDY

WEATHERED ROCK, (BIOTITE GNEISS)

REC = 71%
RQD = 26%
GSI = 60–75

RS–15

REC = 95%
RQD = 95%
GSI = 95–100

REC = 96%
RQD = 95%
GSI = 75–90

BT

476+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2307B	19

478+00.00

-L-

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_45782	**STATION** 457+82	**OFFSET** 41 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 767.8 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 680,454	**EASTING** 1,420,913	**24 HR.** 10.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 04/11/18	**COMP. DATE** 04/11/18	**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)
770											
	767.8	0.0	2	2	3	5		M		767.8 GROUND SURFACE	0.0
765										765.3 **ARTIFICIAL FILL** RED BROWN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA	2.5
	764.1	3.7	5	4	5	9		M		**RESIDUAL** TAN BROWN, LOOSE TO VERY LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	
760											
	759.1	8.7	2	2	2	4	SS-167	M			
755											
	754.1	13.7	2	1	2	3		M			
750											
	749.1	18.7	1	1	2	3	SS-169	M			
745										745.8	22.0
	744.1	23.7	5	6	5	11		M		BROWN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA	
740											
	739.1	28.7	7	10	13	23		M			
735											
	734.1	33.7	4	5	8	13		M			
730											
	729.1	38.7	5	7	10	17		M			
725										725.8	42.0
	724.1	43.7	22	34	50	84		M		BROWN, VERY DENSE, SILTY FINE SAND, TRACE OF MICA	
										722.6	45.2
										Boring Terminated at Elevation 722.6 ft In Silty Sand	

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_45889	**STATION** 458+89	**OFFSET** 60 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 754.4 ft	**TOTAL DEPTH** 33.5 ft	**NORTHING** 680,512	**EASTING** 1,421,008	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/19/18	**COMP. DATE** 03/19/18	**SURFACE WATER DEPTH** 1.9ft	

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
755										
	754.1	0.3								754.4 GROUND SURFACE 0.0
	752.4	2.0	WOH	2	1	3		Sat.		**ALLUVIAL** BROWN, SOFT TO VERY SOFT, SANDY SILT, TRACE OF MICA
750			1	1	1	2		Sat.		749.4 5.0
	747.4	7.0								**RESIDUAL** TAN BROWN, VERY LOOSE TO LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA
745			1	2	1	3		Sat.		
	742.4	12.0								
740			1	2	2	4	SS-4	Sat.		
	737.4	17.0								
735			1	2	3	5		Sat.		
	732.4	22.0								
730			2	2	7	9	SS-6	W		729.4 25.0
	727.4	27.0								TAN BROWN, MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA
725			7	9	13	22		W		724.4 30.0
	722.4	32.0								BROWN GRAY, MEDIUM STIFF, SANDY SILT, TRACE OF MICA
			4	3	5	8		W		720.9 33.5
										Boring Terminated at Elevation 720.9 ft In Sandy Silt

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_45987	**STATION** 459+87	**OFFSET** 37 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 747.8 ft	**TOTAL DEPTH** 33.9 ft	**NORTHING** 680,523	**EASTING** 1,421,110	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/19/18	**COMP. DATE** 03/19/18	**SURFACE WATER DEPTH** 8.5ft	

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)
750											
	747.7	0.1								747.8 GROUND SURFACE	0.0
			1	2	2	4		W		**RESIDUAL**	
745	745.4	2.4								745.8 RED, SOFT, SANDY CLAY, TRACE OF MICA	2.0
			2	3	1	4	SS-10	W		BROWN TAN ORANGE, VERY LOOSE TO LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	
740	740.4	7.4									
			1	1	1	2		Sat.			
735	735.4	12.4									
			2	2	3	5		W			
730	730.4	17.4									
			1	1	2	3	SS-13	W			
725	725.4	22.4									
			2	4	3	7		W			
720	720.4	27.4									
			3	3	9	12		W			
715	715.4	32.4								721.8 BROWN ORANGE, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA	26.0
			25	25	40	65		W		716.8 BROWN GRAY, VERY DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	31.0
										713.9 Boring Terminated at Elevation 713.9 ft In Silty Sand	33.9

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_46073	**STATION** 460+73	**OFFSET** 38 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 741.1 ft	**TOTAL DEPTH** 50.9 ft	**NORTHING** 680,550	**EASTING** 1,421,192	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/20/18	**COMP. DATE** 03/20/18	**SURFACE WATER DEPTH** 15.0ft	

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
745										
	741.1	0.0								741.1 GROUND SURFACE 0.0
740			5	5	5	10		W		740.1 **ROADWAY EMBANKMENT** 1.0
										RIP RAP
735	735.2	5.9								738.1 **RESIDUAL** 3.0
			3	2	3	5	SS-18	W		RED, STIFF, SANDY CLAY, TRACE OF MICA
730	730.0	11.1								ORANGE BROWN TAN, LOOSE, SILTY FINE SAND, TRACE OF MICA
			2	2	2	4	SS-19	W		
725	725.0	16.1								
			2	2	2	4		W		
720	720.0	21.1								720.6 20.5
			4	6	6	12		W		RED TAN, STIFF, SANDY SILT, TRACE OF MICA
715	715.0	26.1								716.6 24.5
			2	5	7	12		W		TAN BROWN, MEDIUM DENSE TO LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA
710	710.0	31.1								709.0 32.1
			3	4	5	9		W		GRAY, STIFF, SANDY SILT, TRACE OF MICA
705	705.0	36.1								706.6 34.5
			7	5	5	10		W		TAN GRAY, LOOSE TO MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA
700	700.0	41.1								
			5	6	7	13		W		
695	695.0	46.1								696.6 44.5
			8	12	15	27		W		GRAY BROWN, VERY STIFF, SANDY SILT, TRACE OF MICA
	690.2	50.9	60/0.0			60/0.0				690.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 690.2 ft On Crystalline Rock 50.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_46188	**STATION** 461+88	**OFFSET** 54 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 738.3 ft	**TOTAL DEPTH** 49.5 ft	**NORTHING** 680,596	**EASTING** 1,421,300	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/20/18	**COMP. DATE** 03/20/18	**SURFACE WATER DEPTH** 17.8ft	

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)
740											
	738.3	0.0	3	3	1	4		Sat.		738.3 GROUND SURFACE	0.0
										737.3 **ROADWAY EMBANKMENT** RIP RAP	1.0
735	735.3	3.0	4	2	3	5	SS-28	W		736.3 **ALLUVIAL** GRAY, VERY LOOSE, SILTY FINE SAND	2.0
										DARK GRAY, MEDIUM STIFF, SANDY CLAY, WITH TRACE OF ORGANIC MATTER (WOOD)	
730	730.3	8.0	3	3	4	7		W		731.8 **RESIDUAL** BROWN ORANGE, MEDIUM STIFF, SILT, TRACE OF MICA	6.5
725	725.3	13.0	1	3	4	7	SS-30	W			
720	720.3	18.0	2	3	4	7		W		721.8 BROWN GRAY, LOOSE TO MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA	16.5
715	715.3	23.0	2	3	4	7		W			
710	710.3	28.0	3	4	5	9		W			
705	705.3	33.0	4	5	6	11		W			
700	700.3	38.0	9	13	17	30		W			
695	695.3	43.0	9	11	12	23		W			
690	690.3	48.0	11	17	26	43		W		691.8 BROWN TAN, DENSE, SILTY FINE SAND, TRACE OF MICA	46.5
										688.8 Boring Terminated at Elevation 688.8 ft In Silty Sand	49.5

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_46281	**STATION** 462+81	**OFFSET** 61 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 734.9 ft	**TOTAL DEPTH** 36.2 ft	**NORTHING** 680,626	**EASTING** 1,421,390	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/22/18	**COMP. DATE** 03/22/18	**SURFACE WATER DEPTH** 21.3ft	

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)
735											
	734.9	0.0	9	1	4	5				734.9 GROUND SURFACE	0.0
										734.4 **ROADWAY EMBANKMENT** RIP RAP	0.5
730	730.2	4.7	2	1	3	4		M		**ALLUVIAL** BROWN, LOOSE, SILTY FINE SAND	
										726.9	8.0
725	725.2	9.7	4	6	8	14	SS-52	M		**RESIDUAL** RED BROWN, STIFF TO VERY STIFF, CLAY, TRACE OF MICA	
720	720.2	14.7	5	9	13	22		M			
715	715.2	19.7	3	4	5	9		M		716.9 RED BROWN, LOOSE, SILTY FINE SAND, TRACE OF MICA	18.0
710	710.2	24.7	2	3	5	8	SS-55	M		711.9 TAN BROWN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA	23.0
705	705.2	29.7	3	3	8	11		M		706.9 BROWN, MEDIUM DENSE, FINE TO COARSE SAND, TRACE OF MICA	28.0
700	700.2	34.7	6	14	25	39		M		701.9 TAN BROWN, DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	33.0
										698.7 Boring Terminated at Elevation 698.7 ft In Silty Sand	36.2

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_46380	**STATION** 463+80	**OFFSET** 60 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 737.9 ft	**TOTAL DEPTH** 54.2 ft	**NORTHING** 680,649	**EASTING** 1,421,486	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/22/18	**COMP. DATE** 03/22/18	**SURFACE WATER DEPTH** 18.3ft	

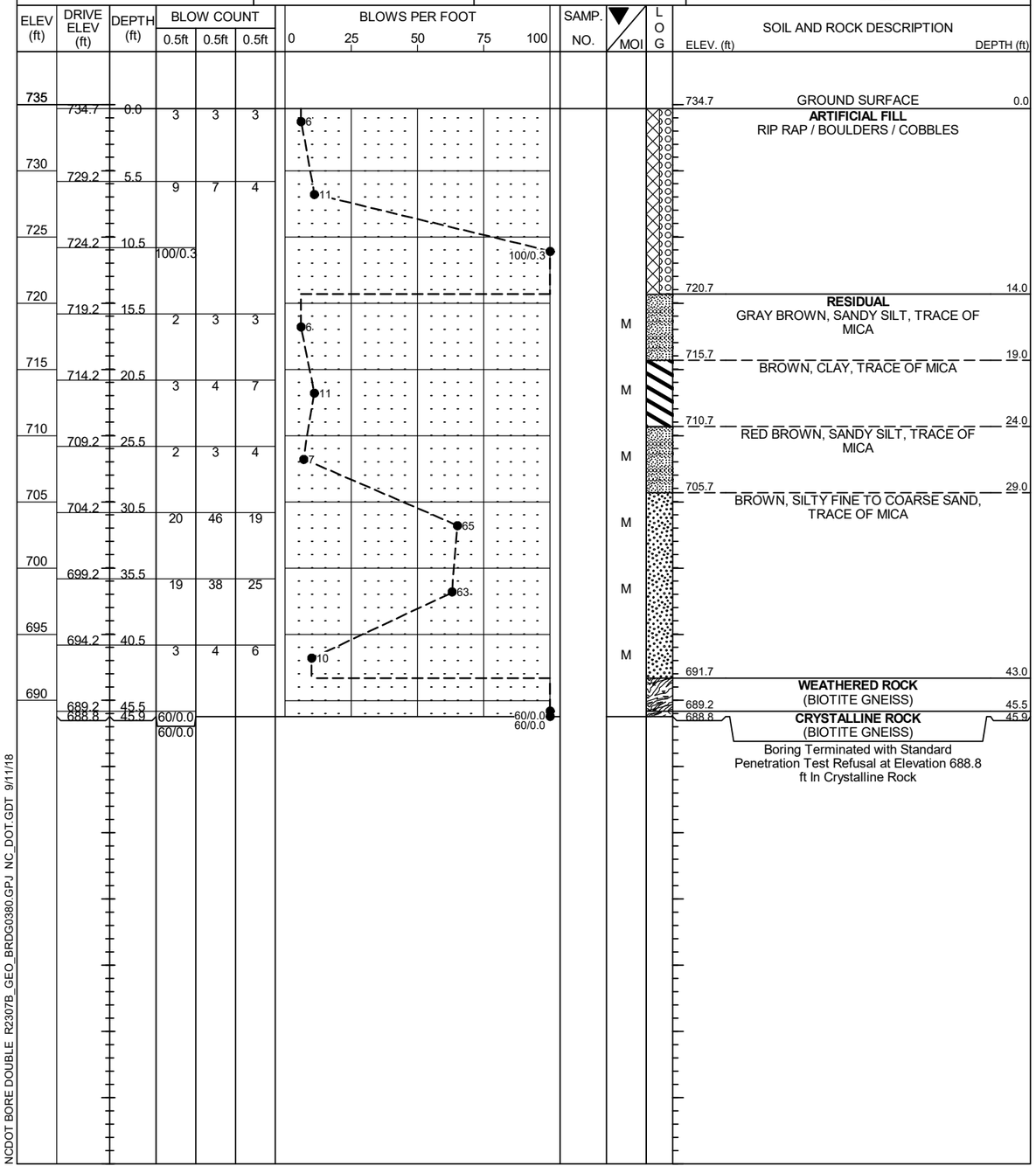
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
740										
	737.9	0.0								737.9 GROUND SURFACE 0.0
			2	2	2	4		Sat.		736.9 **ROADWAY EMBANKMENT** 1.0 RIP RAP
735	735.2	2.7								735.9 2.0
			2	1	1	2		W		**ALLUVIAL** BROWN, LOOSE, SILTY FINE SAND
										RED BROWN, VERY SOFT, SANDY SILT, TRACE OF MICA
730	730.2	7.7								731.9 6.0
			4	6	5	11		Sat.		BROWN, MEDIUM DENSE, COARSE SAND
725	725.2	12.7								726.9 11.0
			2	4	4	8	SS-41	M		**RESIDUAL** BROWN, MEDIUM STIFF, SILT, TRACE OF MICA
720	720.2	17.7								721.9 16.0
			4	5	6	11	SS-42	M		RED BROWN, STIFF, CLAY, TRACE OF MICA
715	715.2	22.7								716.9 21.0
			4	7	11	18		M		RED BROWN, VERY STIFF, SANDY SILT, TRACE OF MICA
710	710.2	27.7								711.9 26.0
			3	4	4	8		M		ORANGE BROWN, LOOSE, SILTY FINE SAND, TRACE OF MICA
705	705.2	32.7								706.9 31.0
			2	4	4	8		M		ORANGE BROWN, MEDIUM STIFF TO STIFF, SANDY SILT, TRACE OF MICA
700	700.2	37.7								
			4	6	9	15		M		
695	695.2	42.7								696.9 41.0
			7	10	18	28		M		ORANGE BROWN, MEDIUM DENSE TO DENSE, SILTY FINE SAND, TRACE OF MICA
690	690.2	47.7								
			9	14	17	31		M		
685	685.2	52.7								686.9 51.0
			13	19	34	53		M		ORANGE BROWN, VERY DENSE, SILTY FINE SAND, TRACE OF MICA
										683.7 54.2
										Boring Terminated at Elevation 683.7 ft In Silty Sand

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_46483	**STATION** 464+83	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 742.6 ft	**TOTAL DEPTH** 49.5 ft	**NORTHING** 680,672	**EASTING** 1,421,587	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/13/18	**COMP. DATE** 04/13/18	**SURFACE WATER DEPTH** 14.0ft	

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
745										
	742.6	0.0								742.6 GROUND SURFACE 0.0
			WOR	1	1	2		Sat.		741.6 **ROADWAY EMBANKMENT** 1.0 RIP RAP
740										GRAY BROWN, SOFT TO MEDIUM STIFF, CLAY, TRACE OF MICA
	738.9	3.7								
			3	2	3	5	SS-189	Sat.		
735										735.6 7.0
	733.8	8.8								**RESIDUAL**
			2	2	3	5		Sat.		TAN BROWN, MEDIUM STIFF TO STIFF, SILT, TRACE OF MICA
730										
	728.8	13.8								
			5	4	5	9	SS-191	W		
725										
	723.8	18.8								
			3	3	7	10		W		
720										720.6 22.0
	718.8	23.8								BROWN, STIFF, CLAY, TRACE OF MICA
			3	4	6	10		W		717.6 25.0
715										STIFF, DARK GRAY, SANDY SILT, TRACE OF MICA
	713.8	28.8								715.6 27.0
			4	6	9	15		M		RED BROWN, STIFF, CLAY, TRACE OF MICA
710										711.6 31.0
	708.8	33.8								710.6 GRAVEL/COBBLES 32.0
			3	3	4	7		M		BROWN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA
705										
	703.8	38.8								
			2	2	4	6		M		700.6 42.0
700										GRAY BROWN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA
	698.8	43.8								
			7	6	7	13		M		695.6 47.0
695										**WEATHERED ROCK** (BIOTITE GNEISS)
	693.8	48.8								693.1 49.5
			41	59/0.2		100/0.7				Boring Terminated at Elevation 693.1 ft In Weathered Rock

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 465+82	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 734.7 ft	**TOTAL DEPTH** 45.9 ft	**NORTHING** 680,700	**EASTING** 1,421,682	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Norwood, M. R.	**START DATE** 04/16/18	**COMP. DATE** 04/16/18	**SURFACE WATER DEPTH** 22.3ft	



NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 465+92	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 749.1 ft	**TOTAL DEPTH** 67.9 ft	**NORTHING** 680,663	**EASTING** 1,421,701	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/12/18	**COMP. DATE** 04/12/18	**SURFACE WATER DEPTH** 7.5ft	

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)
750											
	749.1	0.0	4	2	2	4		Sat.		749.1 GROUND SURFACE	0.0
										ALLUVIAL DARK BROWN, SILTY FINE SAND, TRACE OF MICA	
745										746.1	3.0
	744.2	4.9	2	4	4	8		Sat.		**RESIDUAL** RED BROWN, SILTY CLAY, TRACE OF MICA	
740										741.1	8.0
	739.2	9.9	3	3	5	8		Sat.		TAN, SANDY SILT, TRACE OF MICA	
735										736.1	13.0
	734.2	14.9	4	3	4	7		W		BROWN, SILTY CLAY, TRACE OF MICA	
730										731.1	18.0
	729.2	19.9	3	3	4	7		W		TAN, SANDY SILT, TRACE OF MICA	
725										726.1	23.0
	724.2	24.9	2	4	4	8		W		BROWN, CLAY, TRACE OF QUARTZ FRAGMENTS, TRACE OF MICA	
720										721.1	28.0
	719.2	29.9	2	3	3	6		W		GRAY BROWN, SILTY FINE SAND	
715											
	714.2	34.9	6	7	12	19		W			
710											
	709.2	39.9	10	14	14	28		W			
	706.1	43.0	60/0.0			60/0.0				706.1 **CRYSTALLINE ROCK**	43.0
705										704.4 DARK GRAY BIOTITE GNEISS, MODERATELY TO SEVERELY WEATHERED, MODERATELY HARD TO SOFT, CLOSE FRACTURE SPACING 11 JOINTS AT 45° REC = 100%; RQD = 41%; GSI = 55-70	44.7
700										**RESIDUAL**	
	696.2	52.9	6	70	30/.1					696.2 GRAY BROWN, SILTY FINE SAND, TRACE OF ROCK FRAGMENTS	52.9
695						100/0.6				**WEATHERED ROCK** (BIOTITE GNEISS)	
	693.9	55.2	100/0.4			100/0.4					
690										690.2 **CRYSTALLINE ROCK**	58.9
	689.8	59.3	60/0.0			60/0.0				688.2 DARK GRAY, BIOTITE GNEISS, MODERATELY TO SLIGHTLY WEATHERED, HARD TO MODERATELY HARD, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 4 JOINTS AT 45° REC = 100%; RQD = 60%; GSI = 70-75	60.9
685										681.2 **CRYSTALLINE ROCK** GRAY AND BROWN, BIOTITE GNEISS, MODERATELY TO VERY SEVERELY WEATHERED, MODERATELY HARD TO VERY SOFT, CLOSE TO VERY CLOSE FRACTURE SPACING 5 JOINTS AT 10°-20° 23 JOINTS AT 45° REC = 71%; RQD = 11%; GSI = 55-70	67.9
										Boring Terminated at Elevation 681.2 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 465+92	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 749.1 ft	**TOTAL DEPTH** 67.9 ft	**NORTHING** 680,663	**EASTING** 1,421,701	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/12/18	**COMP. DATE** 04/12/18	**SURFACE WATER DEPTH** 7.5ft	
CORE SIZE 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)
706.1											Begin Coring @ 43.0 ft	
705	706.1	43.0	4.9	*N=60/0.0* 03:30/0.9 01:30 01:00 00:30 00:30	(1.7) 35%	(0.7) 14%		(1.7) 100%	(0.7) 41%		706.1 **CRYSTALLINE ROCK**	43.0
								(0.1) 1%	(0.0) 0%		704.4 DARK GRAY BIOTITE GNEISS, MODERATELY TO SEVERELY WEATHERED, MODERATELY HARD TO SOFT, CLOSE FRACTURE SPACING 11 JOINTS AT 45° GSI = 55-70	44.7
700	701.2	47.9	5.0	01:45 01:00 00:30 00:30 00:30	(0.1) 2%	(0.0) 0%					**RESIDUAL**	
	696.2	52.9		*N=100/0.6*							696.2 GRAY BROWN, SILTY FINE SAND, TRACE OF ROCK FRAGMENTS	52.9
695				*N=100/0.4*							**WEATHERED ROCK** (BIOTITE GNEISS)	
690	689.8	59.3	3.6	*N=60/0.0* 02:00/0.6 06:30 02:30 02:15	(2.9) 81%	(1.6) 44%		(2.0) 100%	(1.2) 60%		690.2 **CRYSTALLINE ROCK**	58.9
	686.2	62.9						(5.0) 71%	(0.8) 11%		688.2 DARK GRAY, BIOTITE GNEISS, MODERATELY TO SLIGHTLY WEATHERED, HARD TO MODERATELY HARD, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 4 JOINTS AT 45° GSI = 70-75	60.9
685			5.0	01:00 01:15 01:15 01:30 01:00	(4.1) 82%	(0.4) 8%					681.2 **CRYSTALLINE ROCK** GRAY AND BROWN, BIOTITE GNEISS, MODERATELY TO VERY SEVERELY WEATHERED, MODERATELY HARD TO VERY SOFT, CLOSE TO VERY CLOSE FRACTURE SPACING 5 JOINTS AT 10°-20° 23 JOINTS AT 45° GSI = 55-70	67.9
	681.2	67.9									Boring Terminated at Elevation 681.2 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 467+08	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 719.2 ft	**TOTAL DEPTH** 46.3 ft	**NORTHING** 680,735	**EASTING** 1,421,803	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/30/18	**COMP. DATE** 05/01/18	**SURFACE WATER DEPTH** 39.4ft	

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)
720											
	719.2	0.0								719.2 GROUND SURFACE	0.0
			WOH	WOH	70	70		Sat.		718.2 **ALLUVIAL** BROWN, SILTY FINE SAND	1.0
										717.2	2.0
	716.0	3.2								716.0 **RESIDUAL** GRAY TAN, SILTY FINE SAND	3.2
715			60/0.1			60/0.1				715.9	3.3
										WEATHERED ROCK (BIOTITE GNEISS)	
										CRYSTALLINE ROCK (BIOTITE GNEISS)	
710											
										708.4 **CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY SLIGHTLY TO MODERATELY WEATHERED, MODERATELY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 3 JOINTS AT 40°-45°	10.8
	706.0	13.2								REC = 52% RQD = 49% GSI = 80-90	
705			10	12	18	30		W			
	701.0	18.2									
700			10	35	15	50		W			
	696.0	23.2								**RESIDUAL** TAN GRAY, SANDY SILT, TRACE OF MICA	
695			4	7	11	18		W			
	691.9	27.3								691.9 **CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, FRESH TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, MODERATELY CLOSE TO WIDE FRACTURE SPACING 7 JOINTS AT 0°-10° 3 JOINTS AT 45° REC = 97% RQD = 93% GSI = 90-100	27.3
			60/0.0			60/0.0					
690											
685							RS-1				
680											
675										672.9	46.3
										Boring Terminated at Elevation 672.9 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 467+08	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 719.2 ft	**TOTAL DEPTH** 46.3 ft	**NORTHING** 680,735	**EASTING** 1,421,803	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/30/18	**COMP. DATE** 05/01/18	**SURFACE WATER DEPTH** 39.4ft	
CORE SIZE NQ	**TOTAL RUN** 26.5 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)
715.9											Begin Coring @ 3.3 ft	
715	715.9	3.3	2.5	00:30/0.5 01:45	(2.4) 96%	(2.4) 96%		(3.9) 52%	(3.7) 49%		715.9 **CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY SLIGHTLY TO MODERATELY WEATHERED, MODERATELY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 3 JOINTS AT 40°-45°	3.3
	713.4	5.8		01:45								
			5.0	01:00 01:15	(1.5) 30%	(1.3) 26%						
710				01:00 00:15								
	708.4	10.8		00:15							GSI = 80-90	
											708.4 **RESIDUAL**	10.8
705				N=30								
700				N=50								
695				N=18								
	691.9	27.3									691.9	27.3
690			4.0	N=60/0.0 02:00	(3.5) 88%	(3.1) 78%		(18.5) 97%	(17.6) 93%		**CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, FRESH TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, MODERATELY CLOSE TO WIDE FRACTURE SPACING 7 JOINTS AT 0°-10° 3 JOINTS AT 45° GSI = 90-100	
	687.9	31.3		02:00 02:15 02:45								
			5.0	03:00 03:15 03:15 03:15 04:15	(5.0) 100%	(5.0) 100%						
685							RS-1					
	682.9	36.3										
680			5.0	04:45 05:00 05:00 03:45 04:00	(5.0) 100%	(4.7) 94%						
	677.9	41.3										
675			5.0	02:30 04:00 03:30 04:15 05:15	(5.0) 100%	(4.8) 96%						
	672.9	46.3									672.9	46.3
											Boring Terminated at Elevation 672.9 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 466+97	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 732.3 ft	**TOTAL DEPTH** 73.4 ft	**NORTHING** 680,684	**EASTING** 1,421,804	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/27/18	**COMP. DATE** 04/27/18	**SURFACE WATER DEPTH** 26.8ft	

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)
735											
	732.3	0.0								732.3 GROUND SURFACE	0.0
730			WOH	WOH	2	2		Sat.		**ALLUVIAL** TAN BROWN, SANDY SILT, TRACE OF MICA	
	726.7	5.6									
725			2	3	3	6		Sat.			
	721.7	10.6								723.3	9.0
720			1	1	1	2		W		**ALLUVIAL** TAN BROWN, SILTY FINE SAND, TRACE OF MICA	
	716.7	15.6								718.3	14.0
715			2	3	4	7		W		**RESIDUAL** BROWN TAN, SILTY FINE SAND, TRACE OF MICA	
	711.7	20.6									
710			5	8	15	23		W			
	706.7	25.6									
705			5	8	18	26		W			
	701.7	30.6								703.3	29.0
700			18	53	47/0.3	100/0.8				**WEATHERED ROCK** (BIOTITE GNEISS)	
	696.7	35.6	100/0.3			100/0.3					
695											
	691.7	40.6	80	20/0.1		100/0.6					
690											
	688.9	43.4	60/0.0			60/0.0				688.9	43.4
685										**CRYSTALLINE ROCK** GRAY TAN, BIOTITE GNEISS, MODERATELY TO VERY SEVERELY WEATHERED, MEDIUM HARD, CLOSE FRACTURE SPACING 38 JOINTS AT 0°-5° 34 JOINTS AT 40°-45° 1 JOINT AT 60° REC = 67% RQD = 27% GSI = 70-75	
680											
675							RS-2				
670											
665											
660										658.9	73.4
										Boring Terminated at Elevation 658.9 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 466+97	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 732.3 ft	**TOTAL DEPTH** 73.4 ft	**NORTHING** 680,684	**EASTING** 1,421,804	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/27/18	**COMP. DATE** 04/27/18	**SURFACE WATER DEPTH** 26.8ft	
CORE SIZE NQ	**TOTAL RUN** 30.0 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)
688.9											Begin Coring @ 43.4 ft	
	688.9	43.4	5.0	*N=60/0.0* 01:45 01:15 01:15 01:15 01:30	(0.7) 14%	(0.4) 8%		(20.1) 67%	(8.2) 27%		688.9 **CRYSTALLINE ROCK** GRAY TAN, BIOTITE GNEISS, MODERATELY TO VERY SEVERELY WEATHERED, MEDIUM HARD, CLOSE FRACTURE SPACING 38 JOINTS AT 0°-5° 34 JOINTS AT 40°-45° 1 JOINT AT 60° GSI = 70-75	43.4
685	683.9	48.4	5.0	00:45 01:15 01:45 01:45 01:30	(3.0) 60%	(0.0) 0%						
680	678.9	53.4	5.0	01:45 01:45 02:00 02:30 02:30	(3.7) 74%	(0.5) 10%						
675	673.9	58.4	5.0	01:00 01:30 01:30 01:30 01:30	(4.2) 84%	(1.9) 38%	RS-2					
670	668.9	63.4	5.0	01:00 01:15 01:30 01:15 01:45	(4.1) 82%	(1.6) 32%						
665	663.9	68.4	5.0	01:00 02:00 01:45 02:15 02:30	(4.4) 88%	(3.8) 76%						
660	658.9	73.4									658.9 Boring Terminated at Elevation 658.9 ft In Crystalline Rock	73.4

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 468+45	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 706.0 ft	**TOTAL DEPTH** 60.6 ft	**NORTHING** 680,771	**EASTING** 1,421,935	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/08/18	**COMP. DATE** 05/09/18	**SURFACE WATER DEPTH** 52.2ft	

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)
710											
										706.0 GROUND SURFACE	0.0
705	705.4	0.6	3	2	4	6		W		**ALLUVIAL** REDDISH BROWN BLACK, SANDY CLAY, LITTLE SILT, TRACE OF ORGANICS	
700	700.9	5.1	2	4	5	9		W			
	696.8	9.2								698.0	8.0
695			1	WOH	1	1		Sat.		**ALLUVIAL** REDDISH BROWN, SILTY FINE SAND, TRACE OF CLAY, TRACE OF ORGANICS	
	691.8	14.2								693.0	13.0
690			2	2	4	4		Sat.		**ALLUVIAL** BROWN, FINE SAND	
	686.8	19.2								687.0	19.0
685			11	84	16/0.1	100/0.6				**WEATHERED ROCK** (BIOTITE GNEISS)	
	681.8	24.2									
680			38	62/0.4		100/0.9					
	676.8	29.2								676.9	29.1
675			60/0.1			60/0.1	RS-3			676.1 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	29.9
670										**CRYSTALLINE ROCK** GRAY TAN BROWN, BIOTITE GNEISS, VERY SLIGHTLY TO SEVERELY WEATHERED, MODERATELY HARD TO MEDIUM HARD, VERY CLOSE TO CLOSE FRACTURE SPACING 8 JOINTS AT 0°-30° 29 JOINTS AT 30°-60° REC = 68% RQD = 39% GSI = 30-40	
665											
660											
										655.4	50.6
655										**CRYSTALLINE ROCK** GRAY BLACK WHITE, BIOTITE GNEISS, FRESHLY WEATHERED, VERY HARD TO HARD, VERY WIDE FRACTURE SPACING REC = 98% RQD = 98% GSI = 80-90	
650										645.4 Boring Terminated at Elevation 645.4 ft In Crystalline Rock	60.6

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 468+45	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 706.0 ft	**TOTAL DEPTH** 60.6 ft	**NORTHING** 680,771	**EASTING** 1,421,935	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/08/18	**COMP. DATE** 05/09/18	**SURFACE WATER DEPTH** 52.2ft	
CORE SIZE NQ	**TOTAL RUN** 30.7 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)
676.1											Begin Coring @ 29.9 ft	
675	676.1	29.9	0.7	02:00/0.7	(0.6) 86%	(0.0) 0%		(14.1) 68%	(8.1) 39%		676.1 **CRYSTALLINE ROCK**	29.9
	675.4	30.6	5.0	02:30 02:00 02:00 01:45 01:45	(3.6) 72%	(1.9) 38%					GRAY TAN BROWN, BIOTITE GNEISS, VERY SLIGHTLY TO SEVERELY WEATHERED, MODERATELY HARD TO MEDIUM HARD, VERY CLOSE TO CLOSE FRACTURE SPACING 8 JOINTS AT 0°-30° 29 JOINTS AT 30°-60° GSI = 30-40	
670	670.4	35.6	5.0	01:30 01:30 01:30 01:30 01:30	(2.1) 42%	(1.6) 32%	RS-3					
665	665.4	40.6	5.0	01:30 01:15 01:30 01:30 01:45	(4.4) 88%	(1.9) 38%						
660	660.4	45.6	5.0	01:15 01:00 02:00 03:00 04:15	(3.4) 68%	(2.9) 58%						
655	655.4	50.6	5.0	04:45 06:30 07:00 09:00 14:00	(5.0) 100%	(5.0) 100%		(9.8) 98%	(9.8) 98%		655.4 **CRYSTALLINE ROCK**	50.6
650	650.4	55.6	5.0	23:00 21:00 03:30 03:15 03:30	(4.8) 96%	(4.8) 96%					GRAY BLACK WHITE, BIOTITE GNEISS, FRESHLY WEATHERED, VERY HARD TO HARD, VERY WIDE FRACTURE SPACING GSI = 80-90	
	645.4	60.6									645.4 Boring Terminated at Elevation 645.4 ft In Crystalline Rock	60.6

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 468+46	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 703.9 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 680,723	**EASTING** 1,421,948	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/07/18	**COMP. DATE** 05/08/18	**SURFACE WATER DEPTH** 54.3ft	

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)
705											
	703.3	0.6	2	3	4	7				703.9 GROUND SURFACE	0.0
700	699.0	4.9	6	3	4	7		W		**ALLUVIAL** DARK BROWN, SANDY SILT, TRACE TO LITTLE CLAY	
	696.2	7.7	1	3	3	6		W			
695	691.8	12.1	2	2	3	5		Sat.		692.9 DARK BROWN, SILTY SAND	11.0
690	686.8	17.1	WOH	WOH	2	2		Sat.		685.9 **RESIDUAL** GRAYISH BROWN, SILTY SAND	18.0
685	681.8	22.1	4	8	40	48		Sat.		683.9 GRAYISH BROWN, SILTY SAND, TRACE OF ROCK FRAGMENTS	20.0
680	676.8	27.1	100/0.2			100/0.2				676.9 **WEATHERED ROCK** (BIOTITE GNEISS)	27.0
675	674.1	29.8	60/0.0			60/0.0				674.1 **CRYSTALLINE ROCK** GRAY TAN BROWN, BIOTITE GNEISS, VERY SLIGHTLY TO VERY SEVERELY WEATHERED, HARD TO MEDIUM HARD, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 22 JOINTS AT 0°-10° 18 JOINTS AT 40°-50° 1 JOINT AT 60 REC = 84% RQD = 43% GSI = 70-80	29.8
670											
665											
660											
655										653.5 **CRYSTALLINE ROCK** GRAY PINK, BIOTITE GNEISS, FRESHLY TO VERY SLIGHTLY WEATHERED, VERY HARD, WIDE TO MODERATELY CLOSE FRACTURE SPACING 4 JOINTS AT 10° 5 JOINTS AT 30° 2 JOINTS AT 45° REC = 84% RQD = 79% GSI = 90-95	50.4
650							RS-4				
645										640.3 Boring Terminated at Elevation 640.3 ft In Crystalline Rock	63.6

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 468+46	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 703.9 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 680,723	**EASTING** 1,421,948	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/07/18	**COMP. DATE** 05/08/18	**SURFACE WATER DEPTH** 54.3ft	
CORE SIZE NQ	**TOTAL RUN** 33.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
674.1											Begin Coring @ 29.8 ft	
	674.1	29.8	3.6	*N=60/0.0* 04:15 02:30 02:45 01:45/0.6	(3.2) 89%	(1.9) 53%		(17.3) 84%	(8.8) 43%		674.1 **CRYSTALLINE ROCK** GRAY TAN BROWN, BIOTITE GNEISS, VERY SLIGHTLY TO VERY SEVERELY WEATHERED, HARD TO MEDIUM HARD, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 22 JOINTS AT 0°-10° 18 JOINTS AT 40°-50° 1 JOINT AT 60° GSI = 70-80	29.8
670	670.5	33.4	5.0	03:15 02:15 03:15 03:15 01:30	(4.3) 86%	(3.2) 64%						
665	665.5	38.4	5.0	01:30 01:45 01:45 01:45 01:30	(4.8) 96%	(1.7) 34%						
660	660.5	43.4	5.0	01:15 01:45 01:15 01:15 01:30	(2.0) 40%	(1.5) 30%						
655	655.5	48.4	5.0	01:00 01:30 01:45 01:30 02:15	(4.0) 80%	(1.7) 34%					653.5	50.4
650	650.5	53.4	5.2	02:00 02:00 02:15 03:15 03:15/1.2	(5.2) 100%	(4.8) 92%	RS-4	(11.1) 84%	(10.4) 79%		653.5 **CRYSTALLINE ROCK** GRAY PINK, BIOTITE GNEISS, FRESHLY TO VERY SLIGHTLY WEATHERED, VERY HARD, WIDE TO MODERATELY CLOSE FRACTURE SPACING 4 JOINTS AT 10° 5 JOINTS AT 30° 2 JOINTS AT 45° GSI = 90-95	50.4
645	645.3	58.6	5.0	02:30 02:30 03:00 02:30 02:45	(4.9) 98%	(4.4) 88%						
	640.3	63.6									640.3 Boring Terminated at Elevation 640.3 ft In Crystalline Rock	63.6

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 469+80	**OFFSET** 63 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 691.9 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 680,792	**EASTING** 1,422,069	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/09/18	**COMP. DATE** 05/09/18	**SURFACE WATER DEPTH** 66.2ft	

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)
695											
	691.7	0.2	2	2	WOH	2		Sat.		691.9 GROUND SURFACE	0.0
690										**ALLUVIAL** DARK GRAY BROWN, SILTY FINE SAND, TRACE OF MICA	
	686.1	5.8	2	2	3	5		Sat.			
685	682.7	9.2	6	9	5	14		Sat.			
680										679.9	12.0
	677.7	14.2	3	6	23	29		Sat.		**ALLUVIAL** GRAY, FINE TO COARSE SAND, TRACE OF MICA, TRACE GRAVEL	
675	672.7	19.2	95	5/0		100/0.5				673.9	18.0
670										**WEATHERED ROCK** (BIOTITE GNEISS)	
	667.7	24.2	70	30/0.4		100/0.9					
665	663.6	28.3	60/0.0			60/0.0				663.6	28.3
660										**CRYSTALLINE ROCK** GRAY BLACK WHITE, BIOTITE GNEISS, FRESH TO VERY SLIGHTLY WEATHERED, VERY HARD TO HARD, MODERATELY CLOSE FRACTURE SPACING 2 JOINTS AT 0°-30°	
										656.6	35.3
										REC = 99% RQD = 97% GSI = 75-85	
										Boring Terminated at Elevation 656.6 ft In Crystalline Rock	
										Terminated at 35.3 feet - sheared core bit and moved over to B3-A (1)	

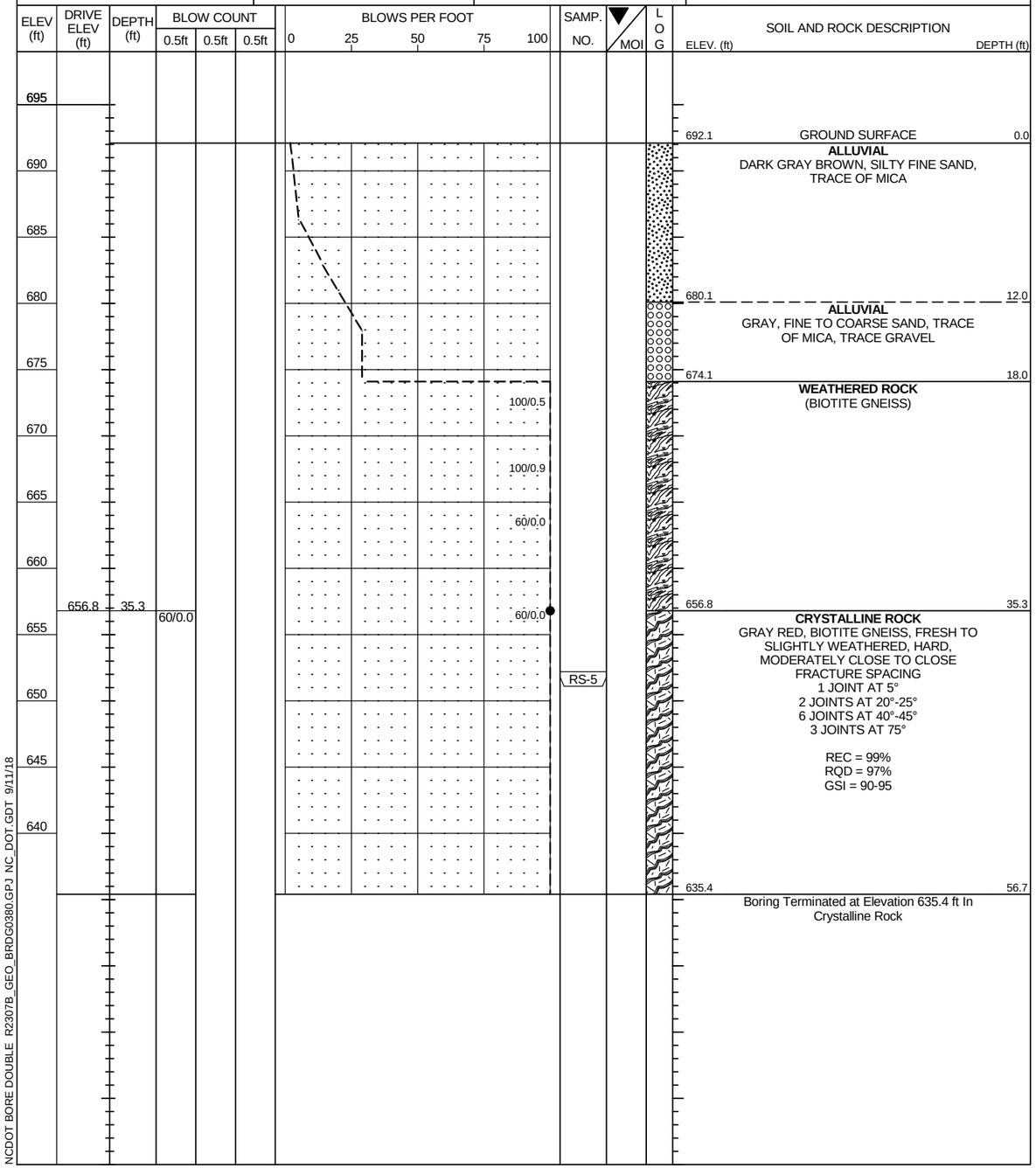
GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 469+80	**OFFSET** 63 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 691.9 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 680,792	**EASTING** 1,422,069	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/09/18	**COMP. DATE** 05/09/18	**SURFACE WATER DEPTH** 66.2ft	
CORE SIZE NQ	**TOTAL RUN** 7.0 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)
663.6											Begin Coring @ 28.3 ft	
	663.6	28.3	3.3	*N=60/0.0* 01:30/0.3 03:45	(3.2) 97%	(3.1) 94%		(6.9) 99%	(6.8) 97%		663.6 **CRYSTALLINE ROCK** GRAY BLACK WHITE, BIOTITE GNEISS, FRESH TO VERY SLIGHTLY WEATHERED, VERY HARD TO HARD, MODERATELY CLOSE FRACTURE SPACING 2 JOINTS AT 0°-30°	28.3
660	660.3	31.6	3.7	04:00 03:45	(3.7) 100%	(3.7) 100%						
	656.6	35.3		04:30 04:00/0.7							656.6 GSI = 75-85	35.3
											Boring Terminated at Elevation 656.6 ft In Crystalline Rock	
											Terminated at 35.3 feet - sheared core bit and moved over to B3-A (1)	

GEOTECHNICAL BORING REPORT
BORE LOG

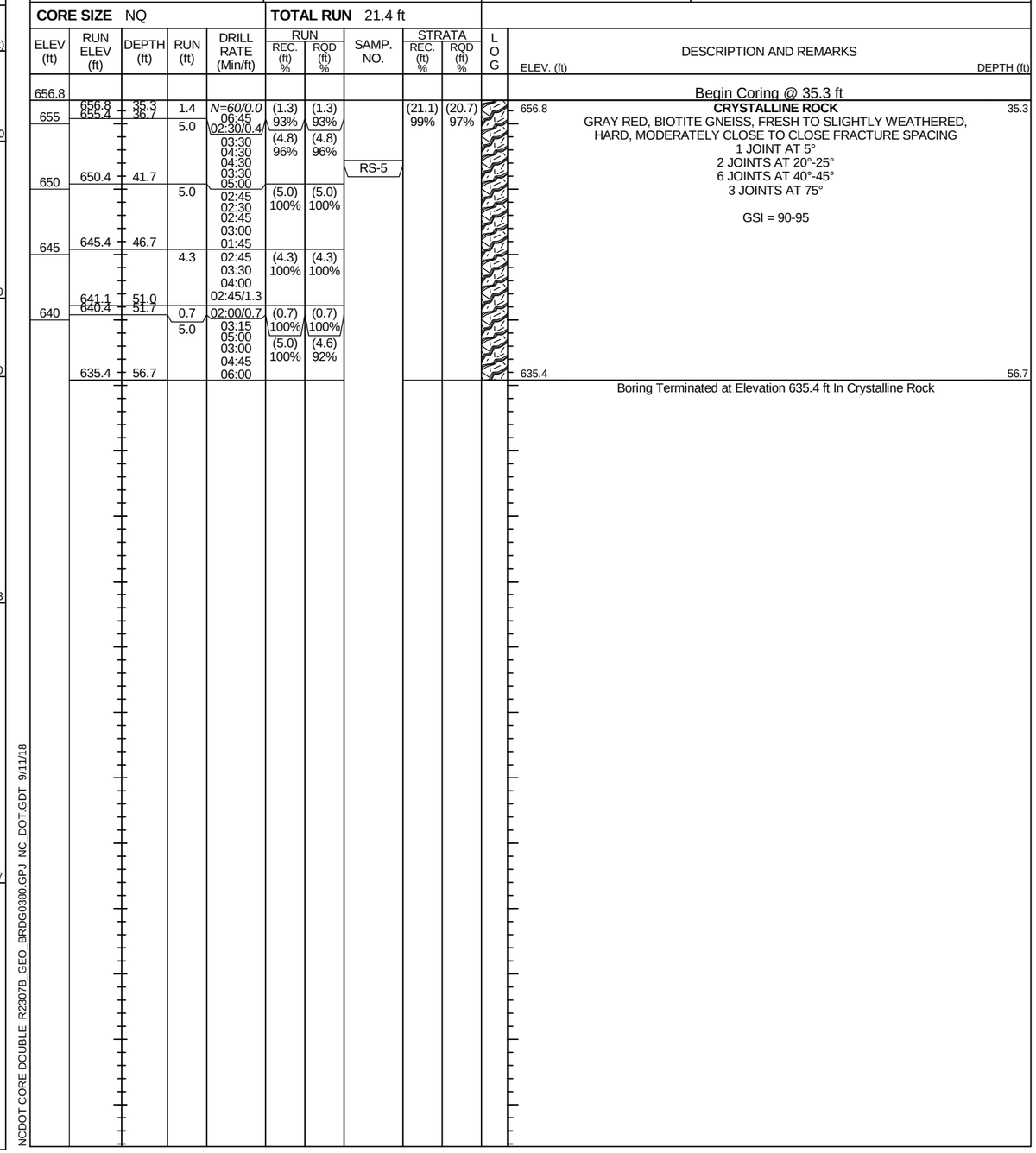
WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-A (1)	**STATION** 469+83	**OFFSET** 73 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 692.1 ft	**TOTAL DEPTH** 56.7 ft	**NORTHING** 680,802	**EASTING** 1,422,070	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/09/18	**COMP. DATE** 05/10/18	**SURFACE WATER DEPTH** 66.0ft	



NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-A (1)	**STATION** 469+83	**OFFSET** 73 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 692.1 ft	**TOTAL DEPTH** 56.7 ft	**NORTHING** 680,802	**EASTING** 1,422,070	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/09/18	**COMP. DATE** 05/10/18	**SURFACE WATER DEPTH** 66.0ft	
CORE SIZE NQ	**TOTAL RUN** 21.4 ft			



NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 469+89	**OFFSET** 16 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 689.3 ft	**TOTAL DEPTH** 49.0 ft	**NORTHING** 680,748	**EASTING** 1,422,089	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/10/18	**COMP. DATE** 05/10/18	**SURFACE WATER DEPTH** 68.7ft	

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)
690											
	689.1	0.2								689.3	0.0
			WOH	1	6	7		Sat.		**ALLUVIAL** GRAY BROWN, SILTY FINE SAND, TRACE OF MICA	
685	685.2	4.1									
			WOH	WOH	WOH	0		Sat.			
	682.8	6.5								683.3	6.0
			WOH	WOH	WOH	0		Sat.		**ALLUVIAL** DARK BROWN BLACK, CLAYEY FINE SAND, TRACE OF ORGANIC MATTER (ROOTS)	
680										679.3	10.0
	677.8	11.5								**ALLUVIAL** DARK GRAY, BROWN SILTY FINE SAND	
			WOH	WOH	WOH	0		Sat.			
675										674.3	15.0
	673.7	15.6								**RESIDUAL** BROWN GRAY, FINE SAND	
			27	32	31	63		Sat.			
670											
	667.8	21.5								667.8	21.5
			60/0.0			60/0.0				**CRYSTALLINE ROCK** (BIOTITE GNEISS)	21.6
665										665.1	24.2
							RS-6			**CRYSTALLINE ROCK** TAN BROWN, BIOTITE GNEISS, MODERATELY WEATHERED, MODERATELY HARD, CLOSE FRACTURE SPACING 3 JOINTS AT 0°-30° REC = 42% RQD = 15% GSI = 60-70	
660											
655										**CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY SLIGHTLY WEATHERED, VERY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 20 JOINTS AT 0°-30° 7 JOINTS AT 30°-60° 2 JOINT AT 60°-75° REC = 97% RQD = 89% GSI = 80-90	
650											
645										640.3	49.0
										Boring Terminated at Elevation 640.3 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 469+89	**OFFSET** 16 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 689.3 ft	**TOTAL DEPTH** 49.0 ft	**NORTHING** 680,748	**EASTING** 1,422,089	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/10/18	**COMP. DATE** 05/10/18	**SURFACE WATER DEPTH** 68.7ft	
CORE SIZE NQ	**TOTAL RUN** 27.4 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)
667.7											Begin Coring @ 21.6 ft	
	667.7	21.6	2.4	00:45/0.4	(0.8)	(0.4)		(1.1)	(0.4)		667.7	21.6
665	665.3	24.0		01:15 01:15	33%	17%		42%	15%		665.1	24.2
			5.0	02:15 01:30 01:15 01:15 01:30	(4.4) 88%	(3.7) 74%	RS-6	(24.1) 97%	(22.0) 89%		**CRYSTALLINE ROCK** TAN BROWN, BIOTITE GNEISS, MODERATELY WEATHERED, MODERATELY HARD, CLOSE FRACTURE SPACING 3 JOINTS AT 0°-30° GSI = 60-70	
660	660.3	29.0										
			5.0	01:30 01:45 01:45 01:45 02:00	(4.9) 98%	(4.2) 84%					**CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY SLIGHTLY WEATHERED, VERY HARD, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 20 JOINTS AT 0°-30° 7 JOINTS AT 30°-60° 2 JOINT AT 60°-75° GSI = 80-90	
655	655.3	34.0										
			5.0	02:00 02:30 02:15 02:00 02:15	(5.0) 100%	(4.5) 90%						
650	650.3	39.0										
			5.0	02:30 03:00 03:00 02:45 02:45	(5.0) 100%	(4.6) 92%						
645	645.3	44.0										
			5.0	02:45 02:45 03:15 03:15 03:15	(5.0) 100%	(5.0) 100%						
	640.3	49.0									640.3	49.0
											Boring Terminated at Elevation 640.3 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 471+23	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 677.8 ft	**TOTAL DEPTH** 47.1 ft	**NORTHING** 680,832	**EASTING** 1,422,207	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/14/18	**COMP. DATE** 05/14/18	**SURFACE WATER DEPTH** 80.2ft	

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)
680											
	677.8	0.0	WOR	WOR	WOR	0		Sat.		677.8 GROUND SURFACE	0.0
675										**ALLUVIAL** DARK GRAY, SILT	
										674.8 GRAY, GRAVEL	3.0
	673.1	4.7	6	5	9	14		Sat.		672.1 **RESIDUAL** TAN, SILTY FINE SAND, TRACE OF MICA	5.7
670											
	668.1	9.7	5	7	10	17		M			
665										664.8 **WEATHERED ROCK** (BIOTITE GNEISS)	13.0
	663.1	14.7	60	40/0.1		100/0.6					
660											
	658.6	19.2	60/0.0			60/0.0				658.6 **CRYSTALLINE ROCK** GRAY WHITE, BIOTITE GNEISS, VERY SLIGHTLY TO MODERATELY WEATHERED, MODERATELY HARD, CLOSE TO VERY CLOSE FRACTURE SPACING 27 JOINTS AT 0°-20° 12 JOINTS AT 30°-45° 4 JOINT AT 60°-80° REC = 94% RQD = 71% GSI = 75-85	19.2
655											
650							RS-7				
645											
640											
635										630.7 Boring Terminated at Elevation 630.7 ft In Crystalline Rock	47.1

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 471+23	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 677.8 ft	**TOTAL DEPTH** 47.1 ft	**NORTHING** 680,832	**EASTING** 1,422,207	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/14/18	**COMP. DATE** 05/14/18	**SURFACE WATER DEPTH** 80.2ft	
CORE SIZE NQ	**TOTAL RUN** 27.9 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)
658.6											Begin Coring @ 19.2 ft	
	658.6	19.2	3.0	*N=60/0.0* 02:30 02:30 03:00	(2.0) 67%	(1.6) 53%		(26.1) 94%	(19.8) 71%		658.6 **CRYSTALLINE ROCK** GRAY WHITE, BIOTITE GNEISS, VERY SLIGHTLY TO MODERATELY WEATHERED, MODERATELY HARD, CLOSE TO VERY CLOSE FRACTURE SPACING 27 JOINTS AT 0°-20° 12 JOINTS AT 30°-45° 4 JOINT AT 60°-80° GSI = 75-85	19.2
655	655.6	22.2	5.0	02:30 02:45 03:00 02:45 03:30	(5.0) 100%	(3.0) 60%						
650	650.6	27.2	5.0	02:15 02:30 03:45 03:00 02:30	(4.7) 94%	(3.9) 78%	RS-7					
645	645.6	32.2	5.0	02:15 03:30 03:30 03:30 04:15	(4.9) 98%	(3.2) 64%						
640	640.6	37.2	5.0	02:45 05:00 04:15 04:45 04:00	(4.7) 94%	(3.6) 72%						
635	635.6	42.2	4.9	02:45 03:45 03:00 02:30 02:00/0.9	(4.8) 98%	(4.5) 92%						
	630.7	47.1									630.7 Boring Terminated at Elevation 630.7 ft In Crystalline Rock	47.1

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B4-B	**STATION** 471+32	**OFFSET** 27 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 677.5 ft	**TOTAL DEPTH** 36.6 ft	**NORTHING** 680,792	**EASTING** 1,422,225	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/14/18	**COMP. DATE** 05/14/18	**SURFACE WATER DEPTH** 80.5ft	

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)
680											
	677.2	0.3								677.5 GROUND SURFACE	0.0
675			2	6	22	28		W		676.2 **ALLUVIAL** DARK BROWN BLACK, SANDY CLAY, TRACE ORGANIC MATTER	1.3
	673.4	4.1	100/0.3			100/0.3				673.5 GRAY BROWN, FINE TO COARSE SAND, TRACE ROCK FRAGMENTS	4.0
670	671.7	5.8	60/0.0			60/0.0	RS-8			671.7 **WEATHERED ROCK** (BIOTITE GNEISS)	5.8
665										**CRYSTALLINE ROCK** GRAY BROWN, BIOTITE GNEISS, MODERATELY HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, WIDE TO CLOSE FRACTURE SPACING 22 JOINTS AT 0°-30° 10 JOINTS AT 30°-60° REC = 96% RQD = 82% GSI = 75-85	
660											
655											
650											
645										640.9	36.6
										Boring Terminated at Elevation 640.9 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Bhuiyan, M. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B4-B	**STATION** 471+32	**OFFSET** 27 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 677.5 ft	**TOTAL DEPTH** 36.6 ft	**NORTHING** 680,792	**EASTING** 1,422,225	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/14/18	**COMP. DATE** 05/14/18	**SURFACE WATER DEPTH** 80.5ft	
CORE SIZE NQ	**TOTAL RUN** 30.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
671.7											Begin Coring @ 5.8 ft	
670	671.7	5.8	1.3	N=60/0.0	(1.2) 92%	(0.9) 69%		(29.6) 96%	(25.3) 82%		671.7 **CRYSTALLINE ROCK** GRAY BROWN, BIOTITE GNEISS, MODERATELY HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, WIDE TO CLOSE FRACTURE SPACING 22 JOINTS AT 0°-30° 10 JOINTS AT 30°-60° GSI = 75-85	5.8
	670.4	7.1	5.0	00:45/0.3 02:30 02:30 02:15 02:30 04:15	(4.7) 94%	(3.3) 66%	RS-8					
665	665.4	12.1	5.0	02:45 02:15 02:00 02:15 02:00	(4.7) 94%	(4.5) 90%						
660	660.4	17.1	5.0	02:15 02:15 02:30 02:45 02:45	(4.8) 96%	(4.2) 84%						
655	655.4	22.1	5.0	02:00 02:30 02:00 02:30 01:45	(4.8) 96%	(4.8) 96%						
650	650.4	27.1	5.0	03:00 02:45 02:30 03:00 03:15	(4.9) 98%	(3.3) 66%						
645	645.4	32.1	4.5	03:15 03:45 03:15 03:00 01:45/0.5	(4.5) 100%	(4.3) 96%						
	640.9	36.6									640.9 Boring Terminated at Elevation 640.9 ft In Crystalline Rock	36.6

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B5-A	**STATION** 472+58	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 678.2 ft	**TOTAL DEPTH** 32.1 ft	**NORTHING** 680,868	**EASTING** 1,422,337	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/23/18	**COMP. DATE** 05/24/18	**SURFACE WATER DEPTH** 80.4ft	

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)
680											
	678.2	0.0	WOR	WOR	WOR	0.		Sat.		678.2 GROUND SURFACE	0.0
										ALLUVIAL	
675										676.2 DARK GRAY, SILT	2.0
	674.2	4.0	60/0.0			60/0.0				675.2 TAN, COARSE SAND	3.0
										674.2 COBBLES/BOULDERS	4.0
670										**CRYSTALLINE ROCK**	
										DARK GRAY AND PINK, BIOTITE GNEISS, HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, CLOSE TO WIDE FRACTURE SPACING	
665										22 JOINTS AT 0°-30°	
										1 JOINT AT 30°-60°	
										1 JOINT AT 60°-75°	
							RS-9			REC = 100%	
660										RQD = 93%	
										GSI = 85-90	
655											
650										646.1	32.1
										Boring Terminated at Elevation 646.1 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B5-A	**STATION** 472+58	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 678.2 ft	**TOTAL DEPTH** 32.1 ft	**NORTHING** 680,868	**EASTING** 1,422,337	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/23/18	**COMP. DATE** 05/24/18	**SURFACE WATER DEPTH** 80.4ft	
CORE SIZE NQ	**TOTAL RUN** 28.1 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)
674.2											Begin Coring @ 4.0 ft	
	674.2	4.0	3.4	*N=60/0.0* 04:30/1.4 03:45 02:15	(3.4) 100%	(3.4) 100%		(28.1) 100%	(26.0) 93%		674.2 **CRYSTALLINE ROCK**	4.0
	670.8	7.4									DARK GRAY AND PINK, BIOTITE GNEISS, HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, CLOSE TO WIDE FRACTURE SPACING	
670			4.7	02:15/0.7 02:00 02:30 02:00 02:00	(4.7) 100%	(4.1) 87%					22 JOINTS AT 0°-30°	
	666.1	12.1									1 JOINT AT 30°-60°	
665			5.0	02:45 02:00 02:00 02:00 02:30	(5.0) 100%	(4.9) 98%	RS-9				1 JOINT AT 60°-75°	
	661.1	17.1									GSI = 85-90	
660			5.0	03:00 03:00 02:45 02:15 02:30	(5.0) 100%	(4.4) 88%						
	656.1	22.1										
655			5.0	02:30 02:30 02:45 02:30 02:00	(5.0) 100%	(4.2) 84%						
	651.1	27.1										
650			5.0	02:15 01:45 01:45 02:00 02:15	(5.0) 100%	(5.0) 100%						
	646.1	32.1									646.1	32.1
											Boring Terminated at Elevation 646.1 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B5-B	**STATION** 472+63	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 678.1 ft	**TOTAL DEPTH** 46.7 ft	**NORTHING** 680,824	**EASTING** 1,422,353	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/22/18	**COMP. DATE** 05/23/18	**SURFACE WATER DEPTH** 80.7ft	

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)
680											
	678.1	0.0	WOR	WOR	WOR	0		Sat.		678.1 GROUND SURFACE	0.0
										ALLUVIAL DARK GRAY, SILT	
675										675.1 TAN, COARSE SAND	3.0
	673.5	4.6	5	10	12	22		Sat.		672.1 COBBLES/BOULDERS	6.0
670										669.1 **WEATHERED ROCK** (BIOTITE GNEISS)	9.0
	668.5	9.6	13	87/0.5		100/1.0					
665										665.1 **RESIDUAL** GRAY BROWN, SILTY FINE SAND, TRACE OF MICA	13.0
	663.5	14.6	45	35	34	69		M			
	660.9	17.2	60/0.0			60/0.0				660.9 / 660.8 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	17.2 / 17.3
660										**CRYSTALLINE ROCK** DARK GRAY AND PINK, BIOTITE GNEISS, HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, WIDE TO CLOSE FRACTURE SPACING 45 JOINTS AT 0°-30° 14 JOINTS AT 30°-60° 4 JOINTS AT 60°-75° NEAR VERTICAL JOINTS FROM 23.5 TO 24.8 FEET NEAR VERTICAL JOINTS FROM 26.4 TO 27.7 FEET REC = 100% RQD = 72% GSI = 80-90	
655							RS-10				
650											
645											
640											
635										631.4 Boring Terminated at Elevation 631.4 ft In Crystalline Rock	46.7

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B5-B	**STATION** 472+63	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 678.1 ft	**TOTAL DEPTH** 46.7 ft	**NORTHING** 680,824	**EASTING** 1,422,353	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/22/18	**COMP. DATE** 05/23/18	**SURFACE WATER DEPTH** 80.7ft	
CORE SIZE NQ	**TOTAL RUN** 29.4 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)
660.8											Begin Coring @ 17.3 ft	
660	660.8	17.3	4.8	02:15/0.8 02:30 02:45 02:15 02:30	(4.8) 100%	(4.6) 96%		(29.4) 100%	(21.2) 72%		660.8 **CRYSTALLINE ROCK** DARK GRAY AND PINK, BIOTITE GNEISS, HARD TO VERY HARD, FRESH TO SLIGHTLY WEATHERED, WIDE TO CLOSE FRACTURE SPACING 45 JOINTS AT 0°-30° 14 JOINTS AT 30°-60° 4 JOINTS AT 60°-75° NEAR VERTICAL JOINTS FROM 23.5 TO 24.8 FEET NEAR VERTICAL JOINTS FROM 26.4 TO 27.7 FEET GSI = 80-90	17.3
	656.0	22.1										
655			5.0	02:30 02:30 02:45 02:30 03:00	(5.0) 100%	(2.3) 46%	RS-10					
	651.0	27.1										
650			5.0	02:15 02:15 02:15 02:00 02:00	(5.0) 100%	(3.8) 76%						
	646.0	32.1										
645			5.0	02:15 02:00 02:15 02:15 03:15	(5.0) 100%	(1.5) 30%						
	641.0	37.1										
640			4.6	03:00 03:15 02:30 02:45 01:45/0.6	(4.6) 100%	(4.2) 91%						
	636.4	41.7										
635			5.0	03:00 03:00 03:15 03:15 03:00	(5.0) 100%	(4.8) 96%						
	631.4	46.7									631.4 Boring Terminated at Elevation 631.4 ft In Crystalline Rock	46.7

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B6-A	**STATION** 473+91	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 679.3 ft	**TOTAL DEPTH** 53.1 ft	**NORTHING** 680,889	**EASTING** 1,422,469	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/31/18	**COMP. DATE** 06/01/18	**SURFACE WATER DEPTH** 79.7ft	

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)
680											
	679.3	0.0	WOR	WOR	WOR	0		Sat.		679.3 GROUND SURFACE	0.0
										ALLUVIAL BROWN GRAY, SANDY SILT	
675	675.3	4.0	4	9	20	29		Sat.		675.3 BROWN TAN, SILTY FINE TO COARSE SAND	4.0
670	671.3	8.0								671.3 **RESIDUAL** TAN BROWN, SILTY FINE TO COARSE SAND, TRACE OF MICA	8.0
	668.6	10.7	7	14	25	39		W			
665	664.3	15.0								664.3 **WEATHERED ROCK** (BIOTITE GNEISS)	15.0
	662.6	16.7	100/0.5			100/0.5					
660	659.3	20.0								659.3 **RESIDUAL** TAN BROWN, SILTY FINE TO COARSE SAND, TRACE OF MICA	20.0
	657.6	21.7	23	23	29	52		M			
655											
	652.6	26.7	21	25	34	59		M		650.8	28.5
650										**WEATHERED ROCK**	
	648.6	30.7	60/0.0			60/0.0	RS-11			648.6 (BIOTITE GNEISS) **CRYSTALLINE ROCK** GRAY PINK, BIOTITE GNEISS, HARD, FRESH TO SLIGHTLY WEATHERED, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 2 JOINTS AT 5°-10° 6 JOINTS AT 20°-30° 6 JOINTS AT 40°-50° 1 JOINT AT 60° REC = 99% RQD = 94% GSI = 90-95	30.7
645											
640											
635											
630	626.2	53.1								626.2 Boring Terminated at Elevation 626.2 ft In Crystalline Rock	53.1

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B6-A	**STATION** 473+91	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 679.3 ft	**TOTAL DEPTH** 53.1 ft	**NORTHING** 680,889	**EASTING** 1,422,469	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 05/31/18	**COMP. DATE** 06/01/18	**SURFACE WATER DEPTH** 79.7ft	
CORE SIZE NQ	**TOTAL RUN** 22.4 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)
648.6											Begin Coring @ 30.7 ft	
	648.6	30.7	2.4	N=60/0.0 01:00/0.4	(2.2) 92%	(2.2) 92%		(22.1) 99%	(21.0) 94%		648.6 **CRYSTALLINE ROCK**	30.7
	646.2	33.1		04:00							GRAY PINK, BIOTITE GNEISS, HARD, FRESH TO SLIGHTLY WEATHERED, MODERATELY CLOSE TO CLOSE FRACTURE SPACING 2 JOINTS AT 5°-10° 6 JOINTS AT 20°-30° 6 JOINTS AT 40°-50° 1 JOINT AT 60° GSI = 90-95	
645			5.0	04:00	(5.0) 100%	(5.0) 100%						
				03:00			RS-11					
				03:15								
				02:45								
	641.2	38.1		02:15								
640				02:30								
			5.0	03:00	(5.0) 100%	(4.3) 86%						
				03:00								
				03:15								
				04:45								
	636.2	43.1		05:30								
635			5.0	07:30	(5.0) 100%	(4.9) 98%						
				10:00								
				18:00								
				06:15/0.1								
	631.2	48.1		04:00								
630				05:30/0.9								
			5.0	06:45	(4.9) 98%	(4.6) 92%						
				08:00								
				06:30								
				07:00								
	626.2	53.1		08:15							626.2 Boring Terminated at Elevation 626.2 ft In Crystalline Rock	53.1

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B6-B	**STATION** 473+90	**OFFSET** 23 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 681.5 ft	**TOTAL DEPTH** 65.3 ft	**NORTHING** 680,849	**EASTING** 1,422,477	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/30/18	**COMP. DATE** 05/31/18	**SURFACE WATER DEPTH** 77.5ft	

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)
	681.5	0.0	WOR	WOR	WOR	0		Sat.		GROUND SURFACE	0.0
										ALLUVIAL DARK GRAY, SANDY SILT	
	676.8	4.7	14	11	30	41		Sat.			4.7
										RESIDUAL GRAY TAN, SILTY FINE TO COARSE SAND	
	672.8	8.7	9	16	10	26		W		673.5	8.0
										BROWN, SILTY FINE TO COARSE SAND, TRACE OF MICA	
	667.8	13.7	18	32	38	70		W			
	662.8	18.7	26	19	15	34		M			
	657.8	23.7	7	10	11	21		M			
	654.5	27.0								**WEATHERED ROCK** (BIOTITE GNEISS)	
	652.8	28.7	100/0.4			100/0.4					
	647.8	33.7	100/0.3			100/0.3					
	642.8	38.7	100/0.2			100/0.2					
	640.6	40.9	60/0.0			60/0.0	RS-12			640.6	40.9
										CRYSTALLINE ROCK DARK GRAY AND PINK, BIOTITE GNEISS, VERY HARD, FRESHLY WEATHERED, VERY WIDE FRACTURE SPACING 1 JOINT AT 10° REC = 98% RQD = 98% GSI = 95-100	
	616.2	65.3									
										Boring Terminated at Elevation 616.2 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B6-B	**STATION** 473+90	**OFFSET** 23 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 681.5 ft	**TOTAL DEPTH** 65.3 ft	**NORTHING** 680,849	**EASTING** 1,422,477	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Williams, T. J.	**START DATE** 05/30/18	**COMP. DATE** 05/31/18	**SURFACE WATER DEPTH** 77.5ft	
CORE SIZE NQ	**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)
640.6											Begin Coring @ 40.9 ft	
640	640.6	40.9	4.4	*N=60/0.0* 03:30/1.4 03:45 04:15 03:45	(4.4) 100%	(4.4) 100%		(24.0) 98%	(24.0) 98%		640.6 **CRYSTALLINE ROCK** DARK GRAY AND PINK, BIOTITE GNEISS, VERY HARD, FRESHLY WEATHERED, VERY WIDE FRACTURE SPACING 1 JOINT AT 10° GSI = 95-100	40.9
	636.2	45.3	5.0	04:00 04:30 04:30 06:00 06:30	(5.0) 100%	(5.0) 100%						
635	631.2	50.3	5.0	09:00 11:00 13:00 12:30 18:30	(4.8) 96%	(4.8) 96%	RS-12					
630	626.2	55.3										
	625.9	55.6	0.3	35:45/0.3	(0.3) 100%	(0.3) 100%						
625			4.7	02:00/0.7 03:00 04:00 03:30 04:15	(4.7) 100%	(4.7) 100%						
	621.2	60.3	5.0	05:00 05:30 06:30 08:15 10:15	(4.8) 96%	(4.8) 96%						
620	616.2	65.3									616.2 Boring Terminated at Elevation 616.2 ft In Crystalline Rock	65.3

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B7-A	**STATION** 475+24	**OFFSET** 62 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 702.7 ft	**TOTAL DEPTH** 62.1 ft	**NORTHING** 680,918	**EASTING** 1,422,598	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 06/05/18	**COMP. DATE** 06/06/18	**SURFACE WATER DEPTH** 55.6ft	

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)
705											
	702.7	0.0	WOR	WOR	WOR	0		Sat.		702.7 GROUND SURFACE	0.0
700										**ALLUVIAL** BROWN TAN, FINE SANDY SILT, TRACE OF MICA	
	698.2	4.5	WOH	1	1	2		Sat.			
695											
	693.2	9.5	WOH	WOH	WOH	0		Sat.			
690											
	688.2	14.5	1	1	3	4		Sat.			
685											
	683.7	19.0	37	7	8	15		Sat.			
680										679.7	23.0
	678.2	24.5								**WEATHERED ROCK** (BIOTITE GNEISS)	
	677.0	25.7	100/0.2			100/0.2				677.0	25.7
675			60/0.0			60/0.0				**CRYSTALLINE ROCK** GRAY WHITE, BIOTITE GNEISS, MODERATELY HARD TO SOFT, SLIGHTLY TO VERY SEVERELY WEATHERED, VERY CLOSE TO CLOSE FRACTURE SPACING 81 JOINTS AT 0°-15° 11 JOINTS AT 30°-45° 1 JOINT AT 70° REC = 72% RQD = 32% GSI = 65-70	
670											
665							RS-13				
660											
655											
650											
645										640.6	62.1
										Boring Terminated at Elevation 640.6 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B7-A	**STATION** 475+24	**OFFSET** 62 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 702.7 ft	**TOTAL DEPTH** 62.1 ft	**NORTHING** 680,918	**EASTING** 1,422,598	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 06/05/18	**COMP. DATE** 06/06/18	**SURFACE WATER DEPTH** 55.6ft	
CORE SIZE NQ	**TOTAL RUN** 36.4 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)
677											Begin Coring @ 25.7 ft	
	677.0	25.7	1.4	01:15/1.4	(0.4)	(0.0)		(26.3)	(11.5)		677.0 **CRYSTALLINE ROCK**	25.7
675	675.6	27.1	5.0	N=60/0.0	29%	0%		72%	32%		GRAY WHITE, BIOTITE GNEISS, MODERATELY HARD TO SOFT, SLIGHTLY TO VERY SEVERELY WEATHERED, VERY CLOSE TO CLOSE FRACTURE SPACING 81 JOINTS AT 0°-15° 11 JOINTS AT 30°-45° 1 JOINT AT 70° GSI = 65-70	
				01:15/1.4								
				02:00	(2.1)	(0.4)						
				02:00	42%	8%						
				02:30								
				02:15								
670	670.6	32.1		01:30								
			5.0	03:30	(2.3)	(1.1)						
				03:00	46%	22%						
				03:00								
				02:00								
665	665.6	37.1		01:45								
			5.0	02:00	(3.4)	(0.8)	RS-13					
				02:15	68%	16%						
				02:30								
				02:00								
660	660.6	42.1		02:00								
			5.0	02:30	(4.0)	(2.1)						
				02:00	80%	42%						
				02:00								
				01:45								
655	655.6	47.1		02:00								
			5.0	03:45	(5.0)	(1.6)						
				04:00	100%	32%						
				04:00								
				03:30								
650	650.6	52.1		03:30								
			5.0	03:30	(4.9)	(3.4)						
				05:00	98%	68%						
				04:00								
				03:45								
645	645.6	57.1		05:00								
			5.0	03:15	(4.2)	(2.1)						
				03:15	84%	42%						
				03:00								
				03:15								
	640.6	62.1		03:15							640.6	62.1
											Boring Terminated at Elevation 640.6 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B7-B	**STATION** 475+25	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 703.6 ft	**TOTAL DEPTH** 29.6 ft	**NORTHING** 680,881	**EASTING** 1,422,608	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER White, J.	**START DATE** 06/04/18	**COMP. DATE** 06/05/18	**SURFACE WATER DEPTH** 55.0ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
705										ELEV. (ft) DEPTH (ft)
	703.6	0.0	WOR	WOR	WOR	0		Sat.		703.6 GROUND SURFACE 0.0
700										**ALLUVIAL** BROWN TAN, FINE SANDY SILT, TRACE OF MICA
	698.5	5.1	WOR	WOR	WOR	0		Sat.		
695										
	693.5	10.1	WOR	WOH	WOH	0		Sat.		
690										
	688.5	15.1	WOH	1	1	2		Sat.		
685										
	683.5	20.1	30	16	39	55		W		683.6 20.0
680										**RESIDUAL** 681.6 BROWN TAN, SILTY FINE TO COARSE SAND, TRACE GRAVEL 22.0
	678.5	25.1	100/0.3			100/0.3				**WEATHERED ROCK** (BIOTITE GNEISS)
675										
	674.2	29.4	60/0.0			60/0.0				674.2 29.4
										674.0 29.6 **CRYSTALLINE ROCK** (BIOTITE GNEISS)
										Boring Terminated at Elevation 674.0 ft In Crystalline Rock
										Terminated at 29.6 feet - sheared core bit (only cored 0.2 feet) and moved over to B7-B (1)

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B7-B (1)	**STATION** 475+23	**OFFSET** 29 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 703.7 ft	**TOTAL DEPTH** 66.9 ft	**NORTHING** 680,886	**EASTING** 1,422,605	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 06/05/18	**COMP. DATE** 06/05/18	**SURFACE WATER DEPTH** 54.9ft	

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)
705										703.7 GROUND SURFACE	0.0
										ALLUVIAL BROWN TAN, FINE SANDY SILT, TRACE OF MICA	
700											
695											
690											
685										683.7	20.0
										681.7 **RESIDUAL** BROWN TAN, SILTY FINE TO COARSE SAND, TRACE GRAVEL	22.0
680										**WEATHERED ROCK** (BIOTITE GNEISS)	
675											
	673.4	30.3	100/0.3			100/0.3					
670											
	668.4	35.3	60/0.1			60/0.1				668.4	35.3
665										668.3 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	35.4
660										**CRYSTALLINE ROCK** GRAY WHITE BLACK, BIOTITE GNEISS, MODERATELY HARD TO SOFT, VERY SLIGHTLY TO VERY SEVERELY WEATHERED, VERY CLOSE TO CLOSE FRACTURE SPACING 27 JOINTS AT 0°-20° 39 JOINTS AT 40°-50° 2 JOINTS AT 70°	
655										REC = 71% RQD = 38% GSI = 65-75	
650							RS-14				
645											
640										636.8	66.9
										Boring Terminated at Elevation 636.8 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B7-B (1)	**STATION** 475+23	**OFFSET** 29 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 703.7 ft	**TOTAL DEPTH** 66.9 ft	**NORTHING** 680,886	**EASTING** 1,422,605	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 06/05/18	**COMP. DATE** 06/05/18	**SURFACE WATER DEPTH** 54.9ft	
CORE SIZE NQ	**TOTAL RUN** 31.5 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)
668.3											Begin Coring @ 35.4 ft	
	668.3	35.4	2.5	04:15	(1.5)	(0.5)		(22.3)	(11.9)		668.3 **CRYSTALLINE ROCK**	35.4
	665.8	37.9		01:45	60%	20%		71%	38%		GRAY WHITE BLACK, BIOTITE GNEISS, MODERATELY HARD TO SOFT, VERY SLIGHTLY TO VERY SEVERELY WEATHERED, VERY CLOSE TO CLOSE FRACTURE SPACING 27 JOINTS AT 0°-20° 39 JOINTS AT 40°-50° 2 JOINTS AT 70°	
665			5.0	01:00/0.5 03:00	(0.6)	(0.0)					GSI = 65-75	
				02:15	12%	0%						
				02:45								
				03:15								
	660.8	42.9		02:00								
660			5.0	02:00	(3.2)	(0.0)						
				02:15	64%	0%						
				02:15								
				02:45								
	655.8	47.9		02:45								
655			5.0	01:30	(3.7)	(1.9)						
				01:45	74%	38%						
				02:00								
				02:00								
	650.8	52.9		02:15								
650			5.0	01:45	(5.0)	(3.6)	RS-14					
				01:45	100%	72%						
				02:45								
				01:45								
	645.8	57.9		02:00								
645			5.0	01:45	(4.3)	(2.2)						
				02:30	86%	44%						
				02:45								
				03:00								
	640.8	62.9		03:00								
640			4.0	02:30	(4.0)	(3.7)						
				02:45	100%	93%						
				02:45								
				03:15								
	636.8	66.9									636.8	66.9
											Boring Terminated at Elevation 636.8 ft In Crystalline Rock	

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B8-A	**STATION** 476+52	**OFFSET** 67 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 709.1 ft	**TOTAL DEPTH** 60.3 ft	**NORTHING** 680,953	**EASTING** 1,422,722	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/26/18	**COMP. DATE** 04/26/18	**SURFACE WATER DEPTH** 50.0ft	

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)
710											
	709.1	0.0								709.1 GROUND SURFACE	0.0
			WOH	2	2	4		Sat.		**ALLUVIAL** BROWN TAN, SANDY SILT, TRACE OF MICA, TRACE ORGANIC MATTER (WOOD) AT 3 FEET	
	706.7	2.4	3	2	1	3		Sat.			
705											
	701.7	7.4	1	WOH	1	1		Sat.			
700										699.1	10.0
	696.7	12.4	2	3	4	7		W		**RESIDUAL** TAN, FINE SANDY SILT, TRACE OF MICA	
695											
	691.7	17.4	2	2	8	10		W		689.1	20.0
690										**WEATHERED ROCK** (BIOTITE GNEISS)	
	686.7	22.4	30	70/0.4		100/0.9					
685											
	681.7	27.4	55	45/0.2		100/0.7					
680											
	676.7	32.4	100/0.4			100/0.4				675.2	33.9
675	675.2	33.9	60/0.0			60/0.0				**CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY HARD, FRESHLY WEATHERED, MODERATELY CLOSE FRACTURE SPACING	
										REC = 95% RQD = 95% GSI = 95-100	673.0 36.1
670										**CRYSTALLINE ROCK** BROWN GRAY, BIOTITE GNEISS, MEDIUM HARD TO HARD, MODERATELY WEATHERED, CLOSE FRACTURE SPACING 8 JOINTS AT 10°-20° 9 JOINTS AT 30° 11 JOINTS AT 45°	665.4 43.7
665										REC = 71% RQD = 26% GSI = 60-75	
660							RS-15			**CRYSTALLINE ROCK** DARK GRAY AND WHITE, BIOTITE GNEISS, VERY HARD, FRESH TO VERY SLIGHTLY WEATHERED, WIDE TO MODERATELY CLOSE FRACTURE SPACING 8 JOINTS AT 10°-20° 3 JOINTS AT 30° NEAR VERTICAL JOINT FROM 46.7 TO 47.1 FEET	648.8 60.3
655										REC = 96% RQD = 95% GSI = 75-90	
650										Boring Terminated at Elevation 648.8 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B8-A	**STATION** 476+52	**OFFSET** 67 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 709.1 ft	**TOTAL DEPTH** 60.3 ft	**NORTHING** 680,953	**EASTING** 1,422,722	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/26/18	**COMP. DATE** 04/26/18	**SURFACE WATER DEPTH** 50.0ft	
CORE SIZE NQ	**TOTAL RUN** 26.4 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)
675.2											Begin Coring @ 33.9 ft	
	675.2	33.9	1.4	*N=60/0.0* 01:15/0.4	(1.4) 100%	(1.4) 100%		(2.1) 95%	(2.1) 95%		675.2 **CRYSTALLINE ROCK** GRAY, BIOTITE GNEISS, VERY HARD, FRESHLY WEATHERED, MODERATELY CLOSE FRACTURE SPACING	33.9
	673.8	35.3	5.0	04:00							673.0 GSI = 95-100	36.1
670				02:30 02:15 01:45 01:45 01:45	(3.8) 76%	(1.9) 38%		(5.4) 71%	(2.0) 26%		**CRYSTALLINE ROCK** BROWN GRAY, BIOTITE GNEISS, MEDIUM HARD TO HARD, MODERATELY WEATHERED, CLOSE FRACTURE SPACING 8 JOINTS AT 10°-20° 9 JOINTS AT 30° 11 JOINTS AT 45°	
	668.8	40.3	5.0	01:15 01:15 02:00 02:30 04:00	(3.7) 74%	(2.2) 44%					665.4 GSI = 60-75	43.7
665								(15.9) 96%	(15.7) 95%			
	663.8	45.3	5.0	02:30 01:30 02:00 02:15 03:30	(5.0) 100%	(4.8) 96%					**CRYSTALLINE ROCK** DARK GRAY AND WHITE, BIOTITE GNEISS, VERY HARD, FRESH TO VERY SLIGHTLY WEATHERED, WIDE TO MODERATELY CLOSE FRACTURE SPACING 8 JOINTS AT 10°-20° 3 JOINTS AT 30° NEAR VERTICAL JOINT FROM 46.7 TO 47.1 FEET	
660	658.8	50.3					RS-15				GSI = 75-90	
			5.0	03:45 02:30 02:45 03:45 05:30	(4.8) 96%	(4.8) 96%						
655	653.8	55.3										
			5.0	04:15 03:45 03:30 05:00 04:30	(4.7) 94%	(4.7) 94%						
650	648.8	60.3									648.8 Boring Terminated at Elevation 648.8 ft In Crystalline Rock	60.3

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B8-B	**STATION** 476+46	**OFFSET** 16 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 720.3 ft	**TOTAL DEPTH** 65.7 ft	**NORTHING** 680,902	**EASTING** 1,422,728	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/25/18	**COMP. DATE** 04/25/18	**SURFACE WATER DEPTH** 38.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
725											
720	720.3	0.0	WOH	WOH	WOH	0		Sat.		720.3 GROUND SURFACE	0.0
	716.9	3.4								**ALLUVIAL** 718.3 BROWN, SILTY FINE TO COARSE SAND, TRACE OF MICA	2.0
715			1	1	3	4		Sat.		**ALLUVIAL** TAN BROWN, FINE SANDY SILT, TRACE OF MICA	
	711.9	8.4								713.3	7.0
710			1	2	2	4		Sat.		**ALLUVIAL** DARK BROWN, SILTY FINE SAND, TRACE ORGANIC MATTER (WOOD)	
	706.9	13.4								708.3	12.0
705			1	3	3	6		Sat.		**RESIDUAL** TAN, FINE SANDY SILT	
	701.9	18.4									
700			2	2	2	4		W			
	696.9	23.4								698.3	22.0
695			3	4	6	10		W		BROWN, FINE TO COARSE SAND	
	691.9	28.4								693.3	27.0
690			3	7	9	16		W		TAN, GRAVEL	
	686.9	33.4									
685			10	11	23	34		W			
	681.9	38.4	100/0.2			100/0.2				683.3	37.0
680										**WEATHERED ROCK** (BIOTITE GNEISS)	
	676.9	43.4	60/0.1			60/0.1	RS-16			676.9	43.4
675										676.8 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	43.5
670										**CRYSTALLINE ROCK** TAN GRAY, BIOTITE GNEISS, HARD TO MODERATELY HARD, VERY SLIGHTLY TO SLIGHTLY WEATHERED, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 23 JOINTS AT 10°-20° 13 JOINTS AT 30° 2 JOINTS AT 45° 2 JOINTS AT 60° REC = 95% RQD = 77% GSI = 75-90	
665											
660											
655										654.6	65.7
										Boring Terminated at Elevation 654.6 ft In Crystalline Rock	

NCDOT BORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Hayes, M. S.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. B8-B	**STATION** 476+46	**OFFSET** 16 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 720.3 ft	**TOTAL DEPTH** 65.7 ft	**NORTHING** 680,902	**EASTING** 1,422,728	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/25/18	**COMP. DATE** 04/25/18	**SURFACE WATER DEPTH** 38.6ft	
CORE SIZE NQ	**TOTAL RUN** 22.2 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
676.8											Begin Coring @ 43.5 ft	
675	676.8	43.5	2.2	01:30/1.2	(2.1)	(1.1)		(21.0)	(17.0)		676.8 **CRYSTALLINE ROCK**	43.5
	674.6	45.7		03:15	95%	50%		95%	77%		TAN GRAY, BIOTITE GNEISS, HARD TO MODERATELY HARD, VERY SLIGHTLY TO SLIGHTLY WEATHERED, CLOSE TO MODERATELY CLOSE FRACTURE SPACING 23 JOINTS AT 10°-20° 13 JOINTS AT 30° 2 JOINTS AT 45° 2 JOINTS AT 60° GSI = 75-90	
			5.0	02:45	(5.0)	(4.9)						
				03:45								
				01:30								
670				01:15	100%	98%	RS-16					
	669.6	50.7		01:00								
			5.0	01:45	(5.0)	(4.6)						
				01:15								
				01:45								
665				03:30	100%	92%						
	664.6	55.7		03:30								
			5.0	01:15	(4.2)	(3.3)						
				01:00								
				02:30								
660				02:00	84%	66%						
	659.6	60.7		02:45								
			5.0	02:15	(4.7)	(3.1)						
				02:15								
				01:30								
655				02:15	94%	62%						
	654.6	65.7		01:45							654.6 Boring Terminated at Elevation 654.6 ft In Crystalline Rock	65.7

NCDOT CORE DOUBLE R2307B_GEO_BRDG0380.GPJ NC_DOT.GDT 9/11/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 478+07	**OFFSET** 68 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 729.3 ft	**TOTAL DEPTH** 84.6 ft	**NORTHING** 680,990	**EASTING** 1,422,872	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Norwood, M. R.	**START DATE** 04/17/18	**COMP. DATE** 04/17/18	**SURFACE WATER DEPTH** 28.2ft

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)
730	729.3	0.0								GROUND SURFACE	0.0
			1	3	3	6		Sat.		**ROADWAY EMBANKMENT** BROWN SANDY SILT, TRACE OF MICA	
725	725.0	4.3								726.3 RED BROWN SILTY CLAY, TRACE OF MICA, TRACE OF GRAVEL	3.0
			5	5	4	9		W			
720	720.0	9.3								721.8 **RESIDUAL** BROWN CLAY, TRACE OF MICA	7.5
			2	2	3	5		W			
715	715.0	14.3								716.8 ORANGE BROWN SILT, TRACE OF MICA	12.5
			2	3	5	8		W			
710	710.0	19.3									
			2	2	3	5		W			
705	705.0	24.3								706.8 ORANGE BROWN SANDY SILT, TRACE OF MICA	22.5
			2	2	4	6		W			
700	700.0	29.3								701.8 BROWN COARSE SAND, TRACE OF MICA	27.5
			3	4	4	8		W			
695	694.8	34.5								696.8 BROWN SILTY FINE TO COARSE SAND, TRACE OF MICA	32.5
			4	4	6	10		M			
690	689.8	39.5									
			4	5	10	15		M			
685	684.8	44.5								686.8 BROWN SANDY SILT, TRACE OF MICA	42.5
			5	7	8	15		M			
680	679.8	49.5								681.8 BROWN SILTY FINE SAND, TRACE OF MICA	47.5
			7	11	16	27		M			
675	674.8	54.5									
			7	11	15	26		M			
670	669.8	59.5									
			14	25	38	63		M			
665	664.8	64.5									
			21	33	33	66		M			
660	659.8	69.5								661.8 **WEATHERED ROCK** (BIOTITE GNEISS)	67.5
			55	45/0.1		100/0.6					
655	654.8	74.5									
			52	48/0.1		100/0.6					
650											

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 478+07	**OFFSET** 68 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 729.3 ft	**TOTAL DEPTH** 84.6 ft	**NORTHING** 680,990	**EASTING** 1,422,872	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Norwood, M. R.	**START DATE** 04/17/18	**COMP. DATE** 04/17/18	**SURFACE WATER DEPTH** 28.2ft

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
650						Match Line				
	649.8	79.5	28	72/0.2		100/0.7				**WEATHERED ROCK** (BIOTITE GNEISS) *(continued)*
645	644.8	84.5	60/0.1			60/0.1				644.8 644.7 **CRYSTALLINE ROCK** (BIOTITE GNEISS) 84.5 84.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 644.7 ft In Crystalline Rock

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 477+92	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 748.1 ft	**TOTAL DEPTH** 93.1 ft	**NORTHING** 680,947	**EASTING** 1,422,867	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/18/18	**COMP. DATE** 04/18/18	**SURFACE WATER DEPTH** 9.8ft	

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)
750											
	748.1	0.0	2	4	3	7		Sat.		748.1 GROUND SURFACE	0.0
										747.1 **ROADWAY EMBANKMENT** RIP RAP	1.0
745	745.3	2.8	3	2	2	4		Sat.		RED BROWN SILTY CLAY, TRACE OF MICA	
740	740.3	7.8	3	3	3	6		Sat.			
735	735.3	12.8	2	100/0.5		100/0.5				734.8 BOULDER	13.3
										733.6 RED BROWN SILTY CLAY, TRACE OF MICA	14.5
730	730.1	18.0	4	4	8	12		M			
725	725.3	22.8	3	3	5	8		M			
720	720.3	27.8	5	8	6	14		M		722.1 GRAY SILTY FINE SAND, TRACE OF MICA	26.0
715	715.3	32.8	3	3	3	6		W		717.1 **RESIDUAL** ORANGE BROWN SANDY SILT, TRACE OF MICA	31.0
710	710.3	37.8	4	5	6	11		W			
705	705.3	42.8	2	3	4	7		W			
700	700.3	47.8	4	6	6	12		Sat.		702.1 BROWN COARSE SAND, TRACE OF MICA	46.0
695	695.3	52.8	11	14	14	28		M		698.1 BROWN SILTY FINE SAND, TRACE OF MICA	50.0
690	690.1	58.0	7	12	14	26		M			
685	685.1	63.0	11	16	21	37		M			
680	680.1	68.0	22	28	25	53		M			
675	675.1	73.0	45	55/0.2		100/0.7		M		677.1 **WEATHERED ROCK** (BIOTITE GNEISS)	71.0
670	670.1	78.0									

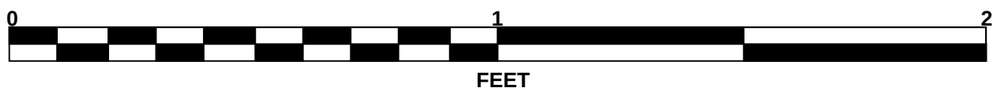
WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 477+92	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 748.1 ft	**TOTAL DEPTH** 93.1 ft	**NORTHING** 680,947	**EASTING** 1,422,867	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME2204 CME-45C 90% 07/31/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, M. R.	**START DATE** 04/18/18	**COMP. DATE** 04/18/18	**SURFACE WATER DEPTH** 9.8ft	

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
670						Match Line				
			80	20/0.1						**WEATHERED ROCK** (BIOTITE GNEISS) *(continued)*
665	665.1	83.0	100/0.2			100/0.6				
660	660.1	88.0	100/0.2			100/0.2				
655	655.1	93.0	60/0.1			100/0.2				655.1 93.0 655.0 **CRYSTALLINE ROCK** (BIOTITE GNEISS) 93.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 655.0 ft In Crystalline Rock
650						60/0.1				

CORE PHOTOGRAPHS

EB1-B

BOX 1: 43.0 - 67.9 FEET



CORE PHOTOGRAPHS

B1-A

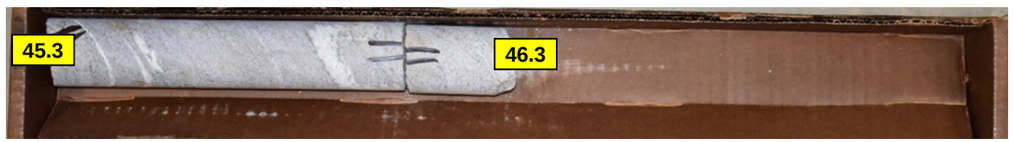
BOXES 1 & 2: 3.3 - 36.3 FEET

0 1 2

FEET

B1-A

BOXES 3 & 4: 36.3 - 46.3 FEET



0 1 2

FEET

CORE PHOTOGRAPHS

B1-B
BOXES 1 & 2: 43.4 - 68.4 FEET

0 1 2
FEET

B1-B
BOX 3: 68.4 - 73.4 FEET

0 1 2
FEET

CORE PHOTOGRAPHS

B2-A

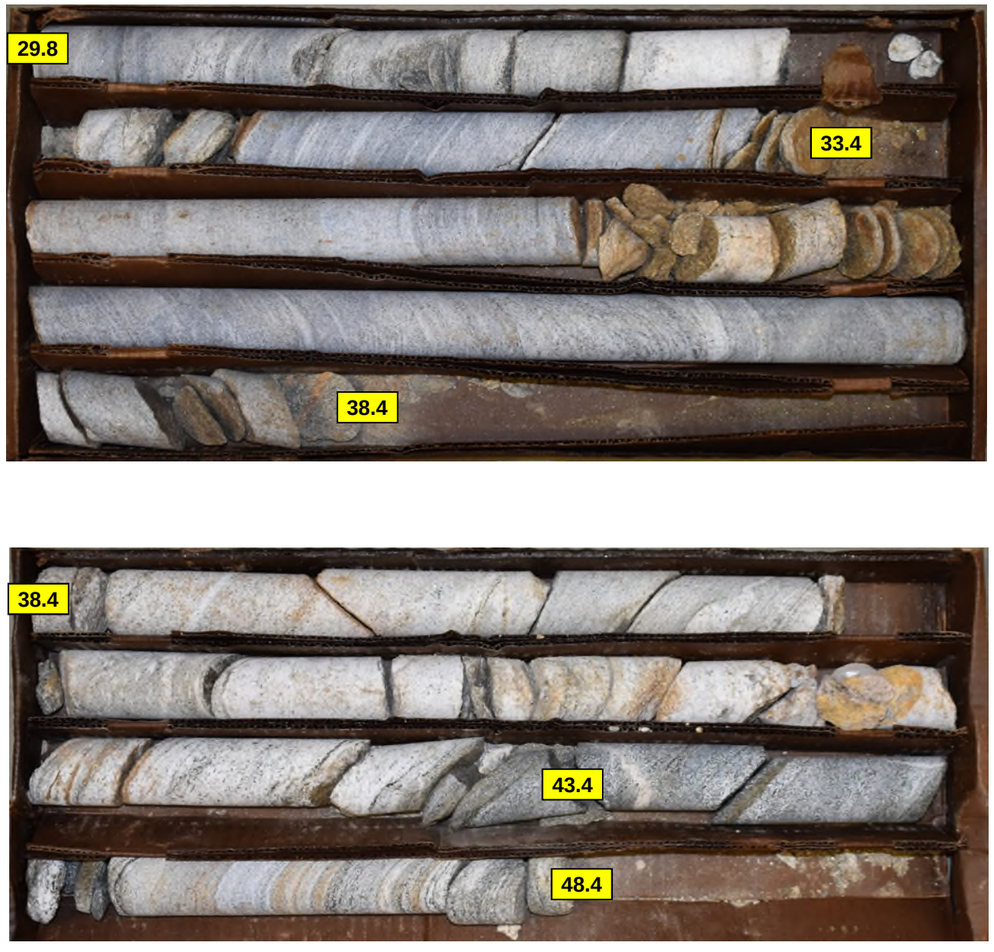
BOXES 1 & 2: 29.9 - 50.6 FEET

B2-A

BOX 3: 50.6 - 60.6 FEET

CORE PHOTOGRAPHS

B2-B
BOXES 1 & 2: 29.8 - 48.4 FEET



B2-B
BOXES 3 & 4: 48.4 - 63.6 FEET

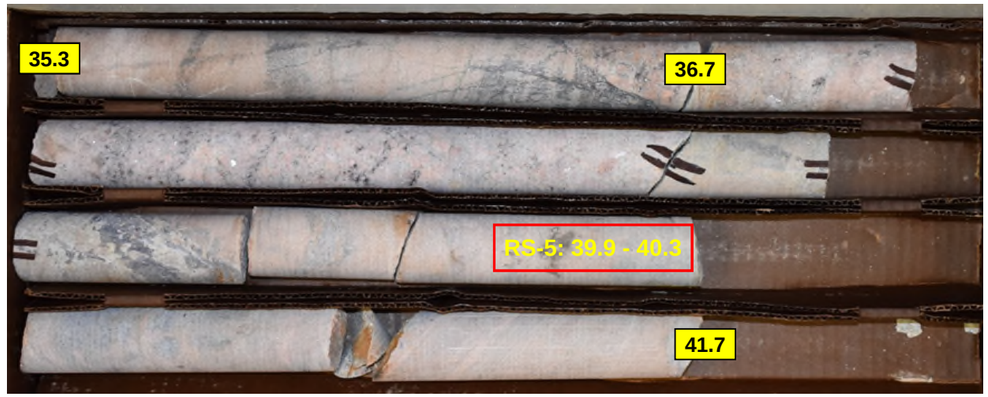
CORE PHOTOGRAPHS

B3-A

BOX 1: 28.3-35.3 FEET

CORE PHOTOGRAPHS

B3-A (1)
BOXES 1 & 2: 35.3-48.8 FEET



0 1 2
FEET

B3-A (1)
BOX 3: 48.8-56.7 FEET

0 1 2
FEET

CORE PHOTOGRAPHS

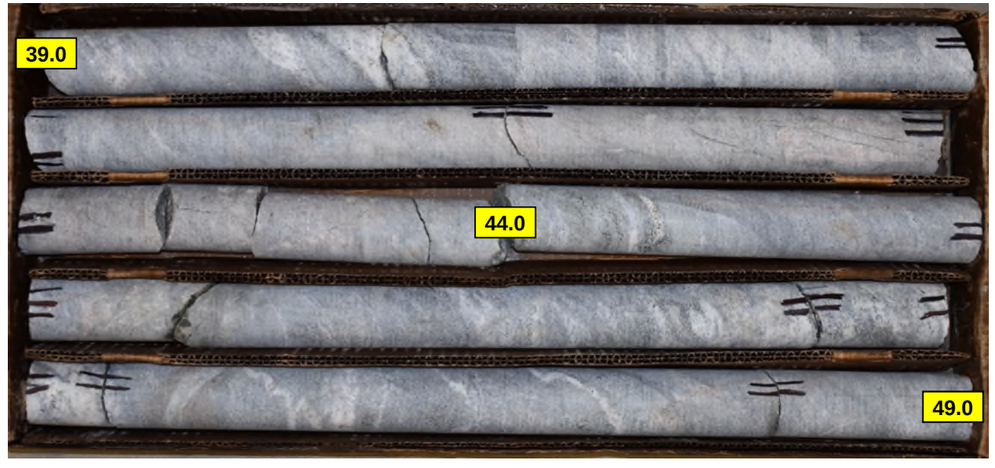
B3-B

BOXES 1 & 2: 21.6 - 34.0 FEET

0 1 2
FEET

B3-B

BOXES 3 & 4: 34.0 - 49.0 FEET

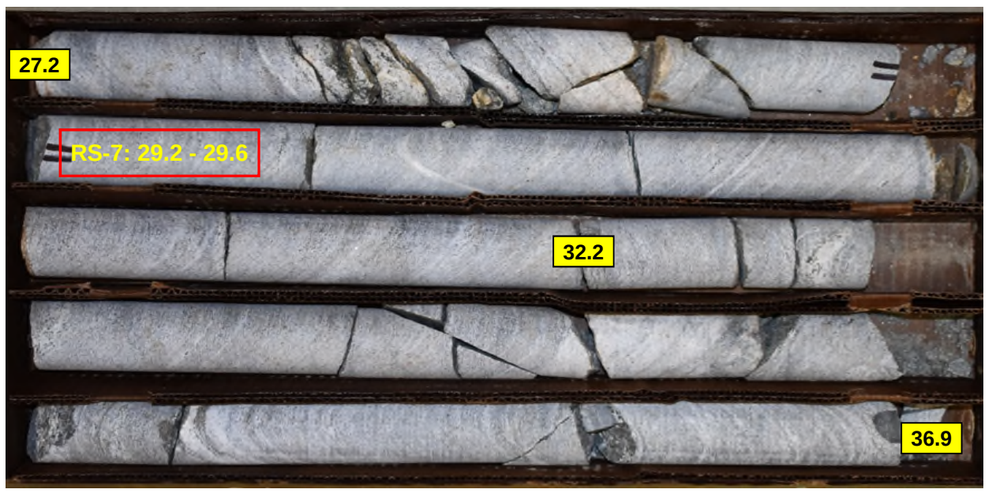


0 1 2
FEET

CORE PHOTOGRAPHS

B4-A

BOXES 1 & 2: 19.2 - 36.9 FEET



0 1 2

FEET

B4-A

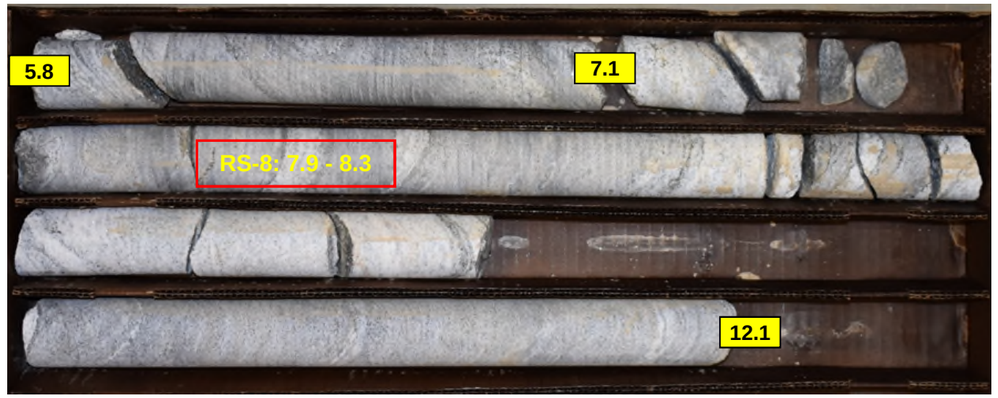
BOXES 3 & 4: 36.9 - 47.1 FEET

0 1 2

FEET

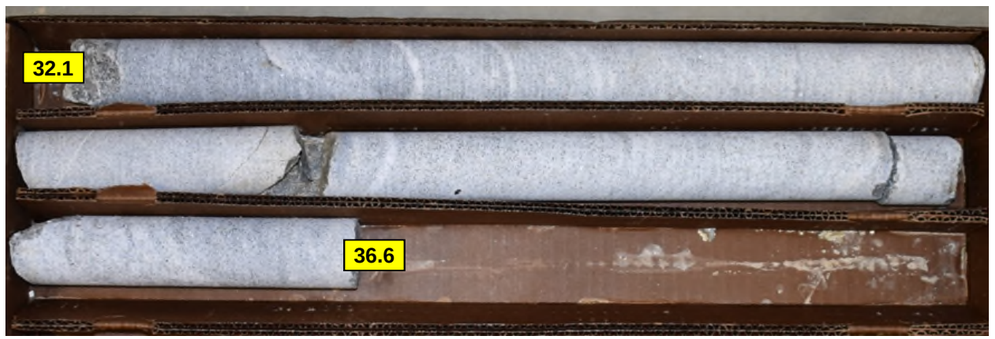
CORE PHOTOGRAPHS

B4-B
BOXES 1 & 2: 5.8 - 22.1 FEET



0 1 2
FEET

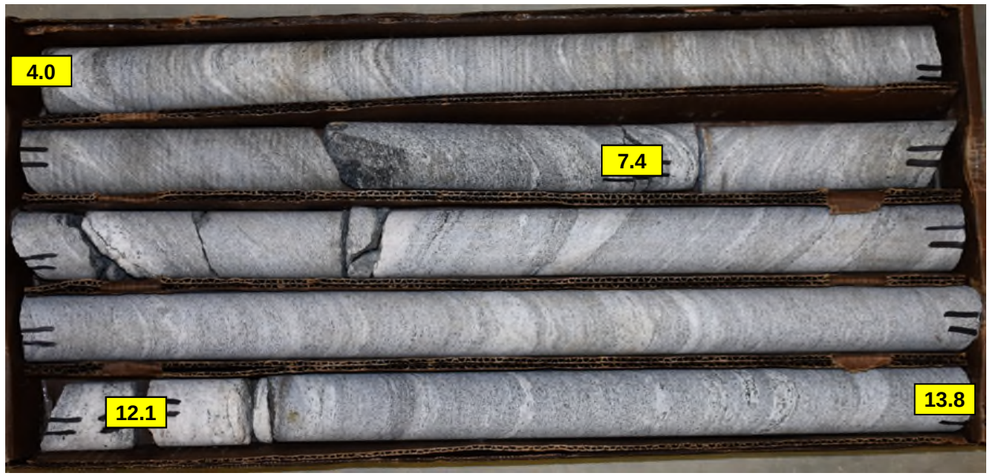
B4-B
BOXES 3 & 4: 22.1 - 36.6 FEET

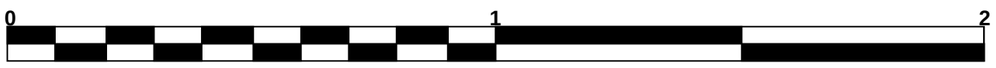


0 1 2
FEET

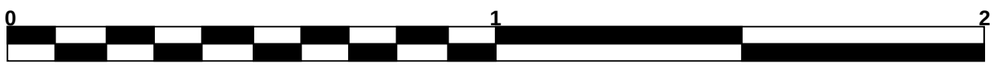
CORE PHOTOGRAPHS

B5-A
BOXES 1 & 2: 4.0 - 23.6 FEET





B5-A
BOX 3: 23.6 - 32.1 FEET



CORE PHOTOGRAPHS

B5-B

BOXES 1 & 2: 17.3 - 37.1 FEET

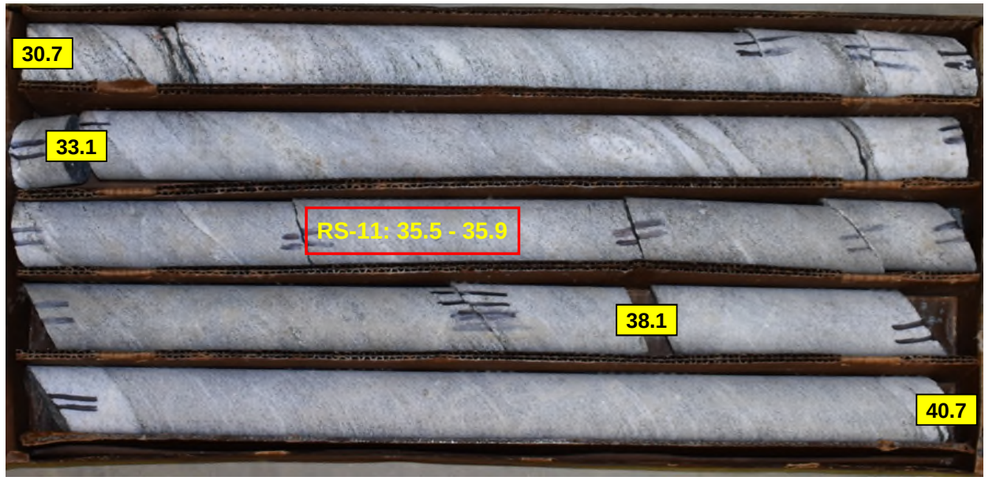
B5-B

BOX 3: 37.1 - 46.7 FEET

CORE PHOTOGRAPHS

B6-A

BOXES 1 & 2: 30.7 - 48.1 FEET



0 1 2

FEET

B6-A

BOX 3: 48.1 - 53.1 FEET

0 1 2

FEET

CORE PHOTOGRAPHS

B6-B

BOXES 1 & 2: 40.9 - 60.3 FEET

0 1 2

FEET

B6-B

BOX 3: 60.3 - 65.3 FEET

0 1 2

FEET

CORE PHOTOGRAPHS

B7-A

BOXES 1 & 2: 26.3 - 52.1 FEET

B7-A

BOX 3: 52.1 - 62.1 FEET

CORE PHOTOGRAPHS

B7-B (1)
BOXES 1 & 2: 35.4 - 62.9 FEET

0 1 2
FEET

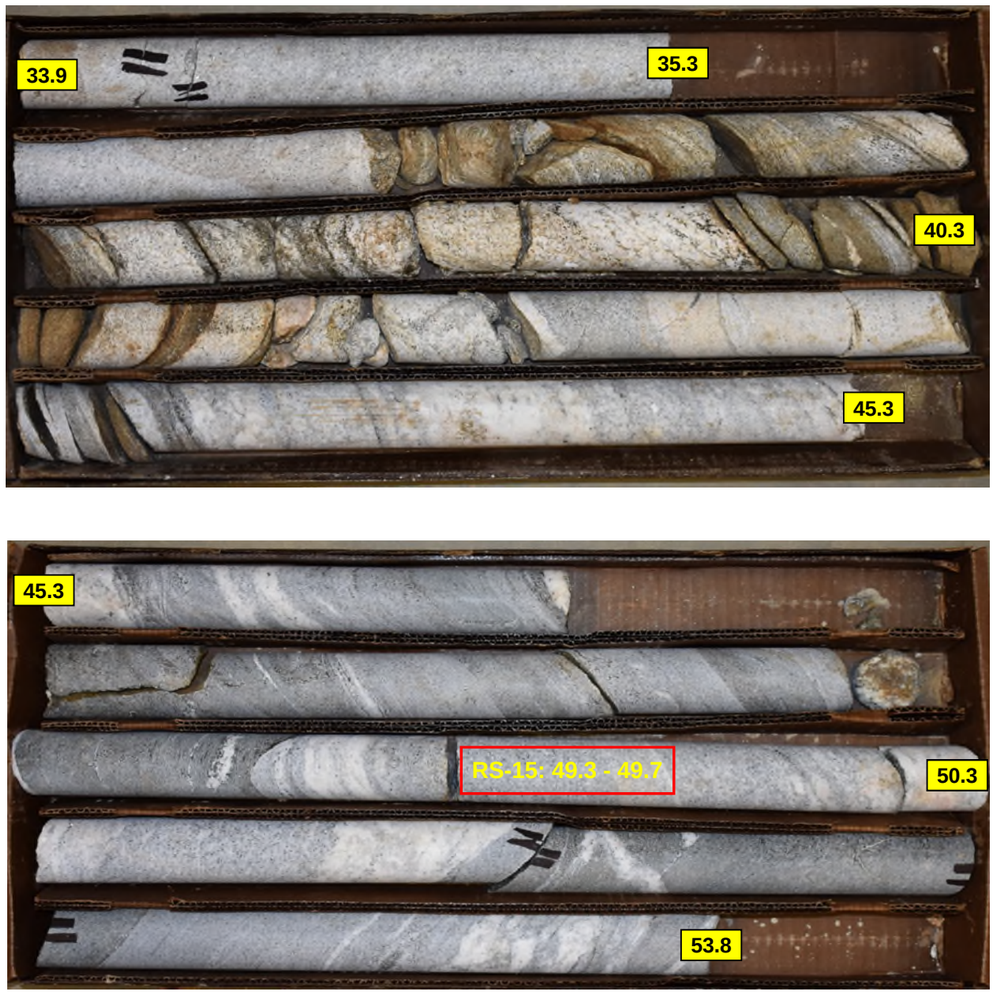
B7-B (1)
BOX 3: 62.9 - 66.9 FEET

0 1 2
FEET

CORE PHOTOGRAPHS

B8-A

BOXES 1 & 2: 33.9 - 53.8 FEET



B8-A

BOX 3: 53.8 - 60.3 FEET

CORE PHOTOGRAPHS

B8-B

BOXES 1 & 2: 43.5 - 61.7 FEET

0 1 2

FEET

B8-B

BOX 3: 61.7 - 67.7 FEET

0 1 2

FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_47894	**STATION** 478+94	**OFFSET** 62 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 733.0 ft	**TOTAL DEPTH** 48.9 ft	**NORTHING** 681,004	**EASTING** 1,422,958	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/29/18	**COMP. DATE** 03/29/18	**SURFACE WATER DEPTH** 23.6ft	

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)
735										
	733.0	0.0	3	6	1	7				733.0 GROUND SURFACE 0.0 732.0 **ROADWAY EMBANKMENT** 1.0 RIP RAP GRAY RED, MEDIUM STIFF, SANDY CLAY, TRACE OF MICA
730										
725	725.6	7.4	2	3	4	7	SS-134	M		
720	720.6	12.4	2	2	5	7		M		
715	715.6	17.4	2	2	3	5	SS-136	M		717.0 16.0 **RESIDUAL** BROWN GRAY, MEDIUM STIFF, SANDY CLAY
710	710.6	22.4	4	8	10	18		M		712.0 21.0 BROWN TAN, VERY STIFF TO STIFF, SANDY CLAY, TRACE OF MICA
705	705.6	27.4	3	4	5	9		M		
700	700.6	32.4	3	3	3	6		M		702.0 31.0 BROWN TAN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA
695	695.6	37.4	4	5	5	10		W		697.0 36.0 BROWN, LOOSE, SILTY COARSE SAND, TRACE OF MICA
	692.7	40.3	69	27	15	42		W		693.5 39.5 BROWN, DENSE, SANDY GRAVEL
690										688.0 45.0 GRAY BROWN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA
685	685.6	47.4	8	8	9	17		M		684.1 48.9 Boring Terminated at Elevation 684.1 ft In Silty Sand

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Campos, L. A.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_47998	**STATION** 479+98	**OFFSET** 66 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 730.4 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 681,032	**EASTING** 1,423,058	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/29/18	**COMP. DATE** 03/29/18	**SURFACE WATER DEPTH** 26.2ft	

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
735										
730	730.4	0.0	1	1	2	3		W		730.4 GROUND SURFACE 0.0 **ALLUVIAL** RED BROWN, SOFT, CLAY, TRACE OF MICA
725	725.5	4.9	3	3	5	8		M		727.4 3.0 **ROADWAY EMBANKMENT** RED GRAY, MEDIUM STIFF, CLAY, TRACE OF MICA
720	720.5	9.9	2	2	5	7	SS-125	M		
715	715.5	14.9	2	2	4	6		M		717.4 13.0 **RESIDUAL** TAN RED BROWN, MEDIUM STIFF TO VERY STIFF, SANDY CLAY, TRACE OF MICA
710	710.5	19.9	5	9	11	20		M		
705	705.5	24.9	4	4	4	8	SS-128	M		
700	700.5	29.9	5	6	8	14		M		
695	695.5	34.9	13	13	8	21		W		697.4 33.0 BROWN GRAY, VERY STIFF, SANDY SILT, TRACE OF MICA
690	690.5	39.9	6	22	41	63		W		689.7 40.7 TAN GRAY, VERY DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA
	685.5	44.9	100/0.3			100/0.3		W		687.4 43.0 **WEATHERED ROCK** (BIOTITE GNEISS)
										685.2 45.2 Boring Terminated at Elevation 685.2 ft In Weathered Rock

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48108	**STATION** 481+08	**OFFSET** 60 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 737.1 ft	**TOTAL DEPTH** 52.8 ft	**NORTHING** 681,052	**EASTING** 1,423,167	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/28/18	**COMP. DATE** 03/28/18	**SURFACE WATER DEPTH** 19.6ft	

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))
740										
	737.1	0.0	2	1	2	3		Sat.		737.1 GROUND SURFACE 0.0
735										**ALLUVIAL** BROWN, VERY LOOSE, SILTY FINE SAND, TRACE OF MICA
	730.7	6.4	3	3	4	7	SS-113	W		733.1 4.0 **ROADWAY EMBANKMENT** GRAY, MEDIUM STIFF, SANDY CLAY, TRACE OF MICA
730										
	725.7	11.4	2	2	4	6		W		
725										
	720.7	16.4	5	8	11	19	SS-115	M		722.1 15.0 **RESIDUAL** RED BROWN VERY STIFF, CLAY, TRACE OF MICA
720										
	715.7	21.4	3	2	2	4		W		717.1 20.0 TAN BROWN, LOOSE TO MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA, TRACE OF ROCK FRAGMENTS
715										
	710.7	26.4	3	4	5	9		W		
710										
	705.7	31.4	2	2	3	5		W		
705										
	700.7	36.4	2	3	5	8		Sat.		
700										
	695.7	41.4	3	6	8	14		Sat.		
695										
	690.7	46.4	3	5	9	14		W		
690										
	685.7	51.4	11	22	78/0.4	100/0.9				687.1 50.0 **WEATHERED ROCK** (BIOTITE GNEISS) 684.3 52.8 Boring Terminated at Elevation 684.3 ft In Weathered Rock
685										

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48210	**STATION** 482+10	**OFFSET** 68 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 734.8 ft	**TOTAL DEPTH** 40.6 ft	**NORTHING** 681,083	**EASTING** 1,423,266	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/28/18	**COMP. DATE** 03/28/18	**SURFACE WATER DEPTH** 21.9ft	

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))
735										
	734.8	0.0	3	1	1	2		Sat.		734.8 GROUND SURFACE 0.0
730	730.7	4.1	5	7	10	17		W		733.5 **ALLUVIAL** BROWN, VERY SOFT, SANDY SILT, TRACE OF MICA 1.3
725	725.7	9.1	2	4	5	9	SS-105	W		731.8 3.0 **RESIDUAL** RED BROWN, VERY SOFT, CLAY, TRACE OF MICA
720	720.7	14.1	2	3	3	6		W		726.8 8.0 RED BROWN, VERY STIFF, SANDY SILT, TRACE OF MICA
715	715.7	19.1	3	2	3	5	SS-107	W		TAN ORANGE, STIFF TO MEDIUM STIFF, SILTY CLAY, TRACE OF MICA
710	710.7	24.1	3	4	3	7		W		716.8 18.0 TAN BROWN, LOOSE TO MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA
705	705.7	29.1	3	4	7	11		W		
700	700.7	34.1	3	5	6	11		W		696.8 38.0 GRAY BROWN, VERY DENSE, SILTY FINE SAND, TRACE OF MICA
695	695.7	39.1	16	25	33	58		W		694.2 40.6 Boring Terminated at Elevation 694.2 ft In Silty Sand

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48283	**STATION** 482+83	**OFFSET** 57 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 741.5 ft	**TOTAL DEPTH** 51.4 ft	**NORTHING** 681,087	**EASTING** 1,423,340	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/27/18	**COMP. DATE** 03/27/18	**SURFACE WATER DEPTH** 15.1ft	

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)
745											
	741.5	0.0	1	6	7	13		W		741.5 GROUND SURFACE	0.0
740										740.0 **ROADWAY EMBANKMENT** RIP RAP	1.5
	735.9	5.6	5	3	6	9	SS-93	W		**RESIDUAL** ORANGE BROWN, STIFF, SANDY SILT, TRACE OF MICA	
735											
	730.9	10.6	4	3	4	7		W			
730											
	725.9	15.6	1	1	2	3	SS-95	W		727.5 TAN BROWN, VERY LOOSE TO LOOSE, SILTY FINE SAND, TRACE OF MICA	14.0
725											
	720.9	20.6	2	1	2	3		W			
720											
	715.9	25.6	2	2	4	6		W			
715											
	710.9	30.6	2	2	3	5		W			
710											
	705.9	35.6	8	12	8	20		W		707.5 TAN BROWN, MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	34.0
705											
	700.9	40.6	5	13	13	26		W			
700											
	695.9	45.6	8	10	14	24		W		697.5 TAN BROWN, VERY STIFF, SANDY SILT, TRACE OF MICA	44.0
695											
	690.9	50.6	63	37/0.3		100/0.8				692.5 **WEATHERED ROCK** (BIOTITE GNEISS)	49.0
										690.1 Boring Terminated at Elevation 690.1 ft In Weathered Rock	51.4

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48377	**STATION** 483+77	**OFFSET** 62 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 745.5 ft	**TOTAL DEPTH** 48.9 ft	**NORTHING** 681,110	**EASTING** 1,423,433	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/27/18	**COMP. DATE** 03/27/18	**SURFACE WATER DEPTH** 11.1ft	

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										
	745.5	0.0	2	3	5	8	SS-81	W		745.5 GROUND SURFACE 0.0
745										**RESIDUAL** RED BROWN, MEDIUM STIFF, SILTY CLAY, TRACE OF MICA
	740.7	4.8	2	3	2	5		Sat.		742.0 ORANGE BROWN, LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA 3.5
740										
	735.7	9.8	2	1	1	2	SS-83	Sat.		737.0 TAN, VERY LOOSE TO LOOSE, SILTY FINE SAND, TRACE OF MICA 8.5
735										
	730.7	14.8	1	1	3	4		W		
730										
	725.7	19.8	2	1	2	3		W		
725										
	720.7	24.8	2	4	4	8		W		
720										
	715.7	29.8	2	4	4	8		W		
715										
	710.7	34.8	4	5	6	11		W		712.0 TAN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA 33.5
710										
	705.7	39.8	5	6	11	17		W		
705										
	700.7	44.8	19	23	77/0.4	100/0.9				702.0 **WEATHERED ROCK** (BIOTITE GNEISS) 43.5
700										
	696.6	48.9	60/0.0			60/0.0				696.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 696.6 ft On Crystalline Rock 48.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48504	**STATION** 485+04	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 751.8 ft	**TOTAL DEPTH** 56.7 ft	**NORTHING** 681,139	**EASTING** 1,423,558	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/26/18	**COMP. DATE** 03/27/18	**SURFACE WATER DEPTH** 4.8ft	

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)
755											
	751.8	0.0								751.8 GROUND SURFACE	0.0
750			2	2	3	5	SS-69	W		**RESIDUAL** RED BROWN, MEDIUM STIFF TO SOFT, SANDY SILT, TRACE OF MICA	
745	745.5	6.3	1	2	2	4		W		742.3 TAN, LOOSE, SILTY FINE SAND, TRACE OF MICA	9.5
740	740.5	11.3	2	3	3	6	SS-71	W		737.3 TAN, STIFF, SANDY SILT, TRACE OF MICA	14.5
735	735.5	16.3	3	5	6	11		W		732.3 TAN, LOOSE, SILTY FINE SAND, TRACE OF MICA	19.5
730	730.5	21.3	3	4	4	8		W			
725	725.5	26.3	2	3	5	8		W			
720	720.5	31.3	3	3	4	7		W		717.3 TAN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA	34.5
715	715.5	36.3	2	3	5	8		W		712.3 TAN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA	39.5
710	710.5	41.3	6	7	9	16		W			
705	705.5	46.3	7	7	8	15		W		702.3 **WEATHERED ROCK** (BIOTITE GNEISS)	49.5
700	700.5	51.3	20	79	21/0.1	100/0.6					
	695.5	56.3	100/0.4			100/0.4				695.1 Boring Terminated at Elevation 695.1 ft In Weathered Rock	56.7

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48582	**STATION** 485+82	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 755.2 ft	**TOTAL DEPTH** 51.6 ft	**NORTHING** 681,140	**EASTING** 1,423,638	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 85% 05/02/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 03/26/18	**COMP. DATE** 03/26/18	**SURFACE WATER DEPTH** 1.4ft	

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	
760											
	755.2	0.0								755.2 GROUND SURFACE	0.0
755			2	3	3	6		W		**RESIDUAL** ORANGE TAN, LOOSE, SILTY FINE SAND, TRACE OF MICA	
750	748.7	6.5	3	2	3	5	SS-59	W		745.2 ORANGE TAN, MEDIUM STIFF TO SOFT, SANDY SILT, TRACE OF MICA	10.0
745	743.7	11.5	1	2	2	4		Sat.			
740	738.7	16.5	2	2	3	5	SS-61	Sat.			
735	733.7	21.5	2	4	6	10		Sat.			
730	728.7	26.5	10	13	8	21		W		730.2 TAN BROWN, MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA, TRACE ROCK FRAGMENTS	25.0
725	723.7	31.5	3	4	5	9		W		725.2 TAN BROWN, STIFF, SANDY SILT, TRACE OF MICA	30.0
720	718.7	36.5	5	8	8	16		W		720.2 TAN BROWN, MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA	35.0
715	713.7	41.5	10	6	6	12		W			
710	708.7	46.5	100/0.3			100/0.3				710.2 **WEATHERED ROCK** (BIOTITE GNEISS)	45.0
705	703.7	51.5	60/0.1			60/0.1				703.7 / 703.6 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	51.5 / 51.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 703.6 ft In Crystalline Rock	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48700	**STATION** 487+00	**OFFSET** 31 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 762.4 ft	**TOTAL DEPTH** 59.2 ft	**NORTHING** 681,128	**EASTING** 1,423,760	**24 HR.** 5.5
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 04/10/18	**COMP. DATE** 04/10/18	**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))
765										
	762.4	0.0	1	1	4	5		M		762.4 GROUND SURFACE 0.0
										762.1 Topsoil 0.3
760	758.7	3.7	4	6	7	13	SS-144	M		**RESIDUAL** RED BROWN, MEDIUM STIFF TO STIFF, SILTY CLAY, TRACE OF MICA
755	753.7	8.7	2	1	2	3		Sat.		755.4 TAN ORANGE, SOFT, SANDY SILT, TRACE OF MICA 7.0
750	748.7	13.7	2	1	2	3	SS-146	Sat.		750.4 TAN, VERY LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA 12.0
745	743.7	18.7	2	1	2	3		Sat.		
740	738.7	23.7	2	2	3	5		Sat.		740.4 ORANGE BROWN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA 22.0
735	733.7	28.7	2	2	2	4		Sat.		735.4 TAN BROWN, LOOSE, SILTY FINE SAND, TRACE OF MICA 27.0
730	728.7	33.7	2	2	4	6		Sat.		
725	723.7	38.7	14	15	8	23		W		725.4 WHITE, MEDIUM DENSE, SILTY FINE TO COARSE SAND, TRACE OF MICA 37.0
720	718.7	43.7	12	14	11	25		W		718.0 BROWN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA 44.4
715	713.7	48.7	8	12	13	25		W		
710	708.7	53.7	7	7	15	22		W		
705	703.7	58.7	100/0.5			100/0.5				705.4 **WEATHERED ROCK** (BIOTITE GNEISS) 57.0
										703.2 Boring Terminated at Elevation 703.2 ft In Weathered Rock 59.2

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** CATAWBA	**GEOLOGIST** Williamson, J. R.	
SITE DESCRIPTION BRIDGE NO. 380 ON NC 150 OVER LAKE NORMAN				**GROUND WTR (ft)**
BORING NO. L_48786	**STATION** 487+86	**OFFSET** 33 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 761.8 ft	**TOTAL DEPTH** 39.5 ft	**NORTHING** 681,139	**EASTING** 1,423,846	**24 HR.** 5.1
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 04/10/18	**COMP. DATE** 04/10/18	**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
765										
	761.8	0.0	1	1	3	4		M		761.8 GROUND SURFACE 0.0
										761.5 Topsoil 0.3
760	758.3	3.5	3	4	3	7	SS-157	M		**RESIDUAL** RED BROWN, SOFT TO MEDIUM STIFF, SANDY CLAY, TRACE OF MICA
755	753.8	8.0	3	3	5	8		W		755.3 ORANGE BROWN, MEDIUM STIFF, SANDY SILT, TRACE OF MICA 6.5
750	748.8	13.0	2	1	2	3		Sat.		750.8 WHITE BROWN, VERY LOOSE TO LOOSE, SILTY FINE TO COARSE SAND, TRACE OF MICA 11.0
745	743.8	18.0	3	2	2	4	SS-160	Sat.		
740	738.8	23.0	3	2	2	4		Sat.		
735	733.8	28.0	2	2	3	5		Sat.		
730	728.8	33.0	7	10	9	19		W		730.8 BROWN, MEDIUM DENSE, SILTY FINE SAND, TRACE OF MICA 31.0
725	723.8	38.0	6	6	13	19		M		725.8 WHITE BROWN, VERY STIFF, SANDY SILT, TRACE OF MICA 36.0
										722.3 Boring Terminated at Elevation 722.3 ft In Sandy Silt 39.5

UNCONFINED COMPRESSION
(ASTM D7012 Method C)

S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: Bidge No. 380 on NC 150 Over Lake Norman
Project Number: 6235-18-001

July 13, 2018
Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in^2)	Unit Weight (lbs/ft^3)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B1-A	RS-1	33.5 - 33.85	4.12	1.86	A	2.72	175.0	90	45,024	16,553	0.0
B1-B	RS-2	58.45 - 58.8	4.14	1.86	B	2.72	160.2	63	5,834	2,145	0.2
B2-A	RS-3	36.4 - 36.75	4.20	1.87	A	2.75	159.2	95	36,992	13,452	0.2
B2-B	RS-4	53.9 - 54.25	4.23	1.87	A	2.75	169.1	99	44,117	16,043	0.1
B3-A	RS-5	39.95 - 40.3	4.16	1.87	A	2.75	165.1	97	40,624	14,772	0.2
B3-B	RS-6	24.5 - 24.85	4.20	1.86	A	2.72	172.5	96	43,992	16,174	0.1
B4-A	RS-7	29.25 - 29.6	4.17	1.86	A	2.72	168.7	92	55,664	20,465	0.1
B4-B	RS-8	7.9 - 8.25	4.30	1.86	B	2.72	167.5	95	56,963	20,942	0.0
B5-A	RS-9	13.85 - 14.2	4.26	1.86	A	2.72	172.6	96	50,651	18,622	0.0
B5-B	RS-10	22.15 - 22.5	4.26	1.86	A	2.72	167.1	97	43,469	15,981	0.1
B6-A	RS-11	35.55 - 35.9	4.26	1.87	A	2.75	169.6	91	40,998	14,908	0.0
B6-B	RS-12	50.3 - 50.65	4.15	1.87	A	2.75	163.7	92	79,820	29,025	0.1
B7-A	RS-13	37.9 - 38.25	4.13	1.86	A	2.72	169.2	105	36,683	13,486	0.0
B7-B	RS-14	53.1 - 53.45	4.22	1.86	A	2.72	171.9	93	52,766	19,399	0.0
B8-A	RS-15	49.3 - 49.65	4.14	1.87	A	2.75	165.5	96	63,660	23,149	0.1
B8-B	RS-16	48.7 - 49.05	4.30	1.87	A	2.75	164.9	95	55,070	20,025	0.1

NOTES:
Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08$^{\epsilon 1}$ *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

A	Test specimen measurements met the desired shape tolerances of ASTM D4543-08$^{\epsilon 1}$ (side straightness, end flatness & parallelism, and end perpendicularity to axis)
B	Test specimen measurements met the desired shape tolerances of ASTM D4543-08$^{\epsilon 1}$ for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
C	Test specimen measurements met the desired shape tolerances of ASTM D4543-08$^{\epsilon 1}$ for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
D	Test specimen measurements met the desired shape tolerances of ASTM D4543-08$^{\epsilon 1}$ for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
E	Test specimen measurements met the desired shape tolerances of ASTM D4543-08$^{\epsilon 1}$ for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

SUMMARY OF LABORATOTY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Charlotte, 9751 Southern Pine Blvd., Charlotte, NC 28273

S&ME Project No.:	6235-18-001	S&ME Project Name: Bridge No. 380 on NC 150 Over Lake Norman		Date Report:	8/13/2018
State Project No.:	37944.1.FR5	County: Catawba		Date Tested:	7/14-8/13/18
Federal ID No.:	NA	TIP No.: R-2307B			
Client Name:	NCDOT Geotechnical Engineering Unit	Client Address: Raleigh, NC			

Boring No.	Sample No.	Station #:	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
							10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay				
L_45782	SS-167	457+82	41 LT	L	8.7-10.2	A-2-4 (0)	99	77	58	27.0	24.7	41	34	17	8	39	0	NP	32.1
L_45782	SS-169	457+82	41 LT	L	18.7-20.2	A-2-4 (0)	100	94	73	26.9	22.3	27	51	15	7	37	0	NP	ND
L_45889	SS-4	458+89	60 LT	L	12-13.5	A-2-5 (0)	100	98	84	26.1	21.1	16	63	15	6	44	41	3	45.3
L_45889	SS-6	458+89	60 LT	L	22-23.5	A-2-4 (0)	99	71	55	20.1	16.0	44	40	12	4	26	0	NP	ND
L_45987	SS-10	459+87	37 LT	L	2.4-3.9	A-2-4 (0)	100	66	50	21.9	19.3	50	31	15	4	30	0	NP	28.9
L_45987	SS-13	459+87	37 LT	L	17.4-18.9	A-2-5 (0)	100	98	87	33.1	27.6	13	59	22	6	47	0	NP	ND
L_46073	SS-18	460+73	38 LT	L	5.9-7.4	A-2-4 (0)	100	84	69	31.8	26.8	31	42	17	10	35	0	NP	37.4
L_46073	SS-19	460+73	38 LT	L	11.1-12.6	A-2-4 (0)	100	83	64	23.0	18.5	36	46	15	4	31	0	NP	ND
L_46188	SS-28	461+88	54 LT	L	3.0-4.5	A-6 (7)	99	87	78	63.6	61.6	21	17	35	27	36	23	13	31.4
L_46188	SS-30	461+88	54 LT	L	13-14.5	A-5 (0)	100	100	93	43.0	35.3	7	58	25	10	45	40	5	ND
L_46281	SS-52	462+81	61 LT	L	9.7-11.2	A-7-6 (8)	100	88	79	56.7	53.5	21	26	13	40	44	26	18	24.2
L_46281	SS-55	462+81	61 LT	L	24.7-26.2	A-4 (1)	100	91	83	44.2	34.6	17	48	22	13	36	28	8	ND
L_46380	SS-41	463+80	60 LT	L	12.7-14.2	A-5 (2)	99	85	73	46.8	43.8	26	30	12	33	41	31	10	ND
L_46380	SS-42	463+80	60 LT	L	17.7-19.2	A-7-6 (10)	100	94	88	67.4	64.4	12	24	11	54	41	25	16	23.6
L_46483	SS-189	464+83	59 LT	L	3.7-5.2	A-7-6 (8)	99	86	77	55.2	51.7	22	26	18	34	46	27	19	22.6
L_46483	SS-191	464+83	59 LT	L	13.8-15.3	A-5 (0)	98	80	70	36.8	32.7	29	38	17	16	46	41	5	ND
L_47894	SS-134	478+94	62 LT	L	7.4-8.9	A-6 (2)	98	84	73	44.0	40.7	26	33	13	28	36	24	12	ND
L_47894	SS-136	478+94	62 LT	L	17.4-18.9	A-6 (9)	100	98	96	69.0	60.9	4	35	22	39	35	19	16	27.2
L_47998	SS-125	479+98	66 LT	L	9.9-11.4	A-7-5 (6)	100	88	77	50.5	47.0	23	30	13	34	52	36	16	32.6
L_47998	SS-128	479+98	66 LT	L	24.9-26.4	A-6 (1)	100	82	70	42.3	39.6	30	30	12	28	32	21	11	ND
L_48108	SS-113	481+08	60 LT	L	6.4-7.9	A-6 (3)	98	86	75	47.9	44.5	23	32	13	32	38	26	12	ND
L_48108	SS-115	481+08	60 LT	L	16.4-17.9	A-7-6 (12)	100	97	94	70.1	64.3	6	30	14	50	44	26	18	26.5
L_48210	SS-105	482+10	68 LT	L	9.1-10.6	A-7-5 (17)	100	100	100	87.6	80.3	0	20	36	45	51	36	15	42.9
L_48210	SS-107	482+10	68 LT	L	19.1-20.6	A-2-4 (0)	97	92	79	33.0	26.1	19	54	21	6	35	0	NP	ND
L_48283	SS-93	482+83	57 LT	L	5.6-7.1	A-4 (0)	100	90	80	38.6	33.6	20	46	17	17	37	36	1	32.2
L_48283	SS-95	482+83	57 LT	L	15.6-17.1	A-2-4 (0)	100	94	77	26.6	21.0	23	56	14	7	29	0	NP	ND
L_48377	SS-81	483+77	62 LT	L	0-1.5	A-7-5 (12)	99	89	82	62.8	60.5	17	22	8	54	53	33	20	28.5
L_48377	SS-83	483+77	62 LT	L	9.8-11.3	A-2-4 (0)	100	90	74	28.4	23.4	26	51	15	8	31	0	NP	ND
L_48504	SS-69	485+04	70 LT	L	0-1.5	A-4 (3)	100	97	90	55.9	52.0	10	38	17	36	38	30	8	28.0
L_48504	SS-71	485+04	70 LT	L	11.3-12.8	A-2-4 (0)	100	99	90	30.0	23.0	10	67	16	7	20	0	NP	ND
L_48582	SS-59	485+82	59 LT	L	6.5-8	A-2-4 (0)	100	96	82	32.2	26.7	18	55	20	7	30	0	NP	42.5
L_48582	SS-61	485+82	59 LT	L	16.5-18	A-4 (0)	97	81	70	42.1	38.1	28	33	22	17	28	0	NP	ND
L_48700	SS-144	487+00	31 LT	L	3.7-5.2	A-7-5 (8)	100	95	89	65.8	62.7	11	26	21	42	45	32	13	27.5
L_48700	SS-146	487+00	31 LT	L	13.7-15.2	A-2-4 (0)	99	81	63	26.7	21.4	36	42	16	6	29	0	NP	ND
L_48786	SS-157	487+86	33 LT	L	3.5-5	A-6 (5)	99	90	80	53.5	50.1	19	30	12	38	33	18	15	14.2
L_48786	SS-160	487+86	33 LT	L	18-19.5	A-2-4 (0)	100	94	80	30.6	24.0	20	56	19	5	24	0	NP	ND

References / Comments / Deviations: ND=Not Detemined. QNS=Quantity Not Sufficient

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

AASHTO T89: Determining the Liquid Limit of Soils

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

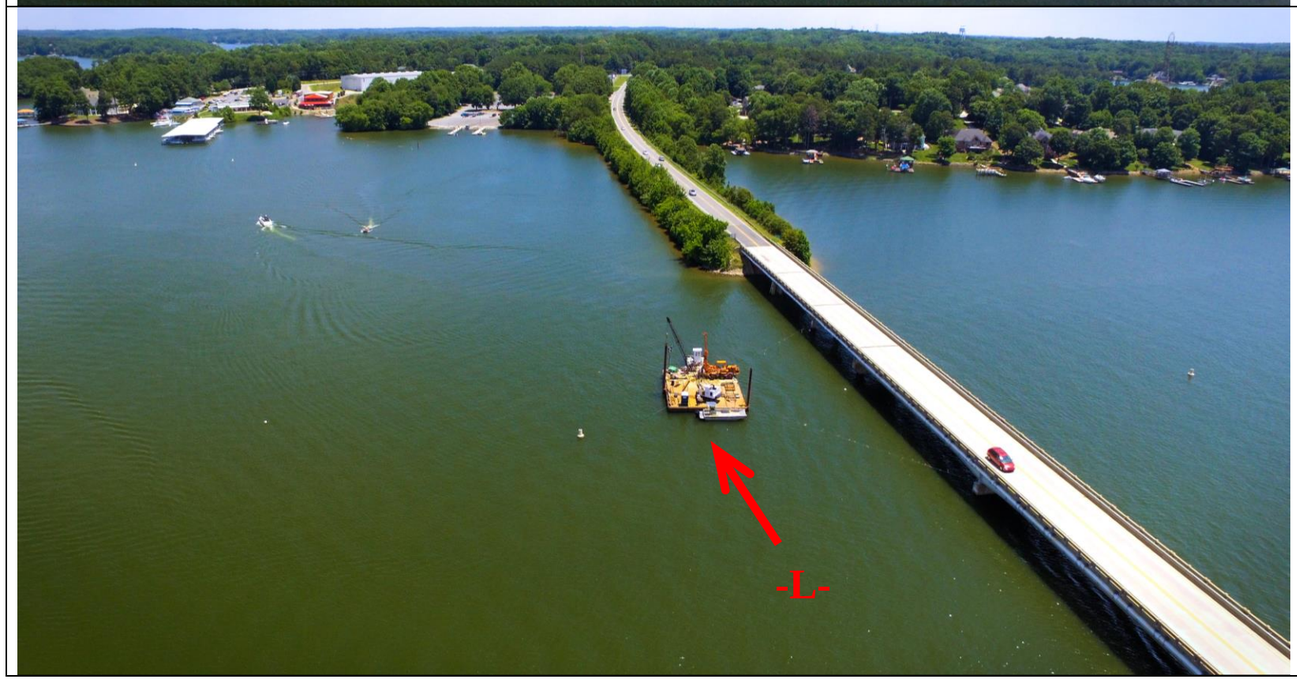
AASHTO T265: Laboratory Determination of Moisture Content of Soils

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

Karen Warner	Karen M Warner	NCDOT 118-06-0305	Luis Campos	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

SITE PHOTOGRAPHS

Bridge No. 380 on -L- (NC 150) over Lake Norman

	Looking southwest towards End Bent 1
	Looking east towards End Bent 2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5717	1	19

REFERENCE: I-5717

PROJECT: 50134

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *IREDELL*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 26 ON NC 150 OVER I-77 BETWEEN SR 1467 AND SR 1116*

SITE DESCRIPTION

CONTENTS

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.

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 THE 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.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. 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.

PERSONNEL

P.M. WEAVER

C.R. PASTRANA

B. LONG

Trigon Exploration

INVESTIGATED BY *ESP Associates, INC.*

DRAWN BY *C.R. PASTRANA*

CHECKED BY *P.M. WEAVER*

SUBMITTED BY *ESP Associates, INC.*

DATE *October 2018*

ESP

ESP ASSOCIATES, INC.
7011 ALBERT PICK RD
SUITE E
GREENSBORO, NC 27409
FIRM # C-0587
WWW.ESPASSOCIATES.COM

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

Digitally signed by: Paul M. Weaver
01847D1094AD49C...

10/31/2018

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5717	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 ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE 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, 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 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] B-57
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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: BY-114: N=676558.7031, E=1447294.8090

ELEVATION: 852.65 FEET

NOTES:

F.I.A.D. FILLED IN AFTER DRILLING

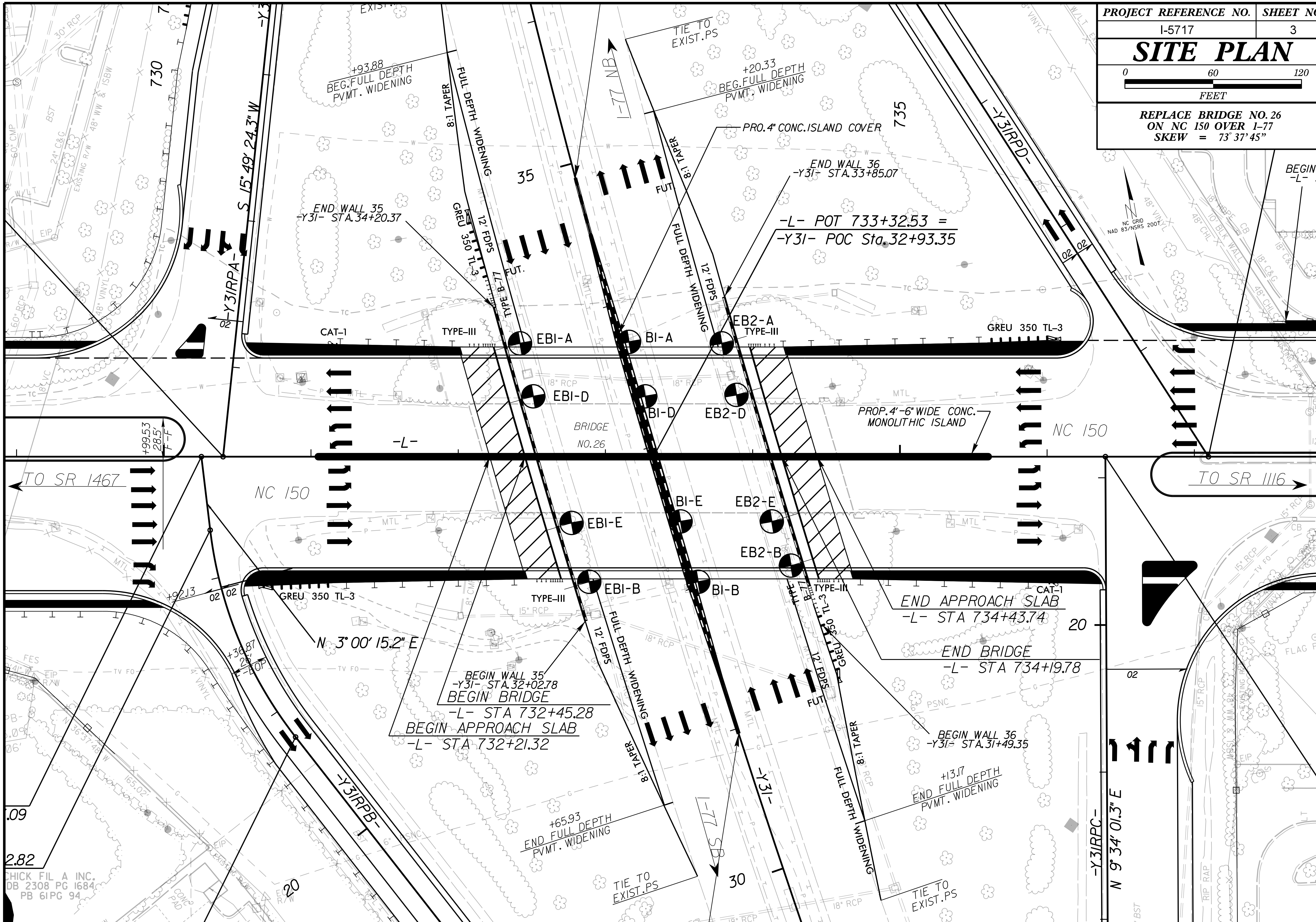
DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
I-5717	3

SITE PLAN

0 60 120
FEET

REPLACE BRIDGE NO. 26 ON NC 150 OVER I-77 SKEW = 73° 37' 45"



-L- POT 733+32.53 =
-Y31- POC Sta. 32+93.35
END WALL 35
-Y31- STA. 34+20.37
END WALL 36
-Y31- STA. 33+85.07
+93.88
BEG. FULL DEPTH
PVMT. WIDENING
+20.33
BEG. FULL DEPTH
PVMT. WIDENING
TIE TO
EXIST. PS
PRO. 4" CONC. ISLAND COVER
I-77 NB
I-77 SB
-Y31-
-Y31RPA-
-Y31RPB-
-Y31RPC-
-Y31RPD-
S 15° 49' 24.3" W
N 3° 00' 15.2" E
N 9° 34' 01.3" E
8:1 TAPER
FULL DEPTH WIDENING
12' FDPS
GREU 350 TL-3
TYPE B-77
TYPE-III
CAT-1
FUT.
EB1-A
B1-A
EB2-A
EB1-D
B1-D
EB2-D
EB1-E
B1-E
EB2-E
EB2-B
EB1-B
B1-B
BRIDGE
NO. 26
-L-
NC 150
TO SR 1467
TO SR 1116
PROP. 4'-6" WIDE CONC.
MONOLITHIC ISLAND
+99.53
28.5'
F-F
+92.13
+36.87
END APPROACH SLAB
-L- STA 734+43.74
END BRIDGE
-L- STA 734+19.78
BEGIN WALL 35
-Y31- STA. 32+02.78
BEGIN BRIDGE
-L- STA 732+45.28
BEGIN APPROACH SLAB
-L- STA 732+21.32
BEGIN WALL 36
-Y31- STA. 31+49.35
+65.93
END FULL DEPTH
PVMT. WIDENING
+13.17
END FULL DEPTH
PVMT. WIDENING
CHICK FIL A INC.
DB 2308 PG 1684
PB 61 PG 94
NC GRID
NAD 83/NSRS 2007
730
735
35
30
20

PROJECT REFERENCE NO.	SHEET NO.
I-5717	4

SECTION THROUGH END BENT 1
SKEW = 73° 37' 45"

0 20 40
FEET
VE = 1.0

-L- STA. 732+45.73

℄

EB1–A
732 + 42
77' LT

EB1–D
732 + 51
41' LT

EB1–E
732 + 77
45' RT

EB1–B
732 + 89
85' RT

EXISTING GROUND

Roadway Embankment: Reddish Brown, Stiff, Silty CLAY, Slightly Plastic, Moist

Residual: Tan-Brown to Brown, Loose, Silty Fine SAND, Micaceous, Moist

10/18 09/18 10/18 10/18

Residual: Brown to Tan-Brown to Dark Brown to Gray-Brown and White, Very Soft to Hard, Coarse to Fine Sandy SILT, Micaceous, Moist to Wet

Residual: Tan and Pink to Tan-Brown to Brown, Medium Dense, Silty Coarse to Fine SAND and Coarse SAND Trace Clay, Moist to Wet

Note: Large Weathered Feldspar Inclusions

Note: Relatively hard layer from 72.2' to 73.7' in EB1-D

Note: Intermittent Rock Fragments Below 76.3' in EB1-D

Note: Thin (0.5'' to 1.0' thick) Seams of A-1-b Material Below 62.0' in EB1-B

Residual: Brown and White, Dense, Silty Coarse to Fine SAND, Moist

Weathered Rock: GRANITIC ROCK

Weathered Rock: GRANITIC ROCK

Weathered Rock: GRANITIC ROCK

Crystalline Rock: GRANITIC ROCK

BT BT BT BT

(A) Residual: White and Dark Brown and Pink, Dense, Silty Coarse to Fine SAND, Micaceous, Moist

(B) Weathered Rock: GRANITIC ROCK

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 5/16/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION.

110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110

PROJECT REFERENCE NO.	SHEET NO.
I-5717	5

SECTION THROUGH BENT 1
SKEW = 73° 37' 45"

0 20 40
FEET
VE = 1.0

-L- STA. 733+32.53

℄

B1–A
733+16
78' LT

B1–D
733+27
41' LT

B1–E
733+51
44' RT

B1–B
733+63
85' RT

EXISTING GROUND (*SEE NOTE)

Residual: Dark Brown, SILT, Micaceous,
Soft to Stiff, Fine Sandy Moist
Residual: Brown to
Residual: Brown to Tan-Brown
10/18
Tan-Brown to Dark Brown, Loose to Medium Dense, Silty Coarse to Fine SAND, Dry to Wet
Note: Small to Large Weathered Feldspar Inclusions
to Dark Brown, Medium Stiff to Very Stiff, Coarse to Fine Sandy SILT, Micaceous, Moist to Wet
Note: Large Weathered Feldspar Inclusions
Residual: Brown to Tan Brown to
Note: Very Soft Zone from 56.4' to 58.1' in B1-D
Dark Brown, Medium Dense to Very Dense, Silty Coarse to Fine SAND, Micaceous,
Note: Large Weathered Feldspar Inclusions
Trace Rock Fragments, Moist to Dry
Note: Large Weathered Feldspar Inclusions and Small Quart Fragments
Residual: Brown to Sandy SILT, Micaceous, Moist
Dark Brown, Hard, Fine
Weathered Rock: GRANITIC ROCK
Residual: Dark Brown, Stiff to Hard, Fine to Coarse Sandy SILT, Micaceous, Moist to Wet
Weathered Rock:
GRANITIC ROCK
Crystalline Rock: Granitic Rock
BT
FIAD
10/18

*NOTE: THE EXISTING GROUNDLINE WAS SURVEYED PRIOR TO CURRENT CONSTRUCTION ON I–77

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 5/16/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION.

(A) Residual: Tan Brown, Very Dense, Silty Fine to Coarse SAND, Moist
Note: In and Out of Hard Layers through Strata
(B) Weathered Rock: GRANITIC ROCK

870 860 850 840 830 820 810 800 790 780 770 760 750 740 730

110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110

PROJECT REFERENCE NO.	SHEET NO.
I-5717	6

SECTION THROUGH END BENT 2
SKEW = 73° 37' 45"

0 20 40
FEET
VE = 1.0

-L- STA. 734+20.25

EB2–A
733+79
77' LT

EB2–D
733+89
42' LT

EB2–E
734+13
44' RT

EB2–B
734+26
74' RT

EXISTING GROUND

Roadway Embankment (Assumed)

Residual: Dark Brown and White to Gray Brown and White to Tan-Brown to Brown to Green Brown, Medium Stiff to Hard, Clayey Coarse to Fine Sandy SILT and Clayey SILT, Micaceous, Moist to Wet

Note: Large Weathered Feldspar Inclusions

09/18

Residual: Tan-Brown to Brown, Medium Dense to Very Dense Silty Coarse to Fine SAND, Micaceous, Moist

Residual: Dark Brown and White to Brown, Medium Dense to Very Dense, Silty Coarse to Fine SAND with Small Fragments, Micaceous, Moist to Wet

Residual: Tan-Brown to Dark Brown, Hard, Coarse to Fine Sandy SILT, Micaceous, Moist

Weathered Rock: GRANITIC ROCK

Residual: Dark Brown and White, Stiff to Very Stiff, Quartz Fragments, Micaceous

Weathered Rock: GRANITIC ROCK

Coarse to Fine Sandy SILT, with Small Quartz Fragments, Some Rock Moist

Note: Large Weathered Feldspar Inclusions

Note: Large Weathered Feldspar Inclusions Below 74' in EB2-B

Residual: Dark Brown and White, Hard, Coarse to Fine Sandy SILT, Moist

Note: Large Weathered Feldspar Inclusions

Crystalline Rock: Granitic Rock

BT

BT DRY 9/18

BT DRY 10/18

BT FIAD 10/18

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 5/16/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 732+42	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.6 ft	**TOTAL DEPTH** 89.2 ft	**NORTHING** 676,372	**EASTING** 1,447,024	**24 HR.** 15.7
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/09/18	**COMP. DATE** 10/15/18	**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))
845										844.6 / 0.0 GROUND SURFACE
										RESIDUAL Tan-Brown, Silty Fine SAND, Micaceous
840	841.0	3.6	2	2	2	4		M		
835	836.0	8.6	1	2	3	5		M		833.3 / 11.3 Tan-Brown to Gray-Brown and White, Fine Sandy SILT, Micaceous
830	831.0	13.6	1	2	2	4				
825	826.0	18.6	1	1	3	4		M		
820	821.0	23.6	3	1	3	4		M		
815	816.0	28.6	1	2	2	4		M		
810	811.0	33.6	1	2	4	6		M		
805	806.0	38.6	2	3	4	7		M		
800	801.0	43.6	10	12	6	18		M		802.6 / 42.0 Tan and Pink, Coarse SAND Note: Large weathered feldspar inclusions
795	796.0	48.6	3	4	7	11		M		796.9 / 47.7 Tan-Brown to Dark Brown and White, Fine Sandy SILT, Micaceous
790	791.0	53.6	4	6	9	15		M		
785	786.0	58.6	3	6	10	16		M		
780	781.0	63.6	11	15	22	37		M		777.8 / 66.8 White and Dark Brown, Silty Coarse to Fine SAND, Micaceous
775	776.0	68.6	12	17	25	42		M		
770	771.0	73.6	24	43	57/0.3	100/0.8				770.5 / 74.1 **WEATHERED ROCK** GRANITIC ROCK
765	766.0	78.6	28	21	21	42				767.1 / 77.5

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 732+42	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.6 ft	**TOTAL DEPTH** 89.2 ft	**NORTHING** 676,372	**EASTING** 1,447,024	**24 HR.** 15.7
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/09/18	**COMP. DATE** 10/15/18	**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
765						Match Line		M		**RESIDUAL**
	761.0	83.6	41	59/0.4		100/0.9				762.7 / 81.9 Dark Brown and Pink, Silty Fine to Coarse SAND *(continued)*
760	756.0	88.6	79	21/0.1		100/0.6				**WEATHERED ROCK** GRANITIC ROCK
										755.4 / 89.2 Boring Terminated at Elevation 755.4 ft in Weathered Rock: GRANITIC ROCK

NCDOT BORE DOUBLE I5717_BRDG_GEO_GINT.GPJ NC_DOT.GDT 10/29/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-D	**STATION** 732+51	**OFFSET** 41 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.1 ft	**TOTAL DEPTH** 84.3 ft	**NORTHING** 676,335	**EASTING** 1,447,027	**24 HR.** 13.9
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/28/18	**COMP. DATE** 09/28/18	**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)
845										844.1 / 0.0 GROUND SURFACE **RESIDUAL** Tan-Brown to Brown, Silty Fine SAND, Micaceous
840	839.9	4.2	2	2	4	6		M		
835	834.9	9.2	2	2	3	5		M		837.1 / 7.0 Tan-Brown to Dark Brown, Fine Sandy SILT, Micaceous
830	829.9	14.2	3	2	2	4		M		
825	824.9	19.2	1	1	2	3		M		
820	819.9	24.2	1	2	3	5		M		
815	814.9	29.2	1	2	2	4		M		
810	809.9	34.2	1	2	2	4		M		
805	804.9	39.2	1	2	3	5		M		
800	799.9	44.2	4	5	7	12		M		801.1 / 43.0 Tan-Brown to Dark Brown, Silty Coarse to Fine SAND, Trace Clay Note: Large weathered feldspar inclusions
795	794.9	49.2	17	13	10	23		M		
790	789.9	54.2	9	10	14	24		M		
785	784.9	59.2	5	6	9	15		M		786.9 / 57.2 Tan-Brown to Dark Brown, Coarse to Fine Sandy SILT, Micaceous Note: Relatively hard layer from 72.2' to 73.7' Note: Intermittent rock fragments below 76.3'
780	779.9	64.2	9	12	16	28		M		
775	774.9	69.2	10	20	27	47		M		
770	769.9	74.2	9	12	19	31		M		
765										

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-D	**STATION** 732+51	**OFFSET** 41 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.1 ft	**TOTAL DEPTH** 84.3 ft	**NORTHING** 676,335	**EASTING** 1,447,027	**24 HR.** 13.9
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/28/18	**COMP. DATE** 09/28/18	**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
765	764.9	79.2	14	19	23	Match Line 42		M		760.3 / 83.8 759.8 / 84.3 **CRYSTALLINE ROCK** GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 759.8 ft in Crystalline Rock: GRANITIC ROCK
760	759.9	84.2	60/0.1			60/0.1				

NCDOT BORE DOUBLE I5717_BRDG_GEO_GINT.GPJ NC_DOT.GDT 10/29/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-E	**STATION** 732+77	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.1 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 676,246	**EASTING** 1,447,038	**24 HR.** 21.6
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Estep, E.	**START DATE** 10/15/18	**COMP. DATE** 10/15/18	**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)
845										843.1 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** Reddish Brown, Silty CLAY, Slightly Plastic
840	839.3	3.8	2	5	4	9		M		836.9 6.2 **RESIDUAL** Reddish Brown to Tan-Brown to Brown with White, Coarse to Fine Sandy SILT
835	834.3	8.8	1	1	1	2		W		
830	829.3	13.8	1	0	1	1		W		
825	824.3	18.8	1	0	0	0		W		
820	819.3	23.8	1	1	2	3		M		
815	814.3	28.8	1	0	1	1		M		
810	809.3	33.8	1	0	2	2		M		
805	804.3	38.8	1	1	2	3		M		
800	799.3	43.8	1	2	3	5		M		
795	794.3	48.8	2	4	6	10		M		
790	789.3	53.8	2	3	4	7		W		
785	784.3	58.8	2	3	6	9		M		
780	779.3	63.8	3	4	7	11		M		
775	774.3	68.8	5	6	10	16		M		
770	769.3	73.8	5	8	100/0.2	100/0.2		M		768.3 74.8 **WEATHERED ROCK** GRANTIC ROCK 765.8 77.3 **RESIDUAL**
765										

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-E	**STATION** 732+77	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.1 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 676,246	**EASTING** 1,447,038	**24 HR.** 21.6
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Estep, E.	**START DATE** 10/15/18	**COMP. DATE** 10/15/18	**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
765						Match Line				
	764.3	78.8		100/0.3		100/0.3				Brown and White, Coarse to Fine Sandy SILT **WEATHERED ROCK** GRANITIC ROCK *(continued)*
760	759.3	83.8		60/0.1		60/0.1				759.3 83.8 759.2 83.9 **CRYSTALLINE ROCK** GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 759.2 ft In Crystalline Rock: GRANITIC ROCK

NCDOT BORE DOUBLE I5717_BRDG_GEO_GINT.GPJ NC_DOT.GDT 10/29/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 732+89	**OFFSET** 85 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 842.0 ft	**TOTAL DEPTH** 88.9 ft	**NORTHING** 676,204	**EASTING** 1,447,043	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/16/18	**COMP. DATE** 10/16/18	**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)
845										
										842.0 GROUND SURFACE 0.0
840										**RESIDUAL** Tan-Brown to Brown with White, Coarse to Fine Sandy SILT Note: Thin (0.5' to 1.0' thick) seams of A-1-b material below 62'
	838.1	3.9	1	2	2	4		M		
835	833.1	8.9	1	1	1	2		M		
830	828.1	13.9	1	0	1	1		M		
825	823.1	18.9	1	1	1	2		W		
820	818.1	23.9	1	2	3	5		W		
815	813.1	28.9	2	3	4	7		M		
810	808.1	33.9	3	3	5	8		M		
805	803.1	38.9	2	3	4	7		M		
800	798.1	43.9	3	4	6	10		M		
795	793.1	48.9	9	7	9	16		M		
790	788.1	53.9	8	4	6	10		M		
785	783.1	58.9	3	3	6	9		M		
780	778.1	63.9	13	17	10	27		M		
775	773.1	68.9	15	13	9	22		M		
770	768.1	73.9	6	14	25	39		M		
765										767.6 74.4 Brown and White, Silty Coarse to Fine SAND

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 732+89	**OFFSET** 85 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 842.0 ft	**TOTAL DEPTH** 88.9 ft	**NORTHING** 676,204	**EASTING** 1,447,043	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/16/18	**COMP. DATE** 10/16/18	**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
765						Match Line				
	763.1	78.9	10	17	17	34		M		Brown and White, Silty Coarse to Fine SAND *(continued)*
760										759.2 82.8
	758.1	83.9	78	22/0.1		100/0.6				**WEATHERED ROCK** GRANITIC ROCK
755										753.1 88.9
	753.1	88.9	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 753.1 ft on Crystalline Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 733+16	**OFFSET** 78 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 846.4 ft	**TOTAL DEPTH** 84.1 ft	**NORTHING** 676,360	**EASTING** 1,447,097	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/04/18	**COMP. DATE** 10/05/18	**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)
850											
										846.4 GROUND SURFACE	0.0
845										845.3 **ROADWAY EMBANKMENT** 5" Asphalt over 8" ABC	1.1
	842.7	3.7	3	2	2	4		M		**RESIDUAL** Dark Brown, Fine Sandy SILT, Micaceous	
840											
	837.7	8.7	3	4	5	9		M			
835											
	832.7	13.7	3	3	4	7		M			
830										830.1	16.3
	827.7	18.7	2	2	3	5		W		Tan-Brown to Dark Brown, Silty Coarse to Fine SAND Note: Small weathered feldspar inclusions	
825											
	822.7	23.7	2	2	3	5		M		823.2	23.2
820										Tan-Brown to Dark Brown, Coarse to Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions	
	817.7	28.7	3	3	5	8		M			
815											
	812.7	33.7	6	5	7	12		M			
810											
	807.7	38.7	7	7	7	14		M			
805											
	802.7	43.7	5	6	7	13		M			
800											
	797.7	48.7	6	7	9	16		M		798.8	47.6
795										Tan-Brown to Dark Brown, Silty Coarse to Fine SAND, Trace Rock Fragments Note: Large weathered feldspar inclusions below 66'	
	792.7	53.7	5	7	9	16		M			
790											
	787.7	58.7	17	15	24	39		M			
785											
	782.7	63.7	19	21	27	48		M			
780											
	777.7	68.7	22	32	45	77		M			
775											
	772.7	73.7	36	24	23	47		M		773.6	72.8
770										Brown to Dark Brown, Fine Sandy SILT, Micaceous	

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 733+16	**OFFSET** 78 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 846.4 ft	**TOTAL DEPTH** 84.1 ft	**NORTHING** 676,360	**EASTING** 1,447,097	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/04/18	**COMP. DATE** 10/05/18	**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
770						Match Line				
	767.7	78.7	42	68/0.2		100/0.7				769.6 **WEATHERED ROCK** 76.8
765										GRANITIC ROCK
	762.7	83.7	100/0.4			100/0.4				762.3 84.1
										Boring Terminated at Elevation 762.3 ft in Weathered Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-D	**STATION** 733+27	**OFFSET** 41 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 846.1 ft	**TOTAL DEPTH** 69.0 ft	**NORTHING** 676,322	**EASTING** 1,447,102	**24 HR.** 15.5
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/04/18	**COMP. DATE** 10/04/18	**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
850										ELEV. (ft) DEPTH (ft)
										846.1 GROUND SURFACE 0.0
845										844.4 **ROADWAY EMBANKMENT** 5" Ashalt over 1'4" ABC 1.7
	842.3	3.8	4	3	4	7		D		**RESIDUAL** Tan-Brown to Brown, Silty Fine SAND Note: Large weathered feldspar inclusions
840										
	837.3	8.8	3	3	5	8		M		838.0 8.1 Brown to Dark Brown, Coarse to Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions
835										
	832.3	13.8	3	3	5	8				
830										
	827.3	18.8	2	3	5	8		M		
825										
	822.3	23.8	6	8	9	17		M		
820										
	817.3	28.8	6	7	9	16		M		
815										
	812.3	33.8	3	3	5	8		M		
810										
	807.3	38.8	4	6	7	13		W		
805										
	802.3	43.8	1	2	5	7		M		
800										
	797.3	48.8	2	3	5	8		M		
795										
	792.3	53.8	49	46	52	98		M		792.7 53.4 Brown, Silty Coarse to Fine SAND, Little Rock Fragments Above 56.4' Note: Very soft zone from 56.4' to 58.1'
790										
	787.3	58.8	23	31	55	86		M		
785										
	782.3	63.8	21	13	13	26		D		
780										
	777.3	68.8	100/0.2			100/0.2				778.7 67.4 **WEATHERED ROCK** GRANITIC ROCK 777.1 69.0 Boring Terminated at Elevation 777.1 ft in Weathered Rock: GRANITIC ROCK

NCDOT BORE DOUBLE I5717_BRDG_GEO_GINT.GPJ NC_DOT.GDT 10/29/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-E	**STATION** 733+51	**OFFSET** 44 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 845.0 ft	**TOTAL DEPTH** 88.8 ft	**NORTHING** 676,234	**EASTING** 1,447,111	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/03/18	**COMP. DATE** 10/03/18	**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)
845										845.0 GROUND SURFACE 0.0
										844.0 **ROADWAY EMBANKMENT** 1.0 4" Asphalt over 8" ABC **RESIDUAL** Tan-Brown to Brown, Silty Fine to Coarse SAND Note: Large weathered feldspar inclusions
840	841.3	3.7	5	4	4	8		D		
835	836.3	8.7	3	4	4	8		M		
830	831.3	13.7	3	3	3	6		M		832.7 12.3 Tan-Brown to Dark Brown to Brown, Coarse to Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions below 53'
825	826.3	18.7	3	3	4	7		M		
820	821.3	23.7	3	3	5	8		M		
815	816.3	28.7	4	5	6	11		M		
810	811.3	33.7	3	3	4	7		W		
805	806.3	38.7	4	4	6	10		M		
800	801.3	43.7	10	14	12	26		M		
795	796.3	48.7	6	6	9	15		M		
790	791.3	53.7	8	10	11	21		M		
785	786.3	58.7	3	5	7	12		M		
780	781.3	63.7	21	28	29	57		M		782.9 62.1 Tan-Brown to Dark Brown, Silty Fine to Coarse SAND, Micaceous Note: Large weathered feldspar inclusions
775	776.3	68.7	12	16	24	40		M		
770	771.3	73.7	15	17	26	43		M		773.7 71.3 Dark Brown, Fine to Coarse Sandy SILT, Micaceous Note: Large weathered feldspar inclusions and small quartz fragments
765	766.3	78.7	17	18	21	39		M		

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-E	**STATION** 733+51	**OFFSET** 44 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 845.0 ft	**TOTAL DEPTH** 88.8 ft	**NORTHING** 676,234	**EASTING** 1,447,111	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/03/18	**COMP. DATE** 10/03/18	**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
765						Match Line				
760	761.3	83.7	15	18	24	42		M		Dark Brown, Fine to Coarse Sandy SILT, Micaceous Note: Large weathered feldspar inclusions and small quartz fragments *(continued)*
	756.3	88.7	60/0.1			60/0.1				756.7 88.3 756.2 **CRYSTALLINE ROCK** 88.8 GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 756.2 ft in Crystalline Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 733+63	**OFFSET** 85 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.4 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 676,192	**EASTING** 1,447,116	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/02/18	**COMP. DATE** 10/02/18	**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)
845										844.4 GROUND SURFACE 0.0
										843.4 **ROADWAY EMBANKMENT** 1.0 4" Asphalt over 8" ABC
840	840.7	3.7	4	4	5	9		D		**RESIDUAL** Tan-Brown, Silty Fine to Coarse SAND Note: Large weathered feldspar inclusions
835	835.7	8.7	4	5	6	11		M		
830	830.7	13.7	4	4	6	10		M		
825	825.7	18.7	4	5	6	11		M		
										823.4 21.0
820	820.7	23.7	5	6	6	12		W		Tan-Brown to Dark Brown, Fine to Coarse Sandy SILT, Micaceous Note: Large weathered feldspar inclusions
815	815.7	28.7	4	4	6	10		M		
810	810.7	33.7	4	4	7	11		M		
805	805.7	38.7	7	10	10	20		M		
800	800.7	43.7	4	7	9	16		M		801.8 42.6 Tan-Brown to Dark Brown, Silty Coarse to Fine SAND Note: Large weathered feldspar inclusions
795	795.7	48.7	7	13	10	23		M		
790	790.7	53.7	9	7	7	14		M		
785	785.7	58.7	3	4	6	10		W		788.1 56.3 Dark Brown, Fine Sandy SILT, Micaceous
780	780.7	63.7	14	35	65	100/1.0				780.2 64.2 **WEATHERED ROCK** GRANITIC ROCK
775	775.7	68.7	21	17	40	57		M		777.4 67.0 **RESIDUAL** Tan-Brown, Silty Coarse to Fine SAND Note: In and out of hard layers through strata
770	770.7	73.7	66	34/0.1		100/0.6				771.2 73.2 **WEATHERED ROCK** GRANITIC ROCK
765	765.7	78.7				100/0.3				768.2 76.2 **RESIDUAL** 766.4 Tan-Brown, Silty Coarse to Fine SAND 78.0

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 733+63	**OFFSET** 85 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 844.4 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 676,192	**EASTING** 1,447,116	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 83% 04/16/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/02/18	**COMP. DATE** 10/02/18	**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
765						Match Line				**WEATHERED ROCK** GRANITIC ROCK *(continued)*
	760.7	83.7		100/0.3						760.5 83.9
				100/0.2		100/0.2				Boring Terminated at Elevation 760.5 ft in Weathered Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 733+79	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.4 ft	**TOTAL DEPTH** 80.3 ft	**NORTHING** 676,348	**EASTING** 1,447,159	**24 HR.** 13.5
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/26/18	**COMP. DATE** 09/27/18	**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))
845										843.4 / 0.0 GROUND SURFACE
										RESIDUAL Tan-Brown to Brown, Fine Sandy SILT, Some Mica. Note: Large weathered feldspar inclusions below 23'
840	839.3	4.1	3	3	5	8		M		
835	834.3	9.1	4	4	3	7		M		
830	829.3	14.1	3	3	5	8		M		
825	824.3	19.1	3	2	3	5		M		
820	819.3	24.1	3	2	3	5		M		
815	814.3	29.1	4	3	4	7		W		
810	809.3	34.1	6	6	6	12		M		
805	804.3	39.1	6	7	8	15		M		806.4 / 37.0 Tan-Brown to Brown, Silty Coarse to Fine SAND, Micaceous
800	799.3	44.1	7	12	15	27		M		
795	794.3	49.1	15	18	22	40		M		
790	789.3	54.1	18	18	21	39		M		
785	784.3	59.1	18	33	41	74		M		
780	779.3	64.1	50	50/0.3		100/0.8				780.2 / 63.2 **WEATHERED ROCK** GRANITIC ROCK
775	774.3	69.1	18	21	41	62		M		775.8 / 67.6 **RESIDUAL** Tan-Brown to Dark Brown, Coarse to Fine Sandy SILT, Micaceous
770	769.3	74.1	56	44/0.2		100/0.7				772.4 / 71.0 **WEATHERED ROCK** GRANITIC ROCK
765										

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 733+79	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.4 ft	**TOTAL DEPTH** 80.3 ft	**NORTHING** 676,348	**EASTING** 1,447,159	**24 HR.** 13.5
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/26/18	**COMP. DATE** 09/27/18	**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
765						Match Line				
	764.3	79.1	27	54	46/0.2	100/0.7				763.1 / 80.3 Boring Terminated at Elevation 763.1 ft in Weathered Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-D	**STATION** 733+89	**OFFSET** 42 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.6 ft	**TOTAL DEPTH** 79.8 ft	**NORTHING** 676,312	**EASTING** 1,447,163	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/25/18	**COMP. DATE** 09/26/18	**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)
845										843.6 GROUND SURFACE 0.0
										RESIDUAL Tan-Brown to Brown, Clayey Coarse to Fine Sandy SILT
840	839.4	4.2	2	4	3	7		M		
835	834.4	9.2	4	2	4	6		M		
830	829.4	14.2	3	3	5	8		M		830.6 13.0 Green-Brown to Tan-Brown, Clayey SILT Note: Large weathered feldspar inclusions
825	824.4	19.2	3	3	6	9		M		
820	819.4	24.2	3	3	5	8		M		
815	814.4	29.2	2	4	4	8		M		
810	809.4	34.2	2	3	4	7		W		810.5 33.1 Green-Brown to Brown, Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions in sample at 44.2 feet
805	804.4	39.2	2	3	6	9		M		
800	799.4	44.2	4	4	7	11		M		
795	794.4	49.2	5	7	9	16		M		
790	789.4	54.2	15	24	27	51		M		
785	784.4	59.2	56	44/0.3		100/0.8				785.1 58.5 **WEATHERED ROCK** GRANITIC ROCK
780	779.4	64.2	8	10	22	32		M		781.6 62.0 **RESIDUAL** Dark Brown, Fine Sandy SILT, Micaceous
775	774.4	69.2	43	57/0.3		100/0.8				777.1 66.5 **WEATHERED ROCK** GRANITIC ROCK
770	769.4	74.2	100/0.4			100/0.4				
765										

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-D	**STATION** 733+89	**OFFSET** 42 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 843.6 ft	**TOTAL DEPTH** 79.8 ft	**NORTHING** 676,312	**EASTING** 1,447,163	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 09/25/18	**COMP. DATE** 09/26/18	**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
765	764.4	79.2	71	29/0.1		Match Line 100/0.6				763.8 79.8 Boring Terminated at Elevation 763.8 ft in Weathered Rock: GRANITIC ROCK Note: Cave-In at 13.6'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-E	**STATION** 734+13	**OFFSET** 44 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 842.7 ft	**TOTAL DEPTH** 84.2 ft	**NORTHING** 676,223	**EASTING** 1,447,172	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/17/18	**COMP. DATE** 10/17/18	**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))
845										842.7 / 0.0 GROUND SURFACE
										RESIDUAL Dark Brown to Gray-Brown and White, Coarse to Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions in upper 8 feet
840	838.6	4.1	2	3	4	7		M		
835	833.6	9.1	2	4	5	9		M		
830	828.6	14.1	2	4	5	9		M		
825	823.6	19.1	14	13	9	22		M		
820	818.6	24.1	4	8	11	19		M		
815	813.6	29.1	4	6	7	13		M		
810	808.6	34.1	5	9	7	16		M		
805	803.6	39.1	4	5	8	13		M		
800	798.6	44.1	4	5	8	13		M		799.5 / 43.2 Dark Brown and White, Coarse to Fine Sandy SILT, with Small Quartz Fragments Note: Large weathered feldspar inclusions
795	793.6	49.1	5	5	7	12		W		795.1 / 47.6 Dark Brown, Silty Coarse to Fine SAND, Micaceous in Upper 5', Some Rock Fragments
790	788.6	54.1	4	6	8	14		W		
785	783.6	59.1	7	9	12	21		M		
780	778.6	64.1	11	14	20	34		M		
775	773.6	69.1	6	10	14	24		M		
770	768.6	74.1	21	27	21	48		M		
765										809.7 / 33.0 Dark Brown and White, Silty Coarse to Fine SAND, Micaceous, with Small Quartz Fragments

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-E	**STATION** 734+13	**OFFSET** 44 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 842.7 ft	**TOTAL DEPTH** 84.2 ft	**NORTHING** 676,223	**EASTING** 1,447,172	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/17/18	**COMP. DATE** 10/17/18	**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
765						Match Line				
	763.6	79.1	14	17	20	37		M		Dark Brown, Silty Coarse to Fine SAND, Micaceous in Upper 5', Some Rock Fragments *(continued)*
760	758.6	84.1	60/0.1			60/0.1				759.0 / 83.7 758.5 / 84.2 **CRYSTALLINE ROCK** GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 758.5 ft in Crystalline Rock: GRANITIC ROCK Note: Cave-In at 12.8'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 734+26	**OFFSET** 74 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 841.9 ft	**TOTAL DEPTH** 86.0 ft	**NORTHING** 676,182	**EASTING** 1,447,178	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/18/18	**COMP. DATE** 10/18/18	**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))
845										
										841.9 / 0.0 GROUND SURFACE
										RESIDUAL Dark Brown and White, Coarse to Fine Sandy SILT, Micaceous Note: Large weathered feldspar inclusions
840	837.4	4.5	2	3	3	6		M		
835	832.4	9.5	3	3	5	8		M		
830	827.4	14.5	3	3	5	8		M		
825	822.4	19.5	3	4	6	10		M		
820	817.4	24.5	4	5	6	11		W		
815	812.4	29.5	4	5	8	13		M		
810	807.4	34.5	15	12	12	24		M		
805	802.4	39.5	17	100/0.3		100/0.3				
800	797.4	44.5	27	73/0.2		100/0.7				
795	792.4	49.5	6	8	12	20		M		
790	787.4	54.5	4	6	9	15		M		
785	782.4	59.5	7	13	14	27		M		
780	777.4	64.5	10	9	10	19		M		
775	772.4	69.5	5	8	11	19		M		
770	767.4	74.5	17	17	23	40		M		
765										
										813.9 / 28.0 Dark Brown, Silty Fine SAND, Trace Rock Fragments
										801.9 / 40.0 **WEATHERED ROCK** GRANITIC ROCK
										794.0 / 47.9 **RESIDUAL** Dark Brown and White, Coarse to Fine Sandy SILT Note: Large weathered feldspar inclusions
										788.9 / 53.0 Brown and White, Silty Coarse to Fine SAND Note: Large weathered feldspar inclusions below 74 feet

WBS 50134.1.FS1	**TIP** I-5717	**COUNTY** IREDELL	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Bridge No. 26 on NC 150 over I-77 Between SR 1467 & SR 1116				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 734+26	**OFFSET** 74 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 841.9 ft	**TOTAL DEPTH** 86.0 ft	**NORTHING** 676,182	**EASTING** 1,447,178	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 95% 03/19/2018		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Estep, E.	**START DATE** 10/18/18	**COMP. DATE** 10/18/18	**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
765						Match Line				
	762.4	79.5	8	8	9	17		M		Brown and White, Silty Coarse to Fine SAND Note: Large weathered feldspar inclusions below 74 feet *(continued)*
760										759.5 / 82.4
	757.4	84.5	12	17	24	41		M		Dark Brown and White, Coarse to Fine Sandy SILT Note: Large weathered feldspar inclusions
										755.9 / 86.0 Boring Terminated at Elevation 755.9 ft in Residual Soil: Sandy SILT

SITE PHOTOGRAPHS
State Project No. 50134.1.FS1 – TIP I-5717 – Replace Bridge No. 26 on NC 150 over I-77 between SR 1467 and SR 1116 – Iredell County, NC

View of Existing Bridge No.26 - End Bent 1 - Looking South

View of Existing Bridge No. 26 - Bent 1 - Looking South

View of Existing Bridge No.26 - End Bent 2 - Looking South

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2307B	1	7

REFERENCE: R-2307B

PROJECT: 37944

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-7	BORING LOGS

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY IREDELL

PROJECT DESCRIPTION NC 150 FROM SR 1840 (GREENWOOD RD) IN CATAWBA COUNTY TO US-21 IN IREDELL COUNTY

SITE DESCRIPTION PRELIMINARILY RECOMMENDED NOISE BARRIER -NW7- FROM -L- STATION 481+74.87 TO 492+94.82

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.

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 THE 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.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. 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.

PERSONNEL

B. SMITH, PG

A. GROSS

M.B. MOSELEY

INVESTIGATED BY B. SMITH, PG

DRAWN BY B. SMITH, PG

CHECKED BY B. WORLEY, PG

SUBMITTED BY B. SMITH, PG

DATE SEPTEMBER, 2017

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339 and C-487
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

NORTH CAROLINA LICENSED SEAL 2390 GEOLOGIST BRETT C. SMITH

DocuSigned by:
Brett C. Smith
BE61A49304C542E...

9/29/2017

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	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 ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
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, 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 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] DIEDRICH D-50
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 2.25" HOLLOW STEM AUGERS

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

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

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:

ELEVATION: FEET

NOTES:

Elevations obtained using r2307b_ls_tin.tin (file dated: 8/9/2016)

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	3

SITE PLAN

0 50 100

FEET

482+00 483+00 484+00 485+00 486+00 487+00 488+00

BEGIN 1'-6" CURB
-LEB- STA. 87+15

BEGIN 1'-6" CURB
-L- STA. 488+78

LAKE NORMAN

EDGE OF WATER AUGUST 2015

EDGE OF WATER JULY 2012

RIP RAP

EXISTING R/W

-L-

-LEB-

WB-1 WB-2 WB-3 WB-4 WB-5 WB-6 WB-7 WB-8

WD DOCK

WD CAN

WOODS

48" WD RAIL

BL-28

EIP

N 09°25'22" W 158.70'

N 10°05'38" E 20.39'

N 12°31'40" W 69.68'

N 78°32'22" W 36.00'

S 62°07'04" W 22.76'

S 73°47'15" W 43.17'

S 55°01'06" W 29.42'

N 88°48'53" W 34.38'

S 57°36'18" W 39.87'

S 65°14'42" W 66.45'

S 28°02'26" E 35.39'

S 43°53'39" E 305.09'

S 34°38'26" W 48.38'

S 67°00'28" W 31.83'

N 54°23'59" W 321.74'

NC GRID
NAD 83/NSRS 2007

-LEB- PC Sta. 80+30.79

-L- CS Sta. 84+38.51

-L- SC Sta. 85+88.51

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-5	**STATION** 481+64	**OFFSET** 67 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.7 ft	**TOTAL DEPTH** 20.2 ft	**NORTHING** 680,941	**EASTING** 1,423,250	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
775										774.7 GROUND SURFACE 0.0
	771.0	3.7	3	3	5	8		M		**ROADWAY EMBANKMENT** brown, micaceous, sandy SILT (A-4) with some to little clay
770										
	766.0	8.7	3	2	4	6		M		763.5 11.2 brown, micaceous, clayey SILT (A-5) with some sand
765										
	761.0	13.7	3	5	7	12		M		758.5 16.2 brown, micaceous, sandy SILT (A-4) with some clay
760										
	756.0	18.7	3	5	7	12		M		754.5 20.2 Boring Terminated at Elevation 754.5 ft in Roadway Embankment (sandy SILT)
755										

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-6	**STATION** 482+66	**OFFSET** 66 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 680,963	**EASTING** 1,423,348	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
775										774.6 GROUND SURFACE 0.0
	771.1	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** brown, micaceous, sandy SILT (A-4) with some clay
770										768.6 6.0
	766.1	8.5	2	4	5	9		M		brown, micaceous, clayey SILT (A-5) with some sand
765										763.6 11.0
	761.1	13.5	3	4	4	8		M		brown-gray, sandy CLAY (A-6) with trace organics
760										758.6 16.0
	756.1	18.5	3	5	7	12		W		brown, micaceous, sandy SILT (A-4) with some clay
755										754.6 20.0 Boring Terminated at Elevation 754.6 ft in Roadway Embankment (sandy SILT)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-1	**STATION** 483+67	**OFFSET** 64 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.5 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 680,985	**EASTING** 1,423,446	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
775										774.5 GROUND SURFACE	0.0
	771.0	3.5	2	3	4	7		M		**ROADWAY EMBANKMENT** brown, micaceous, sandy SILT (A-4) with little clay	
770										768.5	6.0
	766.0	8.5	2	4	5	9		M		brown, micaceous, clayey SILT (A-5) with some sand	
765											
	761.0	13.5	2	3	4	7		M		758.5	16.0
760										brown, micaceous, sandy SILT (A-4) with little clay and trace gravel	
	756.0	18.5	4	5	12	17		W		754.5	20.0
755										Boring Terminated at Elevation 754.5 ft in Roadway Embankment (sandy SILT)	

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-7	**STATION** 484+68	**OFFSET** 60 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.5 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 681,005	**EASTING** 1,423,543	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
775										774.5 GROUND SURFACE	0.0
	771.0	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** brown, micaceous, sandy SILT (A-4) with little clay	
770										768.5	6.0
	766.0	8.5	2	4	8	12		M		brown, micaceous, sandy CLAY (A-6)	
765										763.5	11.0
	761.0	13.5	3	4	6	10		M		brown, micaceous, sandy SILT (A-4) with some clay	
760										758.5	16.0
	756.0	18.5	3	5	5	10		W		brown-gray, micaceous, silty CLAY (A-7) with some sand and trace organics	
755										754.5	20.0
										Boring Terminated at Elevation 754.5 ft in Roadway Embankment (silty CLAY)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-8	**STATION** 485+69	**OFFSET** 56 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.7 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 681,024	**EASTING** 1,423,642	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/20/17	**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)
775										774.7 GROUND SURFACE 0.0
	771.2	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** brown and brown-gray, micaceous, sandy SILT (A-4) with some clay
770										
	766.2	8.5	3	4	6	10		M		
765										
	761.2	13.5	4	5	6	11		M		
760										
	756.2	18.5	5	9	10	19		M		756.7 18.0 **RESIDUAL** 754.7 red-brown, silty CLAY (A-7) with some sand 20.0 Boring Terminated at Elevation 754.7 ft in Residual (silty CLAY)
755										

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-2	**STATION** 486+71	**OFFSET** 53 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.5 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 681,041	**EASTING** 1,423,741	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/20/17	**COMP. DATE** 09/21/17	**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
775										774.5 GROUND SURFACE 0.0
	771.0	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** brown, micaceous, clayey SILT (A-5) with some sand
770										768.5 6.0
	766.0	8.5	3	4	9	13		M		brown, micaceous, sandy CLAY (A-6)
765										761.5 13.0
	761.0	13.5	3	5	5	10		M		**RESIDUAL** red-brown, silty CLAY (A-7) with some sand and little mica 16.0
760										758.5
	756.0	18.5	2	2	2	4		W		brown, micaceous, sandy SILT (A-4) 754.5 20.0 Boring Terminated at Elevation 754.5 ft in Residual (sandy SILT)
755										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-3	**STATION** 487+72	**OFFSET** 48 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 774.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 681,056	**EASTING** 1,423,840	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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)
775										GROUND SURFACE	774.4	0.0
										ROADWAY EMBANKMENT brown, micaceous, sandy CLAY (A-6)		
770	770.9	3.5	2	2	6	8		M			768.4	6.0
										orange-brown, silty CLAY (A-7) with some sand		
765	765.9	8.5	4	8	10	18		M			762.9	11.5
										RESIDUAL red-brown, silty CLAY (A-7) with some sand and mica		
760	760.9	13.5	5	7	9	16		M			758.4	16.0
										brown, saprolitic, micaceous, silty SAND (A-2-4)		
755	755.9	18.5	2	2	2	4		W			754.4	20.0
										Boring Terminated at Elevation 754.4 ft in Residual (silty SAND)		

WBS 37944.1.FR5	**TIP** R-2307B	**COUNTY** IREDELL	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION NC 150 from SR 1840 (Greenwood Road) in Catawba County to US 21 in Iredell County				**GROUND WTR (ft)**
BORING NO. WB-4	**STATION** 488+73	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** 16.1
COLLAR ELEV. 774.8 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 681,071	**EASTING** 1,423,939	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.B.	**START DATE** 09/21/17	**COMP. DATE** 09/21/17	**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)
775										GROUND SURFACE	774.8	0.0
										ROADWAY EMBANKMENT red-brown, silty CLAY (A-7) with some sand and little mica		
770	771.2	3.6	6	7	11	18		M			768.7	6.1
										brown, micaceous, clayey SILT (A-5) with some sand		
765	766.2	8.6	2	3	4	7		M			763.7	11.1
										RESIDUAL brown and brown-gray, saprolitic, micaceous, sandy SILT (A-4) with little clay		
760	761.2	13.6	2	2	4	6		W				
755	756.2	18.6	2	2	3	5		Sat.			754.7	20.1
										Boring Terminated at Elevation 754.7 ft in Residual (sandy SILT)		