STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0044	1	

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ASHE

PROJECT DESCRIPTION REPLACE BRIDGE NO. 0093 ON SR 1644 (MCNEIL ROAD) OVER NORTH FORK NEW RIVER

SITE DESCRIPTION BRIDGE NO. 0093

REFERENCE: HB-0044

PROJECT: 50714

CONTENTS

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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
GRAIN SIZE 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
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [ ] TRICONE ____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B _____
- [ ] -H _____
- [X] -N 0

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:

DESIGN FILES PROVIDED BY NCDOT DATED JULY 30, 2025.

BRIDGE BORING COLLAR ELEVATIONS OBTAINED USING CARLSON BRX7 GPS.

FIAD = FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
HB–0044	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

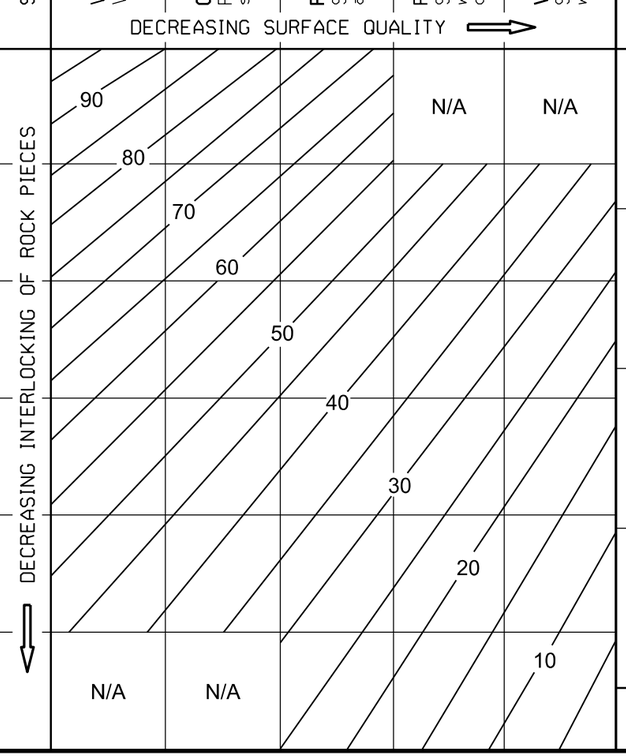
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

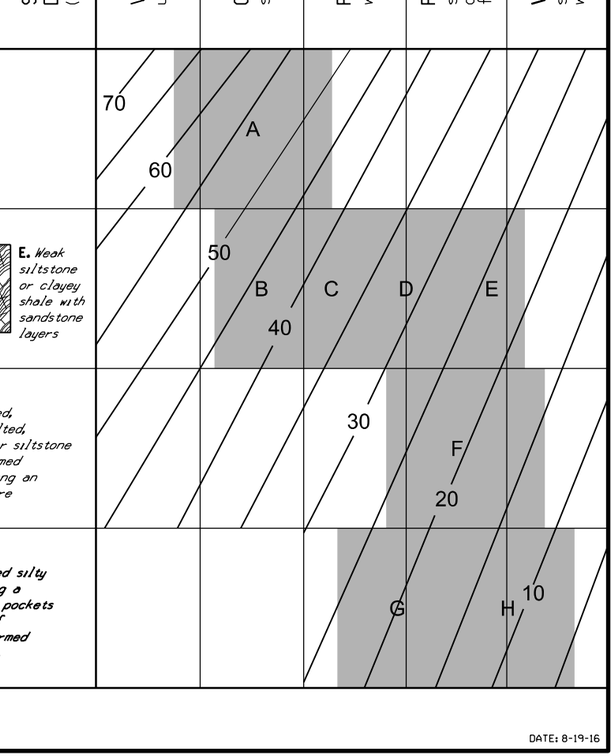


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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

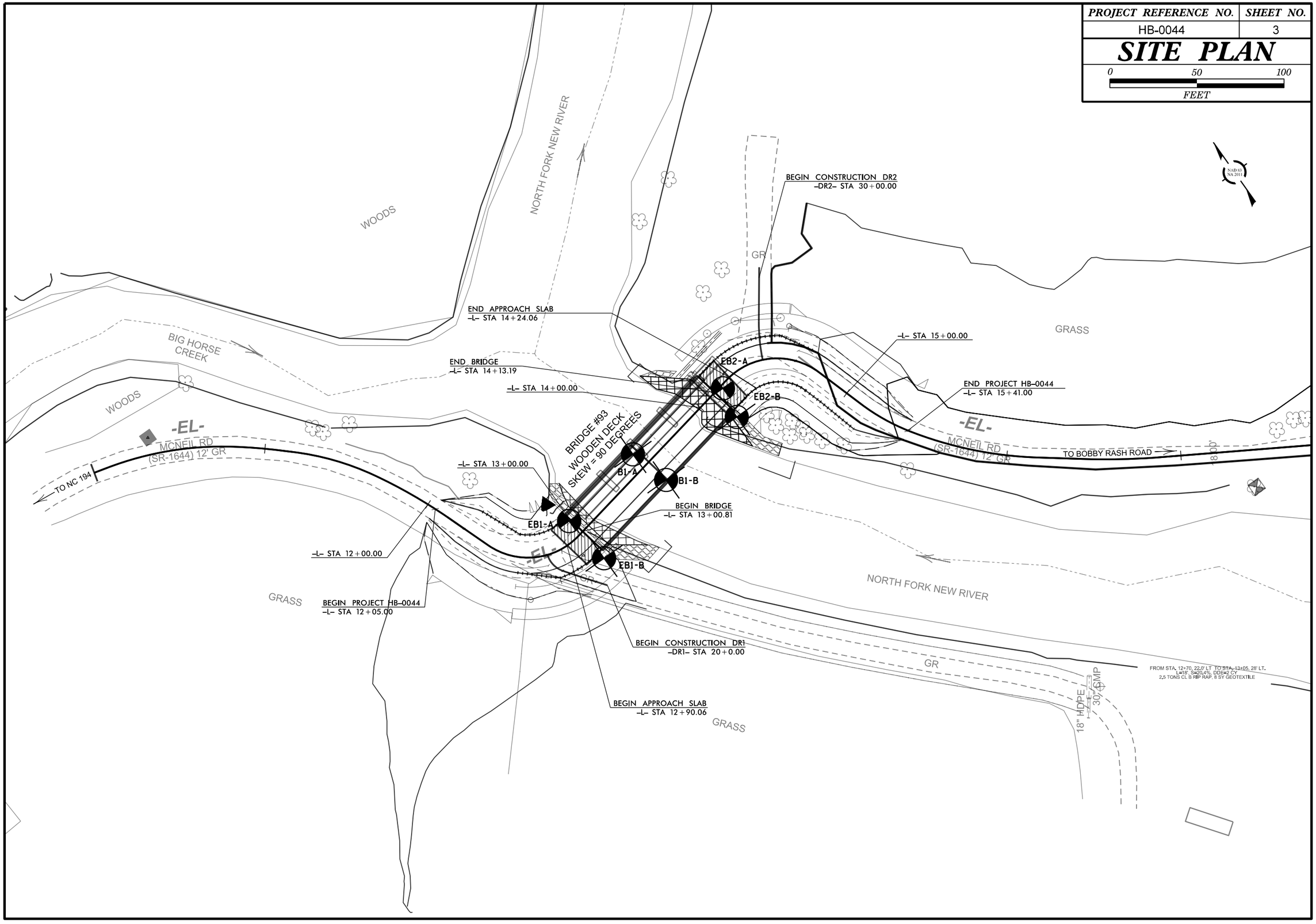


DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
HB-0044	3

SITE PLAN

0 50 100
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 13+01	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,630.4 ft	**TOTAL DEPTH** 8.8 ft	**NORTHING** 1,004,823	**EASTING** 1,266,806	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 11/18/25	**COMP. DATE** 11/18/25	**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)
2635												
2630										2,630.4	GROUND SURFACE	0.0
	2,629.5	0.9								2,629.5	**ROADWAY EMBANKMENT** Concrete (0.9')	0.9
			4	21	16	37		W				
	2,626.9	3.5								2,627.4	**ALLUVIAL** Dense, Brown-Gray-Black, Fine to Coarse Sandy GRAVEL (A-1-a)	3.0
2625			WOH	1	1	2		Sat.			Soft, Gray, Fine Sandy SILT (A-4), with trace mica	
	2,621.6	8.8	60/0.0			60/0.0				2,621.6	Boring Terminated with Standard Penetration Test Refusal at Elevation 2,621.6 ft On Crystalline Rock (Biotite Granitic Gneiss)	8.8

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 12+99	**OFFSET** 19 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,635.1 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 1,004,794	**EASTING** 1,266,810 / **24 HR.** 9.7
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/20/25	**COMP. DATE** 10/20/25	**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))
2640										
2635	2,635.1	0.0								2,635.1 GROUND SURFACE 0.0
			1	1	3	4		M		**ALLUVIAL** Soft, Brown-Red, Fine Sandy SILT (A-4), with trace mica and organics
2630	2,630.7	4.4	2	1	1	2		M		2,627.6 7.5
2625	2,625.7	9.4	2	10	24	34				**RESIDUAL** Dense, Gray, Silty Fine SAND (A-2-4), with trace mica and gravel-sized rock fragments
	2,624.0	11.1	60/0.0			60/0.0				2,624.0 11.1 **CRYSTALLINE ROCK** Gray-White, (Biotite Granitic Gneiss) REC: 94% RQD: 86% GSI: 65-70
2620										
2615										2,615.0 20.1 Boring Terminated at Elevation 2,615.0 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT BORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/10/25

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 12+99	**OFFSET** 19 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,635.1 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 1,004,794	**EASTING** 1,266,810 / **24 HR.** 9.7
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/20/25	**COMP. DATE** 10/20/25	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ	**TOTAL RUN** 9.0 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))
2624											Begin Coring @ 11.1 ft
	2,624.0	11.1	4.0	*N=60/0.0* 3:06/1.0 3:51/1.0 2:28/1.0 3:25/1.0	(3.5) 88%	(2.7) 68%		(8.5) 94%	(7.7) 86%		2,624.0 **CRYSTALLINE ROCK** Moderately to Very Slightly Weathered, Hard to Very Hard, Gray-White, (Biotite Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing GSI: 65-70 11.1
2620	2,620.0	15.1	5.0	2:37/1.0 2:50/1.0 3:04/1.0 2:45/1.0 2:00/1.0	(5.0) 100%	(5.0) 100%					
2615	2,615.0	20.1									2,615.0 20.1 Boring Terminated at Elevation 2,615.0 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT CORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/10/25

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 93 on SR 1644 (McNeil Road) over
North Fork New River
Ashe County, North Carolina
Rock Core Photographs
EB1-B
11.1 to 20.1 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 13+54	**OFFSET** 10 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,623.6 ft	**TOTAL DEPTH** 17.5 ft	**NORTHING** 1,004,833	**EASTING** 1,266,858 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 11/18/25	**COMP. DATE** 11/18/25	**SURFACE WATER DEPTH** 2.2ft

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))
2625										WATER SURFACE (11/18/25)
	2,623.6	0.0						Sat.		2,623.6 GROUND SURFACE 0.0
	2,622.1	1.5	89	11/0.1		100/0.6				2,622.1 **ALLUVIAL** 1.5
	2,621.1	2.5	100/0.3			100/0.3				2,621.1 Very Dense, Gray, Silty Fine to Coarse SAND (A-2-4), with trace gravel 2.5
2620			60/0.0			60/0.0				**WEATHERED ROCK** Gray, (Biotite Granitic Gneiss)
										CRYSTALLINE ROCK Gray-White, (Biotite Granitic Gneiss)
2615										REC: 100% RQD: 99% GSI: 80-85
							RS-01			
2610										2,606.1 17.5
										Boring Terminated at Elevation 2,606.1 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT BORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/11/25

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 13+54	**OFFSET** 10 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,623.6 ft	**TOTAL DEPTH** 17.5 ft	**NORTHING** 1,004,833	**EASTING** 1,266,858 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 11/18/25	**COMP. DATE** 11/18/25	**SURFACE WATER DEPTH** 2.2ft
CORE SIZE NQ	**TOTAL RUN** 15.0 ft		

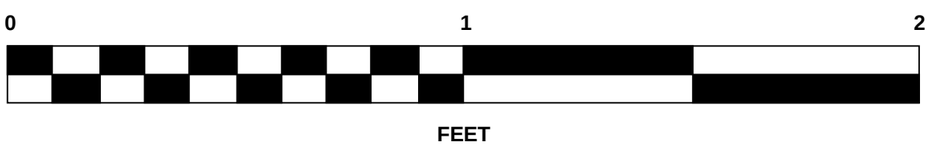
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
2621.1											Begin Coring @ 2.5 ft
2620	2,621.1	2.5	5.0	*N=60/0.0* 2:59/1.0 2:10/1.0 2:11/1.0 2:11/1.0 2:16/1.0	(5.0) 100%	(5.0) 100%		(15.0) 100%	(14.9) 99%		2,621.1 **CRYSTALLINE ROCK** 2.5 Fresh, Moderately Hard to Hard, Gray-White, (Biotite Granitic Gneiss), with Close to Moderately Close Fracture Spacing
	2,616.1	7.5									RS-01: 10.2-10.7 Unit Weight: 178.2 pcf Unconfined Compressive Strength: 8,310 psi (1,197 ksf)
2615			5.0	2:05/1.0 2:25/1.0 2:40/1.0 2:30/1.0 2:44/1.0	(5.0) 100%	(5.0) 100%					GSI: 80-85
	2,611.1	12.5					RS-01				
2610			5.0	3:49/1.0 2:39/1.0 2:31/1.0 2:28/1.0 2:28/1.0	(5.0) 100%	(4.9) 98%					
	2,606.1	17.5									2,606.1 17.5
											Boring Terminated at Elevation 2,606.1 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT CORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/11/25

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 93 on SR 1644 (McNeil Road) over
North Fork New River
Ashe County, North Carolina
Rock Core Photographs
B1-A

2.5 to 17.5 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 13+56	**OFFSET** 14 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,625.1 ft	**TOTAL DEPTH** 30.1 ft	**NORTHING** 1,004,810	**EASTING** 1,266,865 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/16/25	**COMP. DATE** 10/16/25	**SURFACE WATER DEPTH** 0.4ft

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))
2630										
2625	2,625.1	0.0								2,625.1 WATER SURFACE (10/16/25) 0.0
			5	5	11	16		Sat.		**ALLUVIAL** Medium Dense, Brown-Tan, Fine to Coarse Gravelly SAND (A-1-a)
	2,621.1	4.0								2,621.1 4.0
2620	2,619.5	5.6	60/0.0			60/0.0				**CRYSTALLINE ROCK** (Biotite Granitic Gneiss)
			60/0.0			60/0.0				2,619.5 5.6
2615										Black-Gray-White, (Biotite Granitic Gneiss) REC: 100% RQD: 43% GSI: 35-40
2610										
2605										
2600										
2595										2,595.0 30.1 Boring Terminated at Elevation 2,595.0 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT BORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/11/25

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 13+56	**OFFSET** 14 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,625.1 ft	**TOTAL DEPTH** 30.1 ft	**NORTHING** 1,004,810	**EASTING** 1,266,865 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/16/25	**COMP. DATE** 10/16/25	**SURFACE WATER DEPTH** 0.4ft
CORE SIZE NQ	**TOTAL RUN** 24.5 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))
2619.5											Begin Coring @ 5.6 ft
	2,619.5	5.6	4.5	*N=60/0.0* 2:16/1.0 2:17/1.0 1:54/1.0 1:33/1.0 0:57/0.5	(4.5) 100%	(0.8) 18%		(24.4) 100%	(10.5) 43%		2,619.5 Moderately Weathered to Fresh, Moderately Hard to Hard, Gray-White-Black, (Biotite Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing 5.6
2615	2,615.0	10.1									GSI: 35-40
			5.0	1:50/1.0 1:10/1.0 1:21/1.0 1:28/1.0 1:40/1.0	(5.0) 100%	(0.5) 10%					
2610	2,610.0	15.1									
			5.0	1:53/1.0 2:35/1.0 1:35/1.0 1:41/1.0 1:25/1.0	(5.0) 100%	(2.4) 48%					
2605	2,605.0	20.1									
			5.0	1:13/1.0 1:33/1.0 2:07/1.0 2:15/1.0 3:15/1.0	(5.0) 100%	(2.6) 52%					
2600	2,600.0	25.1									
			5.0	2:24/1.0 2:13/1.0 2:07/1.0 4:18/1.0 5:12/1.0	(4.9) 98%	(4.2) 84%					
2595	2,595.0	30.1									2,595.0 30.1 Boring Terminated at Elevation 2,595.0 ft In Crystalline Rock (Biotite Granitic Gneiss)

NCDOT CORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/11/25

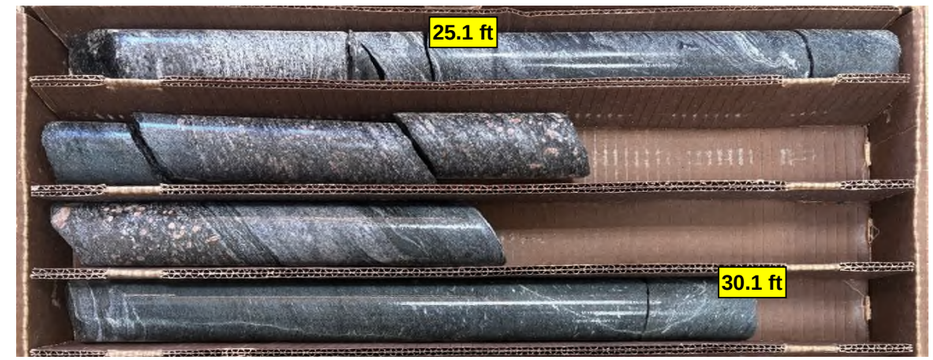
CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 93 on SR 1644 (McNeil Road) over
North Fork New River
Ashe County, North Carolina
Rock Core Photographs
B1-B

5.6 to 30.1 Feet

0 1 2

FEET



0 1 2

FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 14+17	**OFFSET** 2 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,628.6 ft	**TOTAL DEPTH** 7.2 ft	**NORTHING** 1,004,834	**EASTING** 1,266,922	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 11/18/25	**COMP. DATE** 11/18/25	**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)
2630												
	2,628.6	0.0								2,628.6	GROUND SURFACE	0.0
			2	2	2	4		Sat.			**ALLUVIAL** Loose, Brown-Black, Fine to Coarse Gravelly SAND (A-1-b)	
2625	2,625.6	3.0	3	4	5	9		Sat.				
	2,621.4	7.2	60/0.0			60/0.0				2,621.4		7.2

Boring Terminated with Standard Penetration Test Refusal at Elevation 2,621.4 ft On Crystalline Rock (Biotite Granitic Gneiss)

NCDOT BORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/10/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+11	**OFFSET** 19 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,631.0 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 1,004,816	**EASTING** 1,266,919 / **24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/17/25	**COMP. DATE** 10/17/25	**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))
2635										
	2,631.0	0.0								2,631.0 GROUND SURFACE 0.0
2630			1	2	2	4		M		**ALLUVIAL** Soft to Medium Stiff, Brown, Fine Sandy SILT (A-4), with trace organics and gravel
	2,627.7	3.3	4	3	3	6		Sat.		
2625										
	2,622.7	8.3	100/0.2			100/0.2				2,622.7 8.3
	2,621.0	10.0	60/0.0			60/0.0				2,621.0 **WEATHERED ROCK** Gray, (Biotite Granitic Gneiss) 10.0
2620										**CRYSTALLINE ROCK** Gray-White, (Biotite Granitic Gneiss)
										2,616.4 REC: 98% RQD: 76% GSI: 55-60 14.6
										Boring Terminated at Elevation 2,616.4 ft In Crystalline Rock (Biotite Granitic Gneiss)
										Surficial Organic Soil - 0.2'

NCDOT BORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/10/25

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50714.1.1	**TIP** HB-0044	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 093 on SR 1644 (McNeil Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+11	**OFFSET** 19 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,631.0 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 1,004,816	**EASTING** 1,266,919 / **24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/17/25	**COMP. DATE** 10/17/25	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ	**TOTAL RUN** 4.6 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
2621											Begin Coring @ 10.0 ft
2620	2,621.0	10.0	4.6	*N=60/0.0* 4:25/1.0 2:45/1.0 3:03/1.0 3:12/1.0 1:47/0.6	(4.5) 98%	(3.5) 76%		(4.5) 98%	(3.5) 76%		2,621.0 **CRYSTALLINE ROCK** Slightly Weathered to Fresh, Hard, Gray-White, (Biotite Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing 10.0
	2,616.4	14.6									2,616.4 GSI: 55-60 14.6
											Boring Terminated at Elevation 2,616.4 ft In Crystalline Rock (Biotite Granitic Gneiss)
											Surficial Organic Soil - 0.2'

NCDOT CORE DOUBLE 04_GEO_BRDG93_GTM.GPJ NC_DOT.GDT 12/10/25

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 93 on SR 1644 (McNeil Road) over
North Fork New River
Ashe County, North Carolina
Rock Core Photographs
EB2-B
10.0 to 14.6 Feet

ROCK TEST RESULTS

SAMPLE NO.	BORING	NORTHING	EASTING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS–01	B1–A	1004833	1266858	13+54 –L–	10' LT	10.2'–10.7'	BIOTITE GRANITIC GNEISS	178.2	8,310 psi /1,197 ksf

AUTHORIZED SIGNATURE
NCDOT CERT NO. 130–04–0212

Prepared in the Office of:
F&ME CONSULTANTS, INC.
COLUMBIA, SOUTH CAROLINA
NCDOT LAB CERT. NO. 130–0212

PROJECT REFERENCE NO.	SHEET NO.
HB-0044	15

SITE PHOTOS

PHOTO #1: VIEW FROM END BENT NO. 1 FACING EAST TOWARD END BENT NO. 2.

PHOTO #2: VIEW FROM END BENT NO. 2 FACING NORTH, DOWNSTREAM.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0050	1	

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ASHE

PROJECT DESCRIPTION REPLACE BRIDGE NO. 463 ON SR 1563 (CLIFFTON ROAD) OVER NORTH FORK NEW RIVER

SITE DESCRIPTION BRIDGE NO. 0463

REFERENCE: HB-0050

PROJECT: 50720

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-13	BORE LOGS, CORE REPORTS, & CORE PHOTOS
14	ROCK TEST RESULTS
15	SITE PHOTOGRAPHS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 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.

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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

CG2 EXPLORATION

P. MCKENZIE

M. MALISHER

INVESTIGATED BY CG2, PLLC

DRAWN BY M. MALISHER, E.I.T.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY CG2, PLLC

DATE DECEMBER, 2025

Prepared in the Office of:

CAROLINAS GEOTECHNICAL GROUP

1805 SARDIS ROAD N
SUITE 100
CHARLOTTE, NC 28270
(980) 339-8684

NORTH CAROLINA PROFESSIONAL SEAL 026917 ENGINEER MICHAEL J. WALKO

Signed by:
Michael J. Walko 12/15/2025
42C62874D58441C...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
HB-0050	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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
GRAIN SIZE 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
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [ ] TRICONE ____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B _____
- [ ] -H _____
- [X] -N 0

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:

DESIGN FILES PROVIDED BY NCDOT DATED JULY 30, 2025.

BRIDGE BORING COLLAR ELEVATIONS OBTAINED USING CARLSON BRX7 GPS.

FIAD = FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
HB–0050	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

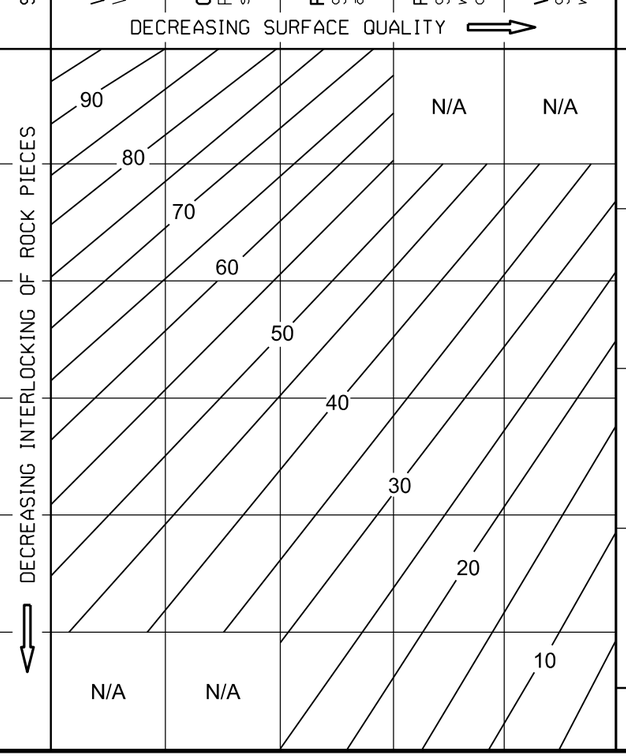
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

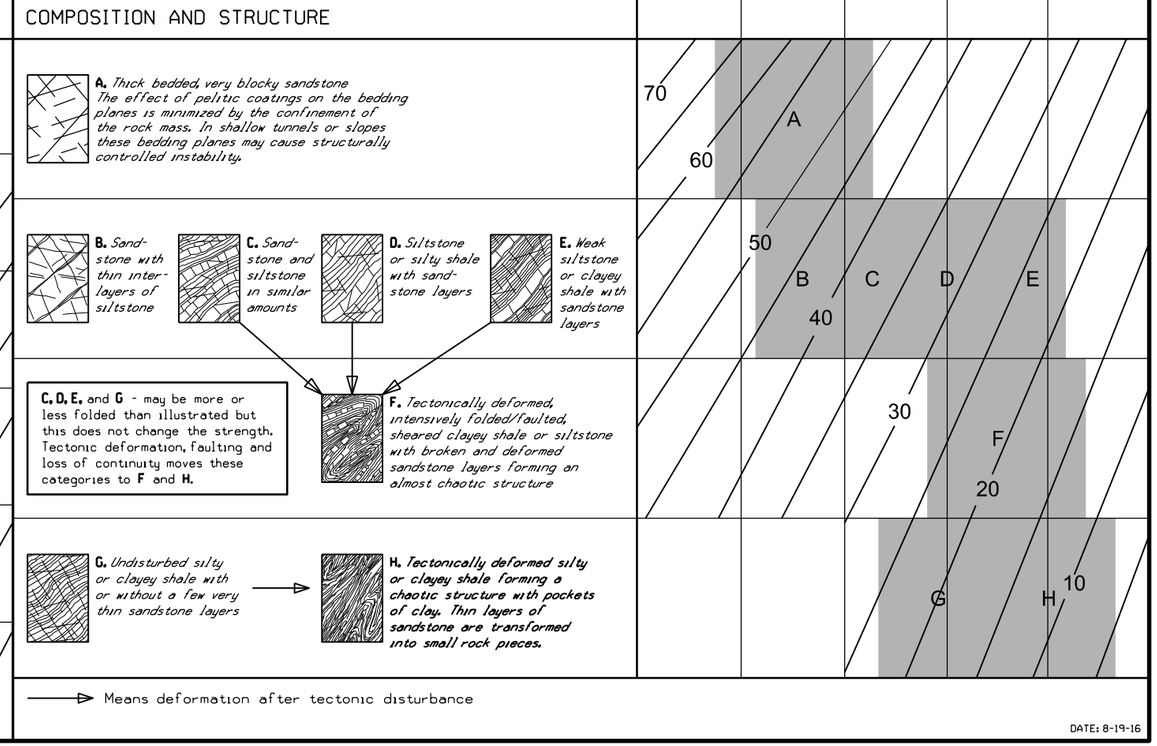


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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

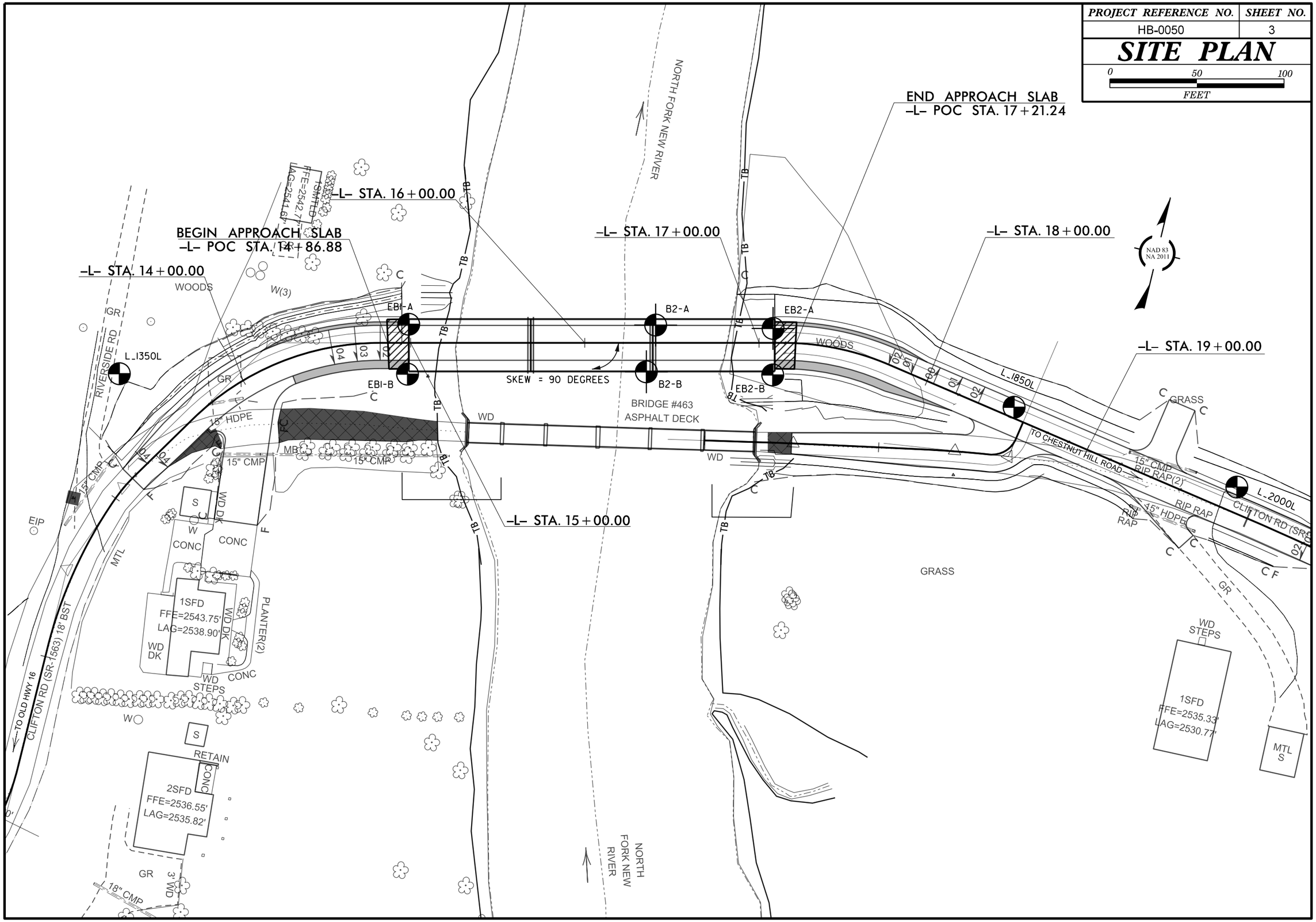


DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
HB-0050	3

SITE PLAN

0 50 100
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. L_1350L	**STATION** 13+52	**OFFSET** 48 ft LT	**ALIGNMENT** -L- / **0 HR.** 17.8
COLLAR ELEV. 2,563.1 ft	**TOTAL DEPTH** 30.4 ft	**NORTHING** 1,012,707	**EASTING** 1,298,377 / **24 HR.** 17.4
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**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)
2565											
										2,563.1 GROUND SURFACE	0.0
2560	2,560.6	2.5	6	3	5	8, 14		M		**ROADWAY EMBANKMENT** Medium Stiff to Stiff, Brown-Orange, Fine Sandy SILT (A-4), with trace gravel and mica	
	2,558.6	4.5	8	6	8			M		2,557.3	5.8
2555	2,555.6	7.5	4	5	6	11, 11		M		Stiff, Red, Silty CLAY (A-7), with trace mica	
	2,553.6	9.5	5	5	6			M		2,553.6	9.5
2550										Stiff, Brown-Red, Fine Sandy CLAY (A-6), with trace mica	
	2,548.6	14.5	4	4	11	15		M		2,548.1	15.0
2545										**RESIDUAL** Stiff to Hard, Brown-Orange-Gray, Fine Sandy SILT (A-4), with trace mica	
	2,543.6	19.5	22	25	18	43		M			
2540											
	2,538.6	24.5	100/0.4			100/0.4				2,538.6	24.5
2535										**WEATHERED ROCK** Brown-Gray, (Biotite Granitic Gneiss)	
	2,533.6	29.5	32	68/0.4		100/0.9				2,532.7	30.4
										Boring Terminated at Elevation 2,532.7 ft In Weathered Rock (Biotite Granitic Gneiss)	

NCDOT BORE DOUBLE 04_GEO_BRDG463_GTM.GPJ NC_DOT.GDT 12/5/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 14+99	**OFFSET** 11 ft LT	**ALIGNMENT** -L- / **0 HR.** 18.4
COLLAR ELEV. 2,529.1 ft	**TOTAL DEPTH** 24.3 ft	**NORTHING** 1,012,773	**EASTING** 1,298,532 / **24 HR.** 11.4
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**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)
2530											
										2,529.1 GROUND SURFACE	0.0
	2,526.7	2.4	2	3	3	6		M		**ARTIFICIAL FILL** Medium Stiff to Hard, Brown, Fine Sandy SILT (A-4), with trace roots and gravel	
2525	2,524.8	4.3	6	4	4	8		M			
	2,521.7	7.4	9	14	35	49		M			
2520	2,519.8	9.3	28	40	33	73				2,520.1	9.0
										Very Dense, Brown, Fine to Coarse Gravelly SAND (A-1-b)	
2515	2,514.8	14.3	40	60/0.4		100/0.9				2,514.8	14.3
										WEATHERED ROCK Brown, (Biotite Granitic Gneiss)	
2510	2,509.8	19.3	35	40	60/0.4	100/0.9					
2505	2,504.8	24.3	60/0.0			60/0.0				2,504.8	24.3
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,504.8 ft On Crystalline Rock (Biotite Granitic Gneiss)	

NCDOT BORE DOUBLE 04_GEO_BRDG463_GTM.GPJ NC_DOT.GDT 12/5/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 14+98	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.6
COLLAR ELEV. 2,528.9 ft	**TOTAL DEPTH** 24.6 ft	**NORTHING** 1,012,745	**EASTING** 1,298,538	**24 HR.** 12.0
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**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)
2530										2,528.9 GROUND SURFACE	0.0
	2,526.1	2.8								**ARTIFICIAL FILL** Stiff to Very Stiff, Brown, Fine Sandy SILT (A-4), with trace mica and gravel	
2525			4	4	5	9		M			
	2,524.1	4.8	4	7	23	30		M		2,522.4	6.5
	2,521.1	7.8								Very Dense, Brown, Fine to Coarse Gravelly SAND (A-1-b), with trace mica	
2520			18	36	29	65		M			
	2,519.1	9.8	26	24	55	79					
2515								M			
	2,514.1	14.8	32	68/0.4		100/0.9				2,514.1	14.8
										WEATHERED ROCK Brown, (Biotite Granitic Gneiss)	
2510										2,510.9	18.0
	2,509.1	19.8	20	17	71	88		M		**RESIDUAL** Hard, Brown, Fine Sandy SILT (A-4), with trace to little mica	
2505											
	2,504.3	24.6	60/0.0			60/0.0				2,504.3	24.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,504.3 ft On Crystalline Rock (Biotite Granitic Gneiss)	
										Note: Possible cobbles and boulders in upper 12 feet of Artificial Fill.	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 16+42	**OFFSET** 10 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,516.2 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 1,012,805	**EASTING** 1,298,670 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** 0.7ft

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))
2520										
	2,516.2	0.0								WATER SURFACE (10/15/25)
2515			2	11	15	26		Sat.		2,516.2 / 0.0 — **ALLUVIAL** Medium Dense, Brown, Fine to Coarse Gravelly SAND (A-1-b) — 2,515.1 / 1.1
	2,512.1	4.1	60/0.0			60/0.0				**RESIDUAL** Stiff, Brown, Fine Sandy SILT (A-4), with trace gravel-sized rock fragments and mica — 2,512.1 / 4.1
2510	2,510.3	5.9	60/0.0			60/0.0	RS-01			2,510.3 / 5.9 — **CRYSTALLINE ROCK** Gray, (Biotite Granitic Gneiss)
2505										Gray, (Biotite Granitic Gneiss) REC = 98% RQD = 77% GSI = 60-65
2500										2,495.7 / 20.5 — Boring Terminated at Elevation 2,495.7 ft In Crystalline Rock (Biotite Granitic Gneiss)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 16+42	**OFFSET** 10 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,516.2 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 1,012,805	**EASTING** 1,298,670 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** 0.7ft
CORE SIZE N/A	**TOTAL RUN** 14.6 ft		

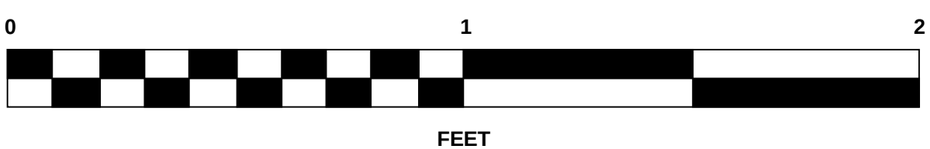
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
2510											Begin Coring @ 5.9 ft
	2,510.3	5.9	4.6	*N=60/0.0* 3:59/1.0 3:48/1.0 3:17/1.0 4:12/1.0 3:44/0.6	(4.3) 93%	(3.9) 85%	RS-01	(14.3) 98%	(11.3) 77%		2,510.3 / 5.9 — Slightly to Very Slightly Weathered, Hard, Gray, (Biotite Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing RS-01: 5.9' - 6.5' Unit Weight: 171.6 pcf Unconfined Compressive Strength: 2,560 psi (369 ksf) GSI = 60-65
2505	2,505.7	10.5	5.0	5:44/1.0 4:28/1.0 3:30/1.0 3:52/1.0 3:59/1.0	(5.0) 100%	(3.5) 70%					
2500	2,500.7	15.5	5.0	3:29/1.0 4:26/1.0 3:50/1.0 4:03/1.0 4:11/1.0	(5.0) 100%	(3.9) 78%					
	2,495.7	20.5									2,495.7 / 20.5 — Boring Terminated at Elevation 2,495.7 ft In Crystalline Rock (Biotite Granitic Gneiss)

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 463 on SR 1563 (Clifton Road)
over North Fork New River
Ashe County, North Carolina

Rock Core Photographs
B2-A

5.9 to 20.5 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 16+35	**OFFSET** 17 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,515.9 ft	**TOTAL DEPTH** 25.1 ft	**NORTHING** 1,012,778	**EASTING** 1,298,671 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/16/25	**COMP. DATE** 10/16/25	**SURFACE WATER DEPTH** 0.9ft

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))
2520										
										WATER SURFACE (10/16/25)
	2,515.9	0.0								2,515.9 / 0.0
2515			3	10	7	17		Sat.		**ALLUVIAL** Medium Dense, Brown, Fine to Coarse Gravelly SAND (A-1-b)
	2,512.2	3.7	100/0.2			100/0.2				2,512.2 / 3.7
2510										**WEATHERED ROCK** (Biotite Granitic Gneiss)
	2,508.3	7.6	60/0.0			60/0.0				2,508.3 / 7.6
2505										**CRYSTALLINE ROCK** Gray-White-Black, (Biotite Granitic Gneiss) REC = 97% RQD = 75% GSI = 55-60
2500							RS-02			
2495										2,490.8 / 25.1
										Boring Terminated at Elevation 2,490.8 ft In Crystalline Rock (Biotite Granitic Gneiss)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** M. Malisher
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 16+35	**OFFSET** 17 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,515.9 ft	**TOTAL DEPTH** 25.1 ft	**NORTHING** 1,012,778	**EASTING** 1,298,671 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/16/25	**COMP. DATE** 10/16/25	**SURFACE WATER DEPTH** 0.9ft
CORE SIZE N/A	**TOTAL RUN** 17.5 ft		

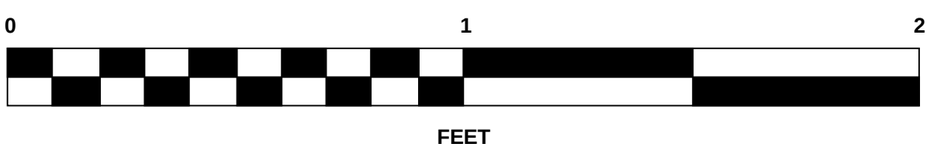
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
2508.3											Begin Coring @ 7.6 ft
	2,508.3	7.6	2.5	*N=60/0.0*	(2.0)	(1.2)		(17.0)	(13.2)		2,508.3 / 7.6 **CRYSTALLINE ROCK** Slightly Weathered to Fresh, Moderately Hard to Hard, Gray-White-Black, (Biotite Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing RS-02: 16.9' - 17.6' Unit Weight: 175.4 pcf Unconfined Compressive Strength: 4,160 psi (599 ksf) GSI = 55-60
				4:19/1.0	80%	48%		97%	75%		
	2,505.8	10.1		3:32/1.0							
2505			5.0	2:18/0.5	(5.0)	(4.3)					
				3:19/1.0	100%	86%					
				3:56/1.0							
				3:44/1.0							
				2:37/1.0							
	2,500.8	15.1		2:28/1.0							
2500			5.0	1:43/1.0	(5.0)	(3.3)					
				1:40/1.0	100%	66%					
				1:45/1.0			RS-02				
				1:52/1.0							
	2,495.8	20.1		2:01/1.0							
2495			5.0	1:38/1.0	(5.0)	(4.4)					
				1:53/1.0	100%	88%					
				2:16/1.0							
				2:09/1.0							
	2,490.8	25.1		1:38/1.0							2,490.8 / 25.1
											Boring Terminated at Elevation 2,490.8 ft In Crystalline Rock (Biotite Granitic Gneiss)

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 463 on SR 1563 (Clifton Road)
over North Fork New River
Ashe County, North Carolina

Rock Core Photographs
B2-B

7.6 to 25.1 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+08	**OFFSET** 8 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,518.7 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 1,012,819	**EASTING** 1,298,736 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**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))
2520										
	2,518.7	0.0								2,518.7 GROUND SURFACE 0.0
			1	3	2	5		M		**ALLUVIAL** Loose, Brown, Fine to Coarse Gravelly SAND (A-1-b), with trace mica 2,516.2 / 2.5
2515	2,514.7	4.0	23	41	53	94		M		**RESIDUAL** Hard, Brown-Gray, Fine Sandy SILT (A-4), with trace mica
2510	2,509.7	9.0								2,509.7 9.0
	2,507.8	10.9	60/0.1			60/0.1				**CRYSTALLINE ROCK** Gray, (Biotite Granitic Gneiss) 2,507.7 / 11.0
			60/0.1			60/0.1				Gray, (Biotite Granitic Gneiss)
2505										REC = 91% RQD = 77% GSI = 60-65 2,503.3 / 15.4
										Boring Terminated at Elevation 2,503.3 ft In Crystalline Rock (Biotite Granitic Gneiss)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+08	**OFFSET** 8 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,518.7 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 1,012,819	**EASTING** 1,298,736 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** N/A
CORE SIZE N/A	**TOTAL RUN** 4.4 ft		

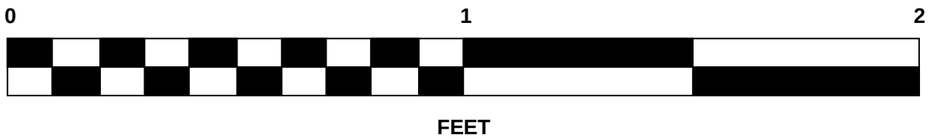
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
2507.7											Begin Coring @ 11.0 ft
	2,507.7	11.0	4.4	4:00/1.0 3:21/1.0 3:08/1.0 3:25/1.0 2:21/0.4	(4.0) 91%	(3.4) 77%		(4.0) 91%	(3.4) 77%		2,507.7 Slighly Weathered to Very Slightly Weathered, Medium Hard to Hard, Gray, (Biotite Granitic Gneiss), with Very Close to Close Fracture Spacing 11.0
2505	2,503.3	15.4									2,503.3 GSI = 60-65 15.4
											Boring Terminated at Elevation 2,503.3 ft In Crystalline Rock (Biotite Granitic Gneiss)

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 463 on SR 1563 (Clifton Road)
over North Fork New River
Ashe County, North Carolina

Rock Core Photographs
EB2-A

11.0 to 15.4 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 17+08	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,520.6 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 1,012,793	**EASTING** 1,298,742	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**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)
2525											
2520	2,520.6	0.0	WOH	1	1	2		M		2,520.6 GROUND SURFACE	0.0
										ALLUVIAL Very Loose, Brown, Fine to Coarse Gravelly Sand (A-1-b), with trace mica	
	2,516.5	4.1	100/0.5			100/0.5				Alluvial Cobbles from 0.0' to 6.0'	
2515										2,514.6	6.0
										RESIDUAL Brown, Fine Sandy SILT (A-4), with trace mica	
	2,511.5	9.1	100/0.3			100/0.3				2,511.5	9.1
2510										**WEATHERED ROCK** Gray, (Biotite Granitic Gneiss)	
	2,506.6	14.0	60/0.0			60/0.0				2,506.6	14.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,506.6 ft On Crystalline Rock (Biotite Granitic Gneiss)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. L_1850L	**STATION** 18+52	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.9
COLLAR ELEV. 2,528.0 ft	**TOTAL DEPTH** 16.4 ft	**NORTHING** 1,012,807	**EASTING** 1,298,881	**24 HR.** 11.0
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**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)
2530											
										2,528.0 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Medium Stiff, Brown, Fine Sandy SILT (A-4), with trace mica	
2525	2,526.0	2.0	2	4	3	7		M		2,524.0	4.0
	2,523.1	4.9	2	2	3	5		M		Medium Stiff, Brown, Silty CLAY (A-7)	
2520	2,521.0	7.0	5	18	14	32		M		2,521.0	7.0
	2,518.1	9.9	8	12	12	24				Medium Dense, Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace to little mica and gravel	
2515										2,517.0	11.0
	2,513.1	14.9	20	12	17	29		M		**RESIDUAL** Very Stiff, Brown-Orange, Fine Sandy SILT (A-4), with trace mica and gravel	
										2,511.6	16.4
										Boring Terminated at Elevation 2,511.6 ft In Residual Sandy SILT (A-4)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50720.1.1	**TIP** HB-0050	**COUNTY** ASHE	**GEOLOGIST** P. McKenzie
SITE DESCRIPTION Replace Bridge No. 463 on SR 1563 (Clifton Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. L_2000L	**STATION** 19+87	**OFFSET** 14 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 2,534.5 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 1,012,792	**EASTING** 1,299,016	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**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)
2535										2,534.5 GROUND SURFACE	0.0
	2,532.3	2.2	3	3	4	7		M		**ROADWAY EMBANKMENT** Medium Stiff, Brown, Silty CLAY (A-7), with trace gravel	
2530	2,530.0	4.5	2	2	4	6		M			
	2,527.3	7.2	2	2	4	6		M		2,528.0 Medium Stiff, Brown, Fine Sandy SILT (A-4), with trace mica	6.5
2525	2,525.0	9.5	2	3	3	6		M			
2520	2,520.0	14.5	13	28	30	58		M		2,521.5 **RESIDUAL** Hard, Brown-Gray, Fine Sandy SILT (A-4), with trace mica	13.0
										2,518.5 Boring Terminated at Elevation 2,518.5 ft In Residual Sandy SILT (A-4)	16.0

Note: Surficial Organic Laden Soil: 0.0-0.3 ft.

Possible cobbles and boulders from 12 to 13 feet in the Roadway Embankment.

ROCK TEST RESULTS

SAMPLE NO.	BORING	NORTHING	EASTING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS–01	B2–A	1012805	1298670	16+42 –L–	10' LT	5.9'–6.5'	BIOTITE GRANITIC GNEISS	171.6	2,560 psi/369 ksf
RS–02	B2–B	1012778	1298671	16+35 –L–	17' RT	16.9'–17.6'	BIOTITE GRANITIC GNEISS	175.4	4,160 psi/599 ksf

AUTHORIZED SIGNATURE
NCDOT CERT NO. 130–04–0212

Prepared in the Office of:
F&ME CONSULTANTS, INC.
COLUMBIA, SOUTH CAROLINA
NCDOT LAB CERT. NO. 130–0212

PROJECT REFERENCE NO.	SHEET NO.
HB-0050	15

SITE PHOTOS

PHOTO #1: VIEW FACING NORTH, DOWNSTREAM.

PHOTO #2: VIEW FROM END BENT NO. 1 FACING EAST TOWARD END BENT 2.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0053	1	

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ASHE

PROJECT DESCRIPTION REPLACE BRIDGE NO. 480 ON SR 1126 (ED LITTLE ROAD) OVER NORTH FORK NEW RIVER

SITE DESCRIPTION BRIDGE NO. 0480

REFERENCE: HB-0053

PROJECT: 50723

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-9	BORE LOGS, CORE REPORTS, & CORE PHOTOS
10	ROCK TEST RESULTS
11	SITE PHOTOGRAPHS

CAUTION NOTICE

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

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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

CG2 EXPLORATION

K. CLARK

INVESTIGATED BY CG2, PLLC

DRAWN BY M. MALISHER, E.I.T.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY CG2, PLLC

DATE JANUARY 2026

Prepared in the Office of:

CAROLINAS GEOTECHNICAL GROUP

1805 SARDIS ROAD N
SUITE 100
CHARLOTTE, NC 28270
(980) 339-8684

NORTH CAROLINA PROFESSIONAL SEAL 026917 ENGINEER MICHAEL J. WALKO

Signed by:
Michael J. Walko 01/13/2026
42C62874D58441C...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
HB-0053	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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
GRAIN SIZE 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
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [ ] TRICONE ____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

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

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

ELEVATION: FEET

NOTES:

ROADWAY DESIGN FILES PROVIDED BY NCDOT DATED OCTOBER 20, 2025.

BRIDGE BORING COLLAR ELEVATIONS OBTAINED USING CARLSON BRX7 GPS.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
HB–0053	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

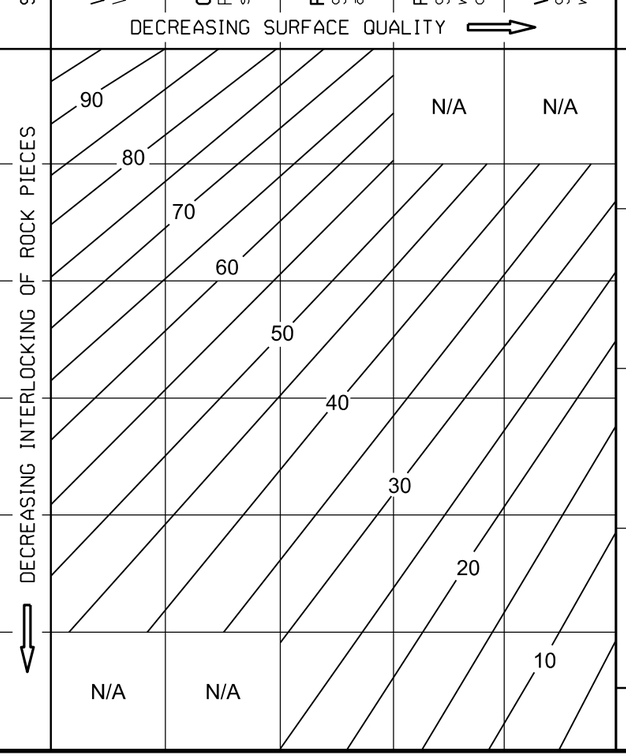
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

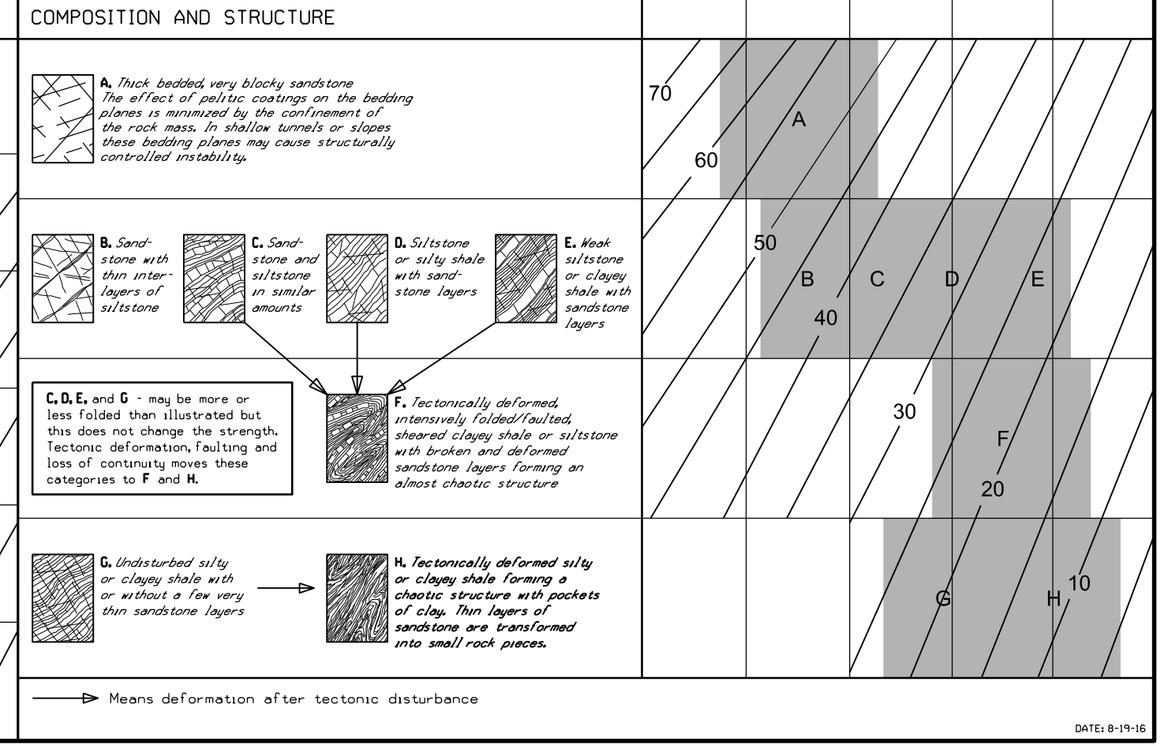


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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

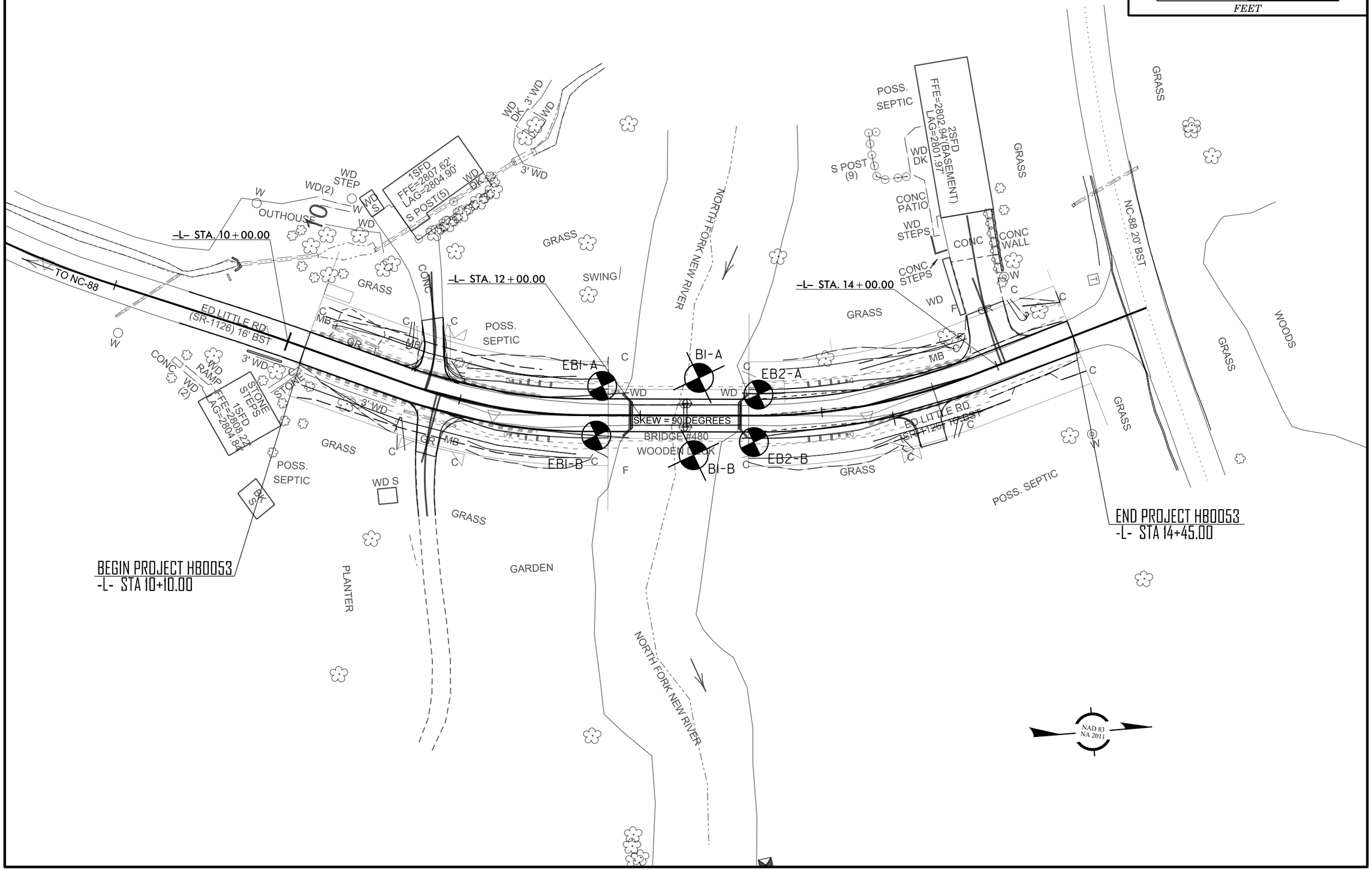


DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
HB-0053	3

SITE PLAN

0 50 100
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 11+79	**OFFSET** 16 ft LT	**ALIGNMENT** L — **0 HR.** N/A
COLLAR ELEV. 2,796.7 ft	**TOTAL DEPTH** 23.7 ft	**NORTHING** 991,849	**EASTING** 1,234,424 — **24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/21/25	**COMP. DATE** 10/21/25	**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)
2800											
	2,796.7	0.0								2,796.7 GROUND SURFACE	0.0
2795			1	2	6	8				**ROADWAY EMBANKMENT** Medium Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel	
	2,793.0	3.7								2,794.2	2.5
			3	4	5	9		M		**RESIDUAL** Stiff to Hard, Gray-Tan-Orange-Black, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel-sized rock fragments	
2790											
	2,788.0	8.7									
			48	48	29	77		M			
2785											
	2,783.0	13.7								2,783.0	13.7
			54	46/0.4		100/0.9				**WEATHERED ROCK** Orange-Brown-Black, (Granitic Gneiss)	
2780										2,779.2	17.5
	2,778.0	18.7								**RESIDUAL** Hard, Gray-Orange-Black, Fine Sandy SILT (A-4), with trace mica	
			17	37	58	95		M			
2775											
	2,773.0	23.7								2,773.0	23.7
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,773.0 ft On Crystalline Rock (Granitic Gneiss)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 11+76	**OFFSET** 11 ft RT	**ALIGNMENT** L — **0 HR.** Dry
COLLAR ELEV. 2,795.6 ft	**TOTAL DEPTH** 13.4 ft	**NORTHING** 991,840	**EASTING** 1,234,450 — **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/21/25	**COMP. DATE** 10/21/25	**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)
2800											
	2,795.6	0.0								2,795.6 GROUND SURFACE	0.0
2795			3	4	5	9		M		**ROADWAY EMBANKMENT** Loose, Gray-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica, gravel, and organics	
	2,792.2	3.4								2,793.1	2.5
			3	7	7	14		M		**ALLUVIAL** Medium Dense, Orange-Brown-Tan, Fine to Coarse Sandy GRAVEL (A-1-a), with trace mica	
2790										2,788.1	7.5
	2,787.2	8.4								**RESIDUAL** Very Dense, Tan-White-Black, Silty Fine to Coarse SAND (A-2-4), with trace mica	
			21	55	35	90		M			
2785											
	2,782.2	13.4								2,782.2	13.4
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,782.2 ft On Crystalline Rock (Granitic Gneiss)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 12+32	**OFFSET** 21 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,790.8 ft	**TOTAL DEPTH** 39.1 ft	**NORTHING** 991,902	**EASTING** 1,234,431 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/21/25	**COMP. DATE** 10/21/25	**SURFACE WATER DEPTH** 1.0ft

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))
2795										
										WATER SURFACE (10/21/25)
2790	2,790.8	0.0	2	2	2	4		Sat.		2,790.8 — GROUND SURFACE 0.0
										2,788.8 — **ALLUVIAL** Loose, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel 2.0
	2,787.2	3.6	19	35	40	75		M		**RESIDUAL** Hard, Gray-Black-Orange, Fine to Coarse Sandy SILT (A-4), with trace mica
2785										
	2,782.2	8.6	12	88/0.4		100/0.9				2,782.2 — **WEATHERED ROCK** Gray-Black-Orange, (Granitic Gneiss) 8.6
2780										
	2,777.2	13.6								
	2,776.5	14.3	60	40/0.2		100/0.7				2,776.5 — **CRYSTALLINE ROCK** Gray-White, (Granitic Gneiss) 14.3
2775			60/0.0			60/0.0				REC = 90% RQD = 87% GSI = 70-75
2770										
							RS-01			
2765										
2760										
							RS-02			
2755										
										2,751.7 — Boring Terminated at Elevation 2,751.7 ft In Crystalline Rock (Granitic Gneiss) 39.1

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 12+32	**OFFSET** 21 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,790.8 ft	**TOTAL DEPTH** 39.1 ft	**NORTHING** 991,902	**EASTING** 1,234,431 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/21/25	**COMP. DATE** 10/21/25	**SURFACE WATER DEPTH** 1.0ft
CORE SIZE NQ	**TOTAL RUN** 24.8 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))
2776.5											Begin Coring @ 14.3 ft
2775	2,776.5	14.3	4.8	N=60/0.0 2:34/0.8 2:27/1.0 2:22/1.0 1:54/1.0 1:32/1.0	(2.2) 46%	(1.7) 35%		(22.2) 90%	(21.5) 87%		2,776.5 — **CRYSTALLINE ROCK** Slightly Weathered to Fresh, Hard to Very Hard, Gray-White, (Granitic Gneiss), with Very Close to Moderately Close Fracture Spacing 14.3
	2,771.7	19.1									GSI = 70-75
2770			5.0	2:42/1.0 4:09/1.0 3:20/1.0 3:21/1.0 3:47/1.0	(5.0) 100%	(4.8) 96%					RS-01: 22.3'-22.9' Unit Weight: 170.8 pcf Unconfined Compressive Strength: 9,300 psi (1,340 ksf)
	2,766.7	24.1					RS-01				
2765			5.0	3:06/1.0 2:18/1.0 2:18/1.0 1:49/1.0 2:25/1.0	(5.0) 100%	(5.0) 100%					RS-02: 32.5'-33.0' Unit Weight: 173.0 pcf Unconfined Compressive Strength: 16,040 psi (2,300 ksf)
	2,761.7	29.1									
2760			5.0	1:56/1.0 2:06/1.0 2:27/1.0 2:42/1.0 2:16/1.0	(5.0) 100%	(5.0) 100%					
	2,756.7	34.1					RS-02				
2755			5.0	1:56/1.0 2:08/1.0 2:36/1.0 2:25/1.0 3:00/1.0	(5.0) 100%	(5.0) 100%					
	2,751.7	39.1									2,751.7 — Boring Terminated at Elevation 2,751.7 ft In Crystalline Rock (Granitic Gneiss) 39.1

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 480 on SR 1126 (Ed Little Rd) over North Fork New River
Ashe County, North Carolina
Rock Core Photographs
Boring: B1-A
14.3 to 39.1 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 12+29	**OFFSET** 22 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,790.0 ft	**TOTAL DEPTH** 40.3 ft	**NORTHING** 991,890	**EASTING** 1,234,472 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/22/25	**COMP. DATE** 10/22/25	**SURFACE WATER DEPTH** 1.0ft

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))
2790										WATER SURFACE (10/22/25)
	2,790.0	0.0	4	13	20	33		M		2,790.0 GROUND SURFACE 0.0
	2,786.2	3.8	13	49	51/0.2	100/0.7				**RESIDUAL** Hard, Orange-Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel-sized rock fragments; 2,785.7 4.3
2785										**WEATHERED ROCK** Orange-Black-Tan-Gray, (Granitic Gneiss)
	2,781.2	8.8	100/0.4			100/0.4				
2780										
	2,776.2	13.8	100/0.2			100/0.2				
2775										2,773.5 16.5
	2,771.2	18.8	33	24	20	44		M		**RESIDUAL** Hard, Orange-Black, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel-sized rock fragments
2770										
	2,766.2	23.8	60/0.0			60/0.0				2,766.2 23.8
2765										**CRYSTALLINE ROCK** 2,764.5 Gray-White-Green, (Granitic Gneiss) 25.5
							RS-03			Gray-White-Green, (Granitic Gneiss)
2760										REC = 100% RQD = 93% GSI = 75-80
2755										
							RS-04			
2750										2,749.7 40.3
										Boring Terminated at Elevation 2,749.7 ft In Crystalline Rock (Granitic Gneiss)

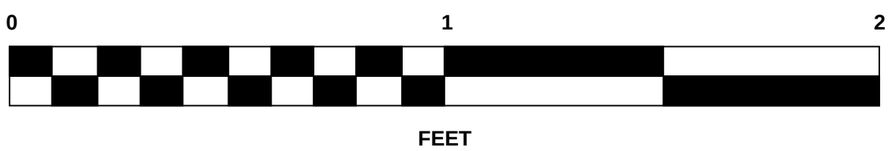
GEOTECHNICAL BORING REPORT
CORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 12+29	**OFFSET** 22 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,790.0 ft	**TOTAL DEPTH** 40.3 ft	**NORTHING** 991,890	**EASTING** 1,234,472 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/22/25	**COMP. DATE** 10/22/25	**SURFACE WATER DEPTH** 1.0ft
CORE SIZE NQ	**TOTAL RUN** 14.8 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))
2764.5											Begin Coring @ 25.5 ft
	2,764.5	25.5	4.8	3:28/0.8 3:20/1.0 3:10/1.0 3:35/1.0 3:00/1.0	(4.8) 100%	(3.7) 77%	RS-03	(14.8) 100%	(13.7) 93%		2,764.5 Moderately Weathered to Fresh, Soft to Very Hard, Gray-White-Green, (Granitic Gneiss), with Very Close to Wide Fracture Spacing 25.5
2760	2,759.7	30.3	5.0	3:14/1.0 3:13/1.0 3:04/1.0 3:00/1.0 3:45/1.0	(5.0) 100%	(5.0) 100%					GSI = 75-80
2755	2,754.7	35.3	5.0	3:41/1.0 2:41/1.0 2:51/1.0 3:10/1.0 3:16/1.0	(5.0) 100%	(5.0) 100%	RS-04				RS-03: 27.5'-28.2' Unit Weight: 176.9 pcf Unconfined Compressive Strength: 23,340 psi (3,360 ksf)
2750	2,749.7	40.3									RS-04: 36.5'-37.2' Unit Weight: 172.0 pcf Unconfined Compressive Strength: 10,670 psi (1,530 ksf)
											2,749.7 40.3
											Boring Terminated at Elevation 2,749.7 ft In Crystalline Rock (Granitic Gneiss)

CAROLINAS GEOTECHNICAL GROUP

Replace Bridge No. 480 on SR 1126 (Ed Little Rd) over North Fork New River
Ashe County, North Carolina
Rock Core Photographs
Boring: B1-B
25.5 to 40.3 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 12+65	**OFFSET** 12 ft LT	**ALIGNMENT** L	**0 HR.** Dry
COLLAR ELEV. 2,795.4 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 991,932	**EASTING** 1,234,447	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/21/25	**COMP. DATE** 10/21/25	**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)
2800											
2795	2,795.4	0.0	4	6	8	14		M		2,795.4 GROUND SURFACE	0.0
										2,792.9 **ROADWAY EMBANKMENT** Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica, gravel, and organics	2.5
	2,791.6	3.8	12	9	15	24		M		**ALLUVIAL** Medium Dense, Red-Gray, Fine to Coarse Sandy GRAVEL (A-1-a), with trace mica	
2790										2,788.9	6.5
	2,786.6	8.8	23	17	12	29		M		**RESIDUAL** Very Stiff, Gray-Black-Orange, Fine to Coarse Sandy SILT (A-4), with trace mica	
2785											
	2,781.6	13.8								2,781.6	13.8
	2,780.4	15.0	60/0.1			60/0.1				2,780.4 **CRYSTALLINE ROCK** Gray-White, (Granitic Gneiss)	15.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,780.4 ft In Crystalline Rock (Granitic Gneiss)	

WBS 50723.1.1	**TIP** HB-0053	**COUNTY** ASHE	**GEOLOGIST** K. Clark
SITE DESCRIPTION Replace Bridge No. 480 on SR 1126 (Ed Little Road) over North Fork New River			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 12+63	**OFFSET** 15 ft RT	**ALIGNMENT** L	**0 HR.** Dry
COLLAR ELEV. 2,794.4 ft	**TOTAL DEPTH** 17.1 ft	**NORTHING** 991,924	**EASTING** 1,234,472	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D-50 97% 04/30/2024		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 10/20/25	**COMP. DATE** 10/20/25	**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	
2795											
	2,794.4	0.0								2,794.4 GROUND SURFACE	0.0
			5	2	16	18		M		2,791.9 **ROADWAY EMBANKMENT** Medium Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica, organics, gravel, and asphalt fragments	2.5
2790	2,790.0	4.4	17	16	13	29		M		**ALLUVIAL** Medium Dense, Gray-Brown, Gravelly Fine to Coarse SAND (A-1-b), with trace mica	
2785	2,785.0	9.4	41	40	60/0.4	100/0.9				2,784.5	9.9
2780	2,780.0	14.4	16	35	65/0.4	100/0.9				**WEATHERED ROCK** Gray-Orange-Black-Tan, (Granitic Gneiss)	
	2,777.3	17.1	60/0.0			60/0.0				2,777.3	17.1
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,777.3 ft On Crystalline Rock (Granitic Gneiss)	

PROJECT REFERENCE NO.	SHEET NO.
HB–0053	10

ROCK TEST RESULTS

SAMPLE NO.	BORING	NORTHING	EASTING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS–01	B1–A	991902	1234431	12+32 –L–	21' LT	22.3'–22.9'	GRANITIC GNEISS	170.8	9,300 psi /1,340 ksf
RS–02	B1–A	991902	1234431	12+32 –L–	21' LT	32.5'–33.0'	GRANITIC GNEISS	173.0	16,040 psi /2,300 ksf
RS–03	B1–B	991890	1234472	12+29 –L–	22' RT	27.5'–28.2'	GRANITIC GNEISS	176.9	23,340 psi /3,360 ksf
RS–04	B1–B	991890	1234472	12+29 –L–	22' RT	36.5'–37.2'	GRANITIC GNEISS	172.0	10,670 psi /1,530 ksf

	119-0705
	NCDOT Cert. No.
	10/16/25
Authorzed Signature	Date

Prepared in the Office of:

UES
PINEVILLE, NC
NCDOT LAB CERT. NO. 119–0705

PROJECT REFERENCE NO.	SHEET NO.
HB-0053	11

SITE PHOTOS

PHOTO #1: VIEW FROM END BENT NO. 2 FACING SOUTH TOWARD END BENT NO. 1.

PHOTO #2: VIEW FROM END BENT NO. 1 FACING NORTH, UPSTREAM.