STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0062	1	

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ANSON

PROJECT DESCRIPTION BRIDGE NO. 14
OVER SOUTH FORK JONES CREEK ON US 52

REFERENCE: BR-0062

PROJECT: 67062

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J. HOLLAND

R. MAFFIA

M. EDWARDS

BRIDGER DRILLING

INVESTIGATED BY J. HOLLAND

DRAWN BY J. HOLLAND

CHECKED BY J. CRENSHAW

SUBMITTED BY SCHNABEL ENG.

DATE JUNE 2023

Schnabel ENGINEERING

NORTH CAROLINA LICENSED SEAL 2818 GEOLOGIST JASON A. HOLLAND

DocuSigned by:
Jason Holland
DF15142D0C8348A...
SIGNATURE

08/08/2023
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BR-0062	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [X] W/ ADVANCER
- [X] TRICONE 2 7/8 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] 2 15/16 " DRAG BIT

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

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BM-1 (N:416759.314, E:16949.430)
-L- STA. 19+32.74, 39.27' RIGHT
ELEVATION: 240.46 FEET

NOTES:

- PAVEMENT/ABC STONE
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
BR-0062	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

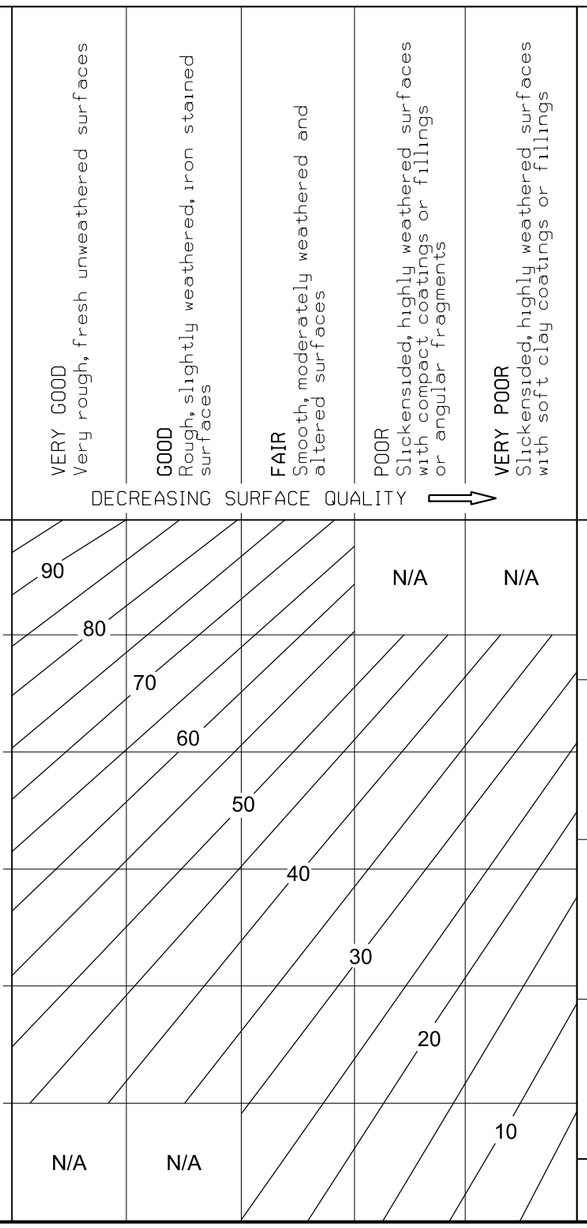
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

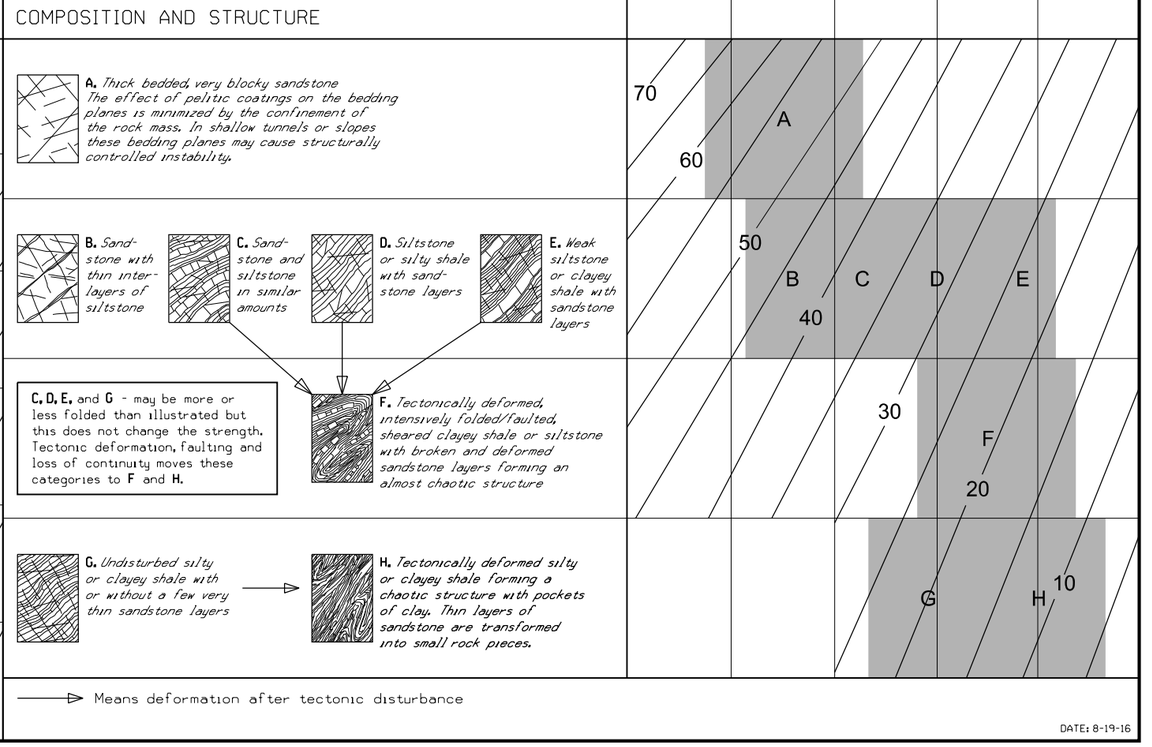


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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.
BR-0062	3

SITE PLAN

0 30 60
FEET

SKEW = 90°

BEGIN BRIDGE
-L- STA. 17+40.00

BEGIN APPROACH SLAB
-L- STA. 17+25.00

END BRIDGE
-L- STA. 18+75.00

END APPROACH SLAB
-L- STA. 18+90.00

-BL-4

-L-

TO WADESBORO

NC 52

BRIDGE #14

EBI-A
EBI-B
BI-A
BI-B
B2-A
B2-B
EB2-A
EB2-B

NC 52

TO MORVEN

END BENT 1

BENT 1

BENT 2

END BENT 2

BM-1

SOUTH FORK OF JONES CREEK

WOODS

JS

17

20

PROJECT REFERENCE NO.	SHEET NO.
BR-0062	4

RE2 **ROADWAY EMBANKMENT:** SOFT TO MEDIUM STIFF, RED, GRAY, AND BROWN, SILT AND CLAYEY SILT (A-4, A-5), WITH SOME SAND, CONTAINS GRAVEL, MICACEOUS, MOIST TO WET

ALI **ALLUVIAL:** MEDIUM STIFF, GRAY, SILTY CLAY (A-7-5), WITH TRACE TO SOME SAND, HIGHLY PLASTIC, MICACEOUS, WET

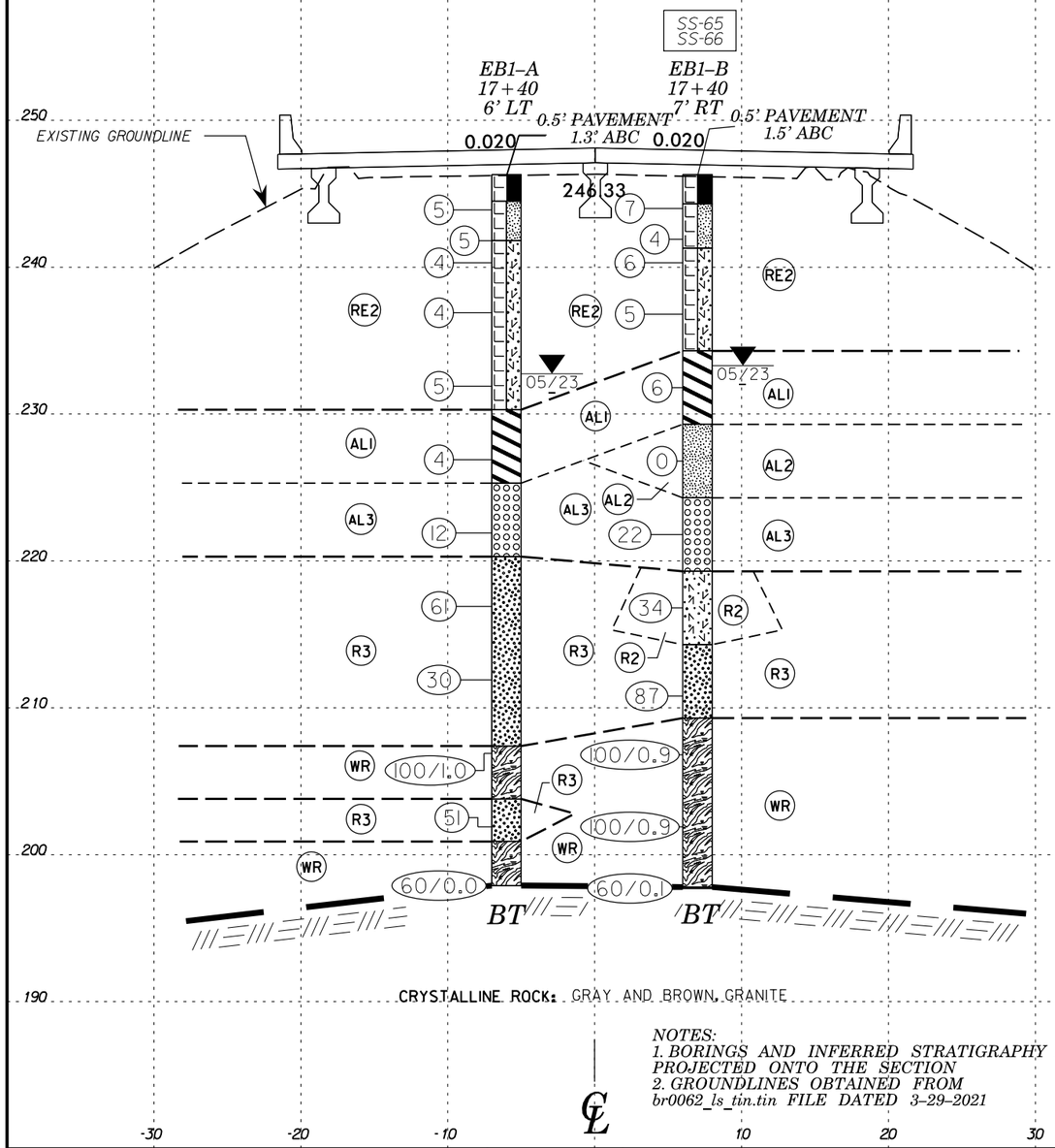
AL2 **ALLUVIAL:** VERY SOFT, GRAY, SILT (A-4), WITH LITTLE SAND, WET

AL3 **ALLUVIAL:** MEDIUM DENSE, GRAY, SAND AND GRAVEL (A-1-b), WITH TRACE CLAY, MOIST TO WET

R2 **RESIDUAL:** HARD, GRAY, CLAYEY SILT (A-5), CONTAINS ROCK FRAGMENTS, MICACEOUS, MOIST

R3 **RESIDUAL:** DENSE TO VERY DENSE, GRAY, SILTY SAND (A-2-4), CONTAINS ROCK FRAGMENTS, SAPROLITIC, MICACEOUS, MOIST

WR **WEATHERED ROCK:** BROWN, ORANGE, AND GRAY, GRANITE

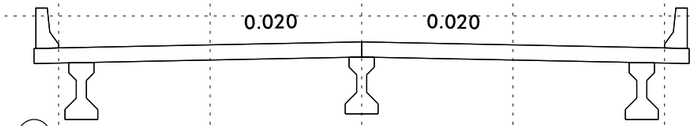


CRYSTALLINE ROCK: GRAY AND BROWN, GRANITE

NOTES:
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTION
2. GROUNDLINES OBTAINED FROM br0062_ls_tin.tin FILE DATED 3-29-2021

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A

END BENT 1 – CROSS SECTION –L– STA. 17+40.00 – 90^ SKEW

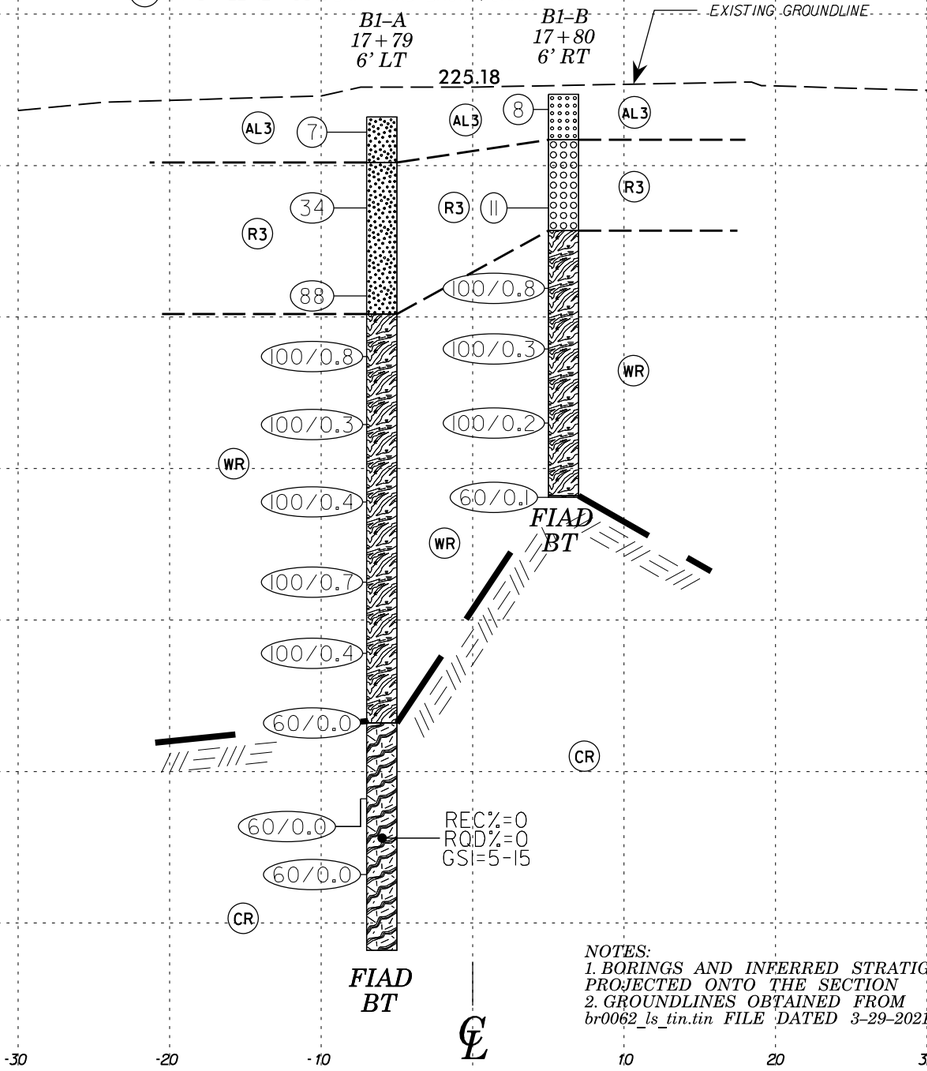


AL3 **ALLUVIAL:** LOOSE, BROWN AND GRAY, SAND AND SILTY SAND (A-3, A-2-4), CONTAINS GRAVEL AND WOOD FRAGMENTS, SATURATED

R3 **RESIDUAL:** MEDIUM DENSE TO VERY DENSE, GRAY AND BLACK, SAND AND SILTY SAND (A-1-b, A-2-4), CONTAINS ROCK FRAGMENTS, MOIST

WR **WEATHERED ROCK:** GRAY, BROWN, AND BLACK, GRANITE

CR **CRYSTALLINE ROCK:** GRAY AND BROWN, GRANITE



NOTES:
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTION
2. GROUNDLINES OBTAINED FROM br0062_ls_tin.tin FILE DATED 3-29-2021

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A

BENT 1 – CROSS SECTION –L– STA. 18+00.00 – 90^ SKEW

PROJECT REFERENCE NO.	SHEET NO.
BR-0062	5

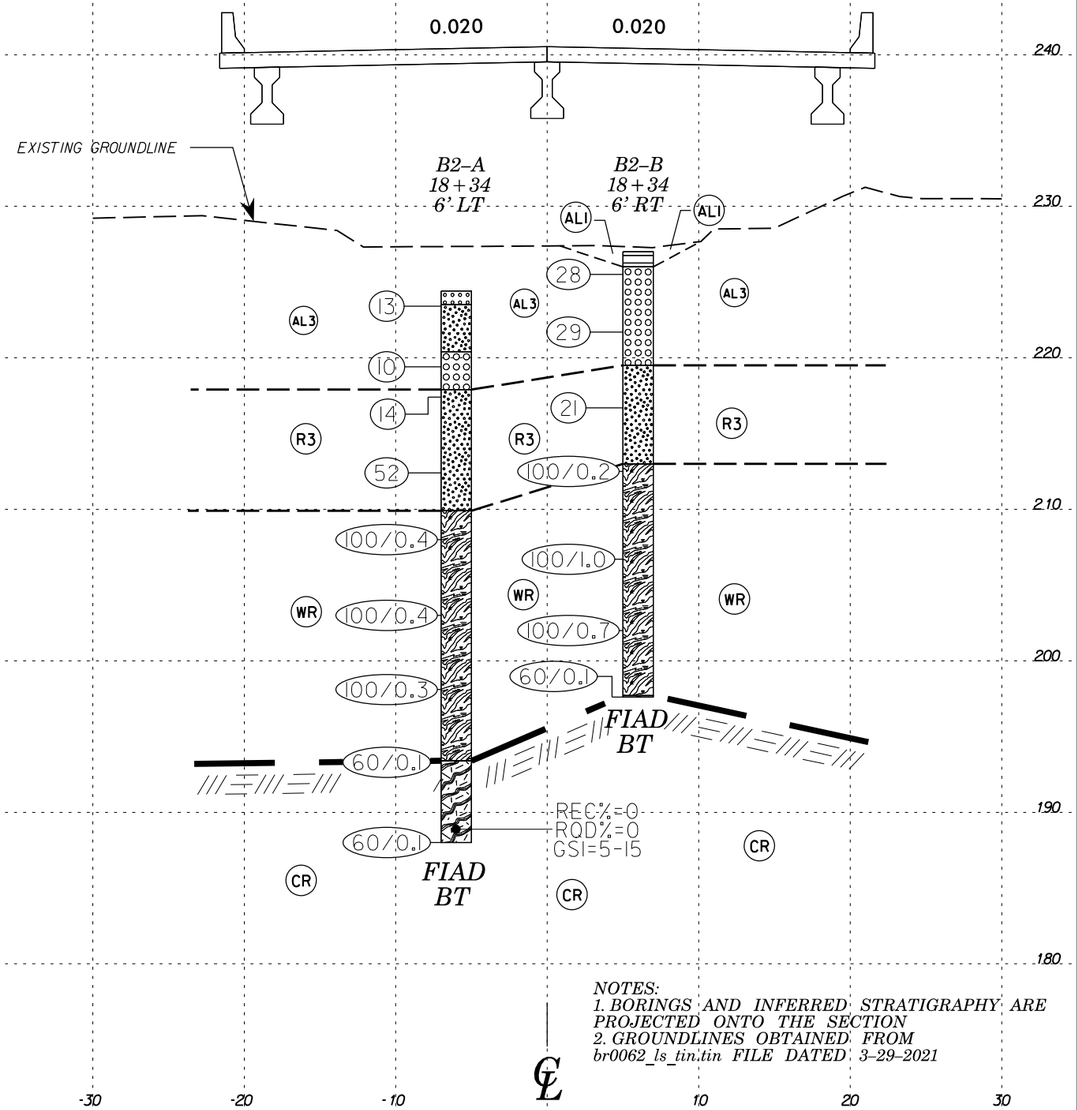
(AL1) **ALLUVIAL:** VERY STIFF, BROWN, SILTY CLAY (A-7), CONTAINS WOOD FRAGMENTS, MODERATELY ORGANIC, WET

(AL3) **ALLUVIAL:** MEDIUM DENSE, BROWN AND GRAY, SAND AND SILTY SANDY (A-1-b, A-3, A-2-4), CONTAINS GRAVEL, SATURATED

(R3) **RESIDUAL:** MEDIUM DENSE TO VERY DENSE, GRAY, SILTY SAND (A-2-4), CONTAINS ROCK FRAGMENTS, SAPROLITIC, MOIST

(WR) **WEATHERED ROCK:** GRAY AND BROWN, GRANITE

(CR) **CRYSTALLINE ROCK:** GRAY AND BROWN, GRANITE



NOTES:
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTION
2. GROUNDLINES OBTAINED FROM br0062_ls_tin.tin FILE DATED 3-29-2021

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A

BENT 2 – CROSS SECTION –L– STA. 18+35.00 – 90^ SKEW

(RE2) **ROADWAY EMBANKMENT:** MEDIUM STIFF TO STIFF, RED AND BROWN, SILT AND CLAYEY SILT (A-4, A-5), WITH LITTLE TO SOME SAND, CONTAINS GRAVEL, MICACEOUS, MOIST TO WET

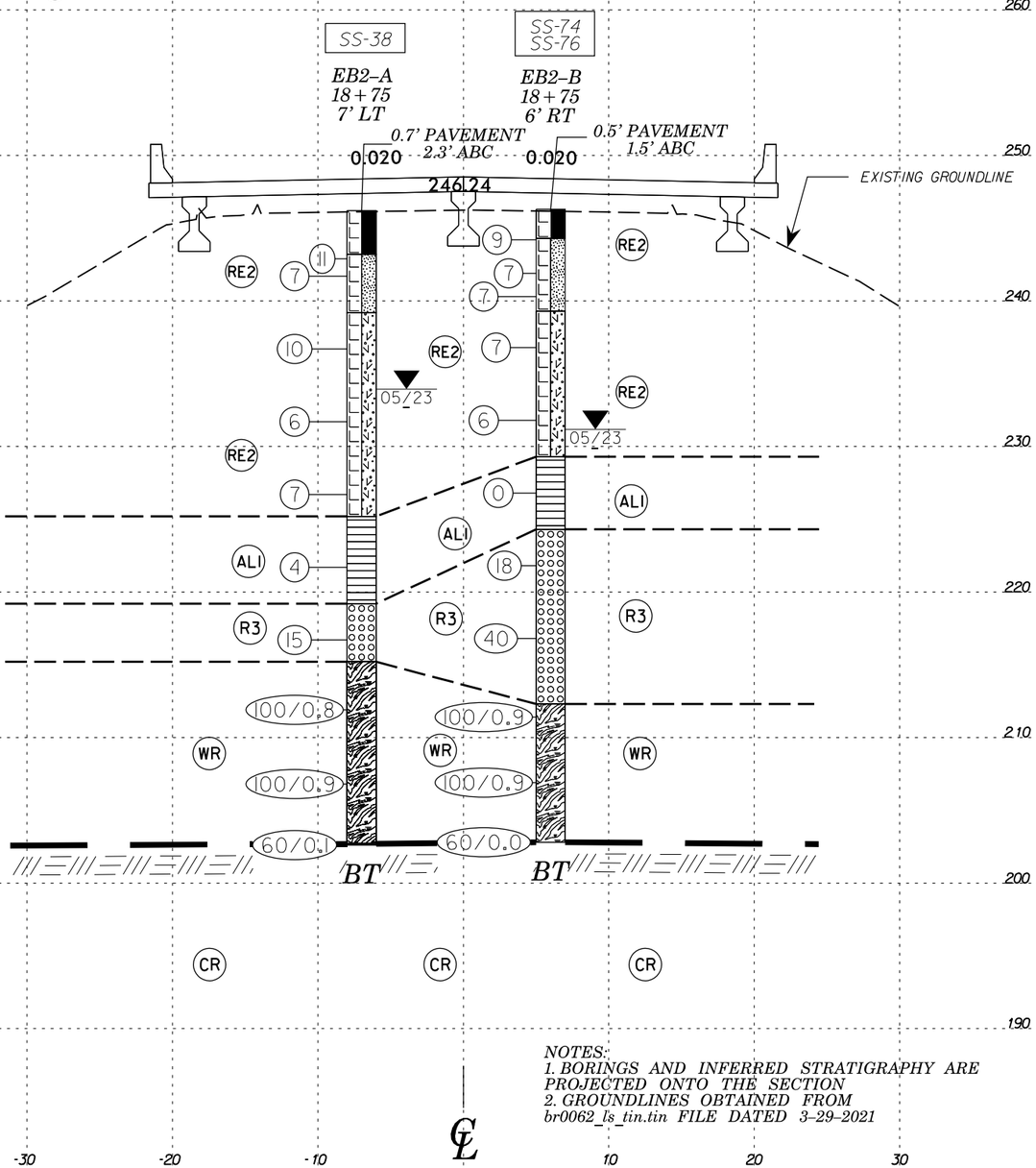
(RE3) **ROADWAY EMBANKMENT:** LOOSE, RED AND BROWN, SILTY SAND (A-2-4), CONTAINS GRAVEL, MICACEOUS, WET

(AL1) **ALLUVIAL:** SOFT TO MEDIUM STIFF, GRAY, BLUE, AND BROWN, SANDY AND SILTY CLAY AND ORGANIC SILTY CLAY (A-7-6), CONTAINS WOOD FRAGMENTS, WET

(R3) **RESIDUAL:** MEDIUM DENSE TO DENSE, GRAY, SAND AND GRAVEL (A-1-b), WET TO SATURATED

(WR) **WEATHERED ROCK:** GRAY, WHITE, AND BROWN, GRANITE

(CR) **CRYSTALLINE ROCK:** GRAY AND WHITE, GRANITE



NOTES:
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTION
2. GROUNDLINES OBTAINED FROM br0062_ls_tin.tin FILE DATED 3-29-2021

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A

END BENT 2 – CROSS SECTION –L– STA. 18+75.00 – 90^ SKEW

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Holland, J.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 17+40	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 246.3 ft	**TOTAL DEPTH** 48.4 ft	**NORTHING** 416,946	**EASTING** 1,694,885	**24 HR.** 13.5
DRILL RIG/HAMMER EFF./DATE BRI282974 CME-45C 76.9% 04/12/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Bigley, N.	**START DATE** 05/01/23	**COMP. DATE** 05/03/23	**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)
250											
										246.3 GROUND SURFACE	0.0
245	244.9	1.4	4	2	3	5 5 4		M		**ROADWAY EMBANKMENT** 0.5' Pavement 1.3' ABC	
	242.8	3.5								244.5 Medium stiff, red, SILT (A-4), with some sand and clay, contains gravel	1.8
	241.3	5.0	2	2	3					241.8 Soft to medium stiff, red and gray, clayey SILT (A-5), contains gravel, micaceous	4.5
240			2	2	2						
	237.9	8.4	2	2	2	4		M			
235											
	232.9	13.4	3	2	3	5					
230										230.3 **ALLUVIAL**	16.0
	227.9	18.4	1	2	2	4		W		Medium stiff, gray, silty CLAY (A-7), with trace sand	
225										225.3 Medium dense, gray, SAND AND GRAVEL (A-1-b), with trace clay	21.0
	222.9	23.4	6	5	7	12		W			
220										220.3 **RESIDUAL**	26.0
	217.9	28.4	11	26	35	61		M		Dense to very dense, gray, silty SAND (A-2-4), contains rock fragments, saprolitic, micaceous	
215											
	212.9	33.4	3	4	26	30					
210											
	207.9	38.4	32	41	59	100/1.0				207.4 **WEATHERED ROCK** Brown and orange, GRANITE	38.9
205											
	202.9	43.4	19	21	30	51		M		203.8 **RESIDUAL** Very dense, brown and orange silty SAND (A-2-4), contains rock fragments, saprolitic, micaceous	42.5
200										200.9 **WEATHERED ROCK**	45.4
	197.9	48.4	60/0.0			60/0.0				197.9 Gray, GRANITE	48.4

Boring Terminated with Standard Penetration Test Refusal at Elevation 197.9 ft On Crystalline Rock (GRANITE)

Loss of drill fluid to formation at 28.2 ft BGS.
Total Casing: 35.0 ft BGS.
Drill rig chatter at 32.4 - 37.4 ft BGS.
Drill rig chatter at 45.4 ft BGS.

Other Samples
ST-01 (18.0 - 20.0 ft)
REC=0.0 ft

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Edwards, M.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 17+40	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** 18.5
COLLAR ELEV. 246.3 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** 416,940	**EASTING** 1,694,875	**24 HR.** 13.0
DRILL RIG/HAMMER EFF./DATE BRI282974 CME-45C 76.9% 04/12/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Bigley, N.	**START DATE** 05/04/23	**COMP. DATE** 05/05/23	**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)
250											
										246.3 GROUND SURFACE	0.0
245	245.0	1.3								**ROADWAY EMBANKMENT**	
			13	3	4	7 4 6				244.3 0.5' Pavement 1.5' ABC	2.0
	242.9	3.4						M		Medium stiff, red and brown, SILT (A-4), contains gravel	
	241.3	5.0	2	2	2					241.3 Medium stiff, red and brown, clayey SILT (A-5), contains gravel	5.0
240			2	2	4						
	237.8	8.5						W			
			2	3	2	5					
235											
	232.8	13.5								234.3 **ALLUVIAL**	12.0
			1	2	4	6	SS-65	29%		Medium stiff, gray, sandy and silty CLAY ((A-7-5)15)), with some sand, highly plastic, micaceous	
230										229.3	17.0
	227.8	18.5								Very soft, gray, SILT ((A-4)4)), with little sand	
			WOH	WOH	WOH	0	SS-66	34%			
225										224.3	22.0
	222.8	23.5								Medium dense, gray SAND AND GRAVEL (A-1-b)	
			10	12	10	22		M			
220										219.3 **RESIDUAL**	27.0
	217.8	28.5								Hard, gray, clayey SILT (A-5), contains rock fragments, micaceous	
			10	13	21	34		M			
215										214.3	32.0
	212.8	33.5								Very dense, gray, silty SAND (A-2-4), contains rock fragments	
			40	41	46	87					
210								M			
	207.8	38.5								209.3 **WEATHERED ROCK**	37.0
			41	59/0.4		100/0.9				Brown, GRANITE	
205											
	202.8	43.5									
			40	60/0.4		100/0.9					
200											
	197.8	48.5	60/0.1			60/0.1				197.8 197.7 **CRYSTALLINE ROCK** Gray and brown, GRANITE	48.5 48.6

Boring Terminated with Standard Penetration Test Refusal at Elevation 197.7 ft In Crystalline Rock (GRANITE)

Total Casing: 30.0 ft.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Maffia, R.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+79	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 223.2 ft	**TOTAL DEPTH** 55.0 ft	**NORTHING** 416,913	**EASTING** 1,694,906	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/02/23	**COMP. DATE** 05/03/23	**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)
230										
225										WATER SURFACE (05/02/23)
	223.2	0.0								223.2 / 0.0 GROUND SURFACE
			2	4	3	7		Sat.		**ALLUVIAL** Loose, brown and gray, silty SAND (A-2-4), contains wood fragments
220										220.2 / 3.0
	218.2	5.0								**RESIDUAL** Dense to very dense, gray, silty SAND (A-2-4), contains rock fragments
			11	16	18	34				
215								M		
	212.4	10.8								
			21	45	43	88				
210										210.2 / 13.0 **WEATHERED ROCK** Gray and brown, GRANITE
	208.2	15.0								
			30	70/0.3		100/0.8				
205										
	203.2	20.0								
			100/0.3			100/0.3				
200										
	198.2	25.0								
			100/0.4			100/0.4				
195										
	193.2	30.0								
			58	42/0.2		100/0.7				
190										
	188.2	35.0								
			100/0.4			100/0.4				
185										
	183.2	40.0								183.2 / 40.0 **CRYSTALLINE ROCK** Gray, GRANITE REC=0% (0.0') RQD=0% (0.0') GSI=5-15
			60/0.0			60/0.0				
180										
	178.2	45.0								
			60/0.0			60/0.0				
175										
	173.2	50.0								
			60/0.0			60/0.0				
170										168.2 / 55.0 Boring Terminated at Elevation 168.2 ft In Crystalline Rock (GRANITE)

Deck to mudline: 23.3 ft.
Total Casing: 60.0 ft.
Initial SPT refusal at 40.0 ft BGS.
Bit refusal at 50.0 ft BGS.
Rock core from 50.0 to 55.0 ft BGS.

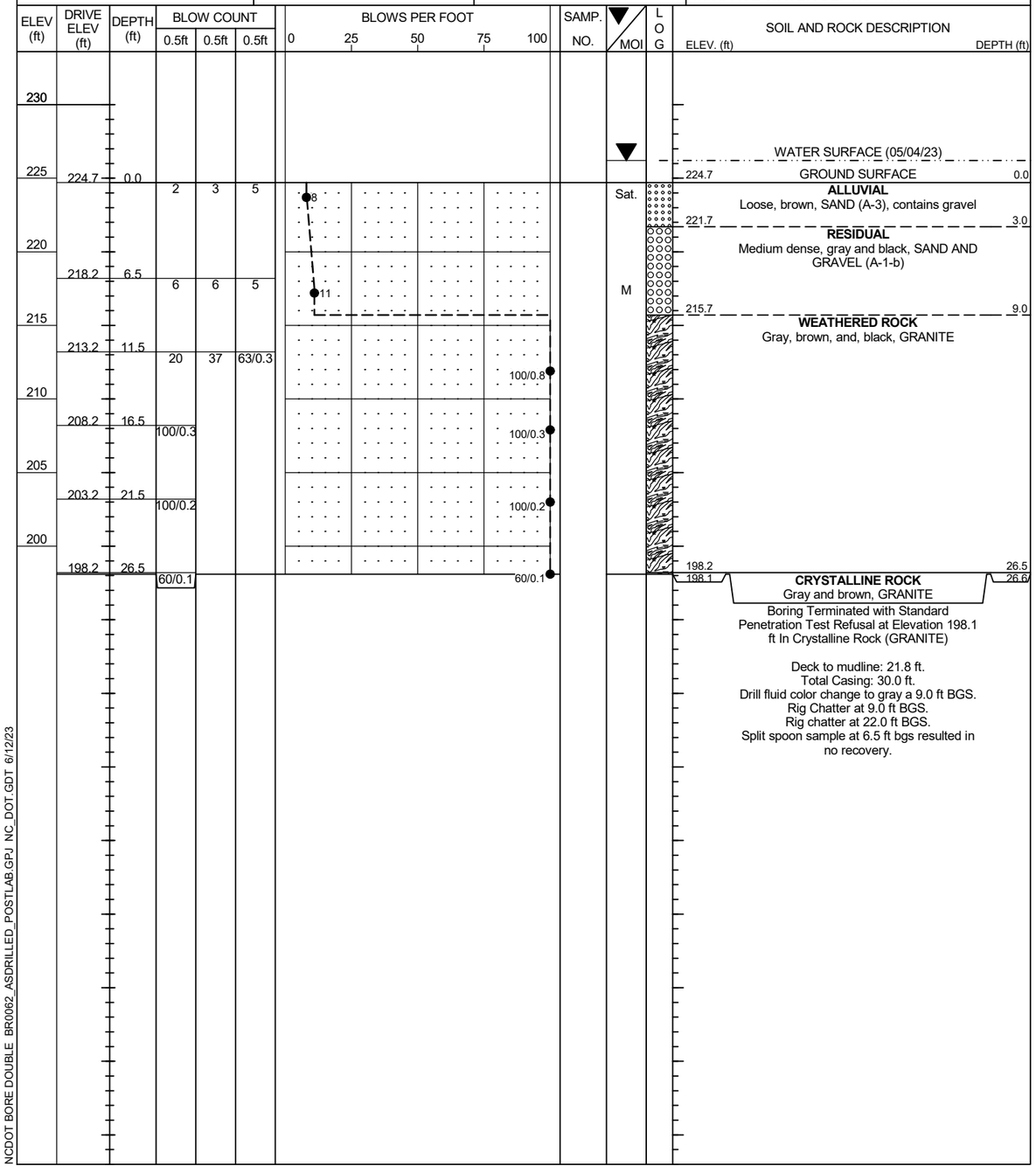
WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Maffia, R.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+79	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 223.2 ft	**TOTAL DEPTH** 55.0 ft	**NORTHING** 416,913	**EASTING** 1,694,906	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/02/23	**COMP. DATE** 05/03/23	**SURFACE WATER DEPTH** 2.2ft	
CORE SIZE NQ	**TOTAL RUN** 5.0 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)
173.2											Begin Coring @ 50.0 ft
	173.2	50.0	5.0	0:53/1.0 1:25/1.0 1:31/1.0 1:27/1.0 1:52/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		**CRYSTALLINE ROCK** Gray, GRANITE REC=0% (0.0') RQD=0% (0.0') GSI=5-15
170											168.2 / 55.0 Boring Terminated at Elevation 168.2 ft In Crystalline Rock (GRANITE)
	168.2	55.0									

Deck to mudline: 23.3 ft.
Total Casing: 60.0 ft.
Initial SPT refusal at 40.0 ft BGS.
Bit refusal at 50.0 ft BGS.
Rock core from 50.0 to 55.0 ft BGS.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Holland, J.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+80	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 24.2
COLLAR ELEV. 224.7 ft	**TOTAL DEPTH** 26.6 ft	**NORTHING** 416,906	**EASTING** 1,694,897	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/04/23	**COMP. DATE** 05/04/23	**SURFACE WATER DEPTH** 1.5ft	



NCDOT BORE DOUBLE BR0062_ASDRILLED_POSTLAB.GPJ NC_DOT.GDT 6/12/23

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Maffia, R.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 18+34	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 224.4 ft	**TOTAL DEPTH** 36.4 ft	**NORTHING** 416,867	**EASTING** 1,694,935	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/01/23	**COMP. DATE** 05/02/23	**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)
230										
225	224.4	0.0	8	6	7	13				WATER SURFACE (05/01/23) 224.4 GROUND SURFACE 0.0
								Sat.		223.5 **ALLUVIAL** 0.9 Medium dense, brown, SAND (A-3)
220	220.4	4.0	4	5	5	10		Sat.		Medium dense, brown, silty SAND (A-2-4) 220.4 4.0
	218.4	6.0	5	5	9	14		Sat.		Medium dense, brown and gray, SAND AND GRAVEL (A-1-b)
215	213.4	11.0	12	15	37	52		M		217.9 6.5 **RESIDUAL** Medium dense to very dense, gray, silty SAND (A-2-4), contains rock fragments
210	208.4	16.0	100/0.4			100/0.4				209.9 14.5 **WEATHERED ROCK** Brown and gray, GRANITE
205	203.4	21.0	100/0.4			100/0.4				
200	198.4	26.0	100/0.3			100/0.3				
195	193.4	31.0	60/0.1			60/0.1				193.4 31.0 **CRYSTALLINE ROCK** Brown and gray, GRANITE REC=0% (0.0') RQD=0% (0.0') GSI=5-15
190	188.1	36.3	60/0.1			60/0.1				188.0 36.4 Boring Terminated with Standard Penetration Test Refusal at Elevation 188.0 ft In Crystalline Rock (GRANITE) Deck to mudline: 22.0 ft. Total Casing: 55.0 ft. Drill rig chatter 10.0 - 12.0 ft BGS. Rock core from 31.1 to 36.1 ft BGS.

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Maffia, R.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 18+34	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 224.4 ft	**TOTAL DEPTH** 36.4 ft	**NORTHING** 416,867	**EASTING** 1,694,935	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/01/23	**COMP. DATE** 05/02/23	**SURFACE WATER DEPTH** 0.7ft	
CORE SIZE NQ	**TOTAL RUN** 5.0 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)
193.3											Begin Coring @ 31.1 ft
	193.3	31.1	5.0	0:19/1.0 0:20/1.0 0:23/1.0 0:41/1.0 0:45/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		**CRYSTALLINE ROCK** Brown and gray, GRANITE REC=0% (0.0') RQD=0% (0.0') GSI=5-15
190	188.3	36.1		N=60/0.1							188.3 36.1 188.0 36.4 Boring Terminated with Standard Penetration Test Refusal at Elevation 188.0 ft In Crystalline Rock (GRANITE) Deck to mudline: 22.0 ft. Total Casing: 55.0 ft. Drill rig chatter 10.0 - 12.0 ft BGS. Rock core from 31.1 to 36.1 ft BGS.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Holland, J.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 18+34	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 21.0
COLLAR ELEV. 227.0 ft	**TOTAL DEPTH** 29.4 ft	**NORTHING** 416,860	**EASTING** 1,694,925	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI421424 CME-45C 83.4% 08/24/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Radford, M.	**START DATE** 05/04/23	**COMP. DATE** 05/04/23	**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)
230										
	226.5	0.5	14	13	15	28		W		227.0 — GROUND SURFACE — 0.0 226.0 — **ALLUVIAL** — 1.0 Very stiff, brown, silty CLAY (A-7), contains wood fragments, moderately organic Medium dense, gray, SAND AND GRAVEL (A-1-b)
225	222.7	4.3	4	14	15	29		Sat.		
220	217.7	9.3	8	8	13	21		M		219.5 — **RESIDUAL** — 7.5 Medium dense, gray, silty SAND (A-2-4), contains rock fragments, saprolitic
215	212.7	14.3	100/0.2			100/0.2				213.0 — **WEATHERED ROCK** — 14.0 Gray and brown, GRANITE
210	207.7	19.3	47	53		100/1.0				
205	202.7	24.3	63	37/0.2		100/0.7				
200	197.7	29.3	60/0.1			60/0.1				197.7 / 197.6 — **CRYSTALLINE ROCK** — 29.3 / 29.4 Gray, GRANITE Boring Terminated with Standard Penetration Test Refusal at Elevation 197.6 ft In Crystalline Rock (GRANITE) Deck to mudline: 19.4 ft. Total Casing: 35.0 ft. Loss of drill fluid at 10.8 ft BGS.

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Holland, J.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+75	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.4
COLLAR ELEV. 246.2 ft	**TOTAL DEPTH** 43.6 ft	**NORTHING** 416,833	**EASTING** 1,694,958	**24 HR.** 12.2
DRILL RIG/HAMMER EFF./DATE BRI282974 CME-45C 76.9% 04/12/2022		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Bigley, N.	**START DATE** 05/03/23	**COMP. DATE** 05/04/23	**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
250										
										246.2 — GROUND SURFACE — 0.0 **ROADWAY EMBANKMENT** 0.7' Pavement 2.3' ABC — 243.2 — 3.0
245	243.9	2.3	11	4	7	11				Medium stiff to stiff, red and brown, SILT (A-4), with little sand, contains gravel, micaceous
	242.7	3.5	3	3	4	7		M		239.2 — 7.0
240	237.7	8.5	3	4	6	10		M		Medium stiff to stiff, red and brown, clayey SILT (A-5), contains gravel, micaceous
235	232.7	13.5	3	3	3	6				
230	227.7	18.5	4	3	4	7		W		225.2 — 21.0 **ALLUVIAL** Medium stiff, blue and gray, silty CLAY ((A-7-6)17)), with little organic matter, contains wood fragments
225	222.7	23.5	2	2	2	4	SS-38	43%		219.2 — 27.0 **RESIDUAL** Medium dense, gray, SAND AND GRAVEL (A-1-b)
220	217.7	28.5	3	5	10	15		Sat.		215.2 — 31.0 **WEATHERED ROCK** Gray and white, GRANITE
215	212.7	33.5	50	50/0.3		100/0.8				
210	207.7	38.5	44	56/0.4		100/0.9				
205	202.7	43.5	60/0.1			60/0.1				202.7 / 202.6 — **CRYSTALLINE ROCK** — 43.5 / 43.6 Gray and white, GRANITE Boring Terminated with Standard Penetration Test Refusal at Elevation 202.6 ft In Crystalline Rock (GRANITE) Total Casing: 30.0 ft BGS.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67062.1.1	**TIP** BR-0062	**COUNTY** ANSON	**GEOLOGIST** Edwards, M.	
SITE DESCRIPTION Bridge No. 14 Over South Fork Jones Creek On US-52				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+75	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 18.5
COLLAR ELEV. 246.3 ft	**TOTAL DEPTH** 43.5 ft	**NORTHING** 416,826	**EASTING** 1,694,947	**24 HR.** 15.0
DRILL RIG/HAMMER EFF./DATE BRI282974 CME-45C 76.9% 04/12/2022		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Bigley, N.	**START DATE** 05/04/23	**COMP. DATE** 05/05/23	**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)
250											
										246.3 GROUND SURFACE	0.0
245	245.2	1.1								**ROADWAY EMBANKMENT**	
			5	5	4	9				244.3 0.5' Pavement 1.5' ABC	2.0
	242.9	3.4	4	3	4	7		M		Medium stiff to stiff, red and brown, SILT (A-4), with some sand, contains gravel, micaceous	
	241.3	5.0								241.3	5.0
240			2	3	4	7		W		Loose, red and brown, silty SAND (A-2-4), contains gravel, micaceous	
	237.8	8.5								239.3	7.0
			2	3	4	7	SS-74	28%		Medium stiff, red and brown, clayey SILT ((A-5)1)), contains gravel, micaceous	
235											
	232.8	13.5						W			
			1	2	4	6					
230											
	227.8	18.5	WOH	WOH	WOH	0	SS-76	35%		229.3	17.0
										ALLUVIAL Very soft, gray and brown, sandy and silty CLAY ((A-7-6)17)), with little organic matter	
225											
										224.3	22.0
	222.8	23.5	3	7	11	18				**RESIDUAL** Medium dense to dense, gray, SAND AND GRAVEL (A-1-b)	
220											
	217.8	28.5	7	14	26	40		W			
215											
	212.8	33.5	12	47	53/0.4	100/0.9				212.3	34.0
										WEATHERED ROCK Gray and brown, GRANITE	
210											
	207.8	38.5	27	73/0.4		100/0.9					
205											
	202.8	43.5	60/0.0			60/0.0				202.8	43.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 202.8 ft On Crystalline Rock (GRANITE)	
										Total Casing: 30.0 ft.	

BRIDGE NO. 14 OVER SOUTH FORK JONES CREEK ON US 52

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-65	17+40	7' RT	13.5 - 15.0	A-7-5(15)	57	27	29.6	12.4	23.6	34.3	80.4	62.0	48.0	29	-
SS-66	17+40	7' RT	18.5 - 20.0	A-4(4)	26	6	2.2	12.0	70.8	15.1	99.5	99.0	88.0	34.0	-
SS-38	18+75	7' LT	23.5 - 25.0	A-7-6(17)	43	15	1.8	6.4	49.5	42.3	98.5	98.0	93.0	43.0	6.9
SS-74	18+75	6' RT	8.5 - 10.0	A-5(1)	49	3	36.2	22.9	26.6	14.3	70.7	52.0	32.0	28.0	-
SS-76	18+75	6' RT	18.5 - 20.0	A-7-6(17)	42	16	1.4	9.3	48.5	40.8	100.0	99.0	92.0	35.0	-

SITE PHOTOGRAPHS
BRIDGE NO. 14 OVER SOUTH FORK JONES CREEK ON US 52

View of US 52 looking southeast.

View of US 52 looking northwest.

View of Bridge 14 over South Fork Jones Creek looking northeast.