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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ANSON

PROJECT DESCRIPTION REPLACE BRIDGE NO 70 OVER ROCKY RIVER ON US 52

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
I.C.	B-4407	1	31

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 1999 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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J. GARRICK A. SUTTLE HPCMID ATLANTIC

INVESTIGATED BY ECS SOUTHEAST, LLD

DRAWN BY _K. DE MONTBRUN, P.E.

CHECKED BY M. WALKO, P.E.

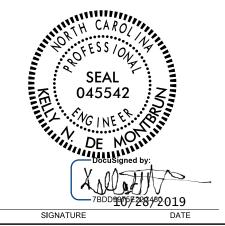
SUBMITTED BY ECS SOUTHEAST, LLP

DATE OCTOBER 2019

Prepared in the Office of:



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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFA E INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
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	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.	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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CHYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING *10 50 MX GRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*40 30 MX 50 MX 51 MN SOILS SOILS SOILS PEAT	GRANULAR SILT - CLAY	- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
#200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL - 40 MX 41 MN LITTLE OR LITTLE OR MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOLIS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. OF MAINE GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI 0F A-7-5 SUBGROUP IS ≤ LL - 3Ø ; PI 0F A-7-6 SUBGROUP IS > LL - 3Ø	SPRING OR SEEP	WITH FRESH ROCK. MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPI REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT ²)	₩ITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4 LOOSE 4 TO 10	SOIL SYMBOL SOIL SYMBOL SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THE THE ROHDWHI EMPHINAMENT TO TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	MMONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4 TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNSUITABLE WASTE USE EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - GSED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.005 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOU MOISTURE SCALE FIELD MOISTURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	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
LL LIOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSDIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK; BM#2; N;527745, E;16667683
(PI) PL _ PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 222.78 FEET
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE CLIFE	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	EXISTING GROUND SURFACE INFORMATION PROVIDED BY NCODT ON
PLASTICITY	CME-55 X 8* HOLLOW AUGERS CHR. \$12E:	INDURATION	JULY 1, 2019.
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS X-N Q2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.]
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS: POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X DIEDRICH D-50 TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
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.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
THE SOURCE STATE OF THE SOURCE OF THE SOURCE OF THE PROPERTY O	X DIEDRICH D-25 .	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

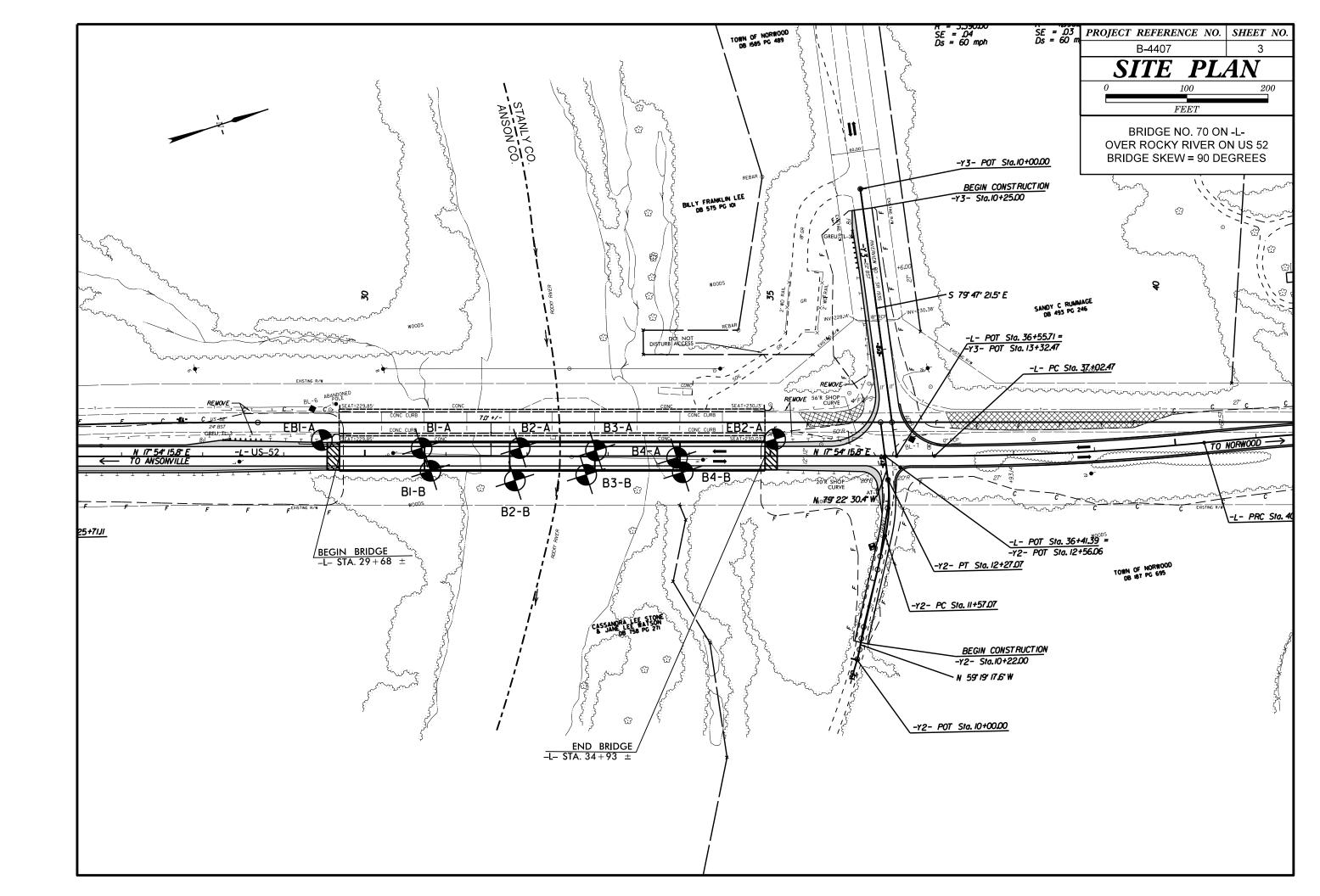
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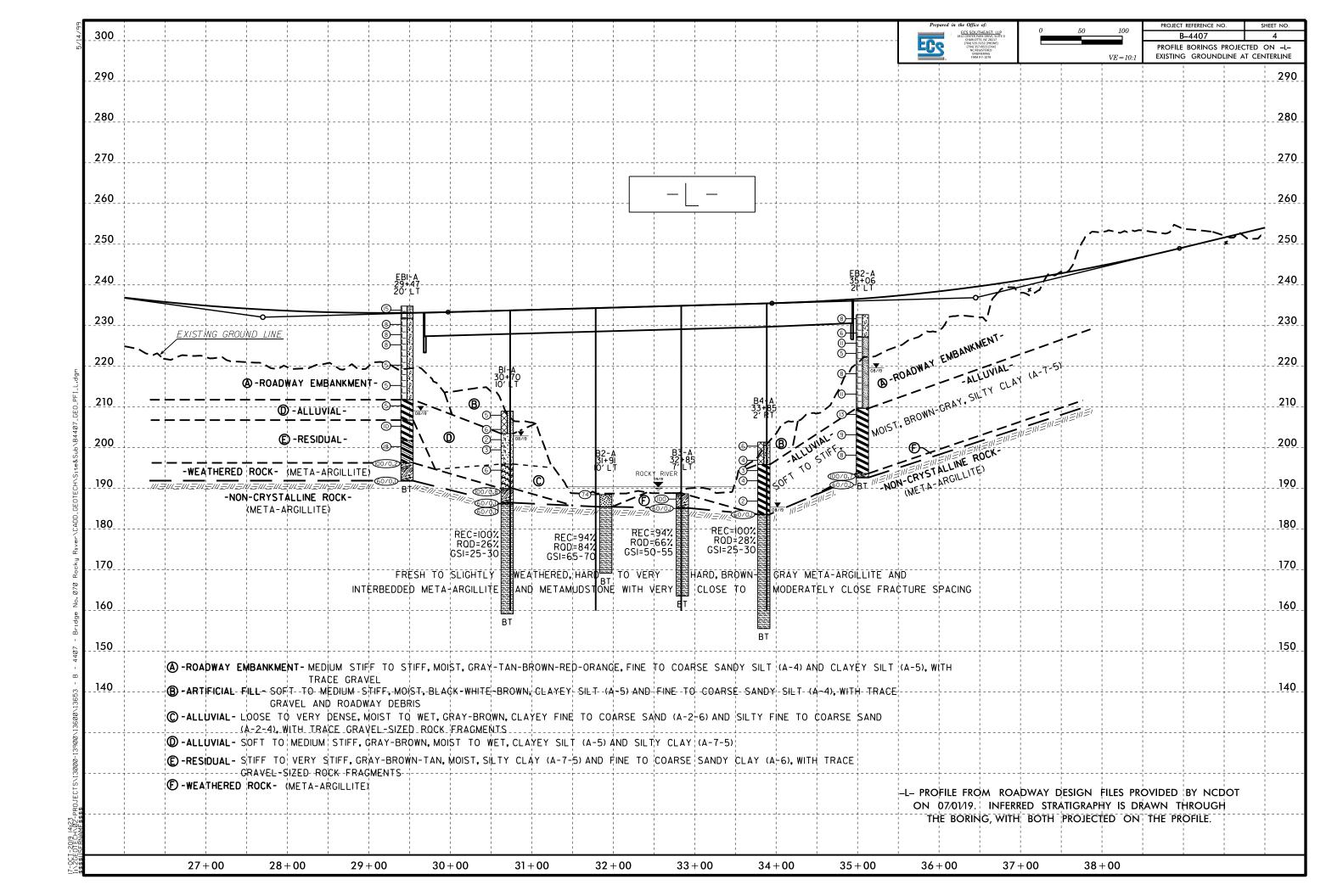
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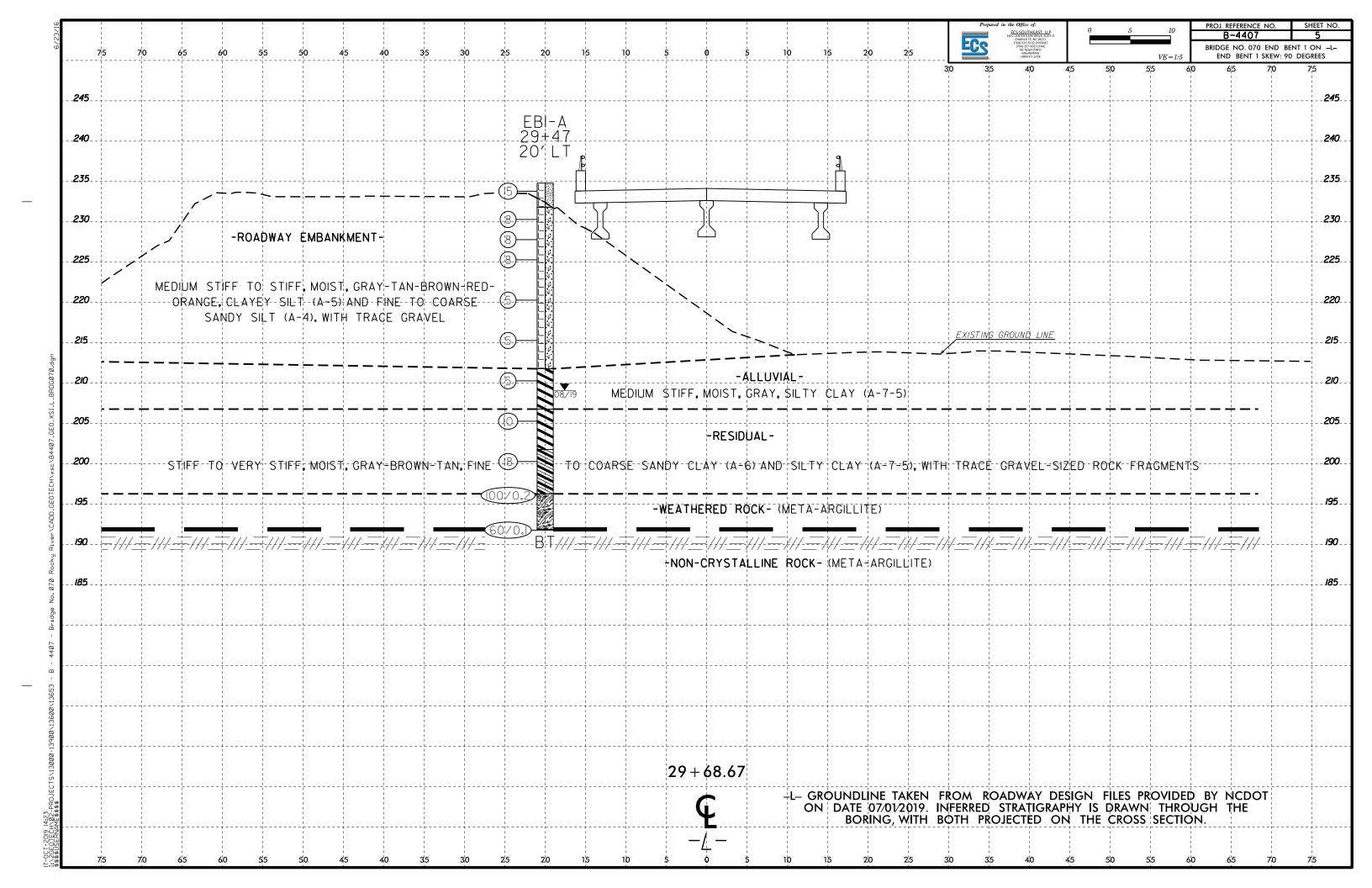
SUBSURFACE INVESTIGATION

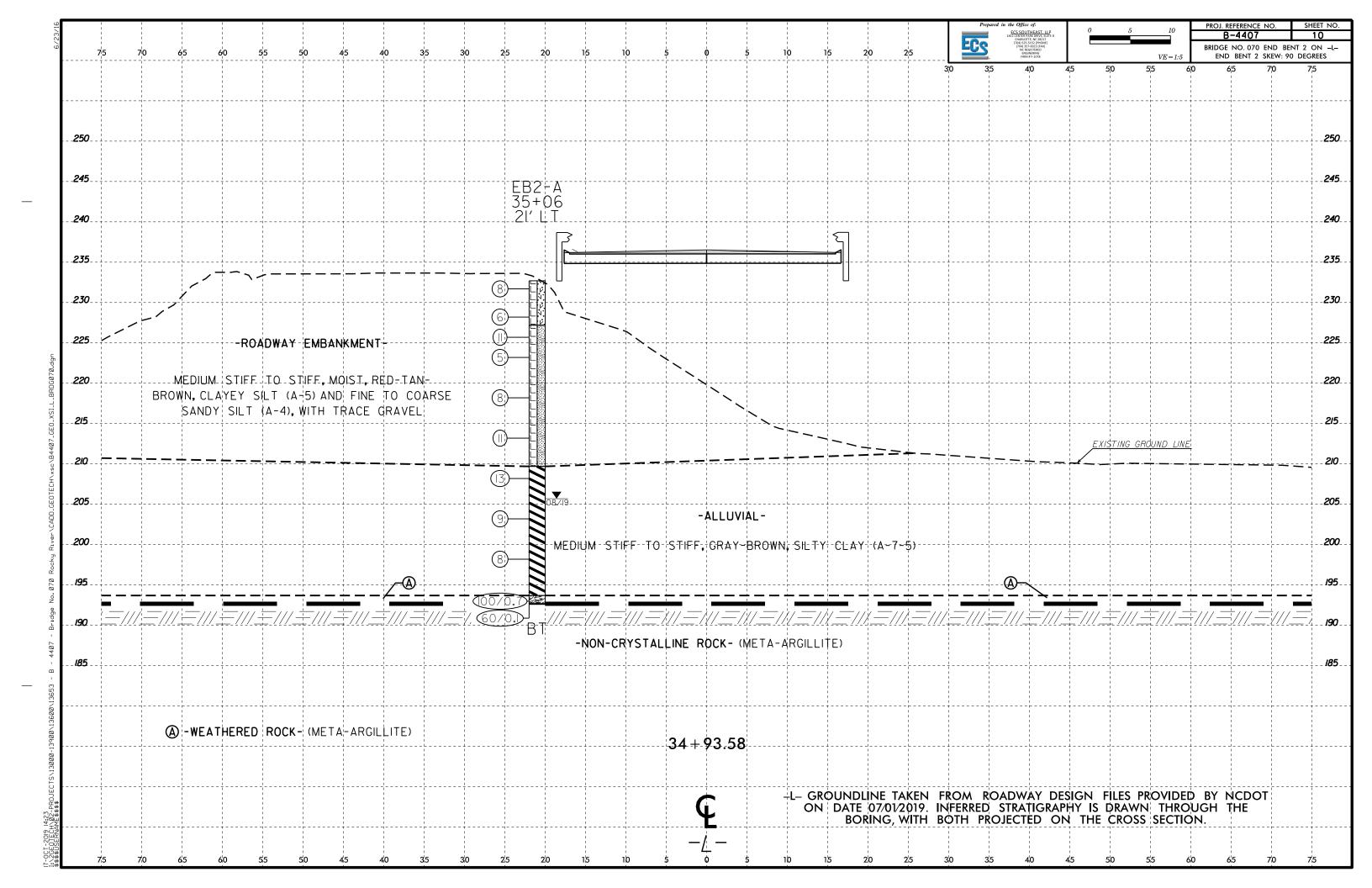
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

		F	ROM AAS	EGEND, GI SHTO LRF	EOLOGIC FD BRID	AL STRENGTH INDEX (GSI) TABLES GE DESIGN SPECIFICATIONS
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.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	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 masss. 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.
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90 8		SURFACE OU	N/A	N/A	COMPOSITION AND STRUCTURE A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass, in shallow tunnels or slopes these bedding planes may cause structurally controlled instability.
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	OCKING OF ROCK PI	70 60	50			8. Sand- stone with stone and stone and siltstone layers of siltstone siltstone amounts Stone layers stone with sandstone layers stone layers stone layers stone layers stone layers
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	ASING INTERL		40	30		C. D. E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	DECRE			20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock overes
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V N/A	N/A			10	Means deformation after tectonic disturbance Mater 8:19 Mater 8:19











SHEET 11

								В	<u>ORE L</u>	<u>.OG</u>						
WBS	38356	3.1.2			TI	IP B-4407		COUNT	Y ANSON				GEOLOGIST J. Garri	ck		
				olace E	-	No. 70 over		er on US					1		-1	ID WTR (ft
BORI	NG NO.	EB1-	-A		S.	TATION 29	+47		OFFSET	20 ft LT			ALIGNMENT -L-		0 HR.	Dry
COLL	AR ELE	EV . 23	34.8 ft		T	OTAL DEPT	H 43.0 ft		NORTHING				EASTING 1,667,349		24 HR.	25.7
DRILL	RIG/HAI	MMER E	FF./DA	TE H	PC0279	Diedrich D50	82% 02/06/20)19		DRILL N	/IETHO	D H.	S. Augers	HAMM	ER TYPE	Automatic
DRILL	LER J.	Cain			S.	TART DATE	08/12/19		COMP. DA	TE 08/	12/19		SURFACE WATER DE	PTH N	'A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	1	0 2	BLOWS PE		75 100	SAMP. NO.	MOI	0 G	SOIL AND RO	OCK DES	CRIPTION	DEPTH (
235	234.8	0.0	6	8	7							1 833	_234.8 GROUI	ND SURFA		0
230	231.3	3.5	4	4	4	15					M		Stiff, Gray-Tan-Bro - 231.8	wn, Fine to , with trace ed-Tan-Or	o Coarse S e gravel ange-Brow	<u> </u>
	228.8 -	6.0	3	3	5	• • • • • • • • • • • • • • • • • • •	: : : :		: : : :		М		- Claye	ey SILT (A-	·5)	
225	226.3	8.5	3	3	5	- - - - - - - - - - - - - - - - - -		· · · · ·			М		· -			
220	221.3	13.5	2	2	3						M					
	-	40.5											- · ·			
215	216.3	18.5	1	2	3	5					М		-			
210	211.3	23.5	2	2	3	• · · · · · · · · · · · · · · · · · · ·					<u></u>		_ 211.8 A l _	LLUVIAL ray, Silty (<u>23</u> 5)
	206.3	28.5											. 206.8	ESIDUAL		2
205	-		2	4	6	10					М		_ Stiff, Gray-Brov		LAY (A-7-5	i)
200	201.3	33.5	6	9	9	18.	::::		::::		М		. 201.8 Very Stiff, Gray-Ta Sandy CLAY (A-6	an-Brown,), with trac t fragments	e gravel-si	<u>33</u> arse zed
95	196.3	38.5	100/0.2	2			: : : : - +	· · · · ·	100/0.2	,			· 196.3	HERED RO		38
95	- - 191.9	42.9											Tan-Gray (l . 191.9			42
	- - - - -		60/0.1						60/0.1					META-ARO	GILLITE) Standard Elevation 1 Rock	
	- - -												- - - -			
	-	 											• • •			
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COUNTY ANSON **WBS** 38356.1.2 **TIP** B-4407 **GEOLOGIST** A. Suttle SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 **GROUND WTR (ft)** OFFSET 10 ft LT ALIGNMENT -L-**STATION** 30+70 BORING NO. B1-A 0 HR. N/A COLLAR ELEV. 209.0 ft TOTAL DEPTH 49.8 ft **NORTHING** 527,254 **EASTING** 1,667,396 24 HR. 6.1 DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 02/06/2019 DRILL METHOD H.S. Augers HAMMER TYPE Automatic **DRILLER** J. Cain **START DATE** 08/15/19 **COMP. DATE** 08/15/19 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT SAMP. **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. MOI G (ft) ELEV. (ft) DEPTH (ft 210 GROUND SURFACE 209.0 ARTIFICIAL FILL М Medium Stiff, Black-White-Brown, Fine to Coarse Sandy SILT (A-4), with trace gravel 205.5 205 and roadway debris \mathbf{V} 203.0 ALLUVIAL M Soft, Gray-Brown, Clayey SILT (A-5) 200.5 200 WOH WOH W Loose, Gray-Brown, Clayey Fine to Coarse W SAND (A-2-6) 190.5 + 18.5 190 15 85/0.3 WEATHERED ROCK 100/0.8 Brown-Gray (META-ARGILLITE) 186.5 + 22.5 186.3 + 22.7 60/0.1 - 60/0 1 NON-CRYSTALLINE ROCK _60/0.1. Gray (META-ARGILLITE) Fresh to Very Slightly Weathered, Hard to Very Hard, Brown-Gray META-ARGILLITE with Very Close to Close Fracture Spacing 180 REC = 100%, RQD=26%, GSI = 25 - 30 175 170 RS-1 165 160 Boring Terminated at Elevation 159.2 ft In Non-Crystalline Rock (META-ARGILLITE)

									C	UI	E LOG					
WBS	38356	.1.2			TIP	B-440)7	C	OUNT	Y A	SON	GEOLOGI	ST A. Suttl	е		
SITE	DESCR	IPTION	Rep	lace Brid	lge No	. 70 o	er Rocky	/ River	on U	S 52					GROUN	D WTR (ft)
BOR	ING NO.	B1-A			STA	TION	30+70			OF	ET 10 ft LT	ALIGNME	NT -L-		0 HR.	N/A
COLI	LAR ELE	V . 20	9.0 ft		TOT	AL DE	PTH 49	.8 ft		NO	THING 527,254	EASTING	1,667,396		24 HR.	6.1
DRILL	RIG/HAI	MER E	FF./DA	TE HPC2	473 CN	ИЕ-550	85% 02/06	/2019			DRILL METHOD H.	S. Augers		HAMM	ER TYPE	Automatic
DRIL	LER J.	Cain			STAI	RT DA	TE 08/1	5/19		CO	P. DATE 08/15/19	SURFACE	WATER DE	PTH N	'A	
COR	E SIZE	NQ2					N 27.0 f	t								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RATA RQD (ft) %	L O G	ELEV. (ft)	DESCRIPTION	AND REMARI	KS		DEPTH (ft)
186.2	186.2 -	- 22.8		101/10	(0.0)	(0.1)					5 11 11 0		ng @ 22.8 ft			
185	184.2	24.8	2.0	1:34/1.0 1:40/1.0				(26.9) 100%			186.2 Fresh to Very S META-ARGIL	lightly weather LITE with Very				22.8
	-	-	5.0	1:18/1.0 1:35/1.0 1:33/1.0	(4.9) 98%	(0.6) 12%					RE	C = 100%, RQ	D=26%, GSI =	25 - 30		
180	170.0	- 20.0		1:23/1.0									41.8' - 42.2'			
	179.2		5.0	1:22/1.0	(5.0)	(1.7)					Unconfined	Unit Weig Compressive	ht = 173.5 pcf Strength = 8,81	0 psi / 1,2	.68 ksf	
	-	-		1:16/1.0 1:26/1.0	100%	34%						•				
175	174.2	34.8		1:21/1.0 1:18/1.0						藍						
	_	-	5.0	1:22/1.0 1:27/1.0	(5.0) 100%	(0.8) 16%				藍						
170	-	-		1:47/1.0 1:31/1.0												
	169.2	- 39.8 -	5.0	1:51/1.0 1:11/1.0	(5.0)	(1.1)										
]	-		1:18/1.0 1:14/1.0	100%	22%	RS-1	1		蓋						
165	164.2	44.8		1:14/1.0 1:18/1.0						藍						
	-	-	5.0	1:18/1.0 1:23/1.0	(5.0) 100%	(2.3) 46%				薑						
160		-		1:19/1.0 1:29/1.0						鼜						
	159.2	49.8		1:21/1.0							159.2 Boring Termina	ated at Elevation	on 159.2 ft In N ARGILLITE)	on-Crysta	line Rock	49.8

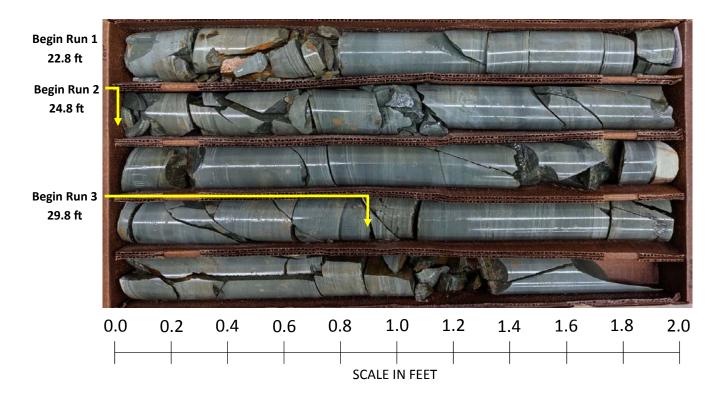


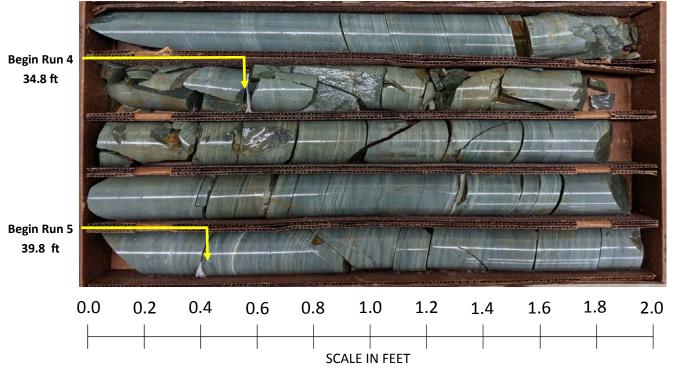
Replace Bridge No. 70 over Rocky River on US 52

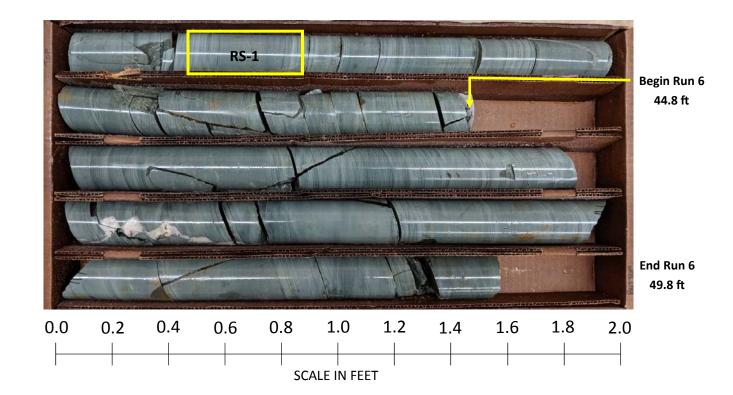
WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B1-A

Station: 30+70 Offset: 10' LT







GEOTECHNICAL BORING REPORT **BORE LOG TIP** B-4407 COUNTY ANSON GEOLOGIST A. Suttle

					1						KE LUG	I		
	38356				l	B-440					NSON	GEOLOGIST A. Suttle		
				lace Brid	-			y River	on U	1		T	1	ID WTR (ft)
BOR	ING NO.	B1-B	1		STA	TION	30+81			OFI	SET 18 ft RT	ALIGNMENT -L-	0 HR.	N/A
COLI	AR ELE	EV . 20	9.5 ft		TOT	AL DE	PTH 61	.1 ft		NO	RTHING 527,256	EASTING 1,667,426	24 HR.	13.1
DRILL	. RIG/HAI	MMER E	FF./DA	TE HPC2	473 CN	ЛЕ-550	85% 02/06	/2019			DRILL METHOD H.S	. Augers HAMM	ER TYPE	Automatic
DRIL	LER J.	Cain			STA	RT DA	TE 08/1	4/19		CO	MP. DATE 08/15/19	SURFACE WATER DEPTH N	'A	
COR	E SIZE	NQ2					N 25.9 f							
ELEV	RUN ELEV	DEPTH		DRILL RATE	REC.	JN RQD	SAMP.	STR REC.	ATA RQD	L	D	ESCRIPTION AND REMARKS		
(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	Ğ	ELEV. (ft)			DEPTH (ft)
174.3	174.3 -	- 35.2	5.0	2.07/4.0	(4.0)	(2.5)		(40.4)	(40.7)		7 474 0 Freely to Mary Olimbia.	Begin Coring @ 35.2 ft	NIDOTONI	
	174.5	33.2	5.0	3:07/1.0 2:58/1.0	(4.8) 96%	(3.5) 70%		(16.4) 98%	(13.7) 82%		7 174.3 Fresh to Very Slightly Ve	Weathered, Very Hard, Gray METASA ry Close to Close Fracture Spacing	IND 1 ONE	with 35.2
170	400.0	400		2:11/1.0 1:53/1.0 1:26/1.0						蠹	REC	C = 98%, RQD = 82%, GSI = 60 - 65		
	169.3 - 168.4 -	40.2	0.9	1:19/0.9	(0.8)	(0.7)				薹	- -	RS-2: 46.1' - 46.5'		
	_	F	5.0	1:24/1.0 1:29/1.0 1:27/1.0	\ <u>89%</u> (5.0)	78% (4.4)				蠹	- - Unconfined C	Unit Weight = 185.4 pcf Compressive Strength = 13,390 psi / 1,	928 ksf	
165		F		1:17/1.0	100%	88%					-	romproduite earligation to,000 points,	020 NOI	
	163.4 -	- 46.1 -	5.0	1:27/1.0 1:17/1.0	(5.0)	(4.3)	RS-2			鼜	• •			
160	-	<u> </u>		1:14/1.0 1:14/1.0	100%	86%					- -			
.00	158.4 -	- 51.1	L	1:30/1.0 1:23/1.0							- •			
	-	-	5.0	1:26/1.0 1:59/1.0	(5.0) 100%	(0.8) 16%		(9.2)	(1.4)		- 157.6 - Very Slight to Mod	erately Weathered, Moderately Hard to	Very Har	51.9 d,
155	-	-		2:11/1.0 1:56/1.0	10070	1070		100%	15%		 Brown-Gray Interbed 	Ided METAMUDSTONE and META-AF ry Close to Close Fracture Spacing	RGILLITE	vith
	153.4 -	56.1	5.0	1:08/1.0 1:12/1.0	(5.0)	(1.4)				霻	-	= 100%, RQD = 15%, GSI = 20 - 25		
450	-	-	0.0	1:23/1.0 1:21/1.0	100%	28%					- -	- 10070, 100D - 1070, COI - 20 20		
150	 148.4 -	61.1		1:16/1.0 1:20/1.0						罿	- - 148.4			61.1
	-	- 0111		1.20/1.0								ted at Elevation 148.4 ft In Non-Crysta (META-ARGILLITE)	line Rock	01.1
	-	L									-	(META-ANGILLITE)		
	-										•			
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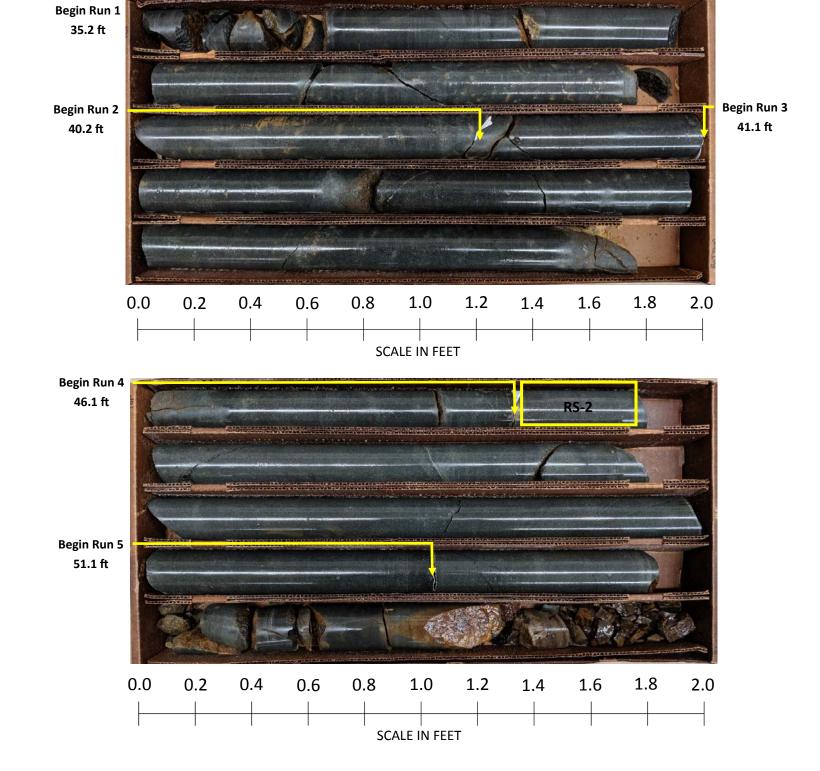
WBS	38356	5.1.2			Т	IP B-4407			ANSON				GEOLOGIST A. Suttle	
			N Rer	olace E		No. 70 over l	Rocky Ri						1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	GROUND WTR (ft)
	NG NO.				Ť	TATION 30-			OFFSET	18 ft RT			ALIGNMENT -L-	0 HR. N/A
	AR ELE					OTAL DEPTH			NORTHIN				EASTING 1,667,426	24 HR. 13.1
						3 CME-550 85%						D H		IER TYPE Automatic
	LER J.		, ., .,	.= .		TART DATE			COMP. DA			- 11	SURFACE WATER DEPTH N	
ELEV	DRIVE	DEPTH	BIC	OW COL				ER FOOT	JUM . D/	SAMP.	-5, 15 V	1 [
(ft)	ELEV (ft)	(ft)	0.5ft	1	0.5ft	0 25			75 100	11	MO	O G	SOIL AND ROCK DES	CRIPTION DEPTH (ft
	(,										I WIC		LLL V. (II)	טבו וווןונ
210														
210	209.5	0.0	3	4	4	· J i. · · ·					Н		- 209.5 GROUND SURF - ALLUVIAL	ACE 0.0
	-	_				.					"		Medium Stiff to Stiff, Brown, (A-4)	Fine Sandy SILT
205	206.0	3.5	5	5	5	10				<u> </u>	М		- -	
	203.5	6.0	3	4	3	· J. · ·					١.,		<u>-</u> -	
	201.0	8.5] ·•[7]					M		- 201.5 Medium Dense, Brown, S	8.0
200	_	<u> </u>	5	7	9	16		<u> </u>	+	1	М		- Medium Dense, Brown, S - (A-2-4)	ILY I THE SAIND
	-	ł											- - - 196.5	40.0
195	196.0	13.5	6	6	8	<u> </u>		<u>L</u>			M		Medium Dense, Brown-Gray	
	-	F				14					'*'	//	Coarse SAND (A	-∠-b)
	- 191.0	18.5				::::/							- - <u>191.5</u>	18.0
190	- 131.0	10.5	12	14	10	1	24		ļ · · · ·	-	w	0000	Medium Dense, Gray, FineGRAVEL (A-1	
	-	ļ.										000	- -	
185	186.0	23.5	100/0.2	3		:::::"			100/0:2			000	186.0 WEATHERED R	23.5
100	-	-	100/0.2	1					100/0.2	1			Gray (META-ARG	
	-	<u> </u>											- - 181.5	28.0
180	181.0	28.5	21	22	13	1	35		T = = = :		М		- RESIDUAL Hard, Brown-Blue-Gray, F	
	-	_											Sandy CLAY (A-6), with tra	ce gravel-sized
	176.0	33.5	ļ				· · ·		· · · ·				176.0	33.5
175	174.4	35.1	60/0.1 60/0.1	1					60/0.1	I			NON-CRYSTALLIN Gray (METASANDS	
	-	<u> </u>	00/0.1										 Fresh to Very Slightly Weath Gray METASANDSTONE w 	
170	_	Ł											- Close Fracture Sp	
	-	ŀ											REC = 98%, RQD = 82%,	GSI = 60 - 65
	-	F											-	
165	_	F							+	<u> </u>			- -	
	-	F								RS-2	1		-	
160	-	F											- -	
	-	F												51.9
	-	F											- 157.6 - Very Slight to Moderately	Weathered,
155	_	F							+	-			 Moderately Hard to Very Hard Interbedded METAMUD 	STONE and
	-	F							: : : :				- META-ARGILLITE with Ver Fracture Spac	
150	-	ļ .							: : : :				- REC = 100%, RQD = 15%	_
.55		<u> </u>								1			- - 148.4	61.1
	-	<u> </u>											Boring Terminated at Eleva Non-Crystalline Rock (MET	ation 148.4 ft In
	_	‡												,
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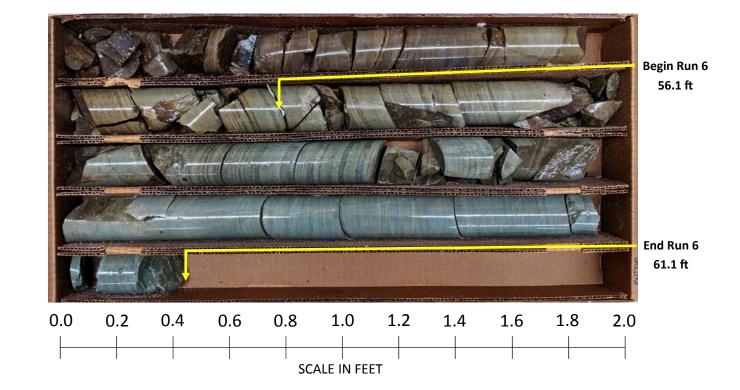


Replace Bridge No. 70 over Rocky River on US 52 WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B1-B

Station: 30+81 Offset: 18' RT





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	38356						B-4				_			NSON	1				GEOLOGIST J. Garrick		
	DESCR			olace E							Rive	r on L	_						T	GROUND WTR (ft)
	NG NO.				S	TA	TION	1 3	31+9	91			+	FSET					ALIGNMENT -L-	0 HR . N/	/A
OLL	AR ELE	E V . 18	88.5 ft		T	OT	AL C)EP	TH	19.3	ft		NO	RTHIN	IG	527,3	69		EASTING 1,667,433	24 HR. N/	
RILL	RIG/HAI	MER E	FF./DA	TE M	IID5152	D-2	25 869	% 02	2/21/2	2019					l	DRILL N	/ETHO	D W	ash Boring HAMI	MER TYPE Automatic	3
RIL	LER B.	Fowle	er		S	TAI	RT [DAT	Ε	09/20	/19		co	MP. D	ATI	E 09/2	20/19	1	SURFACE WATER DEPTH 1	.9ft	
LEV	DRIVE ELEV	DEPTH	'——	ow co		┨.				BLOWS		R FOO			- 1 - 1	SAMP.	lacksquare	L	SOIL AND ROCK DES	SCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft)		25		50		75 	100)	NO.	/MOI	G	ELEV. (ft)	DEPTH	l (ft)
																	_				
90		_																-	WATER SURFACE		· —
ŀ	188.5	- 0.0 -	15	36	38	$^{+}$			Τ.		.		· 174		$^{\rm H}$		W		188.5 GROUND SURF		0.0
85	- 185.5 -	- - 3.0					: :		:				: <u> </u>		\prod				Very Dense, Gray-Browr Coarse SAND (A-2-4)	with trace	3.0
03		-	60/0.1			lt			Η.				: [:	60/0.1	1				gravel-sized rock fr	agments	3.1
	-	_					: :		:		:		: :						Gray (META-ARG	ILLITE)	
80	-	-				IL	• •	• •	<u> </u> :				<u>: :</u>		41				NON-CRYSTALLIN Slightly Weathered, H		
	-	_					: :	: :	:		:		: :		11	RS-3	1		META-ARGILLITE with Moderately Close Fract	Very Close to ture Spacing	
	-	_							:		.		: :		H				REC = 94%, RQD = 84%		
75	_	_				╟			+		+		+		$\ \ $				- -	, 301 – 33 73	
	-	_							:		:		: :		\parallel						
70	_	_					• •		Ŀ				· ·						- 400 0		
						H									╣			===	Boring Terminated at Elev	ation 169.2 ft In	19.3
	-																		Non-Crystalline Rock (ME		
	_	_																	_ 1) Loss of water circulation 9.3 feet. Water did r	during coring at not return.	
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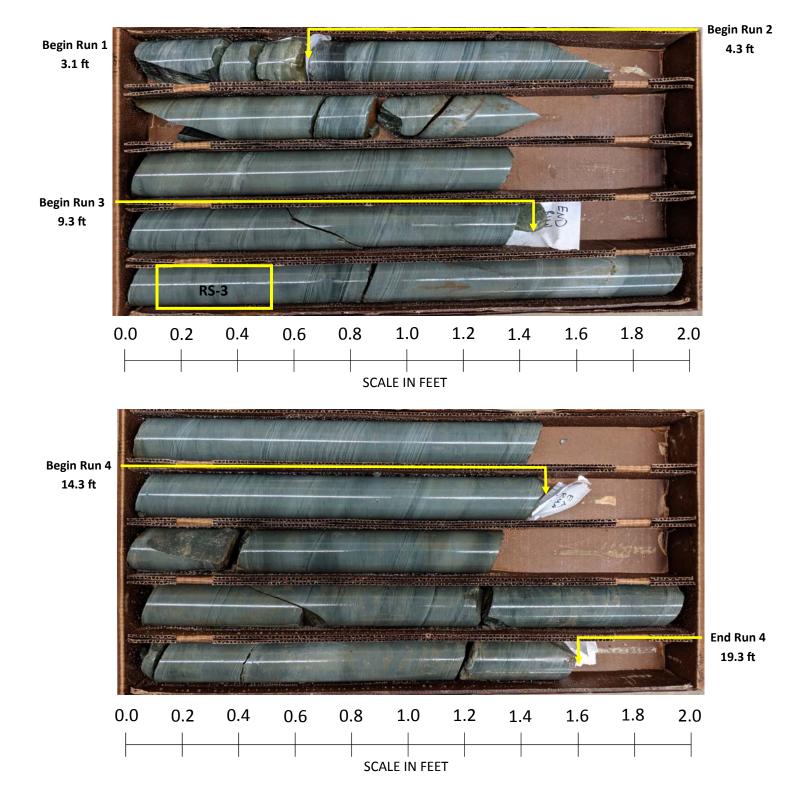
									С	0	RE L	OG					
WBS	38356.	1.2			TIP	B-440)7	С	OUNT	Υ	ANSON		GEOLOGIST J. Garrio	k			
	DESCRI			lace Brid	-			/ Rive	on U	S 52	2				GROUN	ID WTR (ft)	
BOR	ING NO.	B2-A			STA	TION	31+91			OF	FFSET 1	0 ft LT	ALIGNMENT -L-		0 HR.	N/A	
COL	LAR ELE	V. 18	8.5 ft		TOT	AL DE	PTH 19	.3 ft		NC	ORTHING	527,369	EASTING 1,667,433		24 HR.	N/A	
DRILI	RIG/HAM	MER E	FF./DA	TE MID5	152 D-2	5 86% (02/21/2019					DRILL METHOD Was	sh Boring	HAMM	ER TYPE	Automatic	
DRIL	LER B.	Fowle	r		STA	RT DA	TE 09/2	20/19		CC	OMP. DAT	TE 09/20/19	SURFACE WATER DEF	PTH 1.	9ft		
COR	E SIZE 1	NQ2					N 16.2 f										
ELEV (ft)	RUN ELEV (ft)	OEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STF REC. (ft) %	RQD (ft) %	L O G	ELEV. (fi		ESCRIPTION AND REMARK	s		DEPTH (ft)	
1854	405.4	2.4											Begin Coring @ 3.1 ft				
	185.4 184.2	3.1 4.3	5.0	2:49/1.0 \1:01/0.2	(0.7) \ 58%	(0.0) \ 0% /		(15.3) 94%	(13.6) 84%		185.4		NON-CRYSTALLINE ROCH , Hard, Gray META-ARGILLI	ΓE with V	ery Close t	3.1	
	0 179.2 9.3 5.0 1.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											M	oderately Close Fracture Spa	cing			
180	179.2 9.3 4.331.0 1000 0.00 1000 1000 1000 1000 100									REC = 94%, RQD = 84%, GSI = 65 - 70							
	5.0 6:01/1.0 (4.9) (4.9) RS-3												RS-3: 9.4' - 9.8' Unit Weight = 173.4 pcf				
175	T 5:09/1.0 5:35/1.0										-	Unconfined C	compressive Strength = 17,64	0 psi / 2,	540 ksf		
	174.2 14.3 5:54/1.0 5.0 5:14/1.0 (4.7) (4.5)										-						
	‡			5:02/1.0 5:29/1.0	94%	90%											
170	169.2	19.3		7:11/1.0 8:23/1.0							169.2					19.3	
	1			0.20/ 1.0							-	Boring Terminat	ed at Elevation 169.2 ft In No (META-ARGILLITE)	n-Crysta	lline Rock		
	‡										<u> </u>	1) Lago of water sire.	,	t Mata	r did not rot		
	‡										F	1) Loss of water circu	ulation during coring at 9.3 fee	et. vvate	r dia not rei	turn.	
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Replace Bridge No. 70 over Rocky River on US 52 WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B2-A

Station: 31+91 Offset: 10' LT



WBS 38356.1.2 COUNTY ANSON **TIP** B-4407 **GEOLOGIST** J. Garrick GROUND WTR (ft) SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 **STATION** 31+85 OFFSET 30 ft RT ALIGNMENT -L-BORING NO. B2-B 0 HR. N/A COLLAR ELEV. 188.8 ft TOTAL DEPTH 19.6 ft **NORTHING** 527,351 **EASTING** 1,667,469 24 HR. N/A **DRILL RIG/HAMMER EFF./DATE** MID5152 D-25 86% 02/21/2019 DRILL METHOD Wash Boring HAMMER TYPE Automatic DRILLER B. Fowler **START DATE** 09/19/19 **COMP. DATE** 09/20/19 **SURFACE WATER DEPTH** 1.6ft | DRIVE | DEPTH | BLOW COUNT | Cft) | 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT SAMP. SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft MOI G 75 100 NO. ELEV. (ft) DEPTH (ft WATER SURFACE (09/19/19) 190 188.8 GROUND SURFACE 188.8 - 0.0 52 48/0.4 WEATHERED ROCK 100/0.9 Gray (META-ARGILLITE) 185 185.3 7 3.5 --60/0.0 NON-CRYSTALLINE ROCK Slightly Weathered, Hard, Gray META-ARGILLITE with Very Close to Close Fracture Spacing 180 REC = 93%, RQD = 53%, GSI = 40 - 45 175 RS-4 170 Boring Terminated at Elevation 169.2 ft In Non-Crystalline Rock (META-ARGILLITE) 1) Loss of water circulation during coring at 8.5 feet. Water returned at 9.6 feet.

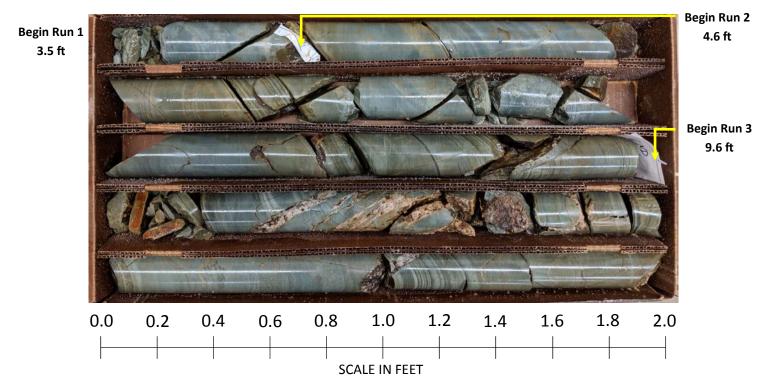
									C	Ol	RE L	OG					
WBS	38356	3.1.2			TIP	B-440)7	C			ANSON			GEOLOGIST J. Garri	ck		
SITE	DESCR	IPTION	Rep	lace Brid	ge No	. 70 o\	er Rocky	River	on U	S 52	2					GROUN	ID WTR (ft)
BOR	ING NO.	. B2-B			STA	ΓΙΟΝ	31+85			OF	FSET	30 ft RT		ALIGNMENT -L-		0 HR.	N/A
COLI	LAR ELI	EV. 18	8.8 ft		TOT	AL DE	PTH 19.	.6 ft		NC	ORTHING	527,351		EASTING 1,667,469		24 HR.	N/A
DRILL	RIG/HAI	MMER E	FF./DA	TE MID5	152 D-2	5 86% ()2/21/2019					DRILL METHOD	Was	sh Boring	HAMN	MER TYPE	Automatic
DRIL	LER B	. Fowle	r		STAF	RT DA	TE 09/1	9/19		CC	OMP. DA	TE 09/20/19		SURFACE WATER DE	PTH 1	.6ft	
COR	E SIZE	NQ2			TOTA	AL RU	N 16.1 f	t									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (f	it)	D	ESCRIPTION AND REMAR	KS		DEPTH (ft)
18553											Ì,			Begin Coring @ 3.5 ft			
	185.3 - 184.2 - -	3.5 4.6	5.0	N=60/0.0 2:06/1.0 1:16/0.1 3:36/1.0 3:27/1.0 6:02/1.0 5:40/1.0	(0.7) (64%) (5.0) 100%	(0.0) 0% (2.8) 56%		(15.0) 93%	(8.6) 53%		185.3 - - -	,		NON-CRYSTALLINE ROO lard, Gray META-ARGILLITE Fracture Spacing	K with Ver	y Close to C	3.5 Close
180	179.2	9.6	5.0	5:40/1.0 5:40/1.0 4:57/1.0	(4.3)	(2.7)				REC = 93%, RQD = 53%, GSI = 40 - 45							
175	75 174.2 14.6 5:24/1.0 (5.0) (3.1)											Unconfin	ed C	RS-4: 16.6' - 17.0' Unit Weight = 173.5 pcf Compressive Strength = 18,6		,684 ksf	
	174.2	14.0	5.0	4:06/1.0		(3.1)				蓋	1						
470	:	‡		4:24/1.0 4:20/1.0 4:40/1.0	100%	62%	RS-4				<u> </u>						
170	169.2	19.6		5:09/1.0							169.2	Davina Tarr	!	to d at Floriation 400 0 ft la N	0	iliaa Daala	19.6
	-	‡									-	Borning Terr	nınaı	ted at Elevation 169.2 ft In N (META-ARGILLITE)	on-Crysta	alline Rock	
		+ - - - - - - - - - - - - - - - - - - -									- - - - - - - - - - - - - - - - - - -	1) Loss of water	Circu	ılation during coring at 8.5 fe feet.	ei. Wale	returret a	



Replace Bridge No. 70 over Rocky River on US 52 WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B2-B

Station: 31+85 Offset: 30' RT



Begin Run 4 14.6 ft End Run 4 19.6 ft 0.0 2.0 0.2 0.4 0.8 1.0 1.2 1.4 SCALE IN FEET

N/A

N/A

DEPTH (ft

GEOTECHNICAL BORING REPORT

GEOTECHNICAL BORING REPORT **BORE LOG**

CORE LOG COUNTY ANSON **WBS** 38356.1.2 **TIP** B-4407 COUNTY ANSON **GEOLOGIST** J. Garrick **WBS** 38356.1.2 **TIP** B-4407 **GEOLOGIST** J. Garrick **GROUND WTR (ft)** SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 **GROUND WTR (ft) STATION** 32+85 OFFSET 7 ft LT ALIGNMENT -L-OFFSET 7 ft LT BORING NO. B3-A 0 HR. N/A BORING NO. B3-A **STATION** 32+85 ALIGNMENT -L-0 HR. **EASTING** 1,667,465 TOTAL DEPTH 25.1 ft **NORTHING** 527,457 TOTAL DEPTH 25.1 ft COLLAR ELEV. 188.7 ft 24 HR. N/A COLLAR ELEV. 188.7 ft **NORTHING** 527,457 **EASTING** 1,667,465 24 HR. **DRILL RIG/HAMMER EFF./DATE** MID5152 D-25 86% 02/21/2019 HAMMER TYPE Automatic **DRILL RIG/HAMMER EFF./DATE** MID5152 D-25 86% 02/21/2019 HAMMER TYPE Automatic **DRILL METHOD** Wash Boring **DRILL METHOD** Wash Boring DRILLER B. Fowler **START DATE** 09/18/19 COMP. DATE 09/18/19 DRILLER B. Fowler **START DATE** 09/18/19 **COMP. DATE** 09/18/19 **SURFACE WATER DEPTH** 1.7ft SURFACE WATER DEPTH 1.7ft ELEV DRIVE DEPTH BLOW COUNT SAMP. **BLOWS PER FOOT** CORE SIZE NQ2 TOTAL RUN 21.5 ft SOIL AND ROCK DESCRIPTION ELEV (ft) (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. MOI G DRILL (ft) ELEV. (ft) ELEV DEPTH RUN SAMP RQD (ft) ELEV RATE DESCRIPTION AND REMARKS (ft) NO. (ft) (ft) (ft) ELEV. (ft) WATER SURFACE (09/18/19) Begin Coring @ 3.6 ft NON-CRYSTALLINE ROCK 18851 190 1:18/1.0 (0.9) (0.9) 4:34/0.5 60% 60% 188.7 **GROUND SURFACE** 185.1 | 3.6 183.6 + 5.1 188.7 Very Slightly to Slightly Weathered, Hard, Gray, Interbedded META-ARGILLITE and METAMUDSTONE with Very Close to Moderately 94% 66% 46 54/0.3 WEATHERED ROCK 5.0 5:15/1.0 4:43/1.0 4:32/1.0 4:29/1.0 100/0.8 Gray (META-ARGILLITE) (5.0) (3.6) Close Fracture Spacing 185.2 185 180 60/0. -60/0.1 NON-CRYSTALLINE ROCK 178.6 + 10.1 REC = 94%, RQD = 66%, GSI = 50 - 55 5:35/1.0 | 5:35/1.0 | 4:16/1.0 | (5.0) | (3.1) | 8:38/1.0 | 100% | 62% Gray (META-ARGILLITE) NON-CRYSTALLINE ROCK RS-5: 18.1' - 18.5' Very Slightly to Slightly Weathered, Hard, . . . Unit Weight = 173.1 pcf 180 175 Gray, Interbedded META-ARGILLITE and Unconfined Compressive Štrength = 16,230 psi / 2,337 ksf 4:57/1. METAMUDSTONE with Very Close to 173.6 - 15.1 Moderately Close Fracture Spacing REC = 94%, RQD = 66%, GSI = 50 - 55 7.18/1 (175 170 RS-5 6:26/1.0 168.6 + 20.1 3:55/1.0 (5.0) (5.0) 5.0 4:05/1.0 | 100% | 100% 4.06/1.0 170 165 RS-5 4:43/1.0 163.6 \(\frac{1}{2} \) 25.1 4:21/1.0 163.6 Boring Terminated at Elevation 163.6 ft In Non-Crystalline Rock (META-ARGILLITE) 165 1) Loss of water circulation during coring at 4.5 feet. Water returned at 5.0 Boring Terminated at Elevation 163.6 ft In Non-Crystalline Rock (META-ARGILLITE) 1) Loss of water circulation during coring at 4.5 feet. Water returned at 5.0 feet.



Begin Run 1

Replace Bridge No. 70 over Rocky River on US 52

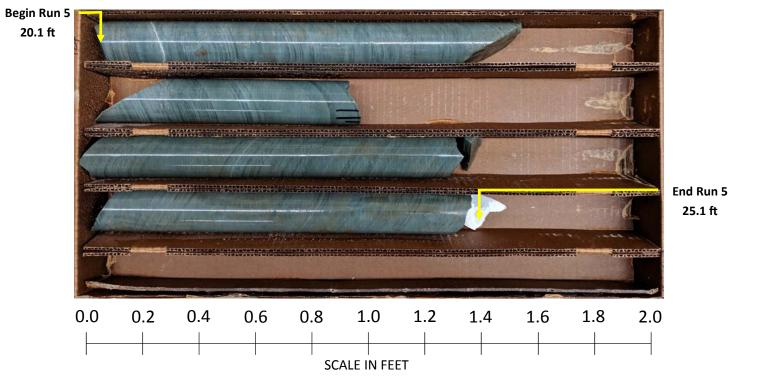
WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B3-A

Station: 32+85 Offset: 7' LT

Begin Run 2





N/A

DEPTH (ft

GEOTECHNICAL BORING REPORT

GEOTECHNICAL BORING REPORT **BORE LOG**

CORE LOG WBS 38356.1.2 **TIP** B-4407 COUNTY ANSON **GEOLOGIST** J. Garrick **WBS** 38356.1.2 **TIP** B-4407 **COUNTY** ANSON **GEOLOGIST** J. Garrick **GROUND WTR (ft)** SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 **GROUND WTR (ft) STATION** 32+73 OFFSET 23 ft RT ALIGNMENT -L-**BORING NO.** B3-B 0 HR. N/A **BORING NO.** B3-B **STATION** 32+73 OFFSET 23 ft RT ALIGNMENT -L-0 HR. **EASTING** 1,667,490 TOTAL DEPTH 29.0 ft **NORTHING** 527,437 **EASTING** 1,667,490 COLLAR ELEV. 188.9 ft 24 HR. N/A COLLAR ELEV. 188.9 ft TOTAL DEPTH 29.0 ft **NORTHING** 527,437 24 HR. **DRILL RIG/HAMMER EFF./DATE** MID5152 D-25 86% 02/21/2019 HAMMER TYPE Automatic **DRILL RIG/HAMMER EFF./DATE** MID5152 D-25 86% 02/21/2019 **DRILL METHOD** Wash Boring **DRILL METHOD** Wash Boring **HAMMER TYPE** Automatic DRILLER B. Fowler **START DATE** 09/19/19 COMP. DATE 09/19/19 DRILLER B. Fowler **START DATE** 09/19/19 COMP. DATE 09/19/19 **SURFACE WATER DEPTH** 1.5ft SURFACE WATER DEPTH 1.5ft ELEV DRIVE DEPTH BLOW COUNT SAMP. **BLOWS PER FOOT** CORE SIZE NQ2 TOTAL RUN 27.0 ft SOIL AND ROCK DESCRIPTION ELEV (ft) (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. MOI G RUN (ft) ELEV. (ft) ELEV DEPTH RUN SAMP. RQD (ft) % ELEV RATE DESCRIPTION AND REMARKS (ft) NO. (ft) (ft) (ft) ELEV. (ft) WATER SURFACE (09/19/19) 190 Begin Coring @ 2.0 ft 188.9 GROUND SURFACE (1.2) (0.0) 60% 0% NON-CRYSTALLINE ROCK 188.9 185 43 57/0.2 WEATHERED ROCK 91% 17% Slightly Weathered, Hard, Gray META-ARGILLITE with Very Close to Close 5.0 100/0.7 60/0.0 186.9 186.9 2.0 Gray (META-ARGILLITE) (4.1) (0.8) 82% 16% Fracture Spacing 60/0.0 NON-CRYSTALLINE ROCK 185 REC = 91%, RQD = 17%, GSI = 20 - 25 Slightly Weathered, Hard, Gray META-ARGILLITE with Very Close to Close 180 179.9 🕺 9.0 7:44/1.0 RS-6: 11.0' - 11.4' Fracture Spacing 5:33/1.0 (4.4) (1.2) Unit Weight = 173.3 pcf 7:29/1.0 88% 24% REC = 91%, RQD = 17%, GSI = 20 - 25 Unconfined Compressive Strength = 14,100 psi / 2,030 ksf 180 RS-6 6:03/1.0 175 | 174.9 | 14.0 3:33/1.0 RS-6 4:24/1.0 (5.0) (0.7) 8:37/1.0 100% 14% 175 7:37/1.0 <u>170</u> 169.9 <u>†</u> 19.0 4:28/1.0 3:03/1.0 (5.0) (0.7) 2:16/1.0 100% 14% 170 3:59/1.0 7:45/1.0 . . . 165 164.9 📘 24.0 3:21/1.0 3:20/1.0 (5.0) (1.2) 5:36/1.0 100% 24% . . . 165 3:40/1.0 8:40/1.0 160 159.9 † 29.0 4:01/1.0 Boring Terminated at Elevation 159.9 ft In Non-Crystalline Rock (META-ARGILLITE) 160 Boring Terminated at Elevation 159.9 ft In Non-Crystalline Rock (META-ARGILLITE)

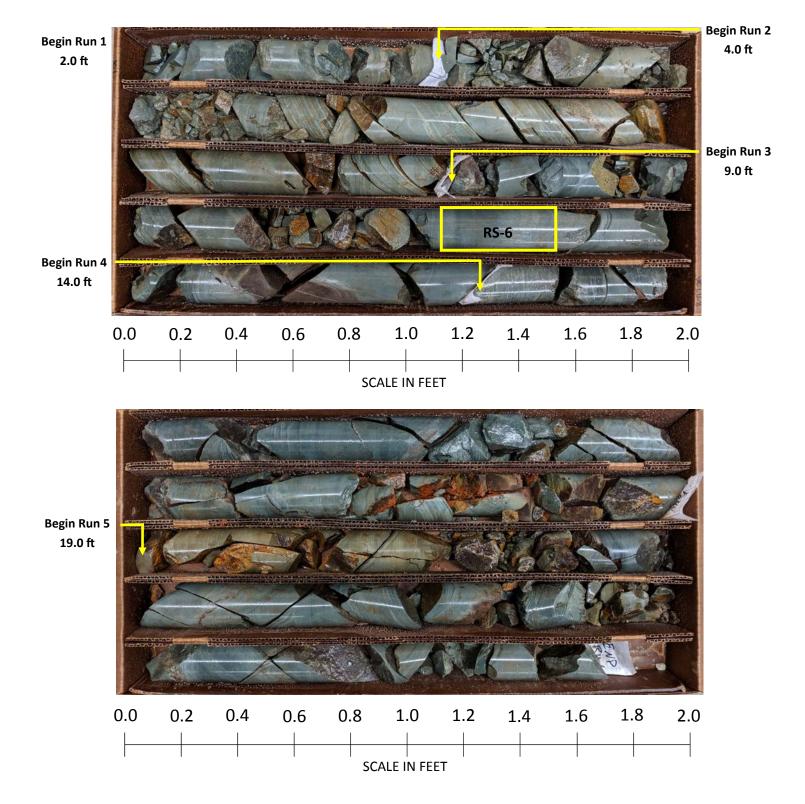


Replace Bridge No. 70 over Rocky River on US 52

WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B3-B

Station: 32+73 Offset: 23' RT





WBS 38356.1.2 COUNTY ANSON **TIP** B-4407 GEOLOGIST J.Garrick/A. Suttle SITE DESCRIPTION Replace Bridge No. 70 over Rocky River on US 52 **GROUND WTR (ft)** ALIGNMENT -L-**STATION** 33+85 OFFSET 2 ft RT **BORING NO.** B4-A 0 HR. N/A COLLAR ELEV. 201.4 ft TOTAL DEPTH 45.8 ft **NORTHING** 527,550 **EASTING** 1,667,504 24 HR. 16.0 DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 02/06/2019 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILLER J. Cain **START DATE** 08/12/19 **COMP. DATE** 08/13/19 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT SAMP. **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. MOI G (ft) ELEV. (ft) DEPTH (ft GROUND SURFACE ARTIFICIAL FILL 200 Soft to Medium Stiff, Brown, Clayey SILT (A-5) 197.9 М 195 195.4 ALLUVIAL М Soft, Brown-Gray, Silty CLAY (A-7-5) 192.9 М 190 187.9 13.5 WOH M 185 183.7 + 17.7 60/0.1 60/0.1 NON-CRYSTALLINE ROCK Gray (META-ARGILLITE) Fresh to Very Slightly Weathered, Hard to 180 Very Hard, Brown-Gray META-ARGILLITE with Very Close to Close Fracture Spacing REC = 100%, RQD = 28%, GSI = 25 - 30 RS-7 175 170 165 160 Boring Terminated at Elevation 155.6 ft In Non-Crystalline Rock (META-ARGILLITE) 1) Boring was offset to the right due to power lines.

									C	<u>OF</u>	RE L	<u>OG</u>						
WBS	38356	5.1.2			TIP	B-440)7	C	DUNT	Y A	ANSON			GEOLOGIS	T J.Garricl	k/A. Sut	tle	
SITE	DESCR	IPTION	Rep	lace Brid	ge No	. 70 ov	er Rocky	River	on U	S 52	2						GROUN	ID WTR (ft)
BOR	ING NO.	B4-A			STA	ΓΙΟΝ	33+85			OF	FSET 2	ft RT		ALIGNMEN	IT -L-		0 HR.	N/A
COLI	LAR ELE	EV . 20	1.4 ft		TOT	AL DE	PTH 45.	8 ft		NORTHING 527,550			EASTING	1,667,504		24 HR.	16.0	
			FF./DA	TE HPC2								DRILL METHO						Automatic
	LER J.						TE 08/1			СО	MP. DAT	E 08/13/19		SURFACE	WATER DEF	PTH N/	Ά	
-	E SIZE	i		DDILL		IN	N 28.0 f	t I str	ΔΤΔ		1							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)	Di	ESCRIPTION A	AND REMARK	S		DEPTH (ft)
183.57	183.6 -	17.8	3.0	2:11/1.0	(2.9)	(0.8)		(27.9)	(7.7)		- 183.6	Fresh to	Very Slic	Begin Coringhtly Weathere	ig @ 17.8 ft	v Hard B	rown-Grav	17.8
180	180.6 - -	Ļ	5.0	2:36/1.0 2:35/1.0 2:38/1.0 2:09/1.0	97% (5.0) 100%	(2.7) 54%		100%	28%	蓋蓋	-		ARGILL	= 100%, RQD	Close to Close	Fracture		17.5
175	175.6 -	- - - 25.8	5.0	2:40/1.0 2:48/1.0 3:00/1.0 0:32/1.0	(5.0)	(1.1)	RS-7				- - -	Unco	nfined C		4.5' - 24.9' nt = 173.3 pcf rength = 16,11	0 psi / 2,3	320 ksf	
170	- - 170.6 -	30.8		0:47/1.0 0:48/1.0 0:48/1.0 1:02/1.0	100%						-							
	- - - 165.6 -	- - - 35.8	5.0	0:45/1.0 0:49/1.0 0:48/1.0 0:54/1.0	(5.0) 100%	(0.0) 0%				芸芸芸	-							
165	-	- 33.6	5.0	1:02/1.0 1:03/1.0 1:02/1.0 1:01/1.0 1:12/1.0	(5.0) 100%	(0.5) 10%				芸芸芸								
160	160.6 -	- 40.8 - -	5.0	1:22/1.0 1:22/1.0 0:56/1.0 0:57/1.0 1:09/1.0	(5.0) 100%	(2.6) 52%				芸芸芸	-							
	155.6 -	- 45.8 -		0:59/1.0 0:49/1.0							- 155.6 	Boring 1	Геrminat	ed at Elevation	n 155.6 ft In No ARGILLITE)	n-Crystal	line Rock	45.8
	-										_	1)	Poring	,	,	nower lin	100	
												1)	Boring	was offset to the	,	power lin	ies.	

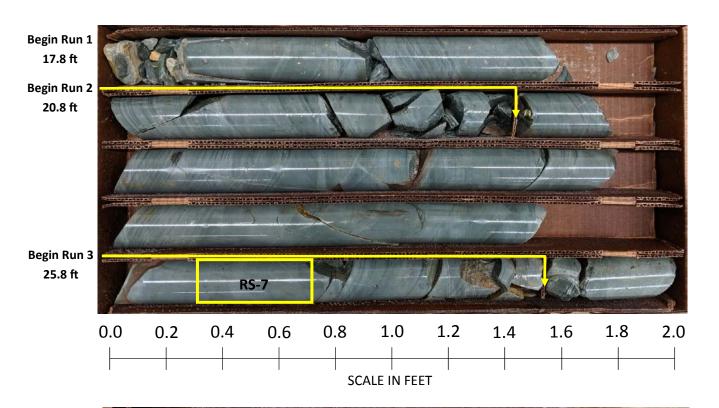


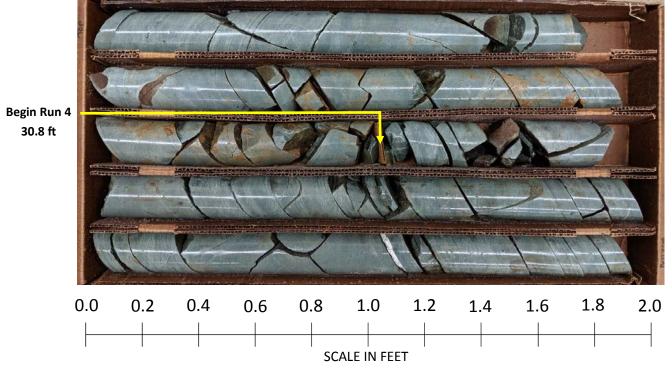
Replace Bridge No. 70 over Rocky River on US 52

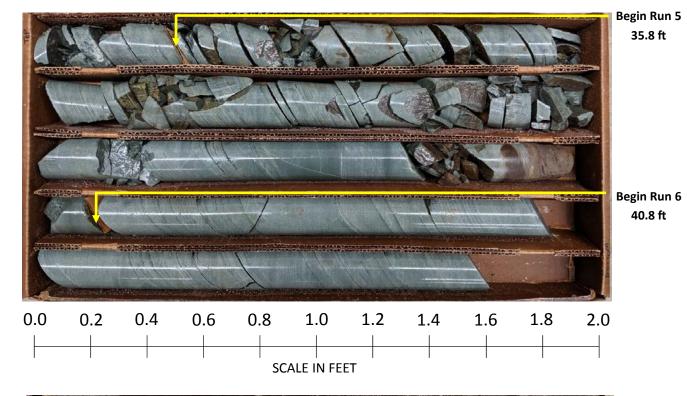
WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B4-A

Station: 33+85 Offset: 2' RT









GEOTECHNICAL BORING REPORT

GEOTECHNICAL BORING REPORT **BORE LOG** CORE LOG

WBS 38356.1.2 TIP B-4407 CC	UNTY ANSON	GEOLOGIST A. Suttle	WBS 38356.1.2 TII		Y ANSON	GEOLOGIST A. Suttle
SITE DESCRIPTION Replace Bridge No. 70 over Rocky River		GROUND WTR (ft)	SITE DESCRIPTION Replace Bridge I			GROUND WTR (ft)
BORING NO. B4-B STATION 33+92	OFFSET 20 ft RT	ALIGNMENT -L- 0 HR. N/A	BORING NO. B4-B	TATION 33+92	OFFSET 20 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 200.3 ft TOTAL DEPTH 46.0 ft	NORTHING 527,551	EASTING 1,667,524 24 HR . 9.0	COLLAR ELEV. 200.3 ft TO	OTAL DEPTH 46.0 ft	NORTHING 527,551	EASTING 1,667,524 24 HR . 9.0
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 85% 02/06/2019	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE HPC2473	3 CME-550 85% 02/06/2019	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic
DRILLER J. Cain START DATE 08/13/19	COMP. DATE 08/13/19	SURFACE WATER DEPTH N/A	DRILLER J. Cain ST	TART DATE 08/13/19	COMP. DATE 08/13/19	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW COUNT BLOWS PER	SAMP. L	SOIL AND ROCK DESCRIPTION		OTAL RUN 27.0 ft		
(ft) (ft) (ft) 0.5ft 0.5ft 0.5ft 0 25 50	75 100 NO. MOI G		ELEV RUN DEPTH RUN DRILL RATE RE	RUN EC. ROD (ff) (ff) NO. (ft) (ft) (ft) % %	L	DESCRIPTION AND REMARKS
			(ft) (ft) (ft) (ft) (Min/ft) (ft)	(ft) (ft) NO. (ft) (ft) (ft) %	O G ELEV. (ft)	DEPTH (ft)
205		_	181.27	20) (070) (400)	E	Begin Coring @ 19.0 ft
		<u>-</u>	180 181.3 + 19.0 2.0 0:46/1.0 (2. 179.3 + 21.0 0:51/1.0 100	2.0) (0.7) (27.0) (10.0) 00% 35% 100% 37%	181.3 Fresh to Very S META-ARGI	Slightly Weathered, Very Hard to Hard, Brown-Gray 19.0 ILLITE with Very Close to Close Fracture Spacing
200 200.3 † 0.0		L - 200.3 GROUND SURFACE 0.0	0:52/1.0 100	5.0) (1.3) 00% 26%	RE	EC = 100%, RQD = 37%, GSI = 30 - 35
1 3 2 3 1	M	ARTIFICIAL FILL	1 175 + 0.51/1.0			RS-8: 34.2' - 34.6'
196.8 + 3.5		Medium Stiff, Brown, Fine Sandy SILT (A-4) 197.3 ALLUVIAL	174.3 26.0 0:53/1.0 5.0 0:56/1.0 (5.0 0:52/1.0 100	5.0) (1.5)	Unconfine	Unit Weight = 166.1 pcf ed Compressive Strength = 9,230 psi / 1,329 ksf
195	· · · · · · · M	Medium Stiff, Brown, Fine Sandy SILT (A-4)	III TI 1 0:48/1.0 I	00% 30%		5,250 ps. / 1,525 ks.
194.3 6.0 2 2 3 1 .	M	402.2	170 169.3 31.0 0:49/1.0 0:52/1.0		<u></u>	
191.8 + 8.5		192.3 Soft, Black-Brown, Clayey SILT (A-5)	5.0 0:47/1.0 (5. 0:55/1.0 100	5.0) (1.8) 00% 36%		
190		<u></u>	T 0:54/1.0 0:57/1.0 0:57/1.0	RS-8		
		187.3 13.0				
185 2 2 2 4	· · · · · · ·	Soft, Brown-Gray, Silty CLAY (A-7-5), with trace organics		00% 38%		
			160 159.3 41.0 0:54/1.0 0:58/1.0		====- ===== ==========================	
1814 + 189]	181.4	T 50 0.56/10 /5	5.0) (2.8)		
180	· · · · · · · · · · · · · · · · · · ·	NON-CRYSTALLINE ROCK Gray (META-ARGILLITE)	155 155 156	3070		
		Fresh to Very Slightty Weathered, Very Hard to Hard, Brown-Gray META-ARGILLITE with	154.3 46.0 0:53/1.0		154.3	46.0 nated at Elevation 154.3 ft In Non-Crystalline Rock
175		Very Close to Close Fracture Spacing			Borning Termin	(META-ARGILLITE)
T		REC = 100%, RQD = 37%, GSI = 30 - 35			<u> </u>	
		-				
170					F	
		_				
165		_				
<u> </u>			61/2 +			
9		-				
		-				
155		154.3 46.0				
	<u> </u>	Boring Terminated at Elevation 154.3 ft In Non-Crystalline Rock (META-ARGILLITE)			-	
		INOTE-OF YSTAILLIE ROOK (IVIETA-ARGILLITE)	g		<u> </u>	
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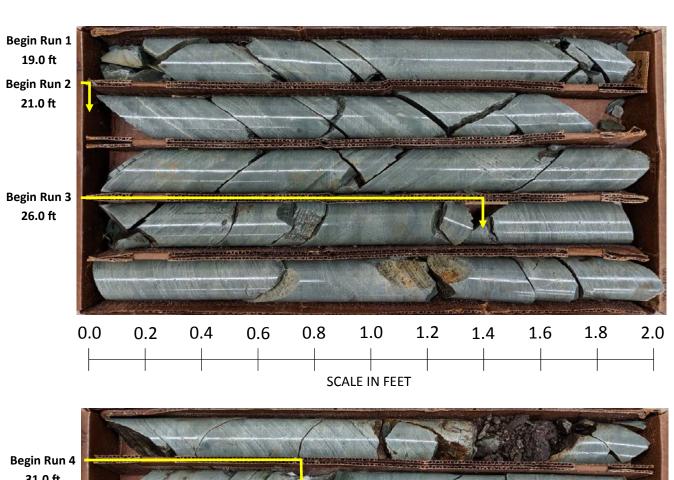


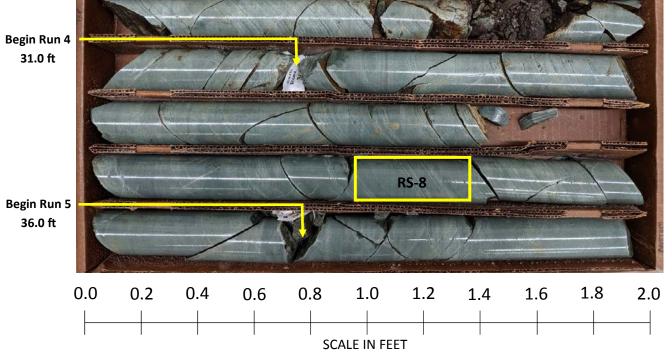
Replace Bridge No. 70 over Rocky River on US 52

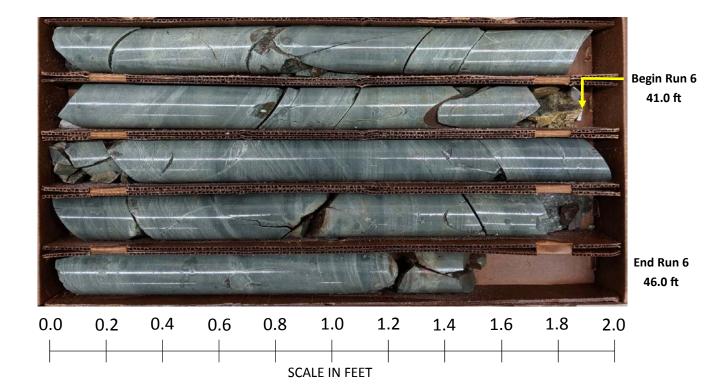
WBS: 38356.1.2 Tip No.: B-4407

Rock Core Photographs: Boring: B4-B

Station: 33+92 Offset: 20' RT









GEOTECHNICAL BORING REPORT

SHEET 28

								<u>B</u>	<u>ORE L</u>	<u>.OG</u>						
	38356					IP B-440			Y ANSON				GEOLOGI	ST J. Garrick		
				lace E	-		er Rocky Ri	ver on U					T			OUND WTR (
	ING NO.				-	TATION			OFFSET				ALIGNME		0 HF	
	LAR ELE						PTH 40.1 f		NORTHING					1,667,520	24 HF	
DRILLER J. Cain											D H	.S. Augers		HAMMER TYP	PE Automation	
	DD1) /E		l pic	ow co		TART DAT	TE 08/12/1	9 PER FOOT	COMP. DA	SAMP.		1 🗆	SURFACE	WATER DEP	TH N/A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft			0		50	75 100	NO.	MOI	0	ELEV. (ft)	SOIL AND ROC	K DESCRIPTION	ON DEPTH
	(10)										/ WICI		LLLV. (II)			DEFII
235																
	232.7	- - - 0.0											 - _ 232.7	GROUND	SURFACE	
	232.7	- 0.0	5	5	3	. 8 .					М		-	ROADWAY E	MBANKMENT	
230	229.2	- - 3.5]			+				- IVIE	dium Stiff, Red-Ta (A-5), with	trace gravel	ey SIL I
	226.7	- - 6.0	2	2	4	6	.				М		227.2			
225	+	-	3	7	4	11					М			ium Stiff to Stiff, I arse Sandy SILT		
	224.2	8.5	4	3	2	•5					М		-			
	\exists	_											-			
220	219.2	13.5											- -			
	\exists		3	3	5						М		-			
215	_	_				. ; .							-			
	214.2	18.5	5	7	4	11					М		-			
	\exists	_											-			
210	209.2	23.5	<u></u>			 .							209.7	<u>A</u> II	UVIAL	
	1	_	4	5	8	•13					M		- Med	ium Stiff to Stiff,	Gray-Brown, Si -7-5)	Ity CLAY
205	\exists					- 7 - 1							- -	(A	-1-3)	
	204.2	28.5	3	4	5	. 49.					М		-			
	}					• • •							•			
200	199.2	33.5											- -			
	1	_	2	3	5	. 8 .					М		-			
195	\exists												- -			
	194.2 192.7	38.5 - 40.0	5	12	88/0.2	1 : :		<u> </u>				477	- 193.7 - 192.7	WEATHE	RED ROCK	3
	102.7	- 40.0 -	60/0.1				l		100/0.7 60/0.1	7			192.6_/	Gray (META	A-ARGILLITE)	
	-	_										[_	Gray (META	ALLINE ROCK A-ARGILLITE)	
	1	-											- Per	Boring Termina netration Test Ref	usal at Elevation	ard on 192.6
		-											<u>.</u>		ystalline Rock RGILLITE)	
	3	_										[-	,	,	
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PROJECT R	EFERENCE	NO.	SHEET NO.
B	29		
ROCK	TEST	RE	ESULTS

	ROCK TEST RESULTS										
SAMPLE NO.	BORING	STATION -L-	OFFSET	DEPTH INTERVAL	RUN REC (%)	RUN RQD (%)	Rock Type	Unit Weight LB/FT³	Unconfined Compressive Stregth (PSI/KSF)		
RS-1	B1-A	30+70	10' LT	41.8' - 42.2'	100	22	Meta-Argillite	173.5	8,810 psi / 1,268 ksf		
RS-2	B1-B	30+81	18' RT	46.1' - 46.5'	100	86	Meta-Sandstone	185.4	13,390 psi / 1,928 ksf		
RS-3	B2-A	31+91	10' LT	9.4' - 9.8'	98	98	Meta-Argillite	173.4	17,640 psi / 2,540 ksf		
RS-4	B2-B	31+85	30' RT	16.6' - 17.0'	100	62	Meta-Argillite	173.5	18,640 psi / 2,684 ksf		
RS-5	ВЗ-А	32+85	7' LT	18.1' - 18.5'	88	32	Meta-Argillite	173.1	16,230 psi / 2,337 ksf		
RS-6	ВЗ-В	32+73	23' RT	11.0' - 11.4'	88	24	Meta-Argillite	173.3	14,100 psi / 2,030 ksf		
RS-7	B4-A	33+85	2' RT	24.5' - 24.9'	100	54	Meta-Argillite	173.3	16,110 psi / 2,320 ksf		
RS-8	B4-B	33+92	20' RT	34.2' - 34.6'	100	36	Meta-Argillite	166.1	9,230 psi / 1,329 ksf		

RS = NQ2 Rock Core Barrel Sample (ASTM D-2113)



PHOTO 1: VIEW AT BENT 2 FACING DOWNSTATION ALONG PROPOSED NEW ALIGNMENT TOWARD END BENT 1.



PHOTO 3: VIEW FROM BENT 4 FACING DOWNSTATION.



PHOTO 2: VIEW NEAR BENT 1, FACING UPSTATION.



PHOTO 4: VIEW NEAR BENT 4, FACING EAST ALONG ROCKY RIVER.

 PROJECT REFERENCE NO.
 SHEET NO.

 B-4407
 30

 SITE PHOTOS

BRIDGE NO. 70 ON -L-OVER ROCKY RIVER ON US 52