# This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document -

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page. This file or an individual page shall not be considered a certified document.

	CONTENTS		<b>STATE OF NORTH CAROLINA</b> DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS
	CONTENTS		GEOTECHNICAL ENGINEERING UNIT
	SHEET NO.	DESCRIPTION	
		TITLE SHEET	STRUCTURE
~	2	LEGEND (SOIL & ROCK)	STRUCTURE
1	2A	SUPPLEMENTAL LEGEND (GSI)	
D I	3	SITE PLAN	SUBSURFACE INVESTIGATION
	4	PROFILE(S)	Sebsemmel my Longinien
	5-8	CROSS SECTION(S)	
	9-24	BORE LOG(S), CORE REPORT(S), & CORE PHOTOGRAPH(S)	
	25 26	SITE PHOTOGRAPH ROCK COMPRESSION TEST	COUNTY <b>IREDELL</b>
	20	RUCK COMPRESSION TEST	SITE DESCRIPTION <b>BRIDGE NO. 38 ON US 21/NC 115</b>
			(SHELTON RD.) OVER THIRD CREEK

# 0 Ś 401 . • • PROJEC

4982

Ŕ

•

REFERENCE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEBTS
N.C.	B-4982	1	27

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES, THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLT EST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 TOT-6800. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARES 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 STIU UNI-FLACED TEST DATA CAN BE RELED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST WETHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL MOISTIGE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OF 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 THE DEPARTMENT AS TO THE THEORY OF MATERNALS AND CONSTRUCTIONS TO BE ENCOUNTERED. OFINION OF THE DEPARTMENT AS TO THE INVESTIGATION TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL CONDENSION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. 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

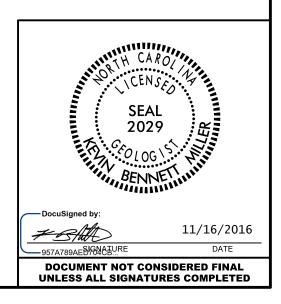
J.K. STICKNEY

#### C.L. SMITH

M.R. MOORE

INVESTIGATED BY \_\_\_\_\_\_K. STICKNEY DRAWN BY <u>T.T. WALKER</u> CHECKED BY \_\_\_\_\_. BEVERLY SUBMITTED BY K.B. MILLER

DATE NOVEMBER 2016

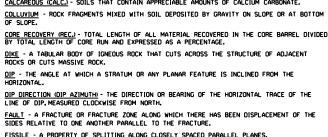


## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION						
SOIL DESCRIPTIONS OF THE SOLL DESCRIPTION OF WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLICHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT 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: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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         - ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD VIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD VIELD SPT REFUSAL. SPT REFUSAL IS PERETRATION 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:						
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: ANGULAR, <u>SUBANGULAR, SUBROUNDED</u> , OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.						
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS ORGANIC MATERIALS		CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT						
CLASS.         ( ≤ 35%, PASSING *200)         ( > 35%, PASSING *200)         CHORE ( + 1/1/1/1/2)           GROUP         A-1         A-3         A-2         A-4         A-5         A-6         A-7         A-1, A-2         A-4, A-5	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE. GOKEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN						
CLASS. A-1-e A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-2-6 A-2-7 A-7-5 A-2-6 A-2-7 A-7-5 A-2-6 A-2-7 A-7-5 A-2-6 A-2-7 A-2-5 A-2-6 A-2-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.						
00000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPIT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED						
18 59 MX GRANULAR SILI- MUCK, CLAY PCAT	PERCENTAGE OF MATERIAL	LICP) - SHELL BEDS, ETC. WEATHERING						
100 30 FA 30 FA 31 HM X 35 HX 35 HX 35 HX 35 HX 35 HX 36 HN	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS</u> 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.						
PARSINDE. PASSING *40 LL 48 MX 41 MN LITILE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN 11 MN MODERATE HICHLY	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	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.						
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO						
OF MAJOR GRAVEL, AND CANE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER 24 HOURS	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.						
MAILKIALS SANU	✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS ✓ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS						
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POUR POOR POUR UNSUTTABLE	Spring or seep	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.						
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 + PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH						
PRIMARY SOIL TYPE COMPACTNESS OR PANGE OF STANDARD RANGE OF UNCONFINED CONSISTENCY 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 SPT REFUSAL						
GENERALLY VERY LOOSE < 4 GENERALLY LOOSE 4 TO 10	SUPE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.						
MATERIAL MEDIUM DENSE 10 TO 30 N/A	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						
(NUN-LURESIVE)         VERY DENSE         > 50           VERY SOFT         < 2		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAFROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF <u>FESTED</u> , WOLD YIELD SPT VALUES (V 00 BPF						
GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2		COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND						
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.						
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS						
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.						
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.						
OBJECLT,         COBD-         CHRL-         SAND         SAND         SAND         CL-           (BLDR,)         (COB,)         (GR,)         (CSE, SD,)         (F SD,)         (SL,)         (CL,)           GRAIN         MM         305         75         2,0         0,25         0,05         0,005	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 BY MODERATE BLOWS.						
SIZE IN. 12 3	BT - BORING TERMINATED MICA, - MICACEOUS WEA, - WEATHERED CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE						
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - 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						
	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> 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.						
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLICHTLY R5 - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNALL.						
PLASTIC   SEMISOLID& REQUIRES DRYING TO RANCE < - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES         TCR - TRICONE REFUSAL         RT - RECOMPACTED TRIAXIAL           FRAGS FRAGMENTS         w - MOISTURE CONTENT         CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING						
	HIHIGHLY V-VERY RATIO EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET						
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE         3 TO 10 FEET         THICKLY BEDDED         1.5 - 4 FEET           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET						
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		CLOSE         0.16         TO         FOOT         VERY         THINLY         BEDDED         0.03         - 0.16         FEET           VERY         CLOSE         LESS         THAN         0.16         FEET         THICKLY         LAMINATED         0.008         - 0.03         FEET						
	Сме-55 Синтнойов Регин новек Соле Size: Х в ношом Augers Соле Size:	THINLY LAMINATED < 0.008 FEET INDURATION						
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC						
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.						
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.						
COLOR		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.	Image: Constraint of the second se							

#### PROJECT REPERENCE NO. **B-4982**



TERMS AND DEFINITIONS

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <u>ARGILLACEOUS</u> - 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

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

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

SURFACE.

ROCKS OR CUTS MASSIVE ROCK.

FAULT - A FRACTURE OF 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.  $\underline{FLOAT}$  - 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 OUALITY DESIGNATION (ROD) - A MEASURE OF ROCK OUALITY 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

BULK

<u>SILL</u> - 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 (SROD) - 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.

G	BENCH MARK: BM-2: R/R SPIKE SET IN BASE OF 24" OAK TREE ON
THICKNESS	SOUTHEAST SIDE OF THIRD CREEK, STATION 22+00.4 -L-, 206.7 RT
4 FEET 1.5 - 4 FEET	ELEVATION: 782.82 FEET
0.16 - 1.5 FEET 0.03 - 0.16 FEET .008 - 0.03 FEET < 0.008 FEET	NOTES:
1 0.000 FEET	
HEAT, PRESSURE, ETC.	
.E.	
STEEL PROBE:	

DATE: 8-15-14

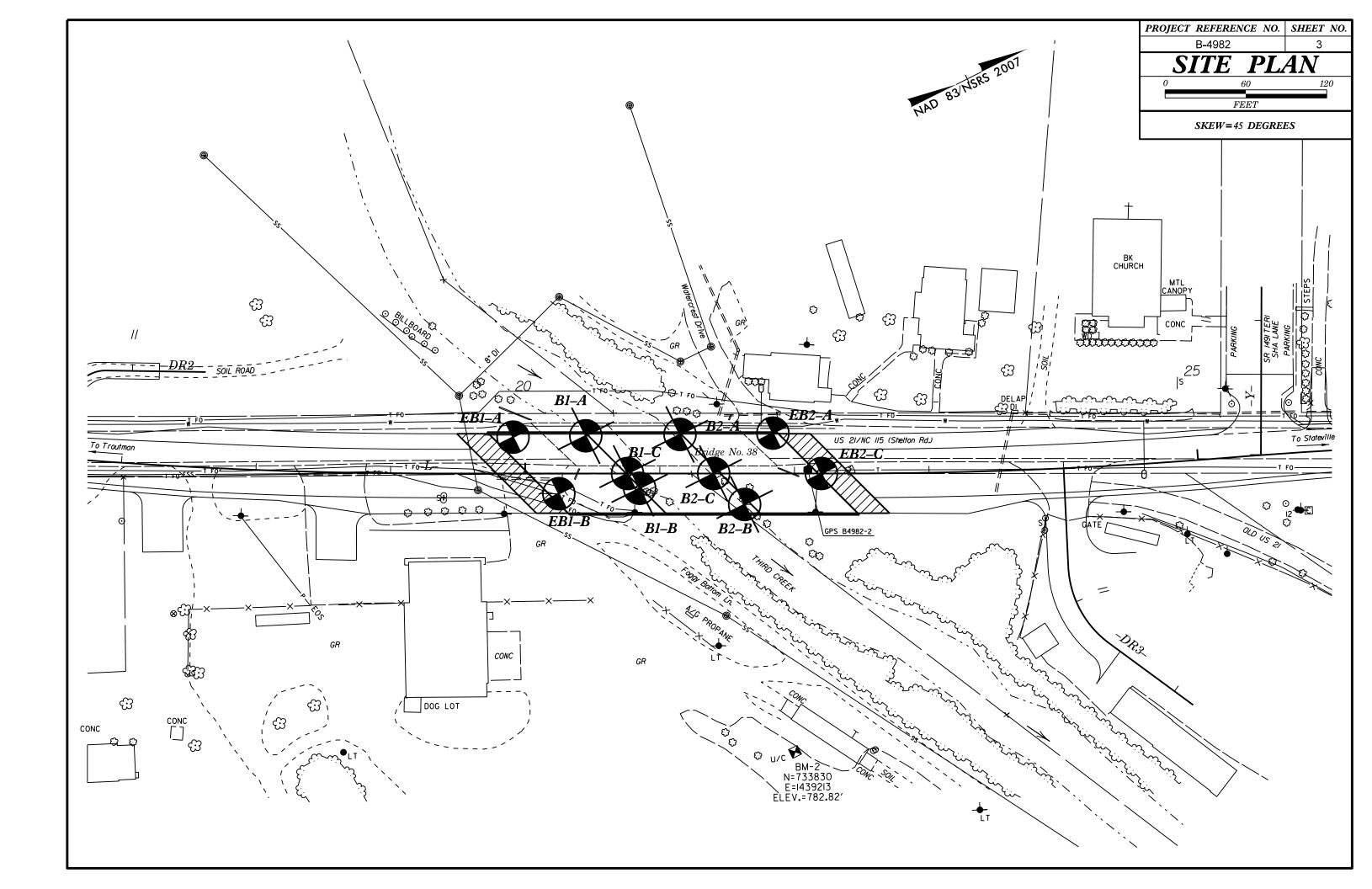
#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

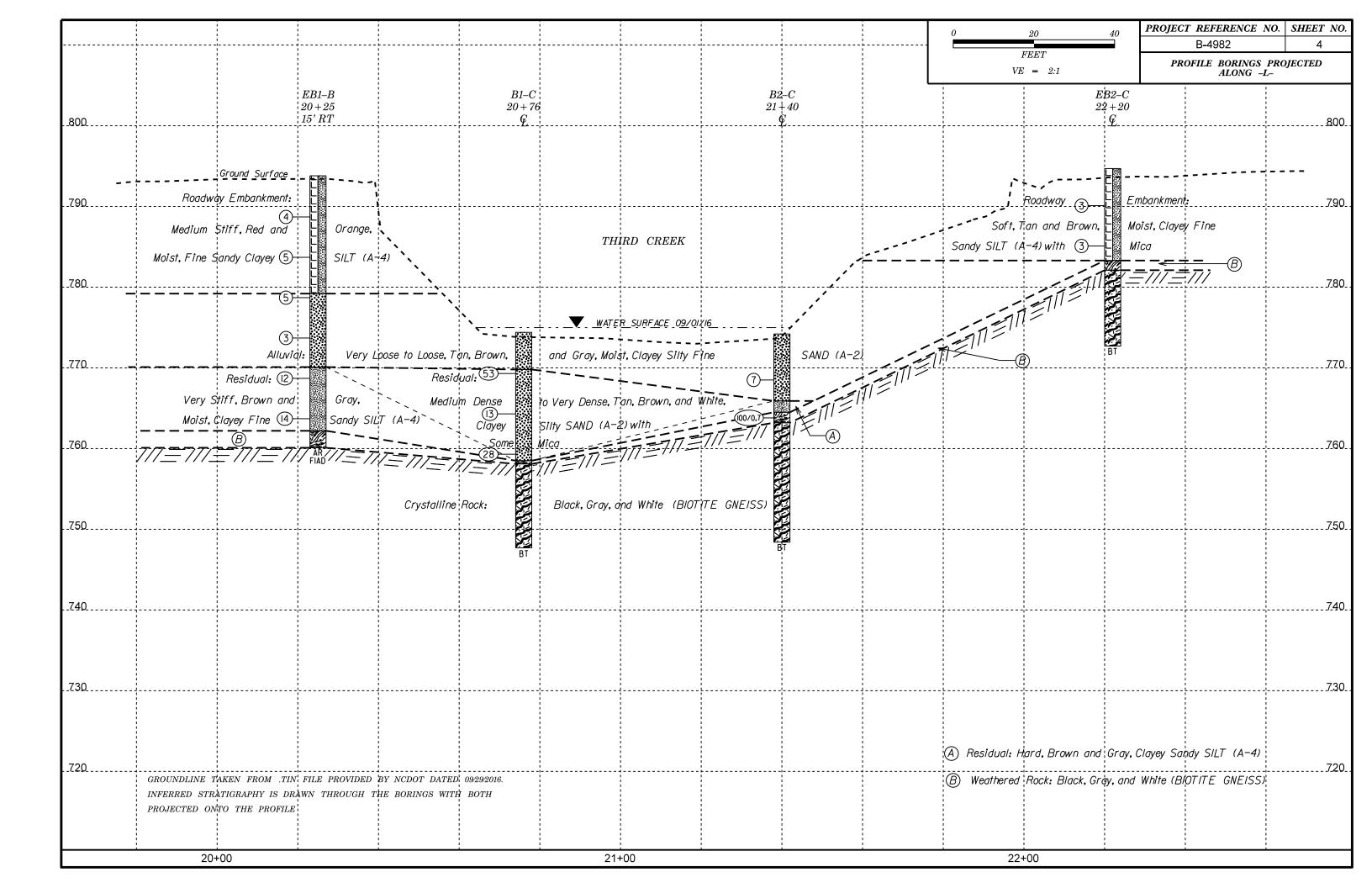
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Ro	ock Mass (Marı	nos and Hoek,	2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 200
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	SURFACE CONDITIONS	VERY GOOD Very rough, fresh unweathered surfaces	22 90 600D 17 Rough, slightly weathered, iron stained 10 surfaces	A 44 70 FAIR 71 Smooth, moderately weathered and 70 altered surfaces 70	<pre>PDOR PDOR &lt; Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</pre>	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 GSI from the contours. Do not attempt to be too         of GSI from the contours. Do not attempt to be too         of GSI from the contours. Do not attempt to be too         of GSI from the contours. Bo not attempt to be too         of GSI from the contours. Bo not attempt to be too         of units arrange from 33 to 37 is more         realistic than giving GSI = 35. Note that the         Hoek-Brown criterion does not apply to structurally         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         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
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	PIECES	90			N/A	N/A	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. 60
BLOCKY - well interlocked un- disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	ROCK		70 60				
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	NTERLOCKING OF			50			B. Sand- stone with stone with siltstone layers of siltstone amounts
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	н			40	30		C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, foulting 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					20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	₩	N/A	N/A			10	Sandstone are transformed into small rock pieces.         Means deformation after tectonic disturbance

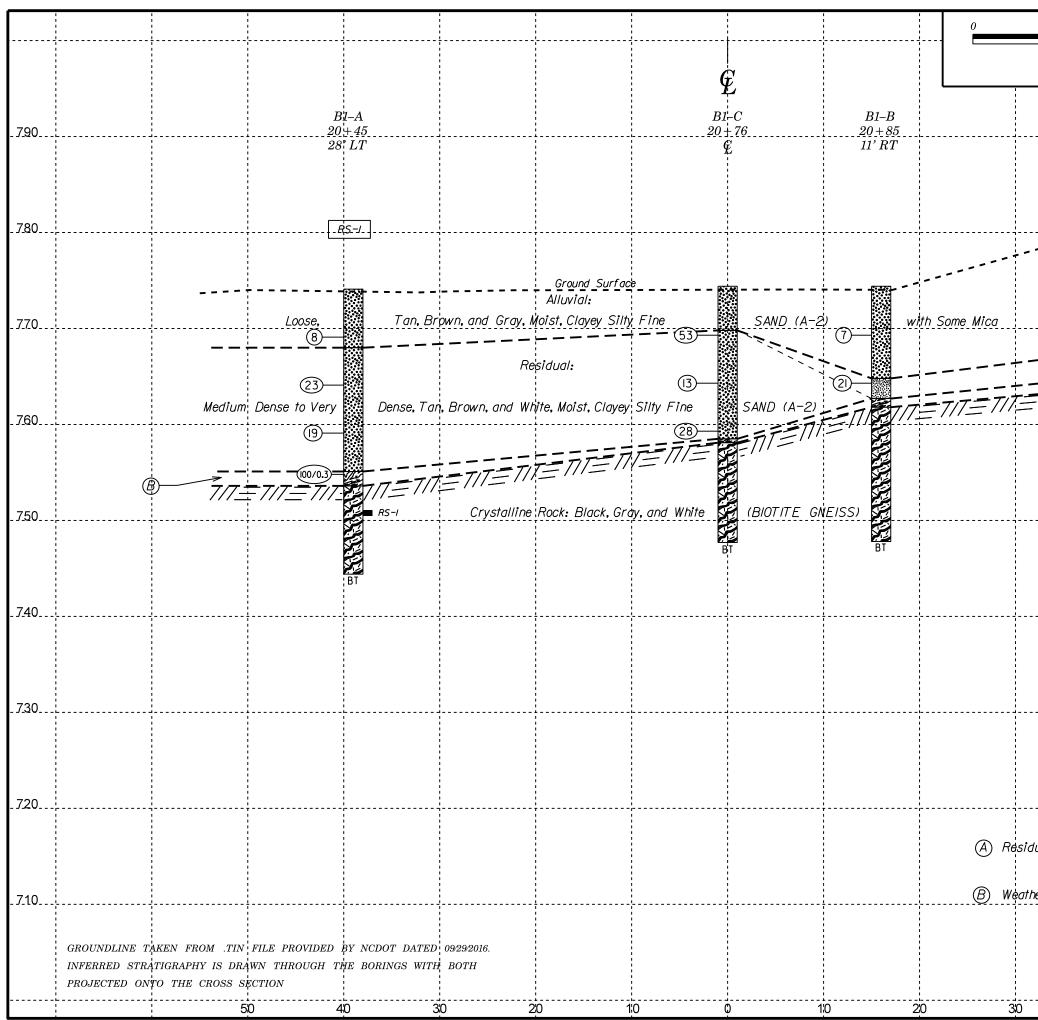
PROJECT REPERENCE NO.	SHEET NO.
B-4982	2A

rectonically bere		Jeneous Nock	1103363 (110) 11	IOS GITO TIDEK	, 2000/
SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)	VERY GOOD - Very Rough, fresh unweathered surfaces	600D - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slicken- sided or highly weathered surfaces with soft clay coatings or fillings
E. Weak	70 60	A 50			
sultstone or clayey shale with sandstone layers		В 40	с с 30	D E	
deformed, ed/faulted, shale or siltstone I deformed s forming an structure deformed silty forming a re with pockets				F/ 20	110
ransformed pieces.					/ /

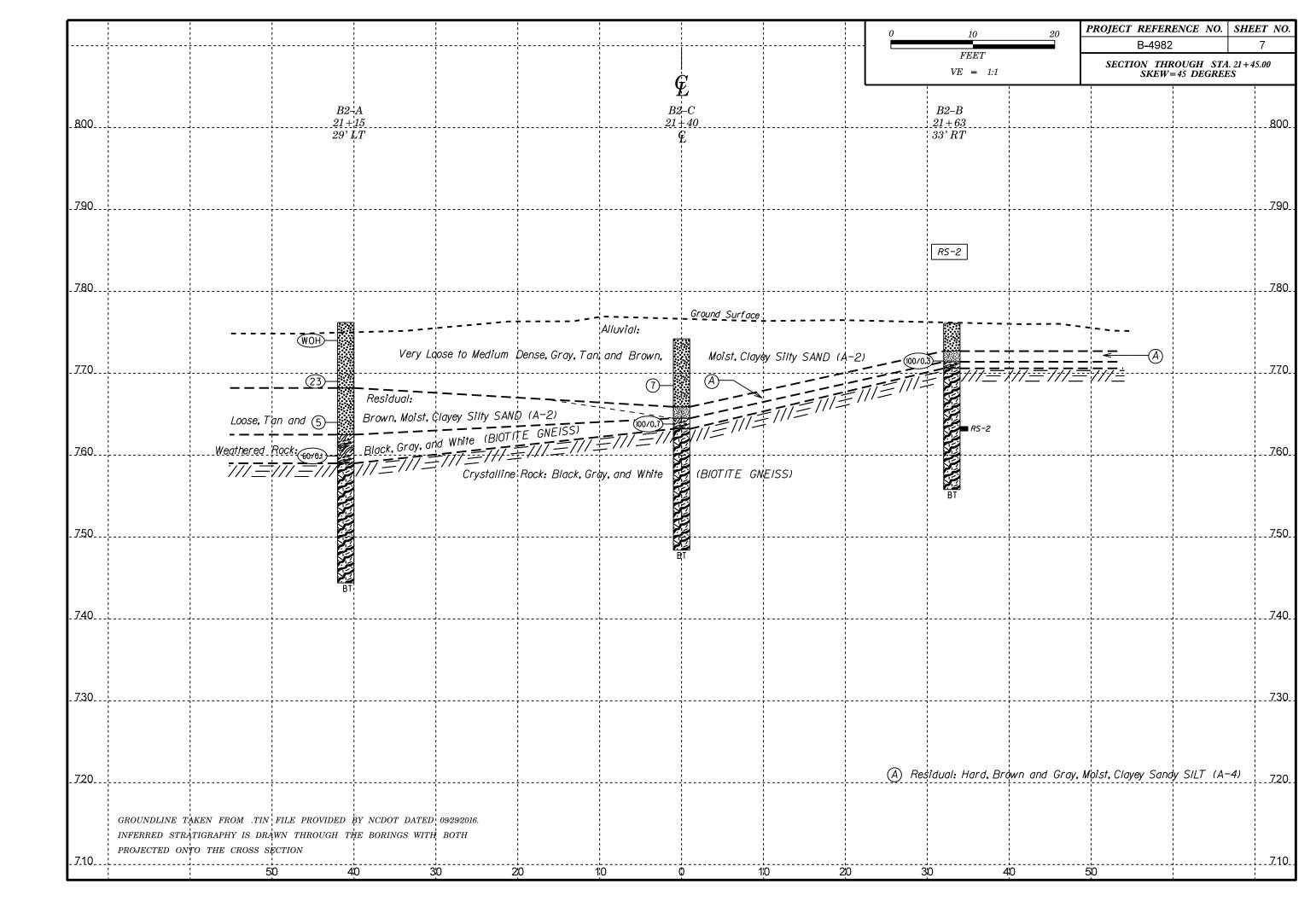


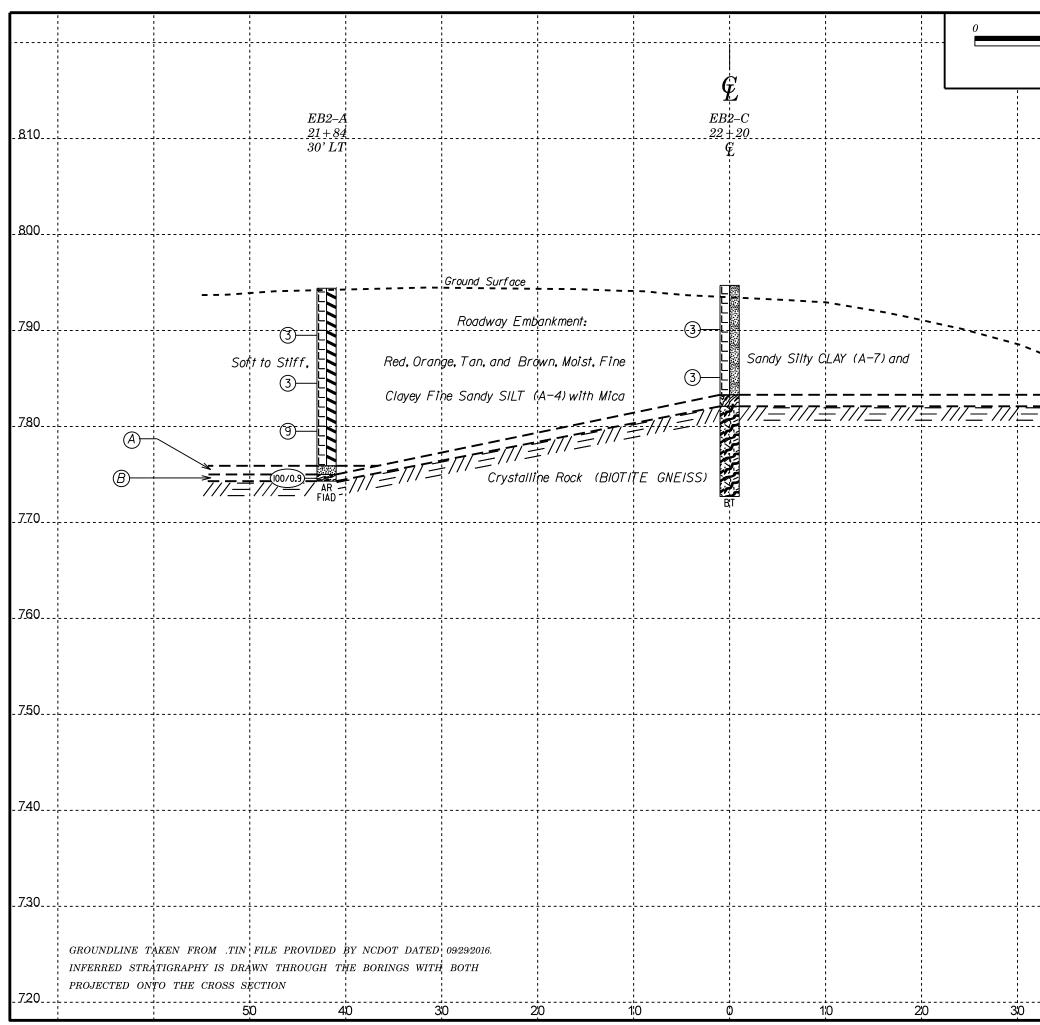


1	1			1	1			1	1		0	10	20	PROJECT REFERENCE NO	D. SHEET NO.
	; {			; {	; <del>;</del>		; 	; 	; 			10		B-4982	5
												FEET VE = 1:1		SECTION THROUGH S SKEW=45 DEGR	
.810			19	1–A + 91						EB1-E 20+23	} 				
	1 1 1 1 1		27'		1 1 1 1 1			$\hat{E}$		21' RT	'				
800															800
				8				Ground Surface							
.790	, , , , ,					Roadway Emba	nkment:						• • • • • • • • •		
	1 1 1 1 1	Sof	t to Medium	Stiff, Red	and Orange, Mo	olst, Sandy Silty	ÇLAY (A−7) with	Some Mica and	4– Fine Sandy		Clayey Sli	LT (A-4)			
	1 1 1 1 1								5-						
. 7.80	, , , , ,	·	2												
			(3)—	Very Loose	to Loose, Gray	Alluvio to Brown, Moist,		D (A-2) with So	pme Mica						
.7.70	1 1 1 1 1	• -		— — — — — — Residual:					3-						
	       	Loose	8 to Very Dense,	Tan-Brown,	Moist, Clayey Si	ilty Fine SAND (			esidual: 12		Noict Clave	y Fine Sandy S			
													1		
. 7.60	, , ,		(0070.6 g	Weathe	red Rock: Brow	יק: White; and - Gra	, BIOTITE GN	EISS)				+			
	1 1 1 1 1 1	77	with Some	R///=///=	 Cryst	+///=///. tálline Rock (BIOT	<u>тте</u> /// <u>—</u> /// тте gneiss)			FIAD	/				
.7.50															
. 7.40	, , , , ,														
700															
. 7.30	<u>.</u>			· · · · · · · · · · · · · · · · · · ·					1  - - - -						7.30.
	-		FILE PROVIDED												
.720	PROJECTED ON	TO THE CROSS S	i												
. 720	PROJECTED ON	TO THE CROSS S				20	1:0	o O	0	20		30	40	50	



B-4982         6           VE = 1:1         SECTION THROUGH STA. 20+75.00           SKEW=45 DEGREES         .75	10	20	PROJECT	REFER	ENCE NO.	SHEET	r NO.
VE = 1:1         SECTION THROUGH STA. 20+75.00 SKEW=45 DEGREES           75         75           76         76           77         77           77         78           77         78           77         78           77         78           77         78           77         78           77         78           77         78           77         77           77         78           77         78           77         78           77         78           77         78           77         78           78         78           77         78           78         78           77         78           78         78           79         74				B-4982		6	
=			SECTI	ON THE SKEW=	ROUGH STA = 45 DEGREA	1. 20 + 75.0 ES	00
=							
$ \begin{array}{c} \begin{array}{c} \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \end{array} \\ \begin{bmatrix} \end{array} \\ \end{array} \\ \begin{bmatrix} \end{array} $ }  }  }					; ; ; ;		. 7.90
$ \begin{array}{c} \begin{array}{c} \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \end{array} \\ \begin{bmatrix} \end{array} \\ \end{array} \\ \begin{bmatrix} \end{array} $ }  }  }		     					
$ \begin{array}{c} \begin{array}{c} \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \end{array} \\ \begin{bmatrix} \end{array} \\ \end{array} \\ \begin{bmatrix} \end{array} $ }  }  }		   			1 1 1		
$ \begin{array}{c} \begin{array}{c} \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \begin{array}{c} \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{bmatrix} \end{array} \\ \begin{bmatrix} \end{array} \\ \end{array} \\ \begin{bmatrix} \end{array} $ }  }  }		1 1 1 1			1 1 1 1		
$\begin{array}{c} \hline \end{array} \\ \hline \end{array} $ \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline  \\ \hline  \\ \\ \hline  \\ \hline  \\ \hline  \\ \hline  \\ \\ \\ \\			• •		, ,		. 7.80
$\begin{array}{c} \hline \end{array} \\ \hline \end{array} $ \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline  \\ \hline  \\ \\ \hline  \\ \hline  \\ \hline  \\ \hline  \\ \\ \\ \\		- 					
$\begin{array}{c} \hline \end{array} \\ \hline \end{array} $ \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline  \\ \hline  \\ \\ \hline  \\ \hline  \\ \hline  \\ \hline  \\ \\ \\ \\		1 1 1 1			     		
$\begin{array}{c} \hline \end{array} \\ \hline \end{array} $ \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array} \\ \hline  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline } \\ \hline \end{array}  \\ \hline  \\ \hline  \\ \hline  \\ \\ \hline  \\ \hline  \\ \hline  \\ \hline  \\ \\ \\ \\							.770.
			4		; ; ; ;		
	- <u>A</u>			—B	     		
			7				
		, , , , , ,			, , , , ,		. 7.60.
		     			1 1 1 1		
		1 1 1 1			       		
		, , , , ,					. <u>7</u> 50
		1 1 1 1			1 1 1 1		
		     					. 7.40
		1 1 1 1 1			1 1 1 1		
		   			   		. 7.30
		     			, 1 1 1 1		
							700
		, , , , ,			, ,		7_20
lual: Very Stiff, Tan and Brown, Moist, Clayey Sandy SILT (A+4)	lual: Very Sti	ff,Tan and Bi	rown, Moisi	t, Clayey	Sandy SIL	T (A+4	)
with Some Mica		with Sol	me Mica		     		
nered Rock: Tan, Black, Gray, and White (BIOTITE GNEISS) 71	hered Rock: 7	an, Black, Gray	, and Whit	e (BIOT	ITE GNEIS	55)	7.10
		1 1 1 1			1       		
40 50	4	;0	50		, , , , ,		





10	20	PROJECT REFERE	NCE NO.	SHEET NO.
FEET		B-4982		8
VE = 1:1		SECTION THRO SKEW=4	UGH STA. 45 DEGREE	22+17.57 S
	1 1 1 1			
				000
	, 			
	1       			
`				
	- <b></b>			
777=	<i></i>			
				770
				770
	, , , ,			
	1 1 1 1			
	<b>-</b>			
A	) Residual: Ha	ard, Brown and Gra	v. Moist. Ci	lavev
		Sandy SILT (A-4)	,, , .	<i>y</i> - <i>y</i>
B	) Weathered H	Rock: White (BIOTITE	E GNEISS	,
				720
4	0	50		<i></i>

									1	OKE																		
	40159					IP B-49				TY IRED					GEOL	OGIST Stickney, J. K.	1			<b>3</b> 4015					IP B-498			NTY
				lge No					elton Rd.	) over Thi					GROUND WTR (ft								lge No		n US 21/N	nelton Ro		
	NG NO					TATION				OFFSE					_	MENT -L-	0 HR.	Dry	BOR	ING NO	<b>).</b> EB1	-В			TATION			OF
	AR EL					OTAL DE				NORTH						NG 1,438,910	24 HR.	FIAD		COLLAR ELEV. 793.8 ft				′ ft	NO			
DRILL	. RIG/HA	MMER E	FF./DA	TE H	-00072	2 CME-550)	X 85%	6 05/20/2	2016			RILLN	/IETHC	DD ⊦	I.S. Augers	HAM	MER TYPE A	utomatic	DRIL	L RIG/HA	AMMER E	EFF./DA	TE H	FO0072	2 CME-550X	85% 05/2	0/2016	
DRIL	LER S	mith, C	. L.		S	TART DA	TE (	08/18/1	16	COMP.	DATE	08/	18/16	_	SURF	ACE WATER DEPTH	I/A		DRI	LER S		C. L.		S	TART DA	<b>FE</b> 08/23	/16	CO
ELEV	DRIVE ELEV	DEPTH							PER FOC			SAMP.	'/			SOIL AND ROCK DES	CRIPTION		ELEV	DRIVE ELEV		· <b> </b>	ow co	1			S PER FO	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25		50	75 I	100	NO.	/мо	I G	ELEV. (ft)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
795		<u> </u>													- 794.5	GROUND SURF		0.0	795		+							
		ţ								· · · · ·	:				-	ROADWAY EMBAN Red-Orange, Sandy Silty (					<u>‡</u>				<u>   </u>			
700		‡				:::		 	· · · ·						-	Some Mica			700		‡					·   · · · ·		
790	790.1	4.4	1	1	1	<b>●</b> 2 · ·			1				м		-				790	- 789.7 -	4.1	2	2	2				
		ŧ				$\left  \begin{bmatrix} \tilde{1} & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{bmatrix} \right $	· · ·	 							L						ŧ				<b>♥</b> <sup>4</sup>     <b>Ⅰ</b>		.   .	
785	785.1	9.4				i · · ·									-				785	- 784.7 -	+ 91							
		Ŧ	2	1	1	<b>•</b> 2 · ·					•		м		F					104.7	+ 3.1	2	2	3	<b>●</b> 5 <sup>•</sup> •			.
		Ŧ					.   .				.				F						Ŧ					· · · · ·		.
780	780.1	14.4	1	1	1		· · ·	· · · ·		· · · · ·			м		779.1			15.4	780	779.7	+ 14.1		2				· · · · ·	
		ŧ				$\begin{bmatrix} \mathbf{P}^2 & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{bmatrix}$									-	ALLUVIAL Gray, Clayey Silty SAND (					Ŧ	2	3	2				
775	775.1	+ - 19.4						· · · · ·							+	Mica			775		‡				!:::	·   · · · ·	·   · · · ·   · · ·	
115	<u> </u>	- 19.4	2	1	2	<b>•</b> 3 · ·							м		- 773.2			21.3	115	- 774.7 -	+ 19.1 +	1	1	2				
		‡				`(:::		 		· · · · ·					-	<b>RESIDUAL</b> Tan-Brown, Clayey Silty F					‡						·   · · · ·	
770	770.1	24.4			4		• •	 	· · ·		·				-	with Some Mi	ca		770	769.7	+ 24.1				- `` -		·   · · ·	· ·   ·
		ŧ	2	4	4	:•³∹		 		· · · · ·	:		м		-						‡	4	7	5	12		·   · · · ·   · · ·	.
		±							· · ·	· · · · ·					-						ŧ				::¦:			
765	765.1	29.4	11	25	31			<u>`</u>	•56 ·				м		-				765	764.7 -	29.1	3	8	6				
		ł					.   .														ł		-		: : <b>!</b>			
760	760.1	T 34.4													760.1			34.4			Ŧ							
		Ŧ	70	30/0.1						100					757.7	WEATHERED F Brown, White, and Gray (Bl		S) 36.8			Ŧ							
		Ŧ					•   •	<u></u>			· [			Sam	-	Boring Terminated by Au	ger Refusal at	/ 00.0			Ŧ							
	-	Ŧ													F	Elevation 757.7 ft on Cr (BIOTITE GNE				-	Ŧ							
		ŧ													F						Ŧ							
		‡													F						ŧ							
	-	ŧ													-					-	‡							
		‡													F						‡							
	-	‡													-						‡							
		‡													F						‡							
		ŧ													E						ŧ							
	-	ŧ													-					-	Ŧ							
		ŧ													Ł						Ŧ							
		Ŧ													F						Ŧ							
	-	Ŧ													F					-	Ŧ							
		Ŧ													F						Ŧ							
	-	‡													<u>-</u>						‡							
1		ŧ													Ę						‡							
		‡													F						‡							
	-	ŧ													F					-	ŧ							
		ł													E						ł							
		Ŧ													_						Ŧ							
	-	Ŧ													F					-	Ŧ			1				
		Ŧ													F						Ŧ			1				
		t													F						<u>†</u>							

#### SHEET 9

INT	<b>y</b> ire	EDEL	L				GEO	OLOGI	ST	Stickney	<sup>,</sup> J. K.				
۲d.)	over T	hird •	Cr	eek								GROUN	D WTR (ft)		
	OFFS	SET	1	5 ft RT			ALI	ALIGNMENT -L- 0 HR.							
	NOR	THIN	G	733,7	59		-			138,963		24 HR.	FIAD		
	non			DRILL N		DΗ			.,	100,000	HAMM	ER TYPE	Automatic		
	0014														
	COM	P. DA	1	E 08/2	23/16	L	501	KFACE	VVA	TER DEF	PTH N/	A			
тос	75	100		SAMP.		0			SO	IL AND RO	CK DESC	RIPTION			
	15	100		NO.	/моі	G									
			+				793.8		F		D SURFA		0.0		
•••		•••					-	Rec	d and	d Orange, F	<sup>-</sup> ine Sand (A-4)	ly Clayey S	ILT		
							_				(,, , , )				
		• •			м		-								
· · · ·		•••				L	-								
	$+ \cdot \cdot$				м		-								
		• •			IVI		-								
•••		•••					-								
	+				м		779.2						14.6		
• •		•••					-	Brow	wn, (	Clayey Silty	LUVIAL SAND (A	-2) with Sc	ome		
•••		•••					-				Mica				
	1		1		м		-								
•••		••• •••					-								
		• •					770.1						23.7		
	· · ·		1		м		-	Bro		RE and Gray, C	SIDUAL	e Sandy S	μт		
•••		· · · ·					-	DIC		anu Gray, C	(A-4)	le Salidy Si			
• •		• •					-								
					м		-								
· <del></del> .	-	·				477	762.2			WFATH	ERED RO	СК	31.6		
• •		• •					760.1	B	Brow	n and White	e (BIOTIT	E GNEISS	) 33.7		
							-	Bo	oring Eleva	Terminate tion 760.1	d by Aug ft on Crys	er Refusal talline Rocl	at k		
							-			(BIOTI	re gnéis	SS)			
						-	_								
							-								
							-								
						-	-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								
							-								

													. <b>O</b> G	,			1			г		
	40159					IP B-4						EDEL					GEOLOGIST Stickney, J. K.	1		- F		40159
SITE	DESCR	IPTIO	Bric	lge No	o. 38 o	n US 2′	1/NC	115 (S	nelton F	Rd.)	over	Third (	Creek					GROUNE	WTR (ft)	- F		DESCR
BOR	ING NO.	. B1-A	4		S	TATION	20	)+45			OFF	SET	28 ft L	Т			ALIGNMENT -L-	0 HR.	N/A	- H		NG NO.
	LAR ELI							<b>H</b> 29.7			NOR	THING	<b>3</b> 733	3,79	7		EASTING 1,438,933	24 HR.	N/A			AR ELE
DRIL	RIG/HA	MMER E	EFF./DA	TE H	F00072	2 CME-55	60X 8	5% 05/2	0/2016				DRIL	LME	etho	DN	V Casing W/SPT & Core HAMM	ER TYPE	Automatic	-		. RIG/HAN
DRIL	<b>LER</b> S	mith, C	C. L.		S	TART D	DATE	08/18	/16		CON	IP. DA	<b>TE</b> 0	8/18	8/16		SURFACE WATER DEPTH 0.	5ft		- F		LER Sr
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	UNT			BLOW	S PER F	ООТ			SAM	P.	▼∕	L O	SOIL AND ROCK DES	RIPTION			COR	E SIZE
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50		75 I	100	NO	. /	моі		ELEV. (ft)		DEPTH (ft)	1	ELEV	RUN ELEV
1																				-	(ft)	(ft)
775		L																			753.6	753.6
	-	<u> </u>	+			<u>   : [:</u>								+			774.1 GROUND SURF/ ALLUVIAL		0.0			
	-	E					•••			•••							Brown and Gray, Clayey Si (A-2) with Some I	ty Fine SAN ∕lica	D	-	750	749.4 -
770	770.1	4.0	1	4	4		· ·								М	F	-					-
	-	ŧ				•••				•••					IVI		768.0 RESIDUAL		6.1		745	-
765	765.1	†					∖. .∖.	· · · ·	·   · · ·   · ·	· · · ·		· · ·					Tan and Brown, Clayey Sil (A-2)	y Fine SAN	c l		145	744.4 -
100		- 3.0	10	11	12	1	)	23							М	-	- (A-2)					-
	-	ŧ					ij	· · · ·	·   · · ·   · ·	· · · ·		· · ·				-						_
760	760.1	14.0	5	8	11		.		·   · ·	• •	· ·	· · ·				-	-					-
	-	ŧ		0			• • 19 • •		·   · · ·   · ·	· · · ·		· · ·			Μ	-						-
	-	<u> </u>					:¦	· · ·	·   · · ·   · ·	· · · ·		· · ·					755.4		10.0			_
755	755.1	19.0	100/0.3	3			- <b>L</b>	— <u> </u>			+	100/0.3				10	755.1 WEATHERED RO		19.0 20.5			-
	-	Ł					· ·		.	•••		· · ·					Tan, Gray, and White (BIO CRYSTALLINE R		<u>s)</u>			-
750	-	Ł					•••		.	• •			RS-	1			Black, Gray, and White (BIO		SS)			-
	-	Ł					•••			•••												-
	-	F					• •									67						-
745		F					· ·	· · ·		<u> </u>		· · ·					-744.4		29.7			-
	-	ŧ															Boring Terminated at Eleva Crystalline Rock (BIOTIT		in			4
	-	ŧ															· · ·	,				-
	-	ŧ															-					-
	-	ŧ																				_
	-	Ł															_					-
	-	Ł																				-
	-	F														F						-
	-	F														F	-					-
	-	ŧ																				-
	-	ţ																		8/16		-
	-	F															-			11/		-
	-	Ł														Ŀ				ED9.		-
	-	F														F				DOT		-
	-	F														F	-			ъ		-
	-	ŧ																		GPJ		_
	-	ŧ															_			038.		-
	-	ŧ																		DGC		-
	-	ŧ																		ШШ		_
	-	+														┝	-			B		-
	-	F														F				GG		-
	-	Ŧ	1																	NCDOT CORE DOUBLE B4982_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 11/8/16		
	-	ŧ	1														-			Ш		-
	-	ŧ	1																	OUBI		-
	-	Ł	1																	Щ Д		
	-	F	1													F	=			Ö		4
	-	Ŧ																		ГÖ		4
I	-																			z		-

V	VBS	40159.1	.1			TIP	B-498	2	C	OUNT	ΥI	REDELL			GEOLOGIST Stickney	J. K.		
s	SITE	DESCRIP	TION	Brid	ge No. 3	B on U	S 21/N	NC 115 (S	Sheltor	n Rd.)	ove	r Third C	reek				GROUN	ID WTR (ft)
E	BOR	ING NO.	B1-A			STAT	ΓΙΟΝ	20+45			OF	FSET 2	8 ft LT		ALIGNMENT -L-		0 HR.	N/A
C	OLI	AR ELEV	1. 77	4.1 ft				PTH 29.	7 ft				733,797		EASTING 1,438,933		24 HR.	N/A
		. RIG/HAMI			TE HFOO					6				NM	V Casing W/SPT & Core	HAMM		Automatic
	RIL	LER Smi	ith C	1		STAF		<b>TE</b> 08/1	8/16		cc	MP. DAT	E 08/18/16		SURFACE WATER DEP	τ <b>Η</b> 0 !	5ft	
_		ESIZE N							0,10									
-		RUN _	EPTH		DRILL	RL	JN		STR	ATA	L							
	LEV (ft)		(ft)	RUN (ft)	RATE (Min/ft)	REC. (ft)	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	ELEV. (f	:)	D	DESCRIPTION AND REMARKS	5		DEPTH (ft)
75	53.6	753.6 _ 3	20.5	4.2		(4.2)			(0,0)	(0, 1)		- 753.6			Begin Coring @ 20.5 ft CRYSTALLINE ROCK			20.5
7	750	ŧ		4.2	1:45/1.0 1:42/1.0 1:51/1.0	100%	(4.1) 98%	RS-1 /	(9.0) 98%	(8.4) 91%		- 753.6			te, Fresh, Hard, BIOTITE GNE Fracture Spacing		Close to V	
		749.4 - 2	24.7	5.0	1:52/1.2 1:40/1.0 1:39/1.0	(4.8) 96%	(4.3) 86%	/				-	I	RS-2	2=12.6-13.2, Qu=20.6 ksi, GSI	=75-80		
7	745	744.4 + 2	29.7		1:39/1.0 1:42/1.0 1:44/1.0	3070	0070					-						20.7
		144.4 - 1	29.1		1:43/1.0							<u> </u>	Boring Termin	nated	d at Elevation 744.4 ft in Crysta GNEISS)	Illine Roc	k (BIOTIT	29.7 E
		‡										-						
		+										-						
		1										L						
		+										_						
		+										-						
		+										_						
		$\pm$										_						
		±																
		Ŧ										F						
		Ŧ										F						
		Ŧ										F						
		<b>–</b>										-						
		Ŧ										F						
		ļ ļ										-						
		+										-						
		‡										-						
		+										-						
		1										-						
		1										F						
01/0		+										-						
		<u>+</u>										F						
3												F						
3		$\pm$										F						
		Ŧ										F						
25.0		-										_						
5005		Ŧ										F						
		Ŧ										F						
ᇳ												F						
		‡										F						
982		+										-						
ц В 4		‡										F						
JUBL		‡										È						
		+										  -						
222		+										F						
3		1										<u>-</u>						
		L																

## CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B1-A 20+45, 28' LT



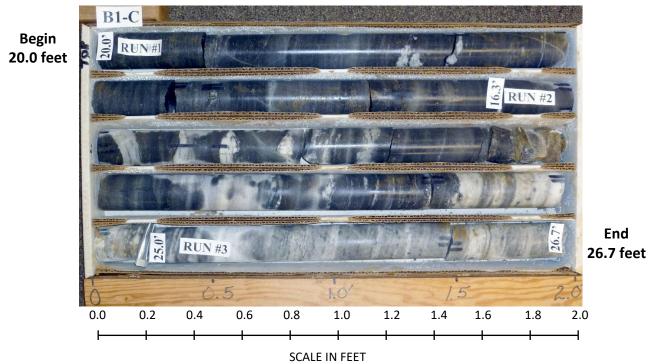
Project: WBS 40159.1.1 T.I.P. B-4982 Bridge No. 38 on US 21/ NC 115 over Third Creek

									ORE		<u>J</u>							
WBS	4015	9.1.1			T	IP B-4982		COUNT	Y IREDE	LL				GEOLOGIST Stickney, J. K.				<b>3</b> 40159
SITE	DESCF	RIPTION	Brid	lge No	. 38 o	n US 21/NC	C 115 (She	lton Rd.)	over Third	l Cre	ek				GROUND WTR	t (ft)		DESCR
BOR	ING NO	. B1-C	;		S	TATION 2	0+76		OFFSET	CL				ALIGNMENT -L-	0 HR.	N/A		RING NO.
COL	LAR EL	<b>EV</b> . 77	74.4 ft		Т	OTAL DEP	<b>FH</b> 26.7 f	t	NORTHI	١G	733,8	12		EASTING 1,438,972	24 HR.	N/A		LAR ELE
DRILI	RIG/HA	MMER E	FF./DA	TE H	-00072	2 CME-550X 8	35% 05/20/2	2016	•	D	RILLN	<b>IETHC</b>	<b>D</b> N	V Casing W/SPT & Core HAMM	ER TYPE Automa	atic	DRIL	l Rig/Ha
DRIL	LER S	Smith, C	. L.		S	TART DATI	08/31/1	6	COMP. D	ATE	08/3	31/16		SURFACE WATER DEPTH 0.2	2ft		DRI	LER S
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	JNT		BLOWS I	PER FOOT		S	SAMP.	▼/	L	SOIL AND ROCK DESC			COF	RE SIZE
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 5	50	75 10	0	NO.	Лиог		ELEV. (ft)		TH (ft)	ELEV	, RUN ELEV
																	(ft)	(ft)
775														-774.4 GROUND SURFA	CE	0.0	758.1	758.1
		Ŧ						1						ALLUVIAL		0.0		
		Ŧ												Tan and Brown, Clayey Silt (A-2)	y Fine SAND		755	754.4
770	770.3	<u>† 4.1</u>	2	35	18			●53.				М		_769.8 RESIDUAL		4.6		-
		ŧ							·   · · · · ·					Tan, Brown, and White, Clay			750	
765	765.3	+ + 9.1							.   .					(A-2) with Some N	lica			749.4 -
105		+	7	7	6	1						М		-				
		ŧ							.   .									
760	760.3	14.1	10	12	16									-				-
		ŧ		12	10		• <u>28.</u>	<u> </u>		-11		М	an	758.5 758.1 WEATHERED RC		15.9 16.3		
		Ŧ												Black, Gray, and White (BIO	TITE GNEISS)	_10.52		
755	-	Ŧ											S	CRYSTALLINE RO Black, Gray, White (BIOTI				
		Ŧ													,			
750		ŧ							·   · · · · ·									-
100	-	ŧ												-				-
		<del>†</del>							.					. 747.7 Boring Terminated at Elevat	ion 747.7 ft in	26.7		
	-	ŧ												Crystalline Rock (BIOTIT	E GNEISS)			-
		ŧ																-
		Ŧ																
	-	ŧ												-				
		‡																
		ŧ																-
	-	ł												-				
		Ŧ											F					
		ŧ																
	-	ŧ												-				
		t															6	
		ł															17/16	
	-	Ŧ											l F	-			⊢ F	-
		‡															<u>B</u> .	
	-	t												_			<u>a</u>	
		ł															S	
		Ŧ											l F				GPJ	
	-	ŧ												-			0038	
		‡															2DG	
		<u>†</u>															Ξ	-
	-	ŧ											l E	-			0	
		Ŧ											F				2_Gf	-
		Ŧ															3498.	-
	-	ŧ												-			ц Ц	-
		<b>‡</b>															DOUB	
		t												_			끮	-
	-	Ŧ											F				NCDOT CORE DOUBLE B4982_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 11/7/16	
		Ŧ															[OC	-
		<u>t</u>															z	

NBS	40159	9.1.1			TIP	B-498	32	С	OUNT	Υ IF	REDELL	GEOLOGIST Stickney	/, J. K.		
			Brid	ge No. 3							Third Creek			GROUND V	VTR (f
	NG NO.			-	1		20+76			1	SET CL	ALIGNMENT -L-		0 HR.	N/
COLL	AR EL	<b>EV</b> . 77	74.4 ft				<b>PTH</b> 26	.7 ft		NO	<b>RTHING</b> 733,812	<b>EASTING</b> 1,438,972		24 HR.	N/
ORILL	RIG/HA	MMER E	FF./DA	TE HFOO	0072 CN	1E-550X	(85%)05	/20/2016	6		DRILL METHOD NM	V Casing W/SPT & Core	HAMM	ER TYPE Aut	tomatic
ORILL	ER S	mith, C	. L.		STA	RT DA	<b>TE</b> 08/3	31/16		CO	MP. DATE 08/31/16	SURFACE WATER DE	PTH 0.2	2ft	
ORE	SIZE	NX			тот	AL RUI	N 10.41	ft							
LEV	RUN ELEV	DEPTH	RUN	DRILL RATE	REC.	JN RQD	SAMP.	REC.	RATA RQD	L O	Г	DESCRIPTION AND REMARK	(5		
(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	G	ELEV. (ft)		.0		DEPTH
58.1	758.1	16.3	0.7	4.44/4.0	(0.7)	(0.7)					758.1	Begin Coring @ 16.3 ft			
755		- 10.0	3.7	1:44/1.0 1:42/1.0 1:38/1.7	100%	(3.7) 100%		(9.9) 95%	(9.5) 91%			CRYSTALLINE ROCK ite, Fresh, Hard, BIOTITE GN	EISS with	Close to Wide	1
133	754.4 -	- 20.0	5.0	1:41/1.0	(4.5)	(4.1)					-	Fracture Spacing GSI=75-80			
	-	+		1:44/1.0 1:47/1.0	90%	82%									
750	- 749.4 <del>-</del>	- 25.0		1:47/1.0 1:50/1.0							_				
	747.7	26.7	1.7	2:00/1.7	(1.7)	(1.7) 100%				Z	747.7				20
	-	F									bonng reminated	d at Elevation 747.7 ft in Crys GNEISS)		K (DIOTTE	
	-	+									-				
	-	L .													
	-	Ł													
	-	Ł													
	-	L													
	-	F									<u>-</u>				
	-	-													
	-	F													
	-	ł													
	-	F													
	_	F									_				
	-	F													
	-	F								F					
	-	F													
	-	F													
	_										_				
	-	F													
	-	F								F					
	-	F								F	-				
										F					
	_	F									_				
	-	F								F					
	-	F								F					
	-	F								F	-				
	-	F													
	-	F									_				
	-	F													
	-	F													
	-	+ + + + + + + + + + + + + + + + + + +									-				
	-	ŧ													
	-	t F									-				
	-	ŧ													
	-	ŧ													
	-	ł									_				

## GEOTECHNICAL BORING REPORT

### CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B1-C 20+76, CL



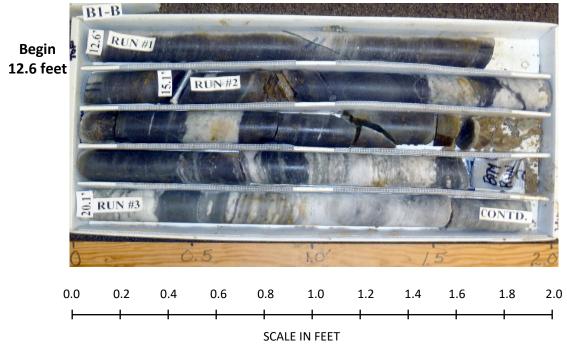
Project: WBS 40159.1.1 T.I.P. B-4982 Bridge No. 38 on US 21/ NC 115 over Third Creek

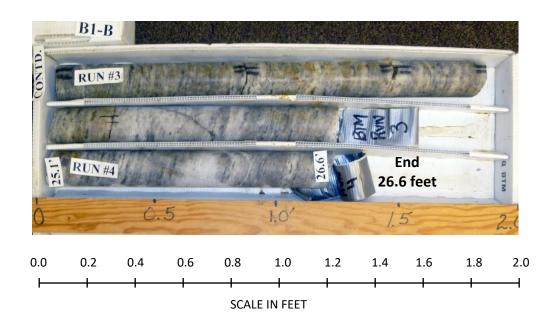
										BC	PRE L	UG																
WBS	40159	9.1.1			ТІ	IP B-49	82		COU	NTY	IREDELI	-				GEOLOGIST Stickney, J. K.				4015					B-498			OU
SITE	DESCR	IPTIO	N Brid	dge No	o. 38 oi	n US 21/	/NC 1	15 (Sh	elton R	d.) ov	er Third (	Creek						t (ft)					lge No. 3	-			Shelto	n R
BOR	ing no.	B1-E	3		S	TATION	20+	85		C	OFFSET	11 ft R1	Г			ALIGNMENT -L-	0 HR.	N/A	BOR	ING NC	<b>).</b> B1-E	3		STA	TION	20+85		
COL	LAR ELI	<b>EV.</b> 7	74.4 ft		Т	OTAL DE	EPTH	26.6	ft	N	ORTHING	<b>3</b> 733,	815			EASTING 1,438,986	24 HR.	N/A			.EV. 77					<b>PTH</b> 26		
RILI	RIG/HA	MMER E	EFF./DA	TE H	F00072	2 CME-550)	X 85%	6 05/20	)/2016			DRILL	METH	<b>IOD</b>	NWC	Casing W/SPT & Core HAMN	NER TYPE Autom	tic	DRIL	L RIG/H/	AMMER E	FF./DA	TE HFO	0072 CN	/E-550>	K 85% 05	5/20/201	ô
RIL	<b>LER</b> S	mith, C	). L.		S	TART DA	٩ΤΕ	09/01/	/16	C	OMP. DA	<b>TE</b> 09	/01/1	6	:	SURFACE WATER DEPTH 0.	.2ft		DRI	LER S	Smith, C	). L.		STA	RT DA	TE 09/0	01/16	
LEV	DRIVE ELEV	DEPTH	BLO	ow co	UNT		I	BLOWS	S PER FO	DOT		SAMP			-	SOIL AND ROCK DES	CRIPTION		COR	E SIZE	NX					<b>N</b> 14.0		
ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25		50 I	75	5 100	NO.	И			LEV. (ft)		TH (ft)	ELEV	RUN ELEV	DEPTH	I RUN	DRILL RATE	REC.	UN RQD	SAMP.	STF REC.	
																			(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(
5		L													-7	74.4 GROUND SURF.	ACE	0.0	761.8									L
	-						:			::						ALLUVIAL		0.0	760		12.6 15.1	2.5	0:51/1.0 0:55/1.5	(2.1) 84%	(2.1) 84%		(13.1) 94%	(1)
	-	F						• • •								Tan and Brown, Clayey Sil	ty Sand (A-2)				+	5.0	1:10/1.0 1:11/1.0	(4.8)	(4.1)			
ļ	770.3	4.1	2	3	4								м		F						ŧ		1:07/1.0	90%	02%			
	-	ŧ				7,1			.		· · · · · · · ·								755	754.3	20.1		1:14/1.0 1:13/1.0		(= =)			
	- 765.3	†   91						• • • •			· · · · · · · ·				-						Ŧ	5.0	1:16/1.0 1:18/1.0	(5.0)	(5.0)			
ſ		-	53	10	11	1	<b>e</b> 21						М		<u>-</u>	64.8 RESIDUAL		9.6	750		Ŧ		1:14/1.0 1:22/1.0 1:23/1.0					
	-	ŧ						<u>.</u>		÷÷	-:-:-:-			1		52.7 Tan and Brown, Clayey Sa 51.8 with Some Mic	ndy SILT (A-4) ca /	11.7 12.6		749.3	<u>25.1</u> 26.6	1.5	1:23/1.0	(1.2)	(1.2)			
	-	ŧ					•	••••		•••				Į.		WEATHERED R Black, Gray, and White (BIC				747.0	+ 20.0		1:34/1.0	<u>80%</u>	80%			+
	-	Ł													1	CRYSTALLINE R	OCK				‡							
	-	F					•		.							Black, Gray, and White (BIC	DTITE GNEISS)				ŧ							
	-	F													7						ŧ							
	-	ŧ							.						1						+							
	-	ŧ						••••			· · · · ·										Ŧ							
	-	ŧ																			Ŧ							
		<u> </u>					.		.					اللبخ	<u>/ 7</u>	17.8 Boring Terminated at Eleva	ation 747.8 ft in	26.6			‡							
	-	Ł													Ł	Crystalline Rock (BIOTIT					‡							
	-	F													F						ŧ							
	-	Ŧ													F						Ŧ							
	-	ŧ													F						Ŧ							
	-	ŧ													Ę						Ŧ							
	-	ŧ													Ł						‡							
	-	Ł													F						‡							
	-	F													F						ŧ							
	-	ŧ													F						ł							
	-	ŧ													F						Ŧ							
	-	ŧ													Ę				(D		Ŧ							
	-	Ł													Ł				11/7/16		‡							
	-	Ł													E						‡							
	-	F													F				T.GDT		ŧ							
	-	ŧ													F				NC_DOT.		ł							
	-	ŧ													Ę						Ŧ							
	-	ŧ													Ł				GP		ŧ							
	-	F													F				0036		‡							
	-	ł													F				GEO_BH_BRDG0038.GPJ		ŧ							
	-	F													F				BH B		t							
	-	F													F				с Ш		ł							
	-	ŧ			1										F				82_G		Ŧ							
	-	ŧ													F				B4982		Ŧ							
	-	ŧ			1										F					.	‡							
	-	+			1										F				DOU		±							
	-	F			1										F				DRE I		t							
	-	ŧ			1										F				NCDOT CORE DOUBLE	.	Ŧ							
	-	t		1	1										Ł				CDO		Ŧ							
			1		<u> </u>														ž	<u> </u>	+	1						┶

**TIP** B-4982 COUN Bridge No. 38 on US 21/NC 115 (Shelton Ro

	0							Otialuaau			
_					-l/		GEOLOGIST	Stickney	, J. K.		
0	neiloi	ı Ră.)		r Third Cre						4	D WTR (ft)
	C #									0 HR.	N/A
	6 ft 20/2016	3				ΝM	EASTING 1, /Casing W/SPT &			24 HR. FR TYPF	N/A Automatic
		,	0		09/01/16	1 10 1	1				Automatic
-	1/16				09/01/16		SURFACE W	AIER DEP	<b>1H</b> 0	211	
ft	STR	ATA	L								
	REC. (ft) %	RQD (ft) %	ŌG			D	ESCRIPTION AN	D REMARK	S		
	%	%		ELEV. (ft)			Begin Coring	@ 12 6 ft			DEPTH (ft)
	(13.1)	(12.4) 89%		- 761.8			CRYSTALLI	NE ROCK			12.6
	94%	89%		-	Black, Gray, a GN	NEIS	Vhite, Slightly We S with Close to W	/ide Fracture	resh, Hai Spacing	d, BIOTTI	=
				-			GSI=7	5-80			
				-							
				-							
				-							
				 -							
				_ 747.8	Boring Termin	ated	at Elevation 747	8 ft in Crysta	alline Roo	k (BIOTITI	26.6
				-			GNEI				
				-							
				_							
				_							
				-							
				F							
				F							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				_							
				_							
				_							
				-							
				F							
				F							
				F							
				F							
				F							
				  -							
				-							
				-							
				F							
				F							

### CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B1-B 20+85, 11' RT

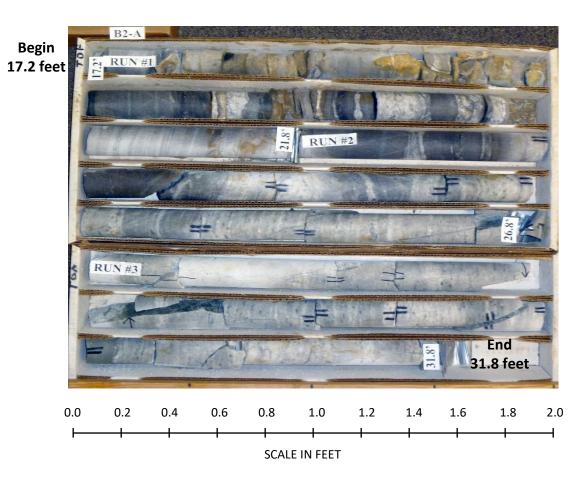




									<u> </u>	<u>ORE I</u>	LOG											-				C
WBS	4015	59.1.1				TIP	B-4982		COUNT	Y IREDEL	.L			GEOLOGIST Stickney, J. K.				40159					B-498			OUN
SITE	DESC	RIPTIO	N Bri	dge N	lo. 38	on U	5 21/NC	115 (She	elton Rd.)	over Third	Creek				GROUND WTR (ft)						lge No. 3	1			Shelto	n Rd.
BORI	NG NC	<b>).</b> B2-A	4			STAT	<b>ION</b> 2'	1+15		OFFSET	29 ft LT			ALIGNMENT -L-	0 HR. N/M			ING NO.				-		21+15		
COLL	AR EL	<b>.EV.</b> 7	76.2 ft			ΤΟΤΑ	L DEPT	<b>H</b> 31.81	ft	NORTHIN	<b>G</b> 733,8	860		EASTING 1,438,964	24 HR. N/M									PTH 31		_
DRILL	. RIG/H/	AMMER E	EFF./D/	ATE	HFO0	)72 CM	E-550X 8	5% 05/20/	2016		DRILL	METHO	DD N	W Casing W/SPT & Core HAM	MERTYPE Automatic						TE HFO					6
DRIL	LER	Smith, C	C. L.			STAR	T DATE	08/22/	16	COMP. D	<b>ATE</b> 08/	/22/16		SURFACE WATER DEPTH	I/A			LER S		). L.				<b>TE</b> 08/2		
ELEV	DRIVE ELEV		·		OUNT				PER FOOT		SAMP.	· 🔻		SOIL AND ROCK DES	CRIPTION		COR		NX	1				<b>N</b> 14.6		
(ft)	(ft)	(ft)	0.5ft	0.5f	t 0.5	ift 0	2	25 I	50	75 100	NO.	Имо		ELEV. (ft)	DEPTH (fi	:)	ELEV (ft)		DEPTH (ft)	RUN (ft)	DRILL RATE	REC.	UN RQD (ft) %	SAMP. NO.	REC.	RATA RQD (ft) %
																		(ft)	(14)	(14)	(Min/ft)	%	%		%	<u>%</u>
780		+												_			759	759.0	17.2	4.6	0:00/1.0	(4.6)	(2.2)		(14.5)	(10.2) 70%
		Ŧ												- -				-	÷		0:00/1.0 0:00/1.0		48%		99%	70%
775	775.0	1.2	+	-	_				1	····				776.2 GROUND SURF			755	754.4 -	- 21.8	5.0	2:14/1.0	(4.9)	(4.4)			
		+ 1.2	WOF	I WO	HWC	ਸ					1	м		Gray, Clayey Silty Fine	SAND (A-2)			-	ł	5.0	2:20/1.0 2:22/1.0 2:35/1.0	98%				
		Ŧ						· · · · ·									750	- 749.4 <del>-</del>	26.8		2:31/1.0					
770	770.0	6.2	10	12	1'	$\dashv \vdash$	· · <u> </u>			· · · ·				_					20.0	5.0		(5.0)	(3.6)			
		‡		'2			· · · · ·	23				M		768.2 RESIDUAL	8.0			-	ł		2:41/1.0 3:31/1.0		72%			
765	765.0	+ + 11.2						· · · · ·						Tan and Brown, Clayey Si	Ity SAND (A-2)		745	744.4 -	- 31.8		3:41/1.0 3:27/1.0	<u> </u>				<u> </u>
	103.0	+ ''.<	1	1	4		5				11	М		-				-	ł							
		‡					<u></u>	-:-:÷÷		+	1		<i>911</i>	- 762.5 - WEATHERED R				-	Ł							
760	760.0	16.2	60/0.1	1						60/0 1	<b> </b>			Black, Gray, and White (Bl	OTITE GNEISS) 17.2			-	ł							
		Ŧ											R	CRYSTALLINE F Black, Gray, and White (Bl	ROCK			-	÷							
755		Ŧ				11	· · · · ·	· · · · ·						- Didok, Ordy, and Write (Di				-	÷							
		Ŧ									1			-				-	ł							
		Ŧ					· · · · ·											-	ŧ							
750		Ŧ									41			_				-	ł							
		Ŧ						· · · · ·										-	ł							
745		Ŧ					· · · · ·	· · · · ·						•				-	÷							
		+	+	-		╉					1			- 744.4 Boring Terminated at Eleva	31.8 ation 744.4 ft in	3		-	+							
		Ŧ												Crystalline Rock (BIOTI	TE GNEISS)			-	ŧ							
		Ŧ												_				-	ł							
		Ŧ																-	Ŧ							
		‡												- -				-	Ŧ							
		‡												-				-	Ŧ							
		‡												- -		9		-	Ŧ							
		‡												_		11/7/16		-	Ŧ							
		‡												- -		μ		-	Ŧ							
		‡														OT.0		-	Ŧ							
		+												-				-	ŧ							
		Ŧ														L L L L L		-	‡							
		Ŧ														38.6		-	‡							
		ł														DGO		-	‡							
		Ŧ														H BR		-	‡							
		Ŧ												-		商		-	t							
		Ŧ												•		GE		-	ŧ							
		Ŧ												•		34982		-	ŧ							
		Ŧ												-		LE E		-	Ŧ							
		‡																-	Ī							
		‡												_		RE C		-	Ŧ			1				
		‡												- -		NCDOT CORE DOUBLE 84382_GEO_BH_BRDG0038.GPJ_NC_DOT.GDT		-	Ŧ							
		‡												• •		LCDC		-	Ŧ			1				
			1									1		_		_ zi			1			1		I	1	

	/ IREDELL	GEOLOGIST Stickney,	
· · · ·	over Third Creek		
	OFFSET 29 ft LT NORTHING 733,860	ALIGNMENT -L- EASTING 1,438,964	0 HR. N/M 24 HR. N/M
05/20/2016		Casing W/SPT & Core	HAMMER TYPE Automatic
	COMP. DATE 08/22/16	SURFACE WATER DEP	
.6 ft			
STRATA	L		
(ft) (ft)	O D G ELEV. (ft)	ESCRIPTION AND REMARKS	S DEPTH (ft)
	<b>7</b> 50.0	Begin Coring @ 17.2 ft	
	759.0 Black, Gray, and V GNEIS	Begin Coring @ 17.2 ft CRYSTALLINE ROCK White, Slightly Weathered to Fr S with Close to Wide Fracture GSI=75-80	esh, Hard, BIOTITE Spacing 31.8

## CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B2-A 21+15, 29' LT

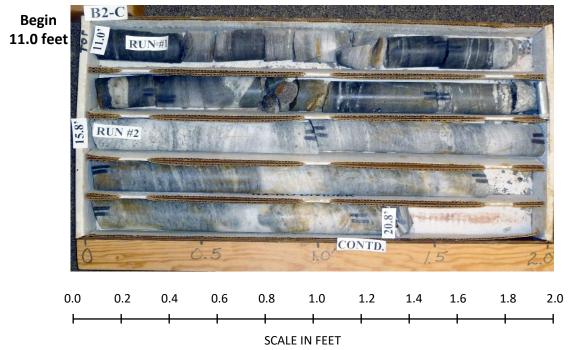


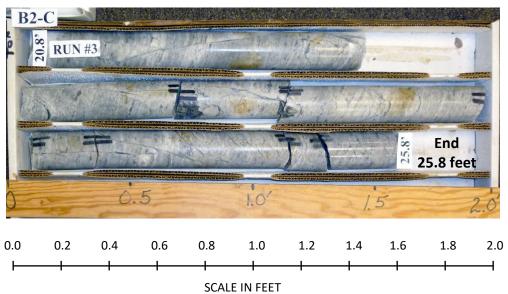
											Or		OG							г						1_		_		
WBS	4015	59.1.1				<b>TIP</b> B	3-4982			COUN	<b>fy</b> if	REDELI	-			GEO	<b>DLOGIST</b> Stickney, J. K.	1		-		40159					B-498			OUN
SITE	DESC	RIPTION	N Brid	dge N	o. 38	on US	21/NC	C 115	(Shel	ton Rd.	) over	Third (	Creek					GROUND	WTR (ft)	-					lge No. 3	-			Shelto	n Ro
BORI	NG NC	<b>)</b> . B2-0	2			STATI	<b>ON</b> 2 <sup>-</sup>	1+40			OFF	SET	CL			ALI	GNMENT -L-	0 HR.	N/A	-		ING NO.						21+40		
COLL	AR EL	LEV. 77	74.2 ft			TOTAL	L DEPT	<b>TH</b> 2	5.8 ft		NO	RTHING	<b>3</b> 733,	869		EAS	<b>TING</b> 1,439,001	24 HR.	N/A			LAR ELE						<b>PTH</b> 25		
DRILL	RIG/H/	AMMER E	EFF./DA	TE ⊦	IFO00	72 CME	-550X 8	35% 0	)5/20/2	016			DRILL	METH	OD 1	W Casir	g W/SPT & Core HAMIN	<b>MERTYPE</b> A	utomatic	_	DRILL	RIG/HAI	MMER E	FF./DA	TE HFO	0072 CN	/E-550>	(85%)05	/20/201	6
DRILL	LER	Smith, C	C. L.			STARI	T DATE	E 08/	/31/16	6	CO	MP. DA	<b>TE</b> 08	/31/16	6	SUF	FACE WATER DEPTH 0	.4ft		H		LER S		. L.		STA	RT DA	<b>TE</b> 08/3	31/16	
	DRIVE		·	ow co					OWS P	PER FOO			SAMP		L		SOIL AND ROCK DES	CRIPTION			COR	E SIZE	NX		1			N 14.8		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.51	it 0	2	25	5	0	75	100	NO.	Имс		ELEV.			DEPTH (ft)		ELEV (ft)		DEPTH (ft)	RUN (ft)	DRILL RATE	REC.	UN RQD (ft) %	SAMP. NO.	REC. (ft) %	
																				-	(11)	(ft)	(11)	(11)	(Min/ft)	% 	%	110.	%	<u>%</u>
775		+														774.2	GROUND SURF	ACE	0.0	-	763.2	763.2 -	11.0	4.8	1:52/1.0	(3.8)	(2.4)		(13.8	(12
		ţ							•••							-	ALLUVIAL Gray, Clayey Silty SA				760	-	ŧ		1:55/1.0 1:54/1.0	79%	50%		(13.8 93%	84
770		‡				:	· · ·	· ·   · ·	· · · ·	· · · ·		· · · · · ·				-	Gray, Glayey Only OF	(A-2)				758.4 -	15.8		1:59/1.0					
	769.5	+ 4.7	2	3	4	╡┝┤	 									F						-	‡	5.0	2:00/1.0 2:02/1.0	(5.0)	(5.0) 100%			
		‡				·¶	<u>(</u> 	· · ·	· · · ·	· · · ·		· · · · · ·				L				-	755	-	ŧ		2:00/1.0					
765	764.5	+ + 9.7				_i		· ·	• •		• •					765.9 764.5	RESIDUAL		8.3 9.7			753.4 -	20.8	5.0	2:03/1.0 2:02/1.0 2:10/1.0	(5.0)	(5.0)			
Ē		‡	53	47/0.2	2	:	<u> </u>				<del>.</del> †.	100/0.7	•			763.2	Brown and Gray, Clayey Sa WEATHERED R		)		750	-	ŧ		2:13/1.0	100%	100%			
700		‡					· · ·	 	· ·	· · ·		· · ·				F	Black, Gray, and White (BIC CRYSTALLINE F	DTITE GNEISS	5)	ŀ	100		25.8		2:15/1.0					
760		+														F	Black, Gray, and White (BIC		5)			-								
		ŧ					· · ·	· ·	•••	· · ·												-	ŧ.							
755		Ŧ							• •							F						-	ŧ							
		Ŧ					· · ·	· ·		· · ·		· · ·				Ł						-	ŧ							
		Ŧ					· · ·					· · ·			×.	E						-	ŧ							
750		Ŧ																	05.0			-	ŧ							
ŀ		Ŧ			+	<u> </u>		· ·	•••				-			<u>- 748.4</u>	Boring Terminated at Eleva		25.8			-	Ł							
		Ŧ														F	Crystalline Rock (BIOTI	FE GNEISS)				-	Ł							
		Ŧ														F						-	Ł							
		Ŧ														F						_	F							
		Ŧ														F						-	F							
		Ŧ														F						-	F							
		‡														F						-	F							
		‡														-						-	ŧ							
		‡														F						-	ŧ							
		‡														F						-	ŧ							
		‡														þ						-	ŧ							
		‡														ŧ				7/16		-	ŧ							
		‡														F				Γ 11/		-	ŧ							
		‡														þ				.GD.		-	ŧ							
		‡														F						-	ŧ							
		ŧ														F				NC		-	ŧ							
		ŧ														F				3.GPJ		_	ŧ							
		$\pm$														F				30035		-	ŧ							
		ł														E				BRD(		-	Ł							
		Ŧ														É				Ha		-	ŧ							
		Ŧ														F				NCDOT CORE DOUBLE B4982_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 11/7/16		-	ŧ							
		Ŧ														F				982_(		-	Ł							
		+														F				: B4(		-	F							1
		‡														F				UBLE		-	Ŧ							1
		‡														ŧ				Ю́О		-	ŧ							1
		‡														F				CORE		-	ŧ							
		‡														F				) TOC		-	ŧ							1
		+		1												F				NCL		-	ł							

COUN

D5/20/2016     DRILL METHOD     NW Casing W/SPT & Core     HAMMER TYPE     Automatic       /31/16     COMP. DATE     08/31/16     SURFACE WATER DEPTH     0.4ft		C	OUNT	Y II	REDELL	-			GEOLOGIS	T Stickney	, J. K.		
25.8 ft       NORTHING       733,869       EASTING       1,439,001       24 HR.       N/A         05/20/2016       DRILL METHOD       NWCasing WSPT & Core       HAMMER TYPE       Automatic         /31/16       COMP. DATE       08/31/16       SURFACE WATER DEPTH       0.4ft         3 ft       Image: Control of the state	(5	Sheltor	n Rd.)	ove	r Third C	ree	k					GROUN	D WTR (ft)
D6/20/2016       DRILL METHOD       NWCasing W/SPT & Core       HAMMER TYPE       Automatic         /31/16       COMP. DATE       08/31/16       SURFACE WATER DEPTH       0.4ft         3 ft				OF	FSET	CL			ALIGNMEN	T -L-		0 HR.	N/A
/31/16       COMP. DATE       08/31/16       SURFACE WATER DEPTH       0.4ft         3 ft	25.	8 ft		NO	RTHING	37	33,869		EASTING	1,439,001		24 HR.	N/A
3 ft       STRATA       L       DESCRIPTION AND REMARKS         REC.       ROD (ft)       G       ELEV. (ft)       DESCRIPTION AND REMARKS         (13.8)       (12.4)       F       763.2       CRYSTALINE ROCK       11.0         93%       84%       F       Black, Gray, and White, Fresh, Hard, BIOTITE GNEISS with Close to Wide Fracture Spacing GSI=75-80       11.0         748.4       748.4       25.8         Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE	)5/	20/2016	6			DR	ILL METHOD	D NM	/Casing W/SPT	& Core	HAMM	ER TYPE	Automatic
STRATA REC. (%)       L O (%)       L O G       DESCRIPTION AND REMARKS         DEPTH (ft)       0 (12.4)       0 (12.4)       0 (12.4)       763.2       CRYSTALLINE ROCK       11.0         93%       84%       763.2       CRYSTALLINE ROCK       11.0         Black, Gray, and White, Fresh, Hard, BIOTITE GNEISS with Close to Wide Fracture Spacing GSI=75-80       0       11.0         748.4       25.8       25.8         Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE       25.8	/3	1/16		со	MP. DA	TE	08/31/16		SURFACE V	VATER DEP	<b>•TH</b> 0.4	4ft	
REC. (f)       RQD (f)       O       DESCRIPTION AND REMARKS         (13.8)       (12.4)       For an and the second	3 f												
Begin Coring @ 11.0 ft         (13.8)       (12.4)         93%       763.2         Black, Gray, and White, Fresh, Hard, BIOTITE GNEISS with Close to Wide         Fracture Spacing         GSI=75-80	-	REC.	RQD	0				D	ESCRIPTION A	ND REMARK	S		
(13.8)       (12.4)       763.2       CRYSTALLINE ROCK       11.0         93%       84%       Black, Gray, and White, Fresh, Hard, BIOTITE GNEISS with Close to Wide       Fracture Spacing         GSI=75-80       GSI=75-80       25.8         T48.4       25.8         Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE		%	%	G	ELEV. (	tt)			Bogin Corin	a@110ff			DEPTH (ft)
Fracture Spacing GSI=75-80		(13.8)	(12.4)	R	763.2		all Oraci an	-1.1.4/1-14	CRYSTAL	LINE ROCK	-100	Olere te V	
T48.4     Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE		9370	0470		-	Die	ack, Gray, an		Fracture	e Spacing	-135 With		vide
Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE					-				G91=	75-80			
Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE					-								
Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE				K	-								
Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE					-								
Boring Terminated at Elevation 748.4 ft in Crystalline Rock (BIOTITE					-								
GNEISS)					- 748.4 -		Boring Term	ninated	at Elevation 74	8.4 ft in Crysta	alline Roo	k (BIOTITI	25.8 E
					-				GNE	EISS)			
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								
					-								

## CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B2-C 21+90, CL





	B	ORE LOG		
<b>WBS</b> 40159.1.1	TIP B-4982 COUNT	TY IREDELL	GEOLOGIST Stickney, J. K.	WBS 40159.1.1
SITE DESCRIPTION Bridge No. 3	38 on US 21/NC 115 (Shelton Rd.)	) over Third Creek	GROUND WTR (ft)	SITE DESCRIPTION
BORING NO. B2-B	STATION 21+63	OFFSET 23 ft RT	ALIGNMENT -L- 0 HR. N/A	BORING NO. B2-B
COLLAR ELEV. 776.1 ft	TOTAL DEPTH 20.3 ft	<b>NORTHING</b> 733,879	EASTING 1,439,032 24 HR. N/A	COLLAR ELEV. 776.
DRILL RIG/HAMMER EFF./DATE HFO	0072 CME-550X 85% 05/20/2016	DRILL METHOD NW	Casing W/SPT & Core HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF
DRILLER Smith, C. L.	START DATE 09/01/16	COMP. DATE 09/01/16	SURFACE WATER DEPTH 0.3ft	DRILLER Smith, C. L
ELEV DRIVE DEPTH BLOW COUN	IT BLOWS PER FOOT	T SAMP.	SOIL AND ROCK DESCRIPTION	CORE SIZE NX
(ft) (ft) (ft) 0.5ft 0.5ft 0	).5ft 0 25 50	75 100 1 100 1 / 1	ELEV. (ft) DEPTH (ft)	
				(ft) (ft) (ft)
780				770.6 770.6 5.5
		· · · · · · · · · · · · · · · · · · ·	776.1 GROUND SURFACE 0.0	<b>- 1</b> 7658 103 1
775			ALLUVIAL Tan and Brown, Clayey Silty Fine SAND	765
771.8 - 4.3		000000	772.7 (A-2) 3.4 771.4 <b>RESIDUAL</b> 4.7	
770 100/0.3		· · 100/0.3	770.6 Brown and Gray, Clayey Sandy SILT (A-4) 5.5 WEATHERED ROCK	
			Black, Gray, and White (BIOTITE GNEISS)	
			CRYSTALLINE ROCK Black, Gray, and White (BIOTITE GNEISS)	755.8 20.3
765				
		· · · · · · RS-2		
760 +				
			755.8 20.3	
			Boring Terminated at Elevation 755.8 ft in Crystalline Rock (BIOTITE GNEISS)	
				19 
				<u> </u>
		E		
		F		NCDOT CORE DOUBLE B4982_GEO_BH_BRDG0038.GPU NC_DOT.GDT 11/8/16
				j žl <u> </u>

DOT.GDT 11/8/

Ŋ GPJ

GEO\_BH\_BRD

B4982\_

DOUBLE

BORE 0 TO Š

## **TIP** B-4982 COUN Bridge No. 38 on US 21/NC 115 (Shelton Rd. **STATION** 21+63 6.1 ft TOTAL DEPTH 20.3 ft FF./DATE HF00072 CME-550X 85% 05/20/2016 **START DATE** 09/01/16 . L. TOTAL RUN 14.8 ft RUN REC. ROD (ft) (ft) NO. DRILL RATE (Min/ft) STRATA REC. RQD (ft) (ft) % % RUN (ft) 4.8 2:00/1.0 (4.8) (4.8) 2:01/1.0 100% 100% 2:00/1.0 100% 100% 2:04/1.0 2:04/1.0 2:02/0.8 5.0 2:10/1.0 (5.0) (5.0) 2:05/1.0 2:06/1.0 100% 2:05/1.0 2:09/1.0 2:12/1.0 5.0 2:15/1.0 (4.9) 4.9) 2:12/1.0 2:13/1.0 98% 98% 2:20/1.0 2:22/1.0 2:22/1.0 2:22/1.0 (14.7) (14.7 99% 99% RS-2

ידא	Y 11	REDEL			GEOI OGI	ST Stickney	ΊК		
		r Third (				. Guokney	,	GROUN	D WTR (ft)
u.)			23 ft RT		ALIGNMEN	JT _! _		0 HR.	N/A
_			<b>G</b> 733,879			1,439,032		24 HR.	N/A
			DRILL METHOD	NM			HAMM		Automatic
	00				-				
		IVIP. DA	<b>TE</b> 09/01/16		SURFACE	WATER DEP	IH 0.3	זונ	
<u> </u>									
A QD t)	L O			D	ESCRIPTION	AND REMARKS	S		
t) 6	G	ELEV.	(ft)						DEPTH (ft)
.7)		- 770.6			CRYSTA	ng @ 5.5 ft LINE ROCK			5.5
.7) %			Black, Gray, and	Whit	te, Fresh, Haro	d, BIOTITE GNE	ISS with	Close to V	Vide
				RS-1	1=23.0-23.6, C	u=17.1 ksi, gsi=	=80-85		
		F							
		F							
		F							
		F							
	R								
		755.8	Boring Termir	nated	at Elevation 7	755.8 ft in Crysta	alline Roo	k (BIOTITE	20.3
		F	5		GN	IEISS)			
ľ		F							
		É.							
		F							
		-							
		-							
		È							
		L							
		F							
		F							
		É							
		F							
		F							
		F							
		F							
		<u>-</u>							
		F							
		Ľ							
		<b>-</b>							
		F							
		F							
		F							
		þ							
		L							
		F							
		F							
		F							
		F							
		F							
		  -							
		F							
		F							
		-							
		F							
		-							

### CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, B2-B 21+63, 23' RT





	1.2	1.4	1.6	1.8	2.0
		_			
=т					

							E
WBS	40159	9.1.1			Т	TIP B-4982 COU	JN
SITE	DESCR	IPTION	Brid	ge No	. 38 o	on US 21/NC 115 (Shelton F	٦d
	ING NO.			-		<b>STATION</b> 21+84	
						OTAL DEPTH 20.1 ft	
				TE HE		2 CME-550X 85% 05/20/2016	
DRIL	LER S					<b>START DATE</b> 08/22/16	
ELEV (ft)	DRIVE ELEV	DEPTH (ft)				BLOWS PER F	OC
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0 25 50	
795		Ļ					
	-						-
	-						•
790	790.5 -	- 3.9	2	1	2		
	-						:
705	- 785.5 -	- 8.9					:
785			2	1	2		
	-	+				$\left \left \left\langle \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle\right ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \cdot \right\rangle ^{-1} + \left \left\langle \cdot \cdot \cdot \cdot \right\rangle ^{$	
780	- 780.5 -	- 13.9					•
100	-		2	4	5	. • • • · · · · · · · · · · · · · · · ·	
	-	È I					:
775	775.5 -	18.9	25	75/0.4			•
		-	20	70/0.4			
	-	F					
	-	ŧ.					
	-	L I					
	-	ł					
	_	F					
	-	F					
	-						
	-	E I					
	-	$\mathbf{F}$					
	-	F					
	-	ŧ					
	-	t					
	-	Ł					
	-	+					
	-	F					
	-	¢					
	-	t					
	-	Ł					
	-	F					
	-	F					
	-	‡					
	-	t					
	-	$\mathbf{F}$					
	-	F					
	-	ŧ					
	-	t					
	-	Ł					
	-	F					
	-	‡					
	-	t					
	-	E					
	-	F					
	-	t					

11/4/16 ž

NT	Y IREDELL				GEOLOG	IST	Stickney,	J. K.		
d.)	over Third C	reek							GROUN	D WTR (ft)
	OFFSET 3	80 ft LT			ALIGNME	INT	-L-		0 HR.	Dry
	NORTHING	733,9	22		EASTING	<b>i</b> 1,4	438,994		24 HR.	FIAD
		DRILL N	IETHO	D H.S	6. Augers			HAMM	ER TYPE	Automatic
	COMP. DAT	<b>FE</b> 08/2	22/16		SURFAC	E WA	TER DEP	TH N/	A	
ООТ		SAMP.	▼/	L		\$0	IL AND ROC			
	75 100	NO.	моі	O G	ELEV. (ft)	30	IL AND NOC			DEPTH (ft)
					794.4		GROUNE		CE	0.0
: :							ROADWAY E	EMBAN	MENT	
· ·					r	leu ar	nd Orange, F (/	4-7)		AT
	+		м							
•••										
•••				ĽN-						
• •			М							
				FN-						
	+		М	ĽN-						
				FN-						
				LN-	775.9 775.0 774.3		RES	IDUAL		18.5
	100/0.9	1		<i>uni</i>	774.3 Br	own a	and Gray, Cla	ayey Sar	ndy SILT (A	
				F			White (BIOT	TITIE GN	IEISS)	
				F	E	Boring Eleva	Terminated ation 774.3 ft	on Crys	talline Roc	at k
				F			(BIOTITI	E GNEIS	iS)	
				F						
				F						
				F						
				F						
				Ŀ						
				E						
				E						
				F						
				ļĒ						

															.0										_	<u> </u>
VBS	40159	.1.1			Т	ΪP	B-498	32			COU	NTY	IR	EDEL	L				GEOLO	GIST	<b>T</b> Stickne	ey, J. K.				WE
ЯТЕ	DESCR	IPTION	Brid	lge No	. 38 o	n U	S 21/N	NC 1	115 (S	Shel	Iton R	d.) c	ver -	Third	Creel	ĸ							GROUN	ID WTR (ft)	)	SIT
BORI	NG NO.	EB2-	С		S	TAT	TION	22+	-20				OFF	SET	CL				ALIGNM	ENT	Γ -L-		0 HR.	Dry	'	во
OLL	AR ELE	<b>V</b> . 79	94.7 ft		Т	ΟΤΑ	AL DE	РТН	<b>1</b> 22.	0 ft			NOR	THIN	G 73	33,9	40		EASTIN	G	1,439,037		24 HR.	Dry	,	со
RILL	RIG/HAN	/IMER E	FF./DA	TE HF	-00072	2 CM	1E-550X	( 85%	% 05/2	20/2	016				DR	ILL N	<b>IETHO</b>	D⊢	I.S. Augers			HAMM	ER TYPE	Automatic		DRI
RIL	LER Sr	mith, C	. L.		S	TAF		TE	08/2	3/16	6		CON	IP. DA	TE	10/3	31/16		SURFAC	ΈV	VATER DE	PTH N/	A			DR
LEV	DRIVE ELEV	DEPTH	BLC	w cou	JNT				BLOW	/S P	PER FC	ют			SA	MP.	▼/	L O			SOIL AND R					со
ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25		5	50	7	5	100	N	IO.	моі		ELEV. (ft)					DEPTH (f	t)	ELE (ft)
95																			794.7		GROU	ND SURF#	<b>CE</b>	0.	.0	782.
	-	-						•		·		• •							_	Tan	ROADWA	Y EMBANI	KMENT		_	780
	791.1	3.6				∐li				•	•••	•••		 						Tan	(A-4	4) with Mica	a contray of			
0	-		3	2	1	ቀ	3										М									
	-	-				!				•		• •														77
5	786.1	8.6	2	1	2	╢		•		•	<u> </u>		<u> </u>				М		_							
1	7							:T	<u></u>			<u>.</u>		 					783.3					11.		
	-	-								•									782.1		(BIOT	HERED RO	SS)		6	
)	-	-					· · ·	· 			· ·	· ·		· · ·	!							ALLINE RO				
	-	-													i				-		(		-)			
5	-	-					· · ·		· · ·	•		•••							-							
		-								•									_ _ 772.7					22.		
ŀ		-						·	<u></u>	•		•••	<u> </u>	<u></u>	Ц			SE?		Bori	ng Terminat	ed by Aug	er Refusal	at	0	
	4	-																	-	Ele	evation 772. (BIOT	THE GNEIS	talline Roc SS)	K		
	1	-																	-							
	-	-																	-							
	-	-																	-							
	4	-																	-							
	4	-																	-							
	4	-																	-							
	-	-																	-							
	-	-																								
		_																	_							
	-	-																	-							
	-	-																	-							
	-	-																	-						16	
	-	-																	-						11/7/	
	1	-																	-						DT	
	4	-																	-						OT.O	
	4	-																								
	-	-																	-						L L L L L	
	4	-																	-						038.0	
	1	_																	-						DGO	
		-																	-						- BR	1
	-	_																								
	1	-																	-						NCDOT CORE DOUBLE B4982 GEO BH BRDG0038.GPJ NC DOT.GDT 11/7/16	1
	4	-																	-						34982	
	+	-																	-						Ш	
	4	-																	-							
	4	-																	-						RED	
	-	-				1												1	-						8	1
	1	-																	_						μĔ	

40159.1.1 **TIP** B-4982 COUN DESCRIPTION Bridge No. 38 on US 21/NC 115 (Shelton Rd ING NO. EB2-C **STATION** 22+20 LAR ELEV. 794.7 ft TOTAL DEPTH 22.0 ft RIG/HAMMER EFF./DATE HF00072 CME-550X 85% 05/20/2016 LER Smith, C. L. **START DATE** 08/23/16 SIZE NX TOTAL RUN 9.4 ft RUN ELEV (ft) DEPTH RUN (ft) (ft) 
 RUN

 REC.
 RQD

 (ft)
 (ft)

 %
 %
 DRILL RATE (Min/ft) STRATA REC. RQE (ft) (ft) % % SAMP. NO. 
 782.1
 12.6
 2.4
 2:47/1.0
 (2.4)
 (1.8)

 779.7
 15.0
 2:54/1.4
 100%
 75%
 (9.1) (6.4 97% 68% 779.7 15.0 
 2:54/1.4
 100%
 75%

 5.0
 3:30/1.0
 (4.8)
 (3.0)

 3:40/1.0
 96%
 60%

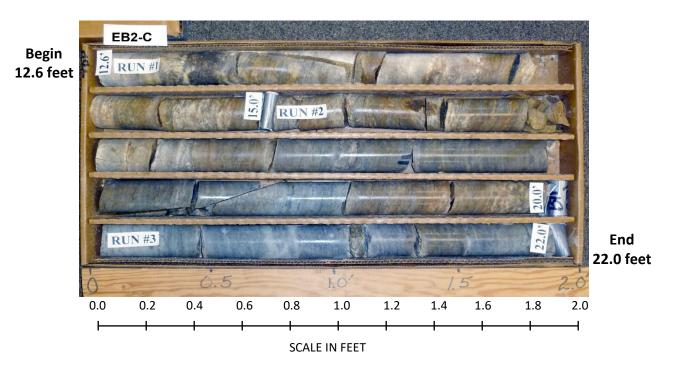
 3:37/1.0
 3:37/1.0
 3:37/1.0

 3:34/2.0
 2.0
 4:01/1.0
 (1.9)

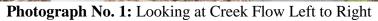
 2.0
 4:01/1.0
 95%
 80%
 774.7 20.0 772.7 22.0

T	Y II	REDELL		GEOLOGIST	Stickney, J. K.		
d.)	over	r Third Cre	ek			GROUND	WTR (ft)
/	1	FSET CL		ALIGNMENT	1	0 HR.	
						-	Dry
	NO	RTHING		EASTING 1,	439,037	24 HR.	Dry
		D	RILL METHOD H.S	6. Augers	HAMM	<b>ERTYPE</b> Au	utomatic
	со	MP. DATE	10/31/16	SURFACE W		Ά	
D	L O		ח	ESCRIPTION AN	D REMARKS		
)	Ğ	ELEV. (ft)					DEPTH (ft)
				Begin Coring	@ 12.6 ft		
4) %		782.1		CRYSTALLI	NE ROCK		. 12.6
%		_ L	ight Brown to Gray, S BIOTITE GNEISS wi	ith Verv Close to N	Aoderately Close Fra	cture Spacing	,
	بتطليح	-		GSI=68	3-70	1 5	
	St.						
		772.7					22.0
		-	Boring Terminated I	by Auger Refusal	at Elevation 772.7 ft	in Crystalline	
		-		Rock (BIOTITE	E GINEISS)		
		_					
		-					
		<u>-</u>					
		-					
		-					
		-					
		-					
		-					
		-					
		-					
		-					
		-					
		_					
		-					
		-					
		-					
		-					
		_					
		-					
		-					
		<u> </u>					
		-					
		Ļ					
		-					
		Ē					
		-					
		<b>–</b>					
		-					
		-					
		-					
		-					
		-					
		-					
		F					
		F					
		L					
		-					
		-					
		-					
		-					

### CORE PHOTOGRAPHS: Bridge No. 38 on US 21/NC 115 (Shelton Rd.) over Third Creek, EB2-C 22+20, CL







## SITE PHOTOGRAPHS



Photograph No. 2: Looking at End Bent 1 towards End Bent 2

#### SHEET 25

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT PHYSICAL TESTING LABORATORY

**T. I. P. No.** B-4982

#### REPORT ON SAMPLES OF ROCK COMPRESSION

Project	40159.1.1	County	Iredell		Owner	J.E. Beverly
Date: Sampled	10/4/2016	Received	10/6/2016		Reported	10/12/2016
Sampled from	Br # 38 over Thind Cree	ek on US21	-NC115	By	J.E. Bever	ly
Submitted by	J.E. Beverly					Standard Specifications
Tested By	Michael Dubeau				Date Tested	10/12/2016

#### TEST RESULTS

Proj. Sample No.		RS-1	<b>RS-2</b>		
Boring Sample No.		B1-A	B2-B		
Diameter	in	1.862	1.870		
Specimen Height	in	3.60	2.97		
Area	in <sup>2</sup>	2.723	2.746		
H/D Ratio		1.93	1.59		
Weight	lbf	0.98	0.78		
Unit Weight	lbf/ft <sup>3</sup>	172.8	165.2		
Ultimate	lbf	56400	48400		
Ultimate	ksi	20.700	17.610		
Ultimate Corrected	ksi	20.6	17.08		
Sec Mod @ 40%	Mpsi		4.82		
Station		20+45	21+63		
Offset		28 LT	23 RT		
Alignment					
Depth (ft)		23.00	12.60		
	to	23.60	13.20		

cc:

Brian Hunter

Physical Testing Engineer

#### SHEET 26