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#### STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NASH

PROJECT DESCRIPTION BRIDGE NO. 91 ON -LREV-(NC 581) OVER TAR RIVER AT STA. 23+90.5

# 94 S Ŕ REFERENCE

## $\sim$ 598 4 PROJEC

STATE PROJECT REFERENCE NO. STATE SHEETS 16 N.C B-5947 1

#### CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION STO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENSATIONS FOR ANY EXTENSION OF TIME FOR ANY RESON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT 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 HAIVING 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

А.	N.	<b>IONES</b>

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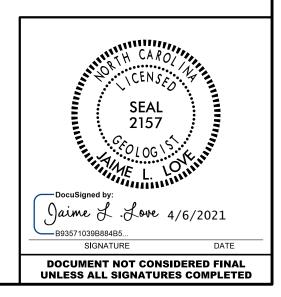
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SUBMITTED BY <u>N. T. ROBERSON</u>

DATE OCTOBER 2020



### 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	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AULIFER - A WATER BEARING FORMATION OR STRATA.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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	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 ORGANIC MATERIALS		CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	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,	
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5		NON-CRYSTALLINE	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-3 A-6, A-7	COMPRESSIBILITY	BOCK (NCB) - SEDIMENTART ROCK THAT WOULD TELLD SPT REFOSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL SOCCESSION SALES	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
2 PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	
40 30 MA 50 MX 51 MN ST NU ST	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 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
PASSING #40 SOILS WITH	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,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL – – 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR 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	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
MUUERAIL		OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STUNE FRAUS. EINE STITY OR CLAVEY STITY CLAVEY 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.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	
	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN.RATING EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABL		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
	- O-M- Spring or seep	WITH FRESH ROCK.	
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 :PI OF A-7-6 SUBGROUP IS > LL - 30		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 FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR 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	
PRIMARY SOIL TYPE CONFIGURESS ON PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 29/023 DIP & DIP DIRECTION WITH SOIL DESCRIPTION	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
VERY LOOSE < 4		(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	
GENERALLY LODSE 4 TO 10	SOIL SYMBOL	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		<u>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</u>	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
(NON-COHESIVE) DENSE 30 10 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		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	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 &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5			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	THE INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER - SPT N-VALUE	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	INSTALLATION	ROCK HARDNESS	1
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS		SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	IXX UNCLASSIFIED EXCAVATION - IT UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNSUITABLE WASTE		SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BUULDER CUBBLE GRAVEL SAND SAND SILI CLAY			SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) SHIND (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 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
	CLCLAY MODMODERATELY $\chi$ -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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	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	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK     FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULUS REGULTES DRYING TO	FRAC FRACTURED, FRACTURES     TCR - TRICONE REFUSAL     RT - RECOMPACTED TRIAXIAL       FRAGS FRAGMENTS     w - MOISTURE CONTENT     CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	RENCH MARK, RI -IOA IRON SRIKE WITH CAR LIDEV. STA 20104 25/01
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BL-104, IRON SPIKE WITH CAP, -LREV- STA. 26+04 25'RT
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 156.90 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	
SL SHRINKAGE LIMIT		MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET           CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.03 - 0.16 FEET	NOTES:
REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
- DRY - (D) ATTAIN OPTIMUM MOISTURE	X CME-55 G* CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	TEMPORARY BENCH MARK (TB-1), TOE OF PAVED EMBANKMENT, -LREV- STA. 25+12 3'RT ELEV.=142.7 FEET
PLASTICITY	X         8* HOLLOW AUGERS	INDURATION	ELEV.=142.7 FEET
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	EBITOP OF RAIL -LREV- STA.22+25 56'RT ELEV.=160.2'
PLASTICITY INDEX (PI) DRY STRENGTH		RUBRING WITH FINGER ERFES NUMEROUS CRAINS.	LLLV.=160.2'
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	EB2 TOP OF RAIL -LREV- STA.25+55 56′RT ELEV.=160.2′
MODERATELY PLASTIC 16-25 MEDIUM		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	LLEV.=160.2'
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
C020N		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).	X CORE BIT VANE SHEAR TEST		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

#### PROJECT REFERENCE NO.

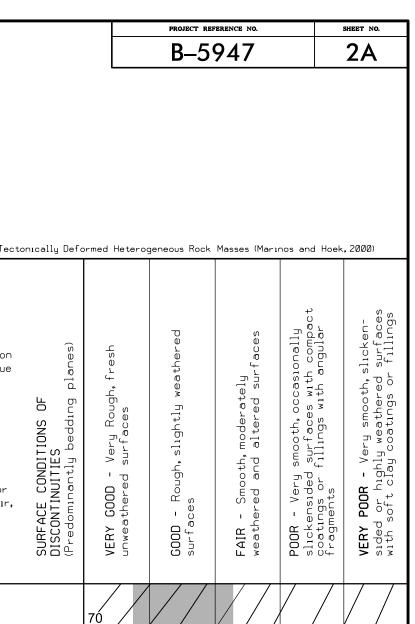


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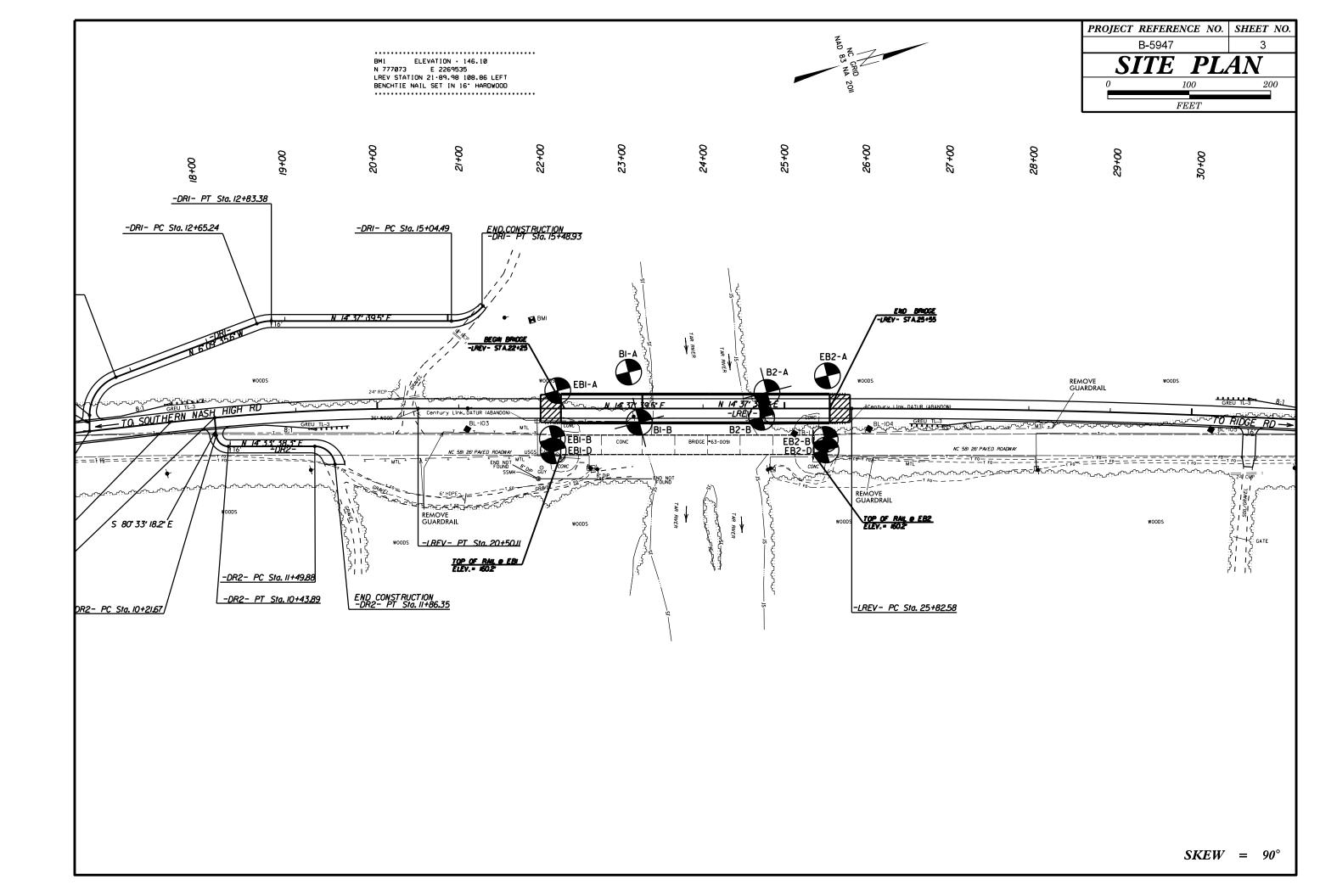
### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

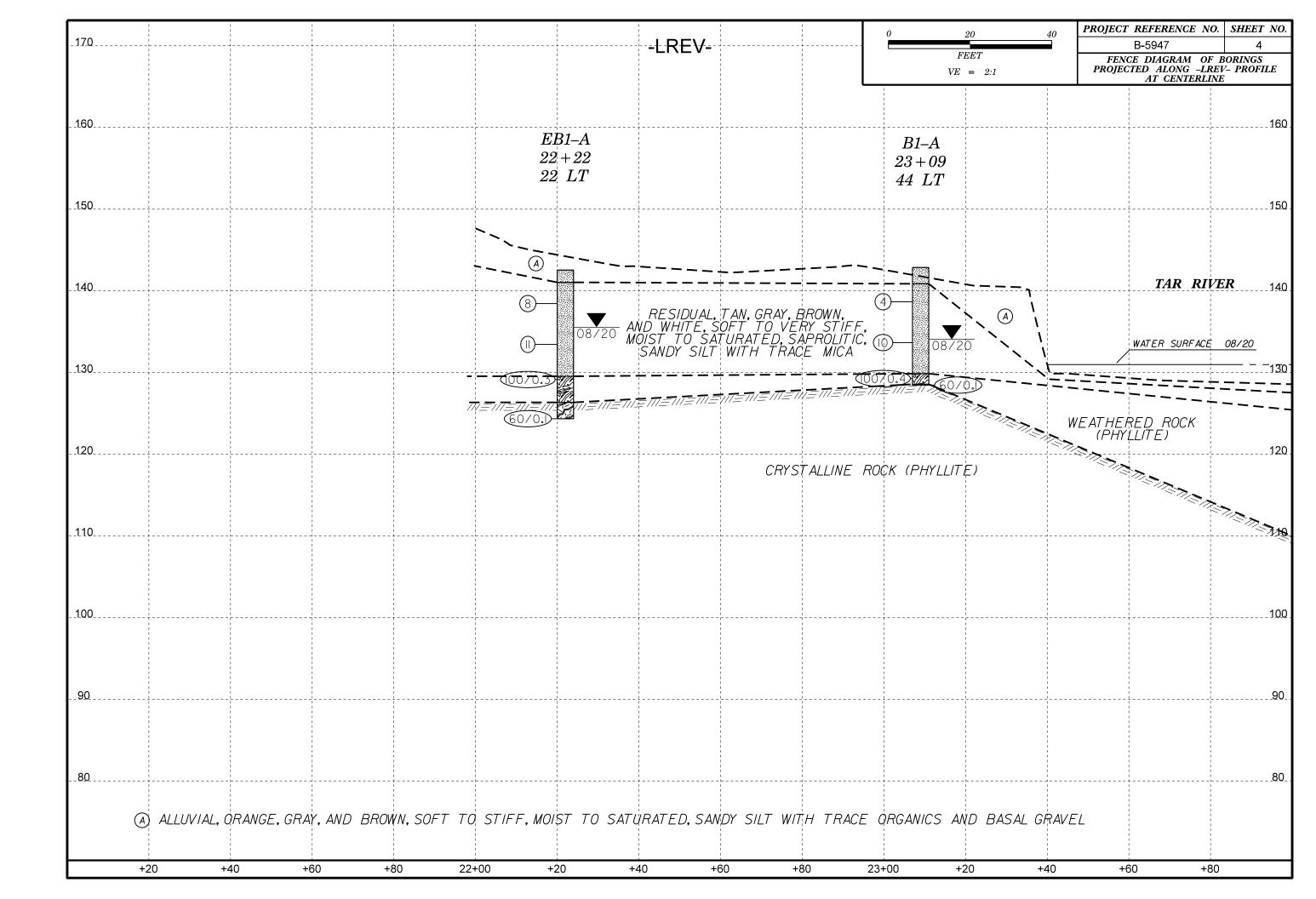
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

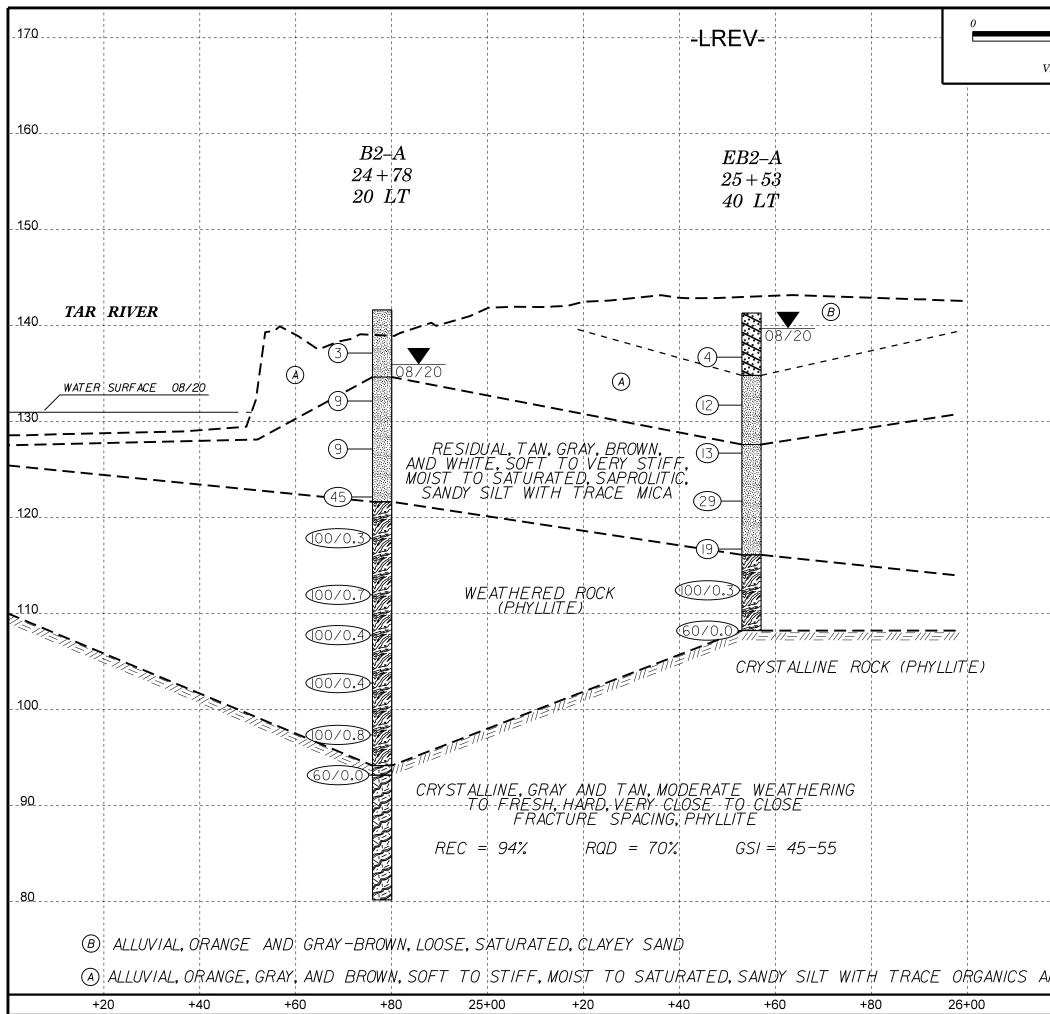
AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed	Rock Mass (Marı	nos and Hoek, 2	2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tec
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) From the lithology, structure and surface conditions of the 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.	VERY GOOD Very rough, fresh unweathered surfaces	<b>GOOD</b> Rough, slightly weathered, iron stained surfaces	<b>FAIR</b> Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	<b>VERY POOR</b> 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 mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.
STRUCTURE	DEC	CREASING SI	URFACE QUA		$\Rightarrow$	COMPOSITION AND STRUCTURE
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked un-	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.
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70 60				B. Sond- stone with thin inter- layers of the sint sint sond stone and siltstone in similar stone layers
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks		5	50			siltstone
formed by many intersecting			40	30		<b>C. D. E.</b> and <b>G</b> - 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 <b>F</b> and <b>H</b> .
discontinuity sets. Persistence of bedding planes or schistosity 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	Mail Into small rock piece



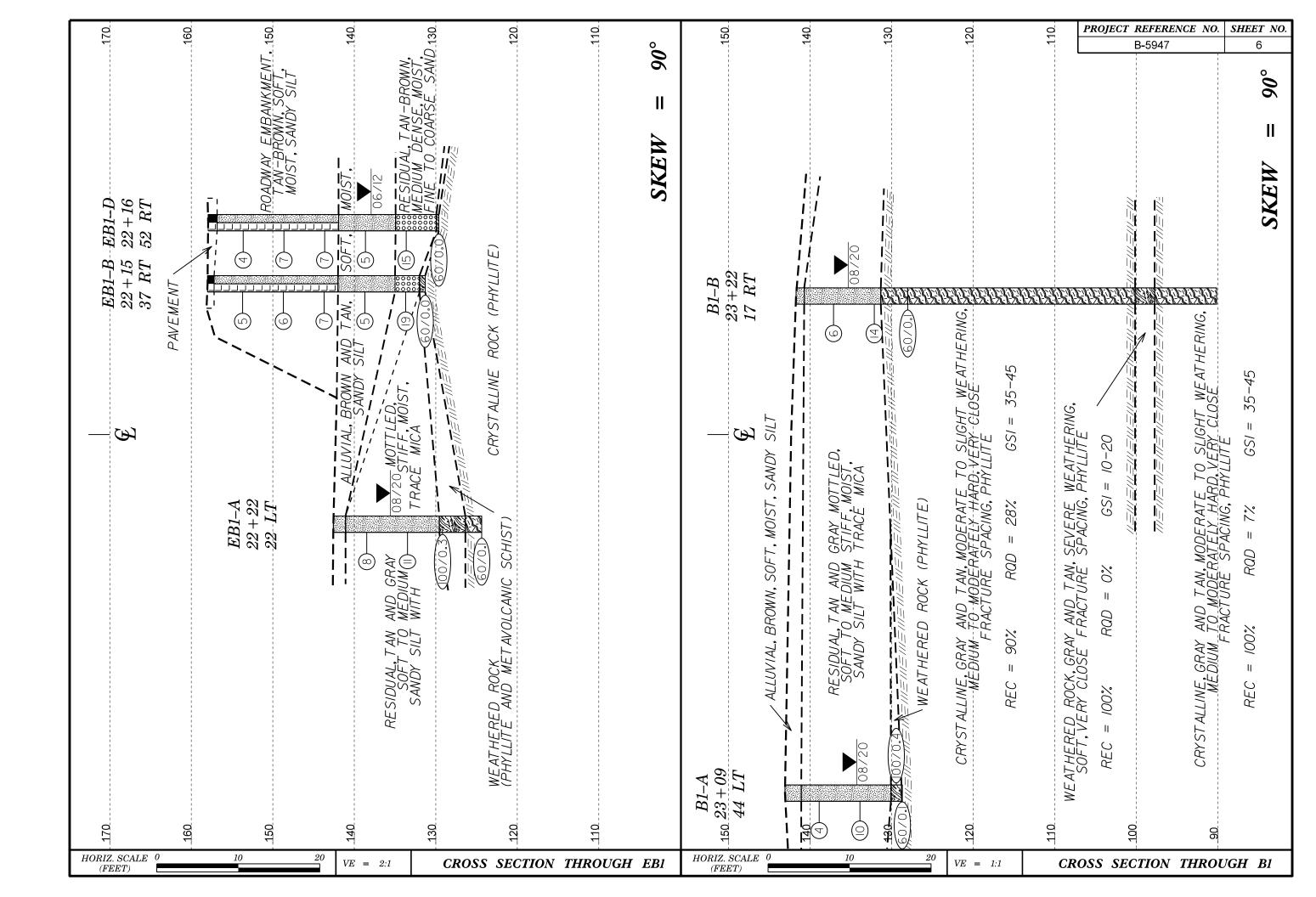
	70 60	A			
E. Weak siltstone or clayey shale with sandstone layers		50 B 40	С	E	
oformed, d/laulted, aale or sultstone deformed formung an ructure			30	F 20	
formed silty forming a with packets ers of ansformed neces.			\$	H	+ <sup>10</sup>

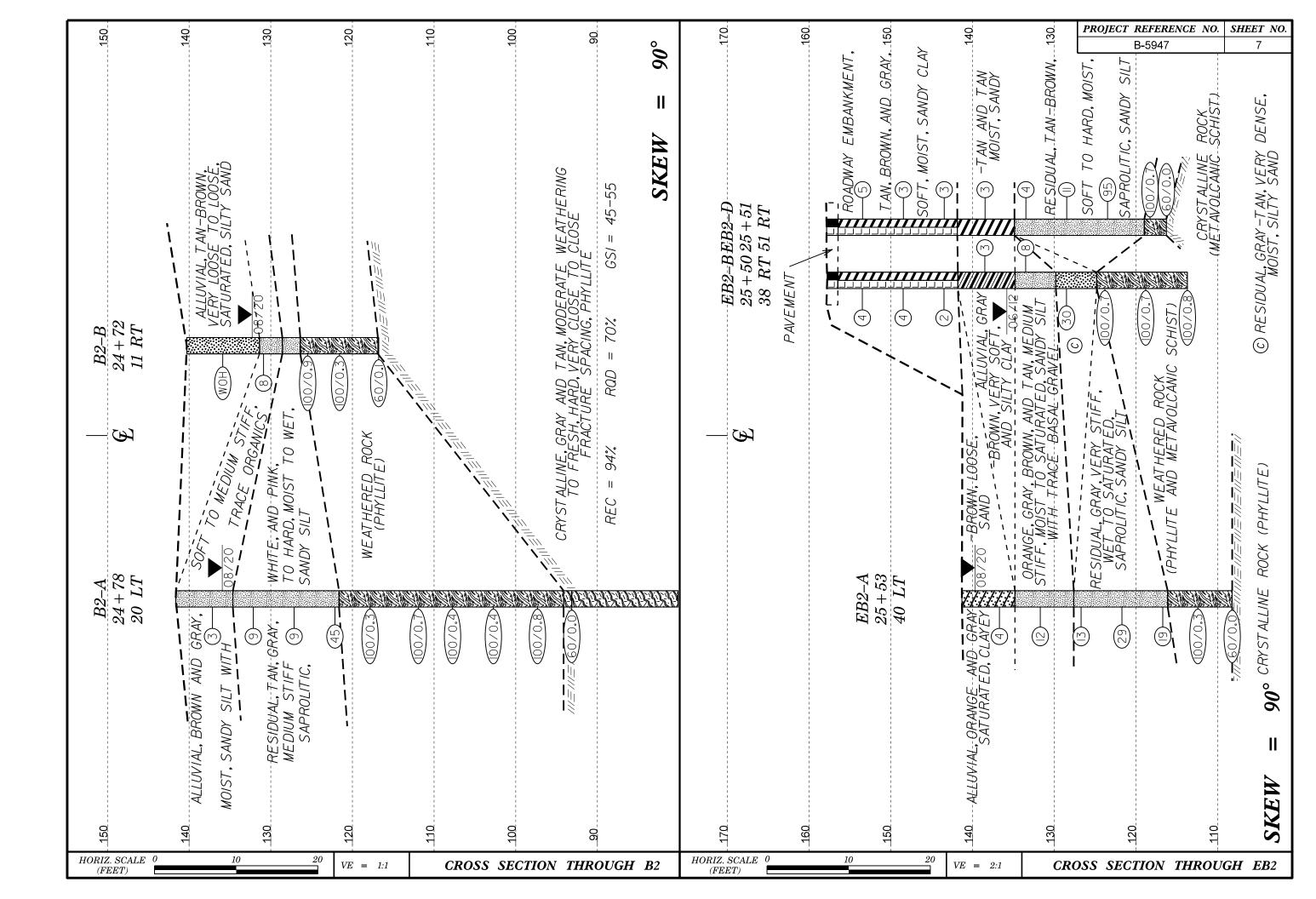




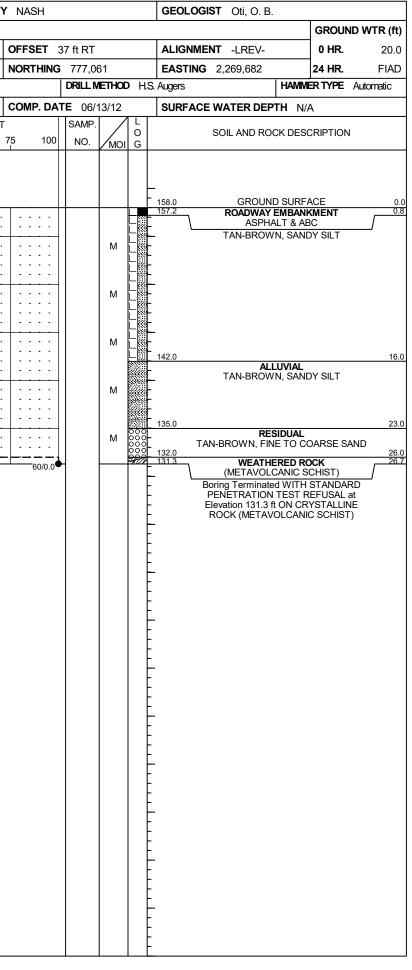


20         7         5           FEET         FENCE DIAGRAM OF BORINGS PROJECTED ALONG - LEVER PROFIL AT CENTERLINE         1		20	40	PROJECT	REFERENCE	NO.	SHEET	<i>NO</i> .
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				FENO	CE DIAGRAM	OF E	BORINGS	
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AND BASAL GRAVEL	ANL	D BASAL	GRAVEL	-				
+50 26+00 +20 +40	+5	50	26+00	+2	20	+40		

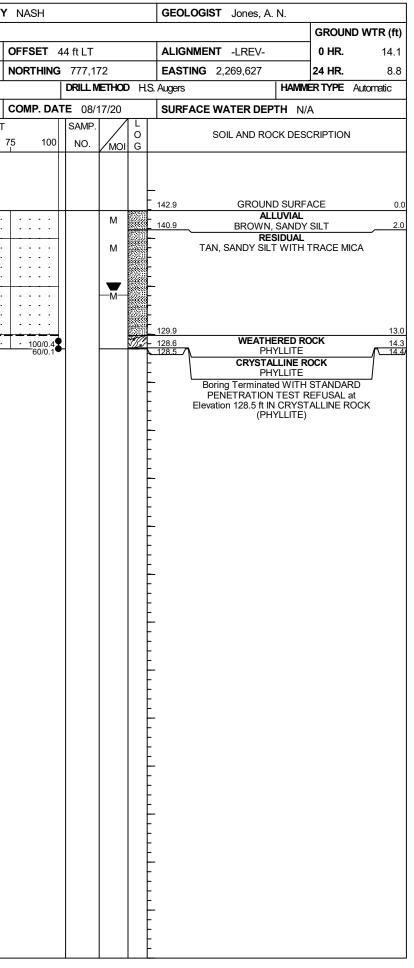




													.00																
	45983.1.1					<b>P</b> B-5				OUNT	Y N/	ASH				G	OLOGIST Jones, A. N				<b>3</b> 45983					<b>P</b> B-594			OUNTY
	SCRIPT		BRID	GE NO	-				ON N	IC 581									GROUND WTR (ft)					DGE N	-	OVER TA		ON NO	
BORING	GINO. E	B1-A			SI		<b>N</b> 22	+22			OFF	SET	22 ft LT	-		A	IGNMENT -LREV-		0 HR. Dry	BOF	Ring No.	EB1-	В		S	TATION	22+15		
	R ELEV.					DTAL I					NOF	RTHING	<b>;</b> 777,0	082		E	<b>STING</b> 2,269,627		<b>24 HR.</b> 7.0	COL	LAR ELI	<b>EV.</b> 15	58.0 ft		т	OTAL DE	<b>PTH</b> 26	.7 ft	
DRILL RIC	g/hamme	R EFF./	/DATE	RFO	0074 C	ME-55	80% 0	3/08/20	19				DRILL	METHO	Эрн	I.S. Au	ers	Hamme	RTYPE Automatic	DRIL	l Rig/Han	<b>IMER EF</b>	F./DAT	e ter	R6847 (	ME-75 91	% 02/02/2	012	
	R Pinte		Э.		ST	FART I	DATE	08/1	7/20		CON	/IP. DA	<b>TE</b> 08	/17/20	)	S	RFACE WATER DEPT	'H N/A	۱.	DRI	LER C	ontract	Driller		S		<b>TE</b> 06/ <sup>-</sup>	13/12	
		РТН	BLOV	v cou	JNT			BLOV	VS PE	R FOO	T		SAMF	P. 🗸		Γ	SOIL AND ROC			ELEV	DRIVE ELEV	DEPTH	BLC	W CO	UNT		BLO	NS PER	R FOOT
(ft)	(ft) (		0.5ft	0.5ft	0.5ft	0	2	5	50		75	100	NO.	Им	DI G		/. (ft)	IN DEGO	DEPTH (1	) (ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7
145																				160									
	Ŧ															F	5 GROUND				-	F							
	F						• •			• • • •		• • •		тм	8380	- 142 - 141	ALLU	JVIAL	1	1	-	-							
140 13	39.4 + 3	3.1					• •		•••			· · ·				<u> </u>	BROWN, S	BANDY S	SILT	155	154.7-	3.3					· · · ·		· · · ·
			1	3	5	. •8	3		::			· · ·		M			TAN AND GRAY MC	TTLED,				t t	1	2	3	• <u>5</u>	·   · · ·		· · · ·
105	t					. <b> </b> .   . <b> </b>	•••								, 👹	ł	WITH TR		UA		-	ţ							
135	34.4 + 8	3.1				- i		<u> </u>				 				F				150	149.7 -	8.3	1	2	4		<u> </u>		
	Ŧ		4	4	1	:•	11				.   .			M		F						F	'	-			.	.	
130	‡					1.1	•••									ŧ.				145		ŧ				11			
12	<u>29.4 + 1;</u>	3.1	00/0.3				<del></del>		÷÷+		<del>: † :</del>	100/0.3			477	- 129	5 WEATHEI		13.	145	<u> </u>	<u>- 13.3</u>	1	2	5	<mark></mark> , .			
	t		0,0.0			· · ·	•••				-   -					1	PHY	LLITE			-	Ł					·   · ·		
125	÷															- 126	CRYSTAL	LINE RC	16.	140	400 7	- 10.0							
12	<u>24.4 + 18</u> +	8.1 60	0/0.1									60/0.1			<u>سَر</u> اهج	124	Boring Terminated			2	- 139.7 -	- 18.3	1	2	3	<b>↓</b> <sub>5</sub>			
	‡															Ę	PENETRATION 1	est re	EFUSAL at			ţ					·   · · ·		· · · ·
	#															Ł	Elevation 124.3 ft IN (PHY	LLITE)	ALLINE ROCK	135	- 134.7-	- 23.3					·   · ·		
	t															Ł							6	9	10		19		
	÷															╞					131.3	26.7	60/0.0				· \		
	· · · · · · · · · · · · · · · · · · ·																												



	45983					IP B-594			Y NASH				GEOLO	GIST Oti, O. B.				WBS	<b>3</b> 45983	3.1.1			TI	P B-59	<del>)</del> 47		COUNTY
SITE	DESCR	IPTION	BRID	DGE N	0.91	OVER TAI	R RIVER (	ON NC 581								GROUND W	/TR (ft)	SITE	DESCR	IPTION	BRID	DGE N	0.910	OVER T	AR RIVE	RON	NC 581
BOR	NG NO.	EB1-I	2		S	TATION	22+16		OFFSET	52 ft F	RT		ALIGN	MENT -LREV-		0 HR.	21.0	BOF	ring no.	B1-A			ST	TATION	23+09		
	LAR ELE					OTAL DE			NORTHIN		-			<b>IG</b> 2,269,697		24 HR.	20.0		LAR EL						<b>EPTH</b> 1		
DRILL	. RIG/HAN	IMER EF	F./DAT	e tef	R6847 (	CME-75 91%	% 02/02/201	2		DRIL	LMETH	OD H	.S. Augers		HAMME	RTYPE Auto	omatic	DRIL	l rig/hai	/IMER EF	-F./DATI	E RFC	20074 C	ME-55 8	30% 03/08/	/2019	
DRIL	LER C	ontract	Driller		S	TART DA	<b>TE</b> 06/13	/12	COMP. D	ATE (	6/13/1	2	SURFA	CE WATER DEPT	'H N/A			DRI	LER P	inter, D	. G.		ST	FART D	<b>ATE</b> 08	3/17/20	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		BLOW	6 PER FOO	Ť	SAN	1P. 🔻			SOIL AND ROCI				ELEV	, DRIVE ELEV	DEPTH	BLC	W CO	UNT		BL(	OWS PI	ER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 10	0 NC	). /M	OI G			IN DECCI		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	0
160		L											L					145		L							
	-	F											157.9	GROUND	SURFA	CE	0.0			Ŧ							
	-	F											_ 156.8	ROADWAY E ASPHAL			1.1			+							
155	154.6-	3.3				     <del> </del>							F '	TAN-BROWN				140	139.7-	3.2							
	-	ŧ	1	2	2	●4			·   · · · · ·		M		-							ŧ	2	2	2	<b>4</b>			
150	-	ŧ				<u>i</u> : : :	· · · · ·		·   · · · · ·				- -					135		ŧ				L İ.		· · ·	· · · · · · · ·
150	149.6-	8.3	1	3	4						Тм		  -					135	134.7-	<u>- 8.2</u>	3	4	6				
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145	144.6-	122											Ł					130	120.7	- 13.2							
	- 144.0	<u> </u>	2	3	4	• • • • •			· · · · ·		м		F						129.7	14.3	100/0.4 60/0.1	1			· · [ · ·		
	-	F											141.9		JVIAL		16.0			Ŧ	00/0.1						
140	139.6-	18.3											F	TAN-BROWN		/ SILT			-	Ŧ							
	-	ŧ	1	2	3	<b>●</b> 5	· · · · ·		·   · · · · ·		<b>™</b>	◩ 😹								ŧ							
125	-	ŧ											-							ŧ							
135	134.6-	23.3	4	7	8		<u> </u>				М		134.9		DUAL		23.0		-	ŧ							
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	129.6-	<u>- 28.3</u>	60/0.0				· <b>· · · · ·</b>		60/0.			<del>925</del>	129.6				L0.0		-	Ŧ							
	-	ŧ											Ļ ι	(METAVOLCA Boring Terminated	WITH S	TANDARD	J			ŧ							
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1	-	ŧ											F	ROCK (METAVO						t							
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										SORE		<u> </u>																		
WBS	<b>S</b> 4598	3.1.1			ТІ	<b>P</b> B-59	47		COUN	TY NASH					GEC	OLOG	IST Jone	es, A. N.			WB	<b>S</b> 4598	3.1.1			TIP	B-594	7	C	COUNTY
SITE	DESC	RIPTION	BRID	DGE N	0. 91 (	OVER T/	AR R	IVER O	N NC 58 <sup>-</sup>	1									GROUN	ID WTR (ft)	SIT	E DESCF	RIPTION	BRI	DGE NO	. 91 OV	ER TA	R RIVER	ON N	IC 581
BOF	RING NC	). B1-B			S	TATION	23+	-22		OFFSE	<b>F</b> 17	ft RT			ALIO	GNME	INT -LRE	EV-	0 HR.	N/A	BO	ring no	. B1-B			STA	TION	23+22		
COL	LAR EL	<b>.EV.</b> 13	9.5 ft		т	OTAL DI	EPTH	<b>1</b> 51.6	ft	NORTH	ING	777,1	69		EAS	STING	2,269,6	90	24 HR.	6.4	CO	LAR EL	<b>EV.</b> 13	39.5 ft		тот	AL DE	<b>PTH</b> 51	.6 ft	
DRIL	L RIG/HA	MMER EF	F./DAT	E RFC	0074 C	ME-55 80	0% 03	3/08/2019		1	0	ORILL N	/IETHO	DN	WCasing	g w/ Co	re	HAMIN	NER TYPE	Automatic	DRI	L RIG/HA	MIMER EI	FF./DAT	E RFOO	074 CME	-55 80%	% 03/08/20	019	
DRII	LER	Pinter, D.	G.		S	TART D	ATE	08/17/2	20	COMP.	DATE	08/	18/20		SUR	RFACE	E WATER	DEPTH N	/A		DRI	L <b>LER</b> F	Pinter, D	). G.		STA	RT DA	<b>TE</b> 08/1	17/20	
ELEV				w co					PER FOO	 DT		SAMP.	<b>V</b>	1 L							co	RE SIZE	NWXL			тот	AL RUI	N 37.91	ft	
(ft)	ELEV	(ft)		0.5ft	0.5ft	0	25	;	50	75	00	NO.	Имо	O I G	ELEV.	. (ft)	SOIL ANI	D ROCK DES	SCRIPTION	DEPTH (ft)	ELE	, RUN	1	I RUN	DRILL	R	UN RQD	SAMP.	STI	
													Ĩ								(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft)	(ft)	NO.	(ft)	(ft) %
140																					125	3								
		╄──					• •						+м-		- 139.5 - 138.5		GR	OUND SURF	-ACE	0.0	125.0 125	125.8	13.7	2.9	0:43/1.0		(0.0) 0%		(25.1	) (7.8) 28%
		‡				· ·     · ·		· · · ·							Ļ		BRC	DWN, SANDY RESIDUAL				122.9	16.6	5.0	0:35/0.9	3		-	90%	20%
135	135.9	- 3.6	2	2	4						·		м		Ł	TA	N AND GR	AY MOTTLE		SILT	120		‡	5.0	0:43/1.0	0 100%	58%			
		1				 									L						120		†		0:46/1.0	)				
	130.9	8.6				· • •					:				Ł							117.9	21.6	5.0	0:57/1.0	) (5.0)	(2.3)	1		
130	-	+	2	5	9		14	<u></u>	· · · ·				м		129.1					10.4	115		1		0:43/1.0	) 100% )	46%			
		Ŧ						· · · ·									CR	YSTALLINE F PHYLLITE				112.9	T 26.6		0:41/1.0	)				
125	125.9	13.6	60/0.1	-							0.1				125.8					13.7			ł	5.0	1:01/1.0		(0.0) 0%	]		
	1	‡	30/0.1								•				Ŧ		WEATH	AN, MODERA HERING, MEI	DIUM TO		110		Ŧ		1:13/1.0	)				
		‡												Ń		Ν		ely hard, \ Re spacing				107.9	31.6	5.0	1:13/1.0	)		-		
120	_	‡					• •									F	REC=90%	RQD=28%	GSI=35-	45	105		‡	5.0	0:41/1.0	100%	0%			
		‡						· · · ·	· · · ·											-	100		+		0:29/1.0	)				
		t									:											102.9	<u> </u>	5.0	0:43/1.0	) (5.0)	(2.6)	-		
115	-	ł								· · · · ·											100		±		1:03/1.0		52%			
		Ŧ									-											97.9	41.6		1:08/1.0	)				
110		Ŧ													F								ł	5.0	1:10/1.0	) (5.0) ) 100%	(0.5)		(2.4)	(0.0) 0%
		Ŧ													-						95		Ŧ		1:36/1.0	)			(7.6)	(0.5)
		‡						· · · · ·			11											92.9	46.6	5.0	2:00/1.0	)	(0.0)	-	100%	5 7%
105		‡													- -						90		ŧ	0.0	0:39/1.0	0 100%	0%			
		‡						· · · ·			:											87.9	+   51.6		2:12/1.0	)				
		t									1 1											07.9	+		0:54/1.0	,		-		
100	-	+																					‡							
1		ł					• •				-			Ģ	97.9		GRAY	AND TAN, S	SEVERE	41.6			t							
95		Ŧ													95.5	_, V	VEATHERI	ING, SOFT, \ RE SPACING	VERY CLOS				t							
		Ŧ									-				Ŧ							·	t							
		Ŧ					• •	· · · · ·			-				Ŧ		AY AND TA	RQD=0% AN, MODERA	ATE TO SLI				Ŧ							
90	-	‡							+ • • •						Ŧ	Ν		HERING, MEI ELY HARD, \		SE	0/20		Ŧ							
90		‡						· · · ·		· · · ·	:		<u> </u>	Sé	87.9	-		RE SPACING			10/20/20	.	Ŧ							
1		‡													F			RQD=7%			GDT		Ŧ							
		‡													F	BC		inated at Elev LINE ROCK			DOT.0	.	‡							
		1													F								‡							
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		+													F						ğ		†		1		1	1	1	

COUNTY NASH

#### **GEOTECHNICAL BORING REPORT** CORE LOG

	СС	UNT	NA	SH				GEOLOGI	ST	Jones, A.	N.						
ON	I NC	581										GROUN	ND WTR (ft)				
			OFFS	<b>SET</b> 1	7 ft	RT		ALIGNME	NT	-LREV-		0 HR.	N/A				
.6 ft			NOR	THING	77	7,169		EASTING	2,	269,690		24 HR.	6.4				
19					DRI	LL METHOD	NW	Casing w/ Cor	e		HAMME	RTYPE	Automatic				
7/2	0		COM	P. DAT	Έ	08/18/20		SURFACE	W/	ATER DEP	TH N/A	Ą					
t	סדי																
RE	STRA EC.	RQD	L O				DI	ESCRIPTION	I AN	D REMARK	s						
5	ft) %	(ft) %	G	ELEV. (ft									DEPTH (ft)				
(25	5.1)	(7.8)		125.8	GF		N, MO	Begin Cori DERATE TC	ing ( ) SL	@ <u>13.7 ft</u> IGHT WEAT	HERING	G, MEDIU	MTO 13.7				
90	)%	28%			MC	DERATELY	HAR				E SPACI	NG, PHYL	LITE				
								GS	SI=35	5-45							
			97.9														
	.4) 0%	(0.0) 0%	GRAY AND TAN, SEVERE WEATHERING, SOFT, VERY CLOSE														
(7	.6)	(0.5)		95.5	١				SI=10				44.0				
	0%	7%	F.		GR	AY AND TAN DERATELY	N, MO	DERATE TO	) SL	IGHT WEAT	HERING	G, MEDIU	мто				
			32		IVIC	DERATELT	HARL		53E 61=35		SFACI	NG, FHTL	-LIIE				
			2	87.9									51.6				
			F			Boring Teri	minate	ed at Elevatio (PH	on 87 IYLL	7.9 ft IN CRY .ITE)	STALLI	NE ROCK					
			-														
			F														
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	45983					<b>IP</b> B-5947			Y NASH				GEOLOGIST Jones, A. N.				45983.					B-594			OUNTY	N
				JGE N			R RIVER OI	N NC 581						GROUND WT	` ´					DGE NO.	1					
	NG NO.					TATION			OFFSET				ALIGNMENT -LREV-	0 HR.	N/A		ING NO.						24+78			OF
							<b>PTH</b> 61.5 f	t	NORTHING				EASTING 2,269,694	24 HR. ER TYPE Automa	5.7								PTH 61			NO
							5 03/08/2019													E RFOOD						
		,		ow cc			E 08/19/2	20 PER FOO	COMP. DA	SAMP.		11	SURFACE WATER DEPTH N	1			LER Pi						TE 08/1			СС
LEV (ft)	DRIVE ELEV (ft)	(ft)	0.5ft	0.5ft		- 0		50	75 100		мо	0	SOIL AND ROCK DES		PTH (ft)		E SIZE		1	DRILL	RI	JN	<b>1</b> 13.0 f	STR	RATA	L
	()														<u> </u>	ELEV (ft)	RUN ELEV (ft)	(ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft)	SAMP. NO.	REC. (ft)	RQD	0 G
45																93.1					70	70		1		
		ŧ											F				93.1	48.5	3.0	N=60/0.0 0:32/1.0 0:34/1.0 0:29/1.0	(3.0) 100%	(1.4)		(12.2)	(9.1)	R
		ŧ				<u>  </u>						525555	141.6 GROUND SURF	ACE	0.0	90	90.1	51.5	5.0	0:34/1.0	(5.0)	(4.0)			(9.1) 70%	
40	-	Ŧ											- ALLUVIAL BROWN, SANDY SILT V						0.0	0:42/1.0 0:43/1.0 1:08/1.0	100%					
-	138.1	3.5	2	2	1				· · · · · ·		Sat		ORGANICS			85	85.1	56.5		1:18/1.0						
5		Ŧ				<b>  </b> ¶°:::					Sat. ▼		124.6		7.0				5.0	1:04/1.0	(4.2) 84%	(3.7) 74%				
	- 133.1	8.5				\ <u>\</u>							<u>– 134.6</u> - <b>RESIDUAL</b> - TAN, GRAY, WHITE, J		7.0		1			1:29/1.0						
		Ŧ	3	5	4						M		SAPROLITIC, SANI				80.1	61.5		1:39/1.0					F	
0	-	Ŧ						+																		
	128.1	13.5 	4	4	5						м															
5	_	ŧ				×,											]									
	123.1	18.5																								
		ŧ	14	21	24			45 <u></u>			M	977	- 121.6 WEATHERED R		20.0			-								
0	-	±						<u> </u>					- PHYLLITE													
	118.1	23.5	100/0.:	3					100/0 3																	
15	_	ŧ											-													
	113.1	28.5	28		40/0 (		.	· · ·					-													
		ŧ	20	60	40/0.2			· · · ·	100/0 / 1									-								
0	-	+																								
	108.1	<u> </u>	100/0.4	4					100/0 /																	
5	-	‡						· · ·					4_ 													
	103.1	38.5	100/0.4				.																			
0		ŧ	100,0.																							
_	- 98.1	43.5																								
	JU. I	+ +	38	62/0.3	3		.		100/0.8	•							4	-								
5	-	Ŧ						+ • • •				1	94.1		47.5	0/20	4									
-	93.1	48.5	60/0.0	ī			.		60/0.0				93.1 CRYSTALLINE F	ск Г	48.5	10/20/2										
90		Ŧ											GRAY AND TAN, MC			GDT	4									
	-	Ŧ											CLOSE TO CLOSE FI	ACTURE		TOD	1	•								
		Ŧ					.						1-	GSI=45-55		o'z	4	•								
5	-	ŧ												301-40-00		I.GPJ	1	•								
		ŧ					.									BH		•								
		<u>+</u>											80.1		61.5		]	-								
		ŧ											Boring Terminated at Elev CRYSTALLINE ROCK	tion 80.1 ft IN PHYLLITE)												
		‡											F F			B5947_0	_									
	-	‡											⊢ -			E B2										
		‡											<u> </u>			DUBLI										
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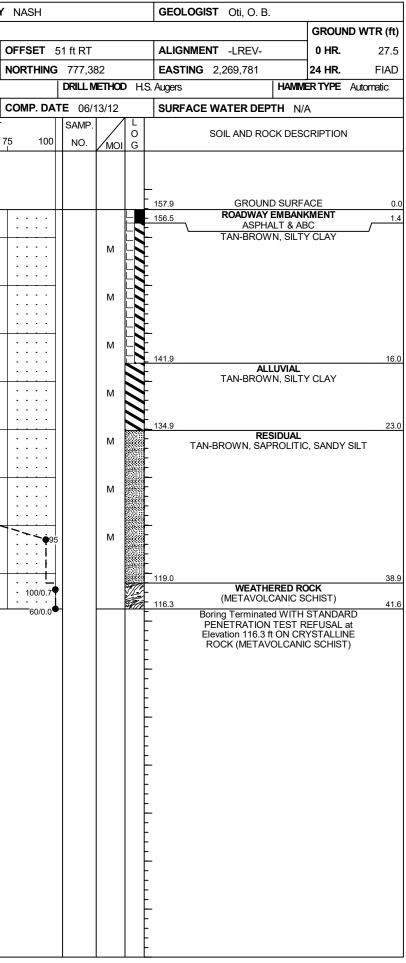
#### **GEOTECHNICAL BORING REPORT** CORE LOG

## GEOLOGIST Jones, A. N. NASH GROUND WTR (ft) ALIGNMENT -LREV-OFFSET 20 ft LT 0 HR. N/A **NORTHING** 777,330 **EASTING** 2,269,694 24 HR. 5.7 DRILL METHOD NW Casing w/ Core HAMMER TYPE Automatic COMP. DATE 08/20/20 SURFACE WATER DEPTH N/A DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft) Begin Coring @ 48.5 ft GRAY AND TAN, MODERATE WEATHERING TO FRESH, HARD, VERY 48.5 CLOSE TO CLOSE FRACTURE SPACING, PHYLLITE 93.1 GSI=45-55 61.5 Boring Terminated at Elevation 80.1 ft IN CRYSTALLINE ROCK (PHYLLITE)

WBS	45983	.1.1			TI	<b>P</b> B-594	17		-	TY NAS	SH				GEOLO	<b>GIST</b> Roberson,	, N. T.		WB	<b>S</b> 45983	3.1.1			TI	<b>P</b> B-5947		COUNTY
			BRI	DGE N		OVER TA			NC 581	-								GROUND WTR (ft					DGE N		OVER TAR		
	ing no.				_	TATION						11 ft RT			_	MENT -LREV-		<b>0 HR.</b> N/A		ring no.				_	TATION 25		
						0TAL DE			t	NORT	THING	777,3			EASTII	<b>IG</b> 2,269,722		24 HR. 8.0 RTYPE Automatic	_						DTAL DEPT		t I
	LER Pi								0	COM		TE 08/2				CE WATER DEPT			_								0
				W CO					U PER FOC		P. DA	SAMP.		1	SURFA	CE WATER DEPT	IH N/A			-		1	w co				U PER FOOT
ELEV (ft)	ELEV (ft)	(ft)	0.5ft	1	0.5ft	0	25		50	75	100	NO.	17	0 I G	ELEV. (ft)	SOIL AND ROC	CK DESC	RIPTION DEPTH (	t) ELEV	/ DRIVE ELEV (ft)	DEPTI (ft)	' <b> </b>		0.5ft	0 2		50 7
145																			145								
140	-	-							+						- 140.3	GROUND	) SURFA	CE 0	0 140						• • • • •		· · · · ·
135	136.9	3.4	woн	woн	woн	• • • • • • • •	- · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·	: :	· · · · · ·		Sat.		-	TAN-BROWN		SAND	135	137.7	+ - 3.6 -	WOH	1	3	↓ ↓		
120	- 131.9 -	- <u>8.4</u>	3	4	4		• •	· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · ·	· · · · · ·		Sat.	-	- 131.4	ALL	UVIAL	8	9 130	132.7	- 8.6 -	3	5	7	• • • • • • • • • • • • • • • • • • •	· · · · ·	· · · · · · · · · · · · · · · · · · ·
130	126.9	13.4						· · · · ·	· · · ·		· · ·		w		128.6	GRAY, S	ANDY SI	11	7	127.7	+ - 13.6	5	5	8	· · · · · · ·	· · · · ·	· · · · ·
125	-	-	5	12	88/0.4					-+	00/0.9	•	vv		<u>126.4</u>	S WEATHE	SILT		125	122.7	- - - 18.6				•13 ••••		
120	121.9	<u>18.4</u>	100/0.3	3				· · · · ·		· · · ·	00/0.3	•			-				120			9	11	18	· · · · · · · · · · · · · · · · · · ·	<b>9</b> 29	· · · · ·
		23.4	60/0.1					 							<u>116.9</u>	CRYSTAL PHY	<b>LINE RC</b> /LLITE	<u>ск</u>	4 5/ 115	117.7	<u>23.6</u>	4	7	12	· · · · · · · · · · · · · · · · · · ·		
	-	-													-	Boring Terminated PENETRATION Elevation 116.8 ft IN (PHY	TEST RE	FUSAL at	110	112.7	- - 28.6 -	100/0.3	3		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · ·	
															 - -					108.2	33.1	60/0.0					

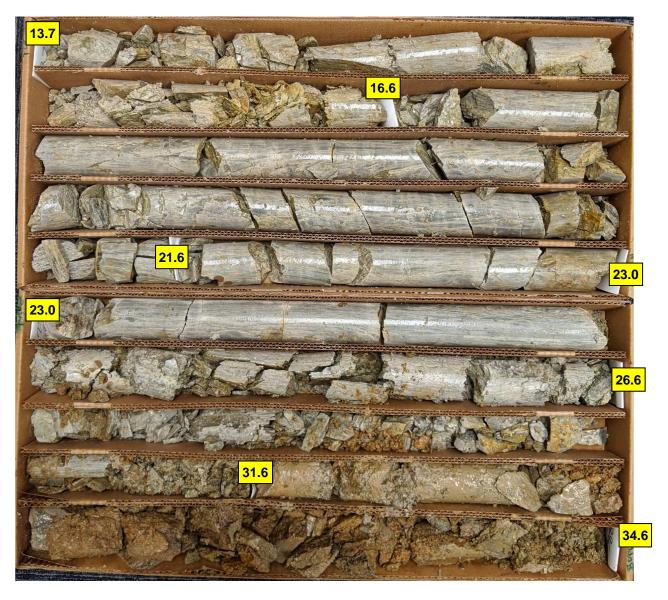
NASH				GEOLOGIST Roberson, N. T.									
						GROUN	ID WTR (ft)						
OFFSET 4	40 ft LT			ALIGNMENT -LRE	0 HR.	N/A							
NORTHING	777,40	)7		EASTING 2,269,69	24 HR.	1.6							
	DRILL M	ETHOD	ЪН	S. Augers	HAMM	ER TYPE	Automatic						
COMP. DATE 08/24/20 SURFACE WATER DEPTH N/A													
	SAMP.		L										
75 100	NO.	моі	O G	SOIL AND	ROCK DESC	RIPTION							
· · · · ·		<b>V</b>	\$\$\$\$\$\$ \$\$ \$\$	141.3 GR( ORANGE AND	DUND SURF/ ALLUVIAL ) GRAY-BRO SAND		0.0 YEY						
		Sat.	///	-									
			///	134.8			6.5						
		Sat.		- ORANGE ANI - - BASAL	D GRAY-BRC SILT . GRAVEL 12.		NDY						
				- 127.6			13.7						
· · · · ·		Sat.		GRAY, SAI	<b>Residual</b> Prolitic, SA	ANDY SIL	т						
		W		-									
		W	<u>.</u>	116.1	ATHERED RO		25.2						
					PHYLLITE		33.1						
000.0-				PENETRAT Elevation 10	inated WITH TON TEST R & 2 ft ON CR OCK (PHYLLIT	EFUSAL : YSTALLIN	at						

<b>WBS</b> 45983.1.1			- 1	TIP B-5947 COUNTY NASH									GEOLOGIST Oti, O. B.			<b>WBS</b> 45983.1.1						<b>TIP</b> B-5947 <b>C</b>				
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581			YNASH				GE	GROUND WTR (ft)		-	WBS 45983.1.1 SITE DESCRIPTION BRIDGE NO.															
STE DESCRIPTION         BRIDGE NO. 91 OVER TAR RIVER ON NC 581           BORING NO.         EB2-B         STATION         25+50							Δι										STATION 25+51									
BORING NO.         EB2-B         STATION         25+50           COLLAR ELEV.         157.8 ft         TOTAL DEPTH         44.1 ft			OFFSET 38 ft RT NORTHING 777,385				_	ALIGNMENT         -LREV-         0 HR.         28.0           EASTING         2.269.768         24 HR.         22.0			BORING NO. EB2-D COLLAR ELEV. 157.9 ft						TOTAL DEPTH 41.6 ft									
				E TFF				)2/02/2012					ррн		, ,	<b>ERTYPE</b> Automatic					E TFF					N
	LER C							06/13/1		DRILL METHOD H.S. / COMP. DATE 06/13/12					RFACE WATER DEPTH N/		┥┝───	DRILL RIGHAMMER EFF./DATE         TER6847         CVE-75         91%         02/02/2012           DRILLER         Contract Driller         START DATE         06/13/12							C	
				ow co					PER FOOT		SAMP.		/ L				ELEV		DEPTH	1	ow co				PER FOO	
(ft)	ELEV (ft)	(ft)	L	0.5ft	-	0	25			75 100	NO.	Имо	O J G	ELEV	SOIL AND ROCK DES	CRIPTION DEPTH (f	(ft)	ELEV (ft)	(ft)	0.5ft	1	-	0	25	50	75
							I		•							X	1									
160																	160									
	-	F												157.8	GROUND SURF.	ACE 0.		+								
	-	+					•••							- 156.5		KMENT 1.3										
155	154.5	3.3					•••			· · · · · ·				-	TAN, BROWN, AND GRAY		155	154.5	3.4							·
	-	Ŧ	1	2	2	<b>4</b>						M		F				ļŦ		2	2	3	<b>•</b> 5			
150	-	F												F			150	Ŧ					[[[[:::			
	149.5	- 8.3 -	2	2	2							м		F				149.5	8.4	1	2	1	<b>J</b>			
	-	Ŧ												F				Ŧ								
145	144.5-	13.3												-			145	144.5	13.4							
	-	ŧ	1	1	1	<b>•</b> 2	•••					м		141.8		16.0		‡		1	1	2	<b>•</b> 3			:
140	-	ŧ												-	ALLUVIAL		140	‡								:
	139.5 -	<del>-</del> 18.3 -	1	1	2							М		-	GRAY-TAN, SAND	Y CLAY		139.5	18.4	woн	1	2				
	-	ŧ				<b>▼</b> ° .		· · · · ·						1				‡					<b>▼</b> <sup>2</sup> · · ·			-
135	134.5-	23.3					•••									23.0	135	134.5	23.4					• • • • •	• • • • •	· 
	-	+	2	3	5	●8	•••	· · · ·				м		-	TAN-BROWN, SANI	DY SILT		1		1	1	3	<b>4</b>	·   · · · ·   · · ·		:
130	-	ŧ						· · · · ·						-			130	‡					1 · · · · · · · · · · · · · · · · · · ·			:
130	129.5	28.3	2	5	25	┤┝╌╘╴	÷.,	····				м		129.8 	RESIDUAL	28.		129.5	28.4	1	2	9	÷ • 11.			
	-	ŧ						<b>x</b> ,00						1	GRAY-TAN, SILTY	SAND		‡								:
125	- 124.5	- 33.3					•••	· · · · ·	· · · · ·	· · · · · ·				124.8		33.0	125	124.5	33.4						<u> </u>	4
	-	-	23	77/0.2				· · · ·		100/0.7	•				WEATHERED RO (METAVOLCANIC S			Ţ		24	27	68	· · · ·	·   · · · ·	·   · · · ·	:
120	-	ŧ						· · · · ·									120	‡					· · · ·	·   · · ·	·   · · · ·	:
120	119.5	- 38.3	85	15/0.2						100/0.7							120	119.5	38.4	27	23	77/0.2				
	-	ł					: :	· · · · · · · ·		• • • • • •	Ţ							116.3	116				· · · ·	.   .	·   · · · ·	•
115	114.5	43.3					•••							113.7					41.0	60/0.0						
	-	+	50	50/0.3						100/0.8	┝┤			<u>- 113.7</u> -	Boring Lerminated at Eleva	44. ation 113.7 ft IN	-	‡								
	-	ŧ												Ę	WEATHERED ROCK (ME SCHIST)	TAVOLCANIC		‡								
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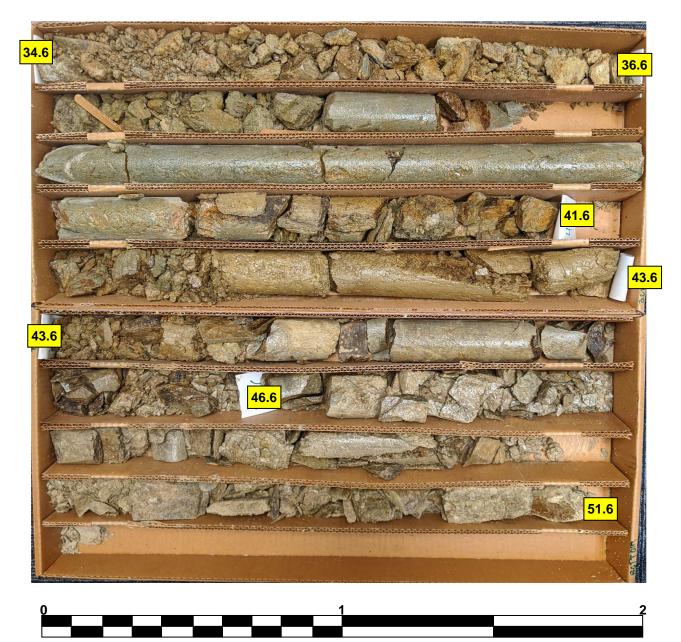
### **CORE PHOTOGRAPHS**

**B1-B** BOXES 1 & 2: 13.7 - 34.6 FEET





**B1-B** BOXES 3 & 4: 34.6 - 51.6 FEET



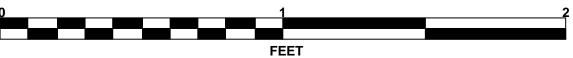
FEET

## SHEET 14 45983.1.1 (B-5947)/BRIDGE NO. 91

### SHEET 15 45983.1.1 (B-5947)/BRIDGE NO. 91 CORE PHOTOGRAPHS

**B2-A** BOXES 1 & 2: 48.5 - 61.5 FEET





### SITE PHOTOGRAPH

Bridge No. 91 on -LREV- (NC 581) over Tar River



SHEET 16 45983.1.1 NASH CO.