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DESCRIPTION

SUPPLEMENTAL LEGEND (GSI)

BORE LOG(S), CORE REPORT, & CORE PHOTOGRAPH

TITLE SHEET LEGEND (SOIL & ROCK)

SITE PLAN

CROSS SECTION(S)

SHEET NO.

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STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _CABARRUS

PROJECT DESCRIPTION BRIDGE NO. 201 ON SR 2443 (DRYE RD.) OVER LITTLE BUFFALO CREEK

STATE PROJECT REPERENCE NO. B-5793

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSES OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6550. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DIES NOT WARRANT OR CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY 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 FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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DATE APRIL 2017



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

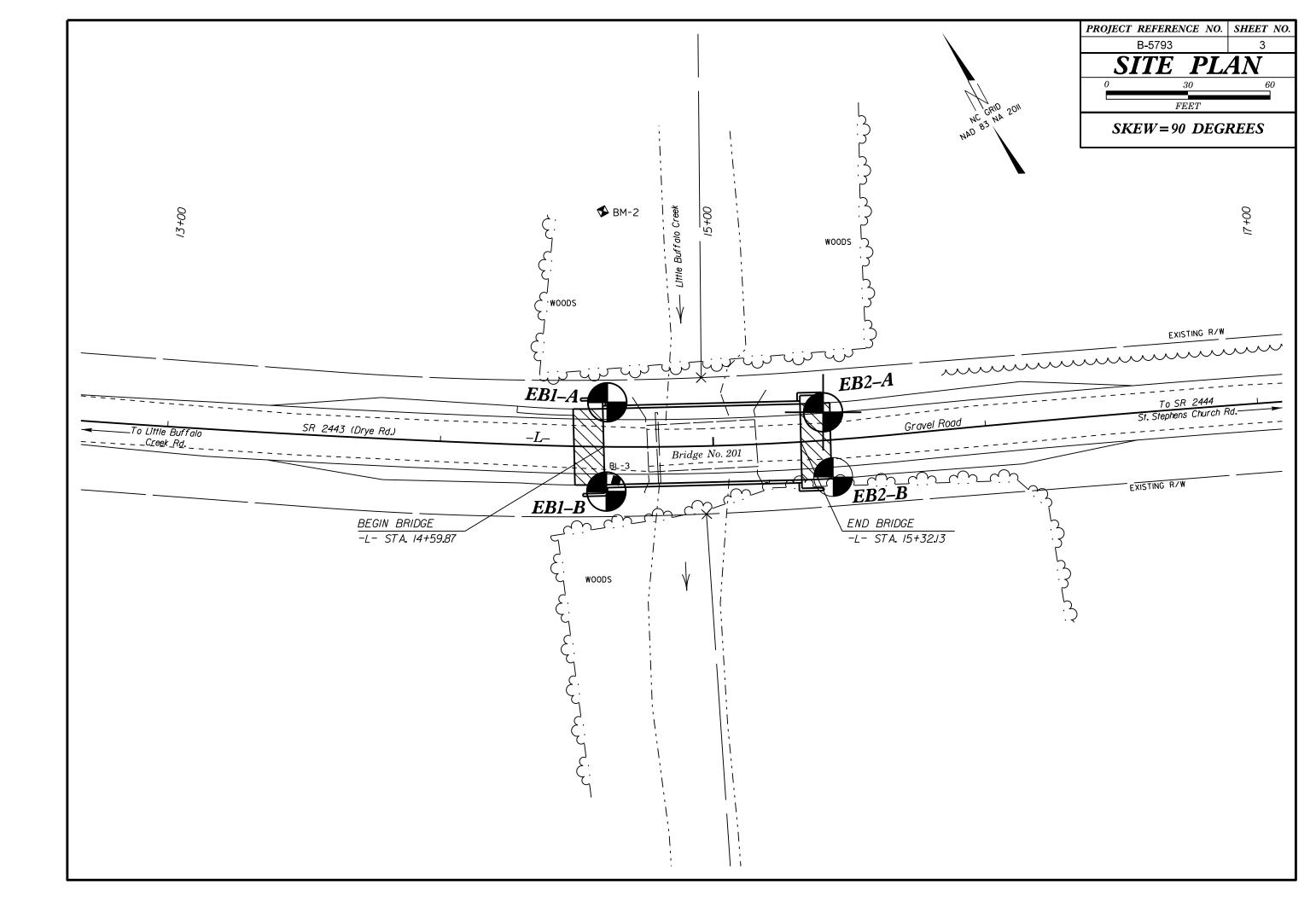
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	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 ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN 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 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED VIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
CEMERAL CRAMIN AR MATERIAL C SILT-CLAY MATERIAL C	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICHEQUE AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (\$\leq 35% PASSING "200) (> 35% PASSING "200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) WOULD VIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GREISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY	NON CONSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
2. PASSING GRANULAR SILT-MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	(CP) SHELL BEOS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
"40 38 MX 50 MX 51 MN SOILS CLAY PEAT		- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
15 MX 25 MX IV MX	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40 CONC. MITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 48 MX 41 MN LITTLE OR HIGHLY PI 5 MX NP 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN 11 MN	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROID INDEX A A A MY A MY 12 MY IS MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
URIAN TYPES STONE FRACS ORGANIC SUILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAMD SOULS SOULS SOULS SOULS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU		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	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN, RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL	.t	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBCROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBCROUP IS > LL - 30	— O-MI⊶ SPRING OR SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/825 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	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE 4 TO 10	SOIL SYMBOL SOIL SYMBOL SPT ONT TEST BORING INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	】 南 - · · · · · · · · · · · · · · · · · ·	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE 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	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A PIEZOMETED	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 ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	##** ALLUVIAL SOIL BOUNDARY INSTALLATION → SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	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	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIF	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USES IN THE TOP OF FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SO.) (F SO.) (SL.) (CL.)	ABBREVIATIONS	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 SIZE IN 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.	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
	CL CLAY MOD MODERATELY 7 - 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	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE CLUBE FOR SUST OF SCRIPTION	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7/4 - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS) OESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH 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.
PLASTIC SEMICOLID. PEGUIDES OBVING TO	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 - WEI - W ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BM *2: RR SPIKE IN BASE OF 36 INCH SYCAMORE
""PLL + PLASTIC LIMIT -	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N: 62/325, E: 1585616, -BL - STATION 15+60.00, 98' LEFT
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	ELEVATION: 555,34 FEET
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD= FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY	CME-55 X 8'HOLLOW AUGERS CORE SIZE:	INDURATION	NM= NOT MEASURED
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N X	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.]
NON PLASTIC 0-5 VERY LOW	TUNG -CAPRIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST X CASING X ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINIEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CME-550X SOUNDING ROU CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
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
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

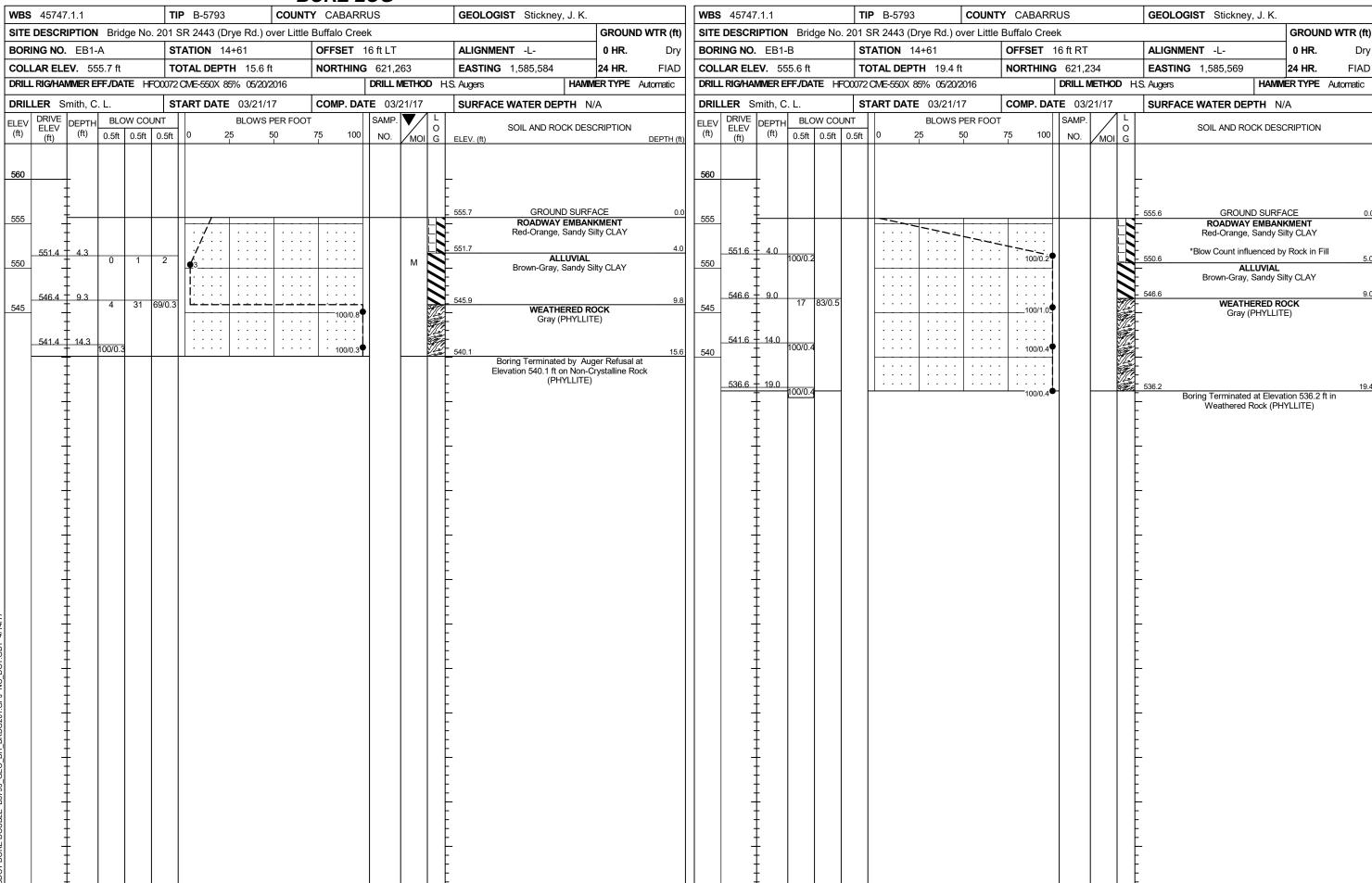
	SUPPL	EMENTAL LE FROM AASE	GEND, GE HTO LRF	EOLOGIC D BRID	AL STRENGTH INDEX (GSI) TABLES GE DESIGN SPECIFICATIONS					
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Rock Mass (Marinos and I	loek, 2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Def	ormed Hetero	geneous Rock N	Masses (Marı	nos and Hoek	, 2000)
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	faces		aces	s O	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marınos.P and Hoek E., 2000)					
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surface GOOD GOOD Rough, slightly weathered, iron stained	urfaces AIR mooth, moderately weathered and ltered surfaces	POOR Slickensided, highly weathered surfa with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	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.	VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - 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
STRUCTURE	DECREASIN	IG SURFACE QUA		>	COMPOSITION AND STRUCTURE					
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90 80 80		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.	70 60	A			
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	70 60				B. Sand- Stone with Stone and Stylestone Stone with Stone and Stylestone Stylestone with Stylestone Stylestone with sand- Stylestone with stylestone with sand- Stylestone with stylestone with sand- Stylestone with stylestone with stylestone with sand- Stylestone with styles		50			
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	OCKING	50			B. Sand- stone with stone and siltstone thin inter- layers of siltstone amounts D. Siltstone or silty shale with sand- stone layers stone layers layers layers layers siltstone		/B 40	C / [D/ /E	
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	ASING INTERL	40	30		C. D. E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.			30	F 20	
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	- DECKE		20		G. Undisturbed silty or clayey shale with or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone layers of sandstone are transformed into small rock pieces.			\$	 	10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V N/A N/A			10	Into small rock pieces. ——→ Means deformation after tectonic disturbance					DATE: 8



								1 1 1		0	10 2	0	RENCE NO. SHEET NO
			 - - -		! ! ! !		! ! ! ! !	! ! ! !			FEET $VE = 1:1$	B-579 CROSS SECTION AT SUPERIOR	03 4 7 THROUGH END BENT STA. 14 + 59.87 V=90 DEGREES
				! ! !	! ! ! !	! ! ! ! !	! ! !	! ! ! ! !		<u> </u>		SKEV	V=90 DEGREES
570	! ! ! ! ! !		 	 	! ! ! !	EB1–A 14+61	! ! ! !		EB1-B 14+61	! ! ! !			570
					1 1 1 1 1 1	16.3' LT	9		16.4' RT	1 1 1 1 1 1			
560				; ; ; ;	 	 	 	 		 			560
						Har	Roadway d. Red -Orange, M	Ground Surface Embankment:					
550	<u> </u>		 	i ! !	3	-/'0/	Alfuv	Noist, Sandy Silty Hial:	(100/0.2) CL	AY			
					5	<u> </u>	Orange to Brown	h-Gray, Moist, Sa	ndy (10071.0)	Silty CLAY		- –	
. 540					(1007)		Weathered Gray (PHY	ZUTTE)	(100/0.4)	 			540
. 240				7/=7	7/=///=/ Non-Crys	AR FIAD FIAD ROCK:	737737		(00/0.4) BT				
					: (PHY : :	LITTE) !		=7/7	BT FIAD	1 1 1 1			
.530				: 		 	 			; ; ; ;			
					1 1 1 1 1	1 1 1 1 1 1	! ! ! !	 		1 1 1 1 1 1			
520					! ! ! ! !	! ! ! !	 	 		 			
<u> 5</u> 10					i ! ! !	i 	i ! !			i ! ! ! !			510
					1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1	1 1 1 1 1 1		 			
					1 1 1 1 1 1	1 1 1 1 1	1 1 1 1 1	1 1 1 1 1		1 1 1 1 1 1			
500				<u> </u> 	 	 	: 	 		 			
					1 1 1 1 1	1 1 1 1 1	1 1 1 1 1	 		1 1 1 1 1			
. 490	ļ		ļ	ļ 	; ; ; {	; ; ; ;	; ; ;	; 		 			490
	CDOUNDLINE	TEN FROM TIVE			1 1 1 1	 	! ! !	 		 			
	GROUNDLINE TAK	IGRAPHY IS DR.	AWN THROUGH T	:	:	: 	: ! ! !			: 			
480	PROJECTED ONTO			 	: 30 2	: ! !:0	: :	: 	: :0 2	: : 20	30 40	50	

										0	10 20	PROJECT REFER	ENCE NO. SHEET 1	NO.
					 	 	 				FEET $VE = 1:1$	CROSS SECTION	THROUGH END BEN TA. 15 + 32.13 =90 DEGREES	NT 2
.810						EB2 15+ 10.3'	<u>41</u>];	EB2-B 15 + 43 13.6' RT				8	810
					 	10.5	<u>'</u>	E						
570						 							5	<u>5</u> 70
. 560							Connection						5	560
						, L , L , , L	Roadway E Medium Sti Sandy Silty	ff, Red-Orange, CLAY — — (6)	Moist,					
550			(A	Residue Brown,	al: Medium Stiff and Gray, Moist,	Red, 8 Silty Sandy		. All	Crice	Red-Brown, San	dy Silty CLAY)	5	550.
540							Crystalline	Rock: (PHYLLIT E		 			5	540
						E FI	AD							
.530													5	530
.520													5	520
. 510													5	5 10.
. 500						 					(A) Weathered	Rock: Gray (PHYLLIT)	<u>E)</u> 5	.5 00.
	INFERRED ST	:	RAWN THROUGH T	BY NCDOT DATED THE BORINGS WITH	:									
490		1	50	- <u> </u> 40 3	: ::::::::::::::::::::::::::::::::::::	¦ 20	; ;: ;:O	; D 1:0)	. 20	; 30 40	<u> </u> 50	4	490.

GEOTECHNICAL BORING REPORT BORE LOG



GEOTECHNICAL BORING REPORT BORE LOG

										<u> 3OF</u>	RE L	<u>UG</u>					
	4574					P B-57					ABARF				GEOLOGIST Stickney, J. K.		
SITE	DESC	RIPTIO	N Brid	lge No					over Littl	e Buffa	alo Cree	ek				GROUND WTR	R (ft)
BOR	ING NO). EB2	-A		S	TATION	15-	+41		OFI	FSET	10 ft LT			ALIGNMENT -L-	0 HR.	9.7
	LAR EL							1 20.6		NO	RTHING	621,2	222		EASTING 1,585,652	24 HR . F	IAD
DRIL	L RIG/HA	MMER	FF./DA	TE HE	-00072	CME-550	OX 85	% 05/20	/2016	·		DRILL	METHO	D SP	T Core Boring HAMI	MER TYPE Automa	atic
DRIL	LER S	Smith, C	D. L.		Sī	TART D	ATE	03/22/	17	СО	MP. DA	TE 03	/22/17		SURFACE WATER DEPTH N	I/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	JNT 0.5ft	0	25		PER FOO	75	100	SAMP NO.	MOI	L O G	SOIL AND ROCK DES		TH (ft)
560		<u> </u> 								: :					558.9 GROUND SURF ROADWAY EMBAN Red-Orange, Sandy S	IKMENT	0.0
555	554.0	4.9	3	2	6	-1	· · · ·						М		- 553.0		5.9
550	549.0	9.9				. T	: : ===	· · · · · · · · · · · · · · · · · · ·	: : : - : : :	: :	· · · · · · · · · · · · · · · · · · ·				RESIDUAL Red, Brown, and Gray, Sil -549.7 WEATHERED R	y Sandy CLAY	9.2
545		<u> </u>	100/0.2				· ·			: :	100/0.2				547.7 Gray (PHYLLI' 546.7 NON-CRYSTALLIN (PHYLLITE	E ROCK	11.2 12.2
540		† †					 								(PHYLLITE		
540	<u> </u>	<u> </u>	\perp							<u>. </u> .					538.3 Boring Terminated at Elevi		20.6
															Non-Crystalline Rock (NOTE: 0HR GROUND WATER M LIKELY INFLUENCED I OPERATION	EASUREMENT BY CORING	
															-		

WBS	45747	'.1.1			TIP	B-579	93	CC	DUNT	Υ (ABARRU	JS	GEOLOGI	ST Stickne	_					
SITE	DESCR	IPTION	l Brid	lge No. 2	01 SR	2443	(Drye Rd.) over	Little	Buff	alo Creek	(GROUN	D WTR (ft			
BOR	ING NO.	EB2	-A		STA	TION	15+41			OF	FSET 10	Oft LT	ALIGNMENT -L-			0 HR.				
COL	LAR ELI	EV . 5	58.9 ft		TOT	AL DE	PTH 20.	6 ft		NO	RTHING	621,222	EASTING	1,585,652		24 HR.	FIAD			
DRIL	L RIG/HA	VIMER E	FF./DA	TE HFO	0072 CIV	/E-550X	85% 05/2	20/2016	;		1	DRILL METHOD S	SPT Core Boring		HAMIN	ER TYPE	Automatic			
DRIL	LER S	mith, C). L.		STAI	RT DA	TE 03/2:	2/17		СО	MP. DAT	E 03/22/17	SURFACE	WATER DE	PTH N	/A				
COR	E SIZE	NX			тот	AL RU	N 9.4 ft													
ELEV	RUN	DEPTH	RUN	DRILL	RUN SAMP. STRATA REC. RQD															
(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft)		(ft) %	RQD (ft) %	L O G	ELEV. (ft)									
547.7	547.7 + 11.2 4.4 (4.4) (0.9) (1.0)								(0.0)	-3-2-	- 547.7 _			ng @ 11.2 f			_ 11			
545	-	45.0			100%			\100% (8.1)	0% (1.3)	鼜	546.7	Brown-Gray, Mod	derate to Slight \ Closely Frac	Weathering, W tured, PHYLL	oderately l TE		d, \12			
	543.3	15.6	5.0		(4.7)	(0.4)		96%	15%	鼜	-	Gray, Very Slight to	Slight Weather	ing, Hard, Clo	sely Fractu	irea, PHYLI	.IIE			
540	-	F			94%	8%					- -									
	538.3	20.6								鼜	538.3						20			
	-	<u> </u>									-	Boring Terminated a	at Elevation 538	.3 ft in Non-Cr	ystalline R	ock (PHYLI	ITE)			
	-	 									-	0HR GROUND \		IOTE: IREMENT I IK	FI Y INFI I	JENCED B	Y			
	:	<u> </u>									- -	or in Controlled		OPERATION		32.102 <i>B B</i>	•			
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CORE PHOTOGRAPH: Bridge No. 201 on SR 2443 (Drye Rd.) over Little Buffalo, EB2-A 14+61, 16' LT





GEOTECHNICAL BORING REPORT BORE LOG

SHEET 9

										L		KE_	<u></u>	<u> </u>							
WBS	45747	'.1.1			Т	ΊP	B-5793			COUN	TY	CABAF	RRL	JS			GEOLOGI	ST Stickne	ey, J. K.		
SITE	DESCR	IPTION	l Brid	dge No	201	SR	2443 (D	rye Ro	ر. اه (.لا	er Littl	e Buf	falo Cr	reek	(GROUN	D WTR (ft)
	ING NO.						ION 1	_						4 ft RT			ALIGNME	NT -L-		0 HR.	Dry
	LAR ELE						L DEP1		6 ft					621,19	99			1,585,644		24 HR.	FIAD
	_ RIG/HAI									016						DD H	.S. Augers	.,000,0			Automatic
												NAD D						. WATER RE			7 (0.0.7.0.0.0
	LER S			2111 00		IAR	T DATE					JIVIP. L		E 03/2		<i>1</i>	SURFACE	WATER DE	PIH N	A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	OW CO 0.5ft	_	0	2	BLO\ 25 		PER FOC	75 	10	- 1 1	SAMP. NO.		O I G	ELEV. (ft)	SOIL AND R	ROCK DESC	CRIPTION	DEPTH (f
560	-	-															558.8		IND SURFA		0.
	-	 															-	Red-Orange	Y EMBAN e, Sandy S	Ity CLAY	
555	555.2	3.6	1	3	3	4 📙	∤ · · ·				•	· · · ·					- 554.7				4.
	‡		"	11 '	6						.		M		-	Red-Brown	LLUVIAL Sandy Sil	ty CLAY			
												.				-	Neu-Diowi	i, Gariuy Gii	ity CLAT		
550	550.2	8.6	3	97/0.5	1		, L			· · ·	<u>-</u> -		<u>.</u>				549.7				9.
	-	-	Ť	0.70.0							ı	100/1.	.0●	•			549.2	WEAT Grav	HERED RO (PHYLLIT	DCK E)	<u>9</u>
																	- B	oring Termina evation 549.2 f	ted by Aug	er Refusal	at ock
																	-				