

REFERENCE: SF-750128

PROJECT: 17BP.8.R.115

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY RANDOLPH
 PROJECT DESCRIPTION BRIDGE NO. 128 ON SR 2442
(RAMSEUR JULIAN ROAD) OVER SANDY CREEK

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
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CAUTION NOTICE

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PERSONNEL

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INVESTIGATED BY B. JOHNSON
 DRAWN BY T. WELLS
 CHECKED BY X. BARRETT
 SUBMITTED BY KLEINFELDER, INC.
 DATE FEBRUARY 2017

Prepared in the Office of:



KLEINFELDER
Bright People. Right Solutions.

7343 WEST FRIENDLY AVE, SUITE B
 GREENSBORO, NC 27410
 NC FIRM LICENSE NO. F-1134



DocuSigned by:
Thomas R. Wells 3/7/2017

7DA5D2D0518F48C SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
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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

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS					
	A-1	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7					
GROUP CLASS.	A-1-a	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7					
SYMBOL																				
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX	40 MX 35 MX	41 MN 35 MX	42 MN 35 MX	43 MN 35 MX	36 MN 36 MN	37 MN 36 MN	38 MN 36 MN	39 MN 36 MN	40 MN 36 MN	41 MN 36 MN	42 MN 36 MN	43 MN 36 MN					
MATERIAL PASSING #40 LL PI	-	-	40 MX 10 MX	41 MN 10 MX	42 MN 11 MN	43 MN 11 MN	44 MN 11 MN	40 MX 10 MX	41 MN 10 MX	42 MN 11 MN	43 MN 11 MN	40 MX 10 MX	41 MN 11 MN	42 MN 11 MN	43 MN 11 MN					
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX												
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS															
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR	POOR	UNSATURABLE			

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.76	2.00	0.42	0.25	0.075	0.053
Boulder (BLDR.)						
Cobble (COB.)						
Gravel (GR.)						
Coarse Sand (CS, SD.)						
Fine Sand (F SD.)						
Silt (SL.)						
Clay (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
MM						
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL	CL. - BORING TERMINATED	CL. - CLAY	CPT - CONE PENETRATION TEST	CSE. - COARSE	DMT - DILATOMETER TEST	DPT - DYNAMIC PENETRATION TEST	e - VOID RATIO	F - FINE	FOSS. - FOSSILIFEROUS	FRAC. - FRACTURED, FRACTURES	FRAGS. - FRAGMENTS	HI. - HIGHLY	MED. - MEDIUM	MICA. - MICACEOUS	MOD. - MODERATELY	NP - NON PLASTIC	ORG. - ORGANIC	PMT - PRESSUREMETER TEST	SAP. - SAPROLITIC	SD. - SAND, SANDY	SL. - SILT, SILTY	SLI. - SLIGHTLY	TCR - TRICONE REFUSAL	w - MOISTURE CONTENT	V - VERY	VST - VANE SHEAR TEST	WEA. - WEATHERED	W - UNIT WEIGHT	W _d - DRY UNIT WEIGHT
												SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO																	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS: <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input checked="" type="checkbox"/> TRICONE 2-1/8" TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT	HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input checked="" type="checkbox"/> -N Q HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST
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ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
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
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET
		THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-3: STA I7+67 -BL- (774,546 FT N, 1,809,123 FT E)

ELEVATION: 609.52 FEET

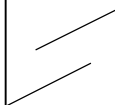
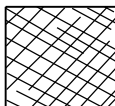


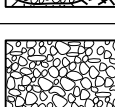
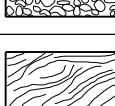
NOTES:
 FIAD - FILLED IMMEDIATELY AFTER DRILLING
 TOP OF RAIL ELAVATION AT DOWNSTREAM SIDE
 EB1 - 612.2 FEET
 EB2 - 612.5 FEET

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

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

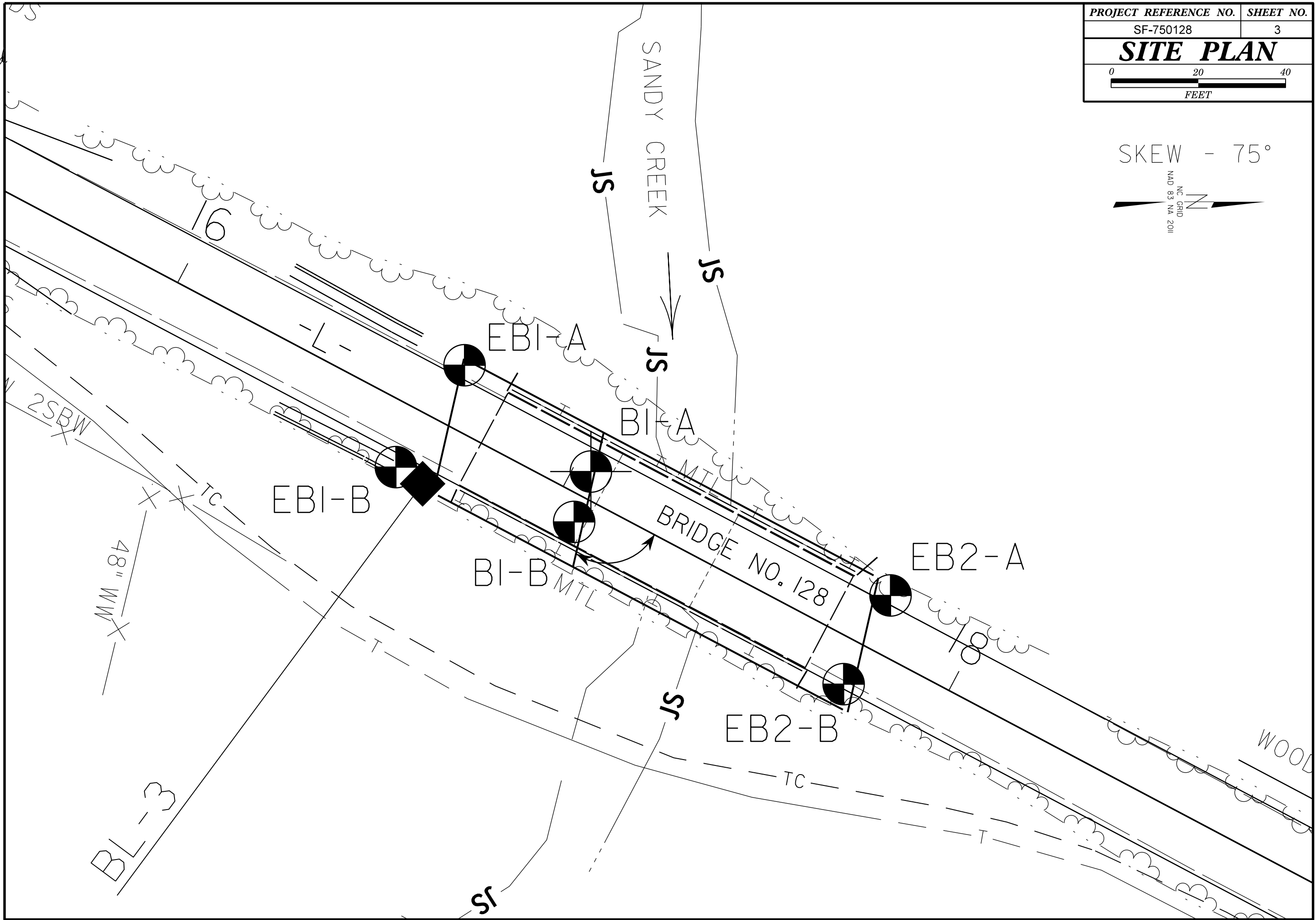
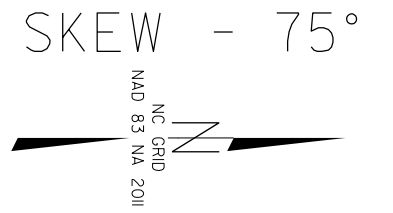
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

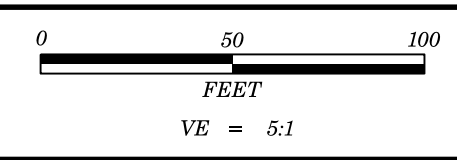
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

<p>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</p> <p>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.</p> <p>STRUCTURE</p>	<p>SURFACE CONDITIONS</p> <p>VERY GOOD Very rough, fresh unweathered surfaces</p> <p>GOOD Rough, slightly weathered, iron stained surfaces</p> <p>FAIR Smooth, moderately weathered and altered surfaces</p> <p>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</p> <p>DECREASING SURFACE QUALITY →</p>					<p>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</p> <p>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.</p> <p>COMPOSITION AND STRUCTURE</p>	<p>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</p> <p>VERY GOOD - Very Rough, fresh unweathered surfaces</p> <p>GOOD - Rough, slightly weathered surfaces</p> <p>FAIR - Smooth, moderately weathered and altered surfaces</p> <p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p> <p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>				
<p>INTERLOCKING OF ROCK PIECES</p> <p>DECREASING INTERLOCKING OF ROCK PIECES ↓</p> <p> INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p> BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p> VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p> BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p> DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p> LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	<p>90</p> <p>80</p> <p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p>	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	<p>N/A</p> <p>N/A</p>	<p>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.</p> <p>B. Sandstone with thin inter-layers of siltstone</p> <p>C. Sandstone and siltstone in similar amounts</p> <p>D. Siltstone or silty shale with sandstone layers</p> <p>E. Weak siltstone or clayey shale with sandstone layers</p> <p>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</p> <p>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</p> <p>H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</p> <p>→ Means deformation after tectonic disturbance</p>	<p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>	

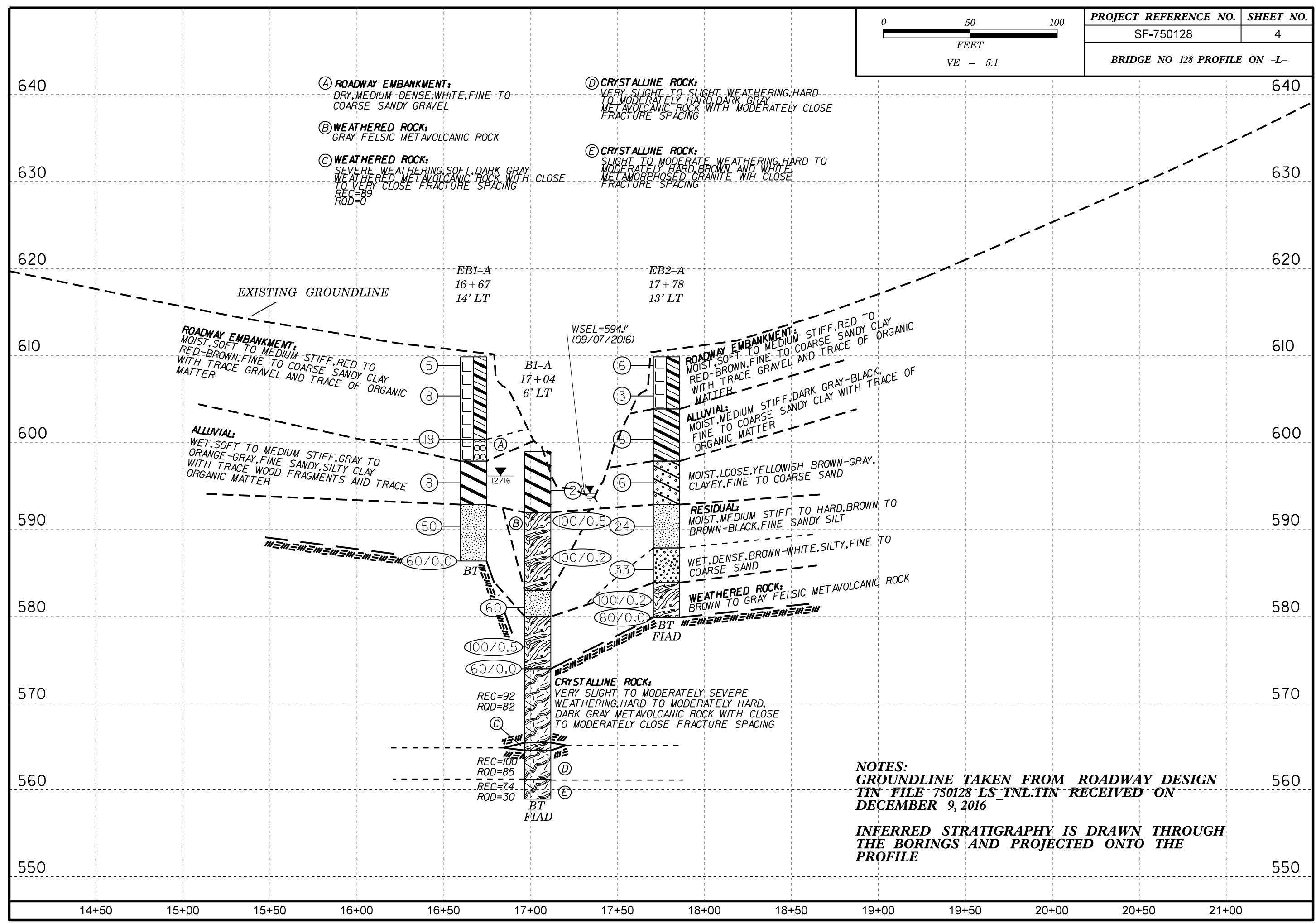
DocuSigned by:
Cheryl Youngblood
B304AB5FC8F3424...

PROJECT REFERENCE NO.	SHEET NO.
SF-750128	3
SITE PLAN	
0 20 40 FEET	





PROJECT REFERENCE NO.	SHEET NO.
SF-750128	4
BRIDGE NO 128 PROFILE ON -L-	



(A) ROADWAY EMBANKMENT:
 DRY, MEDIUM-DENSE, WHITE, FINE TO COARSE SANDY GRAVEL

(B) WEATHERED ROCK:
 GRAY FELSIC METAVOLCANIC ROCK

(C) WEATHERED ROCK:
 SEVERE WEATHERING, SOFT, DARK GRAY WEATHERED METAVOLCANIC ROCK WITH CLOSE TO VERY CLOSE FRACTURE SPACING
 REC=89
 RQD=0

(D) CRYSTALLINE ROCK:
 VERY SLIGHT TO SLIGHT WEATHERING, HARD TO MODERATELY HARD, DARK GRAY METAVOLCANIC ROCK WITH MODERATELY CLOSE FRACTURE SPACING

(E) CRYSTALLINE ROCK:
 SLIGHT TO MODERATE WEATHERING, HARD TO MODERATELY HARD, BROWN AND WHITE METAMORPHOSED GRANITE WITH CLOSE FRACTURE SPACING

ROADWAY EMBANKMENT:
 MOIST, SOFT TO MEDIUM STIFF, RED TO RED-BROWN, FINE TO COARSE SANDY CLAY WITH TRACE GRAVEL AND TRACE OF ORGANIC MATTER

ALLUVIAL:
 WET, SOFT TO MEDIUM STIFF, GRAY TO ORANGE-GRAY, FINE SANDY, SILTY CLAY WITH TRACE WOOD FRAGMENTS AND TRACE ORGANIC MATTER

ROADWAY EMBANKMENT:
 MOIST, SOFT TO MEDIUM STIFF, RED TO RED-BROWN, FINE TO COARSE SANDY CLAY WITH TRACE GRAVEL AND TRACE OF ORGANIC MATTER

ALLUVIAL:
 MOIST, MEDIUM STIFF, DARK GRAY-BLACK, FINE TO COARSE SANDY CLAY WITH TRACE OF ORGANIC MATTER

RESIDUAL:
 MOIST, LOOSE, YELLOWISH BROWN-GRAY, CLAYEY, FINE TO COARSE SAND

RESIDUAL:
 MOIST, MEDIUM STIFF TO HARD, BROWN TO BROWN-BLACK, FINE SANDY SILT

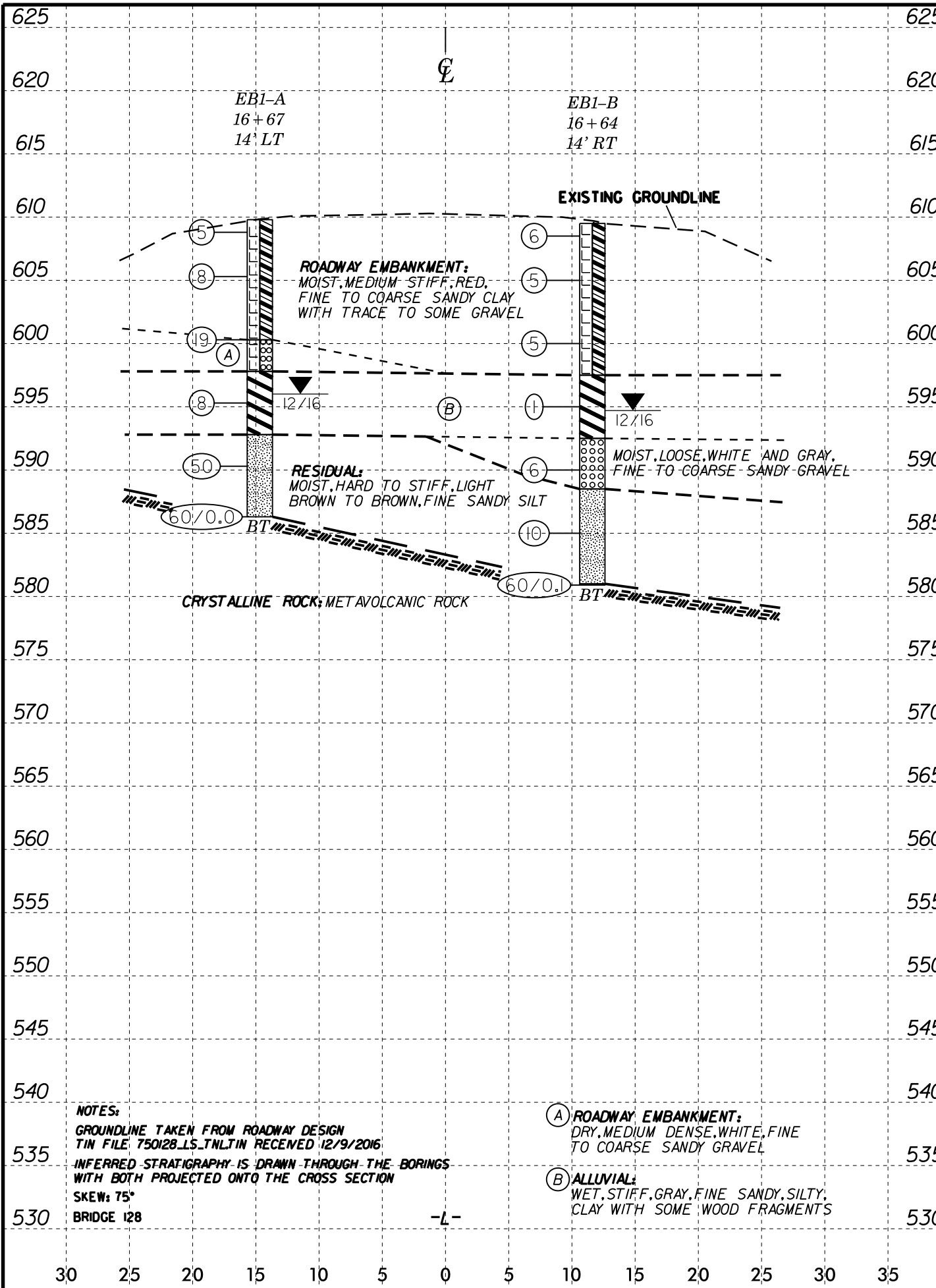
RESIDUAL:
 WET, DENSE, BROWN-WHITE, SILTY, FINE TO COARSE SAND

WEATHERED ROCK:
 BROWN TO GRAY FELSIC METAVOLCANIC ROCK

CRYSTALLINE ROCK:
 VERY SLIGHT TO MODERATELY SEVERE WEATHERING, HARD TO MODERATELY HARD, DARK GRAY METAVOLCANIC ROCK WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING

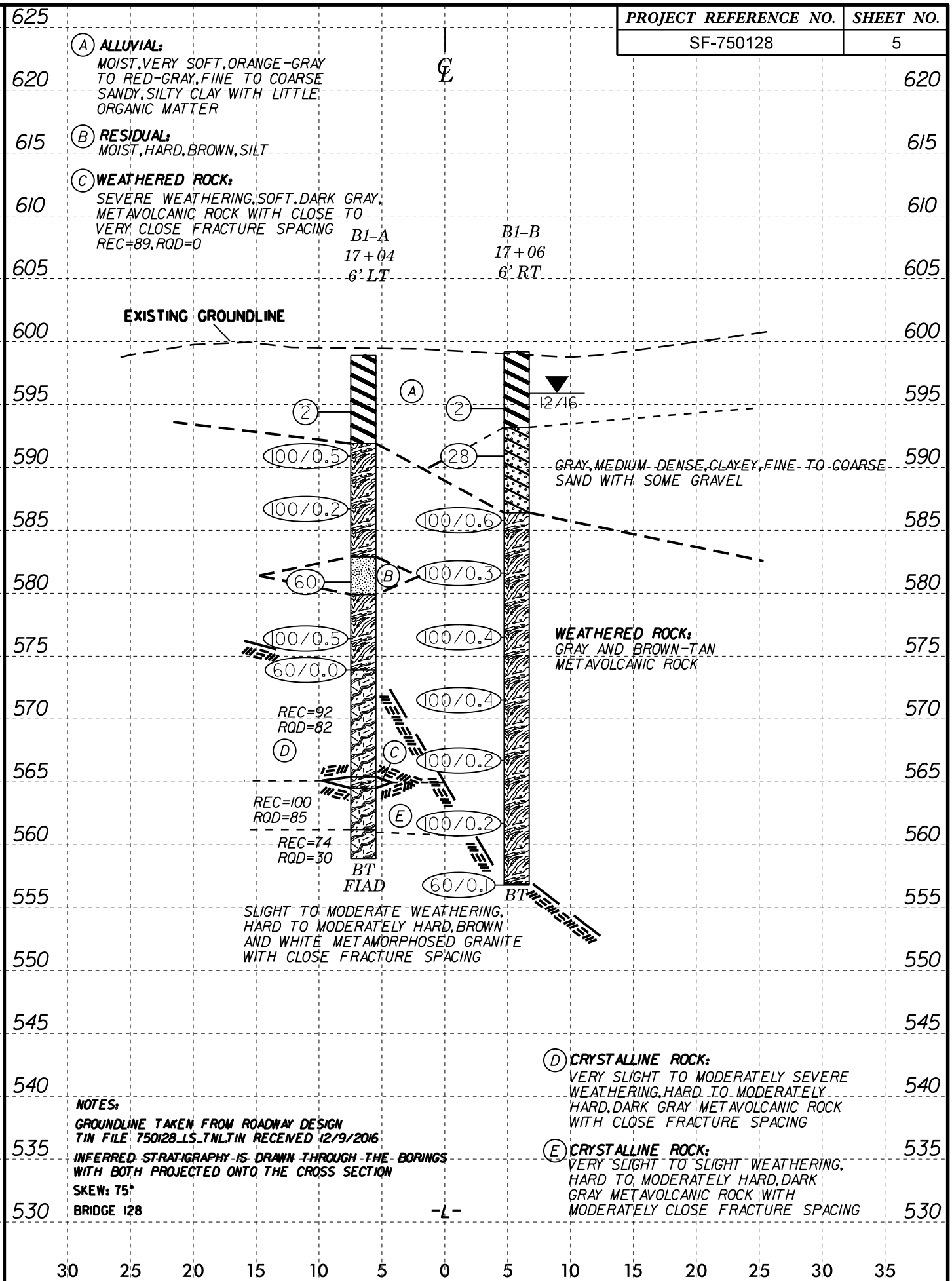
NOTES:
 GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE 750128_LS_TNL.TIN RECEIVED ON DECEMBER 9, 2016

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ONTO THE PROFILE



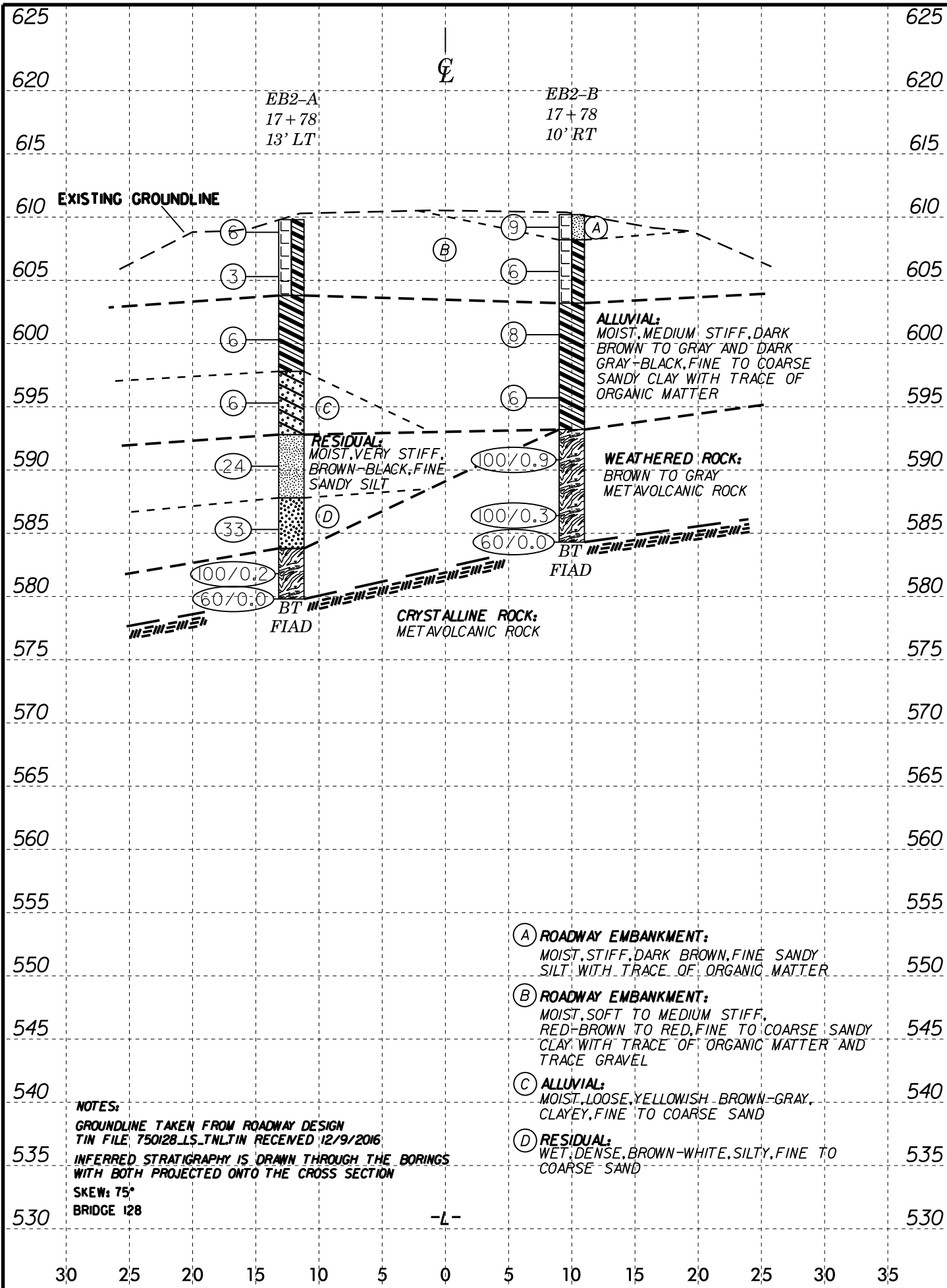
END BENT NO. 1 CROSS SECTION AT STA. 16+72

HORIZ. SCALE 0 10 20 (FEET) VE = 1:1



BENT NO. 1 CROSS SECTION AT STA. 17+07

HORIZ. SCALE 0 10 20 (FEET) VE = 1:1



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson									
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 16+67		OFFSET 14 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 609.8 ft		TOTAL DEPTH 23.5 ft		NORTHING 774,555		EASTING 1,809,096									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER R. Toothman		START DATE 12/30/16		COMP. DATE 12/30/16		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
610	609.8	0.0	2	2	3								M	GROUND SURFACE	0.0
	606.3	3.5	2	4	4								M	ROADWAY EMBANKMENT Red, Fine Sandy CLAY	3.0
605	601.3	8.5	2	3	16								M	Red, Fine to Coarse, Sandy CLAY with Trace Gravel	
600	596.3	13.5	WOH	3	5								M	White, Fine to Coarse Sandy GRAVEL	9.5
595	591.3	18.5											D	ALLUVIAL Gray, Fine Sandy CLAY with Trace Wood Fragments	12.0
590	586.3	23.5											W	RESIDUAL Light Brown, Fine Sandy SILT	17.0
		60/0.0											M	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 586.3 ft on CRYSTALLINE ROCK: METAVOLCANIC ROCK	23.5

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson									
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 16+64		OFFSET 14 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 609.5 ft		TOTAL DEPTH 28.6 ft		NORTHING 774,540		EASTING 1,809,119									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER R. Toothman		START DATE 12/30/16		COMP. DATE 12/30/16		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
610	609.5	0.0	3	3	3								M	GROUND SURFACE	0.0
	606.0	3.5	2	2	3								M	ROADWAY EMBANKMENT Red to Red-Dark Gray, Fine to Coarse Sandy CLAY	
605	601.0	8.5	2	3	2								M	Red, Fine to Coarse, Sandy CLAY with Trace Gravel	
600	596.0	13.5	1	0	1								M	White, Fine to Coarse Sandy GRAVEL	9.5
595	591.0	18.5											D	ALLUVIAL Gray, Fine Sandy, Silty CLAY	12.0
590	586.0	23.5	7	6	4								W	RESIDUAL Brown, Fine Sandy SILT	17.0
585	581.0	28.5											M	White and Gray, Fine to Coarse Sandy GRAVEL	21.0
		60/0.1											M	RESIDUAL Brown, Fine Sandy SILT	23.5
														CRYSTALLINE ROCK METAVOLCANIC ROCK	28.5
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 580.9 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK	28.6

NCDOT BORE DOUBLE_SF750128_GEO_BRDG0128.GPJ_NC_DOT.GDT_2/21/17

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson							
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)						
BORING NO. B1-A		STATION 17+04		OFFSET 6 ft LT		ALIGNMENT -L-							
COLLAR ELEV. 598.9 ft		TOTAL DEPTH 40.0 ft		NORTHING 774,584		EASTING 1,809,120							
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD Mud Rotary/NQ Core		HAMMER TYPE Automatic								
DRILLER R. Toothman		START DATE 12/29/16		COMP. DATE 12/29/16		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
600												598.9 GROUND SURFACE	0.0
595	595.4	3.5	2	1	1						M	ALLUVIAL Orange and Gray, Fine to Coarse Sandy, Silty CLAY with Trace of Organic Matter	
590	591.9	7.0	50	100/0.5								WEATHERED ROCK Gray METAVOLCANIC ROCK	7.0
585	586.9	12.0	100/0.2									RESIDUAL Brown, Fine Sandy SILT	16.0
580	581.9	17.0	14	19	41						M	WEATHERED ROCK Brown METAVOLCANIC ROCK	19.0
575	576.9	22.0	100/0.5									CRYSTALLINE ROCK Dark Gray METAVOLCANIC ROCK	25.0
570	573.9	25.0	60/0.0								RS-1	WEATHERED ROCK Dark Gray METAVOLCANIC ROCK	33.5
565												CRYSTALLINE ROCK Dark Gray METAVOLCANIC ROCK	34.4
560												CRYSTALLINE ROCK Dark Gray METAVOLCANIC ROCK	37.7
												CRYSTALLINE ROCK Brown and White METAMORPHOSED GRANITE	40.0
Boring Terminated at Elevation 558.9 ft in CRYSTALLINE ROCK: METAMORPHOSED GRANITE													

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson						
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)					
BORING NO. B1-A		STATION 17+04		OFFSET 6 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 598.9 ft		TOTAL DEPTH 40.0 ft		NORTHING 774,584		EASTING 1,809,120						
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD Mud Rotary/NQ Core		HAMMER TYPE Automatic							
DRILLER R. Toothman		START DATE 12/29/16		COMP. DATE 12/29/16		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
573.9	573.9	25.0	5.0	N=60/0.0 5:20/1.0 5:38/1.0 3:35/1.0 4:40/1.0 5:55/1.0	(4.7) 94%	(3.9) 78%		(7.8) 92%	(7.0) 82%		Begin Coring @ 25.0 ft CRYSTALLINE ROCK Very Slight to Moderately Severe Weathering, Hard to Moderately Hard, Dark Gray METAVOLCANIC ROCK with Close to Moderately Close Fracture Spacing GSI - 50 to 80 3 Fractures from 0 Degrees to 10 Degrees 2 Fractures from 40 Degrees to 50 Degrees Highly Fractured from 27.0 ft. to 27.8 ft.	25.0
570	568.9	30.0	5.0	2:47/1.0 3:30/1.0 3:10/1.0 2:45/1.0 3:00/1.0	(4.4) 88%	(3.6) 72%	RS-1				WEATHERED ROCK Severe Weathering, Soft, Dark Gray METAVOLCANIC ROCK with Close to Very Close Fracture Spacing GSI - 23 to 30	33.5
565	563.9	35.0	5.0	4:28/1.0 2:32/1.0 2:29/1.0 2:16/1.0 4:25/1.0	(4.5) 90%	(3.0) 60%		(0.8) 89%	(0.0) 0%		CRYSTALLINE ROCK Very Slight to Slight Weathering, Hard to Moderately Hard, Dark Gray METAVOLCANIC ROCK with Moderately Close Fracture Spacing GSI - 75 to 80 1 Fracture from 40 Degrees to 50 Degrees Slight to Moderate Weathering, Hard to Moderately Hard, Brown and White METAMORPHOSED GRANITE with Close Fracture Spacing GSI - 60 to 65 1 Fracture from 0 Degrees to 10 Degrees 4 Fractures from 10 Degrees to 20 Degrees 2 Fracruces from 30 Degrees to 40 Degrees Boring Terminated at Elevation 558.9 ft in CRYSTALLINE ROCK: METAMORPHOSED GRANITE	34.4
560	558.9	40.0						(3.3) 100%	(2.8) 85%			
								(1.7) 74%	(0.7) 30%			

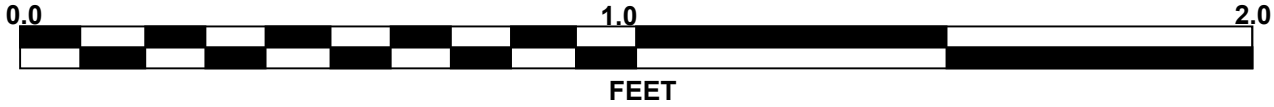
NCDOT BORE DOUBLE SF750128_GEO_BRDG0128.GPJ NC_DOT.GDT 2/21/17

NCDOT BORE DOUBLE SF750128_GEO_BRDG0128.GPJ NC_DOT.GDT 2/21/17

CORE PHOTOGRAPHS

B1-A

BOXES 1 and 2: 25.0 TO 40.0 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson										
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)									
BORING NO. B1-B		STATION 17+06		OFFSET 6 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 599.2 ft		TOTAL DEPTH 42.4 ft		NORTHING 774,581		EASTING 1,809,132										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER R. Toothman		START DATE 12/28/16		COMP. DATE 12/29/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
600														599.2	0.0	GROUND SURFACE
595	595.7	3.5	2	1	1								M	593.2	6.0	ALLUVIAL Red and Gray, Fine to Coarse Sandy, Silty CLAY
590	591.9	7.3	13	13	15								M			Gray, Clayey, Fine to Coarse SAND with Some Gravel
585	586.9	12.3	23	60	40/0.1									586.4	12.8	WEATHERED ROCK Brown to Brown-Tan and Gray METAVOLCANIC ROCK
580	581.9	17.3	100/0.3													
575	576.9	22.3	100/0.4													
570	571.9	27.3	100/0.4													
565	566.9	32.3	100/0.2													
560	561.9	37.3	100/0.2													
	556.9	42.3	60/0.1											556.9	42.3	CRYSTALLINE ROCK METAVOLCANIC ROCK
														556.8	42.4	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 556.8 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK

NCDOT BORE DOUBLE SF750128_GEO_BRDG0128.GPJ NC_DOT.GDT 2/21/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson										
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 17+78		OFFSET 13 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 609.8 ft		TOTAL DEPTH 30.0 ft		NORTHING 774,653		EASTING 1,809,149										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER R. Toothman		START DATE 01/04/16		COMP. DATE 01/04/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
610	609.8	0.0	2	3	3								M	GROUND SURFACE	0.0	
	606.3	3.5	1	2	1								M	ROADWAY EMBANKMENT Red-Brown, Fine to Coarse Sandy CLAY with Trace of Organic Matter and Trace Gravel		
605	601.3	8.5	2	3	3								M	ALLUVIAL Dark Gray-Black, Fine to Coarse Sandy CLAY with Trace of Organic Matter	6.0	
600	596.3	13.5	2	2	4								M	ALLUVIAL Yellowish, Brown-Gray, Clayey, Fine to Coarse SAND	12.0	
595	591.3	18.5	5	10	14								M	RESIDUAL Brown-Black, Fine Sandy SILT	17.0	
590	586.3	23.5	11	24	9								M	RESIDUAL Brown-White, Silty, Fine to Coarse SAND	22.0	
585	582.0	27.8	100/0.2										W	WEATHERED ROCK Gray METAVOLCANIC ROCK	26.0	
580	579.8	30.0	60/0.0												30.0	
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 579.8 ft on CRYSTALLINE ROCK: METAVOLCANIC ROCK	
															Topsoil 0.0 to 0.4 foot	

WBS 17BP.8.R.115		TIP SF-750128		COUNTY RANDOLPH		GEOLOGIST B. Johnson										
SITE DESCRIPTION Bridge No. 128 on SR 2442 (Ramseur Julian Road) over Sandy Creek							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 17+78		OFFSET 10 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 610.2 ft		TOTAL DEPTH 25.9 ft		NORTHING 774,642		EASTING 1,809,169										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER R. Toothman		START DATE 12/30/16		COMP. DATE 12/30/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
615																
610	610.2	0.0	5	6	3								M	GROUND SURFACE	0.0	
	606.7	3.5	2	3	3								M	ROADWAY EMBANKMENT Dark Brown, Fine Sandy SILT with Trace of Organic Matter	2.0	
605	601.7	8.5	3	3	5								M	ROADWAY EMBANKMENT Red, Fine Sandy CLAY	7.0	
600	596.7	13.5	3	3	3								M	ALLUVIAL Dark Brown to Gray, Fine to Coarse Sandy CLAY	17.0	
595	591.7	18.5	32	68/0.4									M	WEATHERED ROCK Brown METAVOLCANIC ROCK	17.0	
590	586.7	23.5	100/0.3													
585	584.3	25.9	60/0.0												25.9	
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 584.3 ft on CRYSTALLINE ROCK: METAVOLCANIC ROCK	
															Topsoil 0.0 to 0.3 foot	

NCDOT BORE DOUBLE_SF750128_GEO_BRDG0128.GPJ_NC_DOT.GDT_2/21/17

SITE PHOTOGRAPHS



View Looking North along -L- from End Bent 1



Profile of Existing Bridge from West of End Bent No. 1