

REFERENCE: BR-0060

PROJECT: 67060

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE

SUBSURFACE INVESTIGATION

COUNTY ALAMANCE

PROJECT DESCRIPTION REPLACE BRIDGE NO.14

ON NC 87 OVER CANE CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0060	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) 707-6850. 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 BOREHOLE. 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 WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

PERSONNEL

J. KARDON

TRIGON EXPLORATION

INVESTIGATED BY J. KARDON

DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

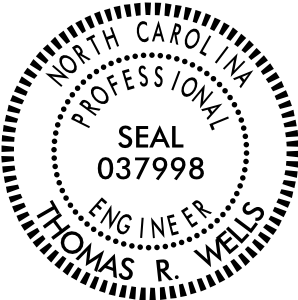
DATE FEBRUARY 2023

Prepared in the Office of:

KLEINFELDER

Bright People. Right Solutions.

422 GALLIMORE DAIRY ROAD, SUITE B  
GREENSBORO, NORTH CAROLINA 27409  
NC ENGINEERING FIRM LICENSE NO. F-1312



DocuSigned by:

Thomas Wells

02/13/2023

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SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

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 206, 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					
GROUP CLASS.	A-1		A-3		A-2		A-4		A-5		A-6		A-7		A-1, A-2		A-4, A-5	
SYMBOL	A-1-a		A-1-b		A-2-4		A-2-5		A-2-6		A-2-7				A-7-5, A-7-6		A-3	
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	36 MN	36 MN					
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX		41 MN 10 MX		40 MX 11 MN		41 MN 10 MX		40 MX 11 MN		41 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		UNSUITABLE	
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 <sup>2</sup> )
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 (CSE. SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						

SOIL MOISTURE - CORRELATION OF TERMS

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

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-GRAY). 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

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

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

SOIL SYMBOL

ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT

INFERRED SOIL BOUNDARY

INFERRED ROCK LINE

ALLUVIAL SOIL BOUNDARY

DIP & DIP DIRECTION OF ROCK STRUCTURES

TEST BORING

AUGER BORING

CORE BORING

MONITORING WELL

PIEZOMETER INSTALLATION

SLOPE INDICATOR INSTALLATION

CONE PENETROMETER TEST

SOUNDING ROD

TEST BORING WITH CORE

SPT N-VALUE

RECOMMENDATION SYMBOLS

UNDERCUT

SHALLOW UNDERCUT

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE

UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL  
BT - 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  
HL - 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  
% - UNIT WEIGHT  
% - 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:  
☐ CME-45C  
☒ CME-55  
☐ CME-550  
☐ VANE SHEAR TEST  
☐ PORTABLE HOIST  
☒ MOBILE B-57  
☐

ADVANCING TOOLS:  
☐ CLAY BITS  
☐ 6" CONTINUOUS FLIGHT AUGER  
☒ 8" HOLLOW AUGERS  
☐ HARD FACED FINGER BITS  
☐ TUNG-CARBIDE INSERTS  
☒ CASING ☐ W/ ADVANCER  
☐ TRICONE ☐ STEEL TEETH  
☒ TRICONE 2-1 1/2" TUNG-CARB.  
☒ CORE BIT  
☐

HAMMER TYPE:  
☒ AUTOMATIC ☐ MANUAL  
CORE SIZE:  
☐ -B ☐ -H ☒ -N Q  
HAND TOOLS:  
☐ POST HOLE DIGGER  
☐ HAND AUGER  
☐ SOUNDING ROD  
☐ VANE SHEAR TEST  
☐

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)

CRYSTALLINE ROCK (CR)

NON-CRYSTALLINE ROCK (NCR)

COASTAL PLAIN SEDIMENTARY ROCK (CP)

WEATHERING

FRESH  
VERY SLIGHT (V SLI.)  
SLIGHT (SLI.)  
MODERATE (MOD.)  
MODERATELY SEVERE (MOD. SEV.)  
SEVERE (SEV.)  
VERY SEVERE (V SEV.)  
COMPLETE

ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  
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.  
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.  
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.  
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. *IF TESTED, WOULD YIELD SPT REFUSAL*  
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. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*  
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. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*  
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 ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD  
HARD  
MODERATELY HARD  
MEDIUM HARD  
SOFT  
VERY SOFT

CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  
CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.  
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.  
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.  
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 PIECES CAN BE BROKEN BY FINGER PRESSURE.  
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

TERM  
VERY WIDE  
WIDE  
MODERATELY CLOSE  
CLOSE  
VERY CLOSE

SPACING  
MORE THAN 10 FEET  
3 TO 10 FEET  
1 TO 3 FEET  
0.16 TO 1 FOOT  
LESS THAN 0.16 FEET

BEDDING

TERM  
VERY THICKLY BEDDED  
THICKLY BEDDED  
THINLY BEDDED  
VERY THINLY BEDDED  
THICKLY LAMINATED  
THINLY LAMINATED

THICKNESS  
4 FEET  
1.5 - 4 FEET  
0.16 - 1.5 FEET  
0.03 - 0.16 FEET  
0.008 - 0.03 FEET  
< 0.008 FEET

INDURATION

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

FRIABLE  
MODERATELY INDURATED  
INDURATED  
EXTREMELY INDURATED

RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  
GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.  
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 DISLOGGED 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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:  
FIAD - FILLED IMMEDIATELY AFTER DRILLING  
THE BORINGS WERE SURVEYED BY SEPI, A DIVISION OF TRANSYSTEMS INC. USING A SUB-CENTIMETER GPS.

DATE: 8-15-14

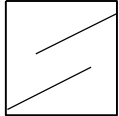
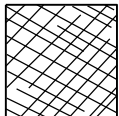
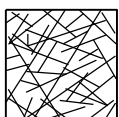

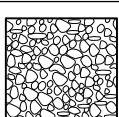
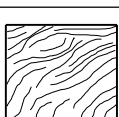
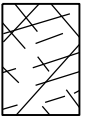


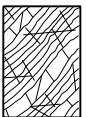
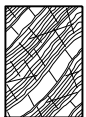



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

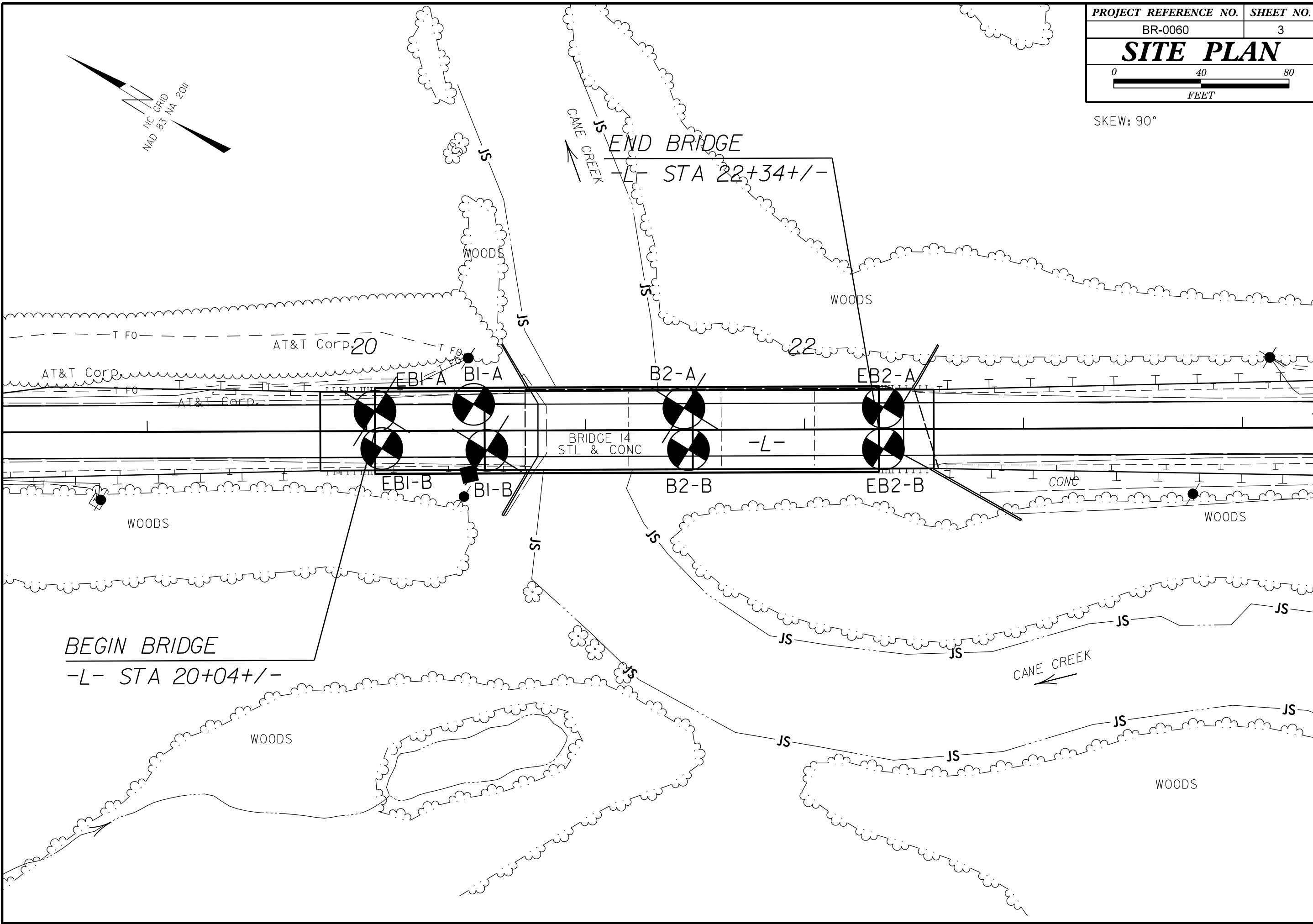
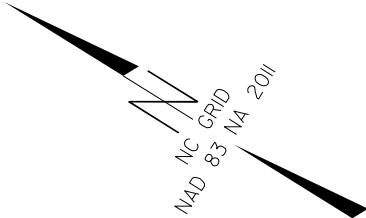
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

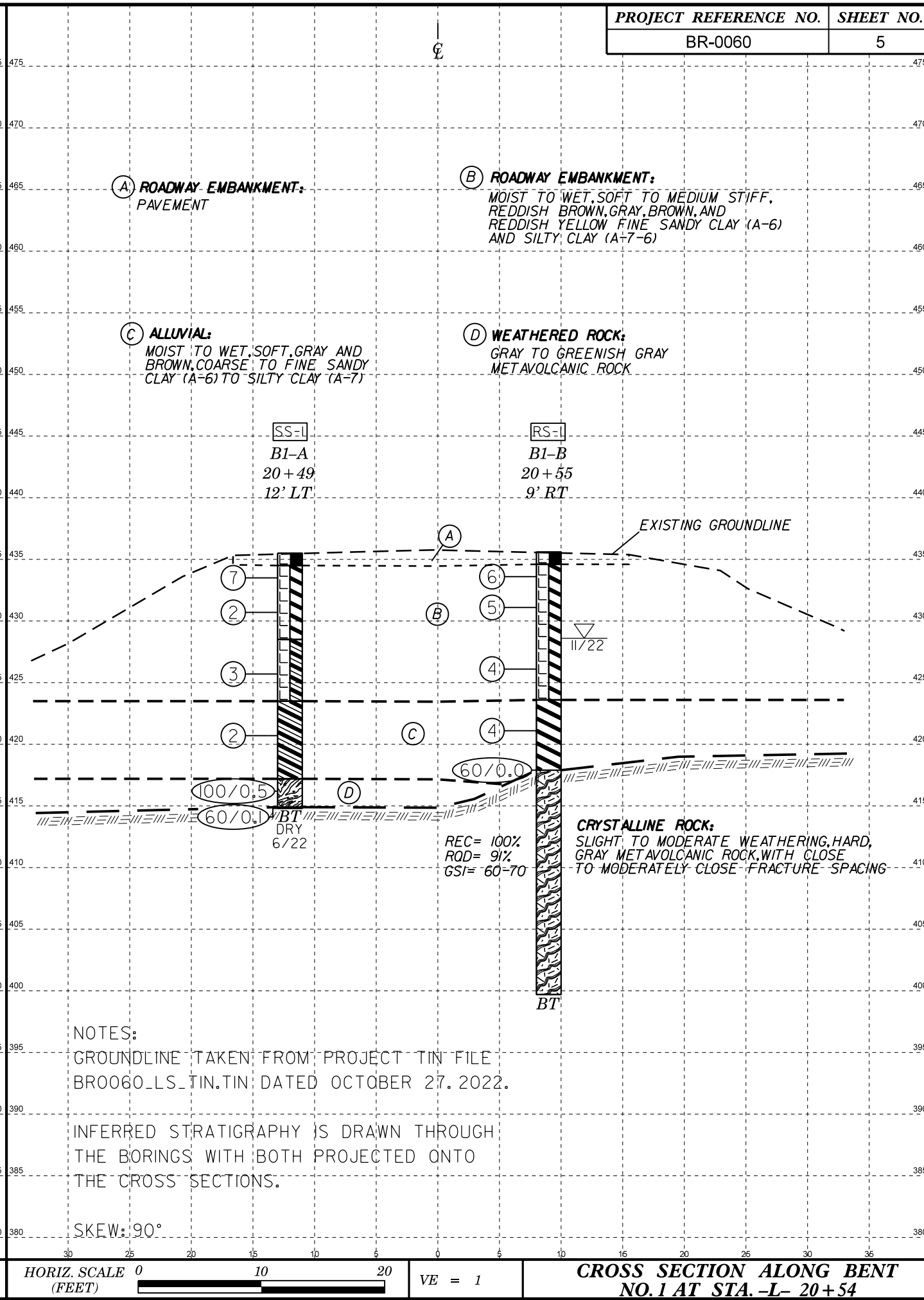
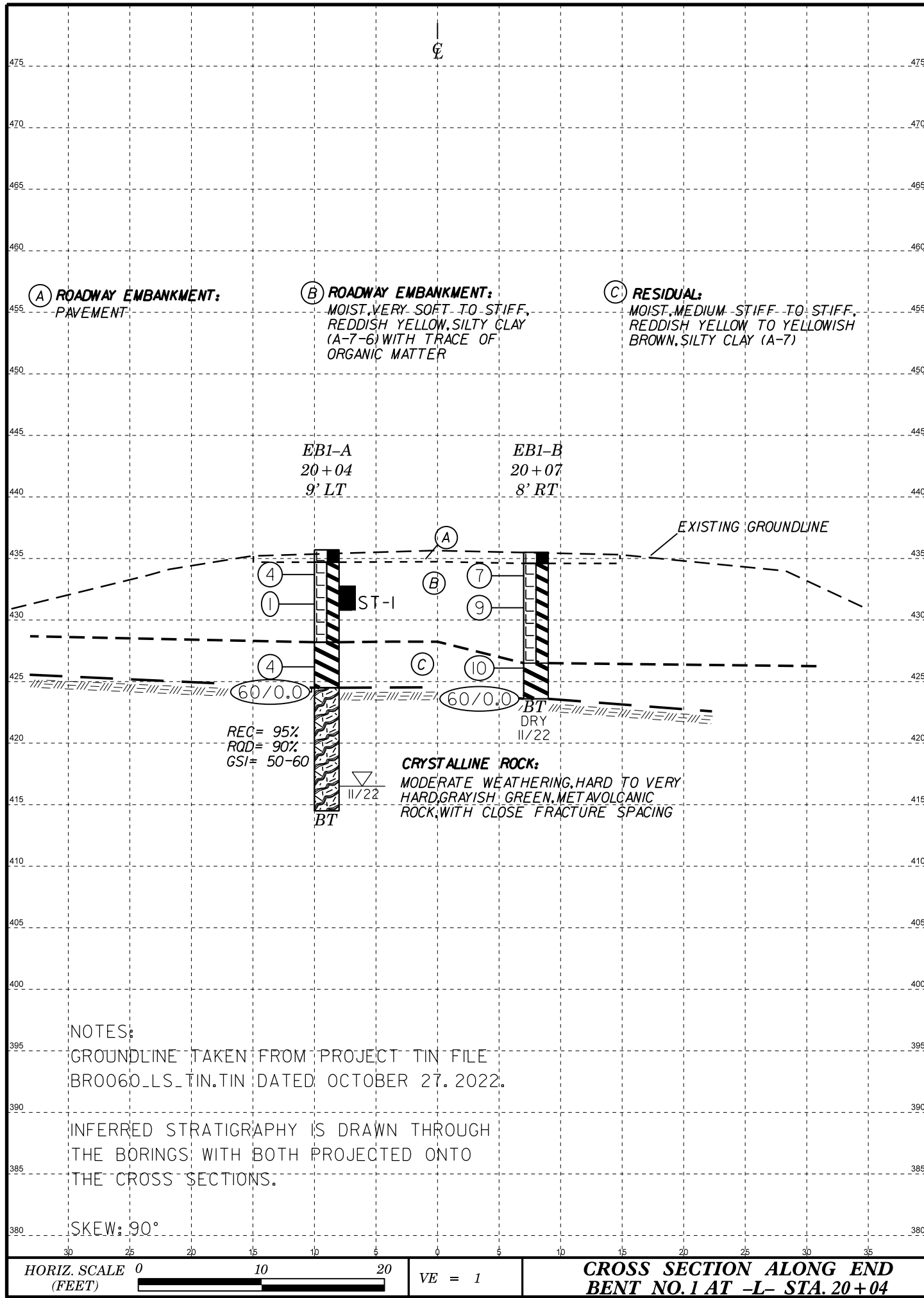
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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



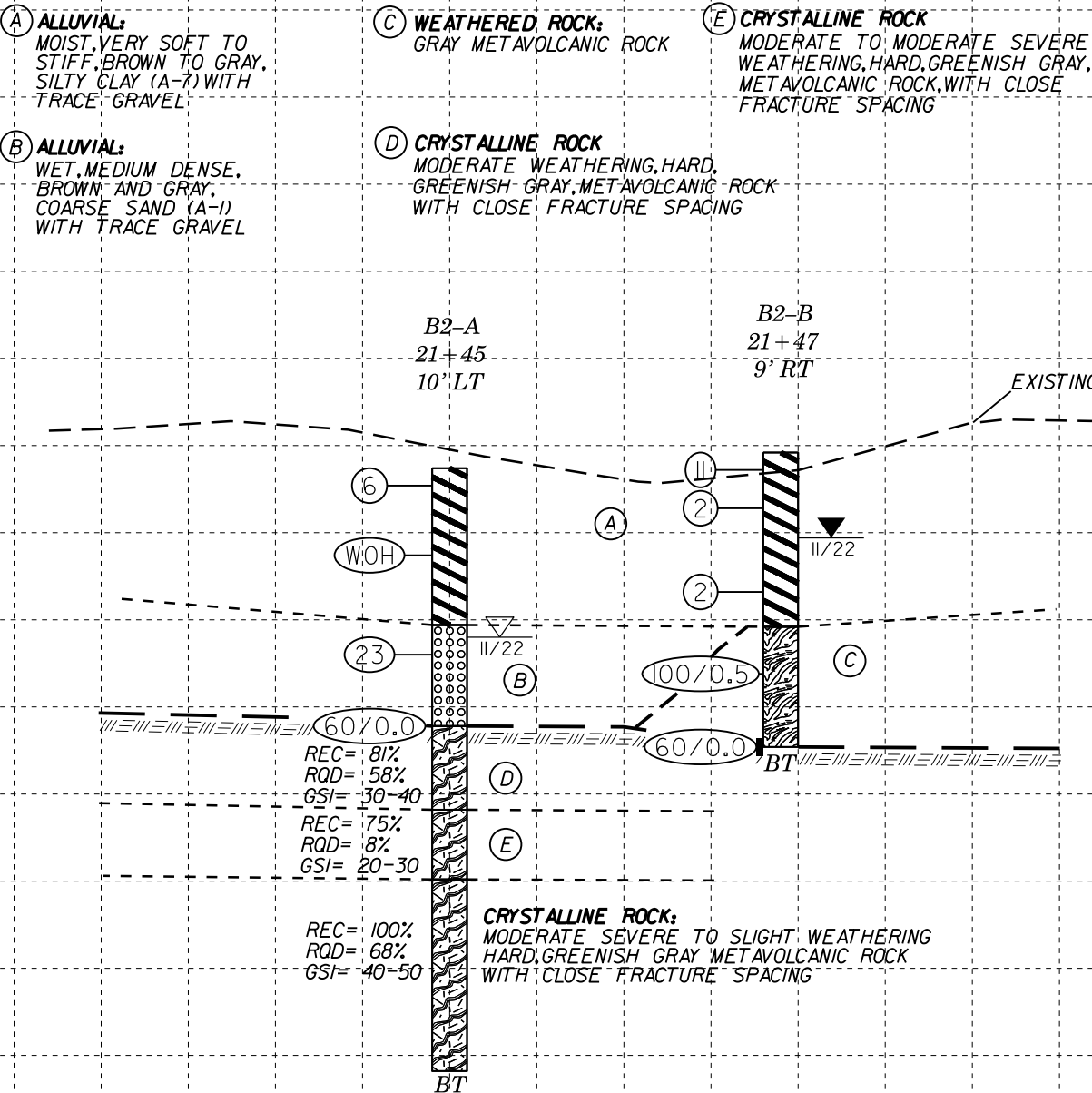




NOTES:  
GROUNDLINE TAKEN FROM PROJECT TIN FILE  
BR0060\_LS\_TIN.TIN DATED OCTOBER 27, 2022.

INFERRED STRATIGRAPHY IS DRAWN THROUGH  
THE BORINGS WITH BOTH PROJECTED ONTO  
THE CROSS SECTIONS.

SKEW: 90°



HORIZ. SCALE 0 10 20  
(FEET)

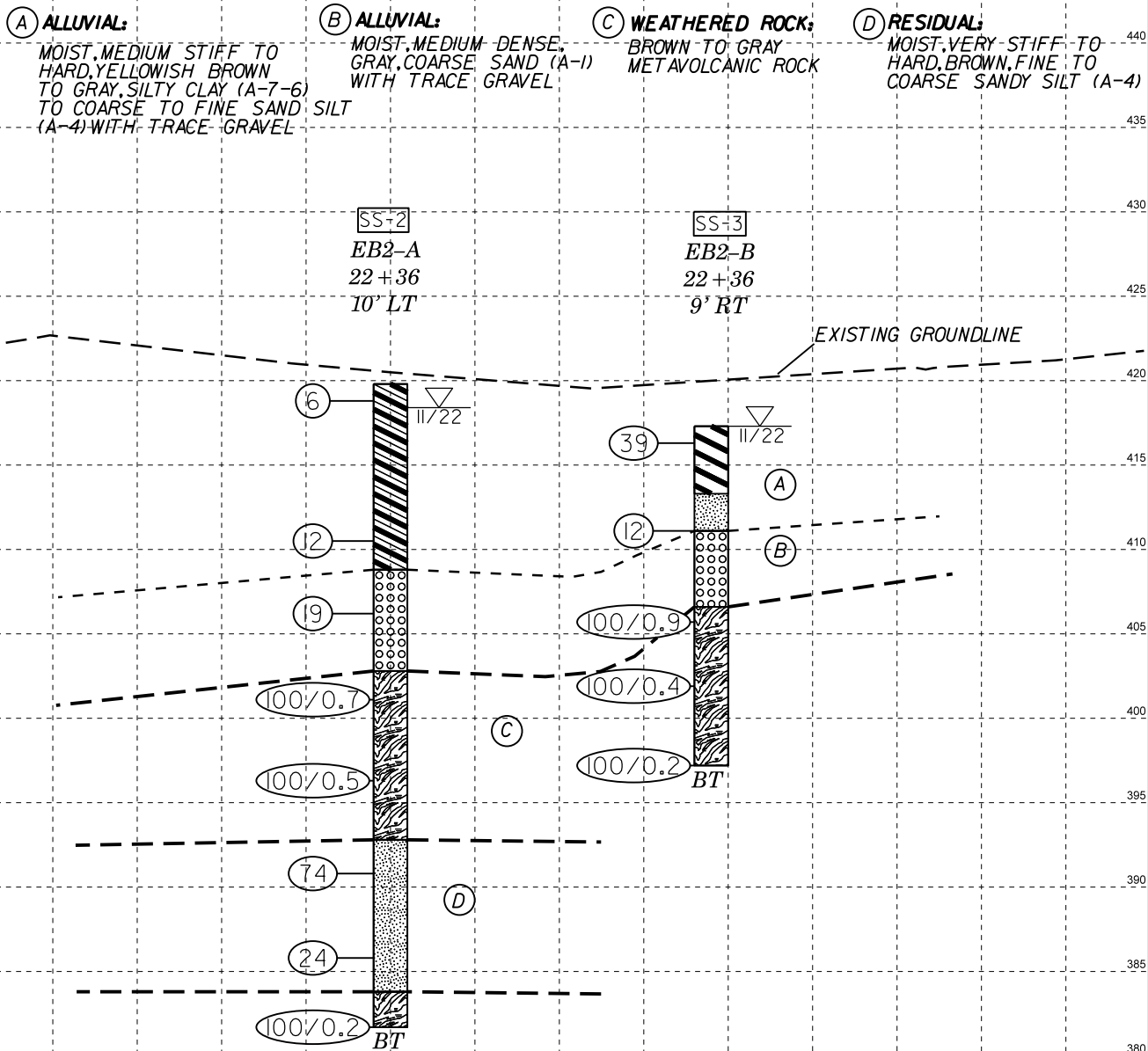
VE = 1

CROSS SECTION ALONG BENT  
NO. 2 AT -L- STA. 21+49

NOTES:  
GROUNDLINE TAKEN FROM PROJECT TIN FILE  
BR0060\_LS\_TIN.TIN DATED OCTOBER 27, 2022.

INFERRED STRATIGRAPHY IS DRAWN THROUGH  
THE BORINGS WITH BOTH PROJECTED ONTO  
THE CROSS SECTIONS.

SKEW: 90°



HORIZ. SCALE 0 10 20  
(FEET)

VE = 1

CROSS SECTION ALONG END  
BENT NO. 2 AT -L- STA. 22+34

GEOTECHNICAL BORING REPORT  
BORE LOG

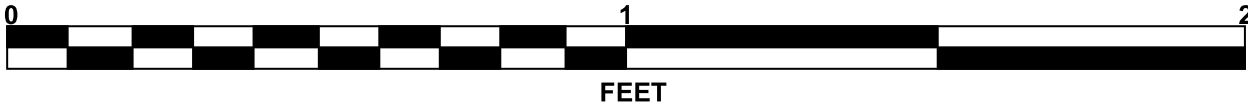
WBS 67060.1.1			TIP BR-0060			COUNTY ALAMANCE			GEOLOGIST J. Kardon						
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek									GROUND WTR (ft)						
BORING NO. EB1-A			STATION 20+04			OFFSET 9 ft LT			ALIGNMENT -L-						
COLLAR ELEV. 435.7 ft			TOTAL DEPTH 21.2 ft			NORTHING 777,141			EASTING 1,912,285						
0 HR.			19.2			24 HR.			FIAD						
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022						DRILL METHOD Mud Rotary/ NQ Core			HAMMER TYPE Automatic						
DRILLER R. Toothman			START DATE 11/22/22			COMP. DATE 11/23/22			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
440															
435	434.7	1.0	4	2	2									435.7	0.0
430	432.3	3.4	1	1	0									434.7	1.0
425	427.2	8.5	1	3	1									428.2	7.5
	424.5	11.2	60/0.0											424.5	11.2
420															
415															
												</			



CORE PHOTOGRAPHS

EB1-A

BOX 1: 11.2 - 21.2 FEET



GEOTECHNICAL BORING REPORT  
BORE LOG

WBS 67060.1.1				TIP BR-0060				COUNTY ALAMANCE				GEOLOGIST J. Kardon					
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek												GROUND WTR (ft)					
BORING NO. EB1-B				STATION 20+07				OFFSET 8 ft RT				ALIGNMENT -L-				0 HR. Dry	
COLLAR ELEV. 435.5 ft				TOTAL DEPTH 11.9 ft				NORTHING 777,130				EASTING 1,912,272				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER R. Toothman				START DATE 11/09/22				COMP. DATE 11/09/22				SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
440																	
435																	
430	434.6	0.9	3	4	3	7	-	-	-	-		M	M	435.5	GROUND SURFACE 0.0		
	432.0	3.5	3	4	5	9	-	-	-	-		M		434.6	ROADWAY EMBANKMENT 0.9		
425	432.0														Pavement: Asphalt (0.0 to 0.3 ft.) & ABC Stone (0.3 to 0.9 ft.)		
	427.1	8.4	1	4	6	10	-	-	-	-		M		426.5	Reddish Yellow, Silty CLAY (A-7) with Trace of Organic Matter		
	423.6	11.9	60/0.0											423.6	RESIDUAL 11.9		
															Yellowish Brown, Silty CLAY (A-7)		
															Boring Terminated with Standard Penetration Test Refusal at Elevation 423.6 ft on CRYSTALLINE ROCK: METAVOLCANIC ROCK		



WBS 67060.1.1				TIP BR-0060				COUNTY ALAMANCE				GEOLOGIST T. Wells					
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek												GROUND WTR (ft)					
BORING NO. B1-A				STATION 20+49				OFFSET 12 ft LT				ALIGNMENT -L-				0 HR. Dry	
COLLAR ELEV. 435.5 ft				TOTAL DEPTH 20.7 ft				NORTHING 777,103				EASTING 1,912,311				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 84% 05/09/2022								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER E. Estep				START DATE 06/15/22				COMP. DATE 06/15/22				SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
440																	
435																	
430	434.5	1.0	10	5	2												
	431.7	3.8	1	1	1												
425	426.7	8.8	2	1	2												
	421.7	13.8	1	1	1												
415	416.7	18.8	100/0.5														
	414.9	20.6	60/0.1														

NC DOT BORE DOUBLE BR0060\_GEO\_BRDG014.GPJ NC\_DOT.GDT 12/31/22

GEOTECHNICAL BORING REPORT  
BORE LOG

GEOTECHNICAL BORING REPORT  
CORE LOG

WBS 67060.1.1		TIP BR-0060		COUNTY ALAMANCE		GEOLOGIST J. Kardon										
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek							GROUND WTR (ft)									
BORING NO. B1-B		STATION 20+55		OFFSET 9 ft RT		ALIGNMENT -L-		0 HR. 7.0								
COLLAR ELEV. 435.6 ft		TOTAL DEPTH 35.9 ft		NORTHING 777,088		EASTING 1,912,297		24 HR. FIAD								
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022				DRILL METHOD Mud Rotary/ NQ Core		HAMMER TYPE Automatic										
DRILLER R. Toothman		START DATE 11/10/22		COMP. DATE 11/14/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
440																
435	434.6	1.0	8	3	3									435.6	GROUND SURFACE 0.0	
430	432.1	3.5	2	2	3							M		434.6	ROADWAY EMBANKMENT 1.0	
												M		Pavement: Asphalt (0.0 to 0.3 ft.) & ABC Stone (0.3 to 1.0 ft.)		
425	427.1	8.5	1	2	2							M		Reddish Yellow, Silty CLAY (A-7)		
420	422.1	13.5	WOH	1	3							M		423.6	ALLUVIAL 12.0	
														Gray, Silty CLAY (A-7)		
415	417.9	17.7	60/0.0											417.9	CRYSTALLINE ROCK 17.7	
														Gray METAVOLCANIC ROCK		
410											RS-1					
405																
400														399.7	35.9	
														Boring Terminated at Elevation 399.7 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK		

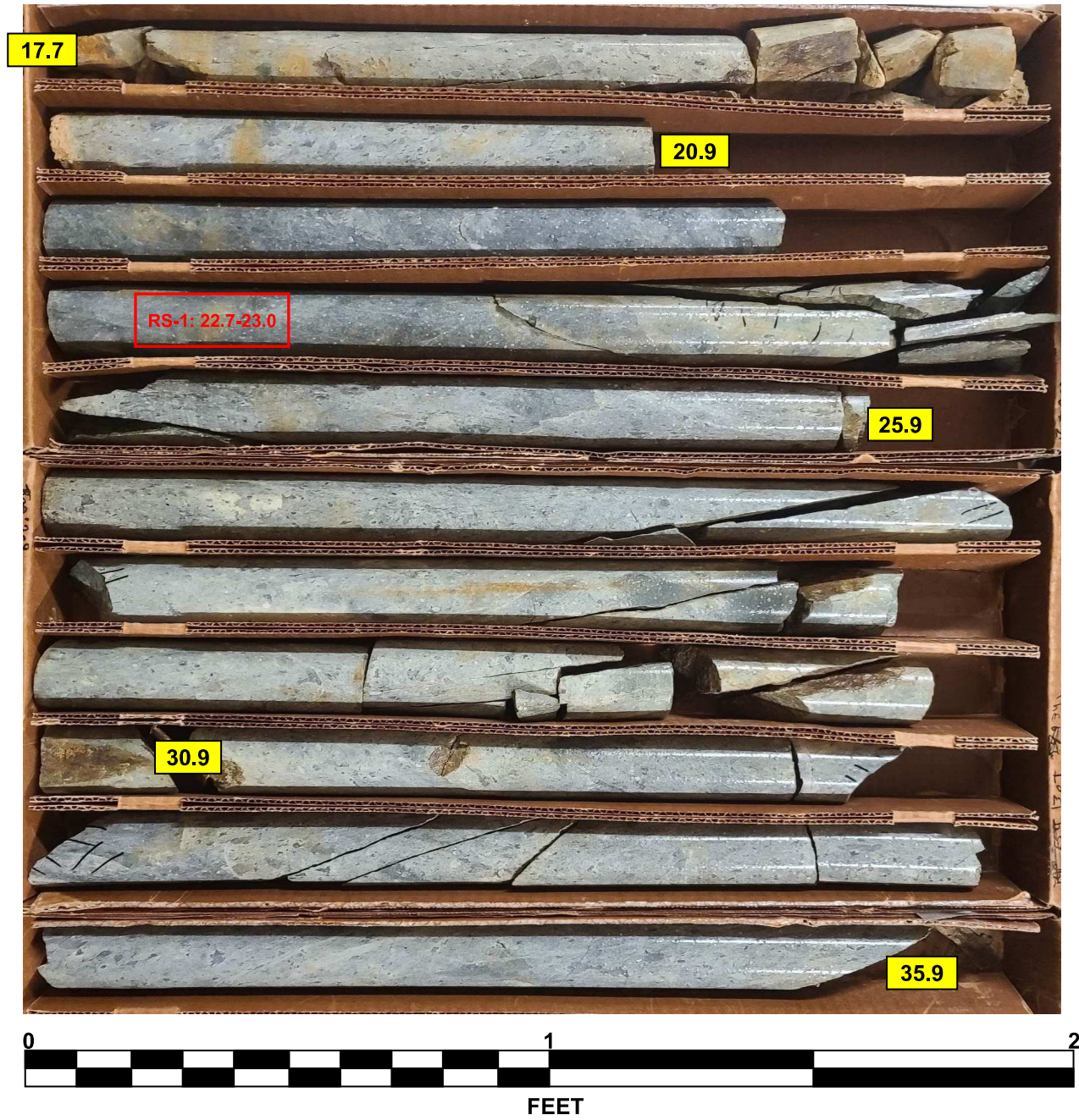
WBS 67060.1.1				TIP BR-0060				COUNTY ALAMANCE				GEOLOGIST J. Kardon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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BORING NO. B1-B				STATION 20+55				OFFSET 9 ft RT				ALIGNMENT -L-				0 HR. 7.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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DRILLER R. Toothman				START DATE 11/10/22				COMP. DATE 11/14/22				SURFACE WATER DEPTH N/A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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415	414.7	20.9		0:45/0.2	100%	75%			100%		91%	CRYSTALLINE ROCK																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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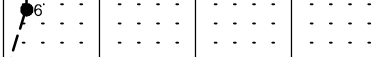

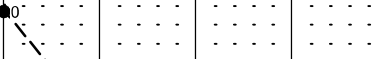
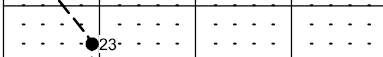

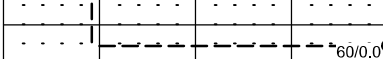
CORE PHOTOGRAPHS

B1-B


BOXES 1, 2 & 3: 17.7 - 35.9 FEET



GEOTECHNICAL BORING REPORT  
BORE LOG

WBS 67060.1.1			TIP BR-0060			COUNTY ALAMANCE			GEOLOGIST J. Kardon							
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek									GROUND WTR (ft)							
BORING NO. B2-A			STATION 21+45			OFFSET 10 ft LT			ALIGNMENT -L-			0 HR. 9.7				
COLLAR ELEV. 418.7 ft			TOTAL DEPTH 34.6 ft			NORTHING 777,022			EASTING 1,912,361			24 HR. FIAD				
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022						DRILL METHOD Mud Rotary/ NQ Core			HAMMER TYPE Automatic							
DRILLER R. Toothman			START DATE 11/21/22			COMP. DATE 11/22/22			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
420																
415	418.7	0.0	3	4	2							M		418.7	GROUND SURFACE	0.0
	414.7	4.0	WOH	WOH	WOH							M			<b>ALLUVIAL</b> Brown, Silty CLAY (A-7)	
410																
405	409.0	9.7	4	14	9							W		409.7	Brown and Gray, Coarse SAND with Gravel (A-1)	9.0
	403.9	14.8	60/0.0									403.9			14.8	
400															<b>CRYSTALLINE ROCK</b> Greenish Gray METAVOLCANIC ROCK	
395														399.1	Greenish Gray METAVOLCANIC ROCK	19.6
														395.1	Greenish Gray METAVOLCANIC ROCK	23.6
390																
385																
														384.1	Boring Terminated at Elevation 384.1 ft in CRYSTALLINE ROCK: METAVOCANIC ROCK	34.6

GEOTECHNICAL BORING REPORT  
CORE LOG

WBS 67060.1.1				TIP BR-0060			COUNTY ALAMANCE			GEOLOGIST J. Kardon		
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek										GROUND WTR (ft)		
BORING NO. B2-A				STATION 21+45			OFFSET 10 ft LT			ALIGNMENT -L-		0 HR. 9.7
COLLAR ELEV. 418.7 ft				TOTAL DEPTH 34.6 ft			NORTHING 777,022			EASTING 1,912,361		24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022							DRILL METHOD Mud Rotary/ NQ Core			HAMMER TYPE Automatic		
DRILLER R. Toothman				START DATE 11/21/22			COMP. DATE 11/22/22			SURFACE WATER DEPTH N/A		
CORE SIZE NQ Core				TOTAL RUN 19.8 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	
					REC. (ft) %	ROD (ft) %		REC. (ft) %	ROD (ft) %			ELEV. (ft)
403.9	403.9	14.8	4.8	N=60/0.0 4:28/0.8 4:42/1.0 4:29/1.0 5:17/1.0 5:07/1.0	(3.9) 81%	(2.8) 58%		(3.9) 81%	(2.8) 58%		Begin Coring @ 14.8 ft	
400	399.1	19.6		4:53/1.0 5:03/1.0 3:37/1.0 8:17/1.0 6:37/1.0	(4.0) 80%	(1.6) 32%		(3.0) 75%	(0.3) 8%		403.9 MODERATE WEATHERING, HARD, GREENISH GRAY, METAVOLCANIC ROCK WITH CLOSE FRACTURE SPACING (GSI: 30-40)	14.8
			5.0								399.1 MODERATE TO MODERATE SEVERE WEATHERING, HARD, GREENISH GRAY, METAVOLCANIC ROCK WITH CLOSE FRACTURE SPACING (GSI: 20-30)	19.6
395	394.1	24.6		5:31/1.0 5:22/1.0 5:50/1.0 5:00/1.0 5:00/1.0	(5.0) 100%	(3.8) 76%		(11.0) 100%	(7.5) 68%		395.1 MODERATE WEATHERING, HARD, GREENISH GRAY, METAVOLCANIC ROCK WITH CLOSE FRACTURE SPACING (GSI: 40-50)	23.6
390			5.0									
	389.1	29.6		3:45/1.0 2:56/1.0 3:34/1.0 5:34/1.0 5:17/1.0	(5.0) 100%	(2.7) 54%						
385	384.1	34.6									384.1 BORING TERMINATED AT ELEVATION 384.1 ft in CRYSTALLINE ROCK: METAVOCANIC ROCK	34.6



CORE PHOTOGRAPHS






**B2-A**  
BOXES 1 & 2: 14.8 - 34.6 FEET



NCDOT BORE DOUBLE BR0060\_GEO\_BRDG014.GPJ NC\_DOT.GDT 2/1/23

WBS 67060.1.1			TIP BR-0060			COUNTY ALAMANCE			GEOLOGIST J. Kardon				
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek									GROUND WTR (ft)				
BORING NO. EB2-A			STATION 22+36			OFFSET 10 ft LT			ALIGNMENT -L-			0 HR. 1.4	
COLLAR ELEV. 419.8 ft			TOTAL DEPTH 38.1 ft			NORTHING 776,945			EASTING 1,912,409			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic				
DRILLER R. Toothman			START DATE 11/17/22			COMP. DATE 11/18/22			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		MOI	
420	419.8	0.0	1	3	3								419.8 GROUND SURFACE 0.0
415													ALLUVIAL Yellowish Brown to Gray, Sandy CLAY (A-6) with Trace Gravel
410	411.5	8.3	WOH	2	10								
405	407.2	12.6	3	8	11								408.8 Gray, Coarse SAND with Trace Gravel (A-1) 11.0
400	401.8	18.0	26	74/0.2									402.8 WEATHERED ROCK 17.0
395	396.8	23.0	100/0.5										WEATHERED ROCK Brown METAVOLCANIC ROCK
390	391.8	28.0	8	19	55								392.8 RESIDUAL 27.0
385	386.8	33.0	9	10	14								Brown, Fine to Coarse Sandy SILT (A-4)
	381.9	37.9	100/0.2										
													383.8 WEATHERED ROCK 36.0
													381.7 WEATHERED ROCK 38.1
													Boring Terminated at Elevation 381.7 ft in WEATHERED ROCK: METAVOLCANIC ROCK

GEOTECHNICAL BORING REPORT  
BORE LOG

WBS 67060.1.1			TIP BR-0060			COUNTY ALAMANCE			GEOLOGIST J. Kardon					
SITE DESCRIPTION Replace Bridge No. 14 on NC 87 over Cane Creek											GROUND WTR (ft)			
BORING NO. EB2-B			STATION 22+36			OFFSET 9 ft RT			ALIGNMENT -L-			0 HR.	0.0	
COLLAR ELEV. 417.3 ft			TOTAL DEPTH 20.1 ft			NORTHING 776,935			EASTING 1,912,392			24 HR.	FIAD	
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022						DRILL METHOD Mud Rotary				HAMMER TYPE Automatic				
DRILLER R. Toothman			START DATE 11/14/22			COMP. DATE 11/17/22			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)
420														
415	417.3	0.0	2	12	27							▽	417.3	GROUND SURFACE 0.0
												M		ALLUVIAL Brown and Gray, Silty CLAY (A-7)
410	412.1	5.2	1	3	9						SS-3	M		413.3 Brown and Gray, Coarse to Fine Sandy SILT (A-4) 4.0
													411.1	Gray, Coarse SAND with Trace Gravel (A-1) 6.2
405	407.1	10.2	7	34	66/0.4									406.6 WEATHERED ROCK 10.7
														Gray METAVOLCANIC ROCK
400	402.3	15.0	100/0.4											
	397.4	19.9	100/0.2											397.2 Boring Terminated at Elevation 397.2 ft in WEATHERED ROCK: METAVOLCANIC ROCK 20.1

NCDOT BORE DOUBLE BR0060\_GEO\_BRDG014.GPJ NC\_DOT.GDT 12/31/22



## LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

**SHEET 16**

**WBS NO. (TIP NO.):** 67060.1.1 (BR-0060)  
**PROJECT ID:** 41379  
**COUNTY:** Alamance  
**DESCRIPTION:** Replace Bridge No. 14 on NC 87 over Cane Creek

[illegible]

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS**  
AASHTO T-297

Client: Kleinfelder  
Client Reference: BR-0060  
Project No.: R-2022-283-001  
Lab ID: R-2022-283-001-001

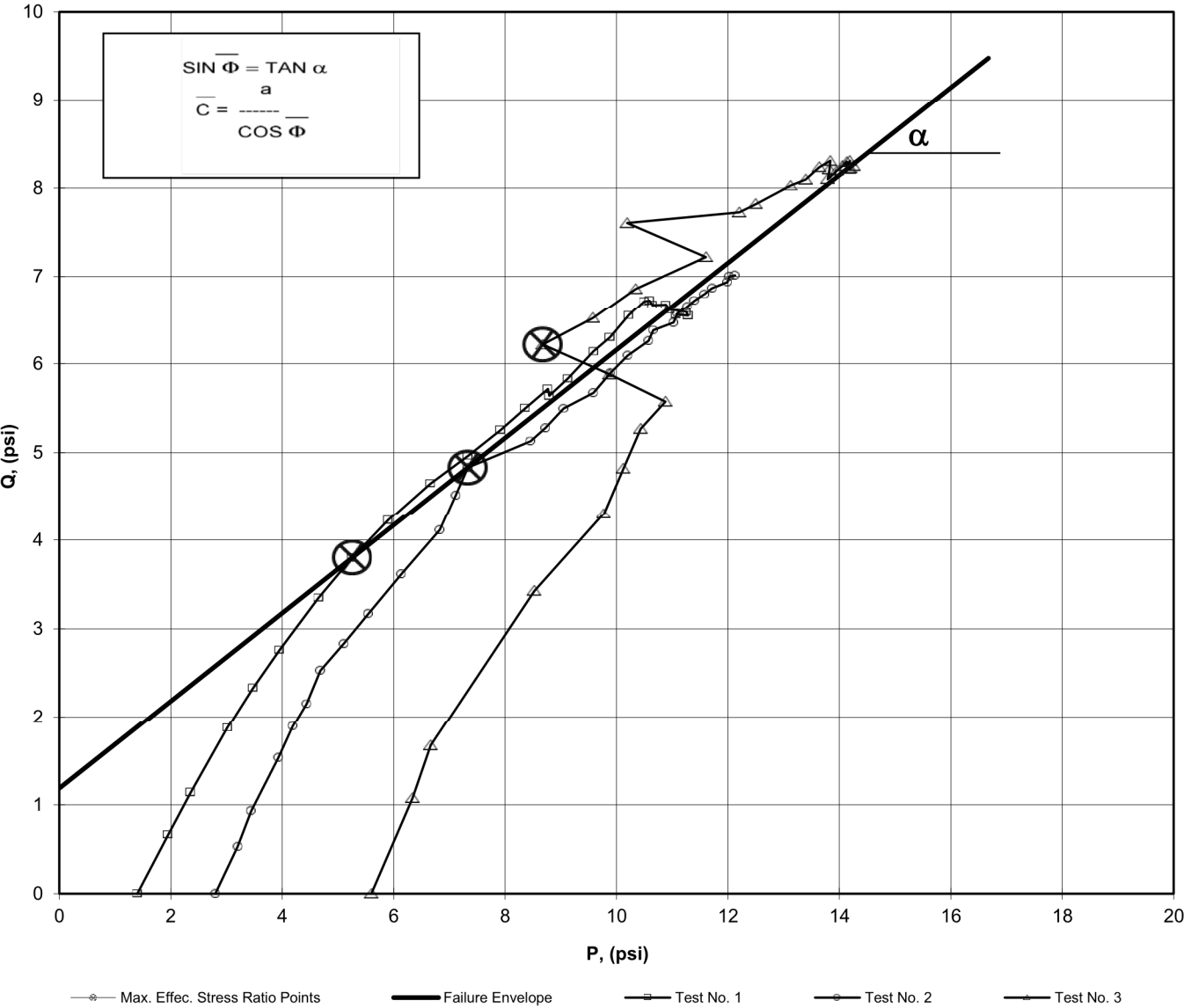
Boring No.: EB1-A  
Depth (ft): 2.9-4.9  
Sample No.: ST-1

**MOHR TOTAL STRENGTH ENVELOPE**  
AASHTO T-297

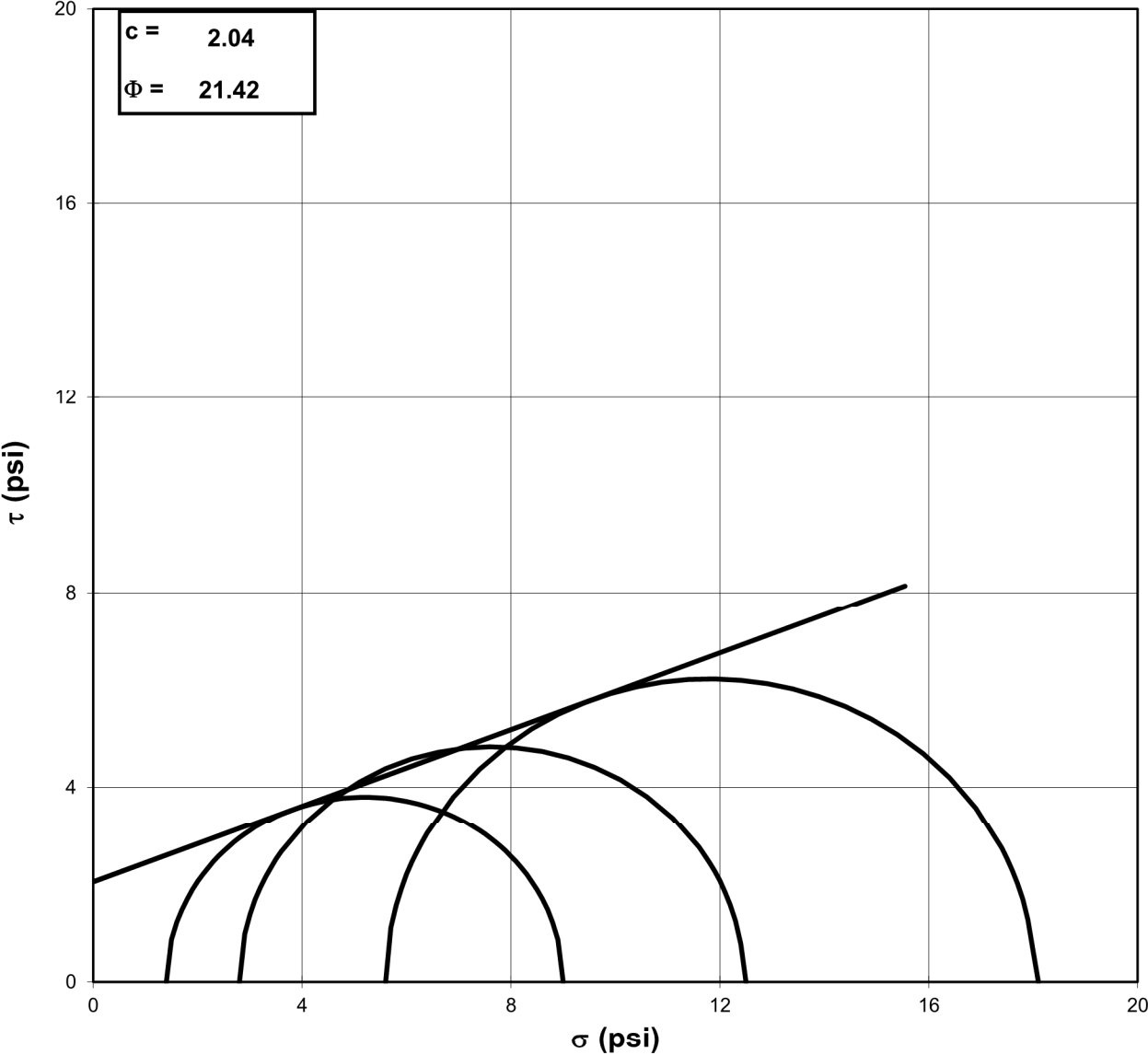
Client: Kleinfelder  
Client Reference: BR-0060  
Project No.: R-2022-283-001  
Lab ID: R-2022-283-001-001  
Visual Description: Red Clay (UNDISTURBED)

Boring No.: EB1-A  
Depth (ft): 2.9-4.9  
Sample No.: ST-1

**Consolidated Undrained Triaxial Test with Pore Pressure**



$a$	$=$	1.19	$\overline{C}$	$=$	1.37
$\alpha$	$=$	26.4	$\overline{\Phi}$	$=$	29.81



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-07-0411    Date: 12/16/22    Approved By: MPS    Date: 12/21/22

page 1 of 10    DCN: CT-S28    DATE: 4/12/13    REVISION: 3    Sigmatrax.xls

Tested By: 129-07-0411    Date: 12/16/22    Approved By: MPS    Date: 12/21/22

page 2 of 10    DCN: CT-S28    DATE: 4/12/13    REVISION: 3

CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
AASHTO T-297



Client: Kleinfelder Boring No.: EB1-A  
Client Reference: BR-0060 Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001 Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Stage No.	0
Test No.	1

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.114	Diameter 1:	2.846
Length 2:	6.099	Diameter 2:	2.805
Length 3:	6.104	Diameter 3:	2.803
Length 4:	6.091	Diameter 4:	2.833
Avg. Length:	6.102	Avg. Diam.:	2.822

PRESSURES (psi)

Cell Pressure (psi)	61.4
Back Pressure (psi)	60.0
Eff. Conf. Pressure (psi)	1.4
Pore Pressure Response (%)	99

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	23.1
Final Change (ml)	0.9

MAXIMUM OBLIQUITY POINTS

$\bar{P}$	=	5.26
Q	=	3.80

Initial Dial Reading (mil)	215
Dial Reading After Saturation (mil)	215
Dial Reading After Consolidation (mil)	216

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
17.1	0.000	60.0
25.5	0.002	60.1
31.4	0.003	60.2
40.6	0.009	60.3
46.3	0.016	60.3
51.7	0.022	60.2
59.2	0.031	60.1
64.9	0.041	59.9
70.4	0.053	59.7
75.9	0.075	59.4
80.2	0.106	59.0
84.3	0.142	58.7
87.9	0.179	58.5
91.2	0.221	58.4
90.6	0.251	58.2
93.7	0.295	58.1
98.6	0.352	58.0
101.5	0.412	57.8
105.6	0.459	57.7
108.9	0.521	57.6
109.7	0.568	57.5
109.8	0.612	57.4
110.7	0.658	57.2
110.3	0.689	57.1
110.4	0.719	56.7
110.3	0.750	56.7
111.1	0.780	56.9

CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
AASHTO T-297



Client: Kleinfelder Boring No.: EB1-A  
Client Reference: BR-0060 Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001 Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Effective Confining Pressure (psi)	1.4	Stage No.	0
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.10
Initial Sample Diameter (in)	2.82
Initial Sample Area (in <sup>2</sup> )	6.25
Initial Sample Volume (in <sup>3</sup> )	38.16

VOLUME CHANGE

Volume After Consolidation (in <sup>3</sup> )	38.10
Length After Consolidation (in)	6.10
Area After Consolidation (in <sup>2</sup> )	6.246

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
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0.04	1.33	0.11	2.62	1.3	2.034	0.08	1.96	0.67
0.05	2.28	0.18	3.50	1.2	2.878	0.08	2.36	1.14
0.15	3.76	0.26	4.90	1.1	4.289	0.07	3.02	1.88
0.26	4.66	0.25	5.81	1.1	5.071	0.06	3.48	2.33
0.35	5.52	0.21	6.71	1.2	5.619	0.04	3.95	2.76
0.51	6.70	0.10	8.00	1.3	6.143	0.01	4.65	3.35
0.67	7.60	-0.06	9.06	1.5	6.217	-0.01	5.26	3.80
0.87	8.46	-0.28	10.13	1.7	6.042	-0.03	5.91	4.23
1.23	9.30	-0.61	11.31	2.0	5.620	-0.07	6.66	4.65
1.73	9.92	-0.97	12.29	2.4	5.188	-0.10	7.33	4.96
2.33	10.51	-1.27	13.18	2.7	4.934	-0.12	7.92	5.25
2.93	11.00	-1.47	13.86	2.9	4.835	-0.13	8.37	5.50
3.62	11.43	-1.65	14.48	3.0	4.750	-0.15	8.77	5.72
4.12	11.28	-1.75	14.43	3.2	4.576	-0.16	8.79	5.64
4.83	11.67	-1.89	14.96	3.3	4.543	-0.16	9.13	5.83
5.77	12.29	-2.05	15.73	3.4	4.565	-0.17	9.59	6.14
6.76	12.60	-2.18	16.18	3.6	4.516	-0.18	9.88	6.30
7.52	13.10	-2.27	16.78	3.7	4.567	-0.18	10.22	6.55
8.54	13.43	-2.38	17.22	3.8	4.550	-0.18	10.50	6.72
9.31	13.45	-2.47	17.32	3.9	4.472	-0.19	10.60	6.72
10.03	13.34	-2.57	17.32	4.0	4.359	-0.19	10.64	6.67
10.79	13.36	-2.81	17.57	4.2	4.175	-0.21	10.89	6.68
11.29	13.23	-2.94	17.57	4.3	4.045	-0.22	10.96	6.61
11.78	13.18	-3.26	17.84	4.7	3.828	-0.25	11.25	6.59
12.29	13.09	-3.34	17.83	4.7	3.761	-0.26	11.28	6.54
12.79	13.12	-3.11	17.63	4.5	3.906	-0.24	11.07	6.56

CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
AASHTO T-297



Client: Kleinfelder      Boring No.: EB1-A  
Client Reference: BR-0060      Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001      Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Stage No.	0
Test No.	2

INITIAL SAMPLE DIMENSIONS (in)			
Length 1:	6.018	Diameter 1:	2.817
Length 2:	6.042	Diameter 2:	2.845
Length 3:	6.036	Diameter 3:	2.854
Length 4:	6.023	Diameter 4:	2.828
Avg. Length	6.030	Avg. Diam.:	2.836

PRESSURES (psi)

Cell Pressure (psi)	62.8
Back Pressure (psi)	60.0
Eff. Conf. Pressure (psi)	2.8
Pore Pressure	
Response (%)	100

VOLUME CHANGE	
Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	22.0
Final Change (ml)	2.0

MAXIMUM OBLIQUITY POINTS

P	=	7.33
Q	=	4.83

Initial Dial Reading (mil)	270
Dial Reading After Saturation (mil)	250
Dial Reading After Consolidation (mil)	260

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
15.8	0.000	60.0
22.6	0.002	60.1
27.6	0.003	60.3
35.3	0.009	60.4
39.9	0.015	60.5
43.3	0.021	60.5
48.1	0.030	60.6
52.0	0.039	60.5
56.4	0.051	60.4
62.3	0.072	60.3
69.0	0.102	60.1
74.5	0.138	60.2
79.0	0.174	60.3
83.4	0.216	59.5
85.7	0.246	59.4
89.1	0.288	59.2
92.2	0.345	58.9
96.1	0.405	58.8
99.5	0.450	58.7
102.7	0.510	58.5
105.0	0.555	58.5
107.0	0.600	58.2
109.3	0.645	58.3
111.0	0.675	58.2
112.5	0.705	58.1
114.1	0.735	58.0
115.7	0.765	58.0
117.6	0.810	57.7
119.4	0.856	57.8
120.2	0.886	57.7
121.9	0.916	57.7

Tested By: 129-07-0411      Date: 12/16/22      Input Checked By: GEM      Date: 12/21/22

CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
AASHTO T-297



Client: Kleinfelder      Boring No.: EB1-A  
Client Reference: BR-0060      Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001      Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Effective Confining Pressure (psi)	2.8	Stage No.	0
		Test No	2

INITIAL DIMENSIONS		VOLUME CHANGE	
Initial Sample Length (in)	6.03	Volume After Consolidation (in <sup>3</sup> )	38.35
Initial Sample Diameter (in)	2.84	Length After Consolidation (in)	6.04
Initial Sample Area (in <sup>2</sup> )	6.32	Area After Consolidation (in <sup>2</sup> )	6.349
Initial Sample Volume (in <sup>3</sup> )	38.09		

Strain (%)	Deviator Stress PSI	Δ U	σ <sub>1</sub>	σ <sub>3</sub>	Effective Principal Stress Ratio	A	P	Q
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0.02	1.06	0.13	3.73	2.7	1.398	0.12	3.20	0.53
0.05	1.86	0.28	4.37	2.5	1.739	0.15	3.44	0.93
0.15	3.07	0.40	5.47	2.4	2.277	0.13	3.93	1.53
0.25	3.78	0.50	6.08	2.3	2.644	0.13	4.19	1.89
0.35	4.30	0.51	6.59	2.3	2.881	0.12	4.44	2.15
0.50	5.05	0.64	7.21	2.2	3.342	0.13	4.68	2.53
0.65	5.66	0.53	7.93	2.3	3.492	0.09	5.10	2.83
0.85	6.33	0.42	8.71	2.4	3.664	0.07	5.54	3.17
1.20	7.24	0.28	9.76	2.5	3.867	0.04	6.14	3.62
1.69	8.23	0.09	10.94	2.7	4.031	0.01	6.83	4.11
2.29	9.04	0.20	11.64	2.6	4.475	0.02	7.12	4.52
2.89	9.66	0.30	12.16	2.5	4.865	0.03	7.33	4.83
3.58	10.26	-0.53	13.58	3.3	4.083	-0.05	8.45	5.13
4.08	10.55	-0.65	14.00	3.4	4.060	-0.06	8.72	5.28
4.77	10.99	-0.76	14.55	3.6	4.091	-0.07	9.05	5.50
5.72	11.34	-1.12	15.26	3.9	3.897	-0.10	9.59	5.67
6.71	11.79	-1.19	15.78	4.0	3.952	-0.10	9.89	5.90
7.46	12.19	-1.31	16.29	4.1	3.967	-0.11	10.20	6.09
8.45	12.52	-1.51	16.83	4.3	3.902	-0.12	10.57	6.26
9.20	12.76	-1.48	17.04	4.3	3.979	-0.12	10.66	6.38
9.94	12.93	-1.76	17.49	4.6	3.835	-0.14	11.03	6.47
10.69	13.14	-1.72	17.66	4.5	3.907	-0.13	11.09	6.57
11.18	13.31	-1.81	17.93	4.6	3.886	-0.14	11.27	6.66
11.68	13.44	-1.87	18.12	4.7	3.877	-0.14	11.40	6.72
12.18	13.60	-1.98	18.38	4.8	3.845	-0.15	11.58	6.80
12.67	13.73	-2.05	18.58	4.8	3.832	-0.15	11.72	6.87
13.42	13.87	-2.25	18.93	5.1	3.744	-0.16	11.99	6.94
14.16	14.00	-2.22	19.03	5.0	3.787	-0.16	12.03	7.00
14.66	14.03	-2.32	19.14	5.1	3.742	-0.17	12.13	7.01
15.16	14.17	-2.35	19.32	5.1	3.751	-0.17	12.23	7.08



CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS

AASHTO T-297

Client: Kleinfelder      Boring No.: EB1-A  
Client Reference: BR-0060      Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001      Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Stage No.	0
Test No.	3

**PRESSURES (psi)**

Cell Pressure (psi) 65.6  
Back Pressure (psi) 60.0  
Eff. Conf. Pressure (psi) 5.6  
Pore Pressure  
Response (%) 99

**MAXIMUM OBLIQUITY POINTS**

$\bar{P}$  = 8.68  
 $\bar{Q}$  = 6.22

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.0	0.000	60.0
27.7	0.001	60.3
35.3	0.003	60.6
57.7	0.008	60.5
68.9	0.015	60.1
75.5	0.021	60.3
81.3	0.029	60.4
85.3	0.038	60.3
89.4	0.050	61.6
94.0	0.071	63.1
98.3	0.101	62.5
103.2	0.138	62.1
108.5	0.174	61.2
114.3	0.216	63.0
116.4	0.246	61.1
118.4	0.288	60.9
122.3	0.346	60.5
124.3	0.406	60.3
127.2	0.451	60.2
129.4	0.511	60.1
129.0	0.556	60.0
128.4	0.601	59.9
130.7	0.646	59.8
132.1	0.676	59.8
133.5	0.706	59.8
133.5	0.737	59.7
135.0	0.767	59.7
134.7	0.812	59.6
135.9	0.858	59.6
137.0	0.888	59.6
137.6	0.918	59.5

Tested By: 129-07-0411      Date: 12/16/2022      Input Checked By: GEM      Date: 12/21/2022

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DCN: CT-S28    DATE: 4/12/13    REVISION: 3



CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS

AASHTO T-297

Client: Kleinfelder      Boring No.: EB1-A  
Client Reference: BR-0060      Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001      Sample No.: ST-1  
Lab ID: R-2022-283-001-001

Visual Description: Red Clay (UNDISTURBED)

Effective Confining Pressure (psi)	5.6	Stage No.	0
		Test No	3

**INITIAL DIMENSIONS**

Initial Sample Length (in) 6.03  
Initial Sample Diameter (in) 2.85  
Initial Sample Area (in<sup>2</sup>) 6.36  
Initial Sample Volume (in<sup>3</sup>) 38.36

**VOLUME CHANGE**

Volume After Consolidation (in<sup>3</sup>) 38.33  
Length After Consolidation (in) 6.03  
Area After Consolidation (in<sup>2</sup>) 6.353

Strain (%)	Deviator Stress PSI	$\Delta U$	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	$\bar{Q}$
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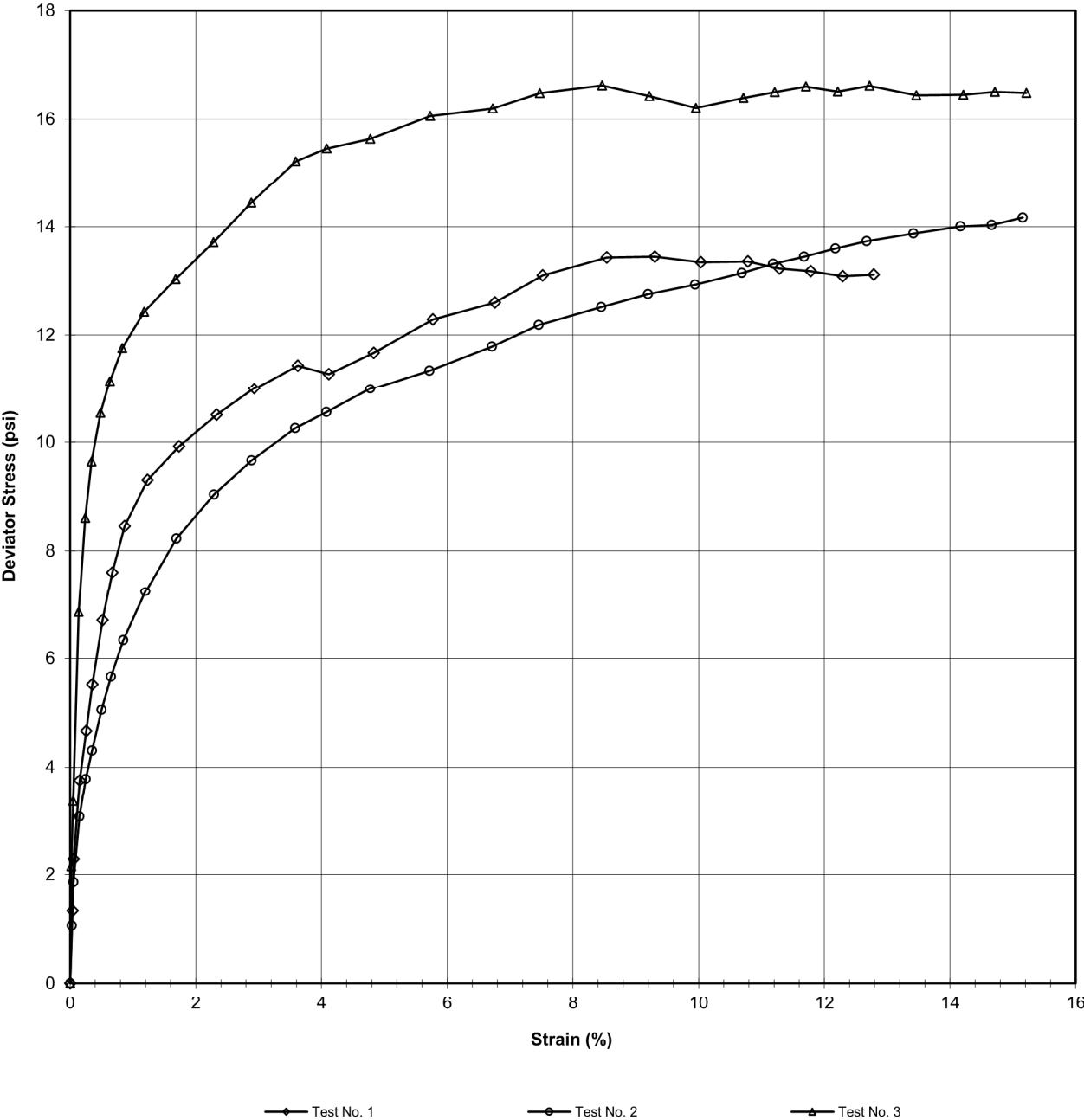
0.02	2.15	0.34	7.41	5.3	1.408	0.16	6.34	1.07
0.05	3.35	0.61	8.34	5.0	1.671	0.18	6.67	1.67
0.14	6.85	0.50	11.95	5.1	2.344	0.07	8.53	3.43
0.24	8.61	0.13	14.07	5.5	2.574	0.02	9.77	4.30
0.34	9.64	0.29	14.95	5.3	2.817	0.03	10.13	4.82
0.48	10.54	0.43	15.70	5.2	3.040	0.04	10.44	5.27
0.63	11.14	0.30	16.45	5.3	3.101	0.03	10.88	5.57
0.83	11.76	1.60	15.76	4.0	3.936	0.14	9.88	5.88
1.17	12.43	3.14	14.89	2.5	6.054	0.26	8.68	6.22
1.68	13.03	2.54	16.09	3.1	5.258	0.20	9.58	6.52
2.28	13.72	2.12	17.20	3.5	4.936	0.16	10.34	6.86
2.88	14.44	1.22	18.83	4.4	4.295	0.09	11.60	7.22
3.59	15.21	3.02	17.80	2.6	6.887	0.20	10.19	7.61
4.08	15.45	1.12	19.93	4.5	4.453	0.07	12.20	7.73
4.78	15.64	0.92	20.32	4.7	4.340	0.06	12.50	7.82
5.73	16.06	0.50	21.16	5.1	4.151	0.03	13.13	8.03
6.72	16.19	0.30	21.49	5.3	4.055	0.02	13.40	8.10
7.47	16.48	0.20	21.88	5.4	4.049	0.01	13.64	8.24
8.46	16.62	0.07	22.15	5.5	4.006	0.00	13.84	8.31
9.21	16.42	-0.01	22.03	5.6	3.927	0.00	13.82	8.21
9.96	16.20	-0.09	21.89	5.7	3.846	-0.01	13.79	8.10
10.71	16.39	-0.16	22.15	5.8	3.845	-0.01	13.96	8.19
11.21	16.50	-0.21	22.30	5.8	3.840	-0.01	14.06	8.25
11.71	16.59	-0.24	22.43	5.8	3.842	-0.01	14.14	8.30
12.21	16.51	-0.26	22.37	5.9	3.815	-0.02	14.12	8.25
12.72	16.61	-0.28	22.49	5.9	3.824	-0.02	14.19	8.31
13.47	16.44	-0.36	22.39	6.0	3.760	-0.02	14.17	8.22
14.21	16.45	-0.37	22.42	6.0	3.753	-0.02	14.20	8.22
14.71	16.50	-0.40	22.51	6.0	3.748	-0.02	14.26	8.25
15.22	16.48	-0.45	22.53	6.1	3.724	-0.03	14.29	8.24

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**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
AASHTO T-297**

Client: Kleinfelder                      Boring No.: EB1-A  
Client Reference: BR-0060              Depth (ft): 2.9-4.9  
Project No.: R-2022-283-001              Sample No.: ST-1  
Lab ID: R-2022-283-001-001  
Visual Description: Red Clay (UNDISTURBED)



Tested By: 129-07-0411      Date: 12/16/2022      Approved By: MPS      Date: 12/21/2022

**CONSOLIDATED UNDRAINED TRIAXIAL TEST  
WITH PORE PRESSURE READINGS  
ASTM D4767-11**

Client: Kleinfelder  
Client Reference: BR-0060  
Project No.: R-2022-283-001  
Lab ID: R-2022-283-001-001      Specific Gravity (assumed)      2.68  
Visual Description: Red Clay (UNDISTURBED)

**SAMPLE CONDITION SUMMARY**

Boring No.:	EB1-A	EB1-A	EB1-A
Depth (ft):	2.9-4.9	2.9-4.9	2.9-4.9
Sample No.:	ST-1	ST-1	ST-1
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	60.0	60.0	60.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	25.7	25.7	25.7
Total Unit Weight (pcf)	111.4	112.2	112.5
Dry Unit Weight (pcf)	88.6	89.3	89.5
Moisture Content (%) (FINAL)	46.7	36.7	35.3
Initial State Void Ratio,e	0.888	0.874	0.870
Void Ratio at Shear, e	0.885	0.887	0.869



Tested By: 129-07-0411      Date: 12/16/22      Input Checked By: GEM      Date: 12/21/22  
page 10 of 10      DCN: CT-S28    DATE: 4/12/13    REVISION: 3





# SITE PHOTOGRAPH

Bridge No. 14 on NC 87 over Cane Creek



View of Existing Bridge No. 14 from West of Bridge Looking East