

PROJECT: 67060

REFERENCE: BR-0060

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-15	BORE LOGS, CORE REPORTS, & CORE PHOTOGRAPHS
16-21	SOIL TEST RESULTS
22	ROCK TEST RESULTS
23	SITE PHOTOGRAPH

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.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

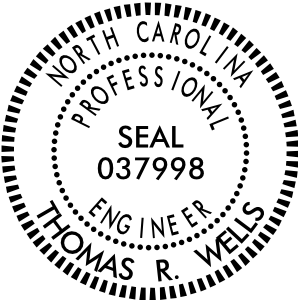
DATE FEBRUARY 2023

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

7DA6D2D0618F4B0

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-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	
SYMBOL															
% PASSING	50 MX	30 MX	50 MX	51 MN	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	36 MN	
*10	6 MX														
*40															
*200															
MATERIAL PASSING #40															
LL															
PI															
GROUP INDEX															
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER						
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

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

CONE PENETROMETER

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)

NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.

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 SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

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	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 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
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 DISLOADED 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE 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

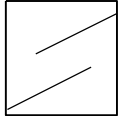
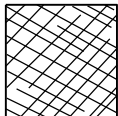
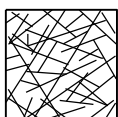
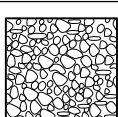
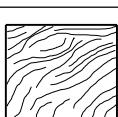
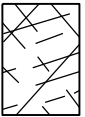
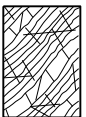
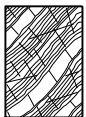
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

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

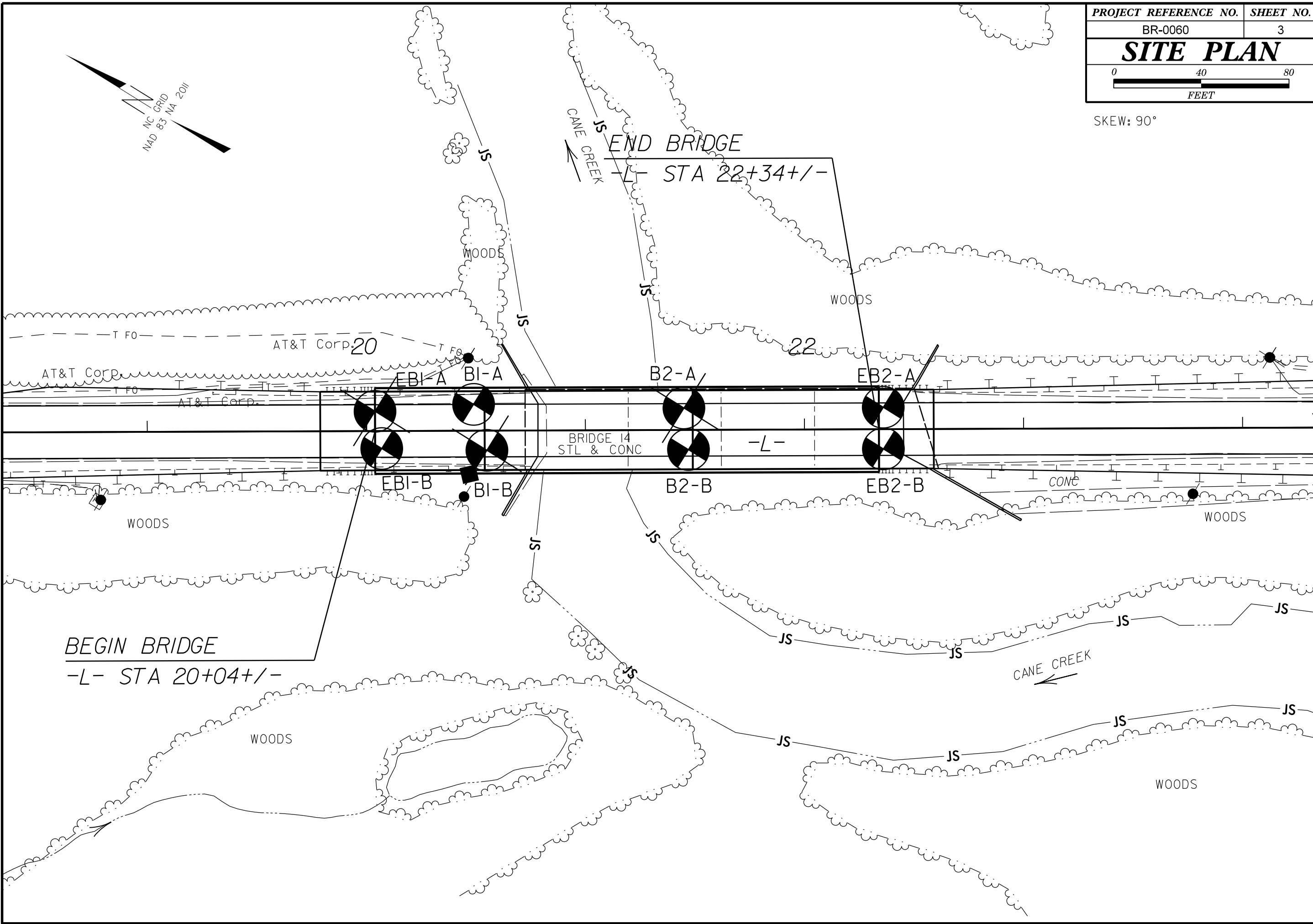
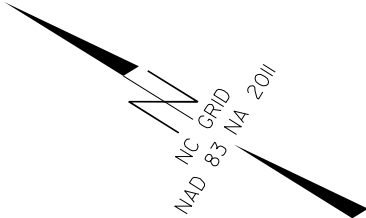
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

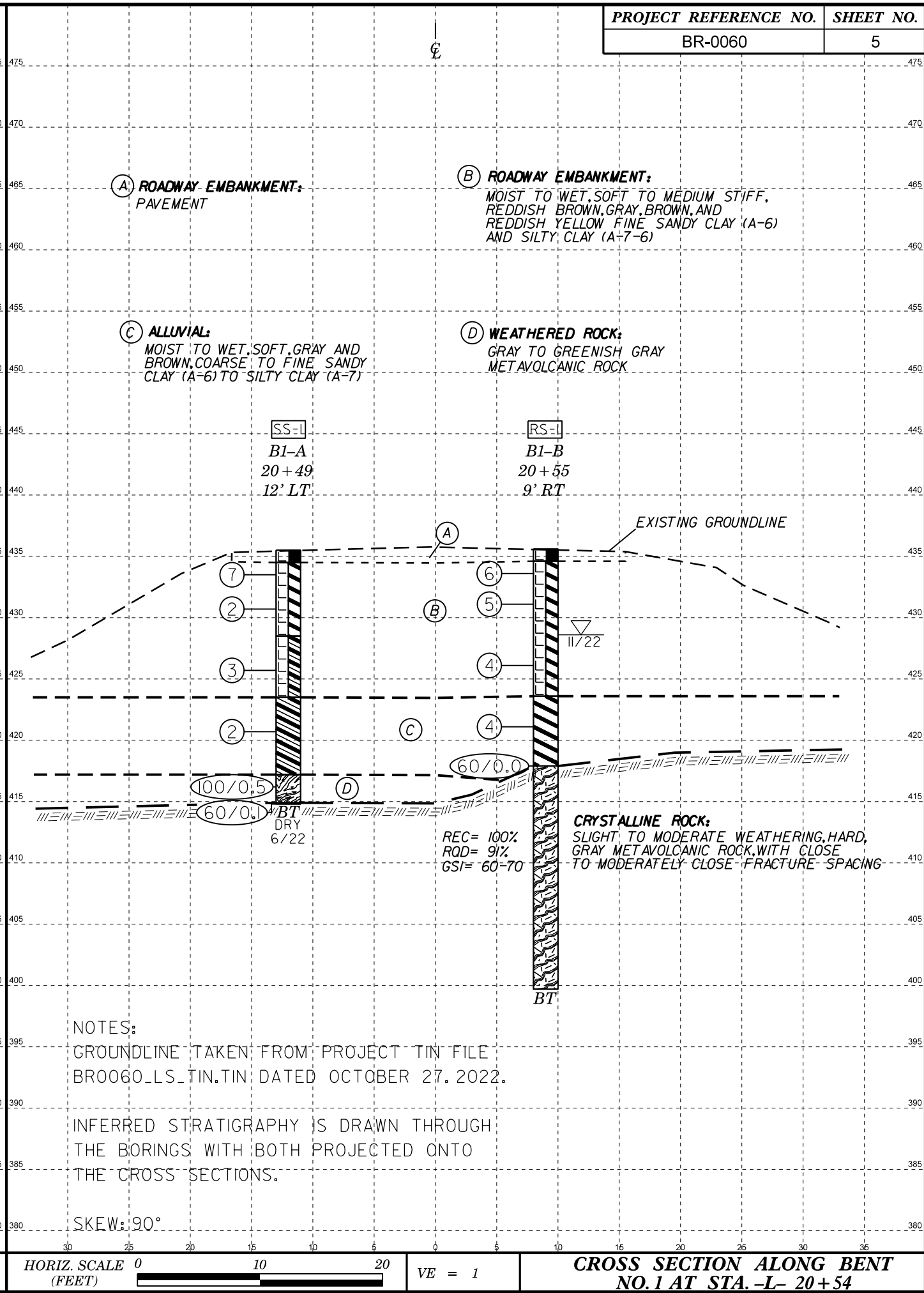
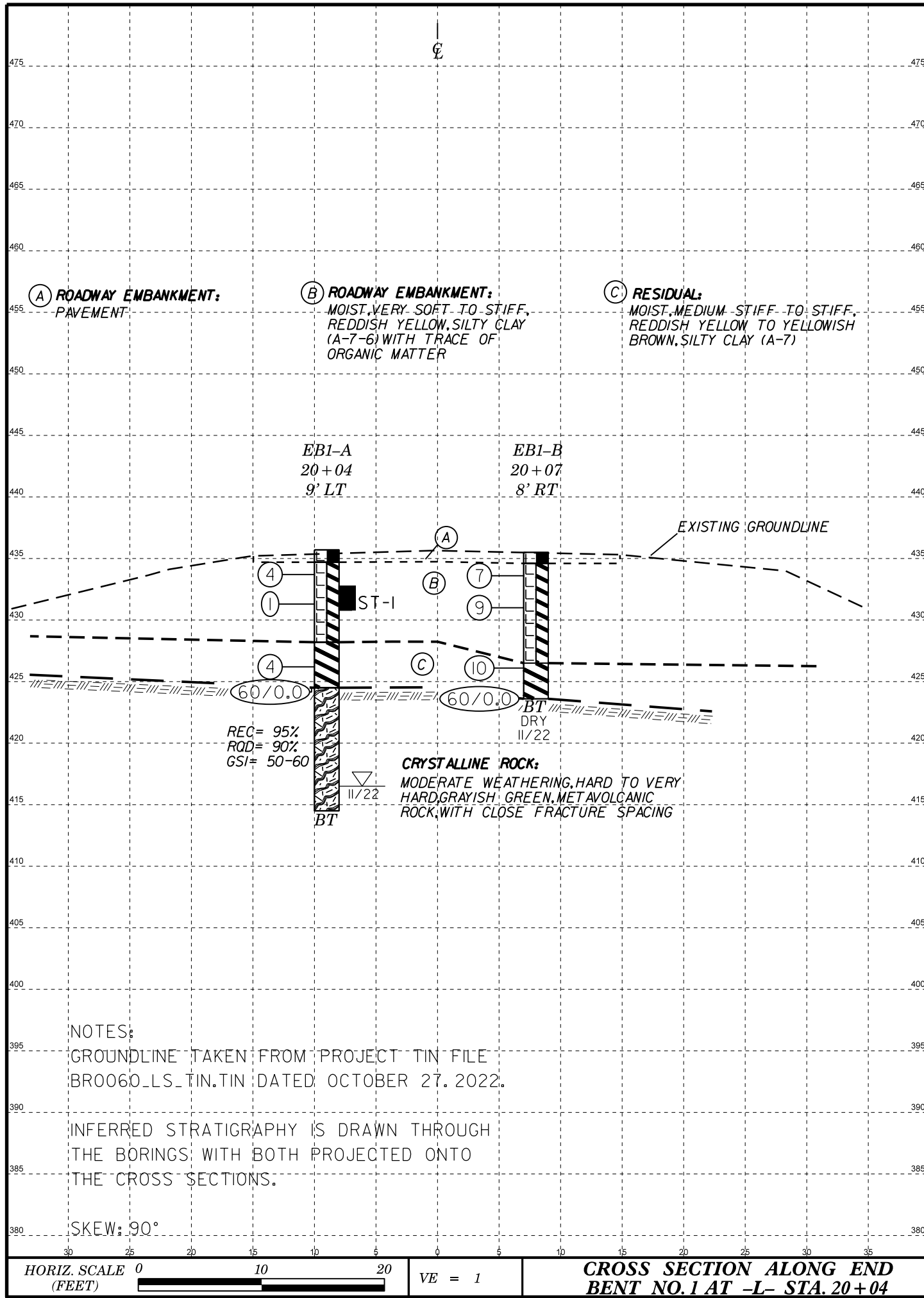
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING SURFACE QUALITY ➡ 90 80 70 60 50 40 30 20 10 N/A N/A	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin inter-layers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers F. Tectonically deformed, intensely folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers 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. ➡ Means deformation after tectonic disturbance	70 60 50 40 30 20 10
---	--	---	---	---	---	---	---

PROJECT REFERENCE NO.	SHEET NO.
BR-0060	3
SITE PLAN	
0 40 80 FEET	

SKEW: 90°

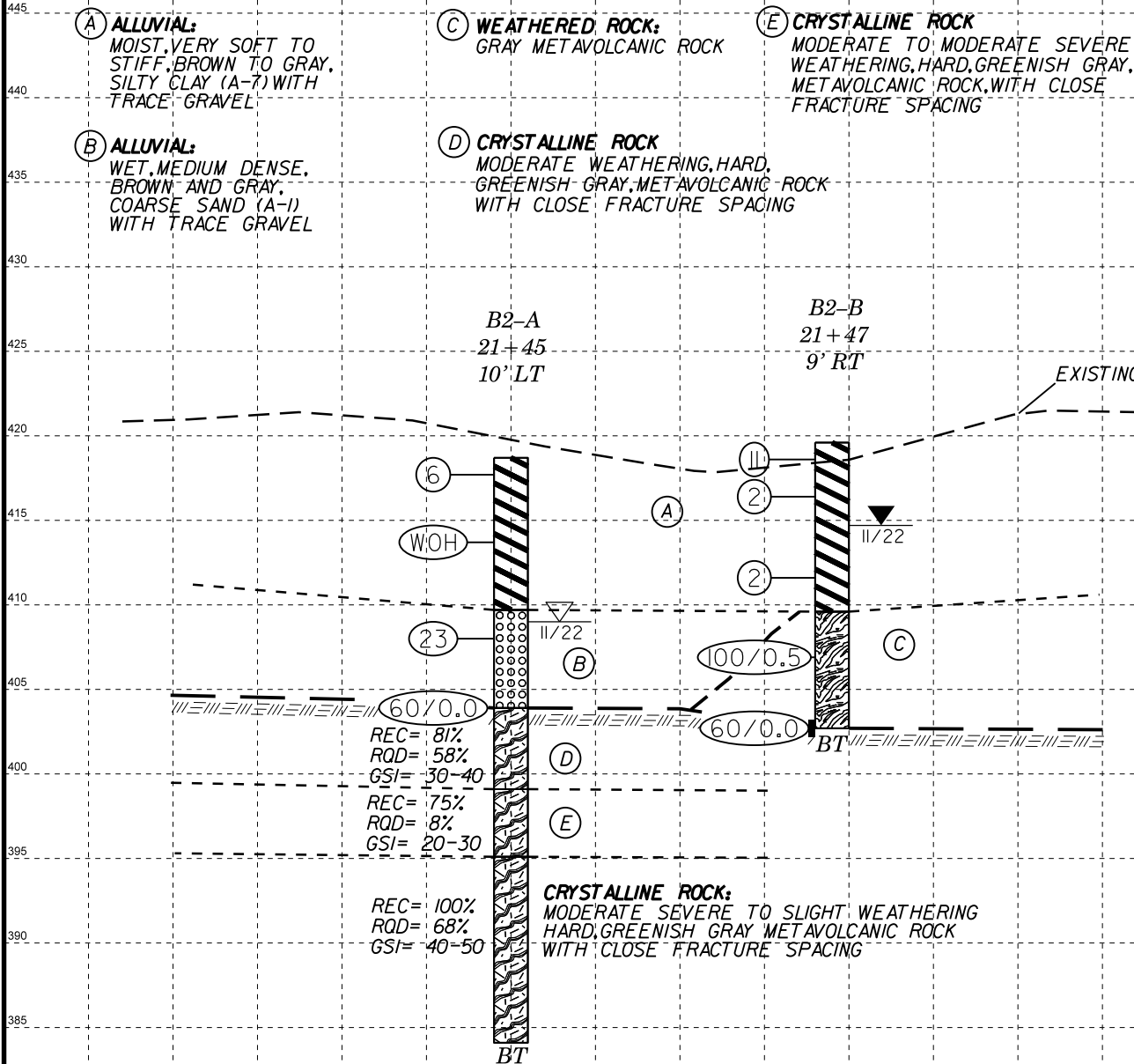




NOTES:
GROUNDLINE TAKEN FROM PROJECT TIN FILE
BR0060_LS_TIN.TIN DATED OCTOBER 27, 2022.

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

SKEW: 90°



HORIZ. SCALE 0 10 20
(FEET)

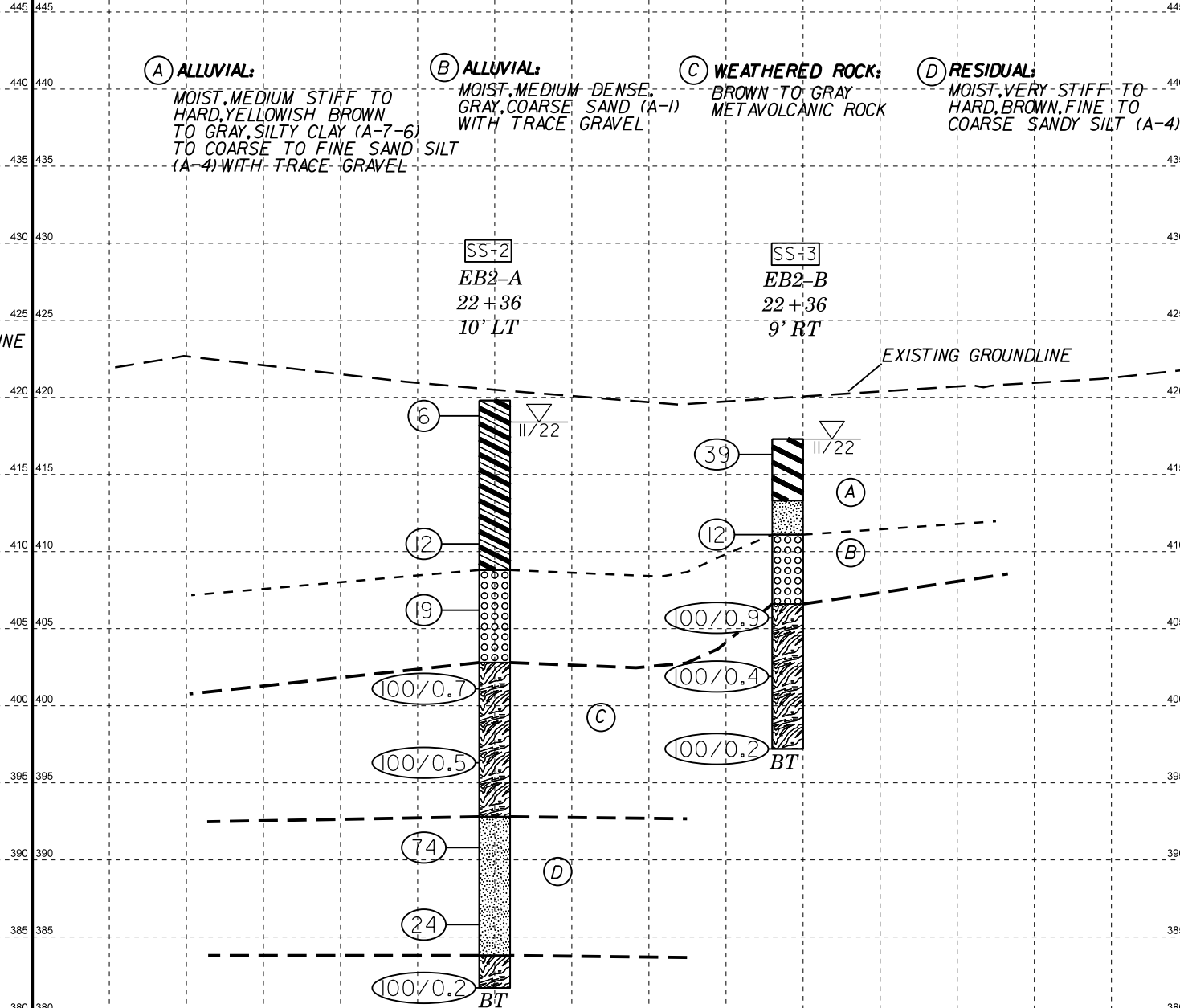
VE = 1

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

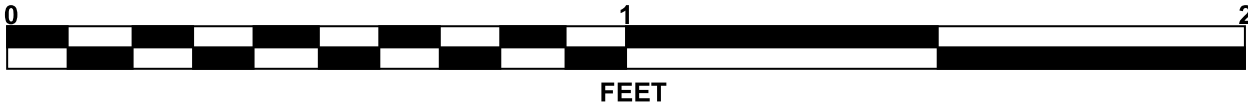
GEOTECHNICAL BORING REPORT
BORE LOG

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-		0 HR. 19.2						
COLLAR ELEV. 435.7 ft		TOTAL DEPTH 21.2 ft		NORTHING 777,141		EASTING 1,912,285		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												
430	432.3	3.4	4	2	2									
			1	1	0									
425	427.2	8.5												
	424.5	11.2	1	3	1									
420			60/0.0											
415														
Boring Terminated at Elevation 414.5 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK														
NOTES: Heavy Fractures from 16.2 to 21.2 ft were machine fractures that occurred during removal from core barrel														
Boring offset to obtain ST-1 from 2.9 to 4.9 ft.														
Other Samples: ST-1 (2.9 - 4.9)														

CORE PHOTOGRAPHS

EB1-A

BOX 1: 11.2 - 21.2 FEET



NC DOT BORE DOUBLE BR0060_GEO_BRDG014.GPJ NC_DOT.GDT 12/31/22

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) 0 HR. Dry 24 HR. FIAD					
BORING NO. B1-A			STATION 20+49			OFFSET 12 ft LT						ALIGNMENT -L-		
COLLAR ELEV. 435.5 ft			TOTAL DEPTH 20.7 ft			NORTHING 777,103						EASTING 1,912,311		
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	434.5	1.0	10	5	2									435.5 GROUND SURFACE 0.0 434.5 ROADWAY EMBANKMENT 1.0 Pavement: Asphalt (0.0 to 0.3 ft.) & ABC Stone (0.3 to 1.0 ft.) Reddish Brown, Silty CLAY (A-7-6)
430	431.7	3.8	1	1	1						SS-1	M	W	428.5 Gray and Brown, Fine Sandy CLAY (A-6) 7.0
425	426.7	8.8	2	1	2							W	W	423.5 ALLUVIAL 12.0 Gray and Brown, Coarse to Fine Sandy CLAY (A-6)
420	421.7	13.8	1	1	1							W	W	417.2 WEATHERED ROCK 18.3 Gray METAVOLCANIC ROCK 20.6
415	416.7 18.8 414.9 20.6	100/0.5 60/0.1												414.8 CRYSTALLINE ROCK 20.7 METAVOLCANIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 414.8 ft on CRYSTALLINE 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.				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																																													
	432.1	3.5	2 2 3											434.6 ROADWAY EMBANKMENT 1.0																																													
430														Pavement: Asphalt (0.0 to 0.3 ft.) & ABC Stone (0.3 to 1.0 ft.)																																													
														Reddish Yellow, Silty CLAY (A-7)																																													
	427.1	8.5	1 2 2																																																								
425																																																											
	422.1	13.5	WOH 1 3											423.6 ALLUVIAL 12.0																																													
420														Gray, Silty CLAY (A-7)																																													
	417.9	17.7	60/0.0											417.9 CRYSTALLINE ROCK 17.7																																													
415														Gray METAVOLCANIC ROCK																																													
														RS-1																																													
410																																																											
405																																																											
400														399.7 Boring Terminated at Elevation 399.7 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK 35.9																																													

GEOTECHNICAL BORING REPORT

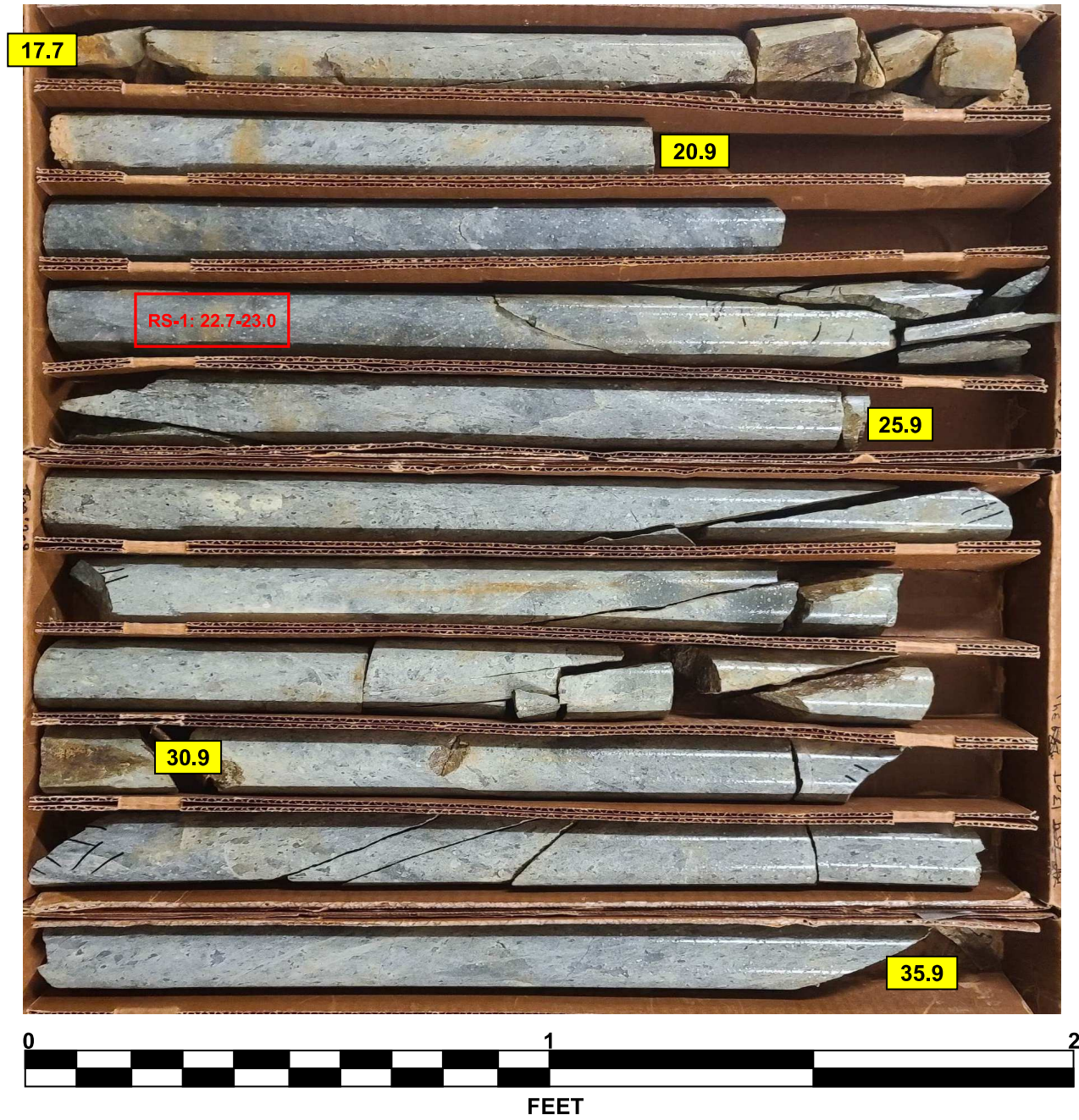
CORE LOG

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		
CORE SIZE NQ Core			TOTAL RUN 18.2 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) % RQD (ft) %		SAMP. NO.	STRATA REC. (ft) % RQD (ft) %		L O G	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
417.9											Begin Coring @ 17.7 ft
	417.9	17.7	3.2	N=60/0.0 0:45/0.2 3:40/1.0 4:31/1.0 5:46/1.0	(3.2) 100%	(2.4) 75%		(18.2) 100%	(16.5) 91%		417.9
415	414.7	20.9	5.0	3:21/1.0 5:15/1.0 4:22/1.0 8:14/1.0 5:50/1.0	(5.0) 100%	(5.0) 100%	RS-1				CRystalline Rock Slight to Moderate Weathering, Hard, Gray METAVOLCANIC ROCK with Close to Moderately Close Fracture Spacing (GSI: 60-70)
410	409.7	25.9	5.0	8:05/1.0 7:00/1.0 6:41/1.0 6:18/1.0 3:40/1.0	(5.0) 100%	(4.4) 88%					
405	404.7	30.9	5.0	3:21/1.0 3:16/1.0 3:25/1.0 3:44/1.0 4:13/1.0	(5.0) 100%	(4.7) 94%					
400	399.7	35.9									399.7
											Boring Terminated at Elevation 399.7 ft in CRYSTALLINE ROCK: METAVOLCANIC ROCK

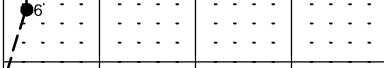
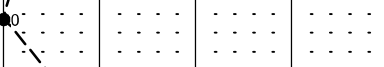
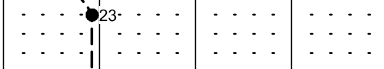
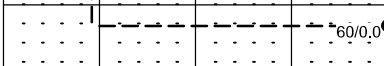
CORE PHOTOGRAPHS

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
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
420														
415	418.7	0.0	3	4	2									418.7 GROUND SURFACE 0.0
	414.7	4.0	WOH	WOH	WOH									
410														
405	409.0	9.7	4	14	9									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														CRYSTALLINE ROCK Greenish Gray METAVOLCANIC ROCK
395														399.1 19.6 Greenish Gray METAVOLCANIC ROCK
														395.1 23.6 Greenish Gray METAVOLCANIC ROCK
390														
385														384.1 34.6 Boring Terminated at Elevation 384.1 ft in CRYSTALLINE ROCK: METAVOCANIC ROCK

GEOTECHNICAL BORING REPORT
CORE LOG

SHEET 12

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)	DEPTH (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%		403.9	Begin Coring @ 14.8 ft CRYSTALLINE ROCK Moderate Weathering, Hard, Greenish Gray, METAVOLCANIC ROCK with Close Fracture Spacing (GSI: 30-40)	14.8
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%		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	5.0	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)
390		389.1	29.6	5.0	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

CORE PHOTOGRAPHS

B2-A
BOXES 1 & 2: 14.8 - 34.6 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-B			STATION 21+47			OFFSET 9 ft RT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 419.6 ft			TOTAL DEPTH 16.9 ft			NORTHING 777,010			EASTING 1,912,345			24 HR. 4.9			
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 87% 05/09/2022						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic						
DRILLER R. Toothman			START DATE 11/09/22			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)
420															
415	419.6	0.0	3	5	6									419.6	0.0
	417.4	2.2	4	1	1									GROUND SURFACE	
410	412.6	7.0	1	0	2									ALLUVIAL	
	407.4	12.2	100/0.5											Brown to Gray, Silty CLAY (A-7) with Trace Gravel	
405	402.7	16.9	60/0.0											409.6	10.0
														WEATHERED ROCK	
														Gray METAVOLCANIC ROCK	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 402.7 ft on CRYSTALLINE ROCK: METAVOLCANIC ROCK	

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.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
420														
419.8	419.8	0.0	1	3	3						SS-2			419.8 GROUND SURFACE 0.0
415														ALLUVIAL
														Yellowish Brown to Gray, Sandy CLAY (A-6) with Trace Gravel
411.5	411.5	8.3	WOH	2	10									
410											M			
407.2	407.2	12.6												408.8 Gray, Coarse SAND with Trace Gravel (A-1) 11.0
405			3	8	11						M			
401.8	401.8	18.0												402.8 WEATHERED ROCK 17.0
400			26	74/0.2										Brown METAVOLCANIC ROCK
396.8	396.8	23.0												
395			100/0.5											100/0.5
391.8	391.8	28.0	8	19	55									392.8 RESIDUAL 27.0
386.8	386.8	33.0	9	10	14						M			Brown, Fine to Coarse Sandy SILT (A-4)
381.9	381.9	37.9									M			383.8 WEATHERED ROCK 36.0
			100/0.2											Brown METAVOLCANIC ROCK 38.1
														Boring Terminated at Elevation 381.7 ft in WEATHERED ROCK: METAVOLCANIC ROCK

NCDOT BORE DOUBLE BR0060_GEO_BRDG014.GPJ NC_DOT.GDT 2/1/23

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 4.0 Brown and Gray, Coarse to Fine Sandy SILT (A-4)
													411.1 6.2 Gray, Coarse SAND with Trace Gravel (A-1)	
405	407.1	10.2	7	34	66/0.4									406.6 10.7 WEATHERED ROCK Gray METAVOLCANIC ROCK
400	402.3	15.0	100/0.4											
	397.4	19.9	100/0.2											397.2 20.1 Boring Terminated at Elevation 397.2 ft in WEATHERED ROCK: METAVOLCANIC ROCK

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]

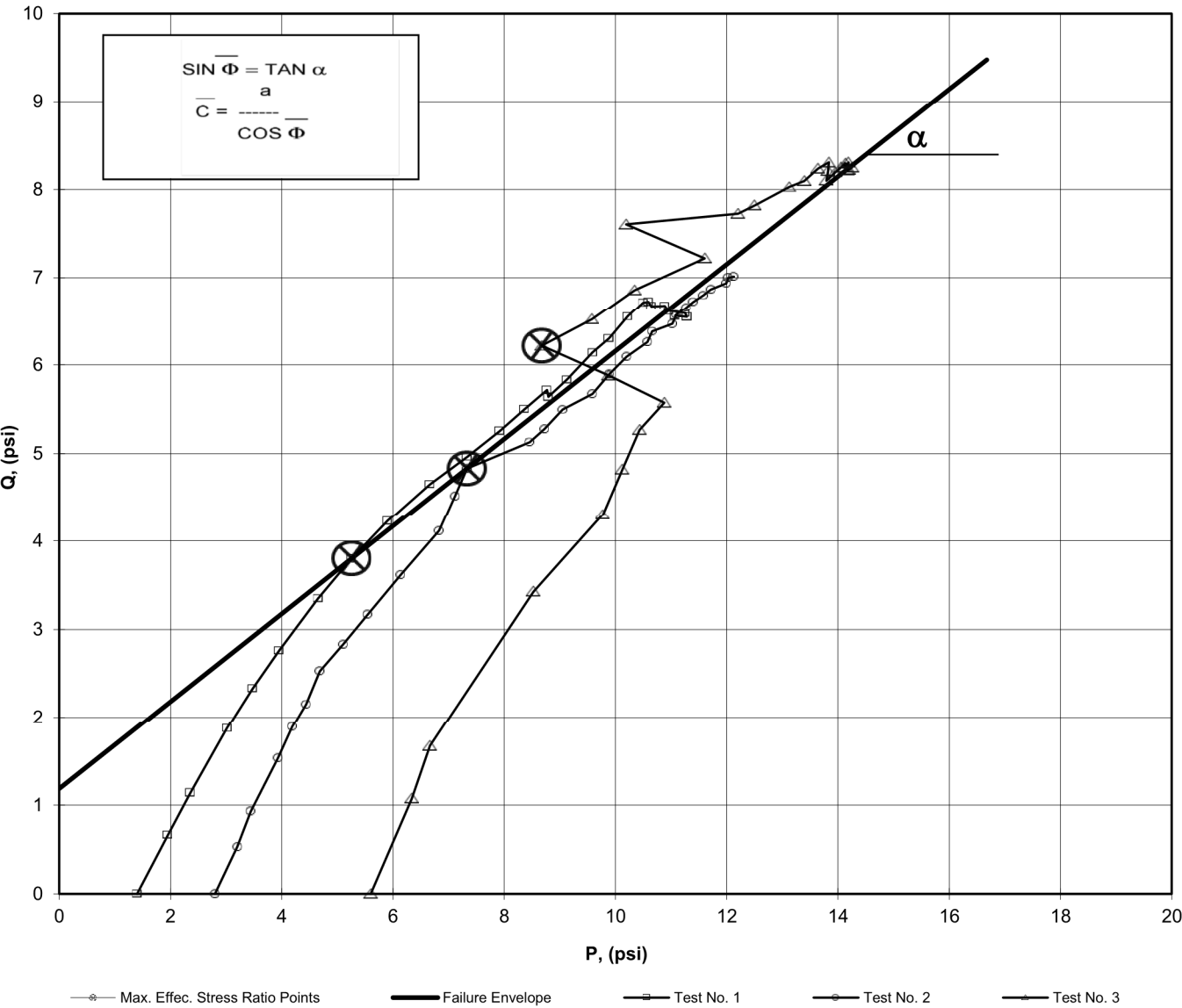
**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297

Client: Kleinfelder 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

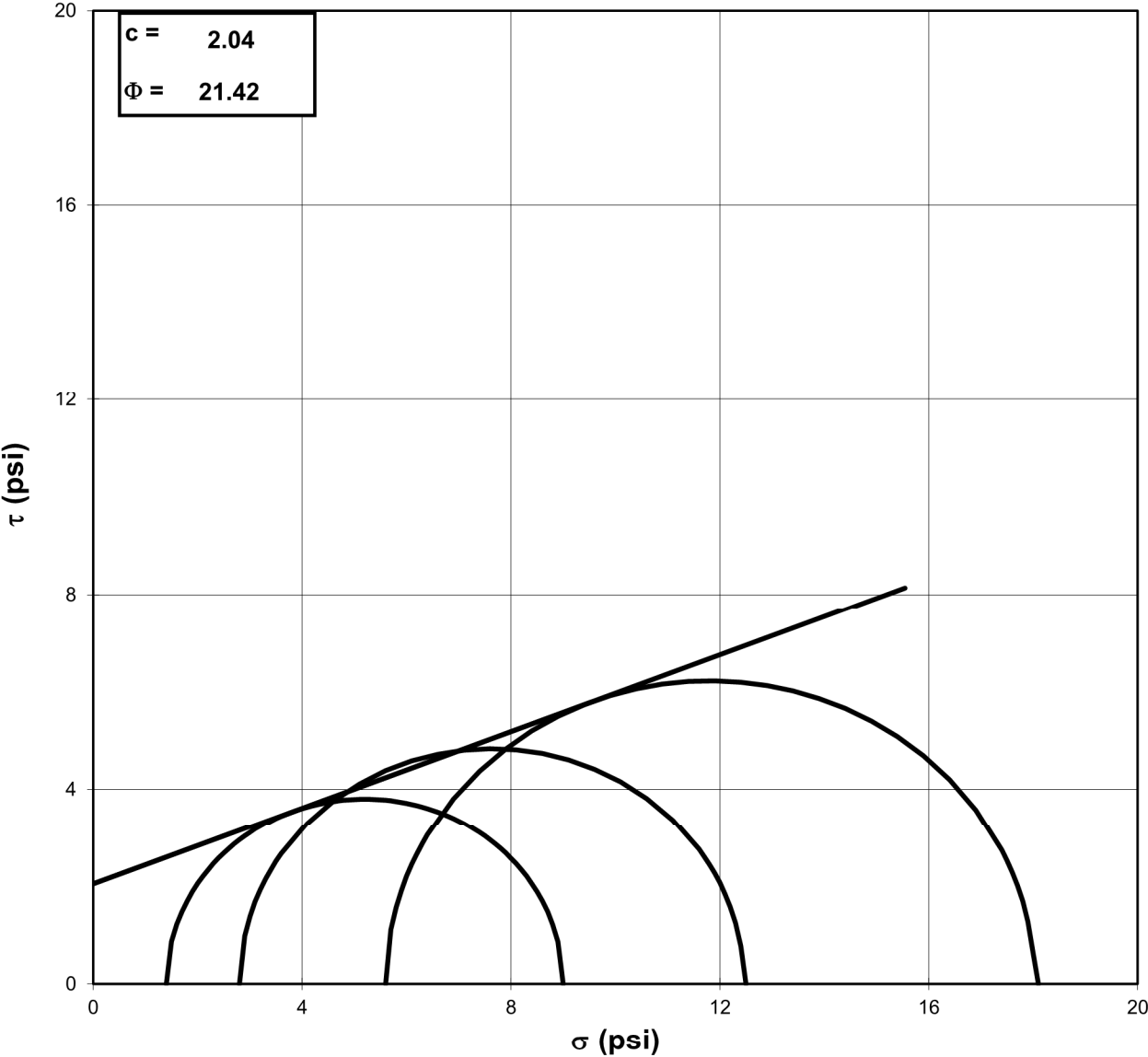
MOHR TOTAL STRENGTH ENVELOPE
AASHTO T-297

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)

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	1.19	$\overline{C}$	=	1.37
α	=	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

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	Volume After Consolidation (in ³)	38.10
Initial Sample Diameter (in)	2.82	Length After Consolidation (in)	6.10
Initial Sample Area (in ²)	6.25	Area After Consolidation (in ²)	6.246
Initial Sample Volume (in ³)	38.16		

Strain (%)	Deviator Stress PSI	ΔU	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	Q
---------------	---------------------------	------------	------------------	------------------	-------------------------------------	-----------	-----------	---

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

$\overline{P}$	=	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 ³)	38.35
Initial Sample Diameter (in)	2.84	Length After Consolidation (in)	6.04
Initial Sample Area (in ²)	6.32	Area After Consolidation (in ²)	6.349
Initial Sample Volume (in ³)	38.09		

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
---------------	---------------------------	------------	-----------------------	-----------------------	-------------------------------------	----------------	----------------	---

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
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

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

page 7 of 10

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



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

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 (in²) 6.36
Initial Sample Volume (in³) 38.36

VOLUME CHANGE

Volume After Consolidation (in³) 38.33
Length After Consolidation (in) 6.03
Area After Consolidation (in²) 6.353

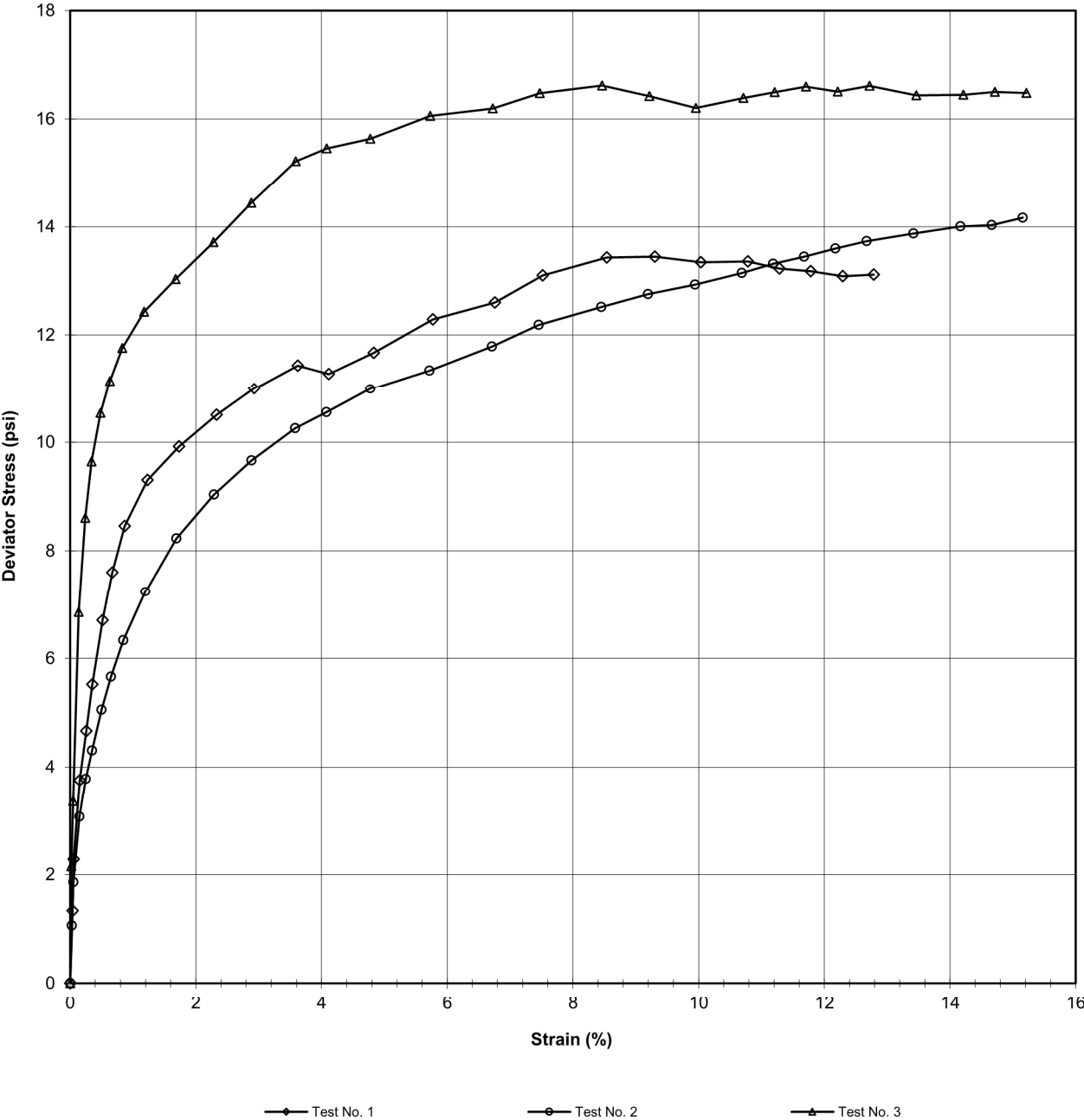
Strain (%)	Deviator Stress PSI	ΔU	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	$\bar{A}$	$\bar{P}$	$\bar{Q}$
---------------	---------------------------	------------	------------------	------------------	-------------------------------------	-----------	-----------	-----------

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

page 8 of 10

**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

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

SHEET 22

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

[illegible]

SITE PHOTOGRAPH

Bridge No. 14 on NC 87 over Cane Creek



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