

REFERENCE: B-5910

PROJECT: 48042

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5910	1	21

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STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY JACKSON
PROJECT DESCRIPTION REPLACE BRIDGE #32 ON NC 116
OVER SAVANNAH CREEK

SITE DESCRIPTION _____

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 MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- 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

C.D. JOHNSON
D.O. CHEEK
C.J. COFFEY

INVESTIGATED BY D.M. MULLEN
DRAWN BY DMM
CHECKED BY JCK
SUBMITTED BY JCK
DATE 7/23/2019



DocuSigned by:
D Matt Mullen 7/26/2019
18909BD3C 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 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table for Soil Legend and AASHTO Classification. Columns include General Class., Group Class., Symbol, % Passing #10 #40 #200, Material Passing #40 LL PI, Group Index, Usual Types of Major Materials, Gen. Rating as Subgrade, Consistency or Denseness (Primary Soil Type, Compactness, Penetration Resistance, Strength), Texture or Grain Size (U.S. Std. Sieve Size, Boulder, Cobble, Gravel, Sand, Silt, Clay), and Soil Moisture - Correlation of Terms (Soil Moisture Scale, Field Moisture Description, Plasticity).

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.

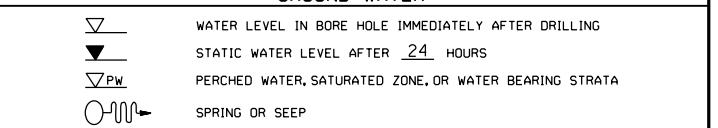
COMPRESSIBILITY

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

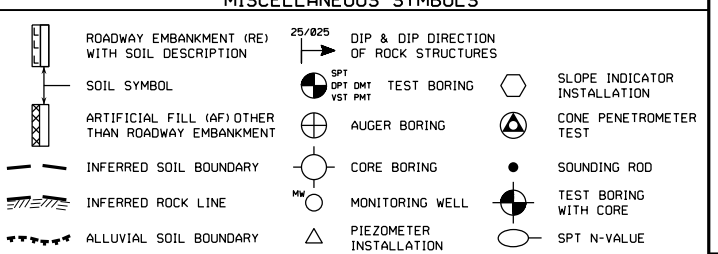
PERCENTAGE OF MATERIAL

Table showing percentages for Organic Material, Granular Soils, Silty-Clay Soils, and Other Material.

GROUND WATER



MISCELLANEOUS SYMBOLS



ROCK DESCRIPTION

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

WEATHERED ROCK (WR): NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

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

NON-CRYSTALLINE ROCK (NCR): FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTARY ROCK (CPS): COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

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

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV): SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CALCAREOUS (CALC): SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
ROCK QUALITY DESIGNATION (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 INTRUSION 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.

ROCK HARDNESS

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

FRACTURE SPACING

Table for Fracture Spacing: Term (Very Wide to Very Close) vs Spacing (More than 10 feet to Less than 0.16 feet).

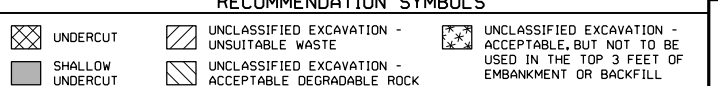
BEDDING

Table for Bedding: Term (Very thickly bedded to Thinly laminated) vs Thickness (4 feet to < 0.008 feet).

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.
FRIBLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

RECOMMENDATION SYMBOLS



ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - COARSE PENETRATION TEST
CSE - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
UN - UNIT WEIGHT
WU - 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

Form for listing equipment used on the project, including Drill Units (CME-45C, CME-55, CME-550, Vane Shear Test, Portable Hoist), Advancing Tools (Clay Bits, 6\"/>

COLOR

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

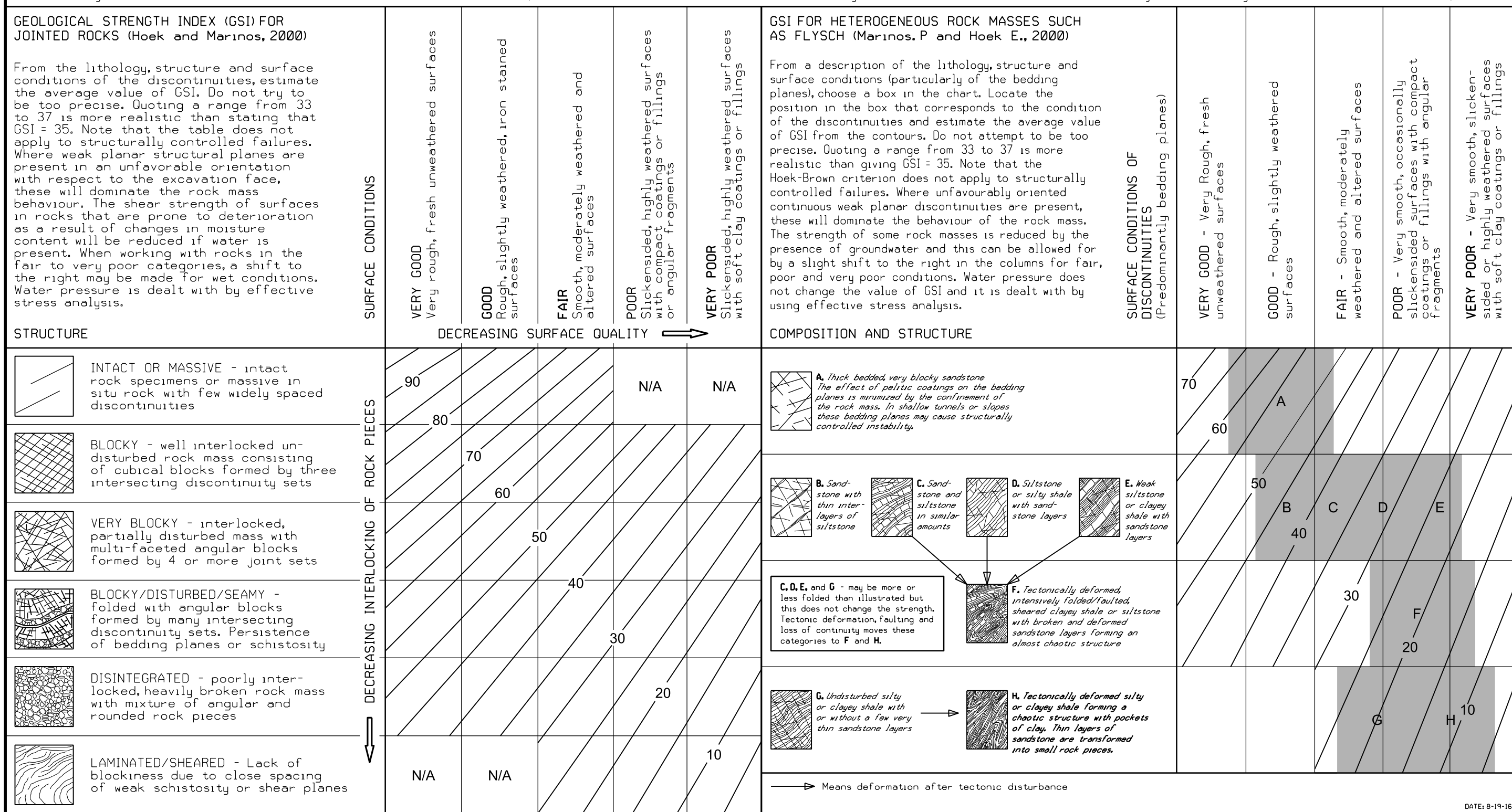
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

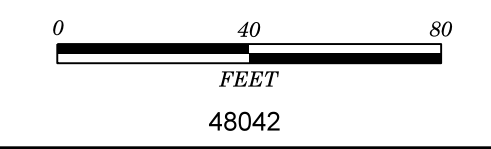
SUBSURFACE INVESTIGATION

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

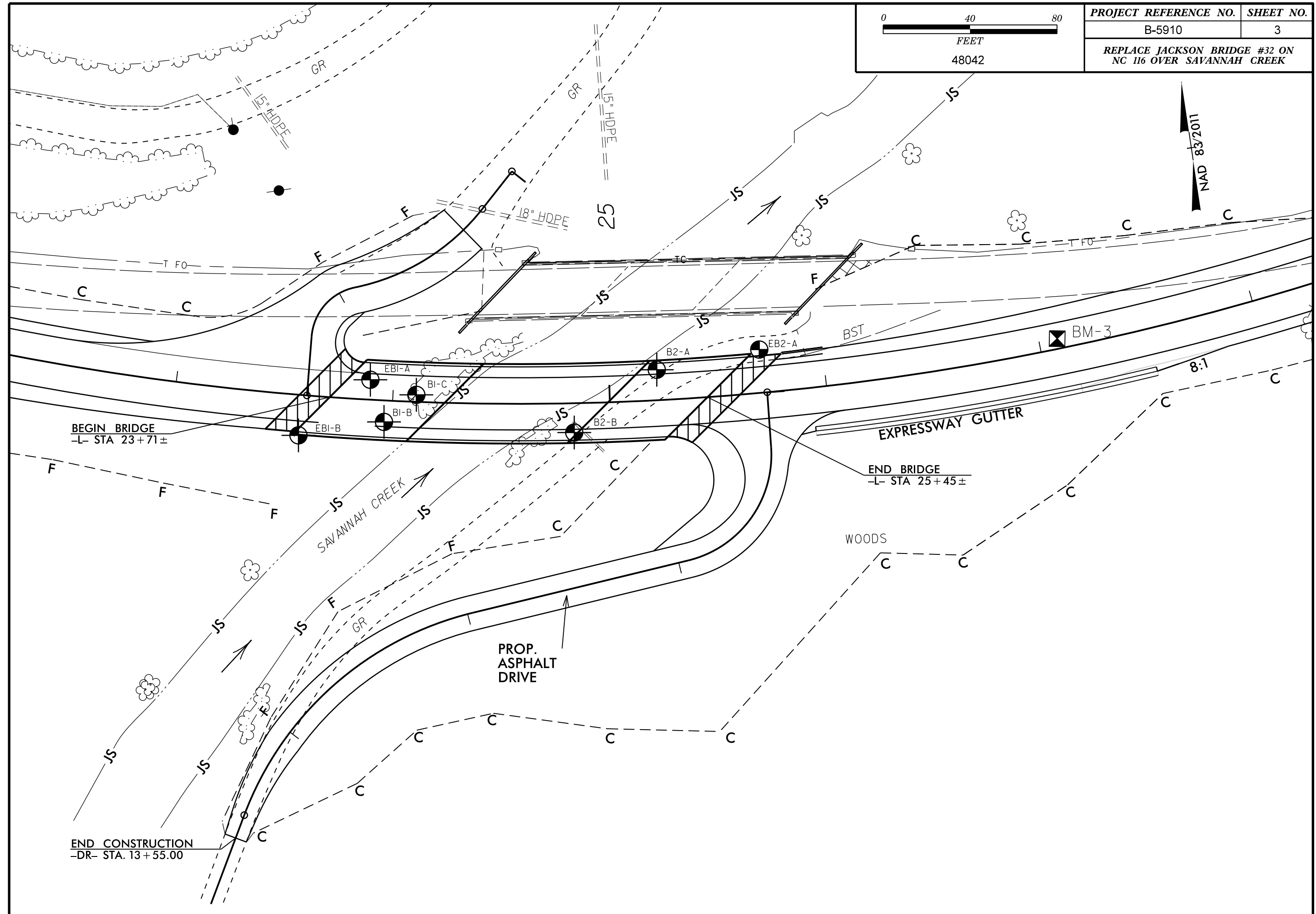
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

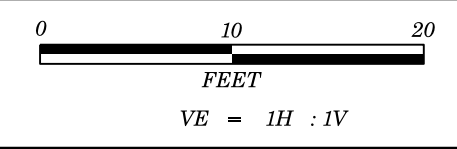
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)



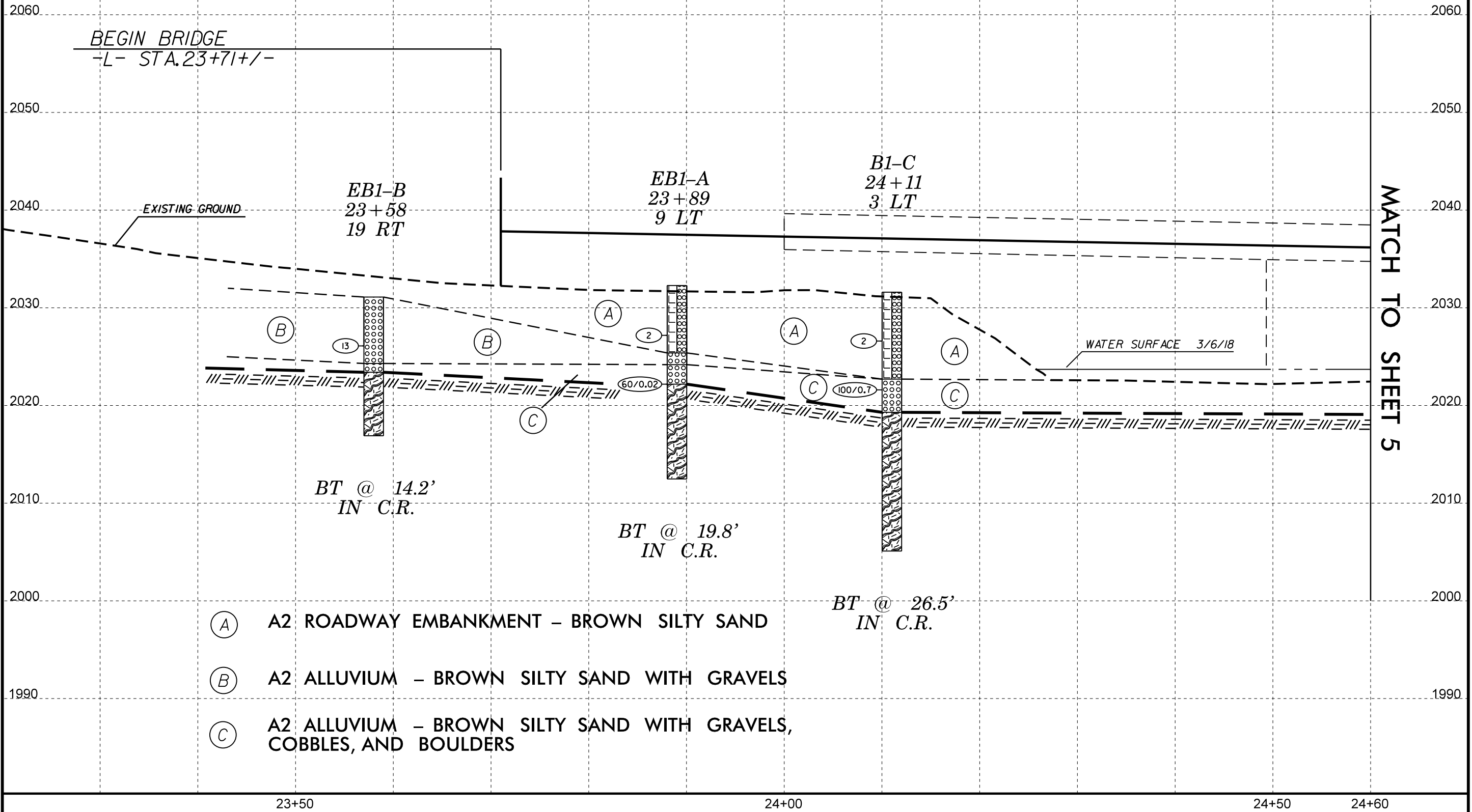


PROJECT REFERENCE NO.	SHEET NO.
B-5910	3
REPLACE JACKSON BRIDGE #32 ON NC 116 OVER SAVANNAH CREEK	



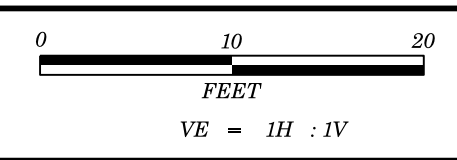


PROJECT REFERENCE NO.	SHEET NO.
B-5910	4
PROFILE ALONG -L-	

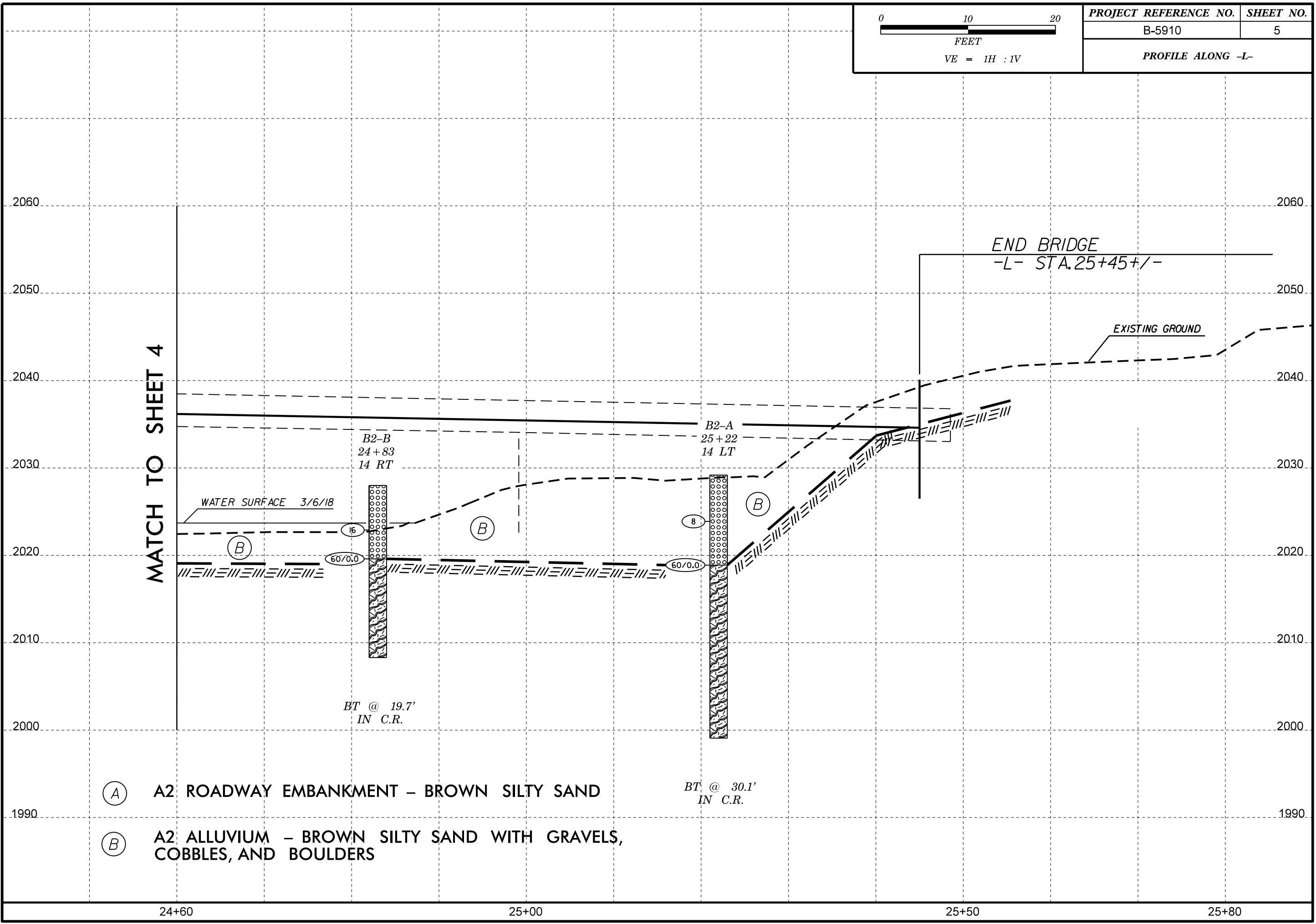


- (A) A2 ROADWAY EMBANKMENT – BROWN SILTY SAND
- (B) A2 ALLUVIUM – BROWN SILTY SAND WITH GRAVELS
- (C) A2 ALLUVIUM – BROWN SILTY SAND WITH GRAVELS, COBBLES, AND BOULDERS

MATCH TO SHEET 5



PROJECT REFERENCE NO.	SHEET NO.
B-5910	5
PROFILE ALONG -L-	



MATCH TO SHEET 4

END BRIDGE
-L- STA. 25+45 +/-

EXISTING GROUND

WATER SURFACE 3/6/18

B2-B
24+83
14 RT

B2-A
25+22
14 LT

BT @ 19.7'
IN C.R.

BT @ 30.1'
IN C.R.

(A) A2 ROADWAY EMBANKMENT - BROWN SILTY SAND

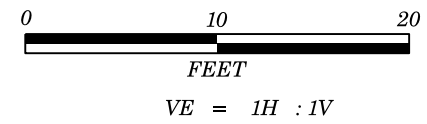
(B) A2 ALLUVIUM - BROWN SILTY SAND WITH GRAVELS, COBBLES, AND BOULDERS

24+60

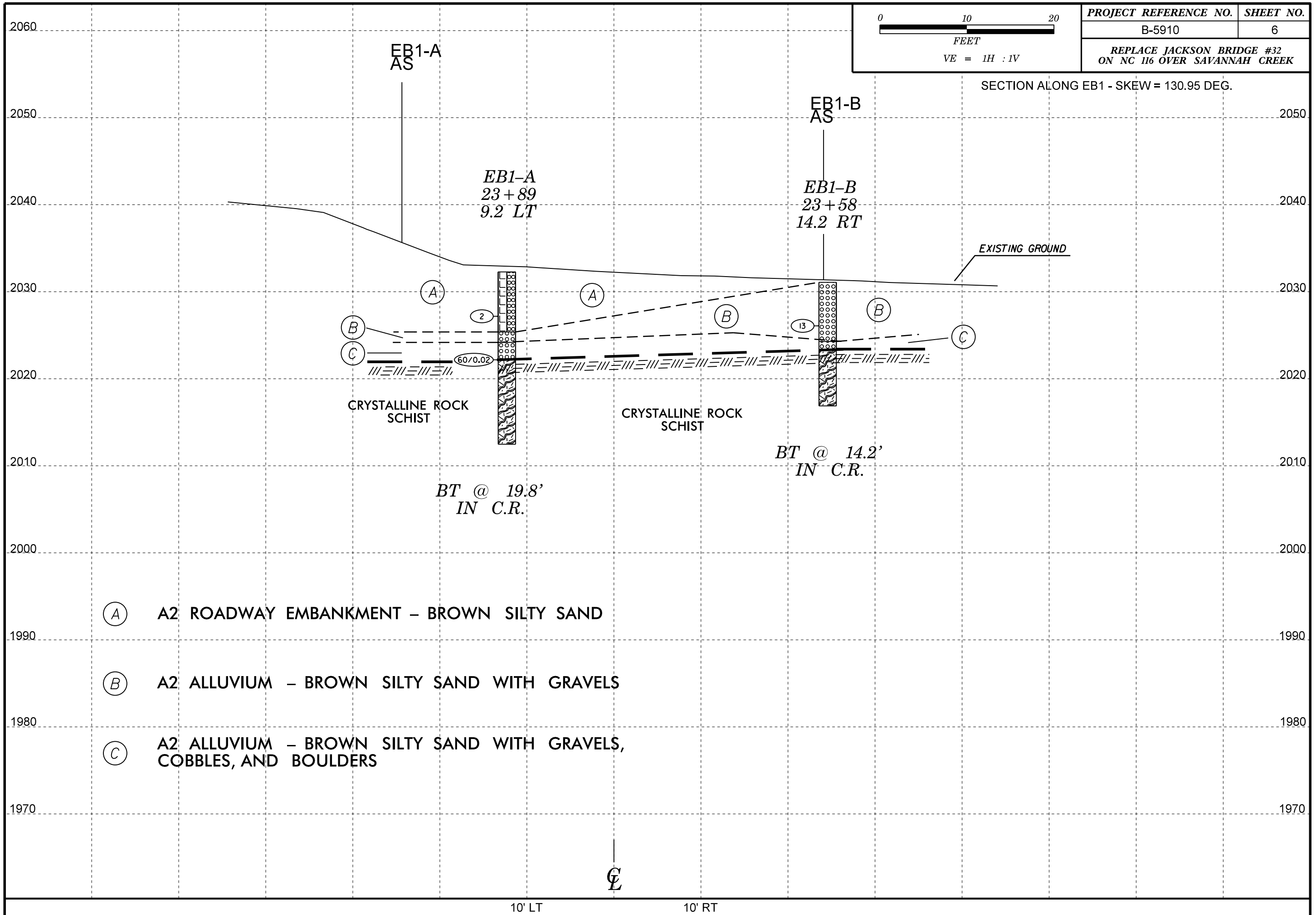
25+00

25+50

25+80



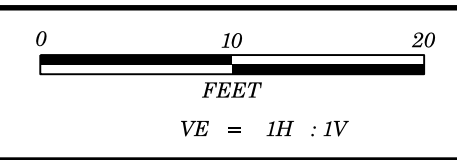
SECTION ALONG EB1 - SKEW = 130.95 DEG.



- (A) A2 ROADWAY EMBANKMENT – BROWN SILTY SAND
- (B) A2 ALLUVIUM – BROWN SILTY SAND WITH GRAVELS
- (C) A2 ALLUVIUM – BROWN SILTY SAND WITH GRAVELS, COBBLES, AND BOULDERS

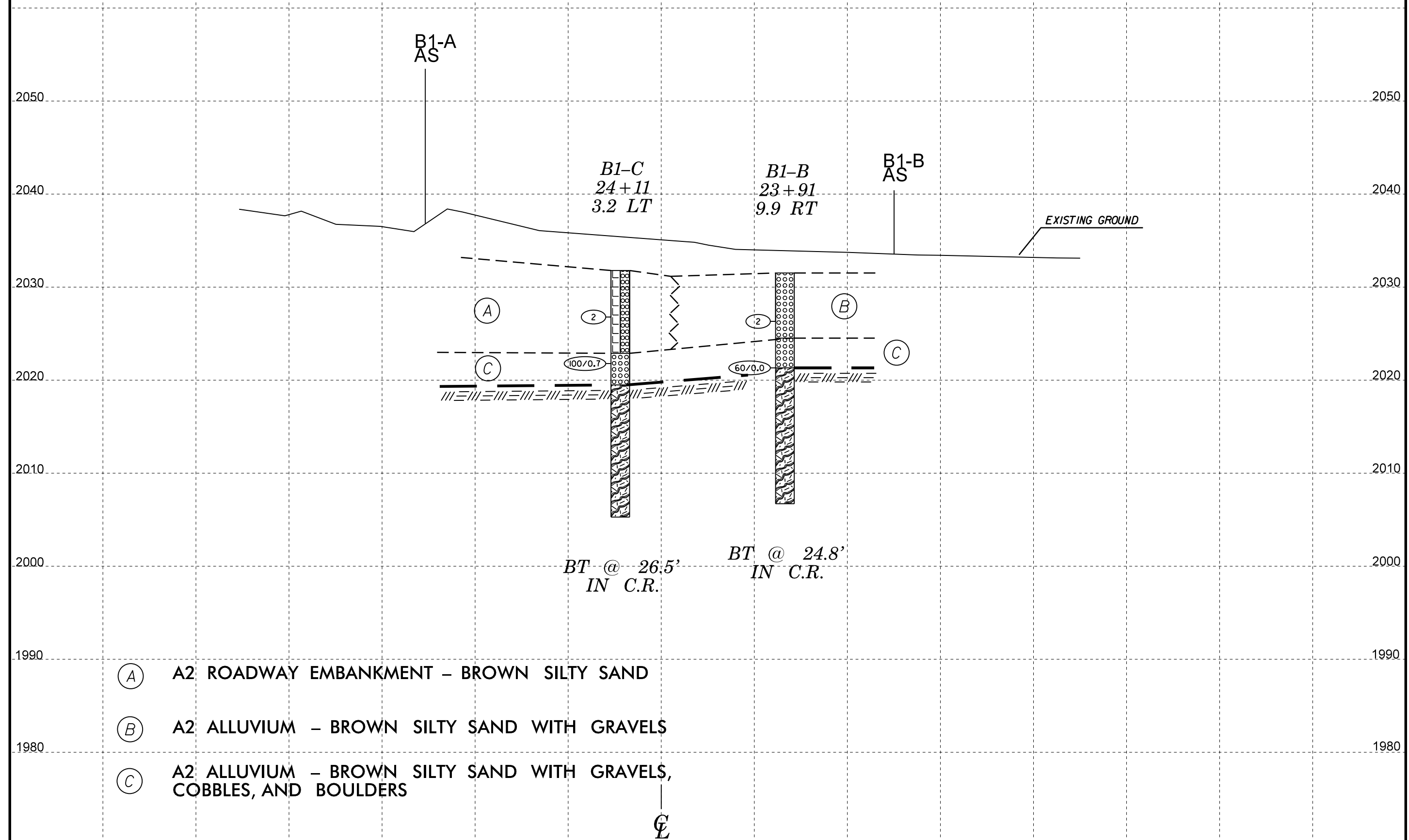
10' LT

10' RT



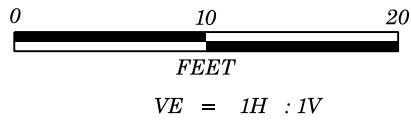
PROJECT REFERENCE NO.	SHEET NO.
B-5910	7
REPLACE JACKSON BRIDGE #32 ON NC 116 OVER SAVANNAH CREEK	

SECTION ALONG B-1 - SKEW = 133.25 DEG.

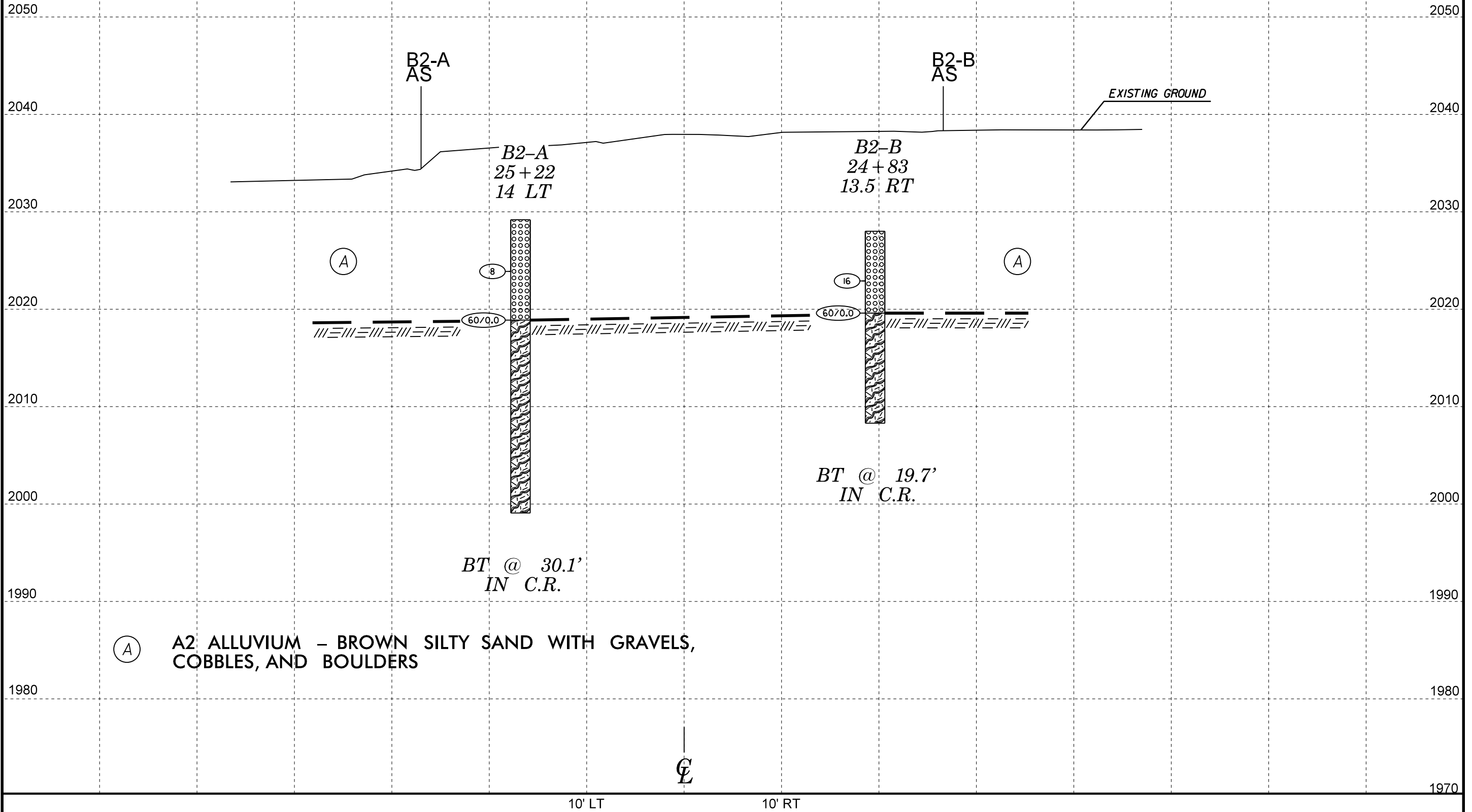


- Ⓐ A2 ROADWAY EMBANKMENT - BROWN SILTY SAND
- Ⓑ A2 ALLUVIUM - BROWN SILTY SAND WITH GRAVELS
- Ⓒ A2 ALLUVIUM - BROWN SILTY SAND WITH GRAVELS, COBBLES, AND BOULDERS

10' LT 10' RT



SECTION ALONG B2 - SKEW = 136.75 DEG.



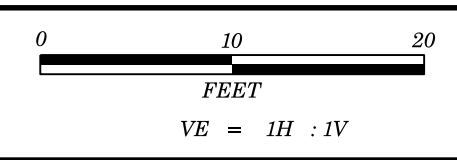
(A) A2 ALLUVIUM - BROWN SILTY SAND WITH GRAVELS,
COBBLES, AND BOULDERS



10' LT

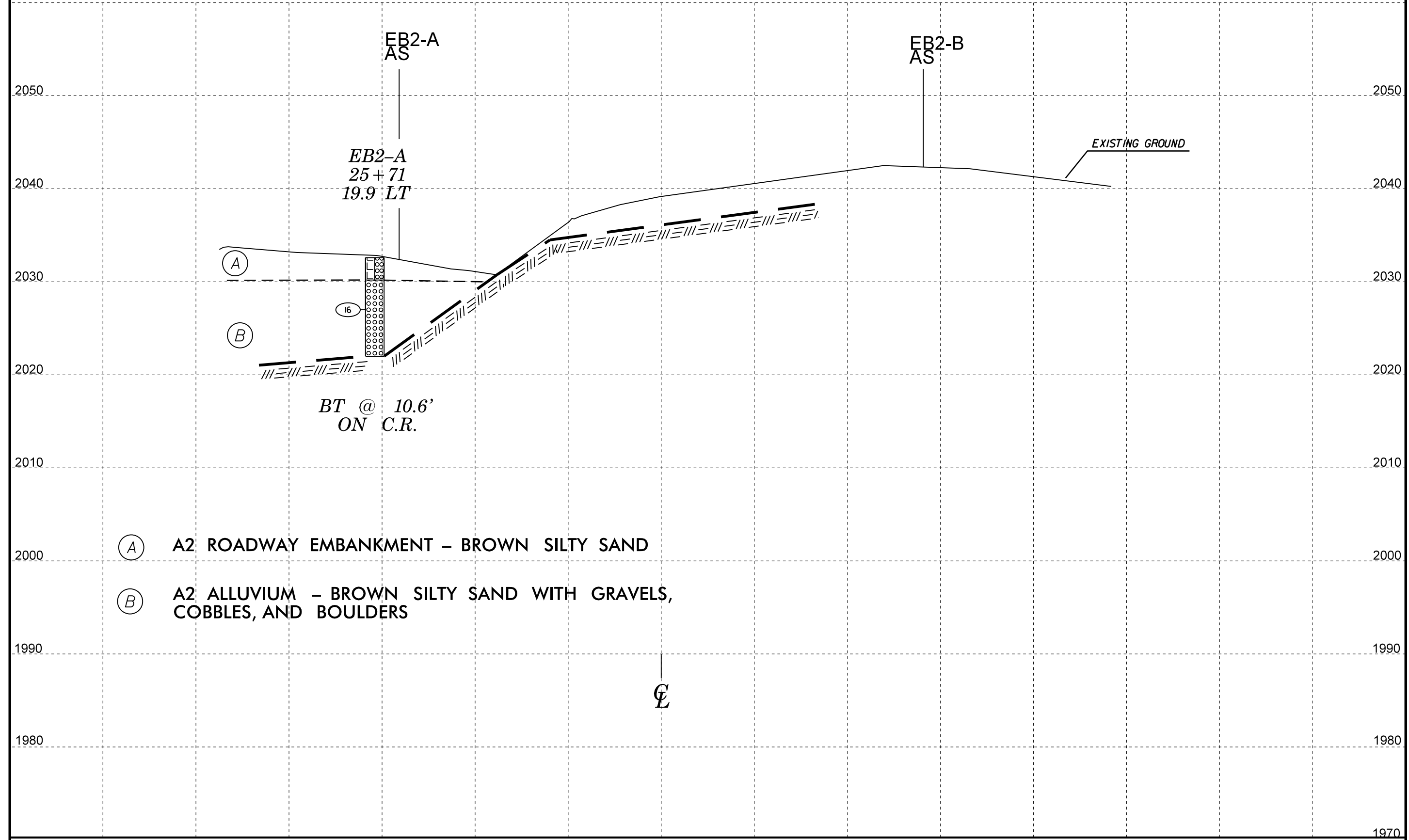
10' RT

1970



PROJECT REFERENCE NO.	SHEET NO.
B-5910	9
REPLACE JACKSON BRIDGE #32 ON NC 116 OVER SAVANNAH CREEK	

SECTION ALONG EB2 - SKEW = 139.05 DEG.



- (A) A2 ROADWAY EMBANKMENT – BROWN SILTY SAND
- (B) A2 ALLUVIUM – BROWN SILTY SAND WITH GRAVELS, COBBLES, AND BOULDERS

10' LT 10' RT

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.	
SITE DESCRIPTION N/A							GROUND WTR (ft)
BORING NO. EB1-A		STATION 23+89		OFFSET 9.2 ft LT		ALIGNMENT L	
COLLAR ELEV. 2,032.3 ft		TOTAL DEPTH 19.8 ft		NORTHING 604,793		EASTING 736,681	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic	
DRILLER Cheek, D. O.		START DATE 02/06/19		COMP. DATE 02/06/19		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2035															
2030															
2025	2,027.2	5.1	0	1	1										
2020	2,022.2	10.1													
2015															

Boring Terminated at Elevation 2,012.5 ft IN
CRYSTALLINE ROCK

NCDOT BORE DOUBLE B5910_GEO_BRDG_BORELOGS.GPJ NC_DOT.GDT 7/8/19

WBS 48042.1.1		TIP b-5910		COUNTY JACKSON		GEOLOGIST N/A	
SITE DESCRIPTION N/A							GROUND WTR (ft)
BORING NO. EB1-A		STATION N/A		OFFSET N/A		ALIGNMENT N/A	
COLLAR ELEV. N/A		TOTAL DEPTH 19.8 ft		NORTHING N/A		EASTING N/A	
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD N/A			HAMMER TYPE Automatic	
DRILLER N/A		START DATE N/A		COMP. DATE 02/06/19		SURFACE WATER DEPTH N/A	
CORE SIZE NXWL			TOTAL RUN 8.9 ft				

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (ft)		REC. (ft)	RQD (ft)			
		10.9	3.9		(3.9)	(3.9)						
		14.8	5.0		(5.0)	(5.0)						
		19.8										

Continued from previous page

GSI: 70 - 90

NCDOT BORE DOUBLE B5910_GEO_BRDG_CORELOGS.B.GPJ NC_DOT.GDT 7/17/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.								
SITE DESCRIPTION N/A							GROUND WTR (ft)							
BORING NO. EB1-B		STATION 23+58		OFFSET 18.6 ft RT		ALIGNMENT L								
COLLAR ELEV. 2,031.1 ft		TOTAL DEPTH 14.2 ft		NORTHING 604,773		EASTING 736,644								
DRILL RIG/HAMMER EFF./DATE AFO6963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing WSPT & Core			HAMMER TYPE Automatic								
DRILLER Cheek, D. O.		START DATE 02/06/19		COMP. DATE 02/06/19		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				
2035														
2030														2,031.1 GROUND SURFACE 0.0
2025	2,026.1	5.0	1	5	8									ALLUVIAL Brown micaceous coarse sand with small pebbles and rock fragments
2020														2,024.3 6.8 2,023.4 7.7 ALLUVIAL Brown micaceous coarse sand with gravels, cobbles, and boulders CRYSTALLINE ROCK Gneiss
Boring Terminated at Elevation 2,016.9 ft IN CRYSTALLINE ROCK														

WBS 48042.1.1		TIP b-5910		COUNTY JACKSON		GEOLOGIST N/A					
SITE DESCRIPTION N/A							GROUND WTR (ft)				
BORING NO. EB1-B		STATION N/A		OFFSET N/A		ALIGNMENT N/A					
COLLAR ELEV. N/A		TOTAL DEPTH 14.2 ft		NORTHING N/A		EASTING N/A					
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD N/A			HAMMER TYPE Automatic					
DRILLER N/A		START DATE N/A		COMP. DATE 02/06/19		SURFACE WATER DEPTH N/A					
CORE SIZE NXWL			TOTAL RUN 5.0 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) %	LOG	DESCRIPTION AND REMARKS
											Continued from previous page
		9.2	5.0		(4.9) 98%	(4.4) 88%					GSI: 60 - 90
		14.2									

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.									
SITE DESCRIPTION N/A							GROUND WTR (ft)								
BORING NO. B1-B		STATION 23+91		OFFSET 9.9 ft RT		ALIGNMENT L									
COLLAR ELEV. 2,031.5 ft		TOTAL DEPTH 24.8 ft		NORTHING 604,773		EASTING 736,684									
DRILL RIG/HAMMER EFF./DATE AFC8963 CME-550X 77% 07/31/2017		DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic											
DRILLER Cheek, D. O.		START DATE 02/06/19		COMP. DATE 02/06/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2035															
2030														2,031.5	GROUND SURFACE 0.0
2025	2,026.3	5.2	woh	1	1									2,023.7	7.8
2020	2,021.3	10.2	60/0											2,021.3	10.2
2015															
2010															
Boring Terminated at Elevation 2,006.7 ft IN CRYSTALLINE ROCK															

NCDOT BORE DOUBLE B5910_GEO_BRDG_BORELOGS.GPJ NC_DOT.GDT 7/8/19

WBS 48042.1.1		TIP b-5910		COUNTY JACKSON		GEOLOGIST N/A						
SITE DESCRIPTION N/A							GROUND WTR (ft)					
BORING NO. B1-B		STATION N/A		OFFSET N/A		ALIGNMENT N/A						
COLLAR ELEV. N/A		TOTAL DEPTH 10.7 ft		NORTHING N/A		EASTING N/A						
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD N/A		HAMMER TYPE Automatic								
DRILLER N/A		START DATE N/A		COMP. DATE 02/06/19		SURFACE WATER DEPTH N/A						
CORE SIZE NXWL			TOTAL RUN 14.1 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
		10.7	4.1		(4.1) 100%	(3.4) 83%						
		14.8	5.0		(5.0) 100%	(4.3) 86%						
		19.8	5.0		(4.5) 90%	(3.6) 72%						
		24.8										
GSI: 40 - 80												

NCDOT BORE DOUBLE B5910_GEO_BRDG_CORELOGS.B.GPJ NC_DOT.GDT 7/17/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION N/A							GROUND WTR (ft)									
BORING NO. B2-A		STATION 25+22		OFFSET 14 ft LT		ALIGNMENT L										
COLLAR ELEV. 2,029.2 ft		TOTAL DEPTH 30.1 ft		NORTHING 604,778		EASTING 736,812										
DRILL RIG/HAMMER EFF./DATE AFC8963 CME-550X 77% 07/31/2017				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 02/07/19		COMP. DATE 02/07/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2030														2,029.2	GROUND SURFACE	0.0
2025	2,023.9	5.3	7	5	3										ALLUVIAL Gray brown silty SAND with gravels and boulders	
2020	2,018.9	10.3												2,018.9	CRYSTALLINE ROCK Gneiss	10.3
2015																
2010																
2005																
2000																
															Boring Terminated at Elevation 1,999.1 ft IN CRYSTALLINE ROCK	

NCDOT BORE DOUBLE B5910_GEO_BRDG_BORELOGS.GPJ NC_DOT.GDT 7/8/19

WBS 48042.1.1		TIP b-5910		COUNTY JACKSON		GEOLOGIST N/A						
SITE DESCRIPTION N/A							GROUND WTR (ft)					
BORING NO. B2-A		STATION N/A		OFFSET N/A		ALIGNMENT N/A						
COLLAR ELEV. N/A		TOTAL DEPTH 30.1 ft		NORTHING N/A		EASTING N/A						
DRILL RIG/HAMMER EFF./DATE NA				DRILL METHOD N/A		HAMMER TYPE Automatic						
DRILLER N/A		START DATE N/A		COMP. DATE 02/07/19		SURFACE WATER DEPTH N/A						
CORE SIZE NXWL			TOTAL RUN 14.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
											Continued from previous page	
		10.3	4.8		(4.6) 96%	(4.6) 96%						
		15.1	5.0		(5.0) 100%	(4.8) 96%						
		20.1	5.0		(5.0) 100%	(5.0) 100%						
		25.1									GSI: 40 - 90	

NCDOT BORE DOUBLE B5910_GEO_BRDG_CORELOGS.B.GPJ NC_DOT.GDT 7/17/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.						
SITE DESCRIPTION N/A							GROUND WTR (ft)					
BORING NO. B2-B		STATION 24+83		OFFSET 13.5 ft RT		ALIGNMENT L						
COLLAR ELEV. 2,028.0 ft		TOTAL DEPTH 19.7 ft		NORTHING 604,755		EASTING 736,770						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Cheek, D. O.		START DATE 02/07/19		COMP. DATE 02/07/19		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			
2030												
2025	2,022.9	5.1	2	7	9							2,028.0 GROUND SURFACE 0.0
2020	2,019.6	8.4	60/0									2,019.6 CRYSTALLINE ROCK 8.4
2015												
2010												
												Boring Terminated at Elevation 2,008.3 ft IN CRYSTALLINE ROCK

WBS 48042.1.1		TIP b-5910		COUNTY JACKSON		GEOLOGIST N/A					
SITE DESCRIPTION N/A							GROUND WTR (ft)				
BORING NO. B2-B		STATION N/A		OFFSET N/A		ALIGNMENT N/A					
COLLAR ELEV. N/A		TOTAL DEPTH 19.7 ft		NORTHING N/A		EASTING N/A					
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD N/A		HAMMER TYPE Automatic					
DRILLER N/A		START DATE N/A		COMP. DATE 02/07/19		SURFACE WATER DEPTH N/A					
CORE SIZE NXWL			TOTAL RUN 11.3 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) %	LOG	DESCRIPTION AND REMARKS
											Continued from previous page
		8.4	1.3		(1.0)	(0.5)					GSI: 50 - 85
		9.7	5.0		77%	38%					
		14.7	5.0		(5.0)	(5.0)					
		19.7			98%	94%					

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 48042.1.1		TIP B-5910		COUNTY JACKSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION N/A							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 25+71		OFFSET 19.9 ft LT		ALIGNMENT L	0 HR. FIAD									
COLLAR ELEV. 2,032.6 ft		TOTAL DEPTH 10.6 ft		NORTHING 604,780		EASTING 736,860	24 HR. N/A									
DRILL RIG/HAMMER EFF./DATE AFC8963 CME-550X 77% 07/31/2017				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 02/07/19		COMP. DATE 02/07/19		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)		
2035														2,032.6	GROUND SURFACE	0.0
2030														2,030.2	ROADWAY EMBANKMENT Brown gray silty SAND	2.4
		2,027.0	5.6	10	12	4									ALLUVIAL Brown gray silty SAND with boulders	
2025		2,022.0	10.6	60/0										2,022.0	CRYSTALLINE ROCK Gneiss Boring Terminated at Elevation 2,022.0 ft ON CRYSTALLINE ROCK	10.6

NCDOT BORE DOUBLE B5910_GEO_BRDG_BORELOGS.GPJ NC_DOT.GDT 7/8/19

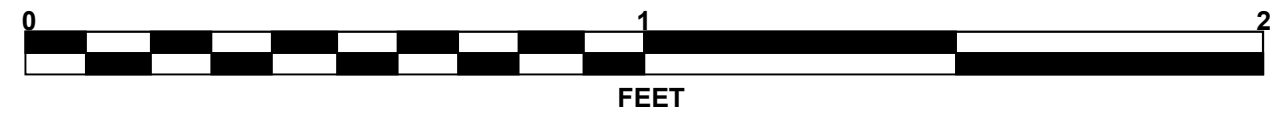
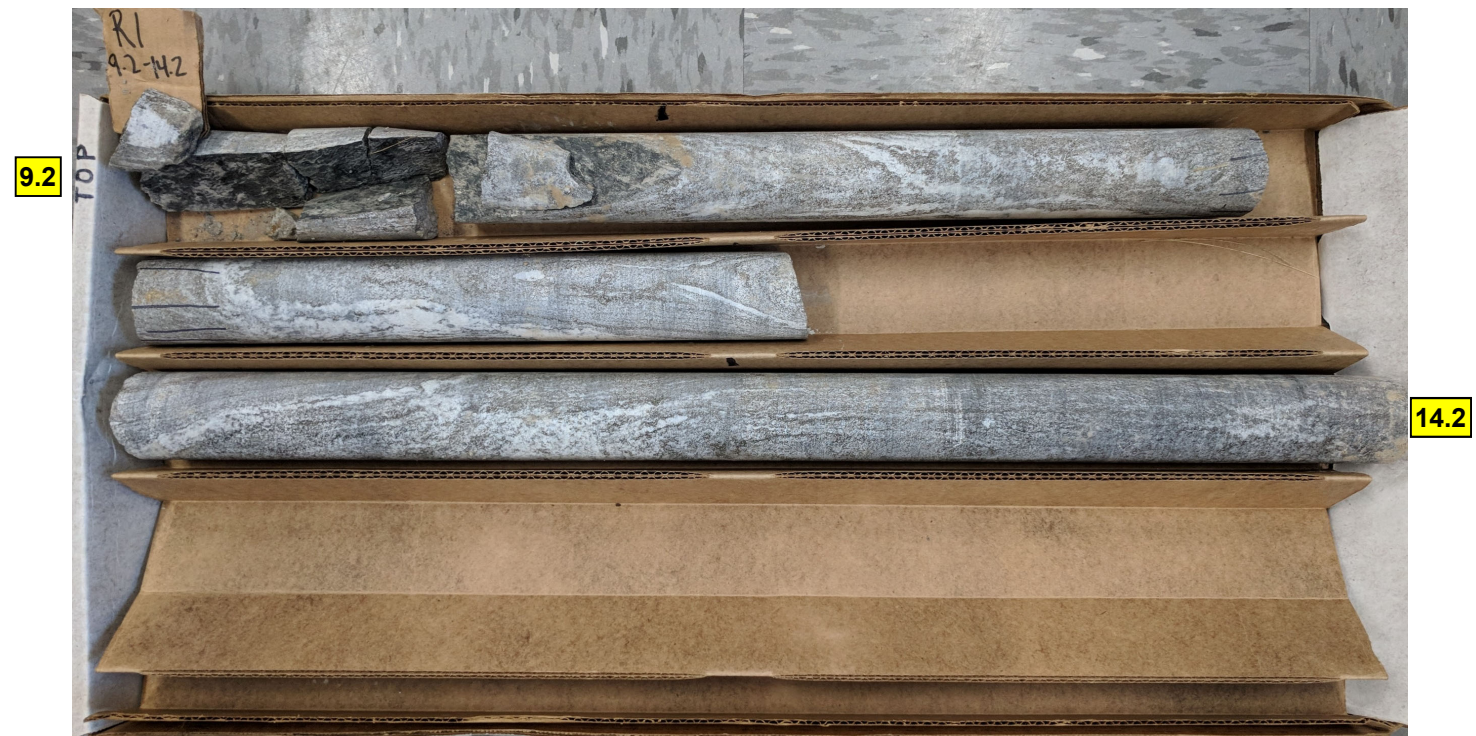
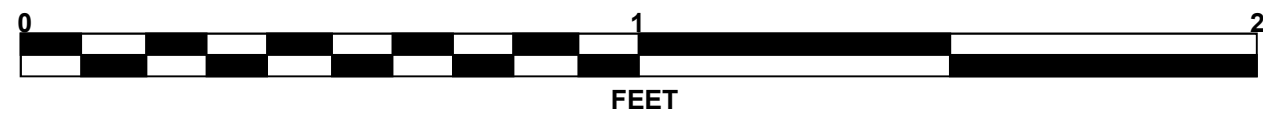
CORE PHOTOGRAPHS

EB1-A

BOX 1 OF 1: 10.9 - 19.8 FEET
GSI 70 - 90

EB1-B

BOX 1 OF 1: 9.2 - 14.2 FEET
GSI 60 - 90



CORE PHOTOGRAPHS

B1-B

BOX 1 OF 2: 10.7 - 19.8 FEET
GSI 40 - 80

B1-B

BOX 2 OF 2: 19.8 - 24.8 FEET
GSI 40 - 80



CORE PHOTOGRAPHS

B1-C

BOX 1 OF 2: 12.3 - 21.3 FEET
GSI 40 - 80

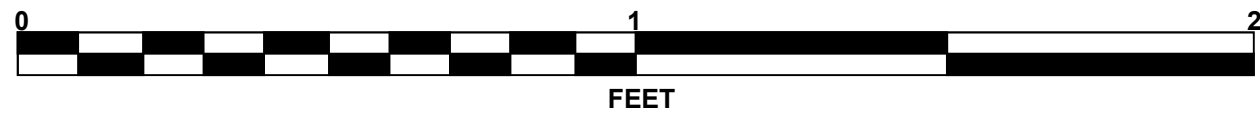
B1-C

BOX 2 OF 2: 21.3 - 25.5 FEET
GSI 40 - 80

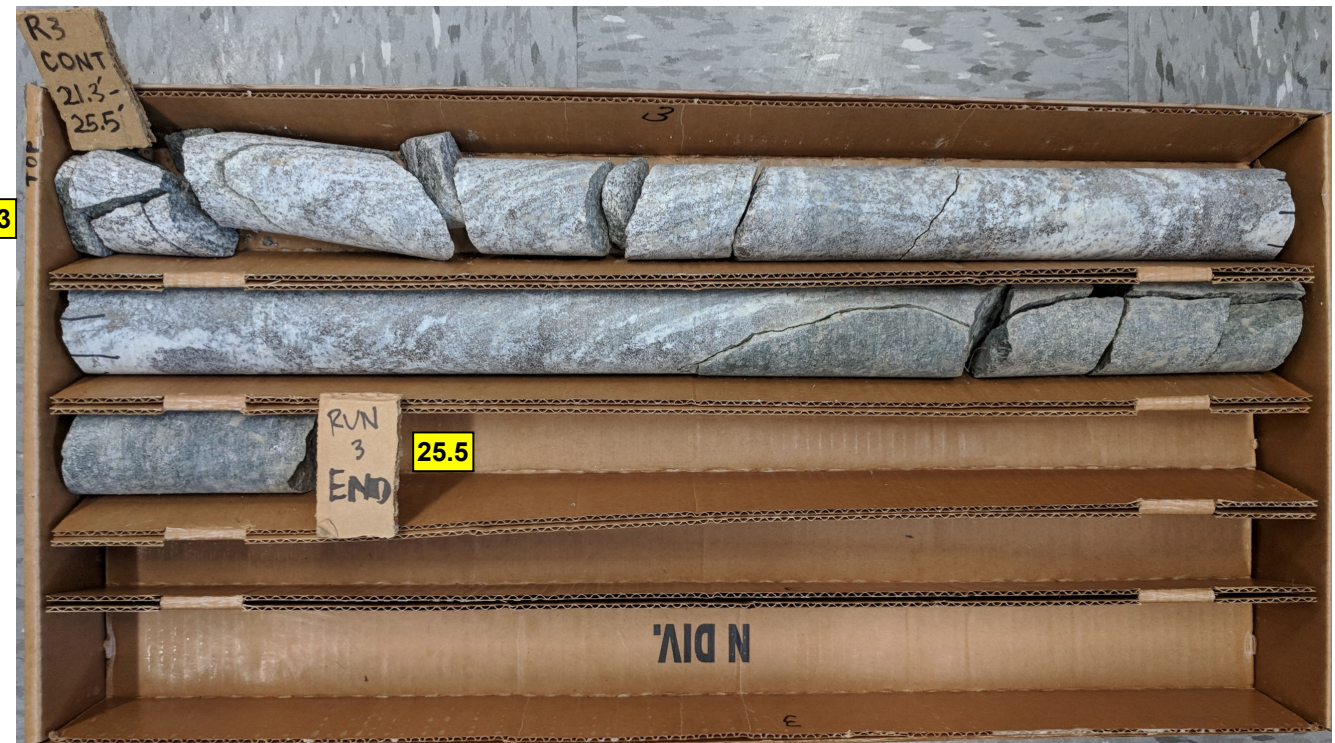
12.3



21.3



21.3



25.5



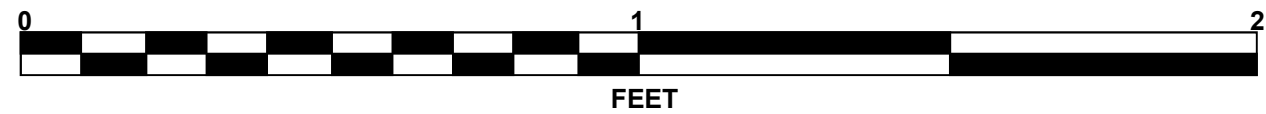
CORE PHOTOGRAPHS

B2-A

BOX 1 OF 2: 10.3 - 20.1 FEET
GSI 40 - 90

B2-A

BOX 2 OF 2: 20.1 - 25.1 FEET
GSI 40 - 90



CORE PHOTOGRAPHS

B2-B

BOX 1 OF 2: 8.4 - 17.7 FEET
GSI 50 - 85

B2-B

BOX 2 OF 2: 17.7 - 19.7 FEET
GSI 60 - 85

