

REFERENCE: BR-0099

PROJECT: 67099.1.1

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SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY RUTHERFORD
PROJECT DESCRIPTION REPLACE BRIDGE #12
ON NC-120 OVER US-74 BYPASS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	67099.1.1 BR-0099	1	9

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 1919 TOL-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

CE STEWMAN
JD WORLEY
CJ COFFEY
DC ELLIOTT
CD JOHNSON

INVESTIGATED BY CE STEWMAN
DRAWN BY CD JOHNSON
CHECKED BY DC ELLIOTT
SUBMITTED BY DC ELLIOTT
DATE 2/6/2024



DocuSigned by:
Crystal D. Johnson 03/05/2024
B465C877463... DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

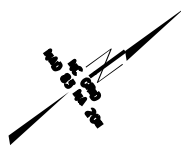
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
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 (ASTM 1 208, 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, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										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.										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:										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 (FPI) - 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 (IN 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 (SROQ) - 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 MATERIAL.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.									
GENERAL CLASS.										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.									
GROUP CLASS.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										NON-CRYSTALLINE ROCK (NCR)										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.									
SYMBOL										COMPRESSIBILITY										COASTAL PLAIN SEDIMENTARY ROCK (CP)										COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.									
2 PASSING #10 #40 #200										PERCENTAGE OF MATERIAL										WEATHERING										FRESH									
MATERIAL PASSING #40 LL PI										ORGANIC MATERIAL										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.									
GROUP INDEX										GROUND WATER										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.									
USUAL TYPES OF MAJOR MATERIALS										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										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.									
GENERAL RATING AS SUBGRADE										STATIC WATER LEVEL AFTER 24 HOURS										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.									
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30										SPRING OR SEEP										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.									
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										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.									
PRIMARY SOIL TYPE										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										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.									
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)										SOIL SYMBOL										ROCK HARDNESS										VERY HARD									
GENERALLY SILT-CLAY MATERIAL (COHESIVE)										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										HARD										CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.									
TEXTURE OR GRAIN SIZE										INFERRED SOIL BOUNDARY										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.									
U.S. STD. SIEVE SIZE OPENING (MM)										INFERRED ROCK LINE										MEDIUM HARD										CAN BE GROUDED OR GOUGED 0.85 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.									
BOULDER (BLR.)										ALLUVIAL SOIL BOUNDARY										SOFT										CAN BE GROUDED 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.									
GRAIN SIZE										RECOMMENDATION SYMBOLS										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.									
SOIL MOISTURE - CORRELATION OF TERMS										UNDERCUT										FRACTURE SPACING										BEDDING									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)										SHALLOW UNDERCUT										TERM										TERM									
FIELD MOISTURE DESCRIPTION										UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE										SPACING										THICKNESS									
GUIDE FOR FIELD MOISTURE DESCRIPTION										UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										VERY WIDE										VERY THICKLY BEDDED									
LL - LIQUID LIMIT										ABBREVIATIONS										WIDE										THICKLY BEDDED									
PL - PLASTIC LIMIT										AR - AUGER REFUSAL																													



20

21

22

23

24

F

F

F

F

EB1-A
Sta 21+50
21' LT

B1-A
Sta 22+33
28' LT

EB2-A
Sta 22+85
20' LT

-L-

BRIDGE 12

SKEW 68°

NC 120

MTL

EB1-B
Sta 21+70
20' RT

B1-B
Sta 22+19
31' RT

EB2-B
Sta 23+01
22' RT

US 74 NB
(TO ASHEVILLE)

US 74 EB
(TO SHELBY)



F

F

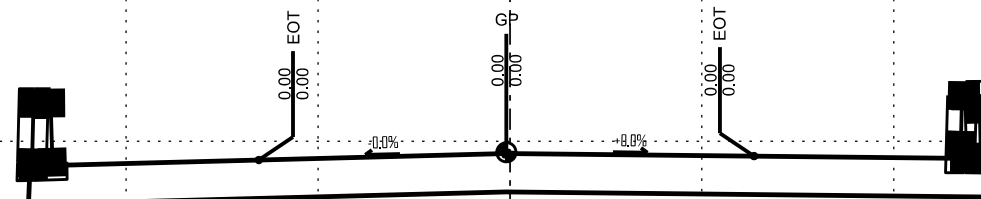
F

(A) ROADWAY EMBANKMENT:
RED MED-STIFF, SANDY-SILT (A-4)
TO CLAYEY-SILT (A-5)
w/TR SAND & MICA

(B) SAPROLITE:
BROWN, SANDY-SILT (A-4)
w/TR CLAY & MICA

(C) WEATHERED ROCK

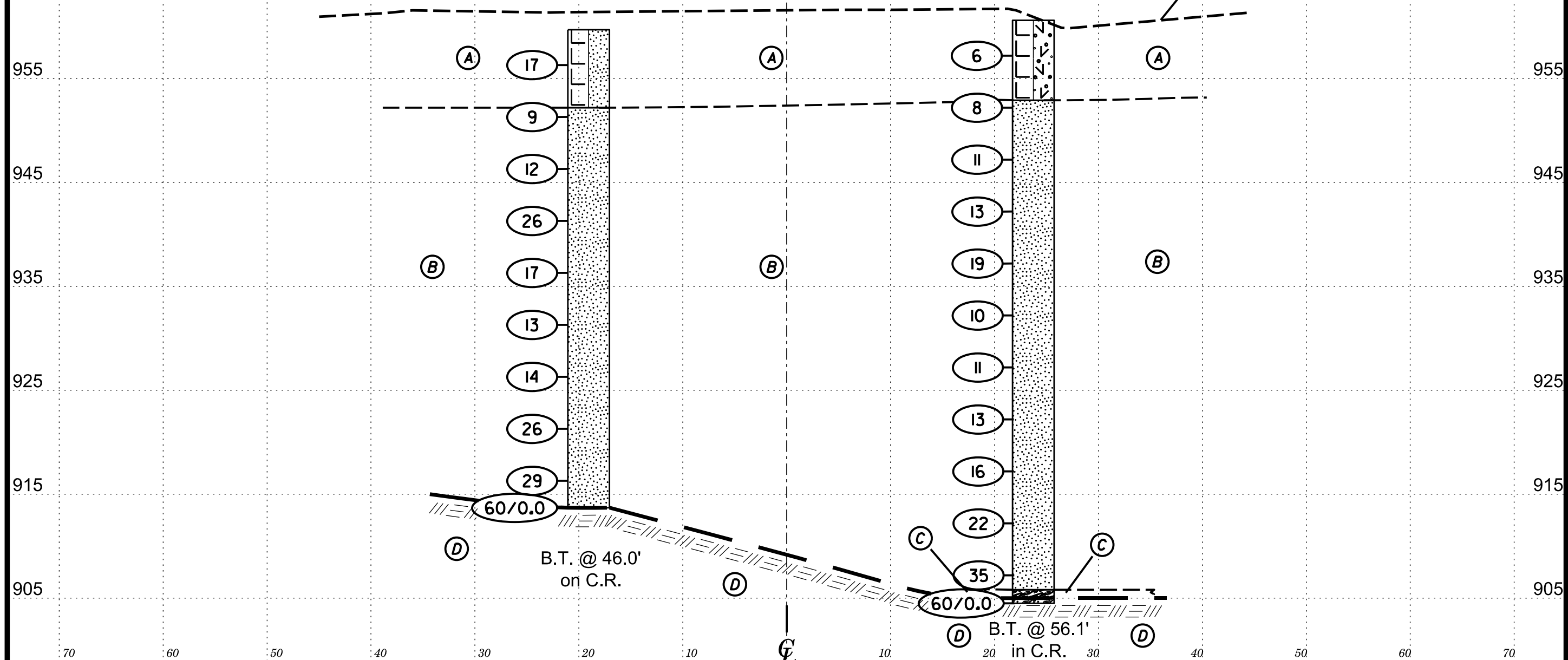
(D) CRYSTALLINE ROCK



EB1-A
Sta 21+50
21 ft LT

EB1-B
Sta 21+70
20 ft RT

EXISTING GROUND

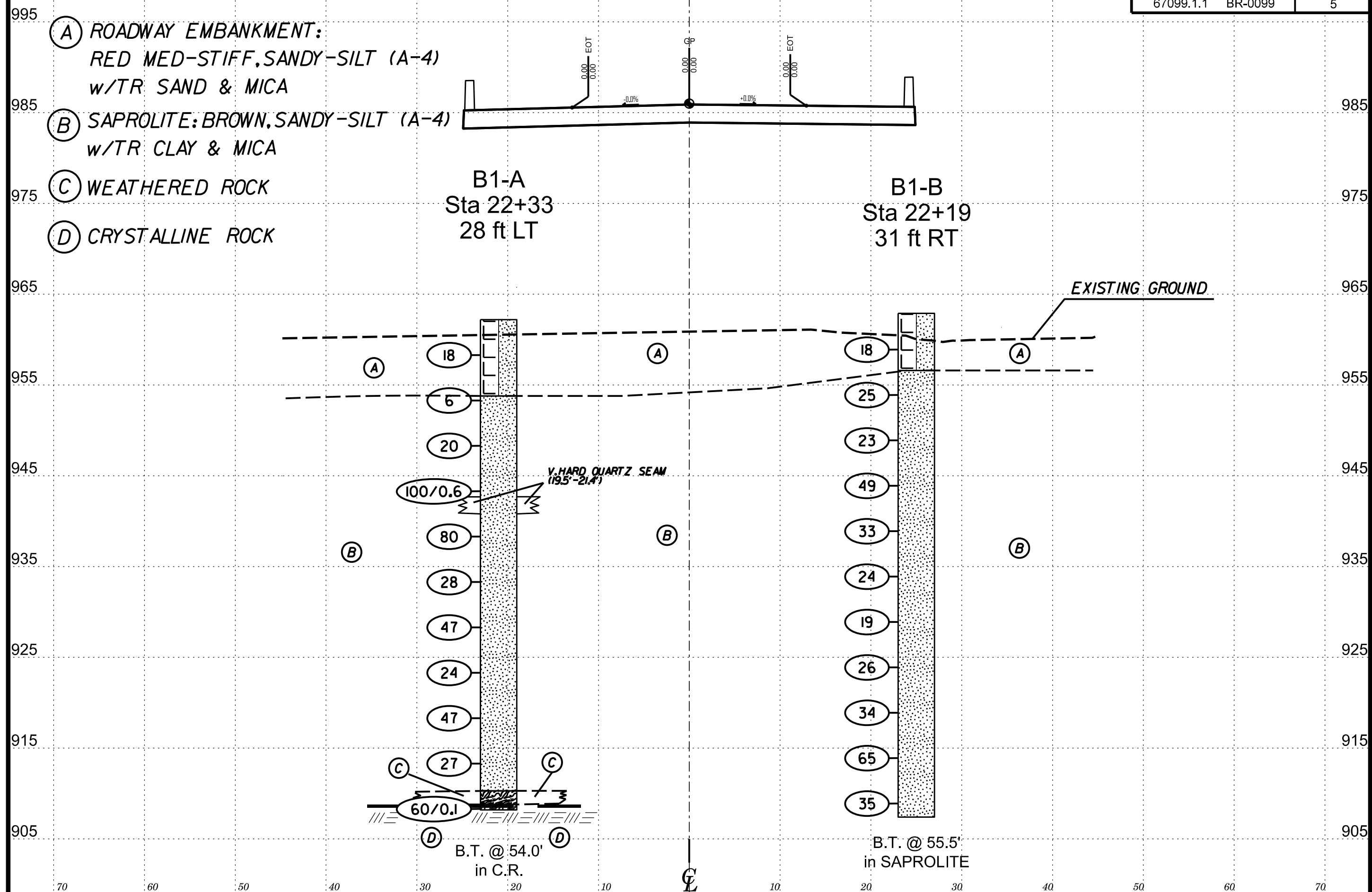


HORIZ. SCALE 0 10 20
(FEET)

VE = 1:1

CROSS-SECTION THRU END BENT#1

SKEW ANGLE 68°



HORIZ. SCALE 0 10 20
(FEET)

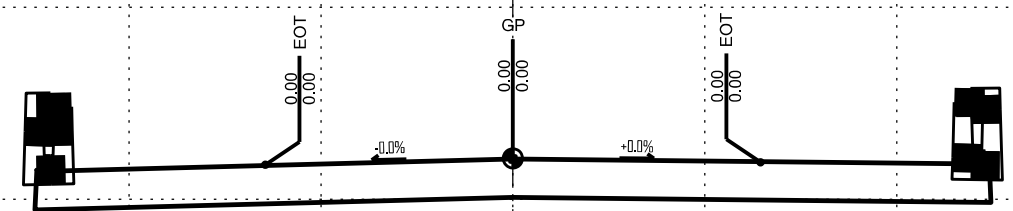
VE = 1:1

CROSS-SECTION THRU INT. BENT #1

SKEW ANGLE 68°

995
985
975
965
955
945
935
925
915
905

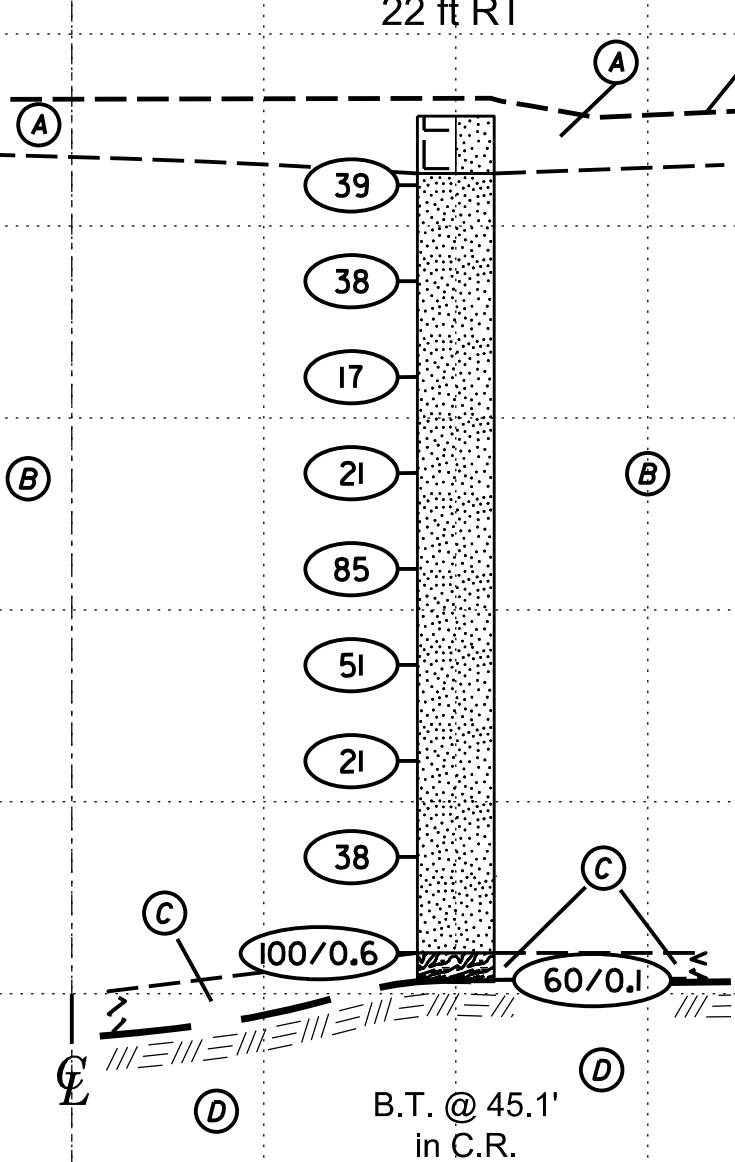
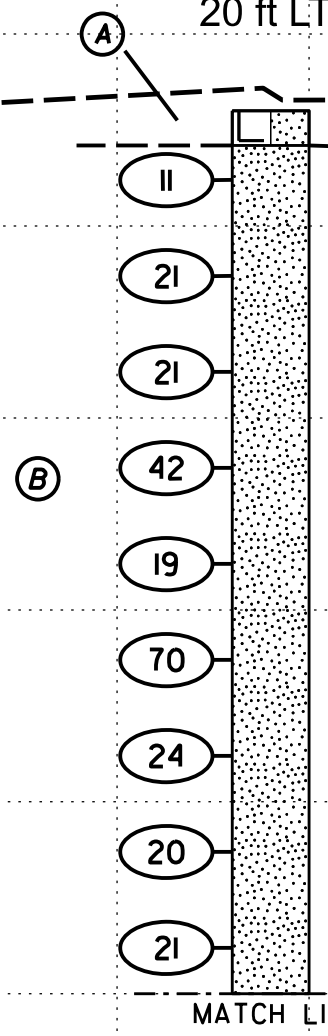
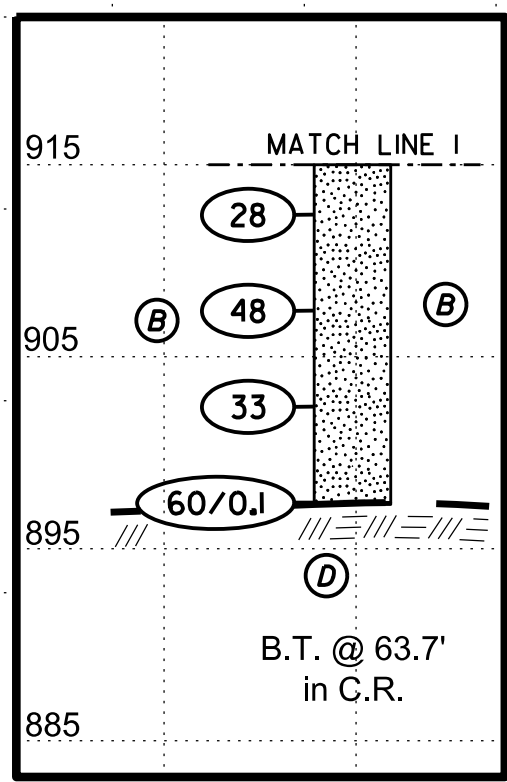
- (A) ROADWAY EMBANKMENT:
RED MED-STIFF, SANDY-SILT (A-4)
w/TR SAND & MICA
- (B) SAPROLITE: BROWN, SANDY-SILT (A-4)
w/TR CLAY & MICA
- (C) WEATHERED ROCK
- (D) CRYSTALLINE ROCK



EB2-A
Sta 22+85
20 ft LT

EB2-B
Sta 23+01
22 ft RT

EXISTING GROUND



NC DOT BORE DOUBLE BR0099 GEO BRDG0012 RUTHERFORD.GPJ NC_DOT.GDT 2/23/24

[illegible]

NC DOT BORE DOUBLE BR0099 GEO BRDG0012 RUTHERFORD.GPJ NC_DOT.GDT 2/23/24

WBS 67099.1.1						TIP BR-0099						COUNTY RUTHERFORD						GEOLOGIST Johnson, C. D.							
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74																		GROUND WTR (ft)							
BORING NO. B1-B						STATION 22+19						OFFSET 31 ft RT						ALIGNMENT -L-						0 HR. Dry	
COLLAR ELEV. 962.9 ft						TOTAL DEPTH 55.5 ft						NORTHING 574,049						EASTING 1,184,566						24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022												DRILL METHOD H.S. Augers						HAMMER TYPE Automatic							
DRILLER Coffey, Jr., C.						START DATE 12/12/23						COMP. DATE 12/12/23						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															
965																									
960	958.9	4.0	8	8	10	• 18					M		962.9	GROUND SURFACE 0.0											
						• 25					M		ROADWAY EMBANKMENT RED MED-STIFF, SANDY-SILT (A4) w/ TR SAND & MICA												
955	953.9	9.0	8	12	13	• 23					M								956.6	6.3					
950	948.9	14.0	7	11	12	• 49					M		SAPROLITE BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS												
	945	943.9	19.0	14	23	26	• 33					M													
940	938.9	24.0	6	15	18	• 24					M														
	935	933.9	29.0	6	7	17	• 19					M													
930	928.9	34.0	6	9	10	• 26					M														
	925	923.9	39.0	9	12	14	• 34					M													
920	918.9	44.0	9	21	13	• 65					M														
	915	913.9	49.0	13	29	36	• 35					M													
910	908.9	54.0	21	14	21						M		907.4	55.5											
													Boring Terminated at Elevation 907.4 ft IN SAPROLITE												

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67099.1.1			TIP BR-0099			COUNTY RUTHERFORD			GEOLOGIST Stewman, C. E.					
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74									GROUND WTR (ft)					
BORING NO. EB2-A			STATION 22+85			OFFSET 20 ft LT			ALIGNMENT -L-			0 HR. Dry		
COLLAR ELEV. 961.0 ft			TOTAL DEPTH 63.7 ft			NORTHING 574,133			EASTING 1,184,563			24 HR. Dry		
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Coffey, Jr., C.			START DATE 01/02/24			COMP. DATE 01/02/24			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)
965														
960													961.0	0.0
													959.2	1.8
	957.4	3.6	4	5	6						M		GROUND SURFACE	
955													ROADWAY EMBANKMENT	
	952.4	8.6	9	12	9						M		BROWN SAND-SILT w/ ANGULAR COBBLES (A-4)	
950													SAPROLITE	
	947.4	13.6	3	8	13						M		BROWN, RED MICACEOUS SAND-SILT w/ MnO SEAMS (A-4)	
945														
	942.4	18.6	13	28	14						M			
940														
	937.4	23.6	2	8	11						M			
935														
	932.4	28.6	20	32	38						M			
930														
	927.4	33.6	4	10	14						M			
925														
	922.4	38.6	2	7	13						M			
920													***BELOW WATER TABLE @ 38.6'	
	917.4	43.6	2	7	14						M			
915														
	912.4	48.6	4	7	21						M			
910														
	907.4	53.6	2	24	24						M			
905														
	902.4	58.6	6	11	22						M			
900														
	897.4	63.6	60/0.1			60/0.1							897.4	63.6
													897.3	63.7
													CRYSTALLINE ROCK	
													BLACK/DARK BROWN/WHITE w/ MICA	
													Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 897.3 ft IN CRYSTALLINE ROCK	

WBS 67099.1.1			TIP BR-0099			COUNTY RUTHERFORD			GEOLOGIST Stewman, C. E.				
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74									GROUND WTR (ft)				
BORING NO. EB2-B			STATION 23+01			OFFSET 22 ft RT			ALIGNMENT -L-			0 HR. Dry	
COLLAR ELEV. 960.7 ft			TOTAL DEPTH 45.1 ft			NORTHING 574,121			EASTING 1,184,606			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER Coffey, Jr., C.			START DATE 01/03/24			COMP. DATE 01/03/24			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			
965													
960													
955	957.1	3.6	11	22	17								960.7 GROUND SURFACE 0.0
950	952.1	8.6	5	17	21								957.7 ROADWAY EMBANKMENT 3.0
945	947.1	13.6	2	6	11								CONCRETE SLAB 0.1'-0.5' ABOVE RED SAND-SILT FILL (A-4) WITH ANGULAR GRAVELS
940	942.1	18.6	9	9	12								SAPROLITE BROWN, TAN MICACEOUS SAND-SILT w/ MnO SEAMS (A-4)
935	937.1	23.6	20	37	48								
930	932.1	28.6	8	23	28								***BELOW WATER TABLE @ 38.6'
925	927.1	33.6	4	10	11								
920	922.1	38.6	3	11	27								
	917.1	43.6	7	44	56/0.1								917.1 WEATHERED ROCK 43.6
	915.7	45.0											915.7 BLACK/DARK BROWN/WHITE w/ MICA 45.0
													915.6 CRYSTALLINE ROCK 45.1
													BLACK/DARK BROWN/WHITE w/ MICA
													Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 915.6 ft IN CRYSTALLINE ROCK

NCDOT BORE DOUBLE BR0099_GEO BRDG0012_RUTHERFORD.GPJ NC DOT.GDT 2/23/24

PROJECT: 67099.1.1

STRUCTURE SUBSURFACE INVESTIGATION

SITE DESCRIPTION RET WALL #1
-Y1- STATION 29+82.69 RT TO 31+12.44 RT

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE(S)
5-6	BORE LOG(S)

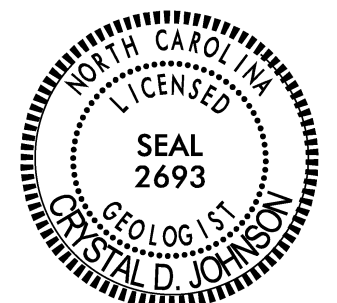
CAUTION NOTICE

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 RESPONSIBLE TO CONDUCT SUCH SURFACE INVESTIGATIONS AS NECESSARY INTERPRETATIONS ARE NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON 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.

PERSONNEL

CD JOHNSON

DATE 02/13/2024



DocuSigned by:
Crystal D. Johnson
03/05/2024

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

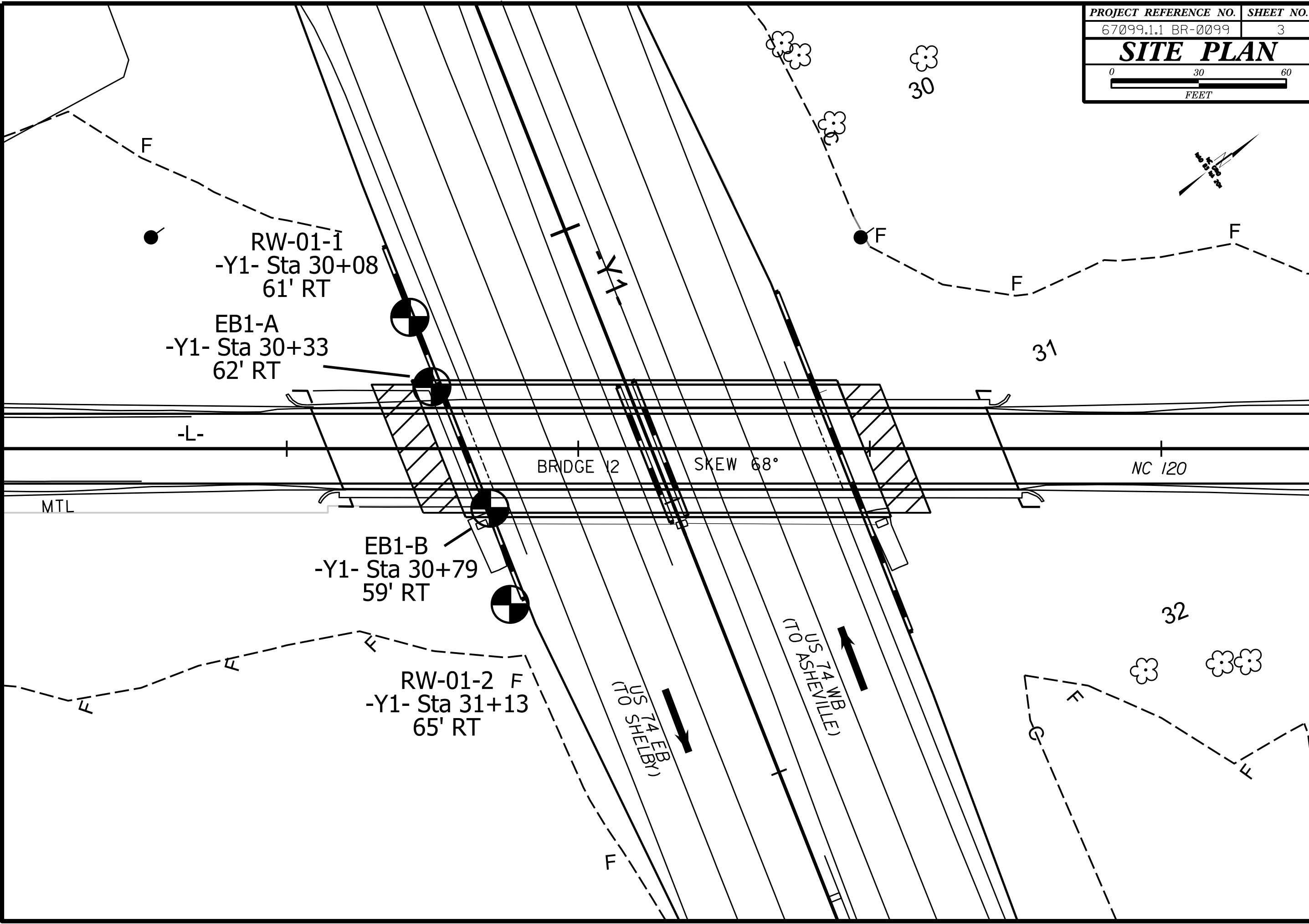
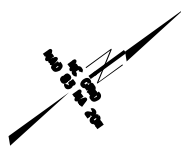
DIVISION OF HIGHWAYS

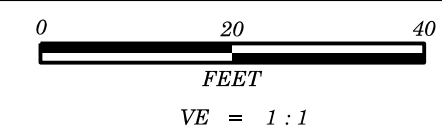
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

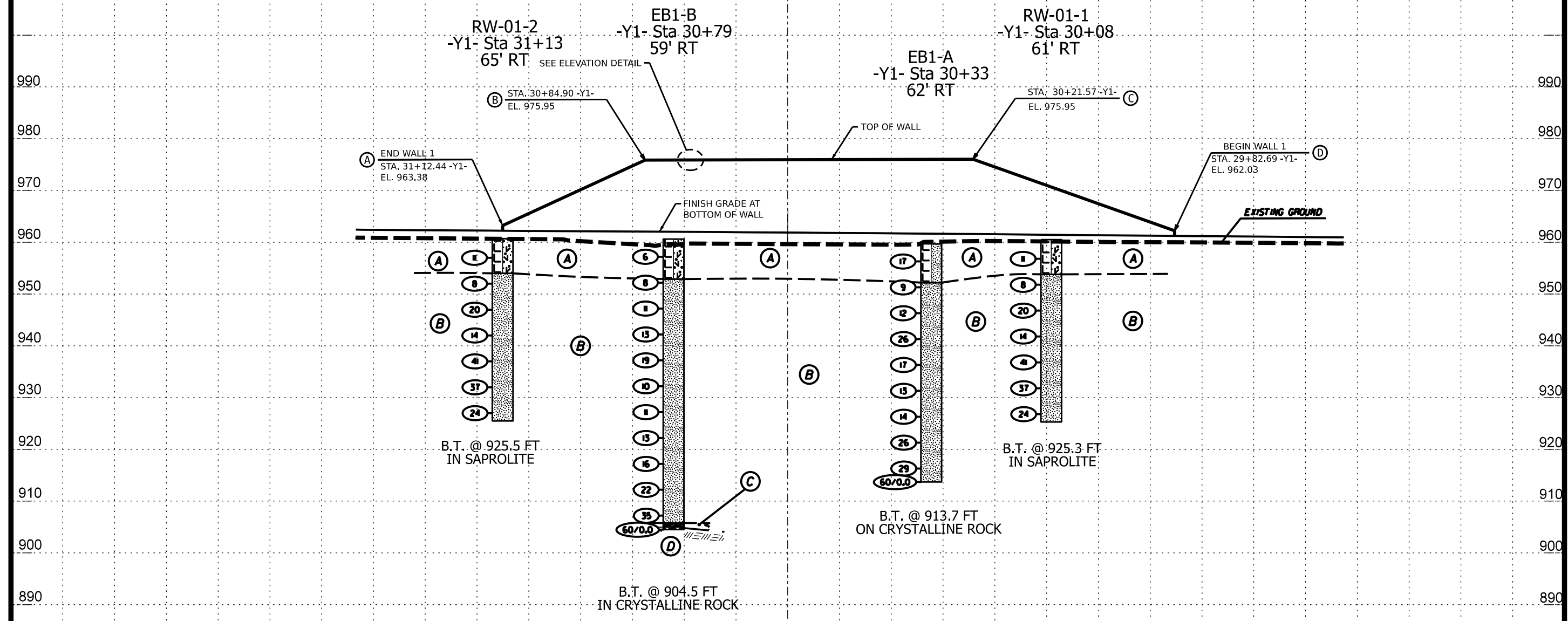
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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 (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, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										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.										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:										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 (FPI) - 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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
GENERAL CLASS.		GRANULAR MATERIALS (≤ 30% PASSING #200)				SILT-CLAY MATERIALS (> 30% PASSING #200)				ORGANIC MATERIALS				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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			





PROJECT REFERENCE NO.	SHEET NO.
67099.1.1 BR-0099	4
PROFILE BORINGS PROJECTED ON RWALL-01	

- (A) ROADWAY EMBANKMENT:
RED MED-STIFF, SANDY-SILT (A-4) TO CLAYEY-SILT (A-5)
w/TR SAND & MICA
- (B) SAPROLITE: BROWN, SANDY-SILT (A-4) w/TR CLAY & MICA
- (C) WEATHERED ROCK
- (D) CRYSTALLINE ROCK



RWALL-01 PROFILE ALONG EXISTING GROUND LINE
INFERRED STRATIGRAPHY IS DRAWN THRU BORING,
PROJECTED ON PROFILE

C

NC DOT BORE DOUBLE BR0099 GEO MSE-1 BRDG0012_RUTHERFORD.GPJ NC DOT.GDT 2/13/24

WBS 67099.1.1			TIP BR-0099			COUNTY RUTHERFORD			GEOLOGIST Johnson, C. D.				
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74									GROUND WTR (ft)				
BORING NO. EB1-A			STATION 30+33			OFFSET 62 ft RT			ALIGNMENT -Y1-			0 HR. Dry	
COLLAR ELEV. 959.7 ft			TOTAL DEPTH 46.0 ft			NORTHING 574,024			EASTING 1,184,483			24 HR. Dry	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER Coffey, Jr., C.			START DATE 12/18/23			COMP. DATE 12/18/23			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			
960													959.7 GROUND SURFACE 0.0
	956.3	3.4	5	8	9							M	ROADWAY EMBANKMENT RED MED-STIFF, SANDY-SILT (A4) w/ TR SAND & MICA
955													952.2 7.5
	951.3	8.4	2	4	5							M	SAPROLITE BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS
950												M	
	946.3	13.4	3	5	7							M	
945													
	941.3	18.4	5	12	14							M	
940													
	936.3	23.4	5	8	9							M	
935													
	931.3	28.4	5	5	8							M	
930													
	926.3	33.4	4	5	9							M	
925													
	921.3	38.4	10	12	14							M	
920													
	916.3	43.4	5	9	20							M	
915													
	913.7	46.0	60/0.0			60/0.0 60/0.0							913.7 46.0
													CRYSTALLINE ROCK BLACK/DARK BROWN/WHITE w/ MICA Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 913.7 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE BR0099 GEO MSE-1 BRDG0012_RUTHERFORD.GPJ NC DOT.GDT 2/13/24

WBS 67099.1.1		TIP BR-0099		COUNTY RUTHERFORD		GEOLOGIST Elliott, D. C.							
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74							GROUND WTR (ft)						
BORING NO. RW-01-2		STATION 31+13		OFFSET 65 ft RT		ALIGNMENT -Y1-		0 HR. Dry					
COLLAR ELEV. 960.7 ft		TOTAL DEPTH 35.2 ft		NORTHING 574,002		EASTING 1,184,559		24 HR. Dry					
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER Coffey, Jr., C.		START DATE 12/14/23		COMP. DATE 12/14/23		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			
965													
960													960.7 GROUND SURFACE 0.0
	957.0	3.7											ROADWAY EMBANKMENT RED MED-STIFF, CLAYEY-SILT (A5) w/ TR SAND & MICA
955			5	5	6						M		
	952.0	8.7	2	3	5						M		954.0 6.7
950											M		SAPROLITE BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS
	947.0	13.7	6	8	12						M		
945											M		
	942.0	18.7	7	7	7						M		
940											M		
	937.0	23.7	5	10	31						M		
935											M		
	932.0	28.7	15	20	17						M		
930											M		
	927.0	33.7	5	10	14						M		925.5 35.2
													Boring Terminated at Elevation 925.5 ft IN SAPROLITE

REFERENCE: BR-0099

PROJECT: 67099.1.1

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE(S)
5-6	BORE LOG(S)

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

STRUCTURE

SUBSURFACE INVESTIGATION

COUNTY RUTHERFORD

PROJECT DESCRIPTION REPLACE BRIDGE #12
ON NC-120 OVER US-74 BYPASS

SITE DESCRIPTION RET WALL #2
-Y1- STATION 30+46.45 LT TO 31+71.61 LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	67099.1.1 BR-0099	1	6

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 RELED 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

CE STEWMAN

JD WORLEY

CJ COFFEY

DC ELLIOTT

CD JOHNSON

INVESTIGATED BY CE STEWMAN

DRAWN BY CD JOHNSON

CHECKED BY DC ELLIOTT

SUBMITTED BY DC ELLIOTT

DATE 02/13/2024



DocuSigned by:
Crystal D. Johnson 03/12/2024

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 (ASTM D 1586). 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, MOST 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-2, A-3, A-4, A-5, A-6, A-7	A-1, A-2, A-3, A-4, A-5, A-6, A-7	A-1, A-2, A-3, A-4, A-5, A-6, A-7
SYMBOL			
% PASSING #10 #40 #200	50-100% 10-25% 10-25%	10-100% 10-25% 10-25%	10-100% 10-25% 10-25%
MATERIAL PASSING #40 LL PI	6-15% 0-5% 0-5%	10-100% 10-25% 10-25%	10-100% 10-25% 10-25%
GROUP INDEX	0-10	0-10	0-10
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS., GRAVEL, AND SAND	FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS, CLAYEY SOILS
GENERAL RATING AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR, POOR, UNSUITABLE

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE (OPENING MM)	4	10	40	60	200	270
	4.75	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 - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
PL - PLASTIC LIMIT	- WET - (W)	SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH
SLIGHTLY PLASTIC	0-5	VERY LOW
MODERATELY PLASTIC	6-15	SLIGHT
HIGHLY PLASTIC	16-25	MEDIUM
	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	MODERATELY COMPRESSIBLE	HIGHLY COMPRESSIBLE
LL < 31	LL > 31 - 50	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
FRAG. - 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 MOIST
ADVANCING TOOLS:
CLAY BITS
6" CONTINUOUS FLIGHT AUGER
6" HOLLOW AUGERS
HARD FACED FINGER BITS
TUNG-CARBIDE INSERTS
CASING w/ ADVANCER
TRICONE STEEL TEETH
TRICONE TUNG-CARB.
CORE BIT
HAMMER TYPE:
AUTOMATIC
MANUAL
CORE SIZE:
8
14
N
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)

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

CRYSTALLINE ROCK (CR)

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

NON-CRYSTALLINE ROCK (NCR)

FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTARY ROCK (CP)

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

WEATHERING

FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SL.): ROCK GENERALLY FRESH, JOINTS STAINED. SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SL.): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. 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.

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 HAND BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD: CAN BE GROUVED OR GOUGED 0.85 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 GROUVED 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

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

TERMS AND DEFINITIONS

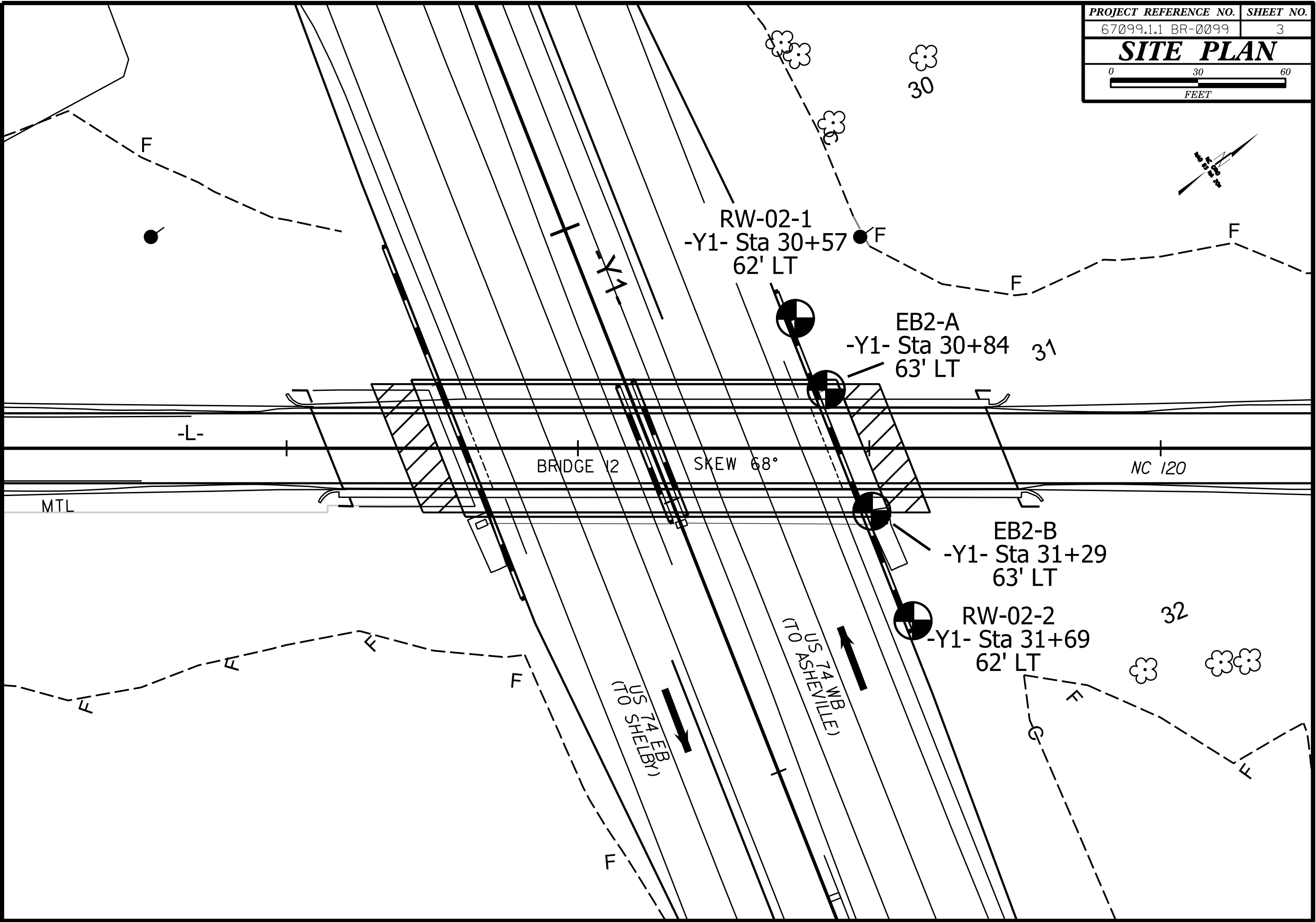
ALLUVIUM (ALLUV.): SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND 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 (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 (IN 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 (SROQ) - 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: BY-II & BY-12

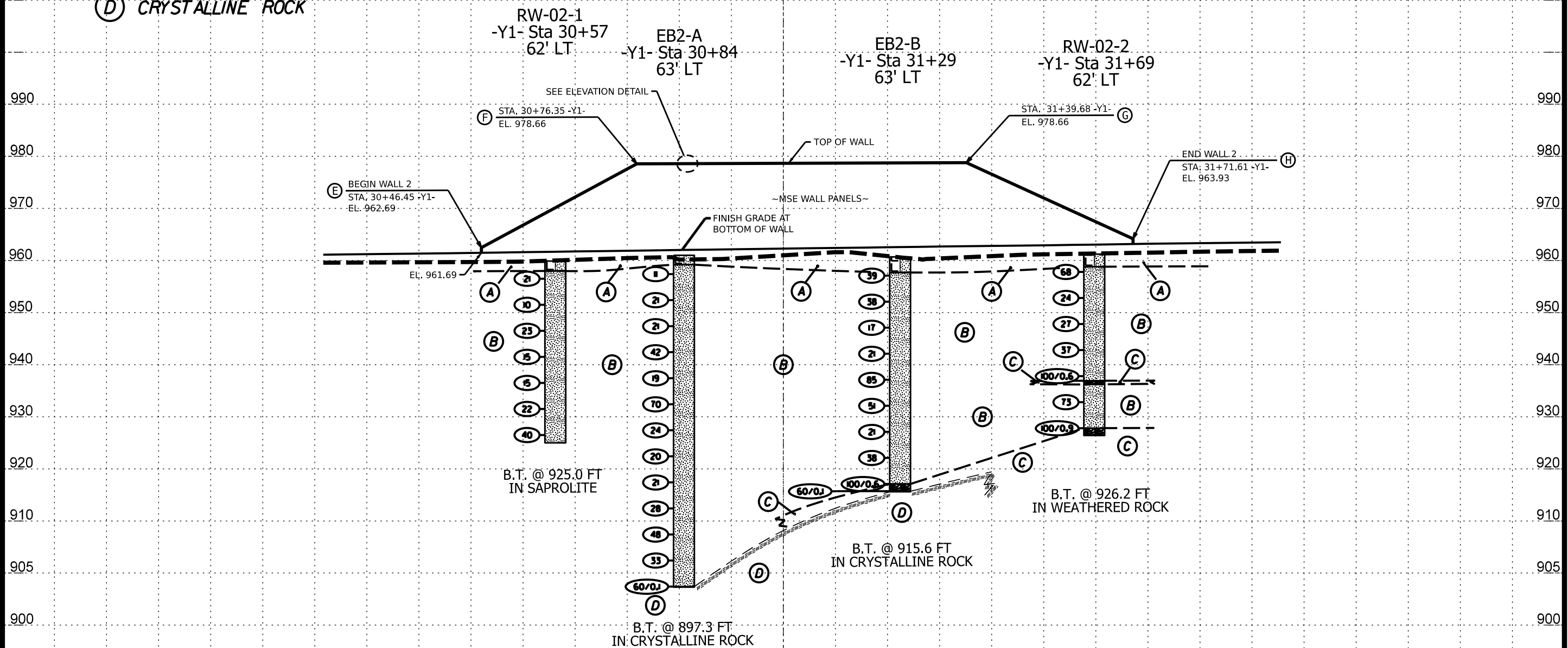
ELEVATION: FEET

NOTES:
BY-II STA. 23+03.78
ELEV. 958.10
N 574083.3650 E N84267.9500
BY-12 STA. 28+99.27
ELEV. 963.04
N 573997.2420 E N84857.1750

DATE: 8-15-14



- (A) ROADWAY EMBANKMENT:
RED MED-STIFF, SANDY-SILT (A-4)
w/TR SAND & MICA
- (B) SAPROLITE: BROWN, SANDY-SILT (A-4) w/TR CLAY & MICA
- (C) WEATHERED ROCK
- (D) CRYSTALLINE ROCK



RWAL02 PROFILE ALONG EXISTING GROUND LINE
INFERRED STRATIGRAPHY IS DRAWN THRU BORING.
PROJECTED ON PROFILE

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67099.1.1		TIP BR-0099		COUNTY RUTHERFORD		GEOLOGIST Stewman, C. E.									
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74												GROUND WTR (ft)			
BORING NO. RW-02-1		STATION 30+57		OFFSET 62 ft LT		ALIGNMENT -Y1-		0 HR. Dry							
COLLAR ELEV. 959.9 ft		TOTAL DEPTH 34.9 ft		NORTHING 574,139		EASTING 1,184,538		24 HR. Dry							
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022				DRILL METHOD H.S. Augers				HAMMER TYPE Automatic							
DRILLER Worley, J. D.		START DATE 01/02/24		COMP. DATE 01/02/24		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)
960														959.9	0.0
955	956.5	3.4									M			958.0	1.9
			2	9	12									ROADWAY EMBANKMENT RED MED-STIFF, CLAYEY-SILT (A4) w/ TR SAND & MICA	
950	951.5	8.4									M			SAPROLITE BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS	
			3	4	6										
945	946.5	13.4									M				
			12	11	12										
940	941.5	18.4									M				
			6	8	7										
935	936.5	23.4									M				
			4	6	9										
930	931.5	28.4									M				
			7	11	11										
925	926.5	33.4									M			925.0	34.9
												Boring Terminated at Elevation 925.0 ft IN SAPROLITE			

WBS 67099.1.1			TIP BR-0099			COUNTY RUTHERFORD			GEOLOGIST Stewman, C. E.						
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74												GROUND WTR (ft)			
BORING NO. EB2-A			STATION 30+84			OFFSET 63 ft LT			ALIGNMENT -Y1-			0 HR. Dry			
COLLAR ELEV. 961.0 ft			TOTAL DEPTH 63.7 ft			NORTHING 574,133			EASTING 1,184,563			24 HR. Dry			
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER Coffey, Jr., C.			START DATE 01/02/24			COMP. DATE 01/02/24			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					
965															
960															
	957.4	3.6	4	5	6										961.0 GROUND SURFACE 0.0
955															959.2 ROADWAY EMBANKMENT 1.8
	952.4	8.6	9	12	9										BROWN SAND-SILT w/ ANGULAR COBBLES (A-4)
950															SAPROLITE
	947.4	13.6	3	8	13										BROWN, RED MICACEOUS SAND-SILT w/ MnO SEAMS (A-4)
945															
	942.4	18.6	13	28	14										
940															
	937.4	23.6	2	8	11										
935															
	932.4	28.6	20	32	38										
930															
	927.4	33.6	4	10	14										
925															
	922.4	38.6	2	7	13										
920															
	917.4	43.6	2	7	14										***BELOW WATER TABLE @ 38.6'
915															
	912.4	48.6	4	7	21										
910															
	907.4	53.6	2	24	24										
905															
	902.4	58.6	6	11	22										
900															
	897.4	63.6	60/0.1												897.4 63.6
															897.3 63.7
															CRYSTALLINE ROCK
															BLACK/DARK BROWN/WHITE w/ MICA
															Boring Terminated WITH STANDARD
															PENETRATION TEST REFUSAL at
															Elevation 897.3 ft IN CRYSTALLINE ROCK

NCDOT BORE DOUBLE BR0099_GEO_RWAL02_BRDG0012_RUTHERFORD.GPJ NC_DOT.GDT 2/23/24

NCDOT BORE DOUBLE BR0099 GEO RWAL02 BRDG0012_RUTHERFORD.GPJ NC DOT.GDT 2/23/24

WBS 67099.1.1		TIP BR-0099		COUNTY RUTHERFORD		GEOLOGIST Stewman, C. E.						
SITE DESCRIPTION REPLACE BRIDGE 0012 ON NC-120 OVER US-74						GROUND WTR (ft)						
BORING NO. RW-02-2		STATION 31+69		OFFSET 62 ft LT		ALIGNMENT -Y1-						
COLLAR ELEV. 961.0 ft		TOTAL DEPTH 34.8 ft		NORTHING 574,110		EASTING 1,184,645						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 83% 04/11/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic						
DRILLER Worley, J. D.		START DATE 01/03/24		COMP. DATE 01/03/24		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		
965												
960												961.0 GROUND SURFACE 0.0
												ROADWAY EMBANKMENT
957.6	3.4		23	43	25							958.6 RED MED-STIFF, CLAYEY-SILT (A4) w/ TR SAND & MICA 2.4
												SAPROLITE
955												BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS
950												
945												
940												
935												936.7 WEATHERED ROCK 24.3
												936.0 **WEATHERED ROCK SEAM** 25.0
												SAPROLITE
930												BROWN/TAN MED-STIFF to STIFF, SANDY-SILT (A4) w/ TR CLAY & MICA : some deeper layers exhibit a BLACK & WHITE (salt & pepper) coloration w/ some ROCK FRAGS
												927.6 33.4
												926.2 WEATHERED ROCK 34.8
												BLACK/DARK BROWN/WHITE w/ MICA
												Boring Terminated at Elevation 926.2 ft IN WEATHERED ROCK