

PROJECT: 17BP.13.R.155 REFERENCE: SF-580267

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY McDOWELL
PROJECT DESCRIPTION REPLACE BRIDGE # 0267 ON
SR-1103 (BAT CAVE RD) OVER the CATAWBA RIVER

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-580267	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 (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:
1. 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.
 2. 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

-NCDOT-

DC CHEEK

CJ COFFEY

CD JOHNSON

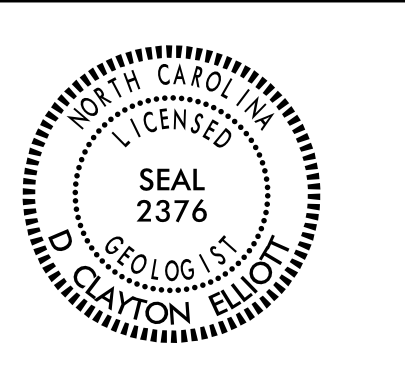
INVESTIGATED BY DC ELLIOTT

DRAWN BY DC ELLIOTT

CHECKED BY JC KUHNE

SUBMITTED BY JC KUHNE

DATE _____



DocuSigned by:
D. Clayton Elliott 4/25/2019

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 T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION
Table with columns for General Class, Soil Class, and Symbol. Includes subgroups A-1-a through A-7-6 and material types like Granular Soils, Silty-Clay Soils, and Muck/Peat.

CONSISTENCY OR DENSENESS
Table with columns for Primary Soil Type, Compactness or Consistency, Range of Standard Penetration Resistance (N-value), and Range of Unconfined Compressive Strength (tons/ft²).

TEXTURE OR GRAIN SIZE
Table with columns for U.S. Std. Sieve Size (mm) and corresponding grain sizes for Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS
Table with columns for Soil Moisture Scale (Atterberg Limits), Field Moisture Description, and Guide for Field Moisture Description (Liquid Limit, Plastic Limit, Optimum Moisture Shrinkage Limit).

PLASTICITY
Table with columns for Plasticity Index (PI) and Dry Strength, showing ranges for Non-Plastic, Slightly Plastic, Moderately Plastic, and Highly Plastic.

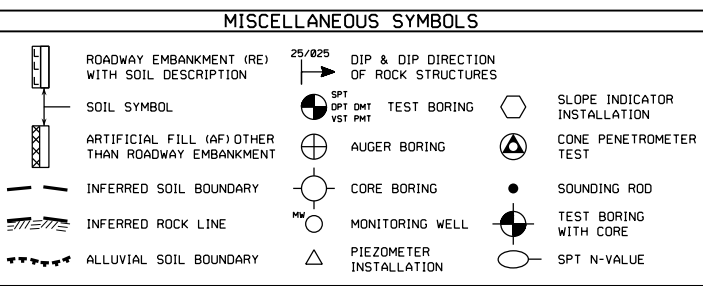
COLOR
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION
WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.
ANGULARITY OF GRAINS
THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
COMPRESSIBILITY
SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL
ORGANIC MATERIAL: TRACE OF ORGANIC MATTER (2-3%), LITTLE ORGANIC MATTER (3-5%), MODERATELY ORGANIC (5-10%), HIGHLY ORGANIC (>10%).
SILT-CLAY SOILS: SILT (3-5%), CLAY (5-12%), OTHER MATERIAL (1-10%, 10-20%, 20-35%, 35% AND ABOVE).

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

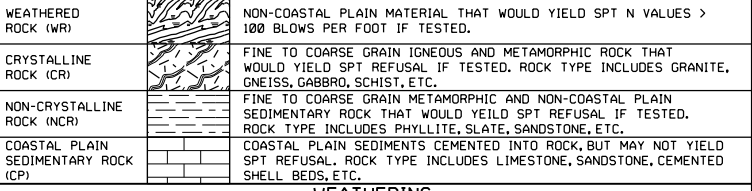


RECOMMENDATION SYMBOLS
UNDERCUT, SHALLOW UNDERCUT, UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE, UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK, UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL.

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, FRAGMENTS, HI. - HIGHLY, MED. - MEDIUM, MICA - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILTY, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, V - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, UG - UNIT WEIGHT, DUG - DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO.

EQUIPMENT USED ON SUBJECT PROJECT
DRILL UNITS: CME-45C, CME-55, CME-550, VANE SHEAR TEST, PORTABLE HOIST.
ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE *STEEL TEETH, TRICONE *TUNG-CARB., CORE BIT.
HAMMER TYPE: AUTOMATIC, MANUAL.
CORE SIZE: B, H, 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:



WEATHERING
FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING.
VERY SLIGHT (V SLI.): ROCK GENERALLY FRESH, JOINTS STAINED.
SLIGHT (SLI.): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH.
MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS.
MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED.
SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED.
VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED.
COMPLETE: ROCK REDUCED TO SOIL.

ROCK HARDNESS
VERY HARD: CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK.
HARD: CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY.
MODERATELY HARD: CAN BE SCRATCHED BY KNIFE OR PICK.
MEDIUM HARD: CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE.
SOFT: CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK.
VERY SOFT: CAN BE CARVED WITH KNIFE.
COMPLETE: ROCK REDUCED TO SOIL.

FRACTURE SPACING and BEDDING
Tables showing terms and thicknesses for fracture spacing (Very Wide to Very Close) and bedding (Very Thickly Bedded to Thinly Laminated).

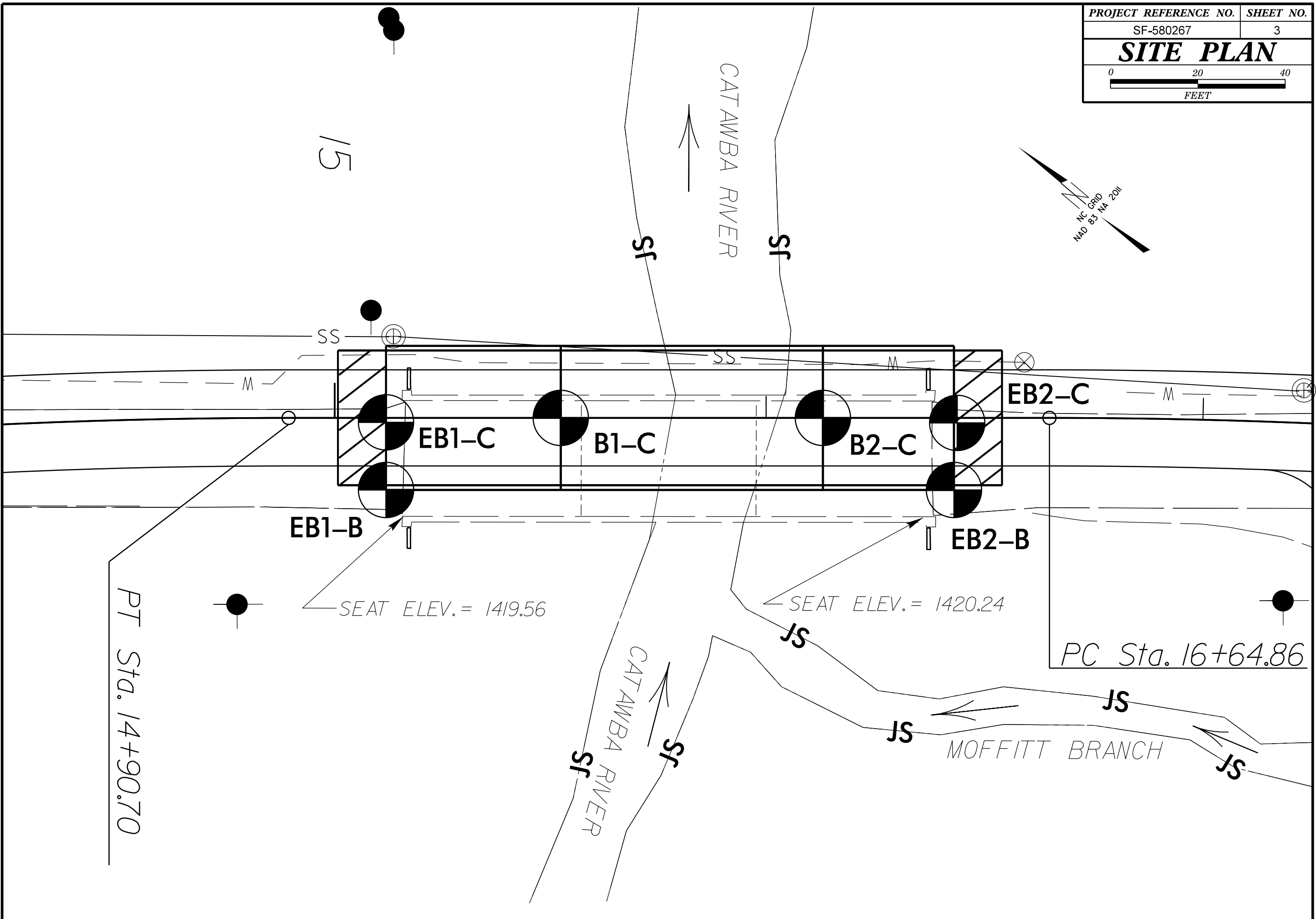
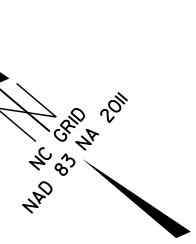
INDURATION
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.
FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS.
MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE.
INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE.
EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE.

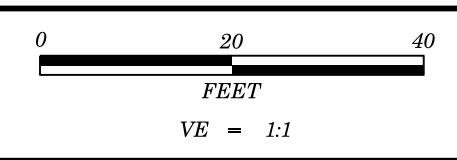
TERMS AND DEFINITIONS
ALLUVIUM (ALLUV.): SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED.
CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.
FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS.
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.
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.
STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

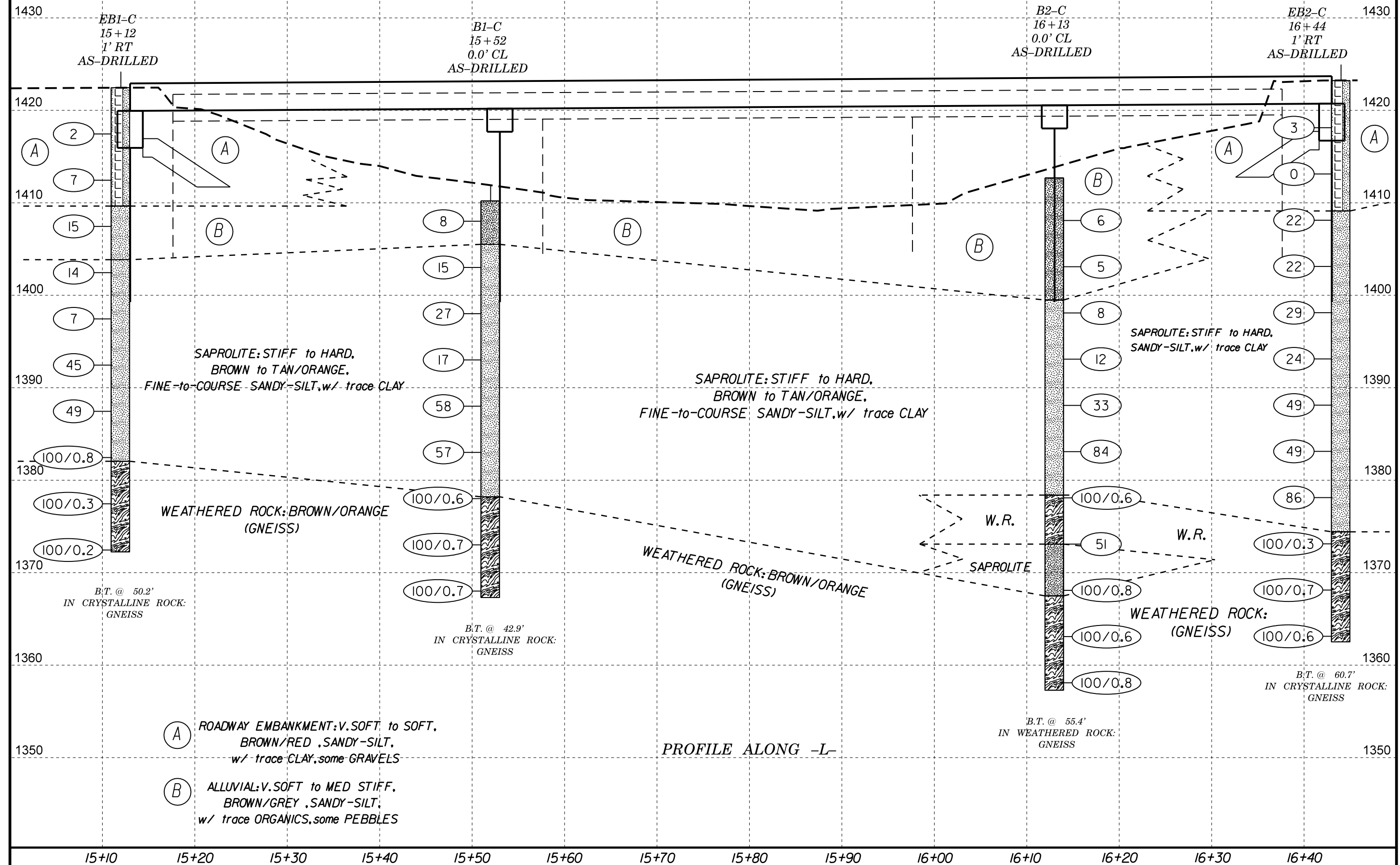
BENCH MARK: BL # 2 : SURVEY DISK IN GROUND
ELEVATION: 1423.51 FEET

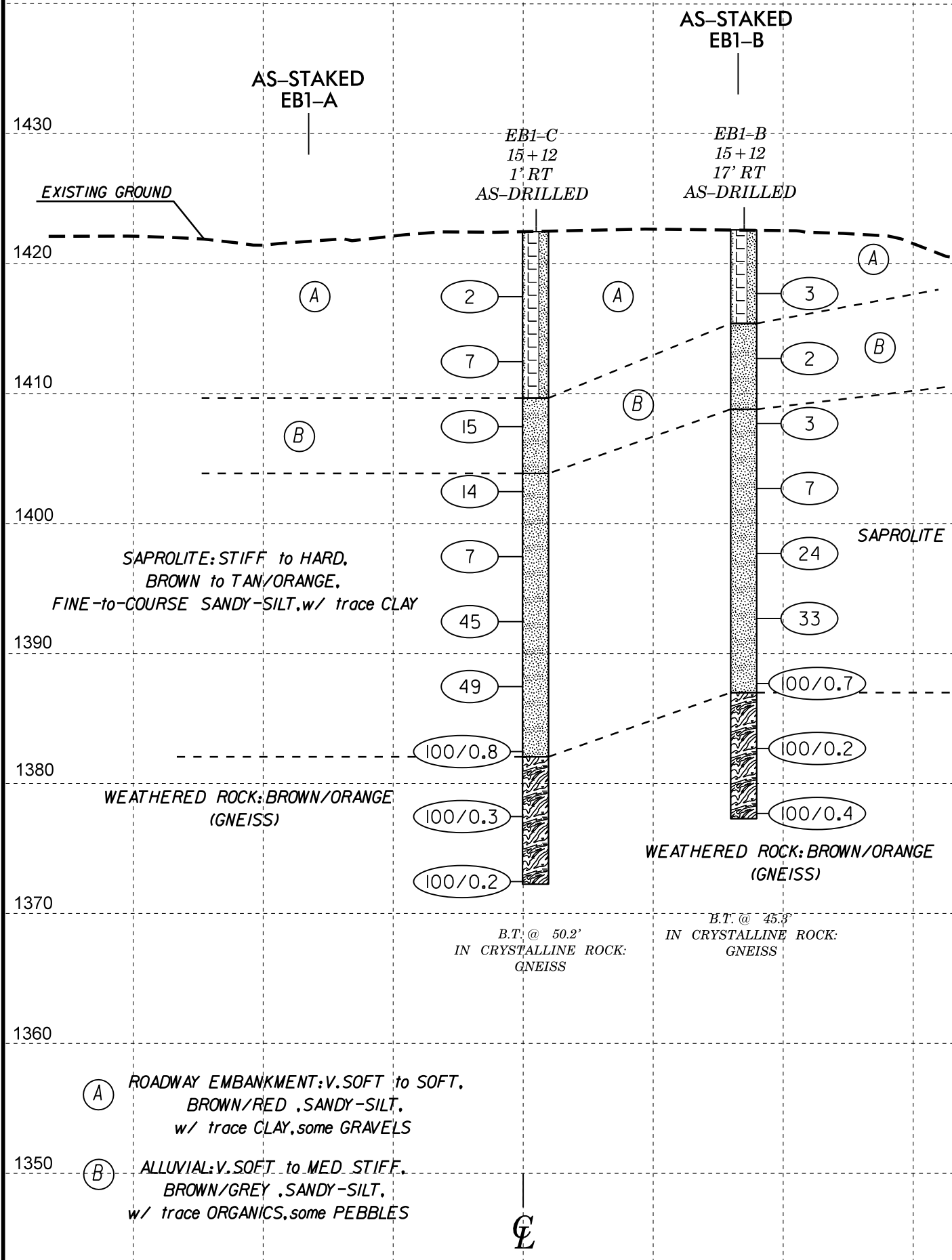
NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING
DATE: 8-15-14





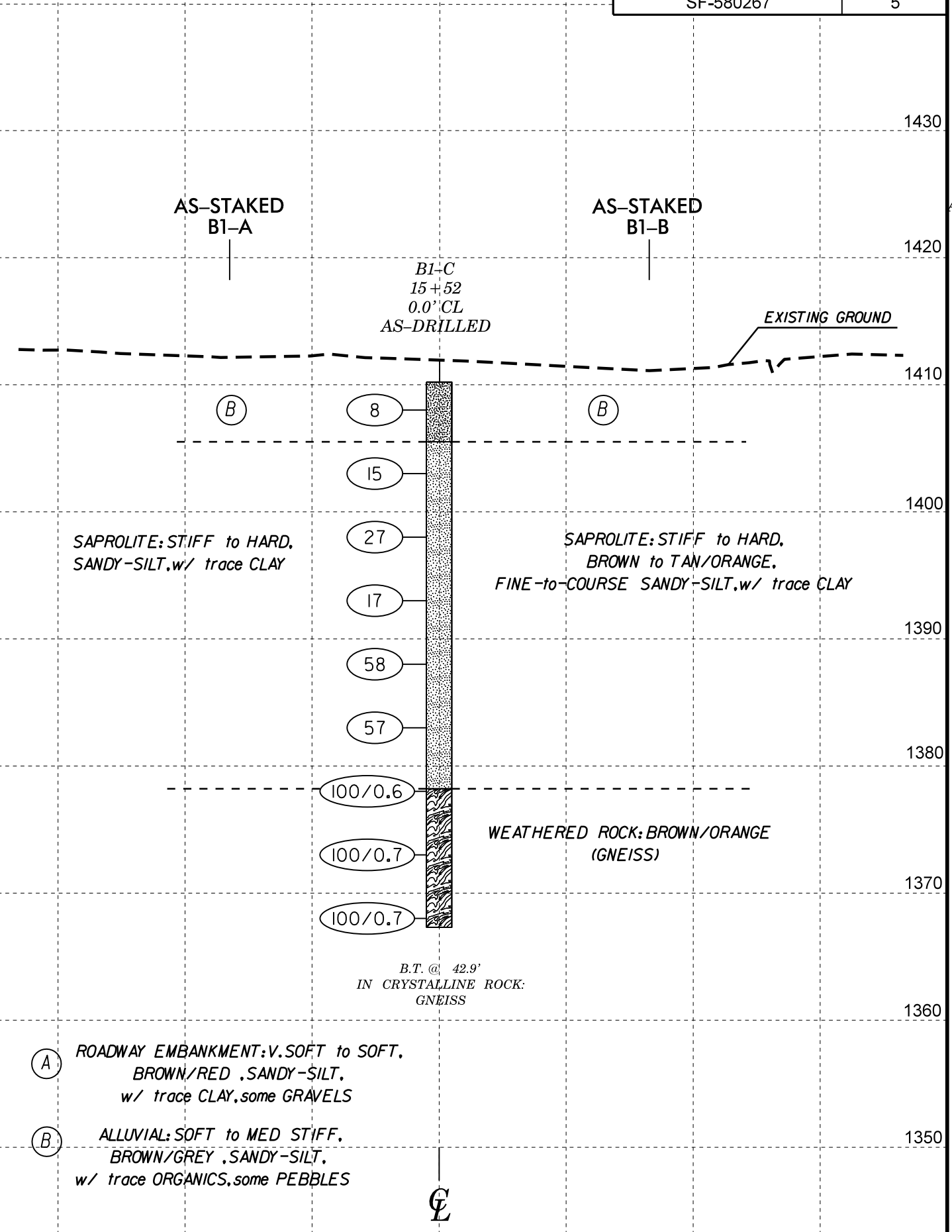
PROJECT REFERENCE NO.	SHEET NO.
SF-580267	4
REPLACE BRIDGE #267 ON SR-1103 (BAT CAVE RD) over CATAWBA RIVER	





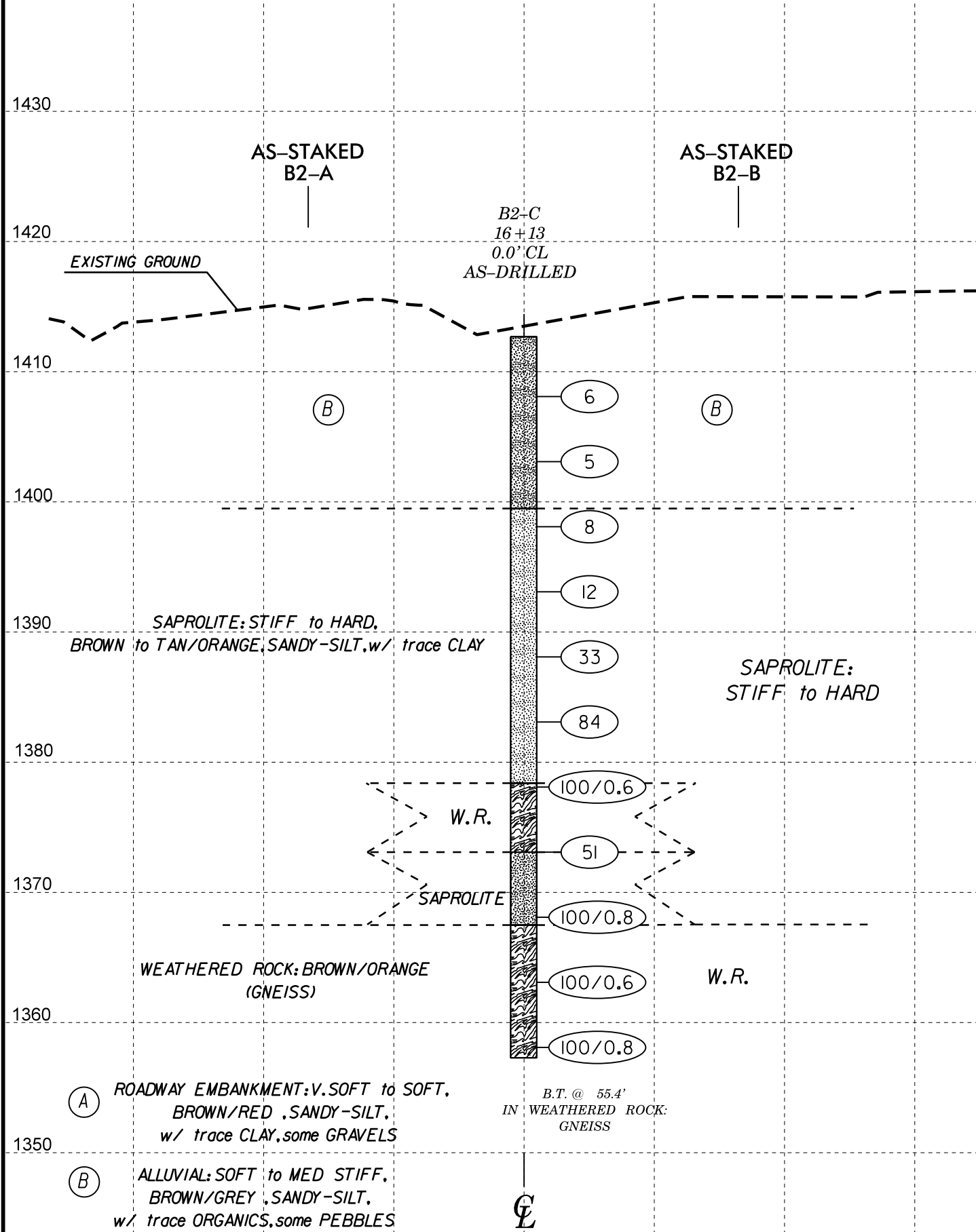
HORIZ. SCALE 0 10 20 (FEET) VE = 1H:1V

SECTION THRU END BENT 1



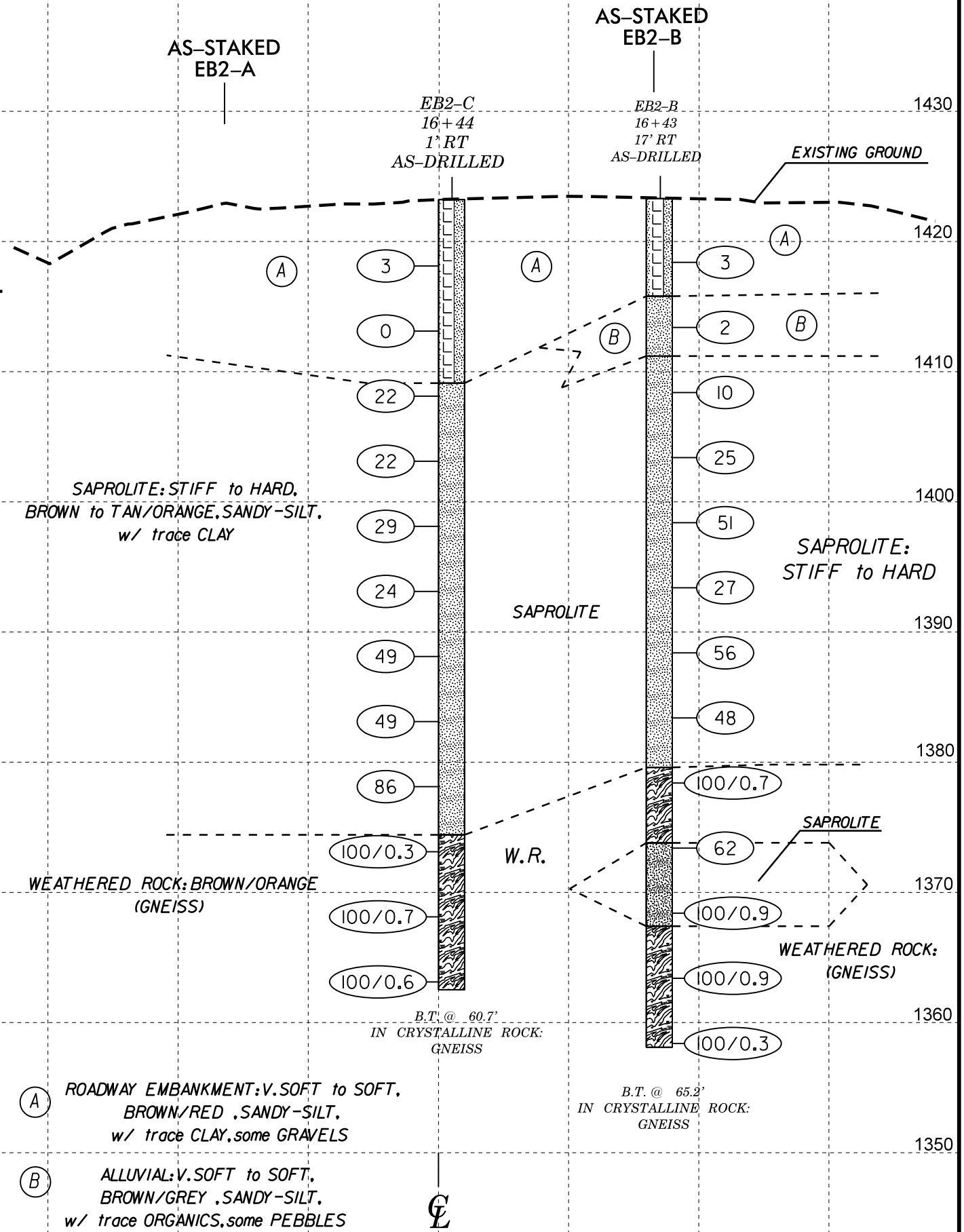
HORIZ. SCALE 0 10 20 (FEET) VE = 1H:1V

SECTION ALONG BENT 1 @ 15+52



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

SECTION ALONG BENT 2 @ 16+13



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

SECTION THRU END BENT 2

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)									
BORING NO. EB1-C		STATION 15+12		OFFSET 1 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,422.5 ft		TOTAL DEPTH 50.2 ft		NORTHING 1,055,400		EASTING 695,928										
DRILL RIG/HAMMER EFF./DATE AFC8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 04/15/19		COMP. DATE 04/15/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1425														GROUND SURFACE	0.0	
1420														ROADWAY EMBANKMENT ASPHALT	0.8	
1415	1,417.5	5.0	1	0	2									ROADWAY EMBANKMENT RED/BROWN SANDY-SILT, w/ trace of CLAY & MICA, some GRAVELS		
1410	1,412.5	10.0	3	4	3											
1405	1,407.5	15.0	6	8	7									ALLUVIAL BROWN SANDY-SILT, w/ trace MICA & ORGANICS	12.8	
1400	1,402.5	20.0	4	6	8									SAPROLITE BROWN/GREY FINE-to-COURSE SANDY-SILT, w/ trace MICA	18.6	
1395	1,397.5	25.0	2	2	5											
1390	1,392.5	30.0	11	20	25											
1385	1,387.5	35.0	7	22	27											
1380	1,382.5	40.0	43	57/0.3										WEATHERED ROCK BROWN/GREY WEATHERED ROCK (GNEISS), w/ trace of MnO @ 45.0'	40.4	
1375	1,377.5	45.0	100/0.3													
	1,372.5	50.0	100/0.2													
															Boring Terminated at Elevation 1,372.3 ft IN WEATHERED ROCK	50.2

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 15+12		OFFSET 17 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,422.6 ft		TOTAL DEPTH 45.3 ft		NORTHING 1,055,388		EASTING 695,918										
DRILL RIG/HAMMER EFF./DATE AFC8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 04/15/19		COMP. DATE 04/15/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1425														GROUND SURFACE	0.0	
1420														ROADWAY EMBANKMENT ASPHALT	0.9	
1415	1,417.7	4.9	1	1	2									ROADWAY EMBANKMENT RED/BROWN SANDY-SILT, w/ trace of CLAY & MICA, some GRAVELS	7.2	
1410	1,412.7	9.9	1	1	1									ALLUVIAL GREYISH-BROWN SANDY-SILT, w/ trace MICA		
1405	1,407.7	14.9	1	1	2									SAPROLITE TAN/ORANGE to BROWN/GREY FINE-to-COURSE SANDY-SILT, w/ trace MICA & CLAY	13.8	
1400	1,402.7	19.9	2	3	4											
1395	1,397.7	24.9	6	11	13											
1390	1,392.7	29.9	6	13	20											
1385	1,387.7	34.9	18	41	59/0.2											
1380	1,382.7	39.9	100/0.2											WEATHERED ROCK BROWN/GREY/RED WEATHERED ROCK (GNEISS), w/ trace of MnO	35.6	
	1,377.7	44.9	100/0.4													
															Boring Terminated at Elevation 1,377.3 ft IN WEATHERED ROCK	45.3

NCDOT BORE DOUBLE 14400B_GEO_BRDG0267_MCDOWELL_BOREHOLES.GPJ NC_DOT.GDT 4/25/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)									
BORING NO. B1-C		STATION 15+52		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,410.2 ft		TOTAL DEPTH 42.9 ft		NORTHING 1,055,427		EASTING 695,899										
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 04/11/19		COMP. DATE 04/11/19		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						
1415																
1410	1,408.0	2.2	2	3	5									1,410.2	GROUND SURFACE	0.0
1405	1,403.0	7.2	3	6	9									1,405.5	ALLUVIAL BROWN SANDY-SILT, w/ trace MICA & ORGANICS, a few PEBBLES	4.7
1400	1,398.0	12.2	7	10	17										SAPROLITE BROWN/WHITE/BLACK FINE-to-COURSE SANDY-SILT, w/ trace MICA & CLAY, trace of ROCK FRAGMENTS	
1395	1,393.0	17.2	7	7	10											
1390	1,388.0	22.2	8	15	43											
1385	1,383.0	27.2	12	24	33											
1380	1,378.0	32.2	66	34/0.1										1,378.2	WEATHERED ROCK BROWN/ORANGE WEATHERED ROCK (GNEISS), w/ trace of MnO	32.0
1375	1,373.0	37.2	39	61/0.2												
1370	1,368.0	42.2	55	45/0.2										1,367.3		42.9
Boring Terminated at Elevation 1,367.3 ft IN WEATHERED ROCK																

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.										
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)									
BORING NO. B2-C		STATION 16+13		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,412.7 ft		TOTAL DEPTH 55.4 ft		NORTHING 1,055,466		EASTING 695,853										
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 04/04/19		COMP. DATE 04/04/19		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						
1415																
1410	1,408.1	4.6	2	4	2									1,412.7	GROUND SURFACE	0.0
1405	1,403.1	9.6	2	3	2										ALLUVIAL TAN/BROWN SANDY-SILT, w/ trace MICA & a few rounded PEBBLES, thru BOULDER/COBBLES 0.0'-4.6'	
1400	1,398.1	14.6	2	3	5										SAPROLITE ORANGE/BROWN FINE-to-COURSE SANDY-SILT, w/ trace MICA & CLAY, a few MnO LAYERS INTERMINGLED	
1395	1,393.1	19.6	3	5	7											
1390	1,388.1	24.6	4	11	22											
1385	1,383.1	29.6	19	22	62											
1380	1,378.1	34.6	42	58/0.1										1,378.4	WEATHERED ROCK RED/BROWN/ORANGE WEATHERED ROCK (GNEISS), w/ trace of MnO	34.3
1375	1,373.1	39.6	10	21	30									1,373.1	SAPROLITE ORANGE/BROWN FINE-to-COURSE SANDY-SILT, w/ trace MICA & CLAY, a few MnO LAYERS INTERMINGLED	39.6
1370	1,368.1	44.6	33	67/0.3										1,367.5	WEATHERED ROCK BROWN/ORANGE WEATHERED ROCK (GNEISS), w/ trace of MnO	45.2
1365	1,363.1	49.6	14	54	46/0.1											
1360	1,358.1	54.6	55	45/0.3										1,357.3		55.4
Boring Terminated at Elevation 1,357.3 ft IN WEATHERED ROCK																

NCDOT BORE DOUBLE 14400B_GEO_BRDG0267_MCDOWELL_BOREHOLES.GPJ_NC_DOT.GDT 4/25/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.	
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)
BORING NO. EB2-C		STATION 16+44		OFFSET 1 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 1,423.2 ft		TOTAL DEPTH 60.7 ft		NORTHING 1,055,484		EASTING 695,829	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic	
DRILLER Cheek, D. O.		START DATE 04/03/19		COMP. DATE 04/03/19		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1425														1,423.2	GROUND SURFACE	0.0
1420	1,418.1	5.1	1	1	2									1,422.7	ROADWAY EMBANKMENT ASPHALT	0.9
1415	1,413.1	10.1	WOH	WOH	WOH										ROADWAY EMBANKMENT BROWN SANDY-SILT, w/ trace of CLAY & MICA, some GRAVELS	
1410	1,408.1	15.1	2	8	14										SAPROLITE BROWN w/ BLACK, SANDY-SILT, w/ trace MICA & ORGANICS	14.1
1405	1,403.1	20.1	4	10	12											
1400	1,398.1	25.1	11	14	15											
1395	1,393.1	30.1	8	10	14											
1390	1,388.1	35.1	8	15	34											
1385	1,383.1	40.1	8	17	32											
1380	1,378.1	45.1	32	35	51											
1375	1,373.1	50.1	100/0.3													
1370	1,368.1	55.1	24	86/0.2												
1365	1,363.1	60.1	75	25/0.1												

WBS 17BP.13.R.155		TIP SF-580267		COUNTY HENDERSON		GEOLOGIST Johnson, C. D.	
SITE DESCRIPTION Replace Bridge No. 267 over Catawba River on SR 1103 (Bat Cave Rd)							GROUND WTR (ft)
BORING NO. EB2-B		STATION 16+43		OFFSET 17 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 1,423.3 ft		TOTAL DEPTH 65.2 ft		NORTHING 1,055,472		EASTING 695,819	
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic	
DRILLER Cheek, D. O.		START DATE 04/02/19		COMP. DATE 04/02/19		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1425														1,423.3	GROUND SURFACE	0.0
1420	1,418.4	4.9	WOH	1	2									1,422.3	ROADWAY EMBANKMENT ASPHALT	1.0
1415	1,413.4	9.9	1	1	1									1,415.8	ROADWAY EMBANKMENT RED/BROWN CLAYEY-SILT, w/ a little SAND & trace of MICA, some GRAVELS	7.5
1410	1,408.4	14.9	3	5	5									1,411.2	ALLUVIAL GREY SANDY-SILT, w/ trace CLAY & MICA & ORGANICS, few small PEBBLES	12.1
1405	1,403.4	19.9	8	10	15										SAPROLITE BROWN/TAN/WHITE, SANDY-SILT, w/ trace CLAY & MICA, a few MnO SEAMS	
1400	1,398.4	24.9	13	21	30											
1395	1,393.4	29.9	8	10	17											
1390	1,388.4	34.9	21	24	32											
1385	1,383.4	39.9	21	28	20											
1380	1,378.4	44.9	26	40	60/0.2											
1375	1,373.4	49.9	13	30	32											
1370	1,368.4	54.9	28	25	75/0.4											
1365	1,363.4	59.9	12	19	81/0.9											
1360	1,358.4	64.9	100/0.3													

NCDOT BORE DOUBLE 14400B_GEO_BRDG0267_MCDOWELL_BOREHOLES.GPJ_NC_DOT.GDT 4/25/19