

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33553.1.1 (B-4206)	1	20

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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33553.1.1 (B-4206) F.A. PROJ. BRSTP-1315(5)

COUNTY MONTGOMERY

PROJECT DESCRIPTION BRIDGE OVER DENSON'S CREEK ON  
SR 1315 (SUBSTATION RD.) BETWEEN SR 1310 AND NC 134

SITE DESCRIPTION BRIDGE #128 OVER DENSON'S CREEK ON  
SR 1315

**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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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

J. K. STICKNEY

C. L. SMITH

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CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

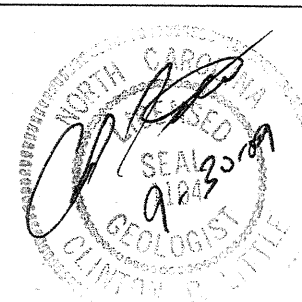
DATE SEPTEMBER, 2009

**PROJECT: 33553.1.1 ID: B-4206**

DRAWN BY: J. E. ROLFSMEYER

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

NOTE - 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.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT

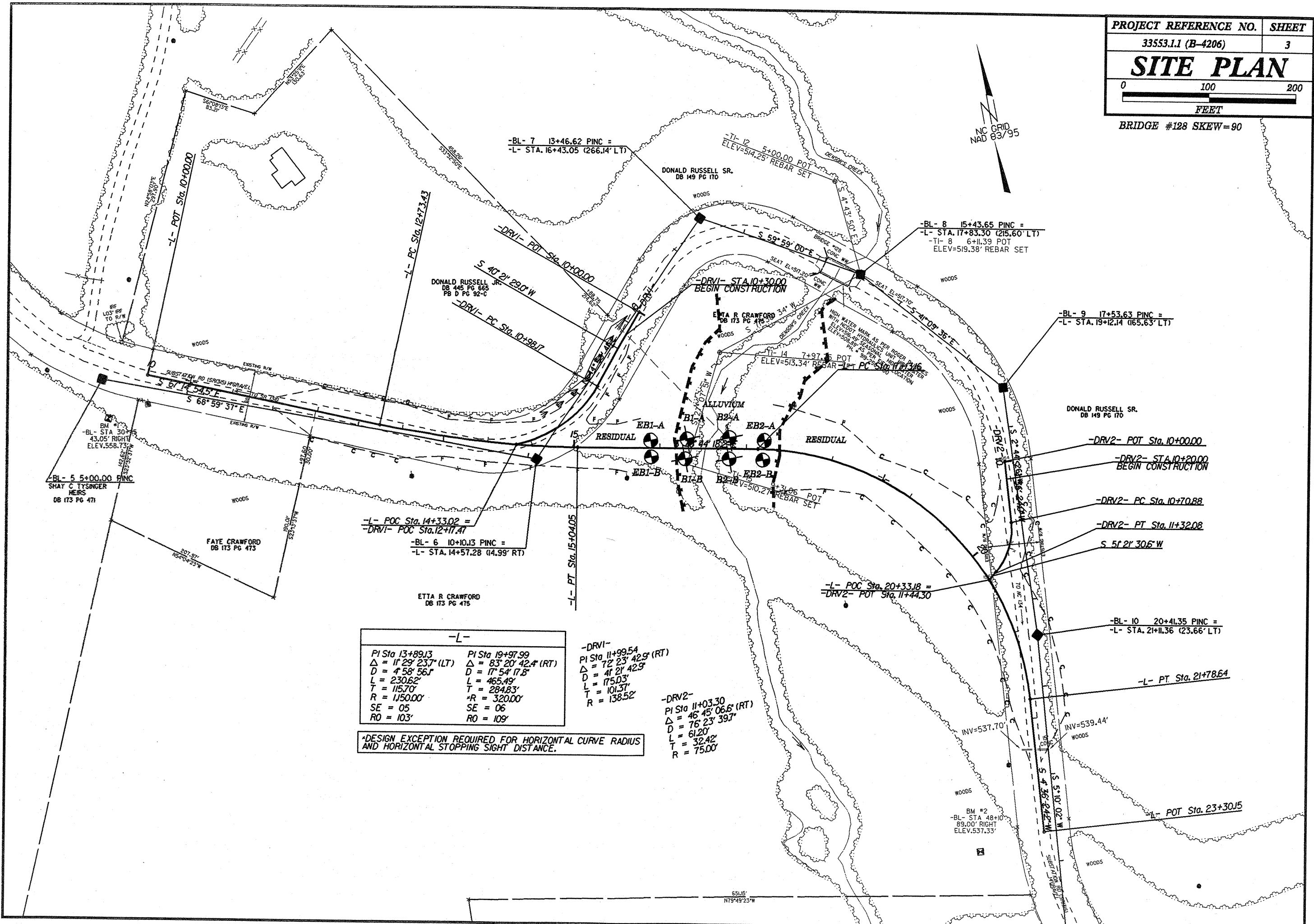
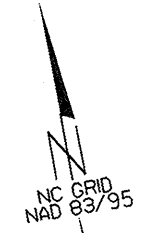
PROJECT REFERENCE NO. 33553.1.I (B-4206)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS											
SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, ARCHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>				WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.				HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, 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. ADUIFIER - 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, 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCRC) - 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				MINERALOGICAL COMPOSITION				WEATHERING				MISCELLANEOUS SYMBOLS											
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				FRESH ROCK FRESH, CRYSTALLINE, 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 DISCOLORATION AND WEATHERING 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, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS 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.				SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)				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 SOUNDING ROD			
SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS				TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%				FRESH VERY SLIGHT (V SL) SLIGHT (SL) MODERATE (MOD) MODERATELY SEVERE (MOD. SEV) SEVERE (SEV) VERY SEVERE (V SEV) COMPLETE				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 SOUNDING ROD											
TEXTURE OR GRAIN SIZE				ABBREVIATIONS				ROCK HARDNESS				EQUIPMENT USED ON SUBJECT PROJECT											
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 2.00 0.42 0.25 0.075 0.053				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				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 GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. 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.				DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST 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 2 1/8" TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B-N O/NO-H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST											
SOIL MOISTURE - CORRELATION OF TERMS				FRACTURE SPACING				BEDDING				INDURATION											
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) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET				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				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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.											
PLASTICITY				FRACTURE SPACING				BEDDING				INDURATION											
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH				TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET				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				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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.											
COLOR				FRACTURE SPACING				BEDDING				INDURATION											
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.				TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET				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				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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.											

BRIDGE #128 SKEW=90



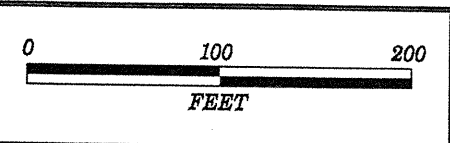
-L-	
PI Sta 13+89.13	PI Sta 19+97.99
$\Delta = 11^{\circ} 29' 23.7''$ (LT)	$\Delta = 83^{\circ} 20' 42.4''$ (RT)
D = 4' 58" 56.1"	D = 17' 54" 17.8"
L = 230.62'	L = 465.49'
T = 115.70'	T = 284.83'
R = 1150.00'	R = 320.00'
SE = 05'	SE = 06'
RO = 103'	RO = 109'

-DRV1-	
PI Sta 11+99.54	
$\Delta = 72^{\circ} 23' 42.9''$ (RT)	
D = 41' 21" 42.9"	
L = 175.03'	
T = 101.37'	
R = 138.52'	

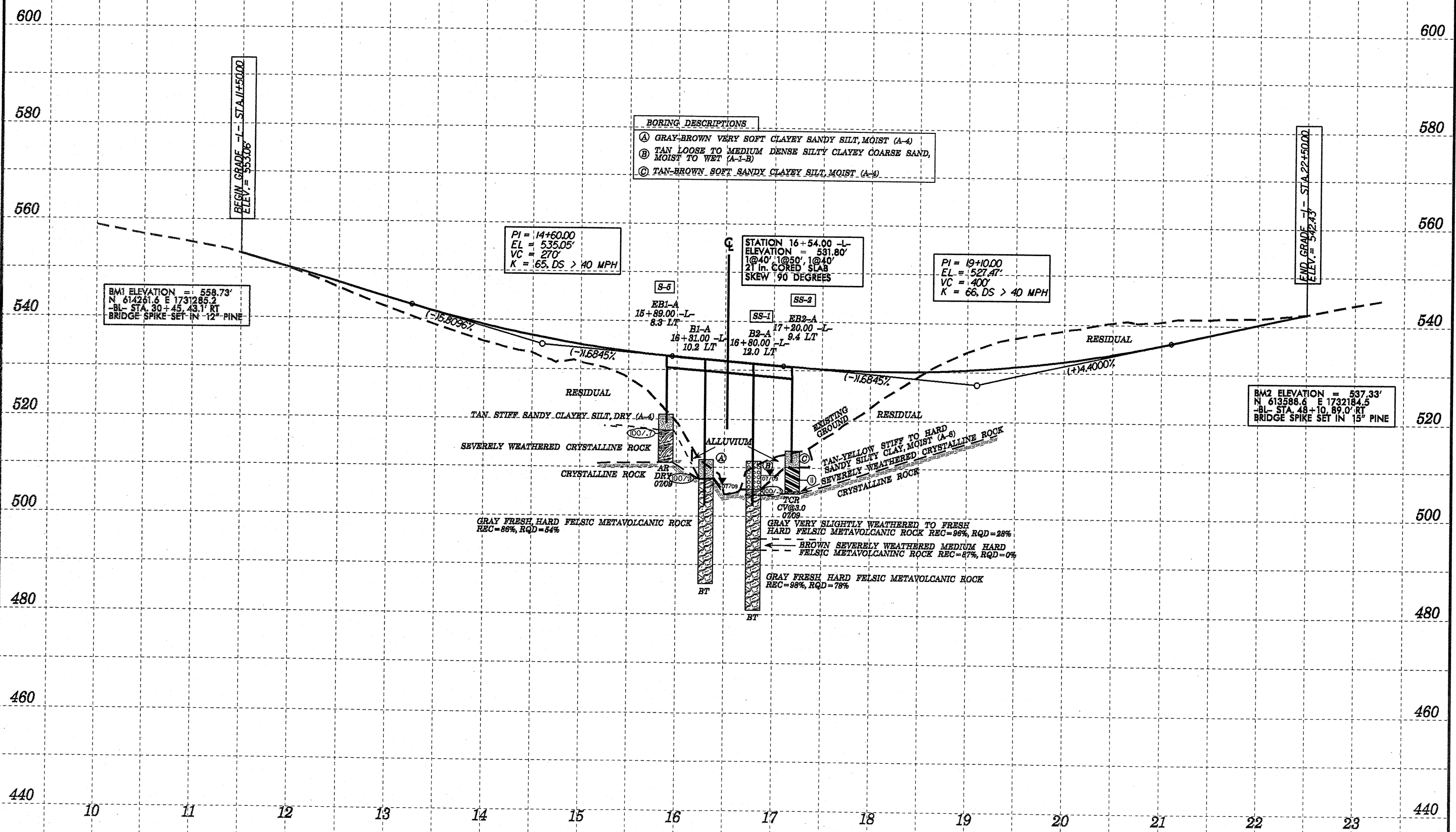
-DRV2-	
PI Sta 11+03.30	
$\Delta = 46^{\circ} 45' 06.6''$ (RT)	
D = 76' 23" 39.7"	
L = 61.20'	
T = 32.42'	
R = 75.00'	

\*DESIGN EXCEPTION REQUIRED FOR HORIZONTAL CURVE RADIUS AND HORIZONTAL STOPPING SIGHT DISTANCE.

# -L- PROFILE



PROJECT REFERENCE NO.	SHEET
33553.1.1 (B-4206)	4
BRIDGE #128 OVER DENSON'S CREEK ON SR 1315 (SUBSTATION RD.) SKEW=90	



**BORING DESCRIPTIONS**

Ⓐ GRAY-BROWN VERY SOFT CLAYEY SANDY SILT, MOIST (A-4)  
 Ⓑ TAN LOOSE TO MEDIUM DENSE SILTY CLAYEY COARSE SAND, MOIST TO WET (A-1-B)  
 Ⓒ TAN-BROWN SOFT SANDY CLAYEY SILT, MOIST (A-4)

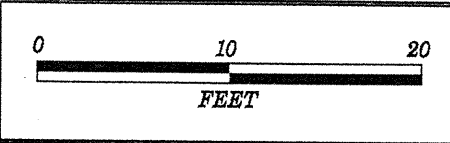
PI = 14+60.00  
 EL = 535.05'  
 VC = 270'  
 K = 65, DS > 40 MPH

STATION 16+54.00 -L-  
 ELEVATION = 531.80'  
 1@40', 1@50', 1@40'  
 21 in. CORED SLAB  
 SKEW 90 DEGREES

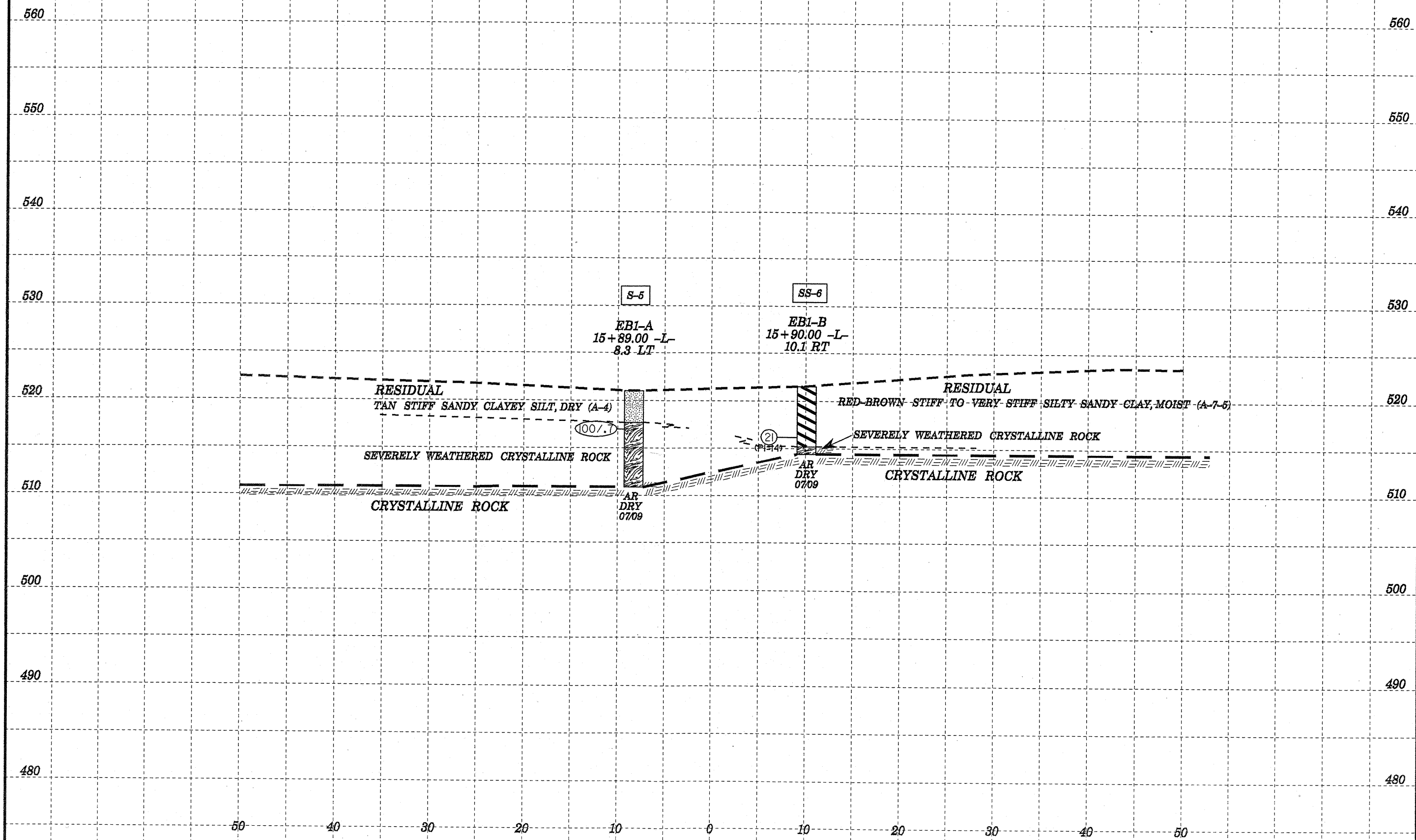
PI = 19+10.00  
 EL = 527.47'  
 VC = 400'  
 K = 66, DS > 40 MPH

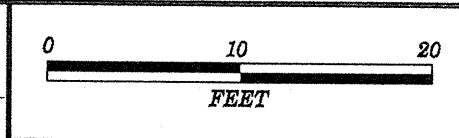
BM2 ELEVATION = 537.33'  
 N 613588.6 E 1732184.5  
 -BL- STA. 48+10.89, 0' RT  
 BRIDGE SPIKE SET IN 15" PINE



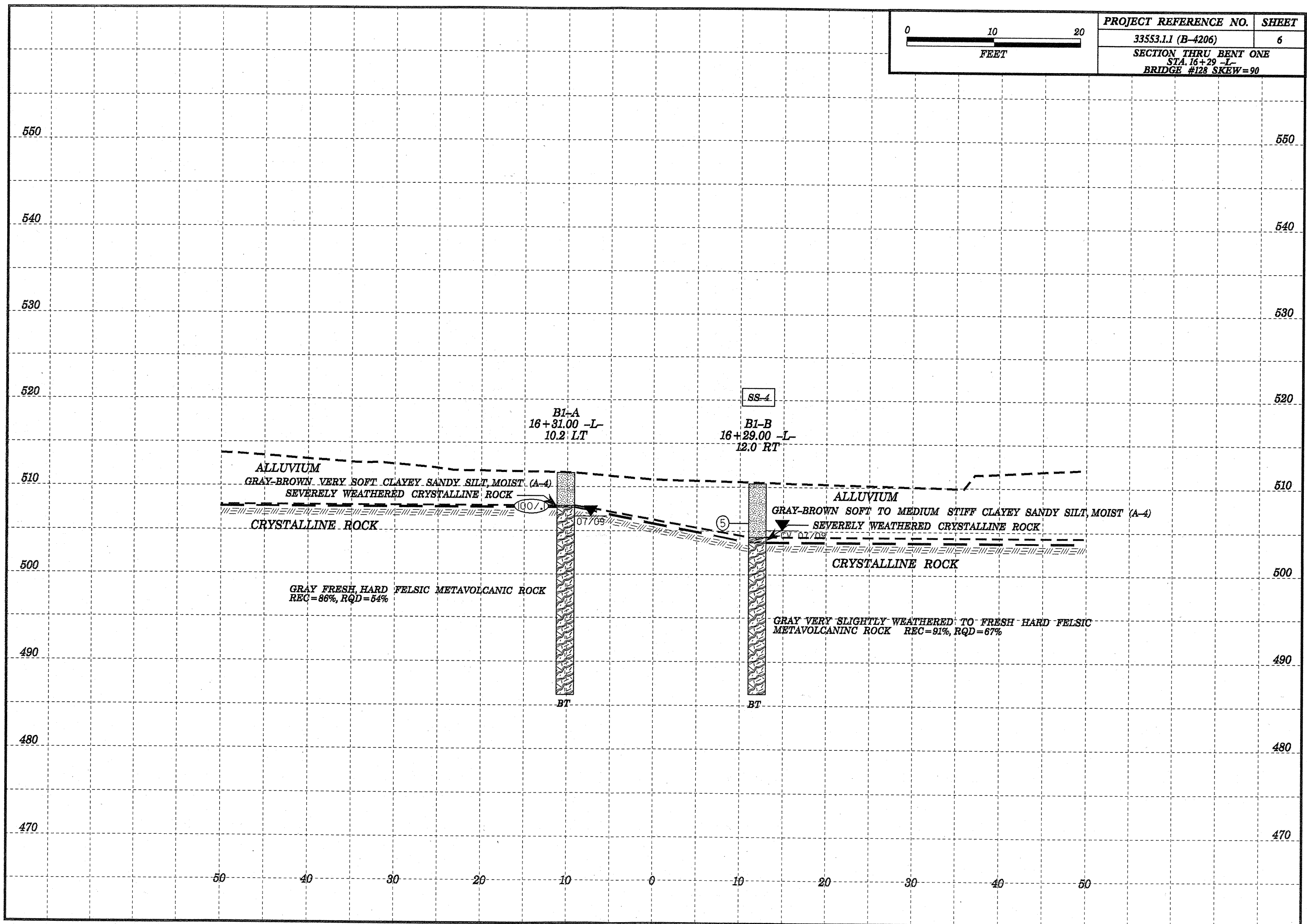


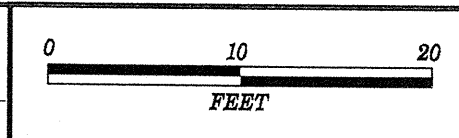
PROJECT REFERENCE NO.	SHEET
33553.1.1 (B-4206)	5
SECTION THRU END BENT ONE	
STA. 15+89 -L-	
BRIDGE #128 SKEW=90	



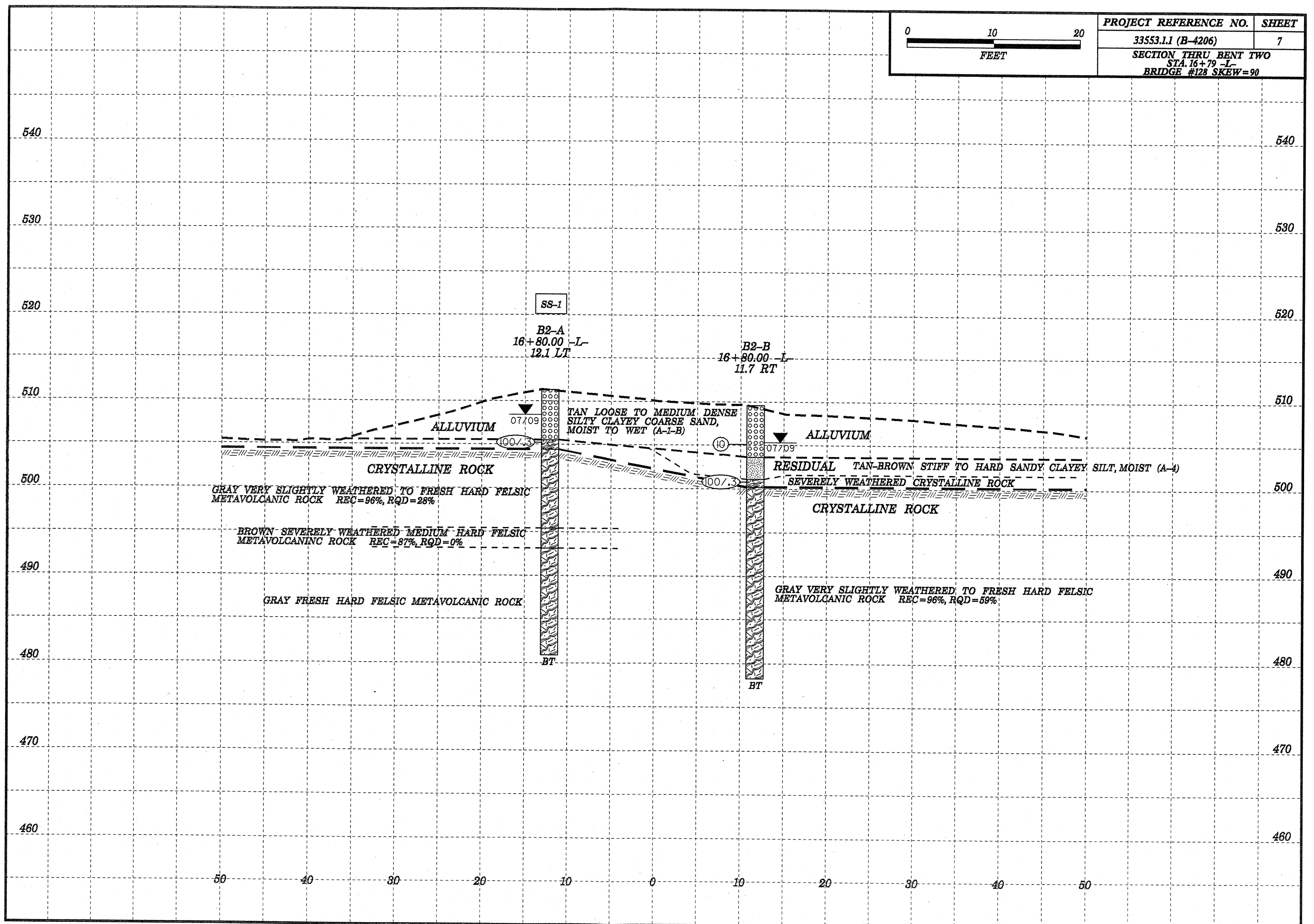


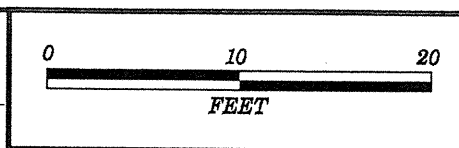
PROJECT REFERENCE NO.	SHEET
33553.1.1 (B-4206)	6
SECTION THRU BENT ONE	
STA. 16+29 -L-	
BRIDGE #128 SKEW=90	



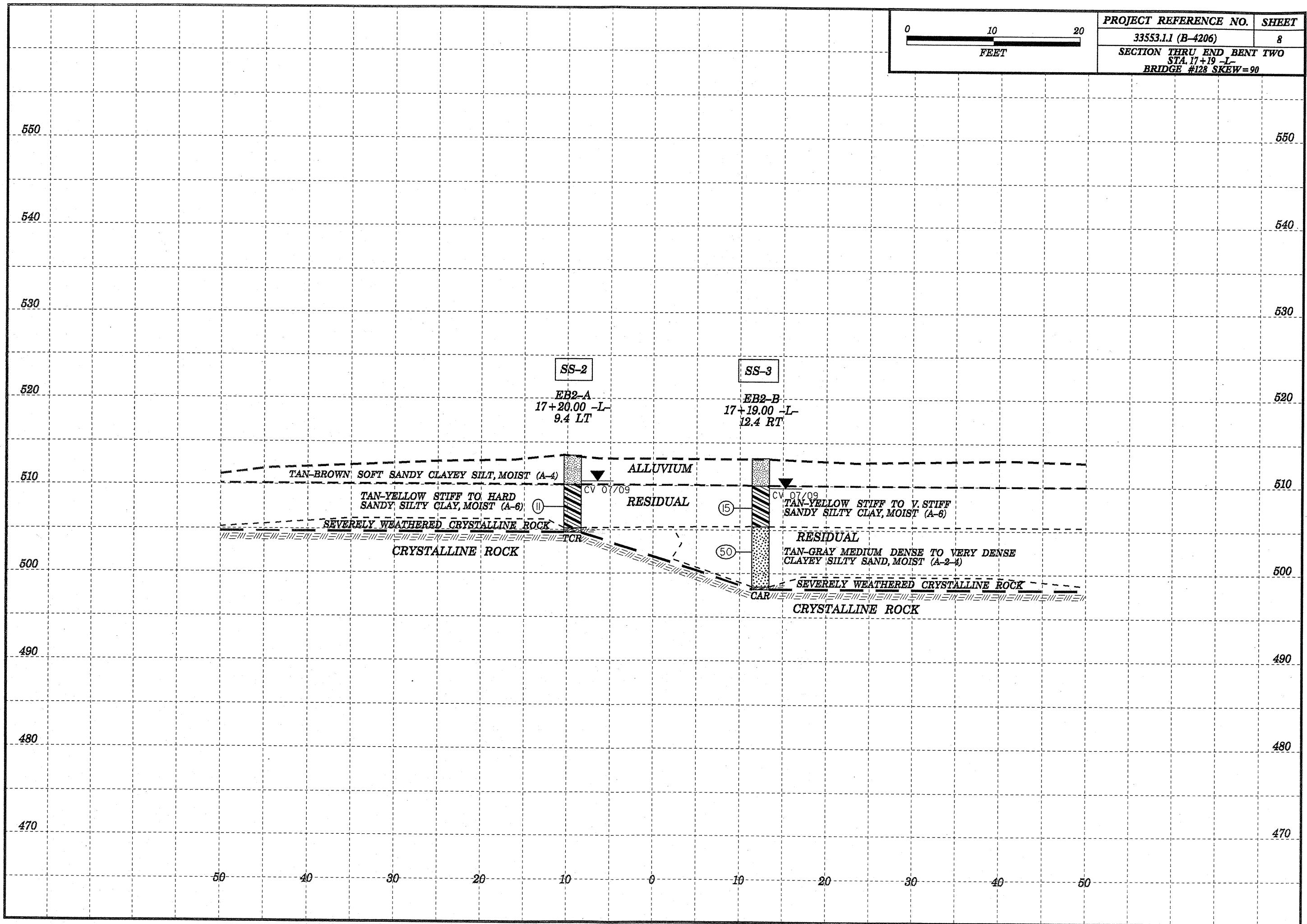


PROJECT REFERENCE NO.	SHEET
33553.1.1 (B-4206)	7
SECTION THRU BENT TWO STA. 16+79 -L- BRIDGE #128 SKEW=90	





PROJECT REFERENCE NO.	SHEET
33553.1.1 (B-4206)	8
SECTION THRU END BENT TWO STA. 17+19 -L- BRIDGE #128 SKEW=90	



PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+89	OFFSET 8ft LT	ALIGNMENT -L-
COLLAR ELEV. 521.0 ft	TOTAL DEPTH 10.1 ft	NORTHING 614,121	EASTING 1,731,896
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 07/28/09	COMP. DATE 07/28/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 10.1 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
525															
520	517.7	3.3											D	521.0 GROUND SURFACE	0.0
													D	517.7 TAN STIFF SANDY CLAYEY SILT, DRY (A-4)	3.3
515			35	65/2						100/7		S-5	D	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	
510														510.9 Boring Terminated BY AUGER REFUSAL at Elevation 510.9 ft ON CRYSTALLINE ROCK	10.1

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+90	OFFSET 10ft RT	ALIGNMENT -L-
COLLAR ELEV. 521.5 ft	TOTAL DEPTH 7.1 ft	NORTHING 614,102	EASTING 1,731,894
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 07/28/09	COMP. DATE 07/28/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 7.1 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
525															
520														521.5 GROUND SURFACE	0.0
														RESIDUAL RED-BROWN STIFF TO VERY STIFF SILTY SANDY CLAY, MOIST (A-7-5)	
515	517.2	4.3	6	7	14								SS-6	515.2 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	6.3
														514.4 Boring Terminated BY AUGER REFUSAL at Elevation 514.4 ft ON CRYSTALLINE ROCK	7.1

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ\_NC\_DOT\_GDT\_09/04/09

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ\_NC\_DOT\_GDT\_09/04/09



PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B1-A	STATION 16+31	OFFSET 10ft LT	ALIGNMENT -L-
COLLAR ELEV. 511.6 ft	TOTAL DEPTH 25.4 ft	NORTHING 614,114	EASTING 1,731,938
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/27/09	COMP. DATE 07/28/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 4.0 ft

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				
515														
510	508.3	3.3	1	100/1									GROUND SURFACE 0.0	
505													ALLUVIAL GRAY-BROWN VERY SOFT CLAYEY SANDY SILT, MOIST (A-4) 3.8	
500													WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK 4.0	
495													CRYSTALLINE ROCK GRAY FRESH, HARD FELSIC METAVOLCANIC ROCK	
490											RS-3			
485													Boring Terminated at Elevation 486.2 ft IN CRYSTALLINE ROCK 25.4	

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B1-A	STATION 16+31	OFFSET 10ft LT	ALIGNMENT -L-
COLLAR ELEV. 511.6 ft	TOTAL DEPTH 25.4 ft	NORTHING 614,114	EASTING 1,731,938
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/27/09	COMP. DATE 07/28/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 4.0 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. (%)	ROD (%)		REC. (%)	ROD (%)			
507.6											Begin Coring @ 4.0 ft	
505	507.6	4.0	5.0		(3.4)	(0.4)		(18.5)	(11.6)		CRYSTALLINE ROCK GRAY FRESH, HARD FELSIC METAVOLCANIC ROCK WITH AVERAGE JOINT SPACING = 0.7', JOINTS SEMI ROUGH R1=12, R2=13, R3=10, R4=20, R5=4, RMR=59 ROCK TYPE E	4.0
500	502.6	9.0	5.0		(4.6)	(4.0)						
495	497.6	14.0	5.0		(4.2)	(2.3)						
490	492.6	19.0	5.0		(4.9)	(3.9)	RS-3					
485	487.6	24.0	1.4		(1.4)	(1.0)						
485	486.2	25.4	1.4		100%	71%					Boring Terminated at Elevation 486.2 ft IN CRYSTALLINE ROCK	25.4

NCDOT CORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B1-B	STATION 16+29	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 510.4 ft	TOTAL DEPTH 24.1 ft	NORTHING 614,093	EASTING 1,731,932
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/27/09	COMP. DATE 07/27/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 6.7 ft

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				
515														
510													GROUND SURFACE	0.0
505	506.9	3.5	1	2	3						SS-4		ALLUVIAL GRAY-BROWN SOFT TO MEDIUM STIFF CLAYEY SANDY SILT, MOIST (A-4)	
500													WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	6.1
495											RS-5		CRYSTALLINE ROCK GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD FELSIC METAVOLCANIC ROCK	6.7
490														
485														486.3
480													Boring Terminated at Elevation 486.3 ft IN CRYSTALLINE ROCK	24.1
475														
470														
465														
460														
455														
450														
445														
440														
435														

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B1-B	STATION 16+29	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 510.4 ft	TOTAL DEPTH 24.1 ft	NORTHING 614,093	EASTING 1,731,932
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/27/09	COMP. DATE 07/27/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 6.7 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. (%)	RQD (%)		REC. (%)	RQD (%)			
503.7											Begin Coring @ 6.7 ft	
500	503.7	6.7	2.4		(2.4)	(0.0)		(15.9)	(11.7)		CRYSTALLINE ROCK	6.7
	501.3	9.1			100%	0%		91%	67%		GRAY VERY SLIGHTLY WEATHERED TO FRESH, HARD FELSIC METAVOLCANIC ROCK WITH AVERAGE JOINT SPACING = 1.0', JOINTS SEMI ROUGH	
	496.3	14.1			(4.2)	(3.8)					R1=12, R2=13, R3=20, R4=20, R5=4, RMR=69 ROCK TYPE E	
495			5.0		(4.9)	(3.9)	RS-5					
	491.3	19.1			(4.4)	(4.0)						
490			5.0		88%	80%						
	486.3	24.1										
485											Boring Terminated at Elevation 486.3 ft IN CRYSTALLINE ROCK	24.1
480												
475												
470												
465												
460												
455												
450												
445												
440												
435												
430												
425												

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B2-A	STATION 16+80	OFFSET 12ft LT	ALIGNMENT -L-
COLLAR ELEV. 511.3 ft	TOTAL DEPTH 30.4 ft	NORTHING 614,107	EASTING 1,731,986
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/22/09	COMP. DATE 07/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 6.9 ft

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				
515														
510													511.3 GROUND SURFACE	0.0
505	506.5	4.8	3	7	100/3						SS-1		505.5 TAN LOOSE TO MEDIUM DENSE SILTY CLAYEY COARSE SAND, MOIST TO WET (A-1-B)	5.8
500											RS-1		504.4 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	8.9
495													495.4 CRYSTALLINE ROCK GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD FELSIC METAVOLCANIC ROCK	15.9
490											RS-2		493.1 CRYSTALLINE ROCK BROWN SEVERELY WEATHERED MEDIUM HARD FELSIC METAVOLCANIC ROCK	18.2
485													480.9 CRYSTALLINE ROCK GRAY FRESH HARD FELSIC METAVOLCANIC ROCK	30.4
480													Boring Terminated at Elevation 480.9 ft IN CRYSTALLINE ROCK	

NC DOT BORE SINGLE B4206 GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B2-A	STATION 16+80	OFFSET 12ft LT	ALIGNMENT -L-
COLLAR ELEV. 511.3 ft	TOTAL DEPTH 30.4 ft	NORTHING 614,107	EASTING 1,731,986
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/22/09	COMP. DATE 07/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 6.9 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. (%)	RQD (%)		REC. (%)	RQD (%)			
504.4		6.9	3.5		(3.4)	(0.8)		(8.6)	(2.5)		Begin Coring @ 6.9 ft	
500	500.9	10.4	5.0		(4.7)	(1.7)	RS-1				CRYSTALLINE ROCK GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD FELSIC METAVOLCANIC WITH AVERAGE JOINT SPACING = 0.5'. JOINTS SEMI ROUGH - RMR COULD NOT BE DETERMINED DUE TO INCOMPLETE DATA FROM ROCK LAB (EQUIPMENT MALFUNCTION)	6.9
495	495.9	15.4	5.0		(4.4)	(1.0)					ROCK TYPE E	15.9
490	490.9	20.4	5.0		(5.0)	(4.8)	RS-2	(2.0)	(0.0)		CRYSTALLINE ROCK BROWN SEVERELY WEATHERED MEDIUM HARD FELSIC METAVOLCANIC ROCK - COMPLETE WEATHERING OF SOME STRATA MAKES JOINT SPACING UNDETERMINED	18.2
485	485.9	25.4	5.0		(4.7)	(3.7)		(11.9)	(9.5)		CRYSTALLINE ROCK GRAY FRESH HARD FELSIC METAVOLCANIC WITH AVERAGE JOINT SPACING = 1.0', JOINTS SEMI ROUGH	
480	480.9	30.4			94%	74%		98%	78%		R1=7, R2=17, R3=30, R4=20, R5=4, RMR=68 ROCK TYPE E	
475											Boring Terminated at Elevation 480.9 ft IN CRYSTALLINE ROCK	30.4

NC DOT BORE SINGLE B4206 GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+80	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 509.6 ft	TOTAL DEPTH 31.3 ft	NORTHING 614,083	EASTING 1,731,982
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/23/09	COMP. DATE 07/23/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 9.4 ft

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
510												509.6	GROUND SURFACE	0.0
505	506.1	3.5										503.6	ALLUVIAL TAN LOOSE TO MEDIUM DENSE SILTY CLAYEY COARSE SAND, MOIST (A-1-b)	6.0
500	501.1	8.5										501.1	RESIDUAL TAN-BROWN STIFF TO HARD SANDY CLAYEY SILT, MOIST (A-4)	8.5
495												500.2	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	9.4
490													CRYSTALLINE ROCK GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD FELSIC METAVOLCANIC ROCK	
485														
480														
475														
470														
465														
460														
455														
450														
445														
440														
435														
430														

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ\_NC\_DOT.GDT\_10/01/09

PROJECT NO. 33553.1.1	ID. B-4206	COUNTY Montgomery	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+80	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 509.6 ft	TOTAL DEPTH 31.3 ft	NORTHING 614,083	EASTING 1,731,982
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 07/23/09	COMP. DATE 07/23/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 9.4 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)	ROD (ft)		REC. (ft)	ROD (ft)			
500.2											Begin Coring @ 9.4 ft	
495	500.2	9.4	4.8		(4.6)	(0.4)		(21.1)	(12.9)		CRYSTALLINE ROCK GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD FELSIC METAVOLCANIC WITH AVERAGE JOINT SPACING = 0.7', JOINTS SEMI ROUGH	9.4
490	495.4	14.2	5.0		(4.6)	(2.2)					R1=15, R2=13, R3=10, R4=20, R5=5, RMR=62 ROCK TYPE E	
485	490.4	19.2	5.0		(5.0)	(4.2)						
480	488.4	21.2	5.0		100%	84%						
475	485.4	24.2	5.0		100%	96%	RS-4					
470	483.4	26.2										
465	480.4	29.2										
460	478.3	31.3	2.1		(1.9)	(1.3)						
455					90%	62%						
450												
445												
440												
435												
430												
425												

NCDOT CORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ\_NC\_DOT.GDT\_10/01/09

Boring Terminated at Elevation 478.3 ft IN CRYSTALLINE ROCK

PROJECT NO. 33553.1.1		ID. B-4206		COUNTY Montgomery		GEOLOGIST Stickney, J. K.							
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek						GROUND WTR (ft)							
BORING NO. EB2-A		STATION 17+20		OFFSET 9ft LT		ALIGNMENT -L-							
COLLAR ELEV. 513.5 ft		TOTAL DEPTH 8.8 ft		NORTHING 614,096		EASTING 1,732,025							
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic									
START DATE 07/23/09		COMP. DATE 07/23/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 8.8 ft							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
515												GROUND SURFACE	0.0
510	508.6	4.9	3	5	6							ALLUVIAL TAN-BROWN SOFT SANDY CLAYEY SILT, MOIST (A-4)	3.4
505												RESIDUAL TAN-YELLOW STIFF TO HARD SANDY SILTY CLAY, MOIST (A-6)	8.3
500												WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	8.8
Boring Terminated WITH TRI-CONE REFUSAL at Elevation 504.7 ft ON CRYSTALLINE ROCK													

PROJECT NO. 33553.1.1		ID. B-4206		COUNTY Montgomery		GEOLOGIST Stickney, J. K.							
SITE DESCRIPTION Bridge #128 on SR 1315 over Denson Creek						GROUND WTR (ft)							
BORING NO. EB2-B		STATION 17+19		OFFSET 12ft RT		ALIGNMENT -L-							
COLLAR ELEV. 513.2 ft		TOTAL DEPTH 15.0 ft		NORTHING 614,075		EASTING 1,732,019							
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic									
START DATE 07/23/09		COMP. DATE 07/23/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 15.0 ft							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
515												GROUND SURFACE	0.0
510	508.5	4.7	3	8	7							ALLUVIAL TAN-BROWN SOFT SANDY CLAYEY SILT, MOIST (A-4)	3.2
505												RESIDUAL TAN-YELLOW STIFF TO V. STIFF SANDY SILTY CLAY, MOIST (A-6)	7.8
500	503.5	9.7	7	22	28							RESIDUAL TAN-GRAY MEDIUM DENSE TO VERY DENSE CLAYEY SILTY SAND, MOIST (A-2-4)	14.7
495												WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	15.0
Boring Terminated WITH CASING ADVANCER REFUSAL at Elevation 498.2 ft ON CRYSTALLINE ROCK													

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 09/04/09

NCDOT BORE SINGLE B4206\_GEO\_BH(ALL)\_BRDG128\_MONTGOMERY.GPJ NC\_DOT\_GDT 09/04/09



PROJECT: 33553.1.1 (B-4206)  
 COUNTY: MONTGOMERY  
 SITE DESCRIPTION: BRIDGE NO. 128 OVER DENSON'S CREEK ON SR 1315

TEST RESULTS

SOIL SAMPLE RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	N	LL	P.I.	% BY WEIGHT				% PASSING SIEVES		
								C. SAND	F. SAND	SILT	CLAY	10	40	200
S-5	8 LT	15+89 -L- EB1-A	0.0-3.0	A-4(5)	NA	33	10	20.3	15.5	27.9	36.3	96	82	66
SS-6	10 RT	15+90 -L- EB1-B	4.8-5.8	A-7-5(9)	21	45	14	18.7	19.5	23.5	38.3	100	88	67
SS-4	12 RT	16+29 -L- B1-B	4.0-5.0	A-4(0)	5	25	3	6.6	33.2	38.0	22.2	100	98	69
SS-1	12 LT	16+80 -L- B2-A	4.8-5.8	A-1-b(0)	100/3	22	NP	58.2	18.5	11.2	12.1	80	47	21
SS-2	9 LT	17+20 -L- EB2-A	5.4-6.4	A-6(10)	11	35	12	5.4	19.5	34.7	40.3	100	98	82
SS-3	12 RT	17+19 -L- EB2-B	10.2-11.2	A-2-4(0)	50	23	NP	50.6	24.0	13.4	12.1	92	59	28

TEST RESULTS

ROCK SAMPLE RESULTS											
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	RQD	UNIT WT	Q(MPa) (ksf)	E(MPa) (MPsi)	%	%	UNIT	VOID
								MOISTURE	ORGANIC	WT. (d)	RATIO
RS-3	10 LT	16+31 -L- B1-A	20.1-20.8	54%	169.7	2278	9.9				
RS-5	12 RT	16+29 -L- B1-B	14.1-14.7	67%	169.3	2474	11.72				
RS-1	12 LT	16+80 -L- B2-A	11.3-11.9	28%	NO TEST DATA AVAILABLE						
RS-2	12 LT	16+80 -L- B2-B	19.6-20.4	78%	170.3	1774	12.78				
RS-4	12 RT	16+80 -L-	22.4-23.0	59%	171.2	5386	12.78				

Sheet  
15



# FIELD SCOUR REPORT

WBS: 33553.1.1 TIP: B-4206 COUNTY: Montgomery

DESCRIPTION(1): Bridge #128 on SR1315 over Denson's Creek

### EXISTING BRIDGE

Information from: Field Inspection  Microfilm \_\_\_\_\_ (reel \_\_\_\_\_ pos: \_\_\_\_\_)  
 Other (explain) \_\_\_\_\_

Bridge No.: 128 Length: 41 Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 3  
 Foundation Type: Concrete footing and timber piles

#### EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None observed

Interior Bents: None observed

Channel Bed: None

Channel Bank: Erosion at bends in creek and under rock outcrops located downstream

#### EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): \_\_\_\_\_

#### INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, or aggrading.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

### DESIGN INFORMATION

Channel Bed Material(7): Rock and boulders

Channel Bank Material(8): silty clayey coarse sand (See SS-1)

Channel Bank Cover(9): Mature trees

Floodplain Width(10): approximately 150'

Floodplain Cover(11): Mature trees and shrubs

Stream is(12): Aggrading \_\_\_\_\_ Degrading \_\_\_\_\_ Undetermined

Channel Migration Tendency(13): moderate

Observations and Other Comments: High debris potential

#### DESIGN SCOUR ELEVATIONS(14)

Feet  Meters \_\_\_\_\_

##### BENTS

B1	B2								
508	507								

Comparison of DSE to Hydraulics Unit theoretical scour:  
Agree with the theoretical scour provided by NCDOT Hydro Unit. No adjustments made.

#### SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank									
Sample No.									
Retained #4									
Passed #10									
Passed #40									
Passed #200									
Coarse Sand									
Fine Sand									
Silt									
Clay									
LL									
PI									
AASHTO									
Station									
Offset									
Depth									

See Sheet # 15 for  
"Soil Test Results"

Reported by: JES JKS / JEB

Date: 9/1/2009

33553.1.1 (B-4206)  
MONTGOMERY COUNTY  
BRIDGE NO. 128 OVER DENSON'S CREEK ON SR 1315

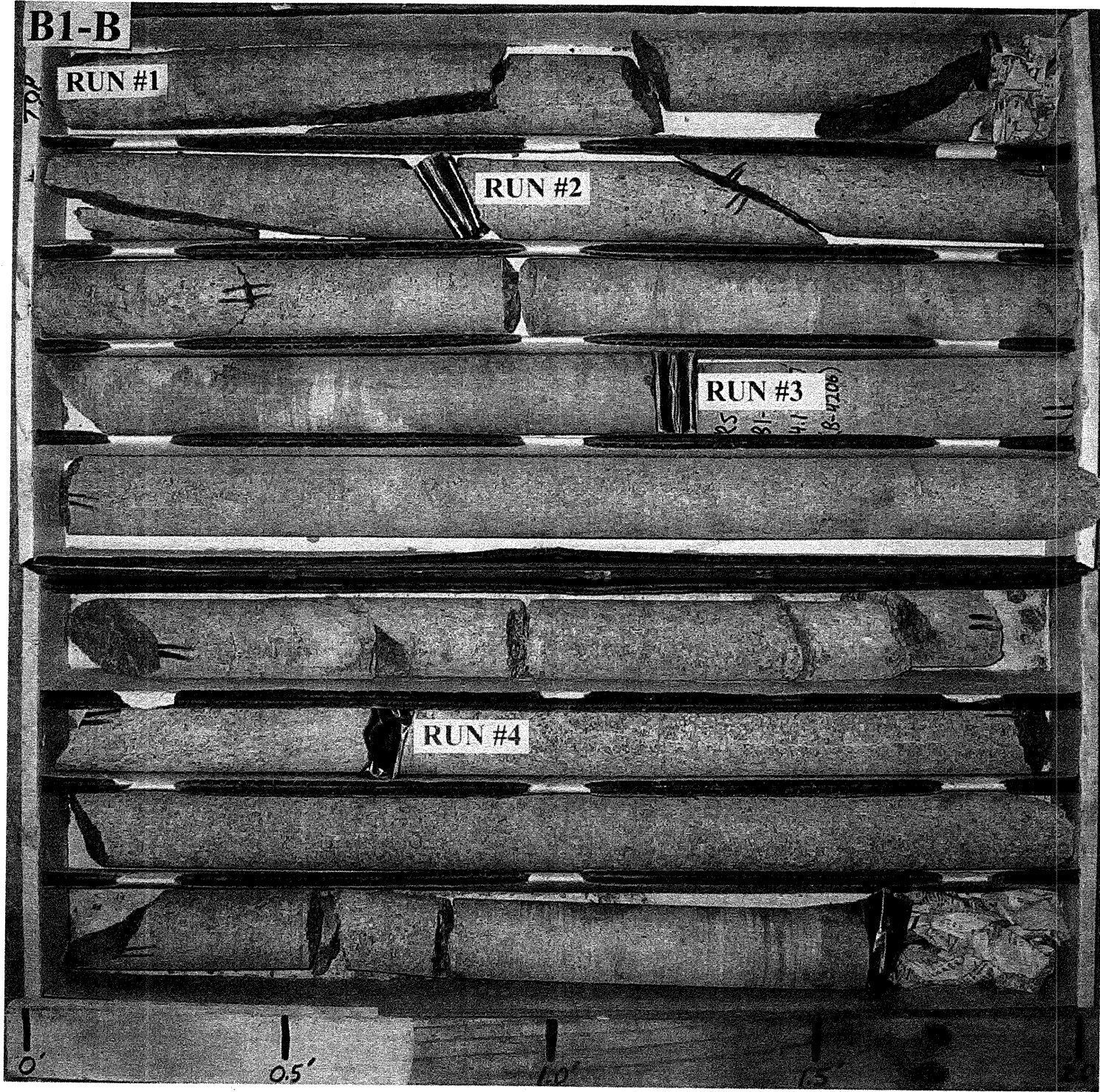
CORE PHOTOS





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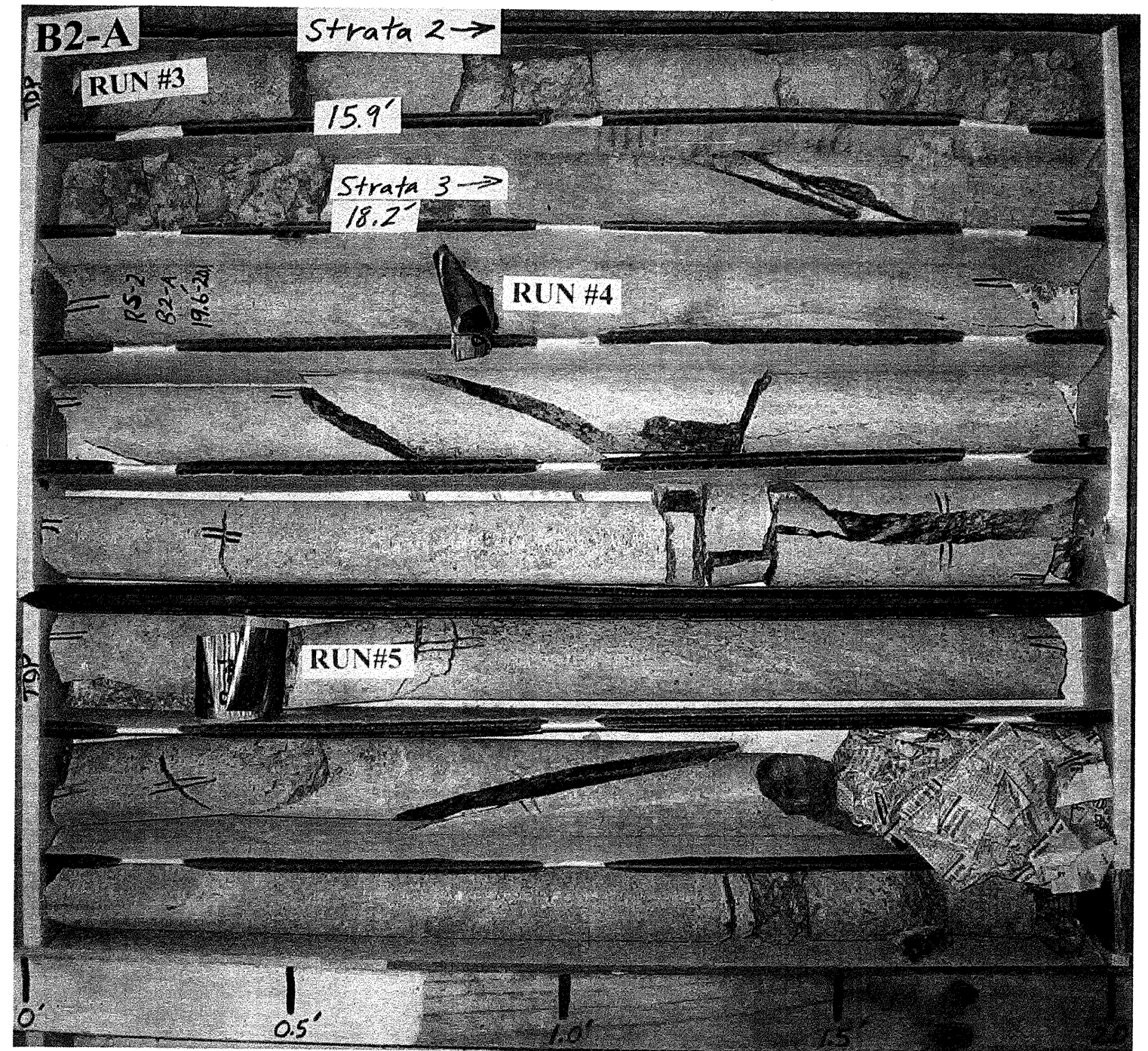
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