

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

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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33631.1.1 (B-4293) F.A. PROJ. BRSTP-1008(11)  
 COUNTY UNION  
 PROJECT DESCRIPTION BRIDGE ON SR 1008 (WAXHAW-  
 INDIAN TRAIL RD.) OVER BLYTHE CREEK BETWEEN  
 NC 16 AND SR 1325  
 SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK

**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.

**PROJECT: 33631.1.1 ID: B-4293**

PERSONNEL

C. C. MURRAY

J. E. ESTEP

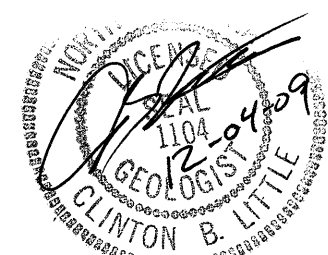
R. M. MOORE

INVESTIGATED BY C. C. MURRAY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE DECEMBER, 2009



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. 33631.11(B-4293)	SHEET NO. 2
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**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

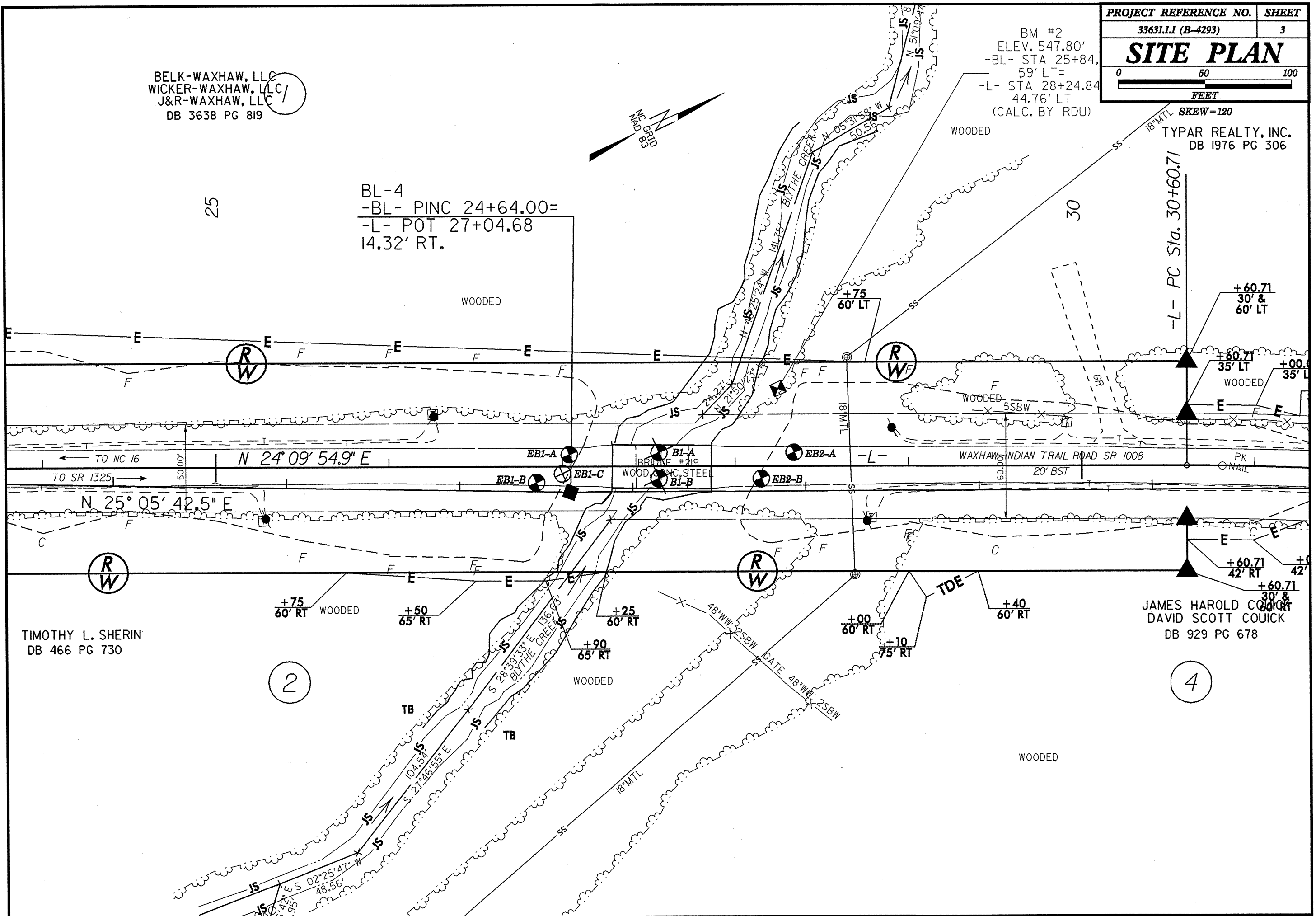
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO 1206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE ASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, ASHTO 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>	<b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b> , <b>SUBANGULAR</b> , <b>SUBROUNDED</b> , OR <b>ROUNDED</b> .	<b>HARD ROCK</b> 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:  <b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  <b>CRYSTALLINE ROCK (CR)</b>  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  <b>NON-CRYSTALLINE ROCK (NCR)</b>  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.  <b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	<b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>MINERALOGICAL COMPOSITION</b>	<b>WEATHERING</b>	
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.	<b>FRESH</b> ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  <b>VERY SLIGHT (V SLI.)</b> 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.  <b>SLIGHT (SLI.)</b> 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.  <b>MODERATE (MOD.)</b> 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.  <b>MODERATELY SEVERE (MOD. SEV.)</b> 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>  <b>SEVERE (SEV.)</b> 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i>  <b>VERY SEVERE (V SEV.)</b> 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. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i>  <b>COMPLETE</b> 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.	
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>COMPRESSION</b>		
GROUP CLASS. A-1-a, A-1-b, A-3, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-1-2, A-3, A-4, A-5, A-6, A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		
SYMBOL	<b>PERCENTAGE OF MATERIAL</b>		
% PASSING # 10, # 40, # 200	ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3%, LITTLE ORGANIC MATTER 3 - 5%, MODERATELY ORGANIC 5 - 10%, HIGHLY ORGANIC >10%		
LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX	<b>GROUND WATER</b>		
USUAL TYPES OF MAJOR MATERIALS, GENERATING AS A SUBGRADE	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		
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<b>MISCELLANEOUS SYMBOLS</b>		
<b>CONSISTENCY OR DENSENESS</b>	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	SPT DMT VST TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	SAMPLE DESIGNATIONS S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE
<b>TEXTURE OR GRAIN SIZE</b>	<b>ABBREVIATIONS</b>		
U.S. STD. SIEVE SIZE OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL	w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT	
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>FRACTURE SPACING</b>	<b>BEDDING</b>
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION	DRILL UNITS: MOBILE B-51, 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 1/16" TUNG-CARB., CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N O/N O, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST	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
<b>PLASTICITY</b>		<b>INDURATION</b>	
NONPLASTIC, MED. PLASTICITY, HIGH PLASTICITY		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.	<b>BENCH MARK:</b> BM2 N 43514 E 1481603, BL STA. 25+84 59.0 LEFT <b>RR SPIKE IN 24' SWEET GUM</b> ELEVATION: 547.8 FT.
<b>COLOR</b>			<b>NOTES:</b>
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.			

BELK-WAXHAW, LLC  
 WICKER-WAXHAW, LLC  
 J&R-WAXHAW, LLC  
 DB 3638 PG 819

BM #2  
 ELEV. 547.80'  
 -BL- STA 25+84,  
 59' LT=  
 -L- STA 28+24.84  
 44.76' LT  
 (CALC. BY RDU)

SKEW=120  
 TYPAR REALTY, INC.  
 DB 1976 PG 306

BL-4  
 -BL- PINC 24+64.00=  
 -L- POT 27+04.68  
 14.32' RT.



TIMOTHY L. SHERIN  
 DB 466 PG 730

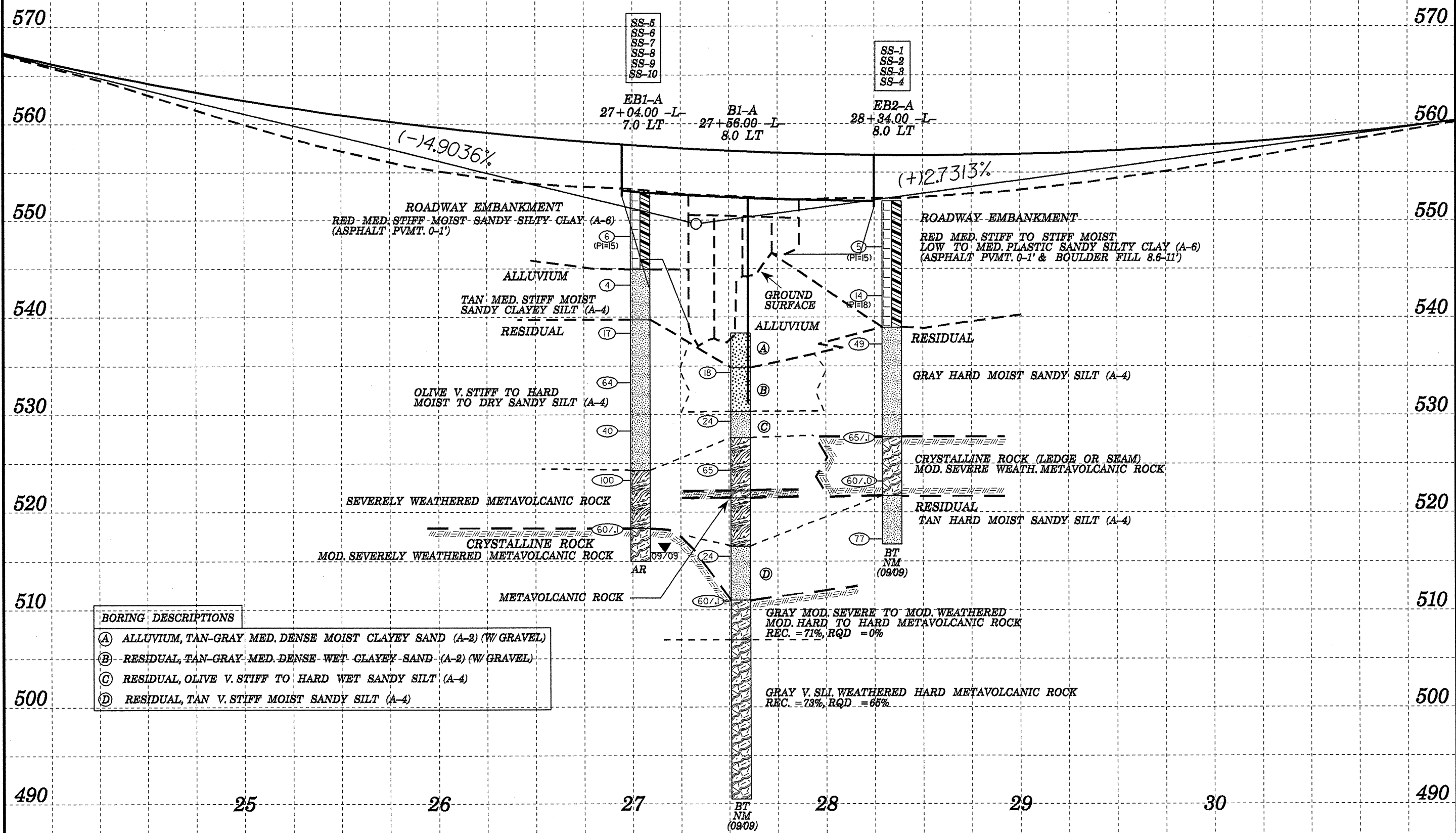
JAMES HAROLD COOK  
 DAVID SCOTT COUICK  
 DB 929 PG 678

2

4



$PI = 27+33.00$   
 $EL = 549.6'$   
 $VC = 808'$   
 $K = 106$

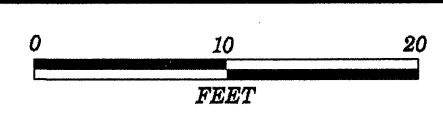


- BORING DESCRIPTIONS**
- (A) ALLUVIUM, TAN-GRAY MED. DENSE MOIST CLAYEY SAND (A-2) (W/ GRAVEL)
  - (B) RESIDUAL, TAN-GRAY MED. DENSE WET CLAYEY SAND (A-2) (W/ GRAVEL)
  - (C) RESIDUAL, OLIVE V. STIFF TO HARD WET SANDY SILT (A-4)
  - (D) RESIDUAL, TAN V. STIFF MOIST SANDY SILT (A-4)

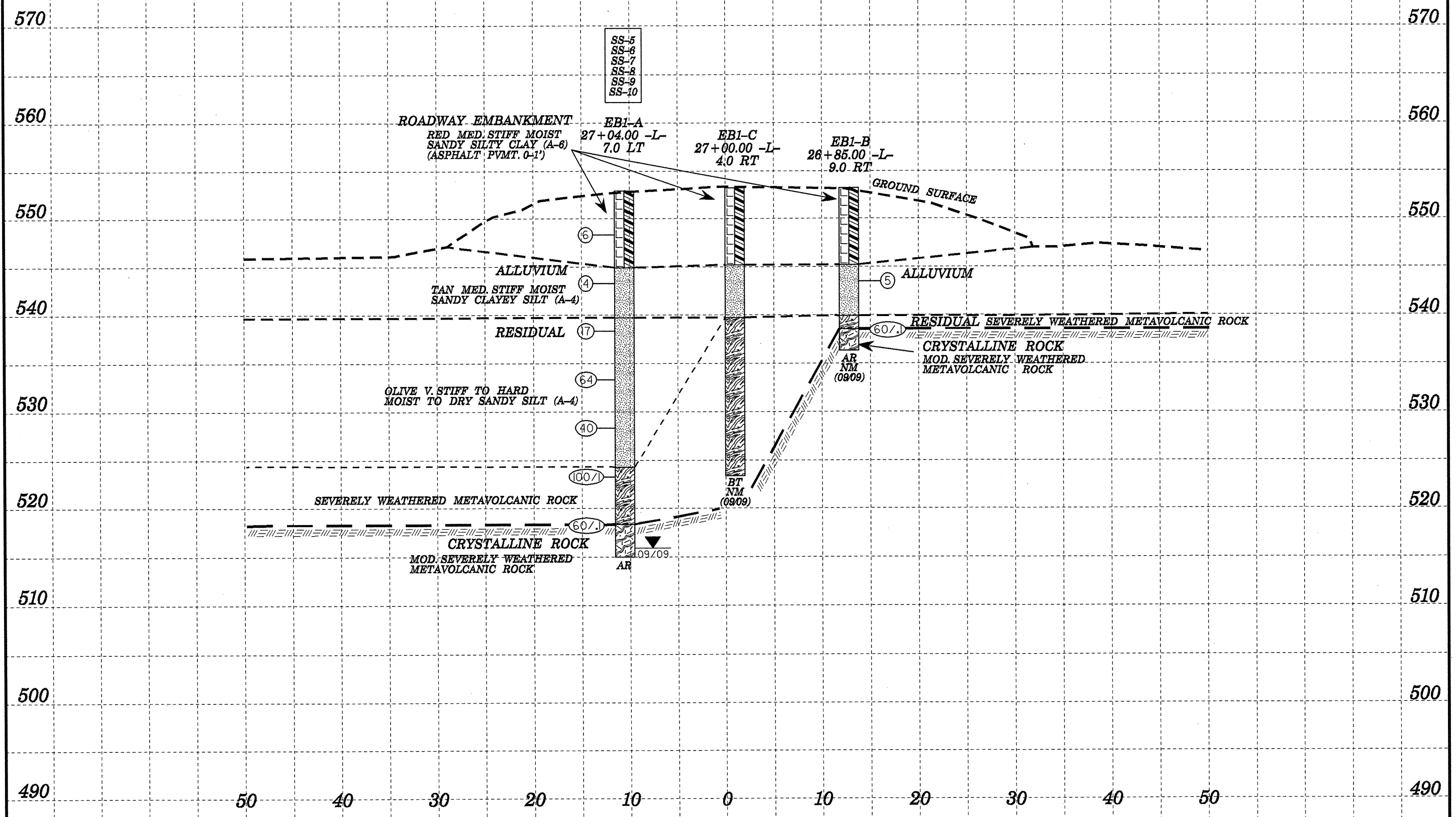
GRAY MOD. SEVERE TO MOD. WEATHERED  
 MOD. HARD TO HARD METAVOLCANIC ROCK  
 REC. = 71%, RQD = 0%

GRAY V. SLT WEATHERED HARD METAVOLCANIC ROCK  
 REC. = 73%, RQD = 65%





PROJECT REFERENCE NO.	SHEET
33631.1.1 (B-4293)	5
SECTION THRU END BENT ONE	
STA. 26+95 -L-	
SKEW=120	



- SS-5
- SS-6
- SS-7
- SS-8
- SS-9
- SS-10

ROADWAY EMBANKMENT  
RED MED. STIFF MOIST  
SANDY SILTY CLAY (A-6)  
(ASPHALT PVMT. 0-1')

EB1-A  
27+04.00 -L-  
7.0 LT

EB1-C  
27+00.00 -L-  
4.0 RT

EB1-B  
26+85.00 -L-  
9.0 RT

GROUND SURFACE

ALLUVIUM  
TAN MED. STIFF MOIST  
SANDY CLAYEY SILT (A-4)

ALLUVIUM

RESIDUAL

RESIDUAL SEVERELY WEATHERED METAVOLCANIC ROCK  
CRYSTALLINE ROCK  
MOD. SEVERELY WEATHERED  
METAVOLCANIC ROCK

OLIVE V. STIFF TO HARD  
MOIST TO DRY SANDY SILT (A-4)

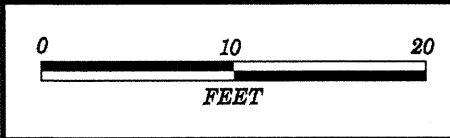
SEVERELY WEATHERED METAVOLCANIC ROCK

CRYSTALLINE ROCK  
MOD. SEVERELY WEATHERED  
METAVOLCANIC ROCK

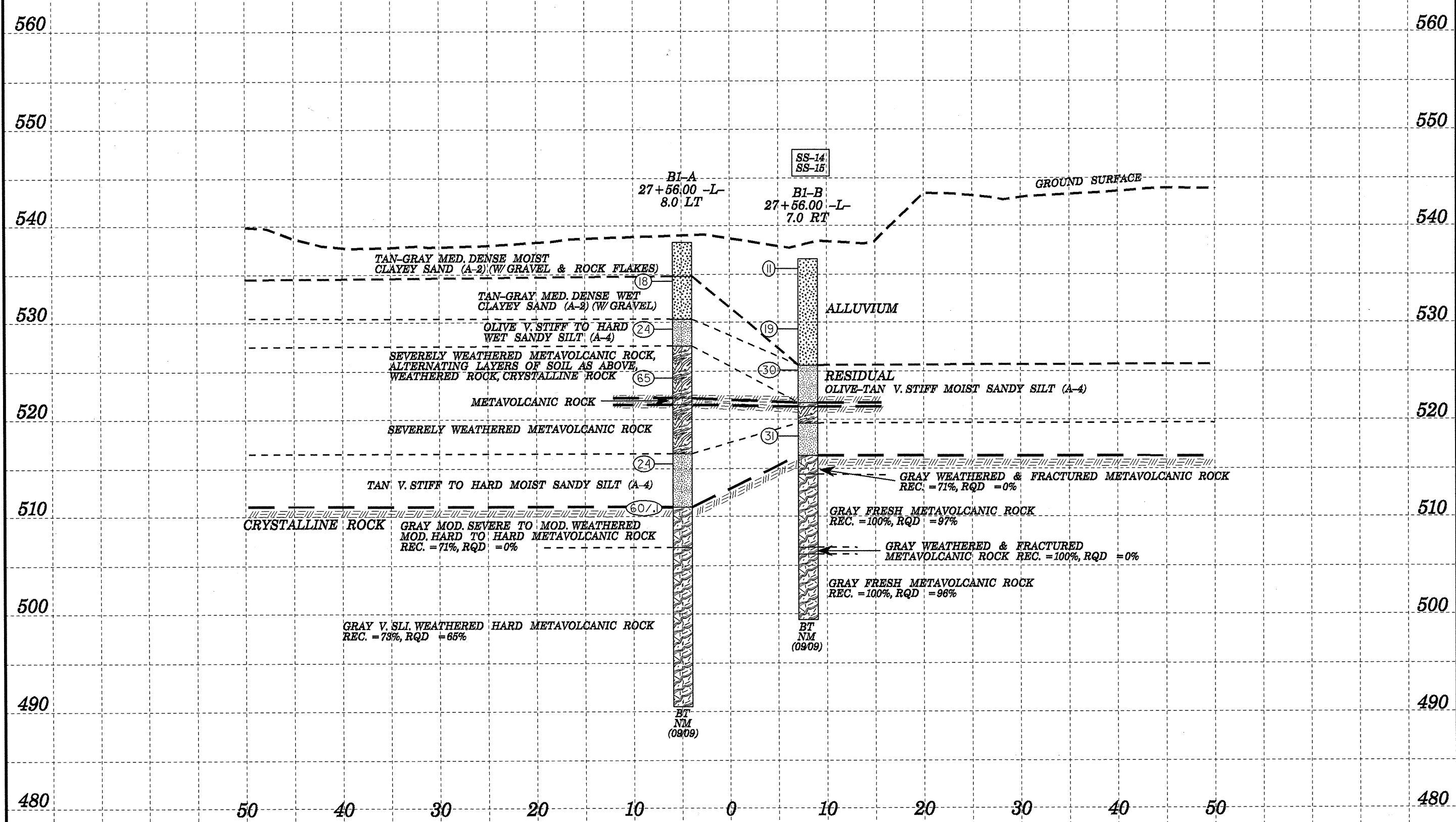
BT  
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(0909)

AR



PROJECT REFERENCE NO.	SHEET
33631.1.1 (B-4293)	6
SECTION THRU BENT ONE	
STA. 27+60 -L-	
SKEW=120	



B1-A  
27+56.00 -L-  
8.0 LT

SS-14  
SS-15  
B1-B  
27+56.00 -L-  
7.0 RT

GROUND SURFACE

TAN-GRAY MED. DENSE MOIST  
CLAYEY SAND (A-2) (W/GRAVEL & ROCK FLAKES)

TAN-GRAY MED. DENSE WET  
CLAYEY SAND (A-2) (W/GRAVEL)

OLIVE V. STIFF TO HARD  
WET SANDY SILT (A-4)

SEVERELY WEATHERED METAVOLCANIC ROCK,  
ALTERNATING LAYERS OF SOIL AS ABOVE,  
WEATHERED ROCK, CRYSTALLINE ROCK

METAVOLCANIC ROCK

SEVERELY WEATHERED METAVOLCANIC ROCK

TAN V. STIFF TO HARD MOIST SANDY SILT (A-4)

CRYSTALLINE ROCK  
GRAY MOD. SEVERE TO MOD. WEATHERED  
MOD. HARD TO HARD METAVOLCANIC ROCK  
REC. = 71%, RQD = 0%

GRAY V. SLI. WEATHERED HARD METAVOLCANIC ROCK  
REC. = 73%, RQD = 65%

ALLUVIUM

RESIDUAL  
OLIVE-TAN V. STIFF MOIST SANDY SILT (A-4)

GRAY WEATHERED & FRACTURED METAVOLCANIC ROCK  
REC. = 71%, RQD = 0%

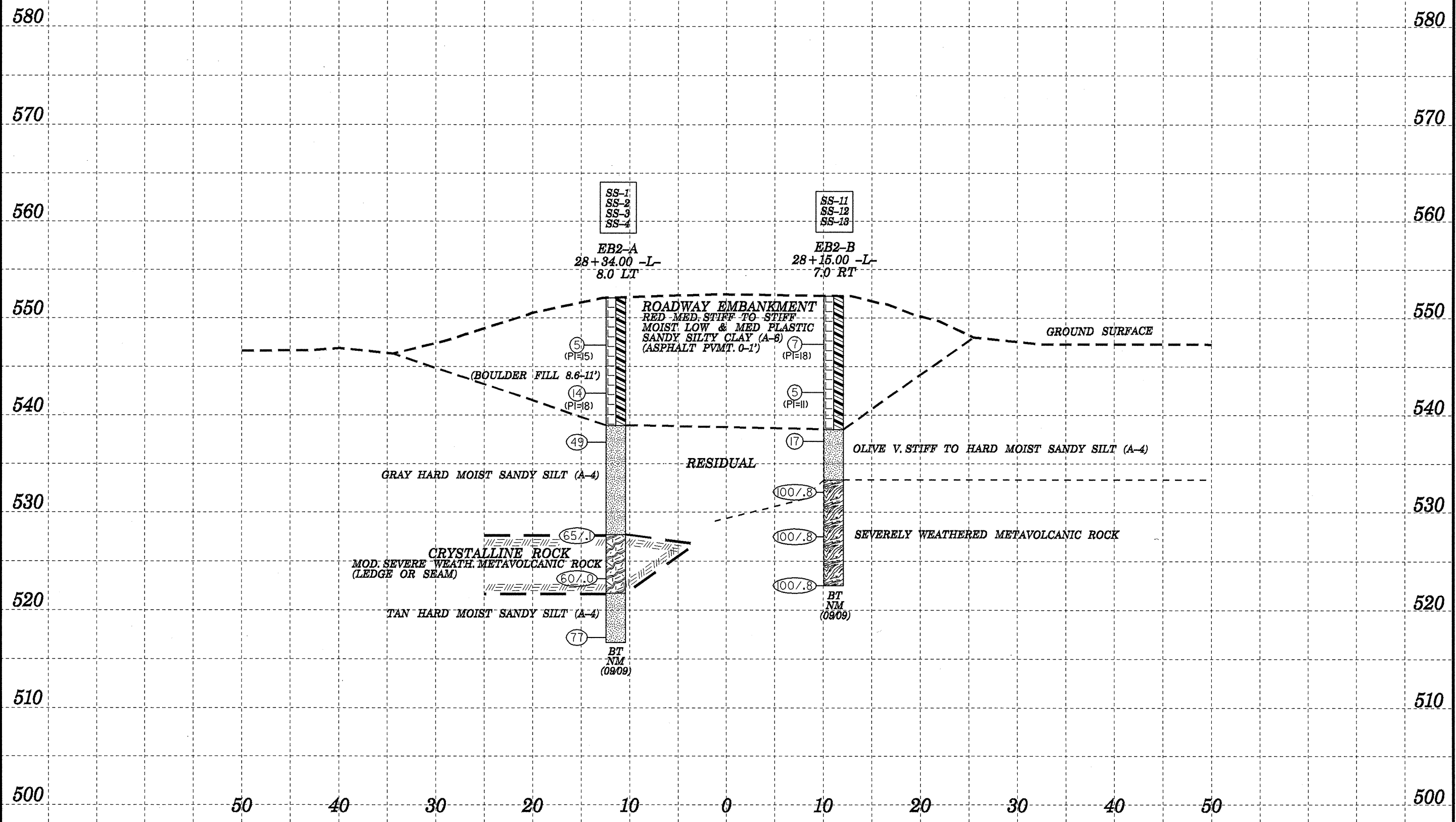
GRAY FRESH METAVOLCANIC ROCK  
REC. = 100%, RQD = 97%

GRAY WEATHERED & FRACTURED  
METAVOLCANIC ROCK REC. = 100%, RQD = 0%

GRAY FRESH METAVOLCANIC ROCK  
REC. = 100%, RQD = 96%

BT  
NM  
(09/09)

BT  
NM  
(09/09)



PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 27+04		OFFSET 7ft LT		ALIGNMENT -L-										
COLLAR ELEV. 552.9 ft		TOTAL DEPTH 37.9 ft		NORTHING 434,988		EASTING 1,481,588										
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
START DATE 09/15/09		COMP. DATE 09/15/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 34.6 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	100						
555														552.9	GROUND SURFACE	0.0
550	549.3	3.6	2	3	3							SS-5	M	544.9	ROADWAY EMBANKMENT RED MED. STIFF MOIST SANDY SILTY CLAY (A-6) (ASPHALT PVMT. 0-1')	
545	544.3	8.6	3	2	2							SS-6	M	539.7	ALLUVIAL TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)	8.0
540	539.3	13.6	5	6	11							SS-7	M		RESIDUAL OLIVE V. STIFF TO HARD MOIST TO DRY SANDY SILT (A-4)	13.2
535	534.3	18.6	15	28	36							SS-8	D			
530	529.3	23.6	17	18	22							SS-9				
525	524.3	28.6	30	51	49/5							SS-10		524.3	WEATHERED ROCK SEVERELY WEATHERED METAVOLCANIC ROCK	28.6
520	519.3	33.6	29	60	60/1									518.3	CRYSTALLINE ROCK MOD. SEVERELY WEATHERED METAVOLCANIC ROCK	34.6
515														515.0	Boring Terminated BY AUGER REFUSAL at Elevation 515.0 ft IN CRYSTALLINE ROCK	37.9

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT\_GDT\_11/20/09

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. EB1-C		STATION 27+00		OFFSET 4ft RT		ALIGNMENT -L-										
COLLAR ELEV. 553.2 ft		TOTAL DEPTH 29.8 ft		NORTHING N/A		EASTING N/A										
DRILL MACHINE CME-550X		DRILL METHOD Solid Augers		HAMMER TYPE Automatic												
START DATE 09/15/09		COMP. DATE 09/15/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
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	100						
555														553.2	GROUND SURFACE	0.0
550														545.2	ROADWAY EMBANKMENT RED MED. STIFF MOIST SANDY SILTY CLAY (A-6) (ASPHALT PVMT. 0-1')	
545														539.7	ALLUVIAL TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)	8.0
540														523.4	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	13.5
535																
530																
525														523.4	Boring Terminated at Elevation 523.4 ft IN SEVERELY WEATHERED CRYSTALLINE ROCK	29.8
520																
515																
510																
505																
500																
495																
490																
485																
480																
475																

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT\_GDT\_11/20/09



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

SHEET

9/17

PROJECT NO. 33631.1.1	ID. B-4293	COUNTY UNION	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 26+85	OFFSET 9ft RT	ALIGNMENT -L-
COLLAR ELEV. 553.2 ft	TOTAL DEPTH 16.9 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 09/15/09	COMP. DATE 09/15/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.7 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						
555																
														553.2	GROUND SURFACE	0.0
550															ROADWAY EMBANKMENT RED MED. STIFF MOIST SANDY SILTY CLAY (A-6) (ASPHALT PVMT. 0-1')	
545	544.5	8.7												545.2	ALLUVIAL TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)	8.0
540	539.5	13.7	2	2	3									539.9		13.3
			24	76	60/1.1									538.5	WEATHERED ROCK SEVERELY WEATHERED METAVOLCANIC ROCK	14.7
535														536.3	CRYSTALLINE ROCK MOD. SEVERELY WEATHERED METAVOLCANIC ROCK	16.9
530															Boring Terminated BY AUGER REFUSAL at Elevation 536.3 ft IN CRYSTALLINE ROCK	
525																
520																
515																
510																
505																
500																
495																
490																
485																
480																
475																

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT.GDT 11/20/09



PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. B1-A		STATION 27+56		OFFSET 8ft LT		ALIGNMENT -L-										
COLLAR ELEV. 538.3 ft		TOTAL DEPTH 47.8 ft		NORTHING 435,036		EASTING 1,481,609										
DRILL MACHINE CME-550X		DRILL METHOD NW Casing W/ Advancer, Tricone w/SPT & Core			HAMMER TYPE Automatic											
START DATE 09/17/09		COMP. DATE 09/17/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 16.1 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	100						
540														538.3	GROUND SURFACE	0.0
														534.8	ALLUVIAL TAN-GRAY MED. DENSE MOIST CLAYEY SAND (A-2)(W/ GRAVEL)	3.5
535	535.3	3.0	5	8	10							M		530.3	RESIDUAL TAN-GRAY MED. DENSE WET CLAYEY SAND (A-2)(W/ GRAVEL)	8.0
530	530.3	8.0	6	8	16							W		527.6	RESIDUAL OLIVE V. STIFF TO HARD WET SANDY SILT (A-4)	10.7
525	525.3	13.0	21	30	35							M		522.2	WEATHERED ROCK ALTERNATING LAYERS OF SOIL AS ABOVE, WEATHERED ROCK, CRYSTALLINE ROCK	16.1
520														521.5	CRYSTALLINE ROCK METAVOLCANIC ROCK	16.8
														516.5	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	21.8
515	516.5	21.8	9	8	16							M		511.0	RESIDUAL TAN V. STIFF MOIST SANDY SILT (A-4)	27.3
510	511.0	27.3	60/1											506.9	CRYSTALLINE ROCK GRAY MOD. SEVERE TO MOD. WEATHERED MOD. HARD TO HARD METAVOLCANIC ROCK	31.4
505															CRYSTALLINE ROCK GRAY V. SLI. WEATHERED HARD METAVOLCANIC ROCK	
500																
495																
490																
485																
480																
475																
470																
465																
460																

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ\_NC\_DOT.GDT\_11/20/09

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)					
BORING NO. B1-A		STATION 27+56		OFFSET 8ft LT		ALIGNMENT -L-						
COLLAR ELEV. 538.3 ft		TOTAL DEPTH 47.8 ft		NORTHING 435,036		EASTING 1,481,609						
DRILL MACHINE CME-550X		DRILL METHOD NW Casing W/ Advancer, Tricone w/SPT & Core			HAMMER TYPE Automatic							
START DATE 09/17/09		COMP. DATE 09/17/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 16.1 ft						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
522.2	522.2	16.1	0.7		(0.2)	(0.0)					Begin Coring @ 16.1 ft	16.1
520	521.5	18.8	5.0		29%	0%					CRYSTALLINE ROCK WEATHERED ROCK SEVERELY WEATHERED METAVOLCANIC ROCK	16.8
515	516.5	21.8		N=24							RESIDUAL TAN V. STIFF MOIST SANDY SILT (A-4)	21.8
510	511.0	27.3									CRYSTALLINE ROCK GRAY MOD. SEVERE TO MOD. WEATHERED MOD. HARD TO HARD METAVOLCANIC ROCK	27.3
	509.5	28.8	1.5	N=60/1	(1.0)	(0.0)		(2.9)	(0.0)		GRAY V. SLI. WEATHERED HARD METAVOLCANIC ROCK R1=12;R2=3;R3=5;R4=0;R5=7;RMR=27	31.4
505	504.5	33.8			(4.4)	(1.7)		(12.0)	(10.6)		CRYSTALLINE ROCK GRAY V. SLI. WEATHERED HARD METAVOLCANIC ROCK R1=12;R2=13;R3=20;R4=20;R5=7;RMR=72	
500	499.5	38.8			100%	94%						
495	494.5	43.8			(5.0)	(4.2)						
490	490.5	47.8			100%	75%					Boring Terminated at Elevation 490.5 ft IN V. SLI. WEATHERED HARD METAVOLCANIC ROCK	47.8
485												
480												
475												
470												
465												
460												
455												
450												
445												

NCDOT CORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ\_NC\_DOT.GDT\_11/20/09

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. B1-B		STATION 27+56		OFFSET 7ft RT		ALIGNMENT -L-										
COLLAR ELEV. 536.6 ft		TOTAL DEPTH 37.2 ft		NORTHING 435,030		EASTING 1,481,622										
DRILL MACHINE CME-550X		DRILL METHOD NW Casing W/ Tricone/ SPT & Core			HAMMER TYPE Automatic											
START DATE 09/16/09		COMP. DATE 09/16/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 14.9 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	100						
540																
	536.6	0.0												536.6	GROUND SURFACE	0.0
535			4	8	3								M	ALLUVIAL TAN-GRAY MED. DENSE MOIST CLAYEY SAND (A-2) (W/ ROCK FLAKES)		
530	530.3	6.3											M			
525	526.1	10.5	12	15	15								M	RESIDUAL OLIVE-TAN V. STIFF MOIST SANDY SILT (A-4)	11.0	
520													SS-14	CRYSTALLINE ROCK	14.9	
														WEATHERED ROCK	15.3	
														SEV. WEATH. CRYSTALLINE ROCK	17.0	
515			10	15	16								M	RESIDUAL TAN HARD MOIST SANDY SILT (A-4)	20.3	
														CRYSTALLINE ROCK	22.2	
510														GRAY WEATHERED & FRACTURED METAVOLCANIC ROCK		
														CRYSTALLINE ROCK		
														GRAY FRESH METAVOLCANIC ROCK		
505														CRYSTALLINE ROCK	29.7	
														GRAY WEATHERED & FRACTURED METAVOLCANIC ROCK	30.4	
														CRYSTALLINE ROCK		
														GRAY FRESH METAVOLCANIC ROCK		
500															37.2	
														Boring Terminated at Elevation 499.4 ft IN FRESH HARD METAVOLCANIC ROCK		

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT\_GDT\_11/20/09

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)					
BORING NO. B1-B		STATION 27+56		OFFSET 7ft RT		ALIGNMENT -L-						
COLLAR ELEV. 536.6 ft		TOTAL DEPTH 37.2 ft		NORTHING 435,030		EASTING 1,481,622						
DRILL MACHINE CME-550X		DRILL METHOD NW Casing W/ Tricone/ SPT & Core			HAMMER TYPE Automatic							
START DATE 09/16/09		COMP. DATE 09/16/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 14.9 ft						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
516.1												
515	516.1 514.4	20.5 22.2	1.7		(1.2) 71%	(0.0) 0%		(7.5) 100%	(7.3) 97%		Begin Coring @ 20.5 ft	
			5.0		(5.0) 100%	(5.0) 100%					CRYSTALLINE ROCK	22.2
			5.0		(5.0) 100%	(3.8) 76%					GRAY MOD. SEV. WEATH. MOD. HARD METAVOLCANIC ROCK R1=4;R2=3;R3=10;R4=12;R5=7;RMR=36 (continued)	
510	509.4	27.2									CRYSTALLINE ROCK	
			5.0								GRAY FRESH HARD METAVOLCANIC ROCK R1=12;R2=20;R3=20;R4=20;R5=7;RMR=79	
505	504.4	32.2			(5.0) 100%	(5.0) 100%		(0.7) 100%	(0.0) 0%		CRYSTALLINE ROCK	29.7
			5.0					(6.8) 100%	(6.5) 96%		GRAY MOD. SEV. WEATHERED MOD. HARD METAVOLCANIC ROCK R1=7;R2=3;R3=5;R4=20;R5=7;RMR=42	30.4
			5.0								CRYSTALLINE ROCK	
			5.0								GRAY FRESH HARD METAVOLCANIC ROCK R1=12;R2=20;R3=20;R4=25;R5=7;RMR=84	
500	499.4	37.2										37.2
											Boring Terminated at Elevation 499.4 ft IN FRESH HARD METAVOLCANIC ROCK	

NCDOT CORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT\_GDT\_11/20/09

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 28+34		OFFSET 8ft LT		ALIGNMENT -L-										
COLLAR ELEV. 552.0 ft		TOTAL DEPTH 35.3 ft		NORTHING N/A		EASTING N/A										
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
START DATE 09/15/09		COMP. DATE 09/15/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 24.3 ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
555															552.0	0.0
550	548.2	3.8	2	3	2							SS-1	M		ROADWAY EMBANKMENT RED MED. STIFF TO STIFF MOIST LOW TO MED. (PI=15,18) PLASTICITY SANDY SILTY CLAY (A-6) (ASPHALT PVMT. 0-1', & BOULDER FILL 8.6-11')	
545	543.2	8.8	25	9	5							SS-2	M			
540	538.2	13.8	13	21	28							SS-3	M		RESIDUAL GRAY HARD MOIST SANDY SILT (A-4)	13.1
535																
530	528.2	23.8	35	65/1									D		CRYSTALLINE ROCK CRYSTALLINE ROCK (LEDGE OR SEAM) MOD. SEVERE WEATH. METAVOLCANIC ROCK	24.3
525	523.2	28.8	60/0										D			
520	518.2	33.8	50	39	38							SS-4	M		RESIDUAL TAN HARD MOIST SANDY SILT (A-4)	30.3
515															Boring Terminated at Elevation 516.7 ft IN TAN HARD MOIST SANDY SILT (A-4)	35.3
510																
505																
500																
495																
490																
485																
480																
475																

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT.GDT 11/20/09

12/17

PROJECT NO. 33631.1.1		ID. B-4293		COUNTY UNION		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE #219 ON SR 1008 OVER BLYTHE CREEK							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 28+15		OFFSET 7ft RT		ALIGNMENT -L-										
COLLAR ELEV. 552.2 ft		TOTAL DEPTH 29.7 ft		NORTHING 435,084		EASTING 1,481,646										
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
START DATE 09/16/09		COMP. DATE 09/16/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
555															552.2	0.0
550	548.3	3.9	2	3	4							SS-11	M		ROADWAY EMBANKMENT RED MED. STIFF TO STIFF MOIST MED. TO LOW (PI=18, 11, 3) PLASTICITY SANDY SILTY CLAY (A-6)	
545	543.3	8.9	2	2	3							SS-12	M			
540	538.3	13.9	5	8	9							SS-13	M		RESIDUAL OLIVE V. STIFF TO HARD MOIST SANDY SILT (A-4)	13.7
535																
530	533.3	18.9	33	44	56/3										WEATHERED ROCK SEVERELY WEATHERED METAVOLCANIC ROCK	18.9
525	528.3	23.9	36	64/3												
520	523.3	28.9	58	42/3											Boring Terminated at Elevation 522.5 ft IN SEVERELY WEATHERED CRYSTALLINE ROCK	29.7
515																
510																
505																
500																
495																
490																
485																
480																
475																

NCDOT BORE SINGLE B4293\_GEO\_BH\_BRD0219.GPJ NC\_DOT.GDT 11/20/09





# FIELD SCOUR REPORT

WBS: 33631 TIP: B-4293 COUNTY: Union

DESCRIPTION(1): Bridge 219 on SR 1008 Over Blythe Creek

### EXISTING BRIDGE

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

Bridge No.: 219 Length: 59' Total Bents: 5 Bents in Channel: 4 Bents in Floodplain: 1  
 Foundation Type: Rubble masonry abutments, timber piles, concrete footing

#### EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: significant scour occurring at SW wing wall, abutment (Abut. One)

Interior Bents: Pier Two footing active scour/undermining  
scour at crutch bent (Pier Three)

Channel Bed: Channel bed is cobble/boulder likely filling scour holes

Channel Bank: Banks scoured in immediate vicinity of bridge.

#### EXISTING SCOUR PROTECTION

Type(3): Sandbags & poured concrete at Abutment One

Extent(4): 20' upstream & downstream on slopes

Effectiveness(5): poor

Obstructions(6): Significant drift at Pier One (logs), additional trash & drift upstream.

#### 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, aggrading, or static.
- 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): Cobble/boulder armoring, med. dense silty sand (A-2-4)

Channel Bank Material(8): Soft sandy silt (A-4) SS-6

Channel Bank Cover(9): Shrubs, vines, trees

Floodplain Width(10): 250'

Floodplain Cover(11): Shrubs, trees

Stream is(12): Aggrading \_\_\_\_\_ Degrading x Static \_\_\_\_\_

Channel Migration Tendency(13): Moderate, toward southwest

Observations and Other Comments: \_\_\_\_\_

Reported by: C. Murray

Date: 9/18/2009

#### DESIGN SCOUR ELEVATIONS(14)

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

#### BENTS

B1

531											

Comparison of DSE to Hydraulics Unit theoretical scour:  
 DSE is equivalent to the Hydraulics Scour. There is no End Bent impact.

DSE determined by: \_\_\_\_\_

C. Little

Date: 12/2/2009

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

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



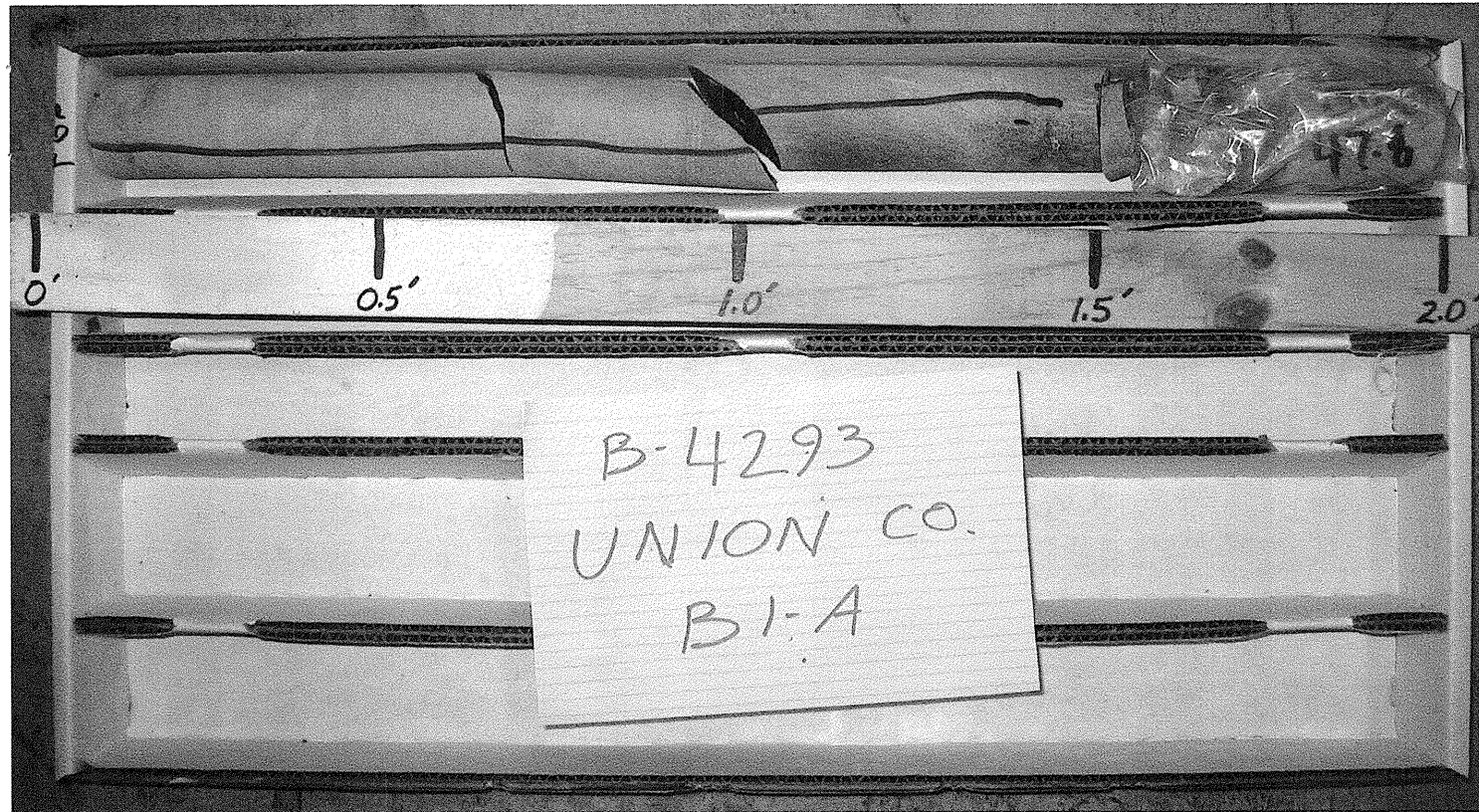
33631.1.1 (B-4293)  
UNION COUNTY  
BRIDGE NO. 219 OVER BLYTHE CREEK ON SR 1008

CORE PHOTOS



33631.1.1 (B-4293)  
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