

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33682.1.1(B-4402)	1	10

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33682.1.1(B-4402) F.A. PROJ. BRZ-1504(9)  
COUNTY ALAMANCE  
PROJECT DESCRIPTION BRIDGE NO. 7 ON -L- (SR 1504) OVER  
TICKLE CREEK

**INVENTORY**

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE(S)
5	CROSS SECTION(S)
6-7	BORE LOG (S)
8	SOIL TEST RESULTS
9	SCOUR REPORT
10	SITE PHOTOGRAPHS)

**CAUTION NOTICE**

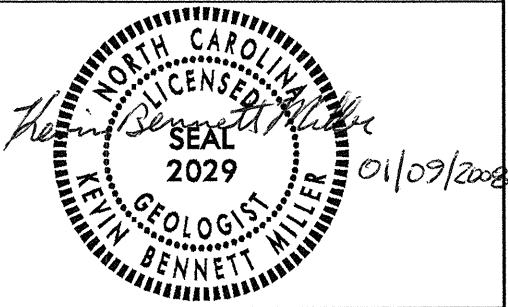
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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.I. MILKOVITS, JR.  
H.R. CONLEY  
D.W. DIXON

INVESTIGATED BY J.I. MILKOVITS, JR.  
CHECKED BY K.B. MILLER  
SUBMITTED BY N.T. ROBERSON  
DATE JANUARY 2008



**PROJECT: 33682.1.1 ID: B-4402**

DRAWN BY: T.T. WALKER

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.

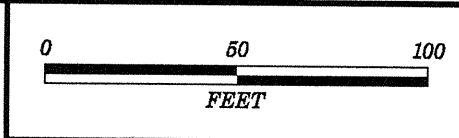
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

PROJECT REFERENCE NO. 33682.1.(B-4402)	SHEET NO. 2
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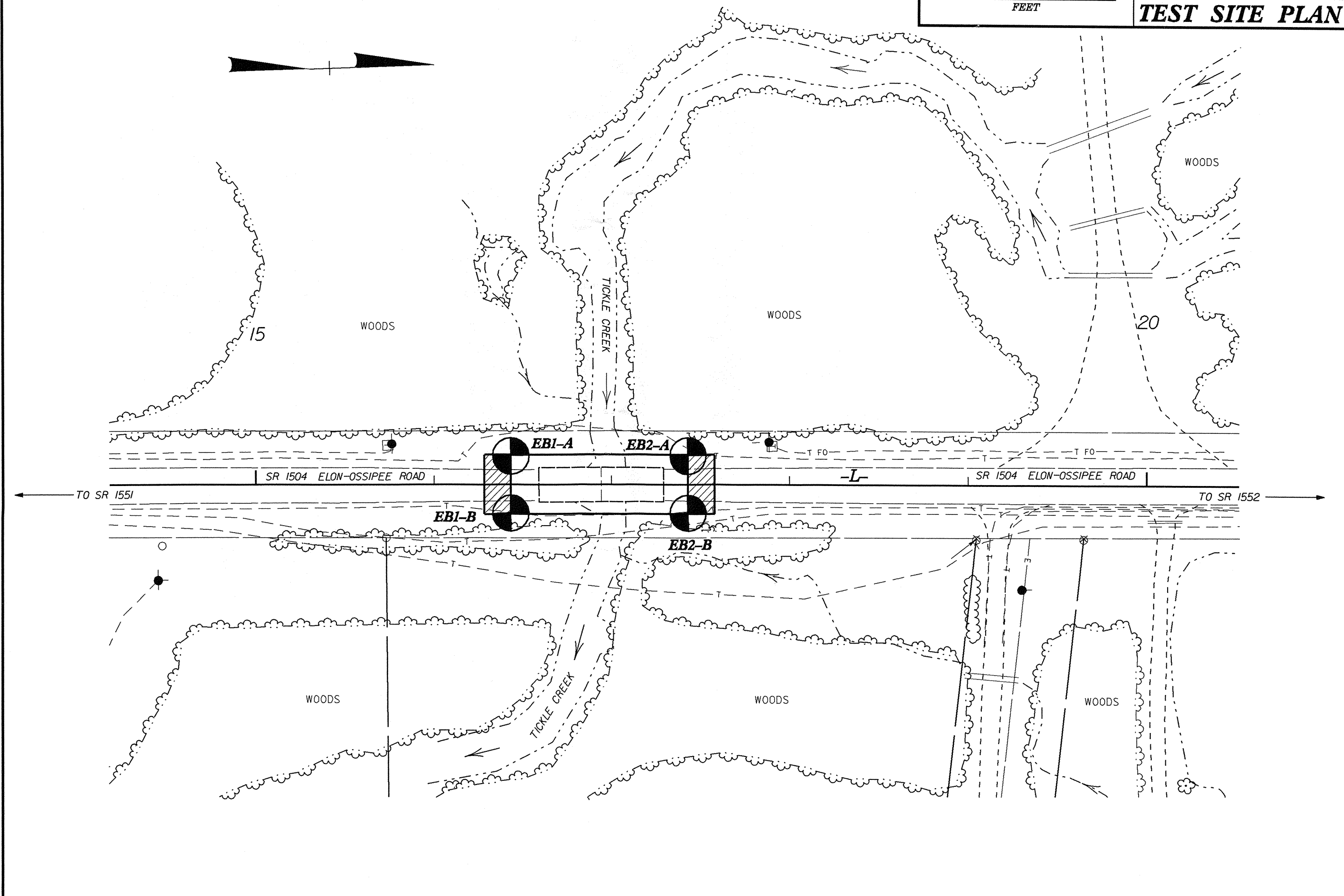
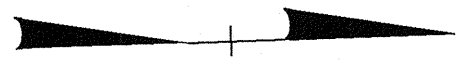
**SUBSURFACE INVESTIGATION**

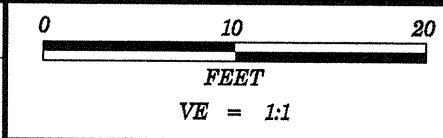
**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

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 (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, DARK, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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. <b>ANGULARITY OF GRAINS</b> 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> <b>CRYSTALLINE ROCK (CR)</b> <b>NON-CRYSTALLINE ROCK (NCR)</b> <b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>	<b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>ADUJFER</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 DISLOGGED 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 REPLACED 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 SL.)</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 (SL.)</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>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 DISLOGGED 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. 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<b>PERCENTAGE OF MATERIAL</b>	<b>GROUND WATER</b>	<b>ROCK HARDNESS</b>	
<b>ORGANIC MATERIAL</b> TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%	<b>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</b> <b>STATIC WATER LEVEL AFTER 24 HOURS</b> <b>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</b> <b>SPRING OR SEEP</b>	<b>VERY HARD</b> - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. <b>HARD</b> - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. <b>MODERATELY HARD</b> - 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. <b>MEDIUM HARD</b> - 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. <b>SOFT</b> - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. <b>VERY SOFT</b> - 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.	
<b>CONSISTENCY OR DENSENESS</b>	<b>MISCELLANEOUS SYMBOLS</b>	<b>ABBREVIATIONS</b>	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	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	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	
<b>TEXTURE OR GRAIN SIZE</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>FRACATURE SPACING</b>	<b>BEDDING</b>
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.75 2.00 0.42 0.25 0.075 0.053	DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 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 N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST	<b>VERY WIDE</b> - MORE THAN 10 FEET <b>WIDE</b> - 3 TO 10 FEET <b>MODERATELY CLOSE</b> - 1 TO 3 FEET <b>CLOSE</b> - 0.6 TO 1 FEET <b>VERY CLOSE</b> - LESS THAN 0.36 FEET	<b>VERY THICKLY BEDDED</b> - > 4 FEET <b>THICKLY BEDDED</b> - 1.5 - 4 FEET <b>THINLY BEDDED</b> - 0.16 - 1.5 FEET <b>VERY THINLY BEDDED</b> - 0.03 - 0.16 FEET <b>THICKLY LAMINATED</b> - 0.008 - 0.03 FEET <b>THINLY LAMINATED</b> - < 0.008 FEET
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		<b>INDURATION</b>	
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		<b>FRIABLE</b> - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. <b>MODERATELY INDURATED</b> - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. <b>INDURATED</b> - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. <b>EXTREMELY INDURATED</b> - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
<b>PLASTICITY</b>			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY			
<b>COLOR</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.			

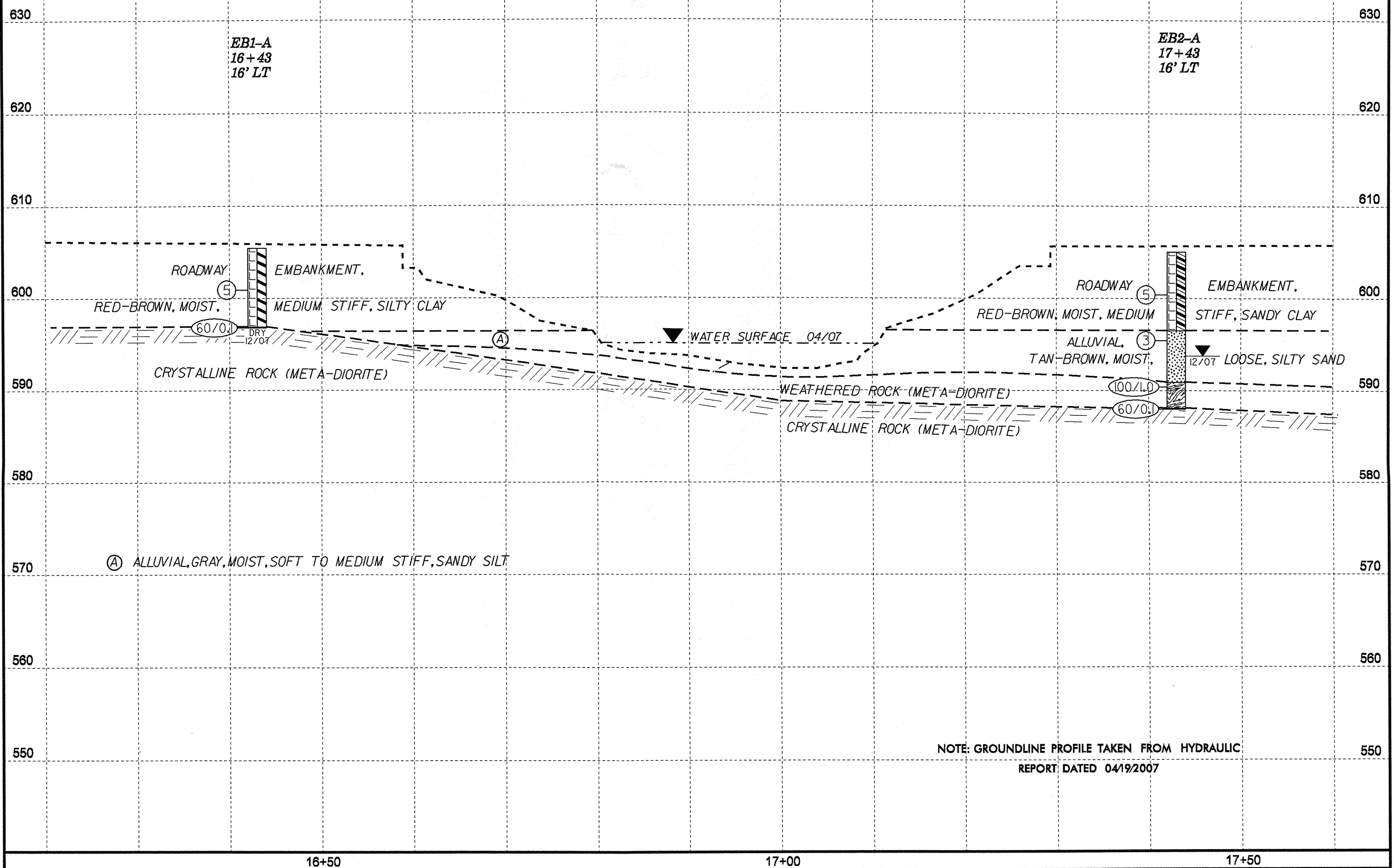


PROJECT REFERENCE NO.	SHEET
33682.1.1(B-4402)	3
<b>TEST SITE PLAN</b>	





PROJECT REFERENCE NO.	SHEET
33682.1.1(B-4402)	4
PROFILE THROUGH BORINGS PROJECTED ALONG -L-	

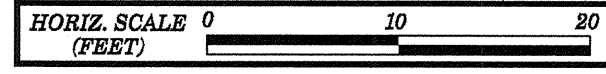
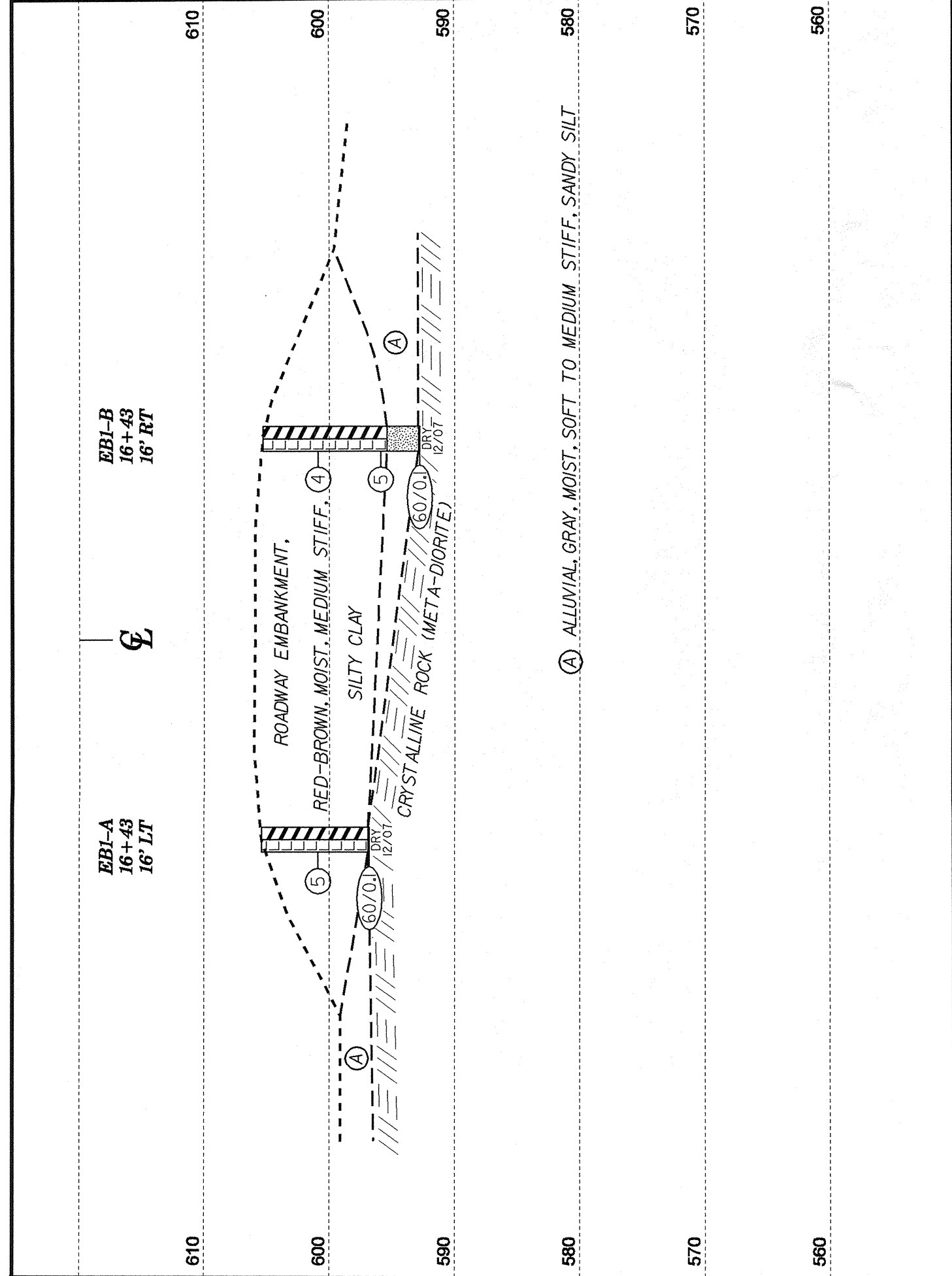


NOTE: GROUNDLINE PROFILE TAKEN FROM HYDRAULIC REPORT DATED 04/19/2007

16+50

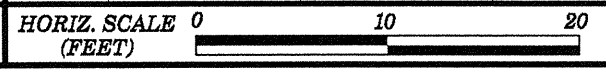
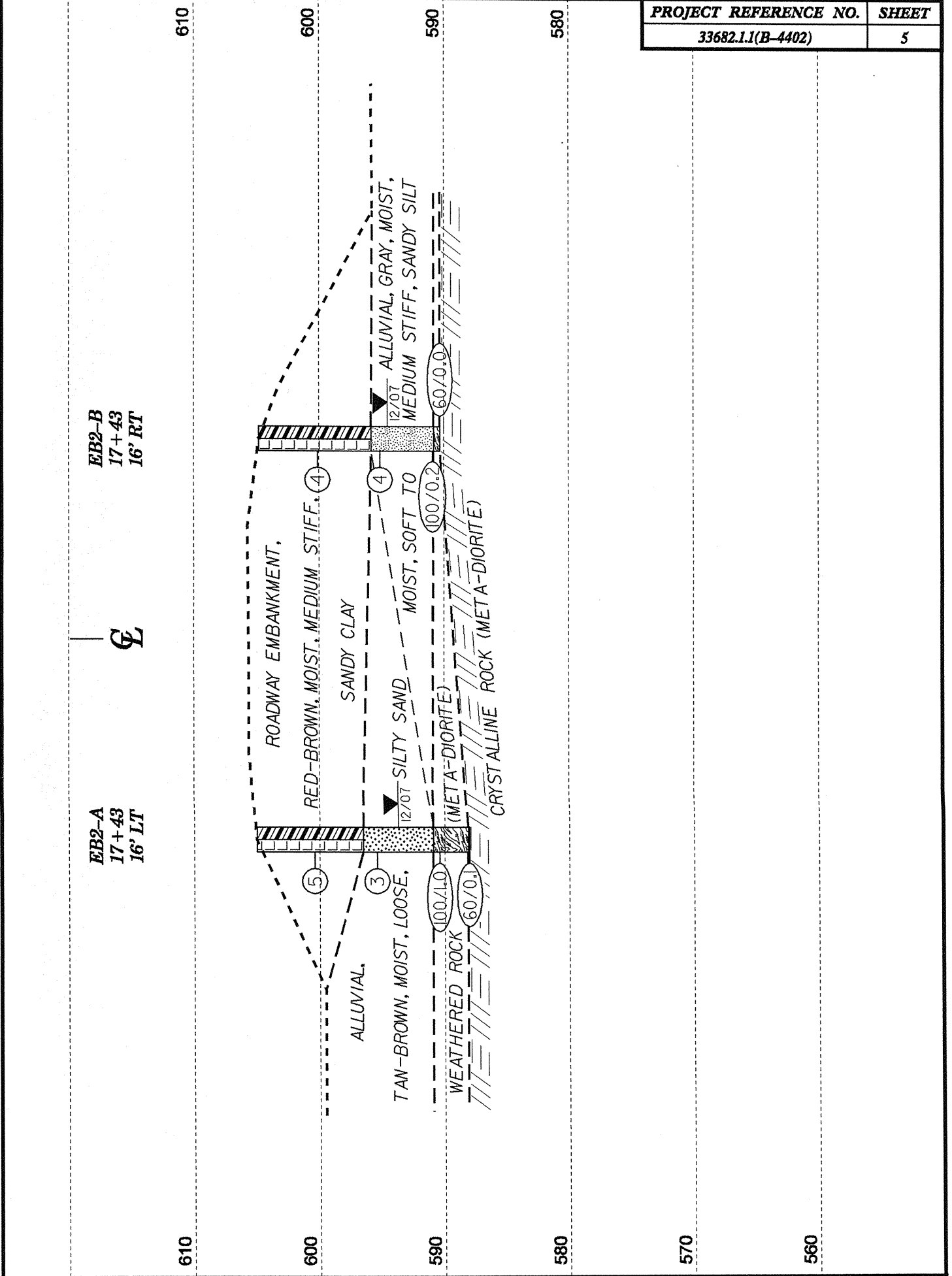
17+00

17+50



VE = 1:1

CROSS SECTION THROUGH END BENT 1



VE = 1:1

CROSS SECTION THROUGH END BENT 2



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 33682.1.1	ID. B-4402	COUNTY ALAMANCE	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 7 ON -L- (SR 1504) OVER TICKLE CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 16+43	OFFSET 16ft LT	ALIGNMENT -L-
COLLAR ELEV. 605.4 ft	TOTAL DEPTH 8.6 ft	NORTHING 869,525	EASTING 1,848,619
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/05/07	COMP. DATE 12/05/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 8.6 ft

PROJECT NO. 33682.1.1	ID. B-4402	COUNTY ALAMANCE	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 7 ON -L- (SR 1504) OVER TICKLE CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+43	OFFSET 16ft RT	ALIGNMENT -L-
COLLAR ELEV. 605.3 ft	TOTAL DEPTH 12.5 ft	NORTHING 869,524	EASTING 1,848,652
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/05/07	COMP. DATE 12/05/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.5 ft

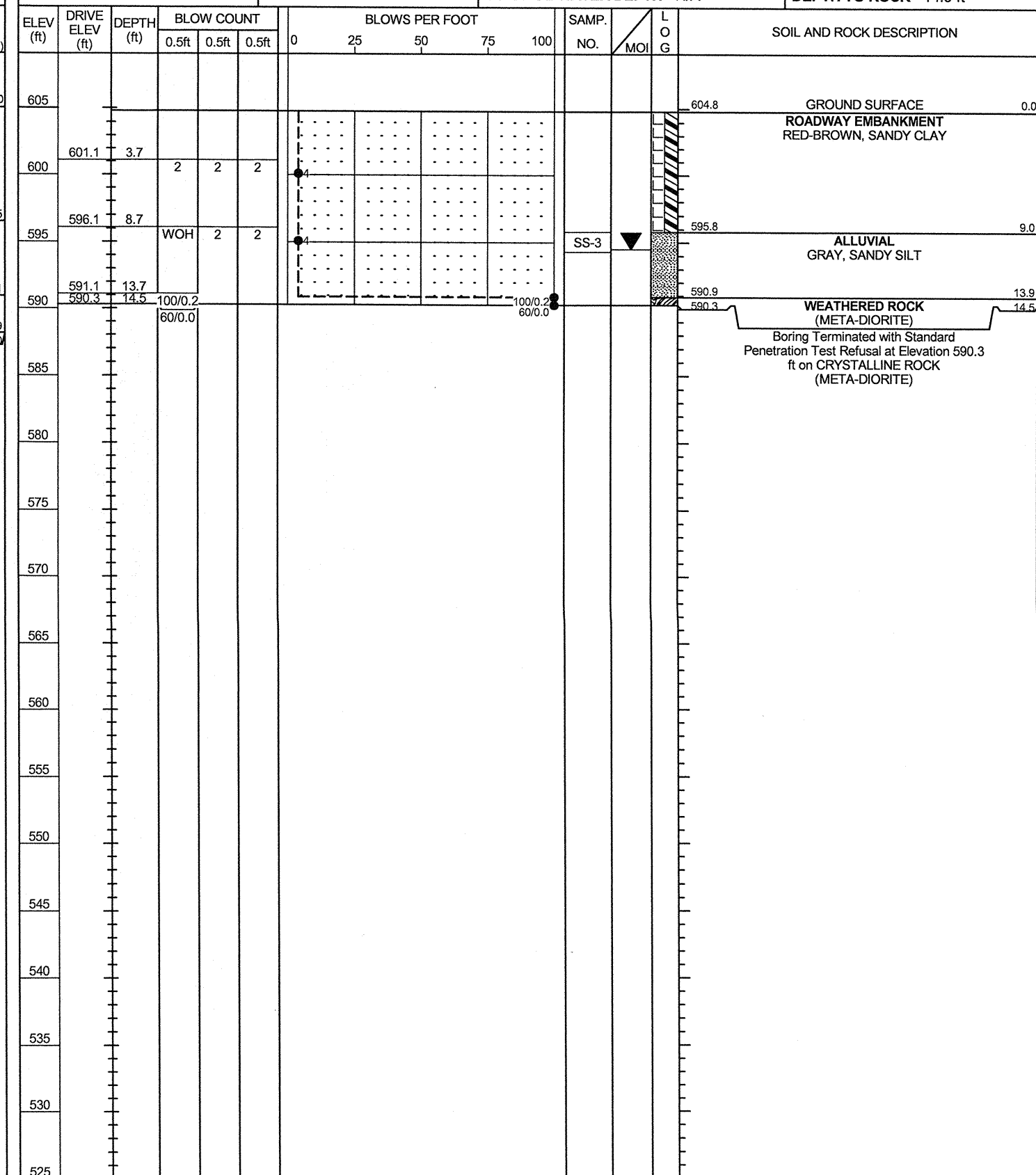
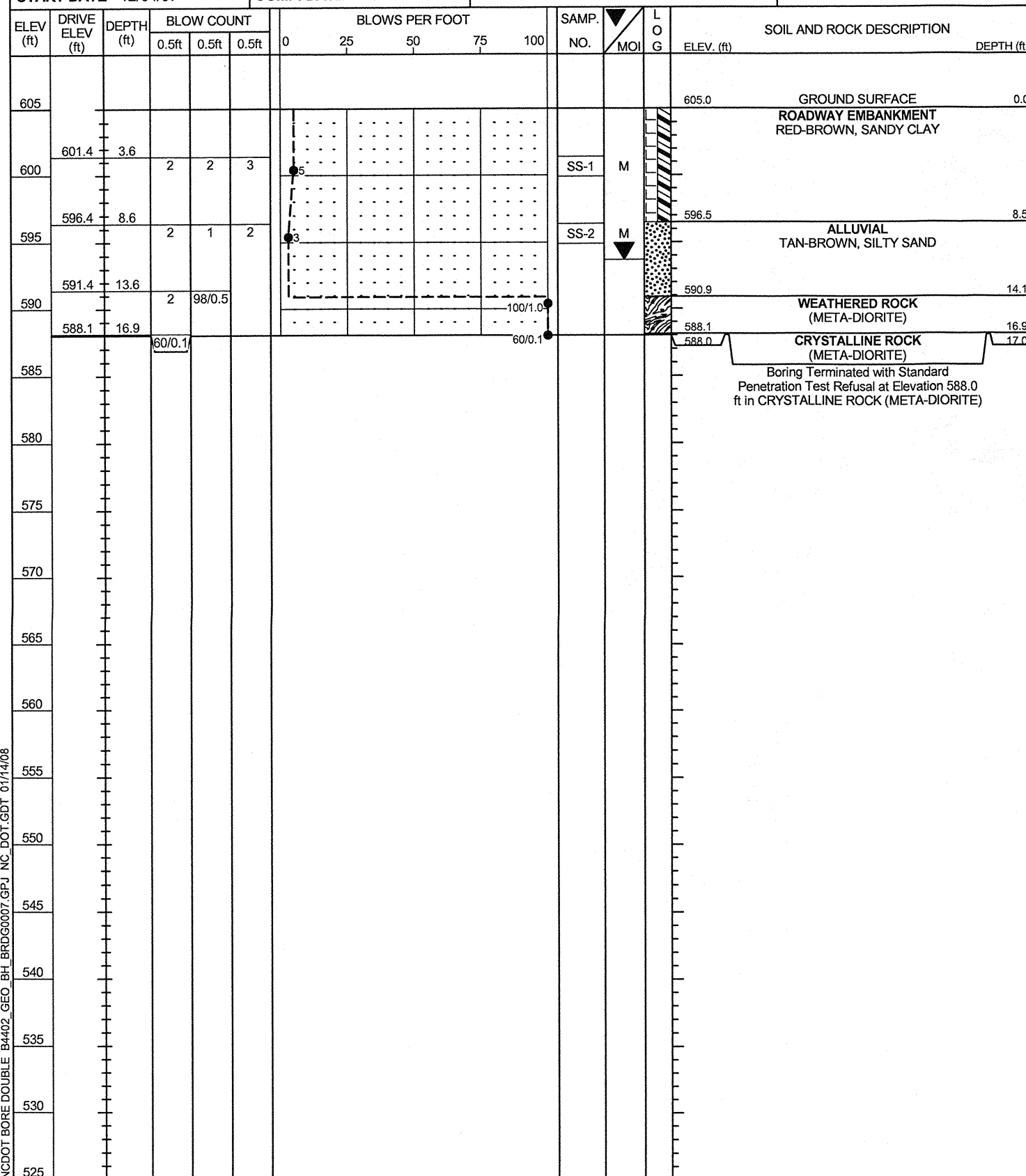
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
610															
605														605.4	0.0
														ROADWAY EMBANKMENT RED-BROWN, SILTY CLAY	
600	601.9	3.5													
			2	2	3										
595	596.9	8.5												596.9	8.5
														596.8	8.6
														CRYSTALLINE ROCK (META-DIORITE)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 596.8 ft in CRYSTALLINE ROCK (META-DIORITE)	
590															
585															
580															
575															
570															
565															
560															
555															
550															
545															
540															
535															
530															

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					
610															
605														605.3	0.0
														ROADWAY EMBANKMENT RED-BROWN, SILTY CLAY	
600	601.9	3.4													
			3	2	2										
595	596.9	8.4												596.9	8.4
														595.4	9.9
														ALLUVIAL GRAY, SANDY SILT	
														592.9	12.4
														592.8	12.5
														CRYSTALLINE ROCK (META-DIORITE)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 592.8 ft in CRYSTALLINE ROCK (META-DIORITE)	
590															
585															
580															
575															
570															
565															
560															
555															
550															
545															
540															
535															
530															

NCDOT BORE DOUBLE B4402 GEO BH BRDG007.GPJ NC DOT.GDT 01/14/08

PROJECT NO. 33682.1.1	ID. B-4402	COUNTY ALAMANCE	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 7 ON -L- (SR 1504) OVER TICKLE CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 17+43	OFFSET 16ft LT	ALIGNMENT -L-
COLLAR ELEV. 605.0 ft	TOTAL DEPTH 17.0 ft	NORTHING 869,625	EASTING 1,848,622
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/04/07	COMP. DATE 12/04/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.0 ft

PROJECT NO. 33682.1.1	ID. B-4402	COUNTY ALAMANCE	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 7 ON -L- (SR 1504) OVER TICKLE CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+43	OFFSET 16ft RT	ALIGNMENT -L-
COLLAR ELEV. 604.8 ft	TOTAL DEPTH 14.5 ft	NORTHING 869,624	EASTING 1,848,655
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/04/07	COMP. DATE 12/04/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.5 ft



NCDOT BORE DOUBLE B4402\_GEO\_BH\_BRD0007.GPJ NC\_DOT.GDT 01/14/08

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4	16'RT	16+43	3.4-4.9	A-7-6(11)	47	23	26.4	18.3	18.2	37.1	97	80	57	-	-

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	16'LT	17+43	3.6-5.1	A-6(5)	35	17	30.5	20.2	22.6	26.8	97	78	51	-	-
SS-2	16'LT	17+43	8.6-10.1	A-2-4(0)	17	2	33.8	36.7	19.3	10.3	100	81	35	-	-

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	16'RT	17+43	9.0-10.2	A-4(2)	26	8	19.2	30.9	29.4	20.6	100	91	56	-	-





**FIELD  
 SCOUR REPORT**

WBS: 33682.1.1 TIP: B-4402 COUNTY: Alamance

DESCRIPTION(1): Bridge No. 7 on -L- (SR 1504/Elon-Ossipee Road) over Tickle Creek

**EXISTING BRIDGE**

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

Bridge No.: 7 Length: 70.5' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2  
 Foundation Type: Timber piles and timber on footings

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: Minor local and contraction around end bent 2

Interior Bents: Local scour around footings, 1-2'

Channel Bed: Minor contraction

Channel Bank: At EB2, contraction around the base of the slope.

**EXISTING SCOUR PROTECTION**

Type(3): Rip rap

Extent(4): Under existing structure

Effectiveness(5): Effective

Obstructions(6): Fallen trees 20' downstream and boulders up and downstream

**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): Alluvial, loose, silty sand (A-2-4) - SS-2, and soft, sandy silt (A-4) - SS-3

Channel Bank Material(8): Alluvial, loose, silty sand (A-2-4) - SS-2, and soft, sandy silt (A-4) - SS-3

Channel Bank Cover(9): Grass, brush and small trees

Floodplain Width(10): 70 to 100'

Floodplain Cover(11): Grass, brush and trees

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

Channel Migration Tendency(13): Slight tendency for migration toward the east

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

**DESIGN SCOUR ELEVATIONS(14)**

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

**BENTS**

EB1	EB2											
N/A	N/A											

Comparison of DSE to Hydraulics Unit theoretical scour:  
 The Geotechnical Unit agrees with the Hydraulics Unit 100 year theoretical scour elevation of 588.8 feet. The theoretical scour envelope does not impact with either end bent.

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

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

Reported by: *Joseph I. Milkovits, Jr.* Date: 11/14/2007

# SITE PHOTOGRAPH

Bridge No. 7 on -L- (SR 1504) Over Tickle Creek



Looking North towards End Bent 2