

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33769.1.1(B-4558) F.A. PROJ. BRZ-1330(6)
COUNTY JOHNSTON
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH RD.)
OVER STONY FORK CREEK

INVENTORY

CONTENTS

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

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.

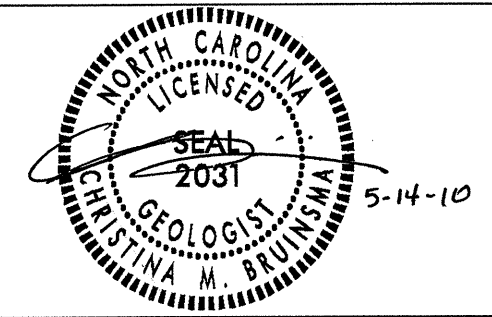
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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: 33769.1.1
ID: B-4558

PERSONNEL
C.M. BRUINSMA
H.R. CONLEY
J.R. MATULA
J. R. TURNAGE

INVESTIGATED BY C.M. BRUINSMA
CHECKED BY N.T. ROBERSON
SUBMITTED BY C.M. BRUINSMA
DATE MAY 2010



DRAWN BY: T.T. WALKER, C.M. BRUINSMA

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.

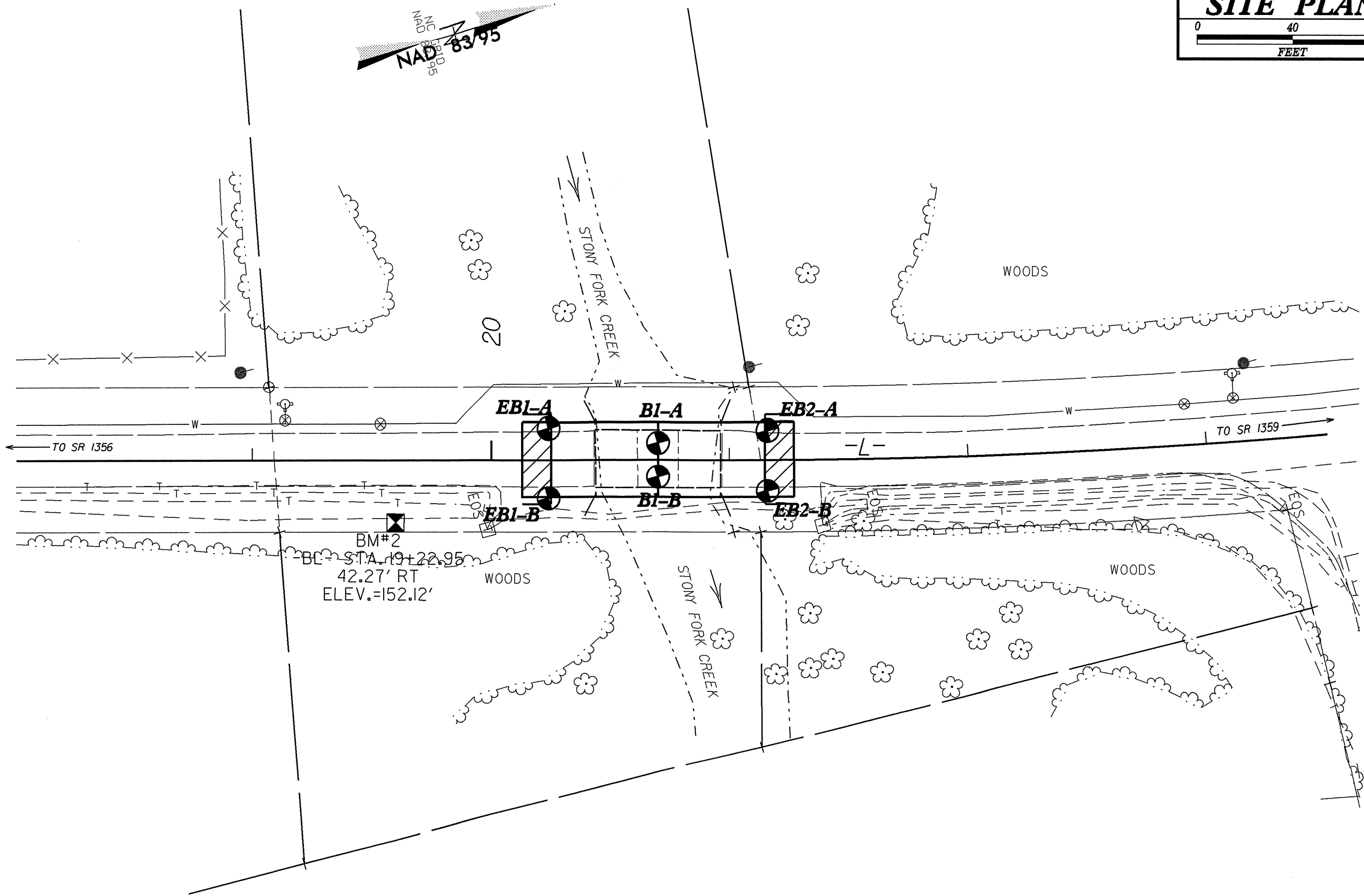
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

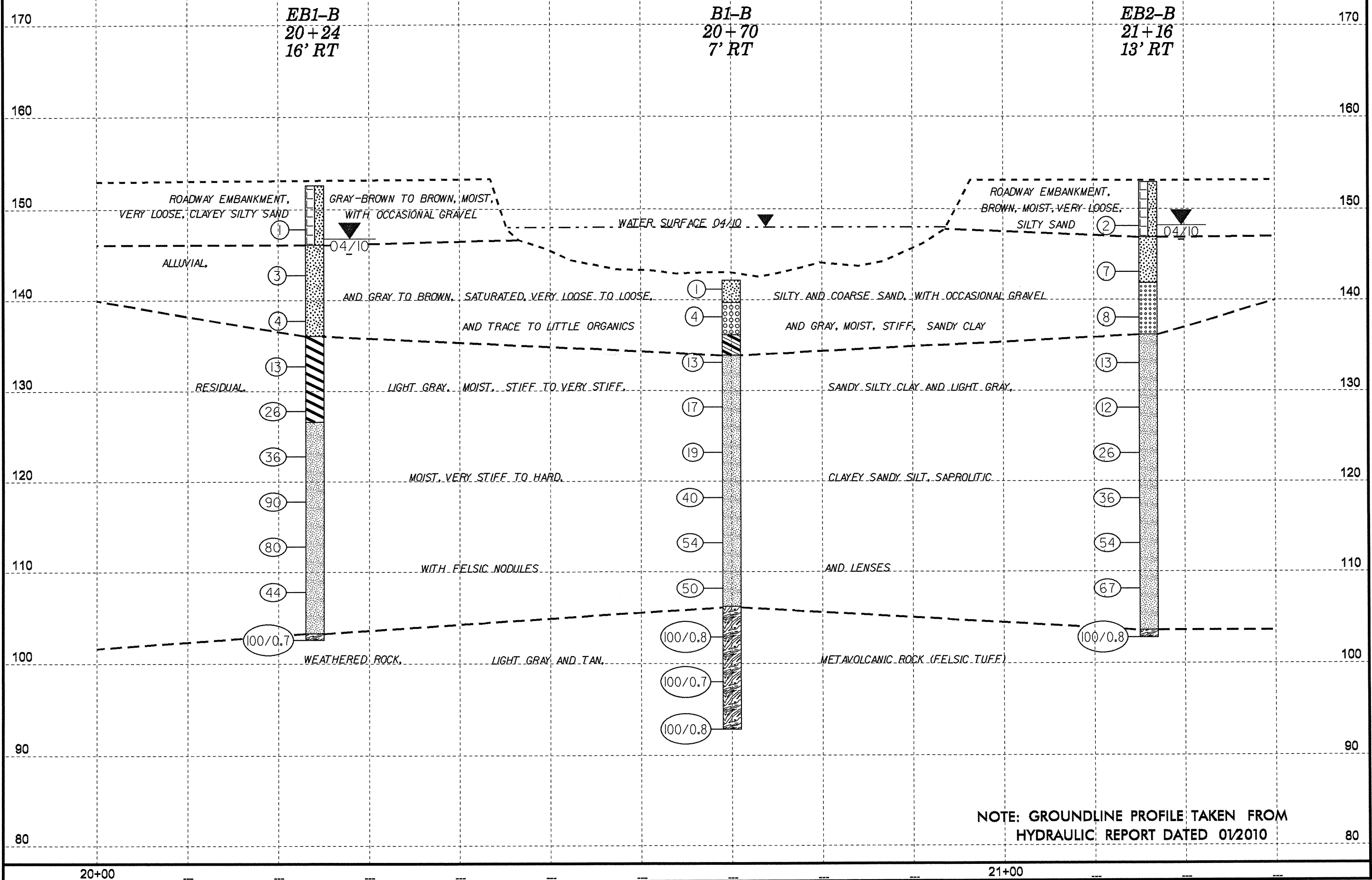
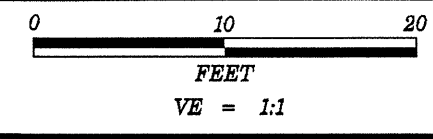
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. 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. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, 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. FLOOD - 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (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										GROUND WATER									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7 SYMBOL [Diagrams showing soil patterns for various groups] % PASSING: 10, 40, 200 LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX USUAL TYPES OF MAJOR MATERIALS: FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND, SILTY SOILS, CLAYEY SOILS GEN. RATING AS A SUBGRADE: EXCELLENT TO GOOD, FAIR TO POOR, FAIR TO POOR, POOR, UNSUITABLE PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY: SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31, LIQUID LIMIT EQUAL TO 31-50, LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL: 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% GRANULAR SOILS: 2-3%, 3-5%, 5-12%, >10% SILT-CLAY SOILS: 3-5%, 5-12%, 12-20%, >20% OTHER MATERIAL: TRACE 1-10%, LITTLE 10-20%, SOME 20-35%, HIGHLY 35% AND ABOVE										FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, 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.										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									
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS										SOIL MOISTURE - CORRELATION OF TERMS									
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) GENERALLY GRANULAR MATERIAL (NON-COHESIVE): VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE GENERALLY SILT-CLAY MATERIAL (COHESIVE): VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD										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, 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										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 PEICES 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 FINGERNAIL.										SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION LLI - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE SHRINKAGE LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									
TEXTURE OR GRAIN SIZE										ABBREVIATIONS										FRACTURE SPACING										BEDDING									
U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270 BOULDER (BLDR), COBBLE (COB), GRAVEL (GR), COARSE SAND (CS, SD), FINE SAND (F SD), SILT (SL), CLAY (CL) GRAIN SIZE: MM 305, 75, 2.0, 0.25, 0.075, 0.005; IN. 12, 3, 0.075, 0.01, 0.003, 0.0002										AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, V - VOID RATIO, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES, FRAGS. - FRAGMENTS, HL - HIGHLY, MED. - MEDIUM, MICA - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, W - MOISTURE CONTENT, V - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, Wt% - UNIT WEIGHT, Wt% - DRY UNIT WEIGHT										TERM, SPACING, THICKNESS 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: 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)										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										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION										COLOR									
PLASTICITY INDEX (PI), DRY STRENGTH NONPLASTIC: 0-5, VERY LOW LOW PLASTICITY: 6-15, SLIGHT MED. PLASTICITY: 16-25, MEDIUM HIGH PLASTICITY: 26 OR MORE, HIGH										DRILL UNITS: MOBILE B, BK-51, CME-45C, CME-550, PORTABLE HOIST, CME-550X 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										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										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.									
BENCH MARK: TBM #2 RR SPIKE IN BASE OF 12" PINE (BL) 19+22.95, 42.27' RT ELEVATION: 152.12 FT.										NOTES:										REVISIONS:										REVISIONS:									

NAD 83/95
 NC 83/95
 83/95



SKEW=90°



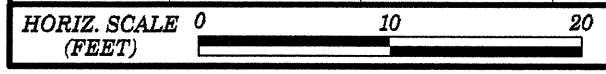
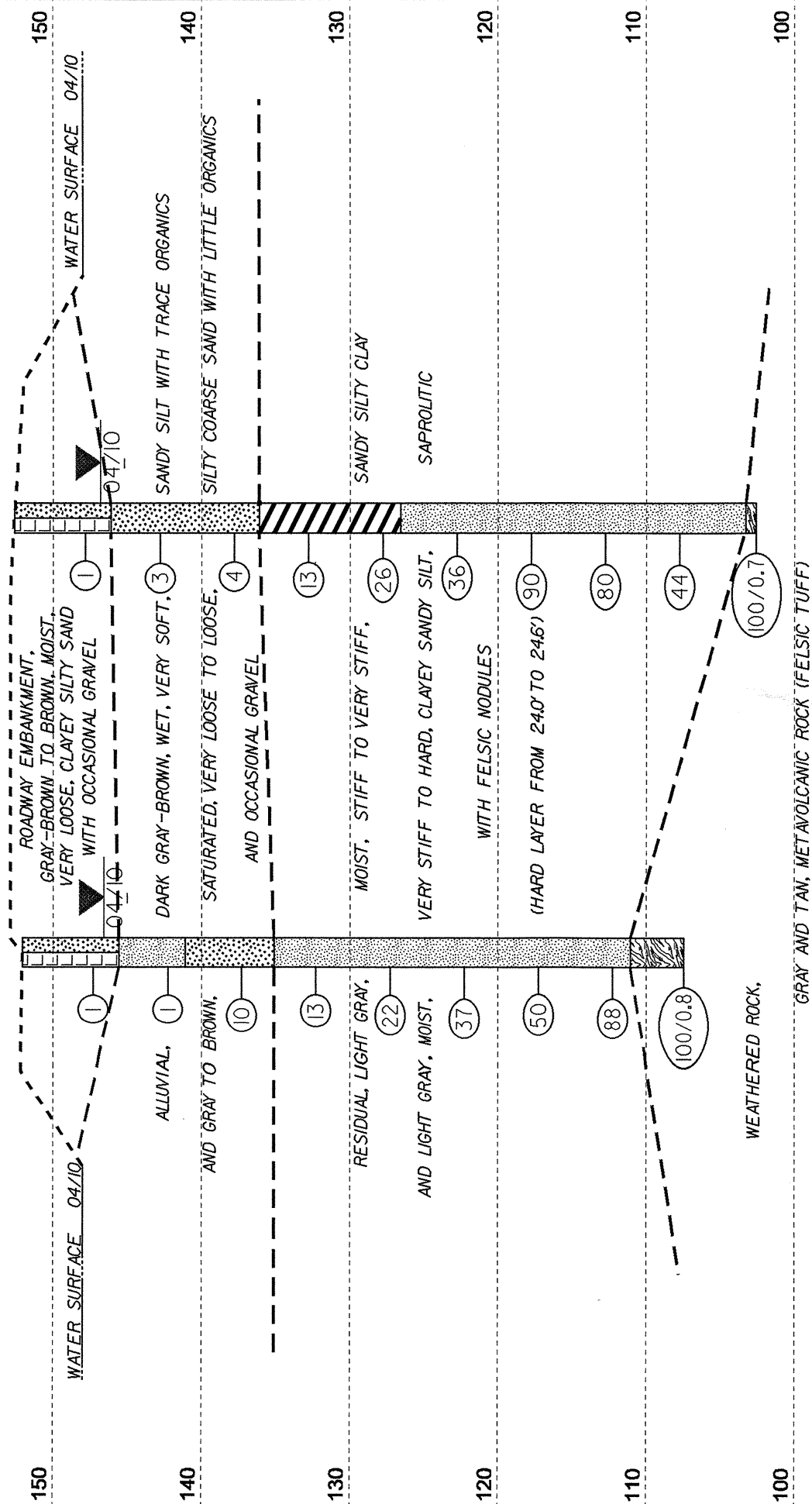
E1-B
20+24
16' RT

E1-A
20+24
13' LT



160

160



VE = 1:1

CROSS SECTION THROUGH END BENT 1

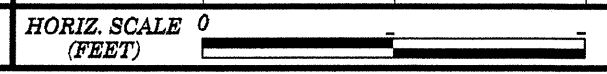
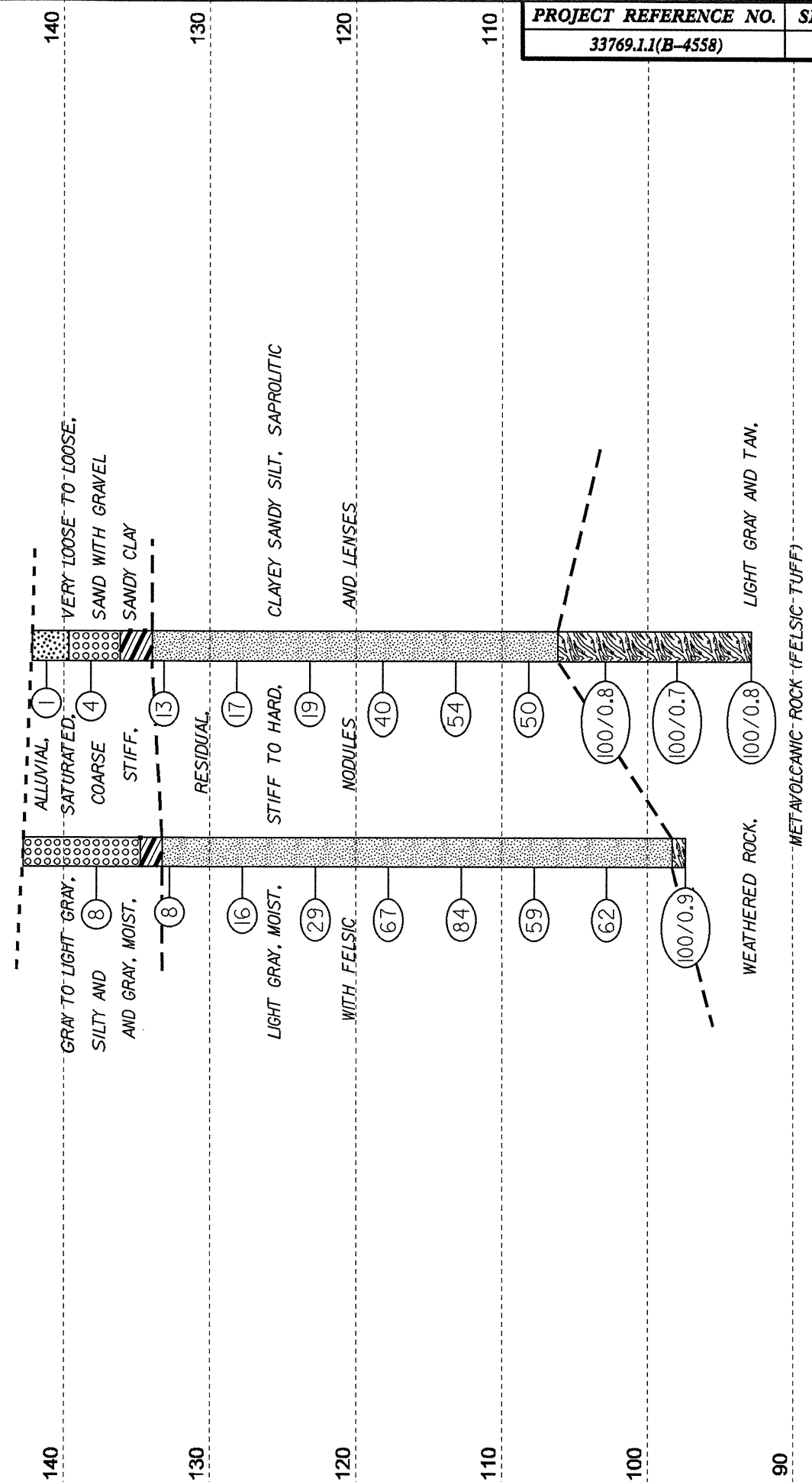
E1-B
20+70
7' RT

E1-A
20+70
7' LT



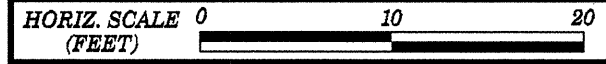
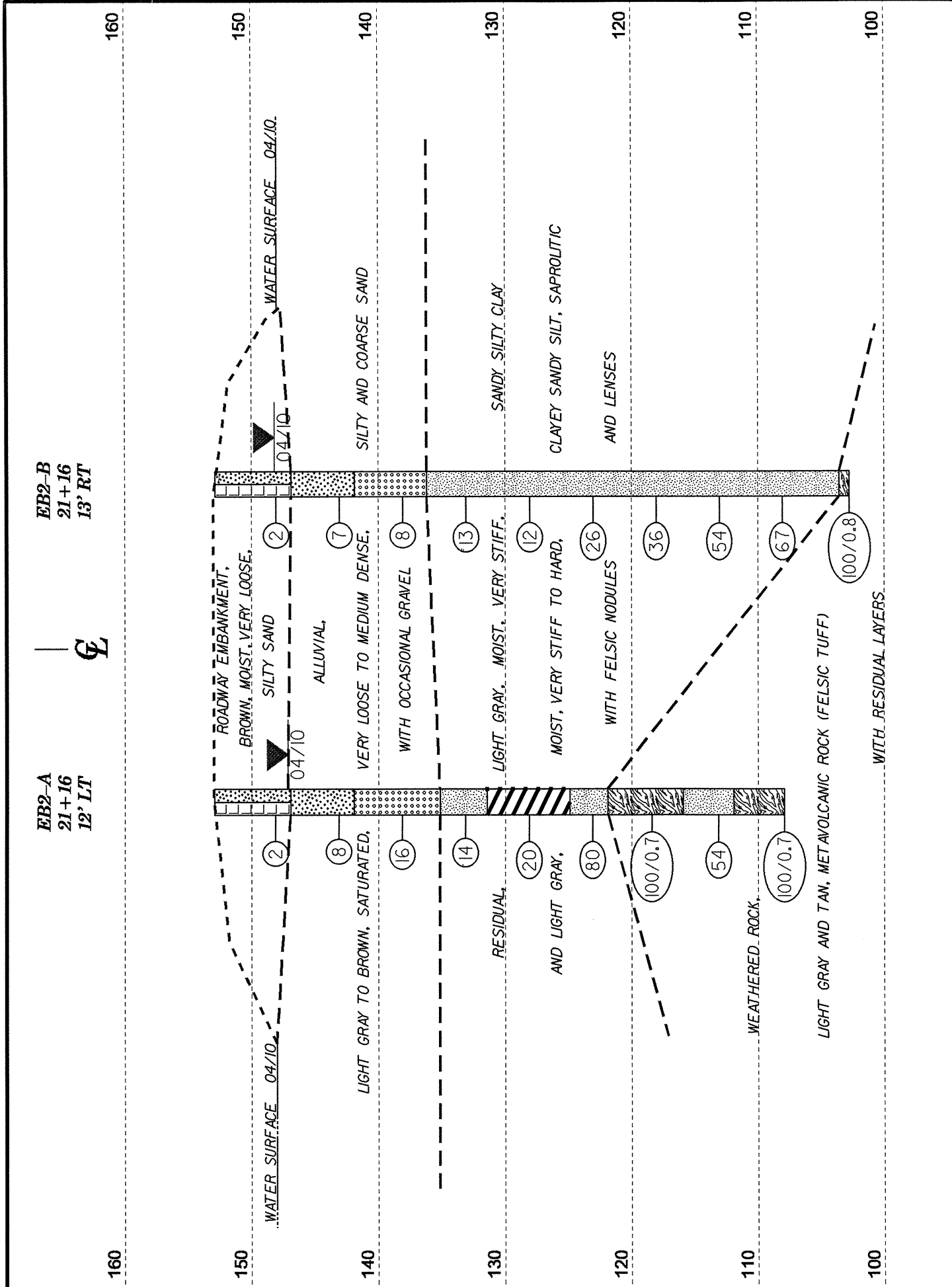
150

150



VE = 1:1

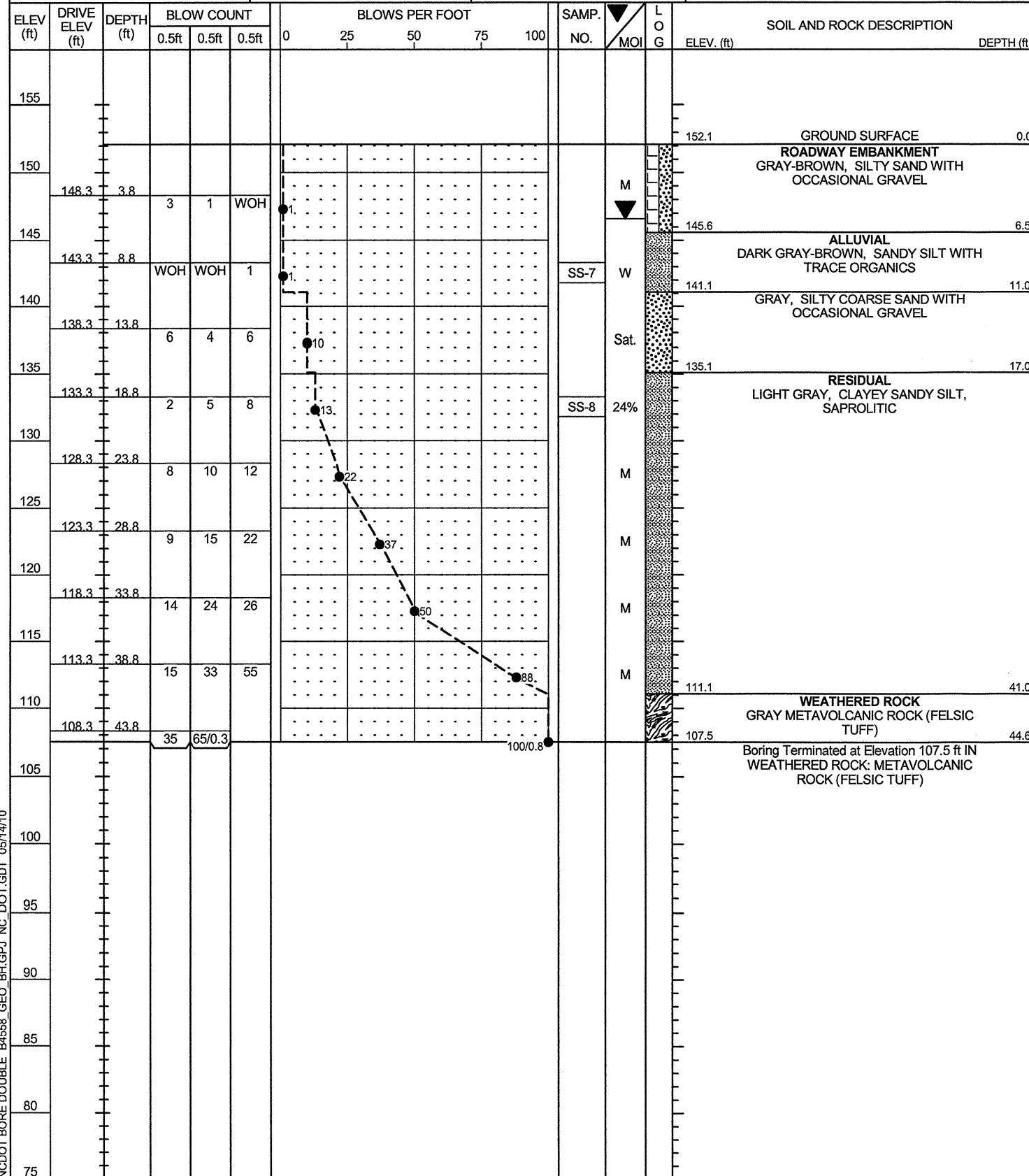
CROSS SECTION THROUGH BENT 1



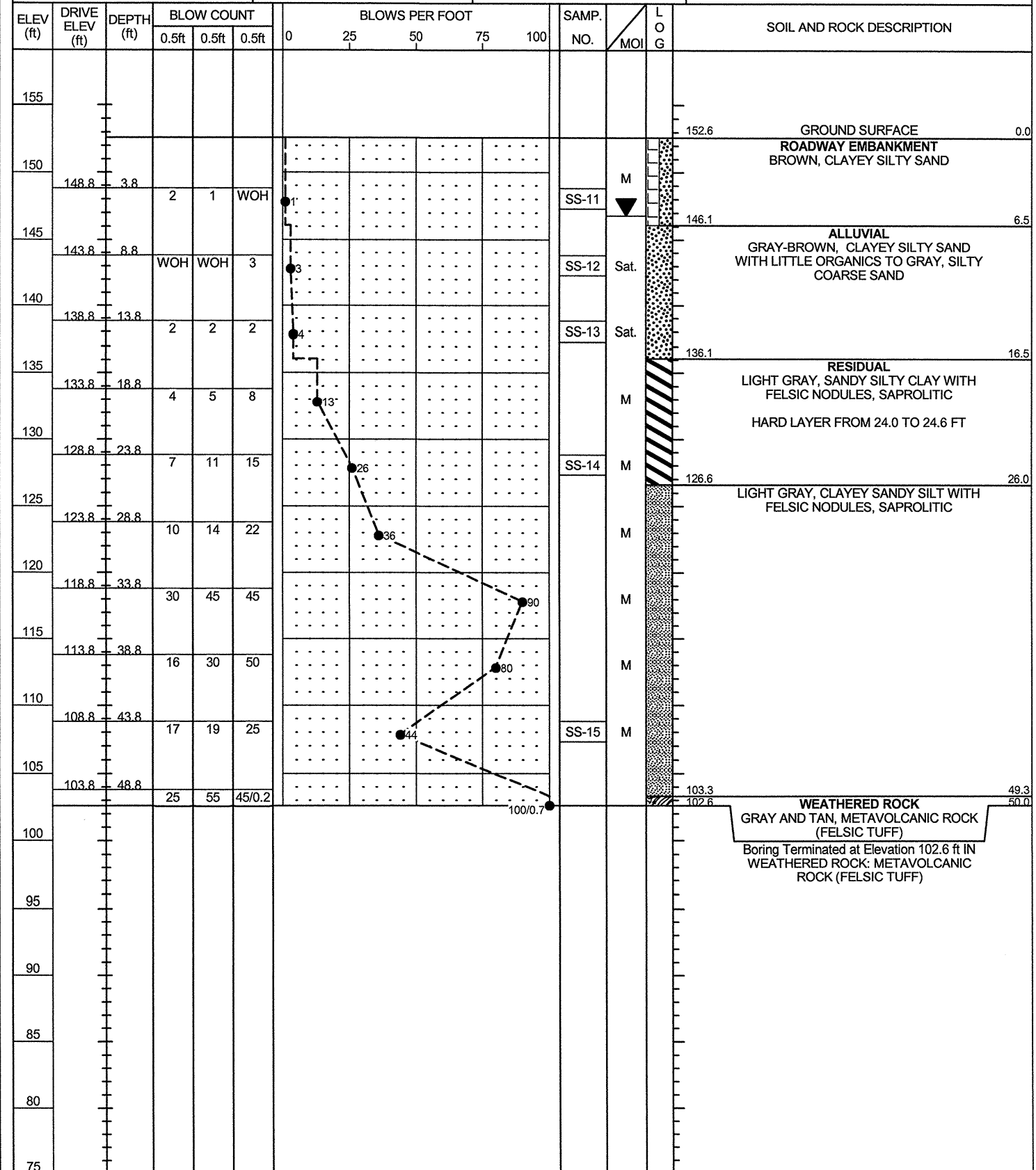
VE = 1:1

CROSS SECTION THROUGH END BENT 2

PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 20+24	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 152.1 ft	TOTAL DEPTH 44.6 ft	NORTHING 612,568	EASTING 2,147,842
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/19/10	COMP. DATE 04/19/10	SURFACE WATER DEPTH N/A



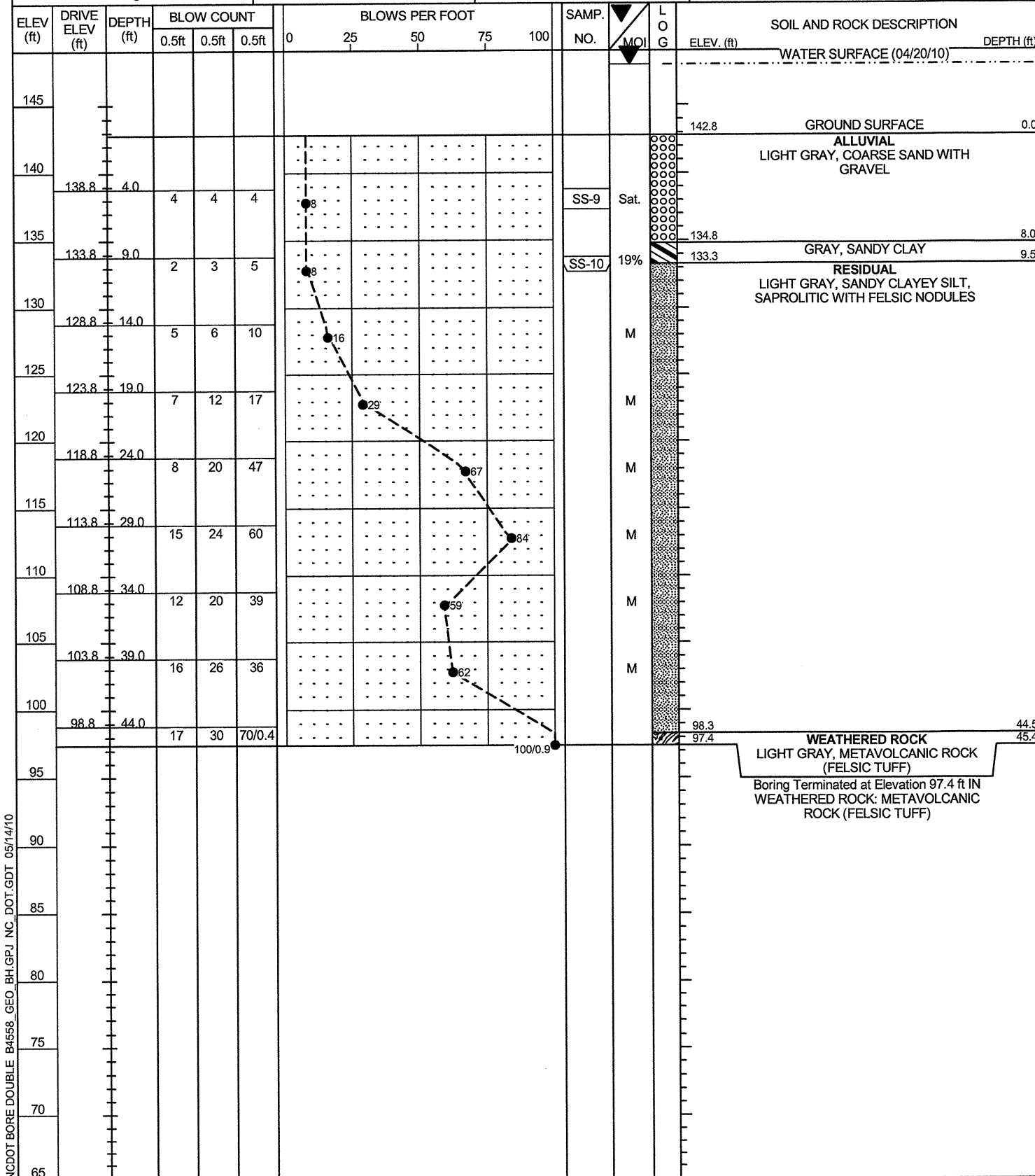
PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 20+24	OFFSET 16 ft RT	ALIGNMENT -L-
COLLAR ELEV. 152.6 ft	TOTAL DEPTH 50.0 ft	NORTHING 612,560	EASTING 2,147,869
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/22/10	COMP. DATE 04/22/10	SURFACE WATER DEPTH N/A



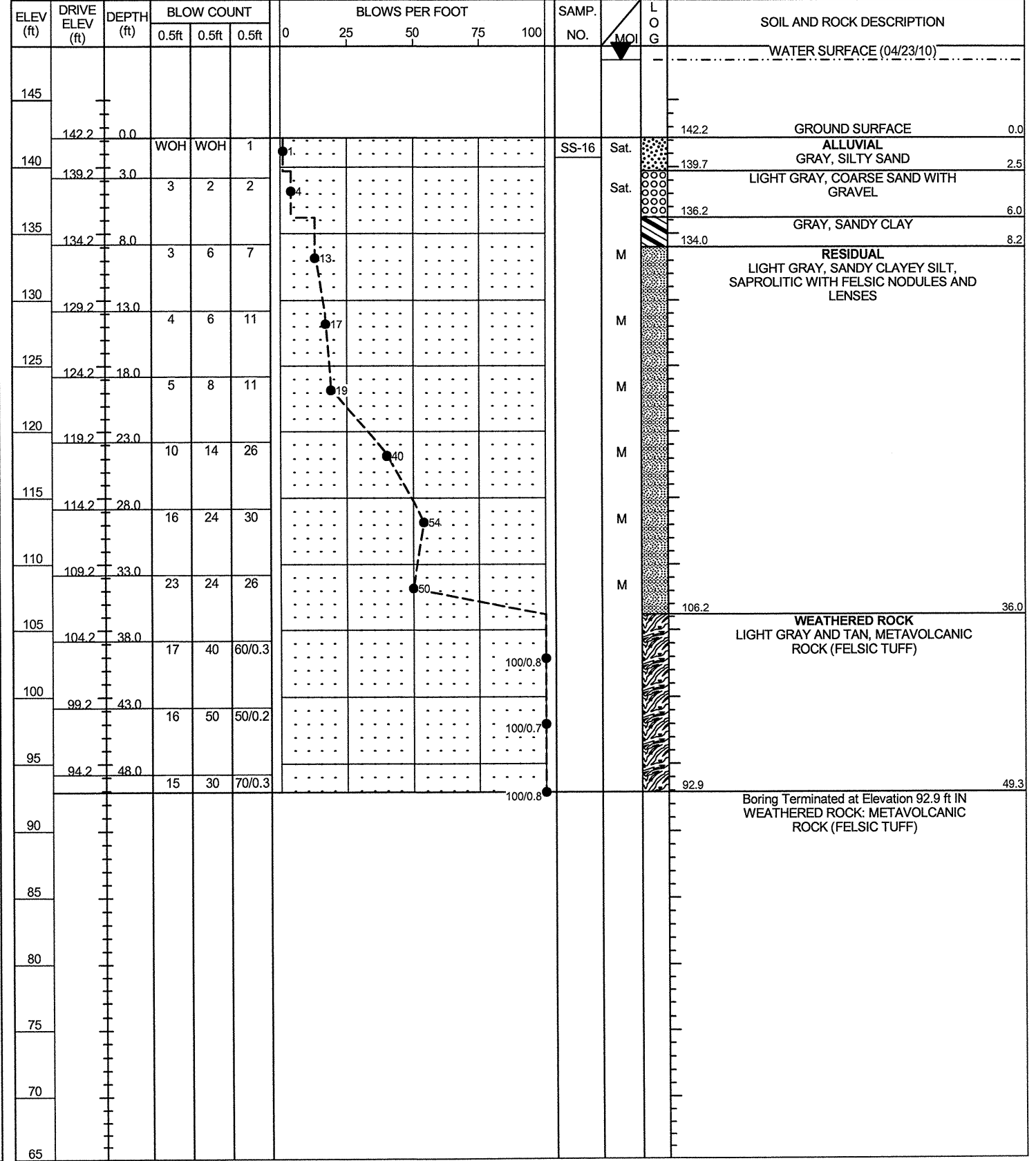
NCDOT BORE DOUBLE B4558 GEO_BH.GPJ NC_DOT.GDT 05/14/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. B1-A	STATION 20+70	OFFSET 7 ft LT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 142.8 ft	TOTAL DEPTH 45.4 ft	NORTHING 612,610	EASTING 2,147,860 24 HR. N/A
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/20/10	COMP. DATE 04/20/10	SURFACE WATER DEPTH 5.2ft

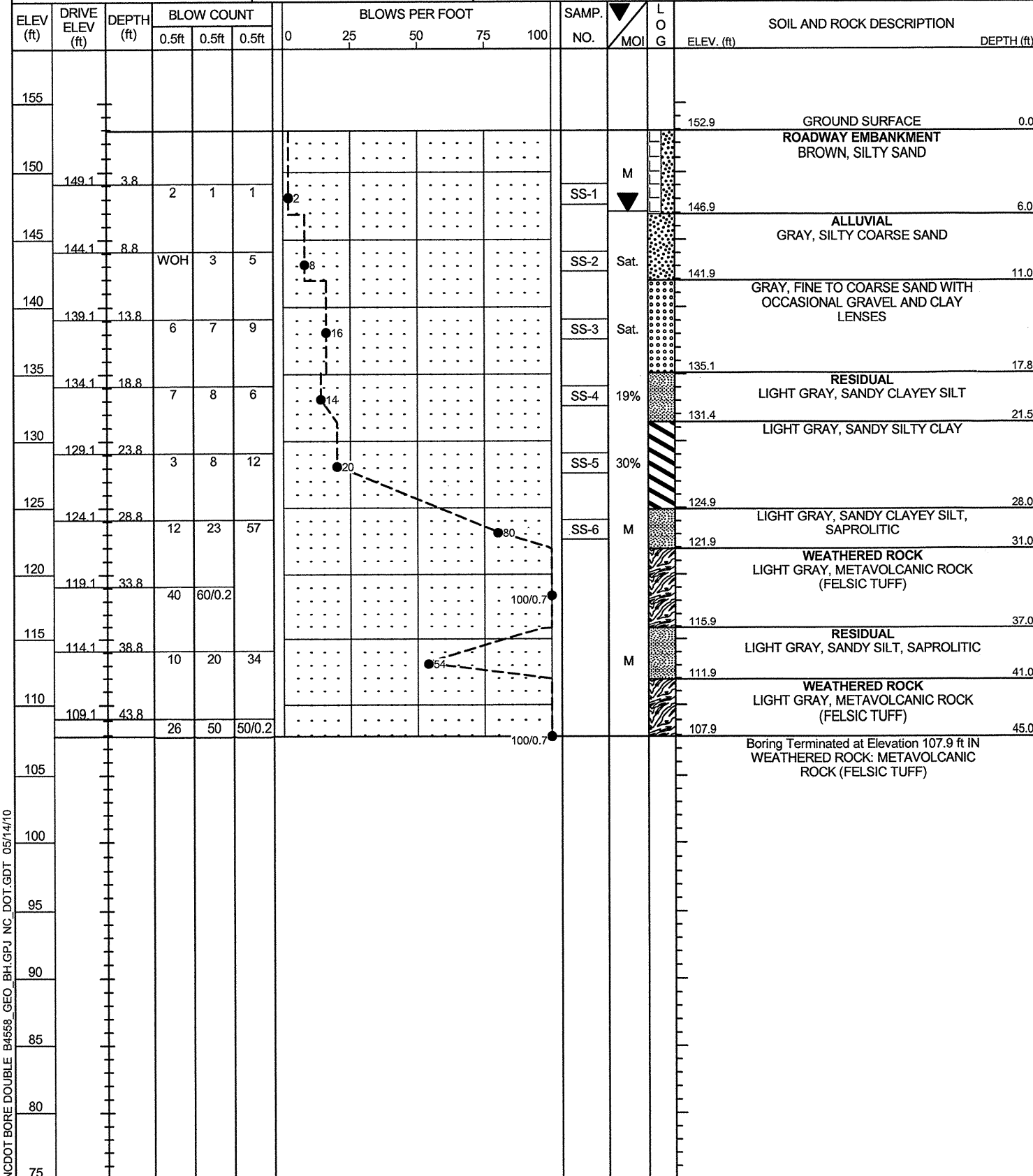


PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 20+70	OFFSET 7 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 142.2 ft	TOTAL DEPTH 49.3 ft	NORTHING 612,607	EASTING 2,147,874 24 HR. N/A
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/23/10	COMP. DATE 04/23/10	SURFACE WATER DEPTH 5.8ft

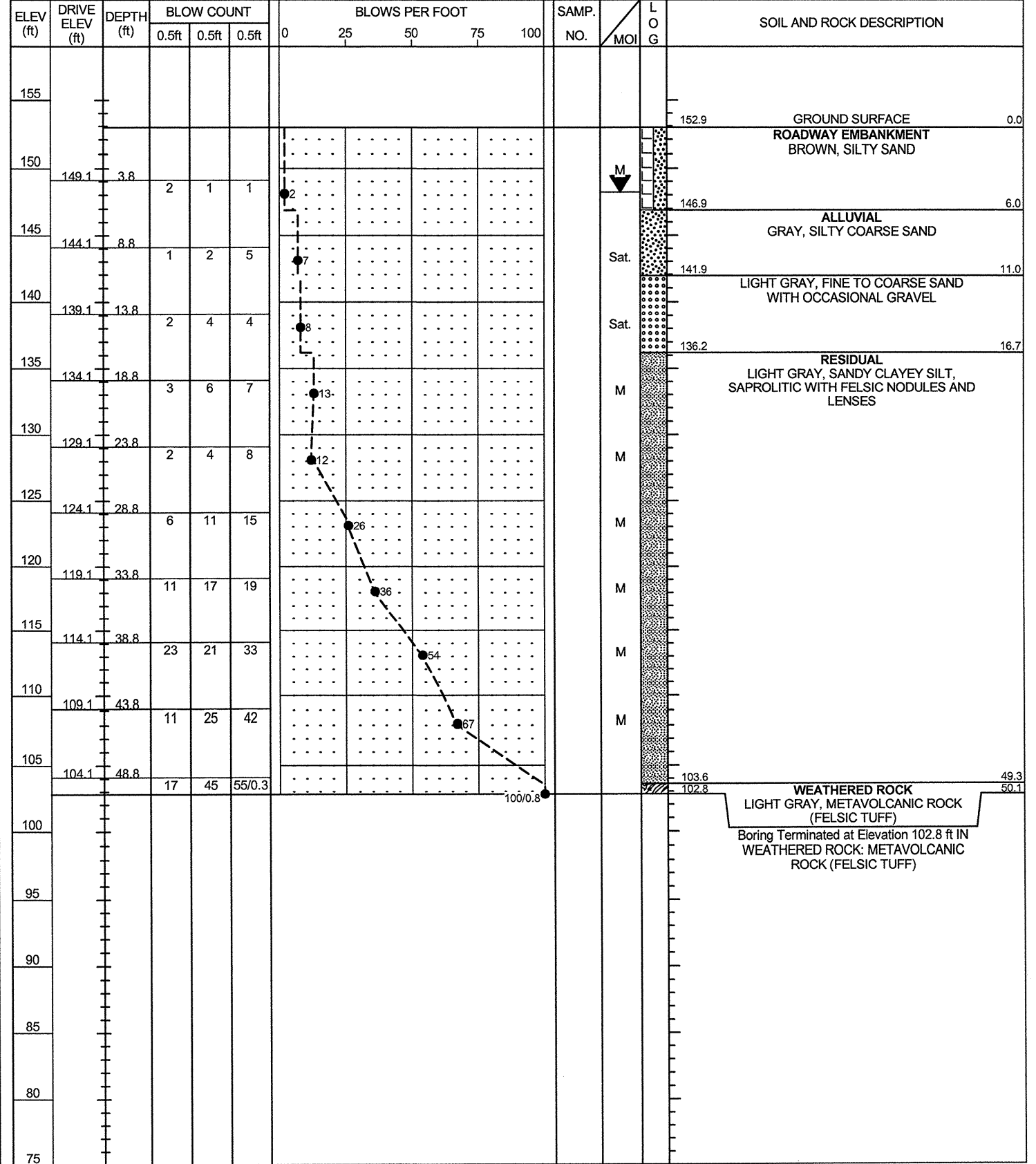


NCDOT BORE DOUBLE B4558_GEO BH.GPJ NC.DOT.GDT 05/14/10

PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 21+16	OFFSET 12 ft LT	ALIGNMENT -L-
COLLAR ELEV. 152.9 ft	TOTAL DEPTH 45.0 ft	NORTHING 612,656	EASTING 2,147,868
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/19/10	COMP. DATE 04/19/10	SURFACE WATER DEPTH N/A



PROJECT NO. 33769.1.1	ID. B-4558	COUNTY Johnston	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION BRIDGE NO. 86 ON SR 1330 (RALEIGH ROAD) OVER STONY FORK CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 21+16	OFFSET 13 ft RT	ALIGNMENT -L-
COLLAR ELEV. 152.9 ft	TOTAL DEPTH 50.1 ft	NORTHING 612,649	EASTING 2,147,892
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Turnage, J. R.	START DATE 04/22/10	COMP. DATE 04/22/10	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B4558 GEO. BH.GPJ NC_DOT.GDT 05/14/10

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	13 LT	20+24	8.8-10.3	A-4(0)	23	10	39.4	24.2	18.2	18.2	93	72	37	-	-
SS-8	13 LT	20+24	18.8-20.3	A-4(8)	32	10	0.8	31.1	39.8	28.3	100	100	83	24.4	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	12 LT	21+16	3.8-5.3	A-2-4(0)	17	2	41.0	38.8	12.1	8.1	97	74	25	-	-
SS-2	12 LT	21+16	8.8-10.3	A-2-4(0)	17	NP	49.1	39.8	7.1	4.0	98	70	14	-	-
SS-3	12 LT	21+16	13.8-15.3	A-3(0)	21	NP	65.5	30.5	2.0	2.0	93	61	6	-	-
SS-4	12 LT	21+16	18.8-20.3	A-4(2)	25	9	9.1	48.1	24.6	18.2	100	95	52	19.4	-
SS-5	12 LT	21+16	23.8-25.3	A-7-6(12)	41	18	8.9	25.7	27.1	38.4	100	93	72	29.6	-
SS-6	12 LT	21+16	28.8-30.3	A-4(1)	31	6	9.3	45.7	26.9	18.2	99	93	50	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-11	16 RT	20+24	3.8-5.3	A-2-4(0)	19	NP	28.1	50.5	11.3	10.1	98	84	27	-	-
SS-12	16 RT	20+24	8.8-10.3	A-2-4(0)	19	5	31.5	39.4	10.9	18.2	89	76	29	-	-
SS-13	16 RT	20+24	13.8-15.3	A-2-4(0)	24	10	78.0	10.5	3.4	8.1	96	40	11	-	-
SS-14	16 RT	20+24	23.8-25.3	A-7-6(7)	46	21	18.4	8.5	28.7	44.4	64	54	48	-	-
SS-15	16 RT	20+24	43.8-45.3	A-4(11)	39	10	3.8	11.3	52.5	32.3	100	96	91	-	-

B1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9	7 LT	20+70	4.0-5.5	A-1-b(0)	18	NP	83.2	12.7	4.0	0.0	95	31	5	-	-
SS-10	7 LT	20+70	9.0-9.5	A-6(4)	31	18	11.1	47.3	11.3	30.3	100	99	45	18.7	-

B1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	7 RT	20+70	0.0-1.5	A-2-4(0)	18	NP	23.8	54.1	11.9	10.1	98	89	29	-	-



**FIELD
 SCOUR REPORT**

WBS: 33769.1.1 TIP: B-4558 COUNTY: Johnston

DESCRIPTION(1): Bridge No. 86 over Stony Fork Creek on SR 1330 (Raleigh Road)

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) Hydraulics Report

Bridge No.: 86 Length: 52.7 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2

Foundation Type: Driven wooden piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None evident.

Interior Bents: None evident.

Channel Bed: None evident.

Channel Bank: None evident. Swampy environment.

EXISTING SCOUR PROTECTION

Type(3): Rip-rap

Extent(4): Placed along the southwestern corner of existing end bent 1.

Effectiveness(5): Effective in protecting driven piles of existing structure during higher flow.

Obstructions(6): None visible.

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): Silty sands and coarse sands with gravel.

Channel Bank Material(8): Sandy silt and sandy clay.

Channel Bank Cover(9): Moderate to large trees, shrubs and grasses.

Floodplain Width(10): 1000+ feet

Floodplain Cover(11): Moderate to large trees, shrubs and grasses.

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Channel does not show any migration preferences, due to it's swampy nature.

Observations and Other Comments: Stream is very swampy in nature, with a 5 foot deep channel in conjunction with shallow ponding on the floodplain.

DESIGN SCOUR ELEVATIONS(14)

Feet x Meters _____

BENTS

B1	B2	B3										
135.2												

Comparison of DSE to Hydraulics Unit theoretical scour:
 The Geotechnical Engineering Unit agrees with the Hydraulic Unit's theoretical scour elevations as noted above.

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 10,
 "Soil Test Results",
 for samples:
 SS-7, SS-10 and SS-12 (bank)
 SS-3, SS-9 and SS-16 (bed)

Reported by:
 Christina M. Bruinsma, L.G.

Date: 4/20/2010

SITE PHOTO

BRIDGE NO. 86 OVER STONY FORK CREEK ON SR1330 (RALEIGH ROAD) AT -L- STATION 21+05



LOOKING SOUTHEAST