

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33788.1.1(B-4588)	1	14

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33788.1.1 (B-4588) F.A. PROJ. BRZ-1670 (1)
COUNTY NASH
PROJECT DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON
SR 1670 (FIRST STREET EXTENSION)

INVENTORY

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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

C.D. CZJAKA

N.T. ROBERSON

J.R. TURNAGE

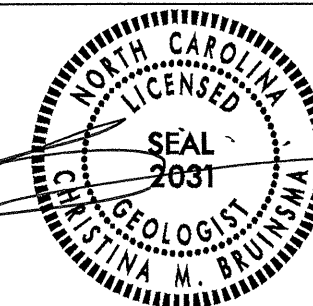
M. WHALEN

INVESTIGATED BY C.M. BRUINSMA

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE JUNE 2009



6-15-09

PROJECT: 33788.1.1 ID: B-4588

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





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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.

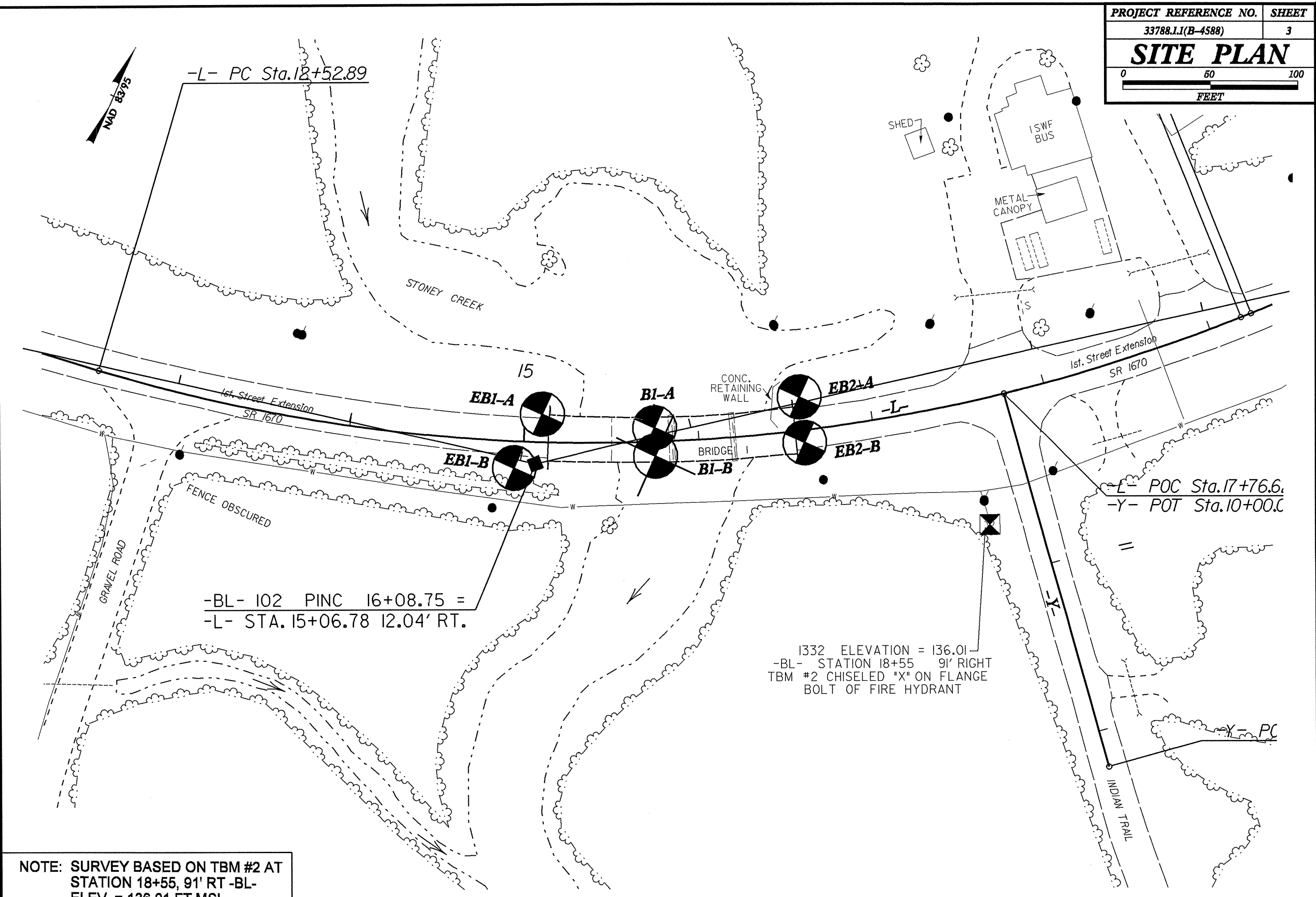
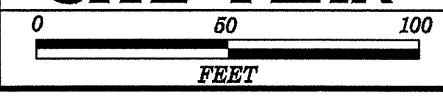
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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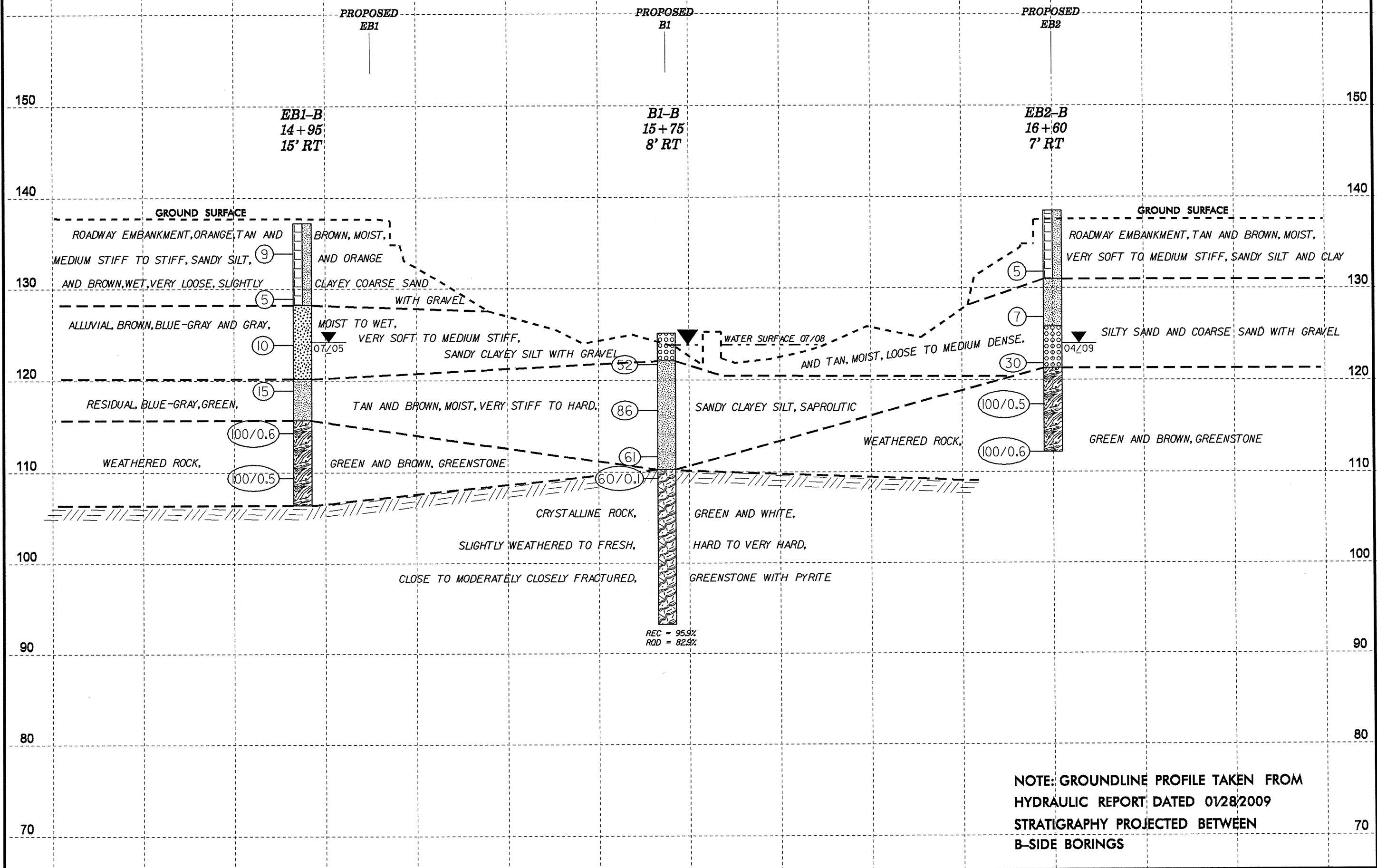
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) POORLY GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	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:  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  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.  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	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. FLUID - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL LEGEND AND AASHTO CLASSIFICATION 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 (Grid of patterns for soil types)	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	WEATHERING 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> 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.	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. FLUID - 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. 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TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
USUAL TYPES OF MAJOR MATERIALS FINE SAND, SILTY OR CLAYEY SAND, SILTY SOILS, CLAYEY SOILS	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	ROCK HARDNESS 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 GROUDED 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 GROUDED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	BENCH MARK: TBM #2: CHISELED 'X' IN TOP FLANGE BOLT OF FIRE HYDRANT STATION 18+55, 91FT RT, -BL- ELEVATION: 136.01 FT.
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	MISCELLANEOUS SYMBOLS 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 S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE SPT N-VALUE SPT REFUSAL	NOTES:
TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270 COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE, SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)	ABBREVIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - HIGHLY MED. - MEDIUM MICA. - MICA 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 % - UNIT WEIGHT % - DRY UNIT WEIGHT	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-51, BK-51, CME-45C, CME-550, PORTABLE HOIST, CME-550x 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 TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, X, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST	INDURATION 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.
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
PLASTICITY NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY			
COLOR DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			

SITE PLAN



NOTE: SURVEY BASED ON TBM #2 AT
STATION 18+55, 91' RT -BL-
ELEV. = 136.01 FT MSL
BRIDGE SKEW = 90°

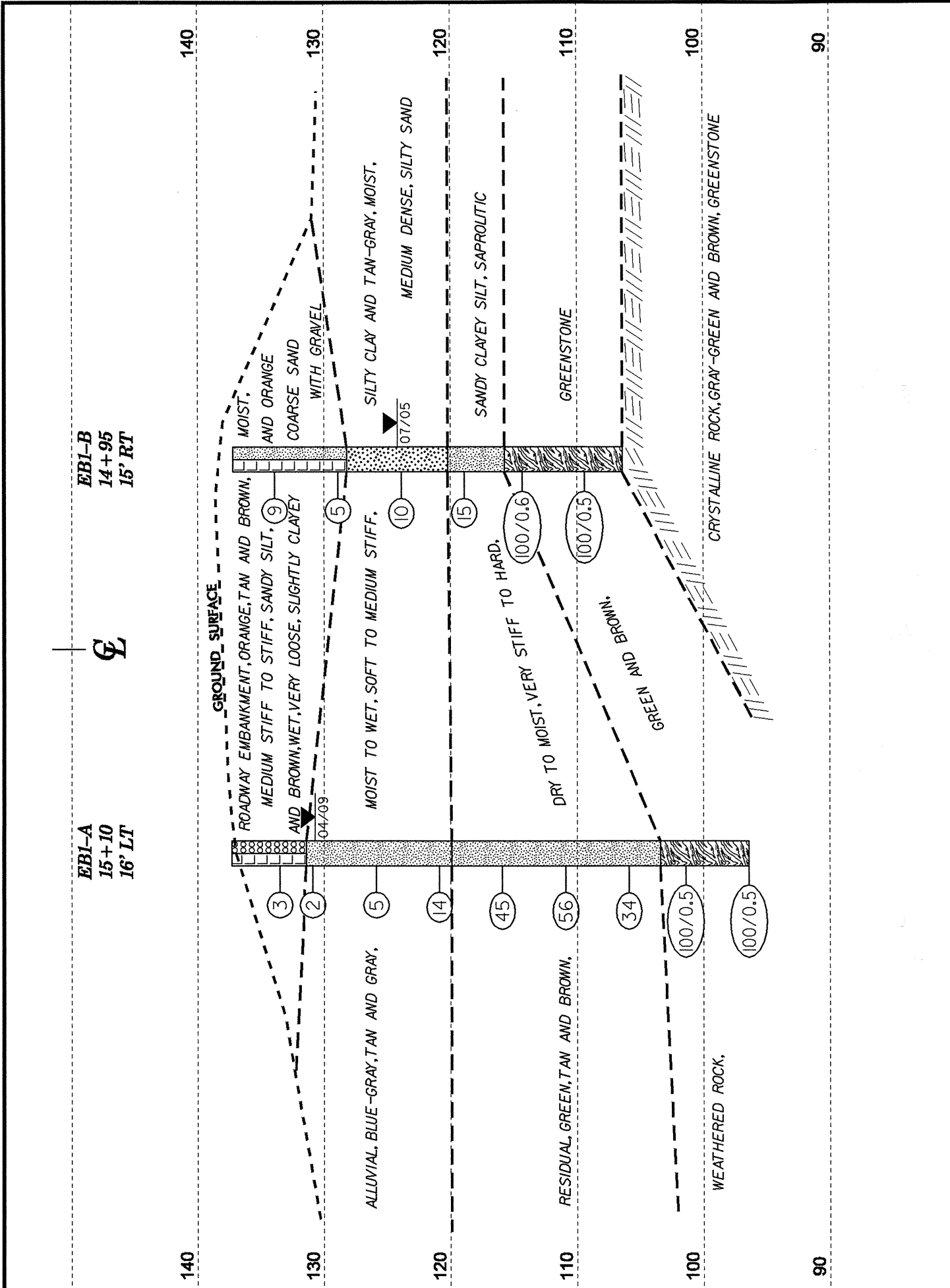


NOTE: GROUNDLINE PROFILE TAKEN FROM HYDRAULIC REPORT DATED 01/28/2009 STRATIGRAPHY PROJECTED BETWEEN B-SIDE BORINGS

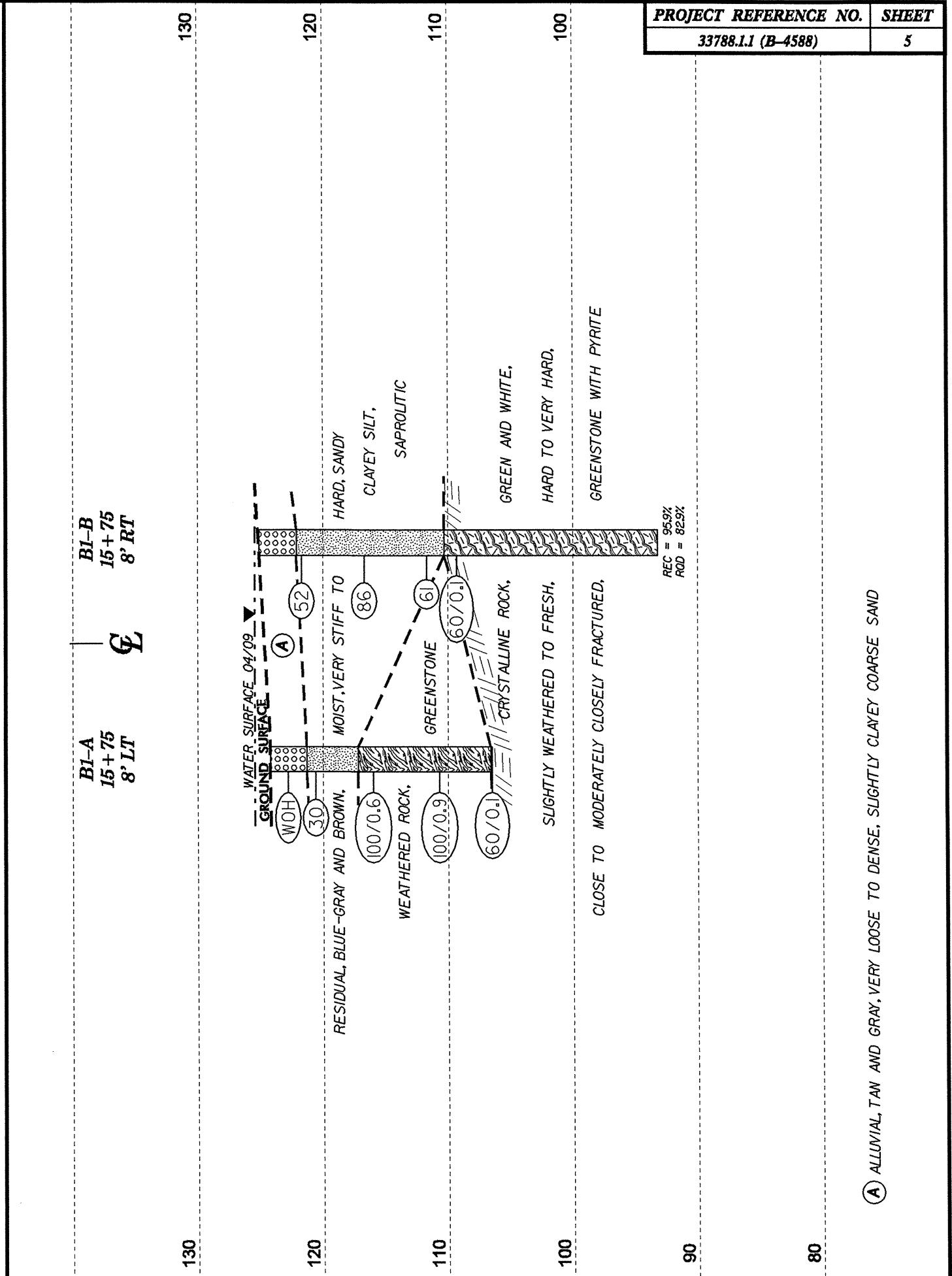
15+00

16+00

17+00



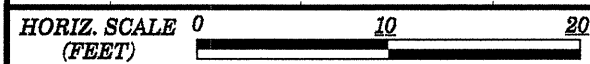
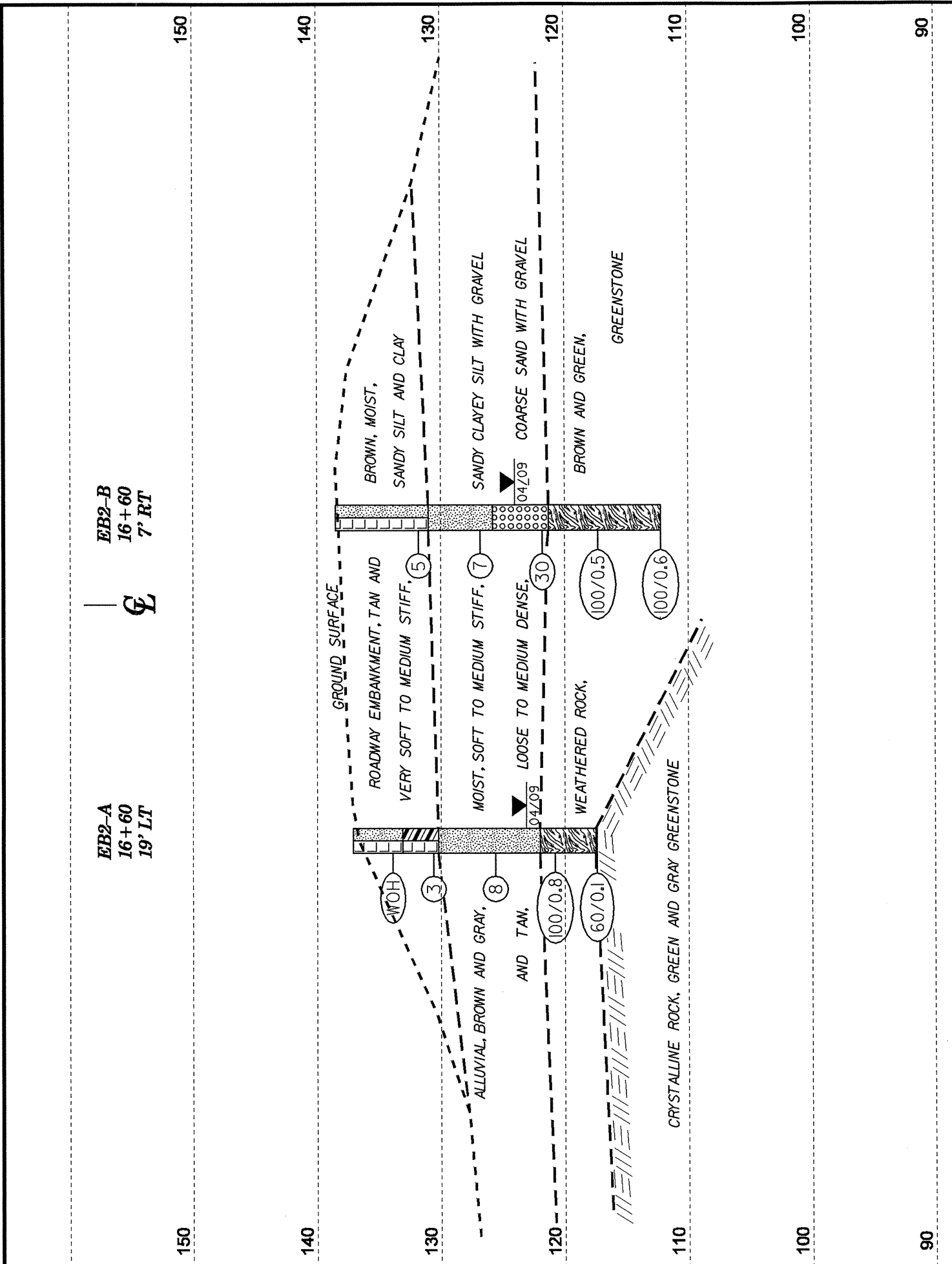
HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 **CROSS SECTION THROUGH END BENT 1**



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 **CROSS SECTION THROUGH BENT 1**

Ⓐ ALLUVIAL TAN AND GRAY, VERY LOOSE TO DENSE, SLIGHTLY CLAYEY COARSE SAND

REC = 95.9%
ROD = 82.9%



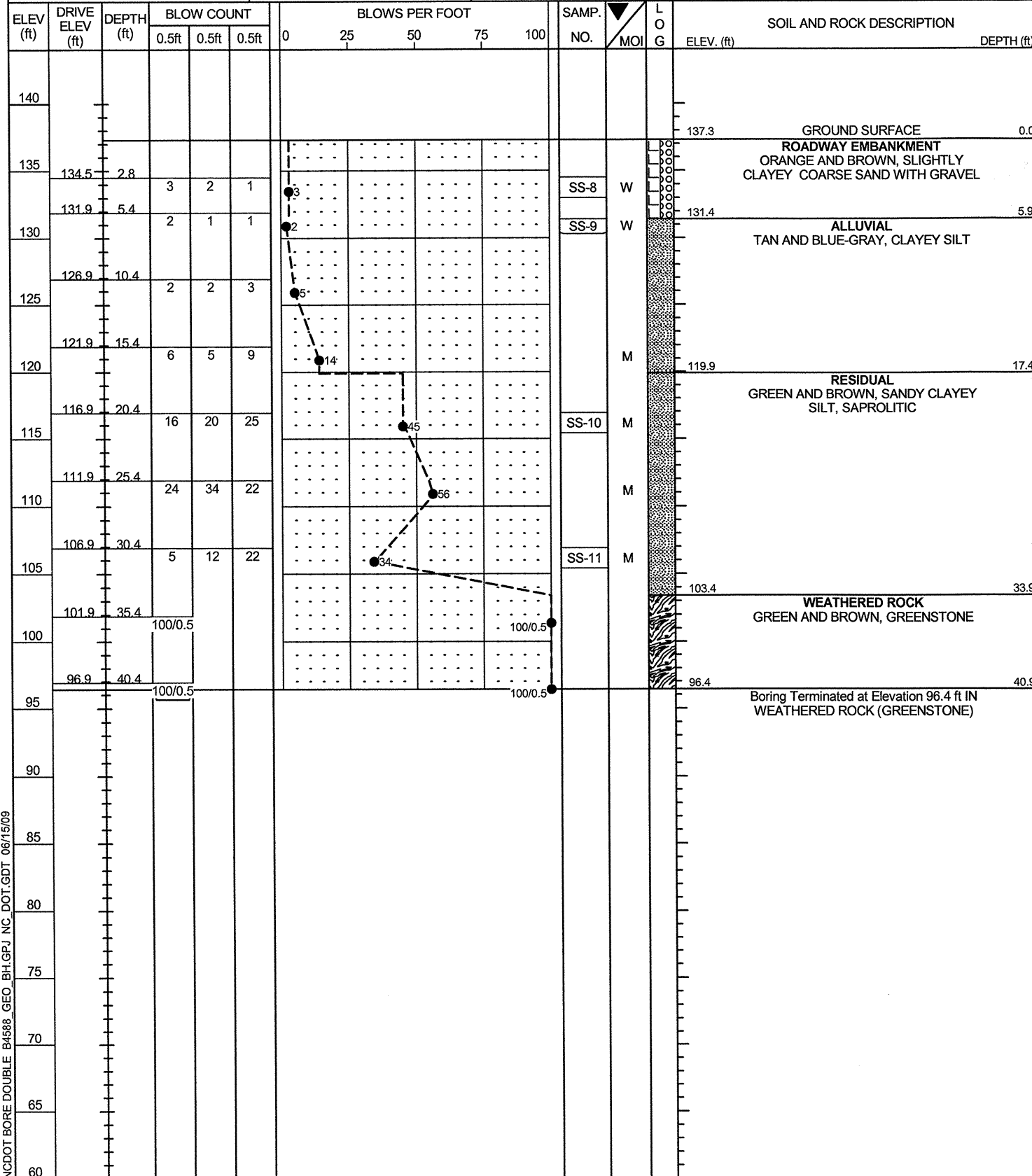
VE = 1:1

CROSS SECTION THROUGH END BENT 2

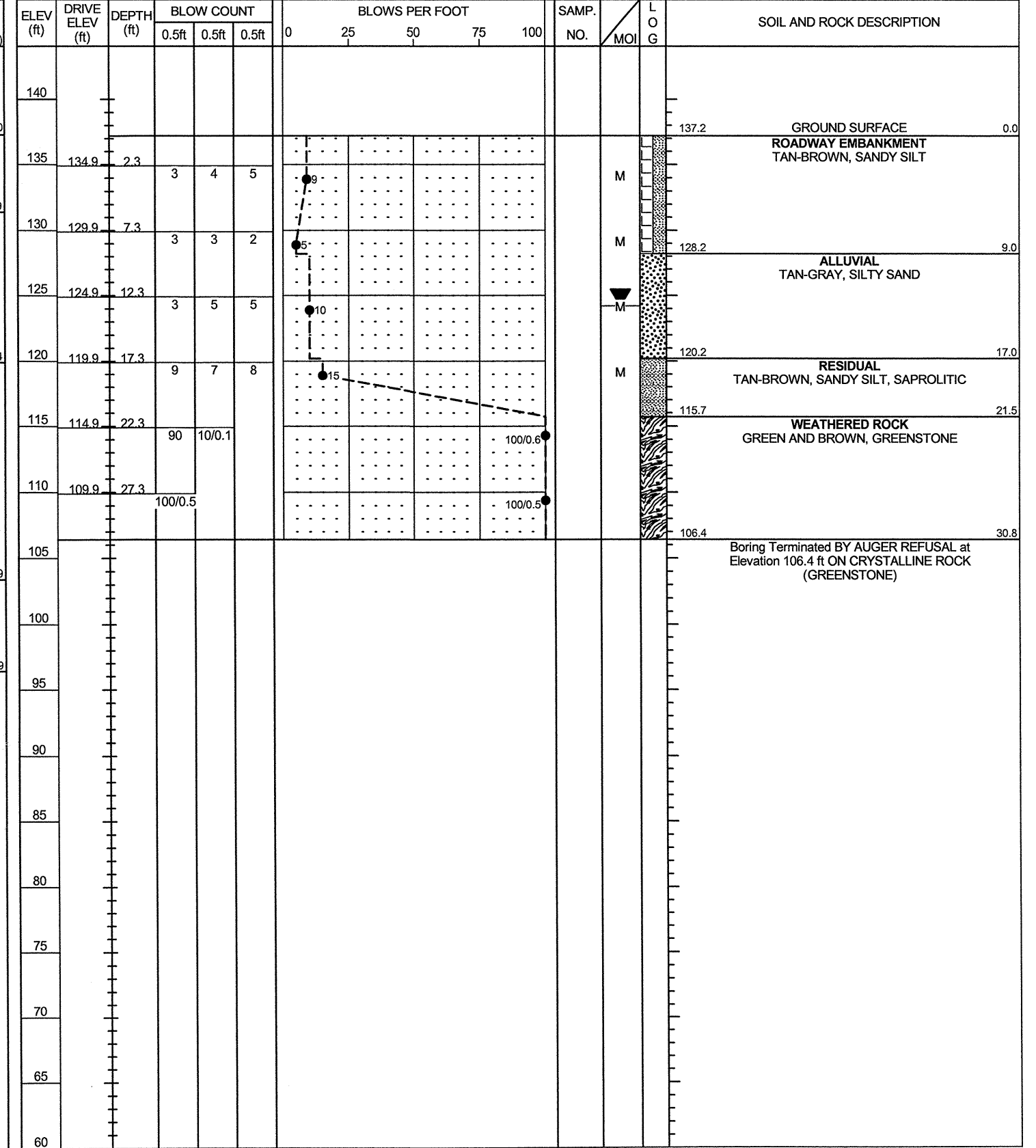


NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+10	OFFSET 16ft LT	ALIGNMENT -L-
COLLAR ELEV. 137.3 ft	TOTAL DEPTH 40.9 ft	NORTHING 813,271	EASTING 2,310,751
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/08/09	COMP. DATE 04/08/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+95	OFFSET 15ft RT	ALIGNMENT -L-
COLLAR ELEV. 137.2 ft	TOTAL DEPTH 30.8 ft	NORTHING 813,236	EASTING 2,310,749
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 07/25/05	COMP. DATE 07/25/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 30.8 ft



NCDOT BORE DOUBLE B4588 GEO_BH.GPJ NC_DOT_GDT 06/15/09



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+75	OFFSET 8ft LT	ALIGNMENT -L-
COLLAR ELEV. 124.2 ft	TOTAL DEPTH 17.7 ft	NORTHING 813,290	EASTING 2,310,812
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/08/09	COMP. DATE 04/08/09	SURFACE WATER DEPTH 2.9ft	DEPTH TO ROCK 17.6 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
125														WATER SURFACE (04/08/09)
123.8	123.8	0.4												GROUND SURFACE
121.6	121.6	2.6	1	1	WOH						SS-6	W		ALLUVIAL TAN AND GRAY, SLIGHTLY CLAYEY COARSE SAND
117.2	117.2	7.6	82	18/0.1										RESIDUAL BLUE-GRAY, CLAYEY SILT, SAPROLITIC
111.6	111.6	12.6	32	68/0.4										WEATHERED ROCK GREEN AND BROWN, GREENSTONE
106.6	106.6	17.6	60/0.1											CRYSTALLINE ROCK GREEN AND GRAY, GREENSTONE
106.5	106.5	17.7												Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 106.5 ft IN CRYSTALLINE ROCK (GREENSTONE)

NCDOT BORE DOUBLE B4588_GEO_BH.GPJ NC_DOT.GDT 06/15/09



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT



NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+75	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. 125.1 ft	TOTAL DEPTH 31.9 ft	NORTHING 813,276	EASTING 2,310,820
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 04/07/09	COMP. DATE 04/07/09	SURFACE WATER DEPTH 1.3ft	DEPTH TO ROCK 14.8 ft

PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+75	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. 125.1 ft	TOTAL DEPTH 31.9 ft	NORTHING 813,276	EASTING 2,310,820
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 04/07/09	COMP. DATE 04/07/09	SURFACE WATER DEPTH 1.3ft	DEPTH TO ROCK 14.8 ft

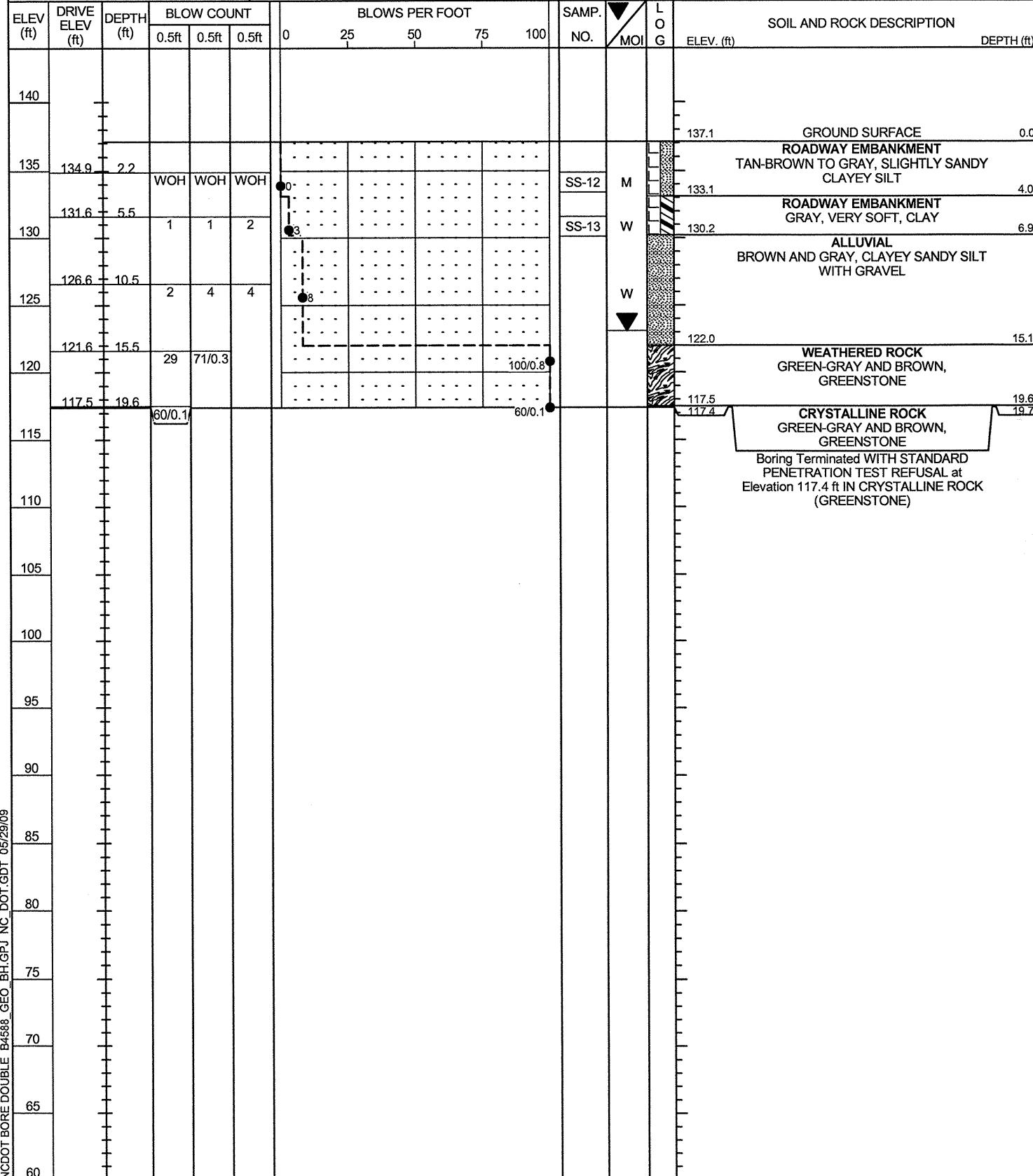
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
130															
125															
122.7	122.7	2.4	5	17	35										
120															
117.7	117.7	7.4	7	26	60										
115															
112.7	112.7	12.4	17	27	34										
110	110.3	14.8	60/0.1												
105															
100															
95															
93.2															
90															
85															
80															
75															
70															
65															
60															
55															
50															

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
110.2	110.2	14.9	2.0	1:48	(1.8)	(1.0)		(16.3)	(14.1)		Begin Coring @ 14.9 ft	14.9
108.2	108.2	16.9	5.0	1:47	90%	50%		96%	83%		CRYSTALLINE ROCK	
105				1:55	(4.9)	(4.0)					GREEN AND WHITE, SLIGHTLY WEATHERED TO FRESH, HARD TO VERY HARD, CLOSELY TO MODERATELY CLOSELY FRACTURED, GREENSTONE WITH PYRITE	
103.2	103.2	21.9	5.0	1:02	98%	80%					RMR RATING = 71; RMR CLASS II (GOOD ROCK)	
100				1:02								
98.2	98.2	26.9	5.0	1:05	(4.6)	(4.1)	RS-1					
95				1:31	92%	82%						
93.2	93.2	31.9	5.0	1:27	(5.0)	(5.0)						
90				1:32	100%	100%						
85				1:20								
80				1:21								
75				1:51								
70				1:26								
65				1:31								
60				1:34								
55				1:41								
50												
45												
40												
35												

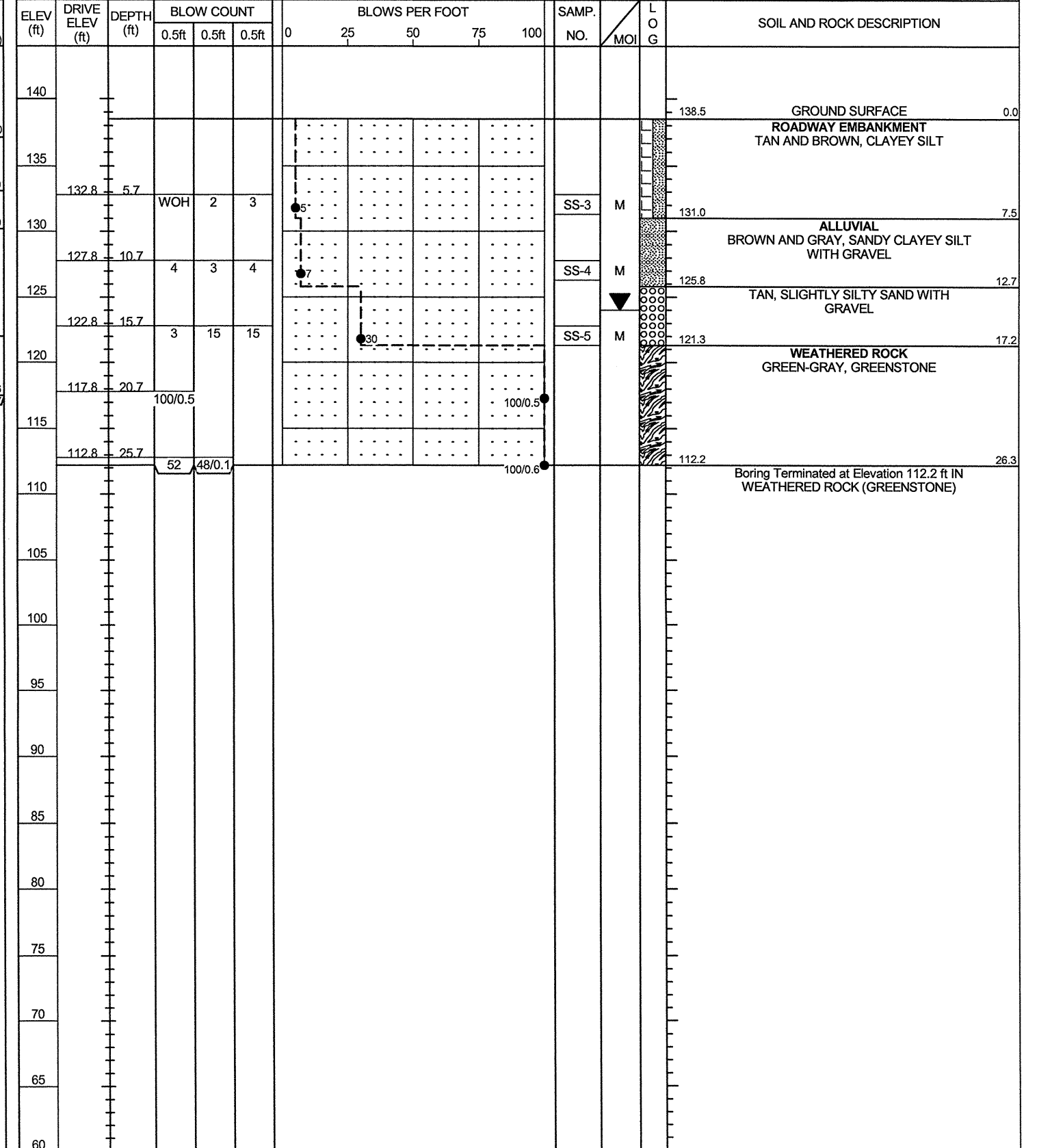
NCDOT BORE DOUBLE COPY OF B4588 GEO_BH.GPJ NC DOT GDT 06/15/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 16+60	OFFSET 19ft LT	ALIGNMENT -L-
COLLAR ELEV. 137.1 ft	TOTAL DEPTH 19.7 ft	NORTHING 813,340	EASTING 2,310,881
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/09/09	COMP. DATE 04/09/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 19.6 ft



PROJECT NO. 33788.1.1	ID. B-4588	COUNTY NASH	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+60	OFFSET 7ft RT	ALIGNMENT -L-
COLLAR ELEV. 138.5 ft	TOTAL DEPTH 26.3 ft	NORTHING 813,318	EASTING 2,310,894
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/07/09	COMP. DATE 04/07/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4588_GEO_BH.GPJ NC DOT.GDT 05/29/09

EB1-A

SOIL TEST RESULTS															
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-8	16 LT	15+10	2.8-4.1	A-1-b(0)	15	NP	51.7	27.2	13.0	8.1	72	48	17	-	-
SS-9	16 LT	15+10	5.9-6.9	A-4(2)	26	9	17.0	34.1	22.7	26.2	100	95	55	-	-
SS-10	16 LT	15+10	20.4-21.9	A-4(1)	32	6	42.4	13.1	34.4	10.1	97	63	46	-	-
SS-11	16 LT	15+10	36.4-37.9	A-4(0)	30	4	28.7	27.9	37.4	6.1	97	78	50	-	-

B1-B

ROCK TEST RESULTS											
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	UNIT WEIGHT (lbs/ft ³)	H/D RATIO	AREA (in ²)	ULTIMATE LOAD (lbf)	ULTIMATE LOAD (ksi)	ULTIMATE LOAD (corrected) (ksi)	SEC MOD @ 40% (Mpsi)	
RS-1	8 RT	15+75	21.9-22.6	181.8	2.18	2.7465	14690	5.35	5.4	6.24	

B1-A

SOIL TEST RESULTS															
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-6	8 LT	15+75	0.4-1.9	A-1-b(0)	28	NP	82.9	11.0	3.0	3.0	96	34	7	-	-
SS-7	8 LT	15+75	2.9-4.1	A-4(0)	27	3	45.4	14.9	31.6	8.1	96	60	41	-	-

B1-B

SOIL TEST RESULTS															
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	8 RT	15+75	2.4-3.0	A-1-b(0)	19	NP	79.1	10.5	8.4	2.0	74	26	9	-	-
SS-2	8 RT	15+75	3.0-3.9	A-4(0)	31	3	46.8	17.0	28.2	8.1	100	61	40	-	-

EB2-A

SOIL TEST RESULTS															
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-12	19 LT	16+60	2.2-3.7	A-4(0)	21	8	38.3	23.0	20.5	18.2	95	70	40	-	-
SS-13	19 LT	16+60	5.5-7.0	A-6(14)	40	21	14.3	15.5	37.8	32.3	97	87	72	-	-

EB2-B

SOIL TEST RESULTS															
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	7 RT	16+60	5.7-7.2	A-4(5)	28	10	15.3	22.6	29.8	32.3	99	89	68	-	-
SS-4	7 RT	16+60	10.7-12.2	A-4(2)	29	8	11.3	37.9	26.5	24.2	98	93	58	-	-
SS-5	7 RT	16+60	15.7-17.2	A-1-b(0)	25	4	62.6	19.6	11.8	6.1	86	46	18	-	-



FIELD SCOUR REPORT

WBS: 33788.1.1 TIP: B-4588 COUNTY: Nash

DESCRIPTION(1): Bridge No. 1 over Stoney Creek on SR 1670 (First Street Extension)

EXISTING BRIDGE

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

Bridge No.: 1 Length: 135 Total Bents: 5 Bents in Channel: 2 Bents in Floodplain: 3
 Foundation Type: Driven wooden piles, with exception to bents in channel on concrete footings.

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None evident.

Interior Bents: Some scour on downstream side of existing bent 2 and 3 (concrete footings).

Channel Bed: Minimal scour in association with center of channel.

Channel Bank: Scour along bank behind existing bent 3 of structure.

EXISTING SCOUR PROTECTION

Type(3): None evident.

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): None observed at the time of investigation.

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 sand, and coarse sand with occasional gravel

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

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

Floodplain Width(10): 500 - 700 feet

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

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Migration to the northeast.

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet x Meters _____

BENTS

B1														
116.4														

Comparison of DSE to Hydraulics Unit theoretical scour:
 The GSE is 10.6 feet higher than the theoretical elevation shown on the Bridge and Hydraulic Design Report

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 11,
 "Soil Test Results",
 for samples:
 SS-6 (bed) and SS-9 (bank)

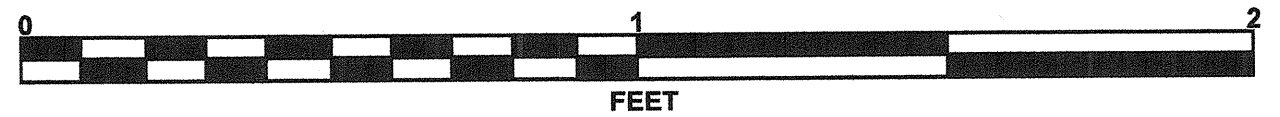
Reported by:
 Christina M. Bruinsma, L.G.

Date: 3/19/2009

CORE PHOTOGRAPHS

B1-B

BOX 3: 14.9 - 31.9 FEET



SITE PHOTO

BRIDGE NO. 1 OVER STONEY CREEK ON SR 1670 (FIRST STREET EXTENSION) AT -L- STATION 16+60



LOOKING SOUTHWEST