

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33222.1.1 (B-3680) F.A. PROJ. BRSTP-15(11)
COUNTY MOORE
PROJECT DESCRIPTION BRIDGE NO. 2 ON US 15/501
OVER CSX RAILROAD

SITE DESCRIPTION _____

CONTENTS

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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 1919 707-6850. 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-PLACED) 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

M. BACHMAN

J. HVOZDIK

HPC, LLC

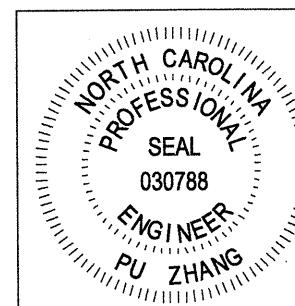
INVESTIGATED BY P. ZHANG

CHECKED BY G. LANG

SUBMITTED BY P. ZHANG

DATE MAR. 2012

PROJECT: 33222.1.1 ID: B-3680



P. Zhang
3-15-12
SIGNATURE

DRAWN BY: P. ZHANG


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.

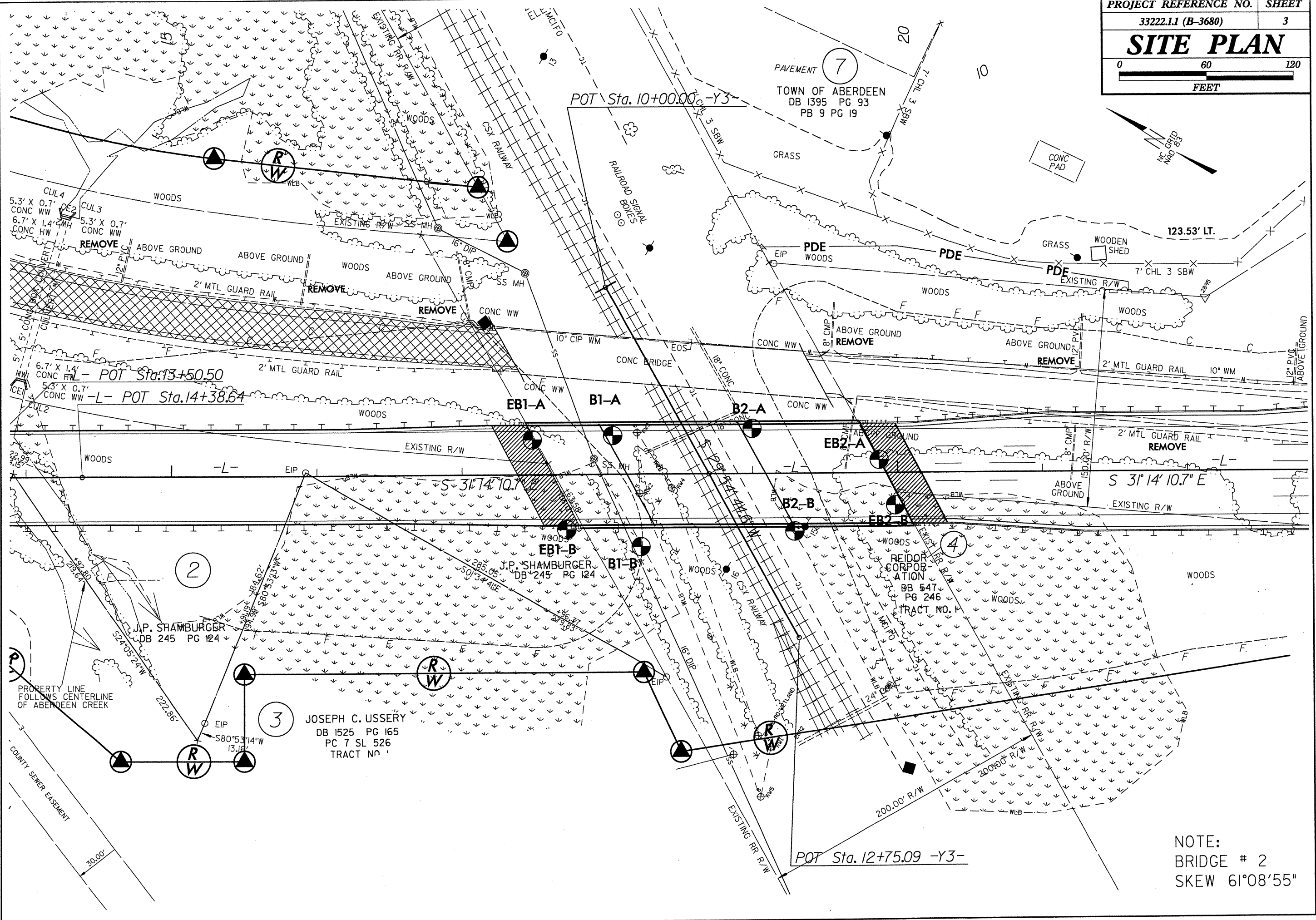
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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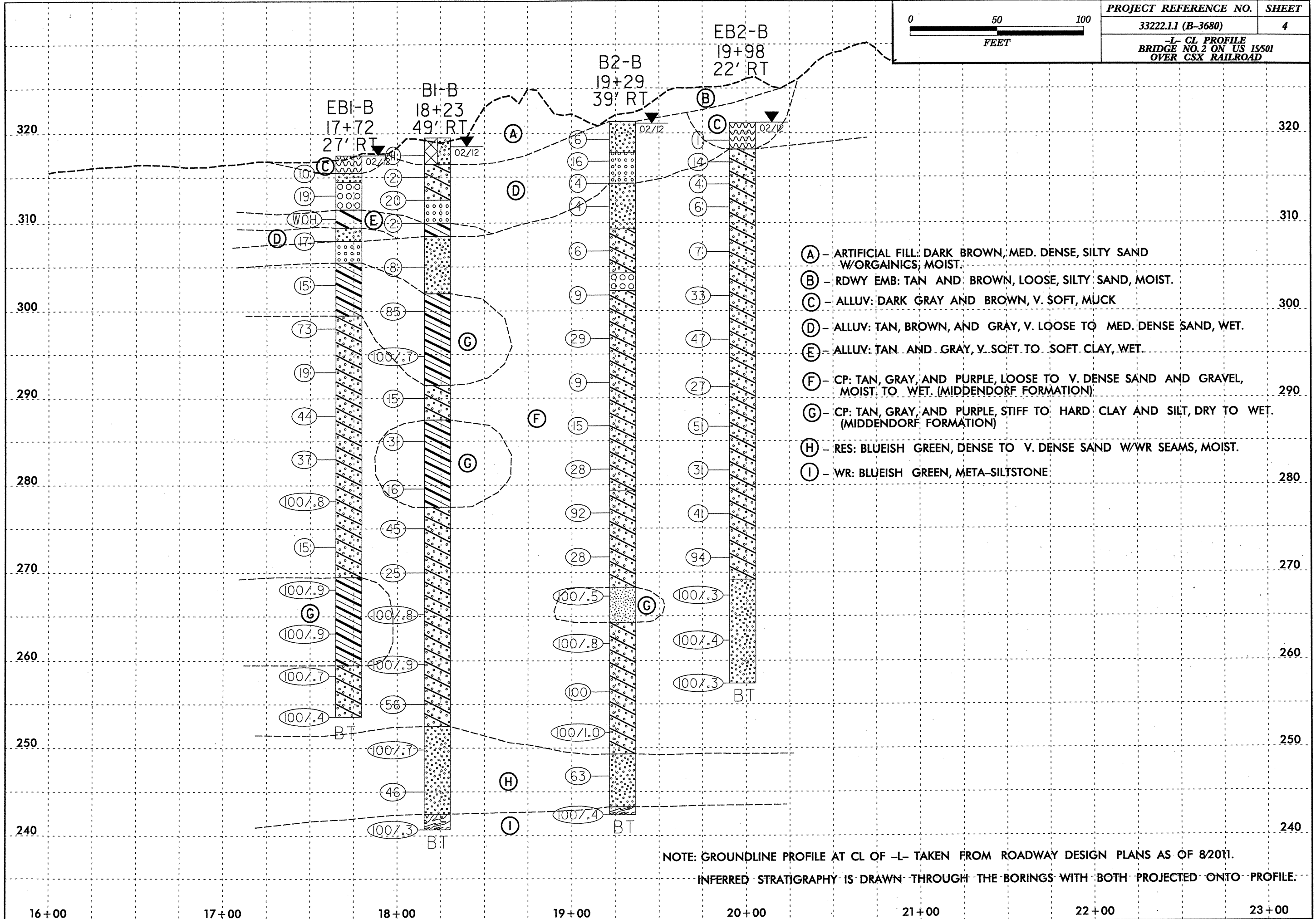
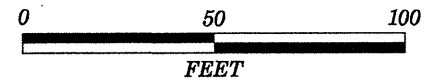
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

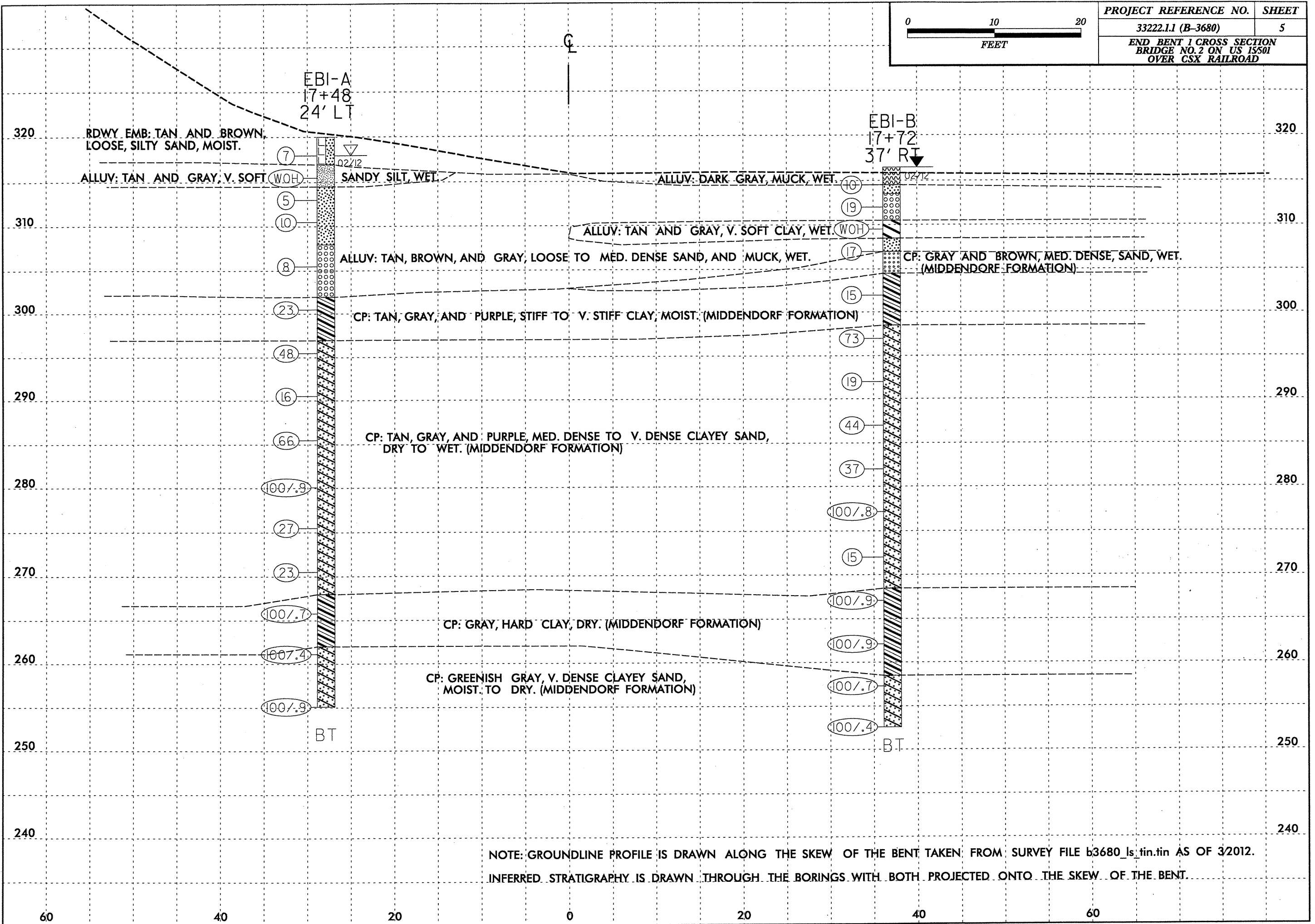
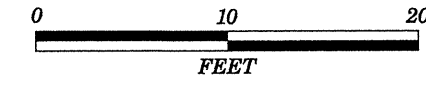
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS 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: WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR)  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 SEDIMENTARY ROCK (CP)  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. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - A 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 (SREC.) - 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	
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) 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 (SLI.) 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.	
COMPRESSIBILITY	PERCENTAGE OF MATERIAL	GROUND WATER	
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	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	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	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	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	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 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. 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.	
TEXTURE OR GRAIN SIZE	ABBREVIATIONS	FRACTURE SPACING	BEDDING
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED ? - UNIT WEIGHT % - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO	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	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
SOIL MOISTURE - CORRELATION OF TERMS	EQUIPMENT USED ON SUBJECT PROJECT	INDURATION	
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DRILL UNITS: MOBILE B-51 BK-51 CME-45C CME-550 PORTABLE HOIST D-50 ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 6" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE 3 * 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. 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.	BENCH MARK: BM #2: RR SPIKE IN BASE OF RR TELEGRAPH POLE STA. 17+30.33, 330.620' LT ELEVATION: 324.210 FT.
PLASTICITY			NOTES: ADDITIONAL ABBREVIATIONS: CASREF - CASING REFUSAL FIAD - BORING FILLED IN AFTER DRILLING CV - CAVED
NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH LOW PLASTICITY 0-5 VERY LOW MED. PLASTICITY 6-15 SLIGHT HIGH PLASTICITY 16-25 MEDIUM 26 OR MORE HIGH			
COLOR			
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.			

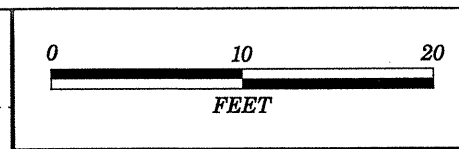


NOTE:
 BRIDGE # 2
 SKEW 61°08'55"

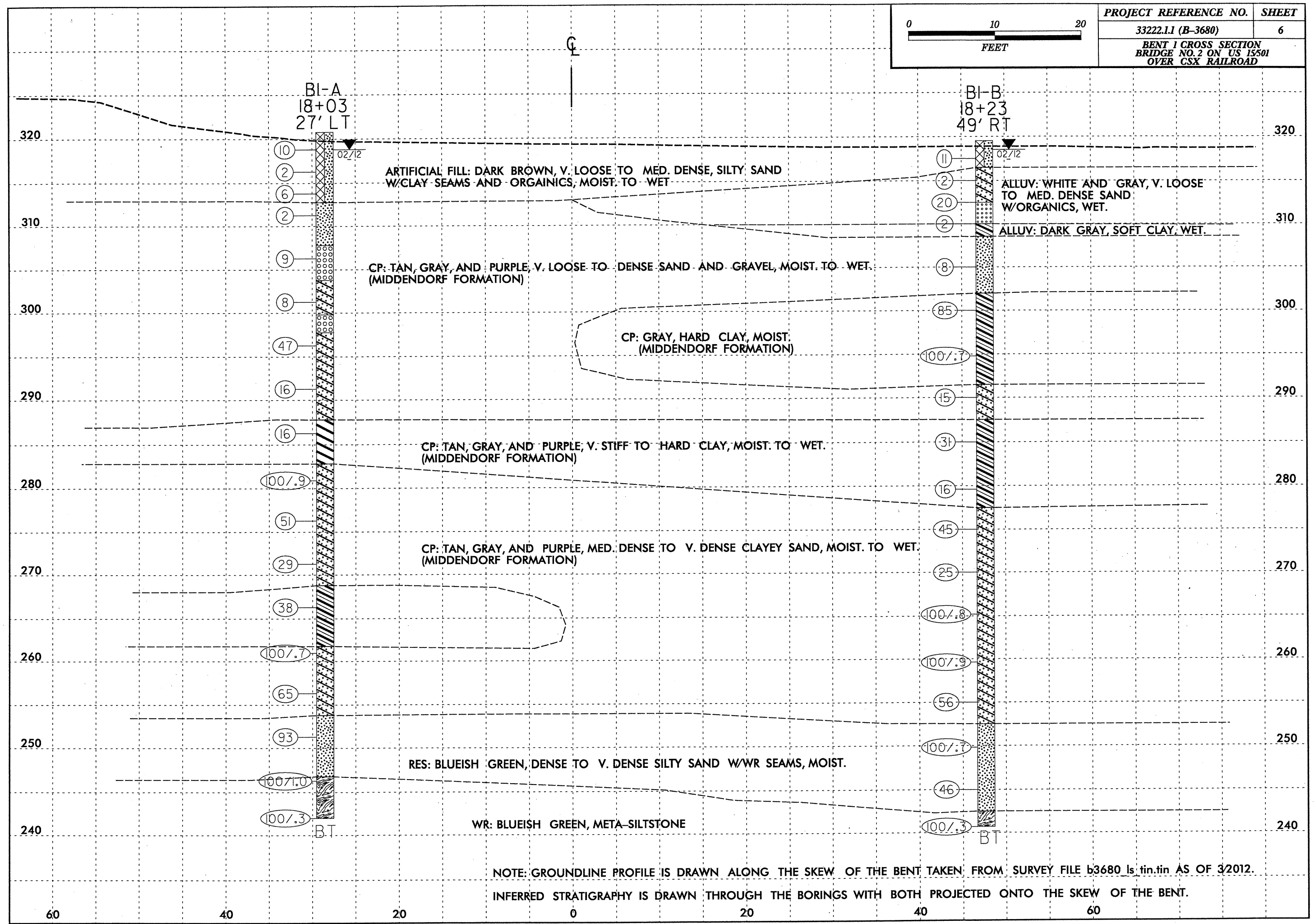


NOTE: GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 8/2011.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

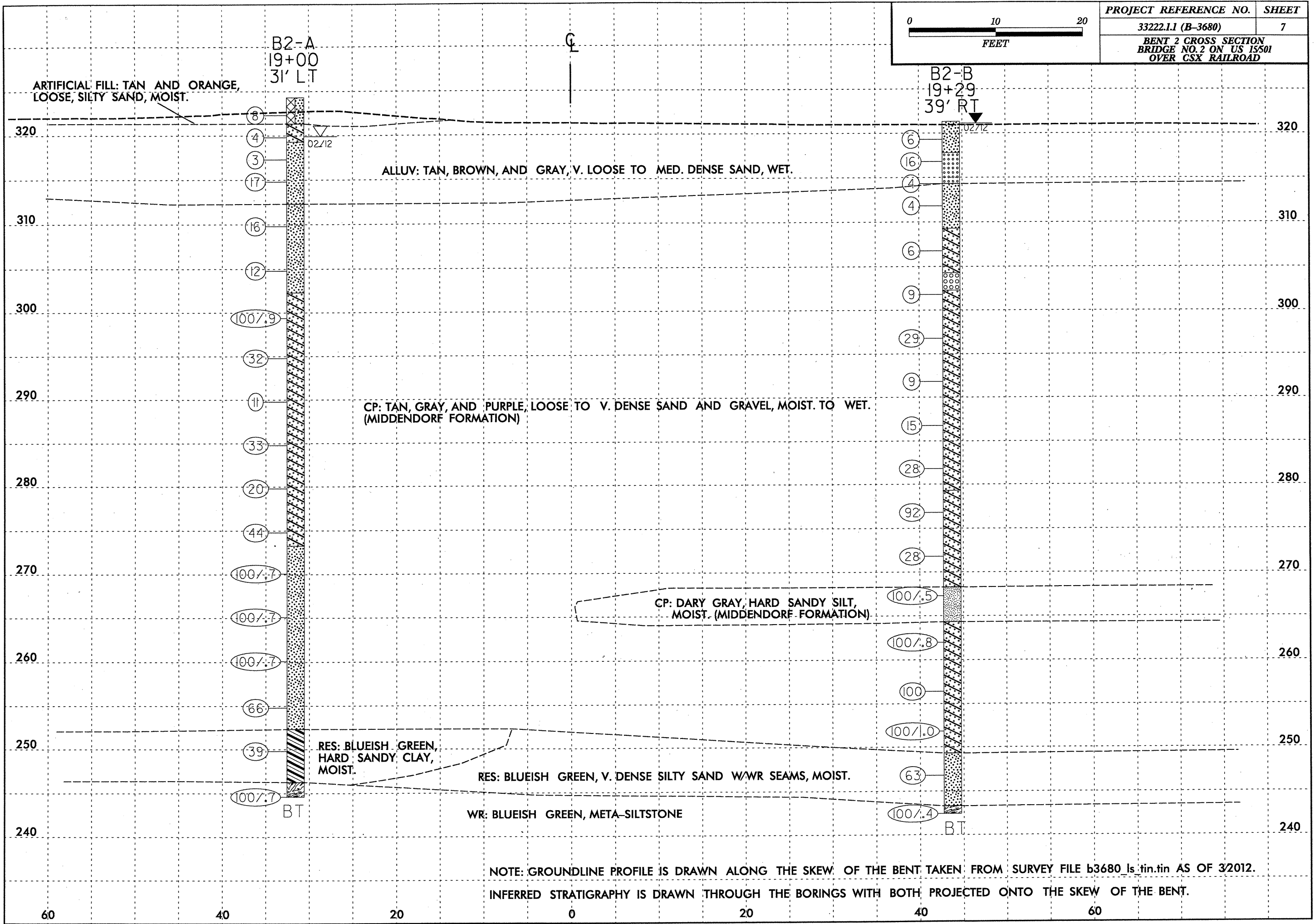
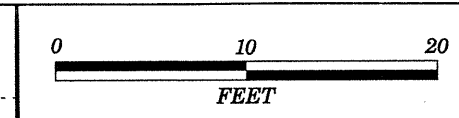




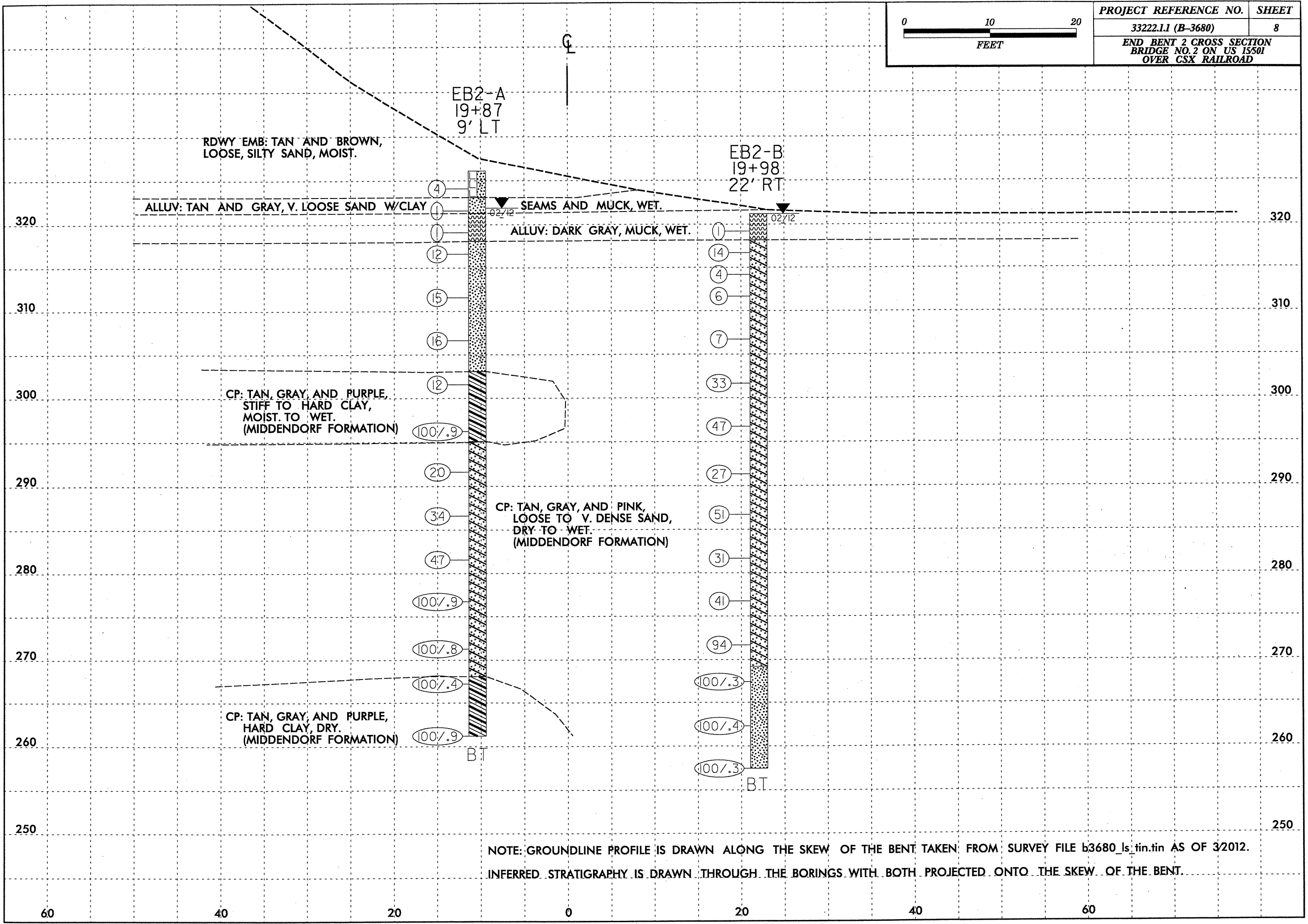
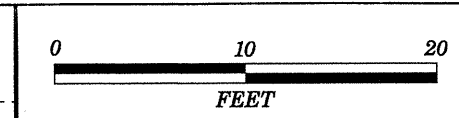
PROJECT REFERENCE NO.	SHEET
33222.11 (B-3680)	6
BENT 1 CROSS SECTION BRIDGE NO. 2 ON US 15501 OVER CSX RAILROAD	



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NOTE: GROUNDLINE PROFILE IS DRAWN ALONG THE SKEW OF THE BENT TAKEN FROM SURVEY FILE b3680_ls.tin.tin AS OF 3/2012.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE SKEW OF THE BENT.



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST ZHANG, P
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B1-A	STATION 18+03	OFFSET 27 ft LT	ALIGNMENT -L-
COLLAR ELEV. 320.8 ft	TOTAL DEPTH 78.8 ft	NORTHING 501,159	EASTING 1,871,201
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 01/31/12	COMP. DATE 02/01/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
325															320.8	0.0
320	319.8	1.0	6	5	5									ARTIFICIAL FILL TAN, BROWN, AND GRAY, LOOSE TO V. LOOSE, SILTY SAND (A-2-4) WITH CLAY SEAMS		
315	317.3	3.5	2	1	1										312.8	8.0
310	314.8	6.0	4	3	3									COASTAL PLAIN MIDDENDORF FORMATION: LIGHT GRAY, V. LOOSE, SILTY SAND (A-2-4) WITH CLAY SEAMS		
305	312.3	8.5	6	1	1										307.8	13.0
300	307.3	13.5	4	4	5									MIDDENDORF FORMATION: PURPLE, TAN, AND GRAY, LOOSE, SLIGHTLY SILTY SAND (A-1-b) WITH SOME GRAVEL		
295	302.3	18.5	4	3	5										303.8	17.0
290	297.3	23.5	6	20	27									MIDDENDORF FORMATION: TAN AND GRAY, LOOSE, CLAYEY SAND (A-2-6) WITH CLAY SEAMS		
285	292.3	28.5	6	7	9										299.8	21.0
280	287.3	33.5	5	6	10									MIDDENDORF FORMATION: LIGHT GRAY AND WHITE, MED. DENSE, SANDY GRAVEL (A-1-a)		
275	282.3	38.5	11	18	82/4										297.8	23.0
270	277.3	43.5	24	25	26									MIDDENDORF FORMATION: TAN, PURPLE, AND GRAY, DENSE TO MED. DENSE, CLAYEY SAND (A-2-6)		
265	272.3	48.5	10	13	16										287.8	33.0
260	267.3	53.5	11	12	26										282.8	38.0
255	262.3	58.5	8	46	54/2									MIDDENDORF FORMATION: TAN, LIGHT GRAY, V. DENSE TO MED. DENSE, CLAYEY SAND (A-2-6), MICACEOUS		
250	257.3	63.5	19	25	40										282.8	38.0
245	252.3	68.5	29	53	40									MIDDENDORF FORMATION: TAN, GRAY, AND PURPLE, HARD, SANDY CLAY (A-6)		
	247.3	73.5	23	35	65/5										268.8	52.0
															261.8	59.0
														MIDDENDORF FORMATION: GRAY, GREENISH GRAY, AND PURPLE, V. DENSE, CLAYEY SAND (A-2-6), MICACEOUS		
															253.8	67.0
														RESIDUAL BLUEISH GREEN, V. DENSE, SILTY SAND (A-2-4), MICACEOUS		
															246.8	74.0

WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST ZHANG, P
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B1-A	STATION 18+03	OFFSET 27 ft LT	ALIGNMENT -L-
COLLAR ELEV. 320.8 ft	TOTAL DEPTH 78.8 ft	NORTHING 501,159	EASTING 1,871,201
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 01/31/12	COMP. DATE 02/01/12	SURFACE WATER DEPTH N/A

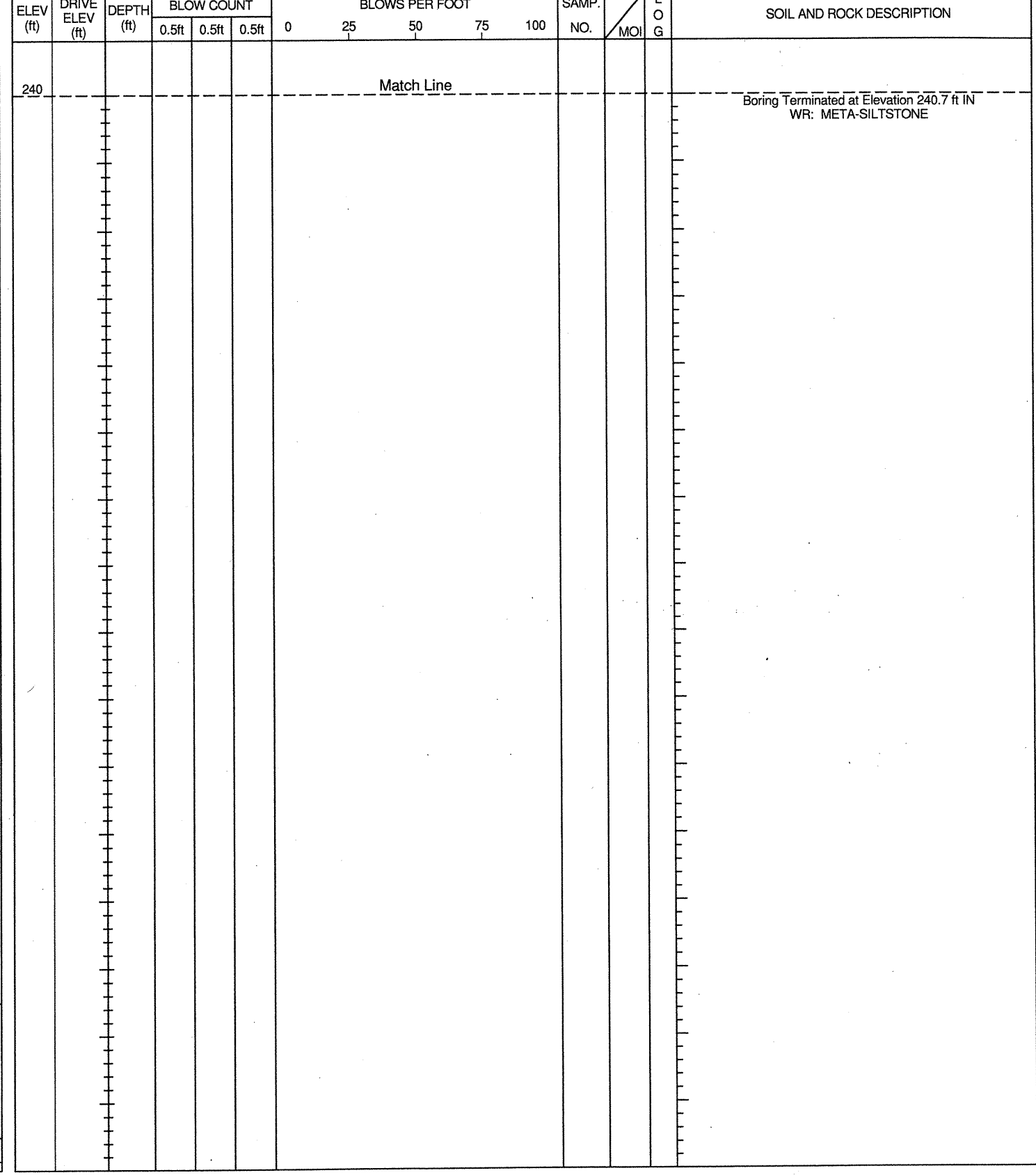
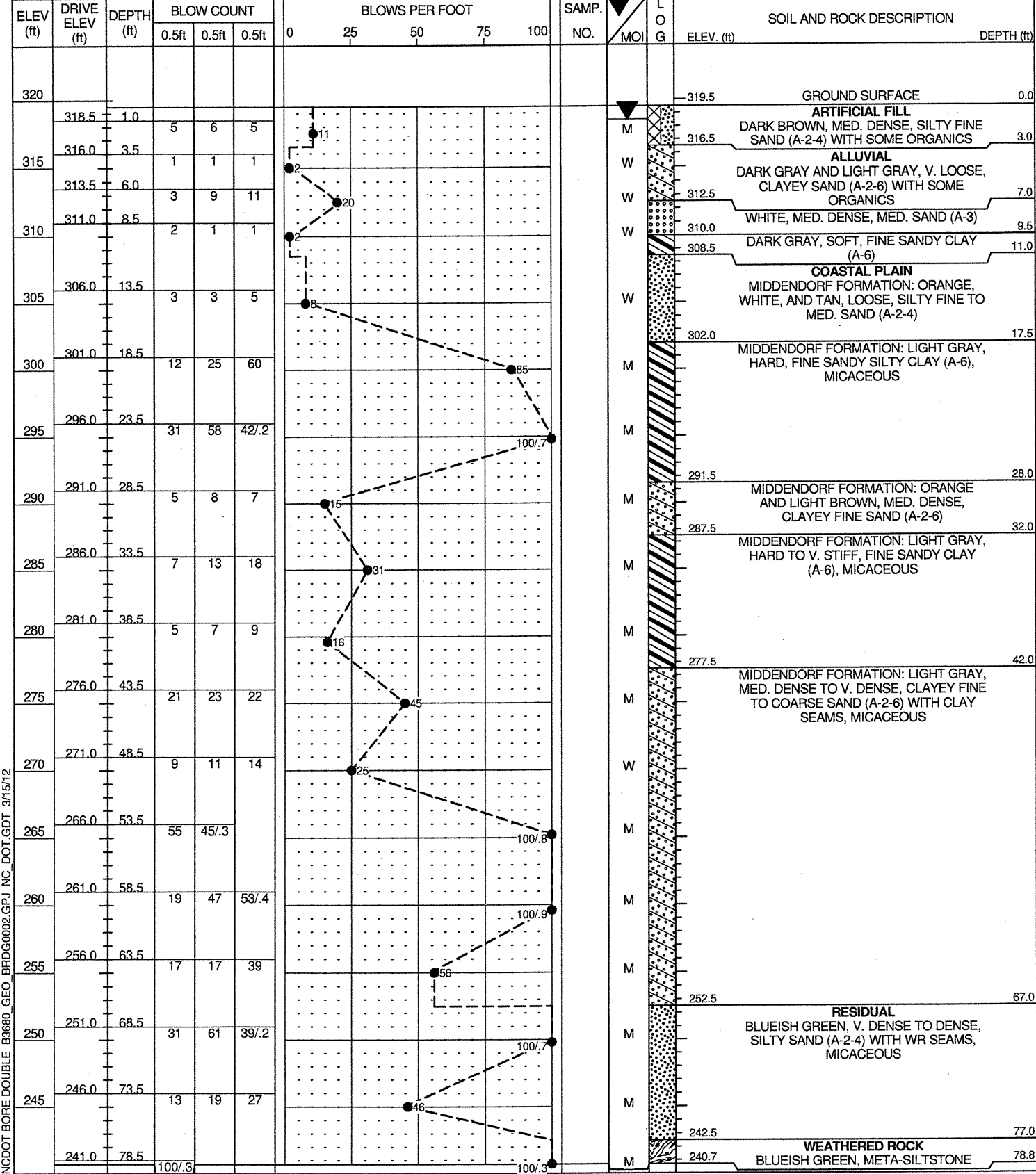
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
245															242.0	78.8
														WEATHERED ROCK BLUEISH GREEN, META-SILTSTONE (continued)		
														Boring Terminated at Elevation 242.0 ft IN WR: META-SILTSTONE		

NCDOT BORE DOUBLE B3680_GEO_BRD0002.GPJ NC_DOT_GDT_3/15/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

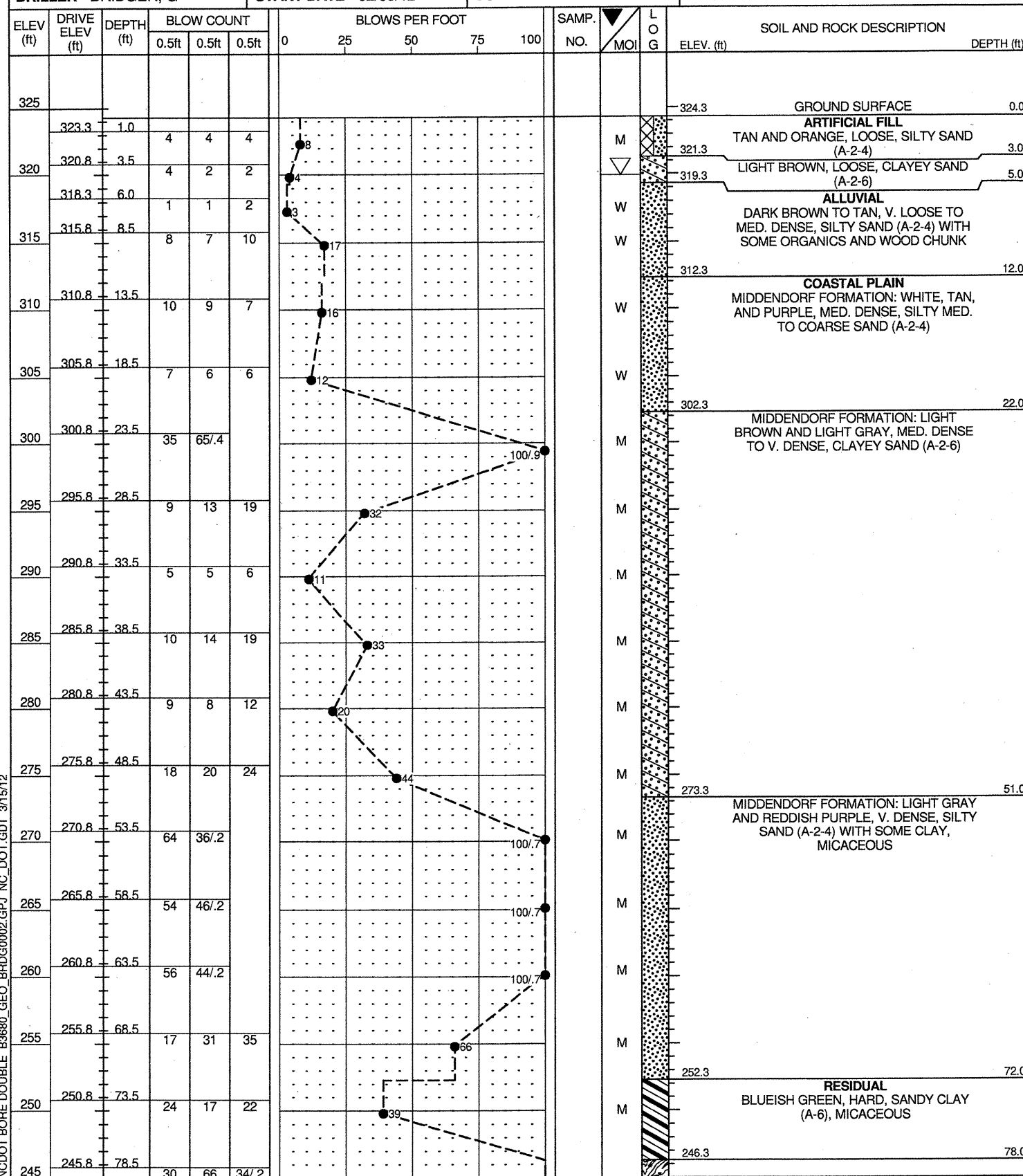
WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST HVOZDIK, J
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B1-B	STATION 18+23	OFFSET 49 ft RT	ALIGNMENT -L-
COLLAR ELEV. 319.5 ft	TOTAL DEPTH 78.8 ft	NORTHING 501,104	EASTING 1,871,147
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 01/31/12	COMP. DATE 01/31/12	SURFACE WATER DEPTH N/A

WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST HVOZDIK, J
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B1-B	STATION 18+23	OFFSET 49 ft RT	ALIGNMENT -L-
COLLAR ELEV. 319.5 ft	TOTAL DEPTH 78.8 ft	NORTHING 501,104	EASTING 1,871,147
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 01/31/12	COMP. DATE 01/31/12	SURFACE WATER DEPTH N/A

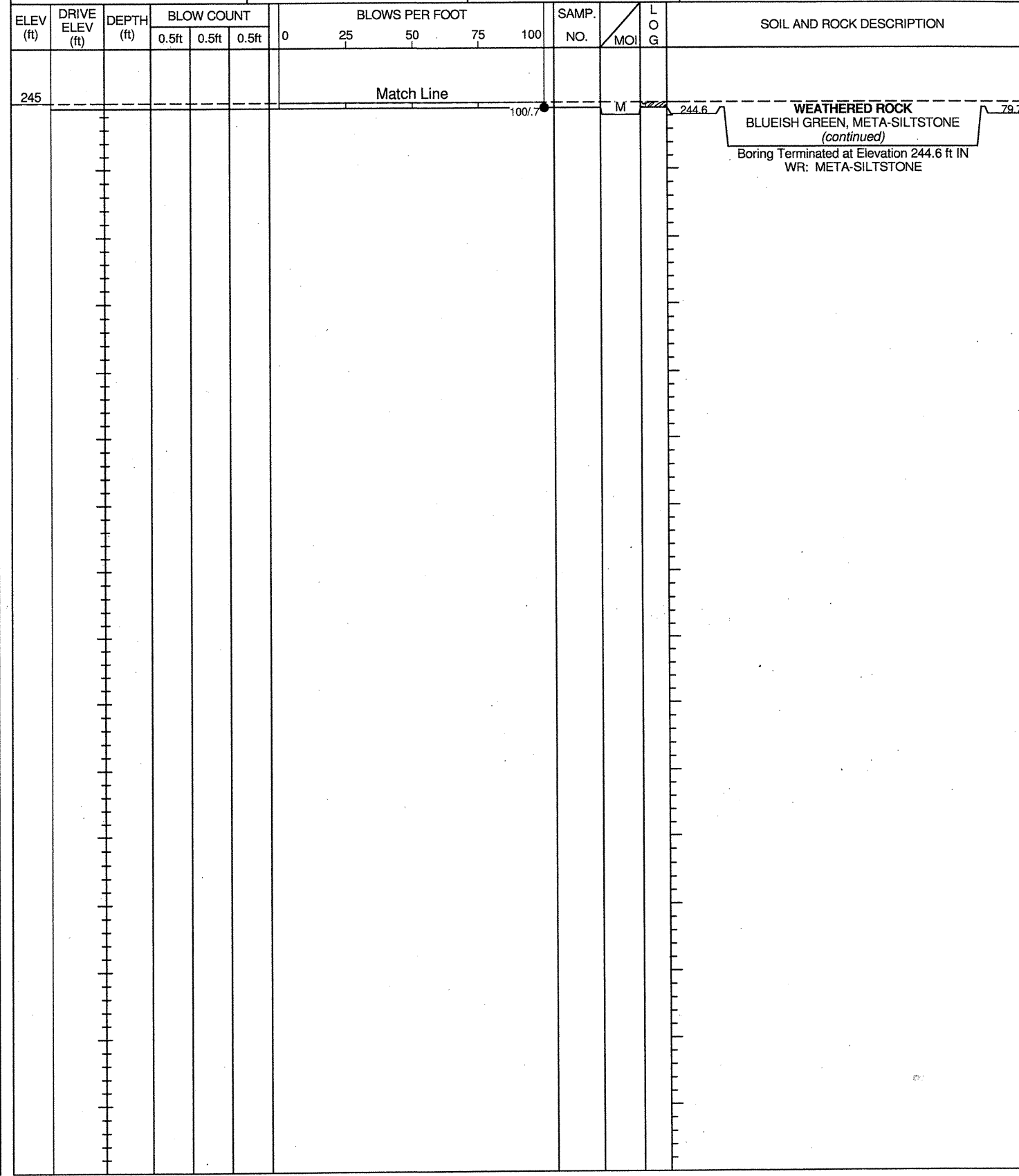


NCDOT BORE DOUBLE B3680_GEO_BRDG002.GPJ NC DOT GDT 3/15/12

WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST HVOZDIK, J
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B2-A	STATION 19+00	OFFSET 31 ft LT	ALIGNMENT -L-
COLLAR ELEV. 324.3 ft	TOTAL DEPTH 79.7 ft	NORTHING 501,079	EASTING 1,871,255
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 02/03/12	COMP. DATE 02/03/12	SURFACE WATER DEPTH N/A



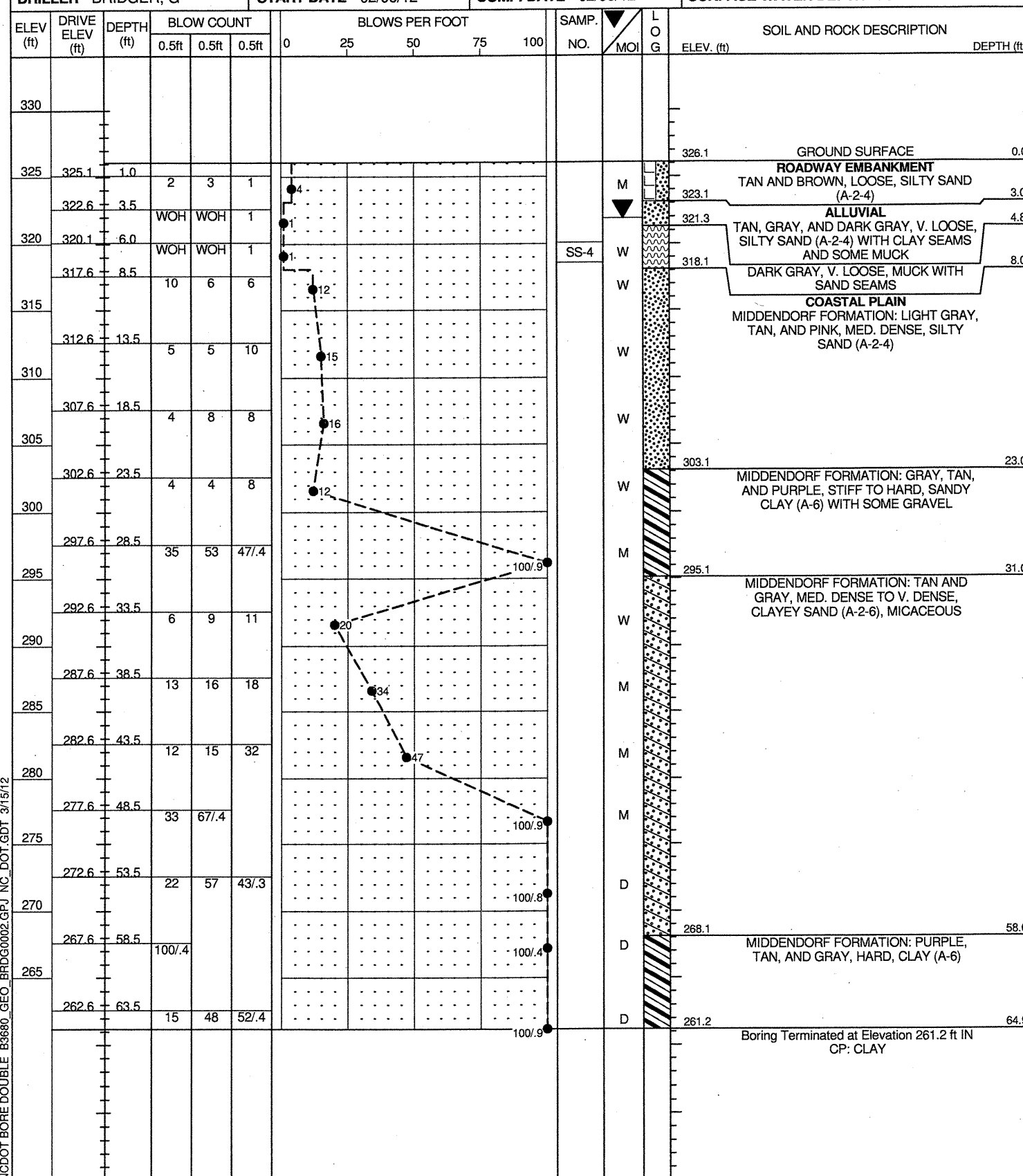
WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST HVOZDIK, J
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. B2-A	STATION 19+00	OFFSET 31 ft LT	ALIGNMENT -L-
COLLAR ELEV. 324.3 ft	TOTAL DEPTH 79.7 ft	NORTHING 501,079	EASTING 1,871,255
DRILL RIG/HAMMER EFF./DATE HPC D-50T		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER BRIDGER, G	START DATE 02/03/12	COMP. DATE 02/03/12	SURFACE WATER DEPTH N/A



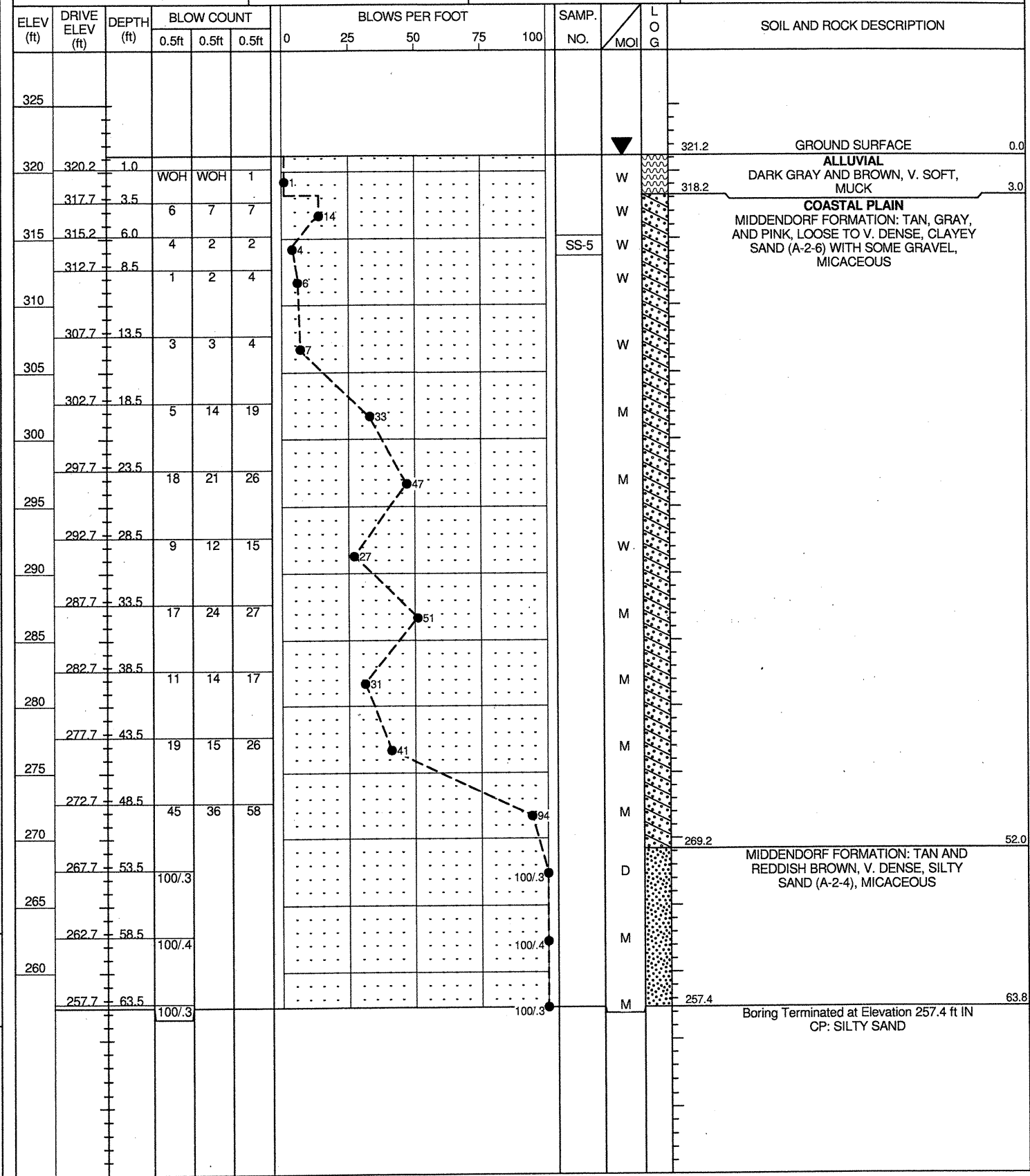
NCDOT BORE DOUBLE B3680_GEO_BRDG0002.GPJ NC_DOT_GDT 3/15/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST ZHANG, P
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. EB2-A	STATION 19+87	OFFSET 9 ft LT	ALIGNMENT -L-
COLLAR ELEV. 326.1 ft	TOTAL DEPTH 64.9 ft	NORTHING 500,993	EASTING 1,871,282
DRILL RIG/HAMMER EFF./DATE HPC BK-51 HDT		DRILL METHOD Mud Rotary	HAMMER TYPE Manual
DRILLER BRIDGER, G	START DATE 02/06/12	COMP. DATE 02/06/12	SURFACE WATER DEPTH N/A



WBS 33222.1.1	TIP B-3680	COUNTY MOORE	GEOLOGIST ZHANG, P
SITE DESCRIPTION BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD			GROUND WTR (ft)
BORING NO. EB2-B	STATION 19+98	OFFSET 22 ft RT	ALIGNMENT -L-
COLLAR ELEV. 321.2 ft	TOTAL DEPTH 63.8 ft	NORTHING 500,967	EASTING 1,871,261
DRILL RIG/HAMMER EFF./DATE HPC BK-51 HDT		DRILL METHOD Mud Rotary	HAMMER TYPE Manual
DRILLER BRIDGER, G	START DATE 02/06/12	COMP. DATE 02/06/12	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B9680_GEO_BRDG002.GPJ NC_DOT_GDT 3/15/12



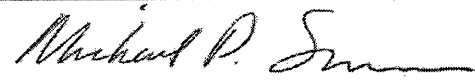
AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD

NCDOT Project No: 33222.1.1 - T.I.P. No: B-3680

MOORE COUNTY, NC

BORING #		SAMPLE #	TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limit Test Results			MC
AASHTO Classification			% PASSING SIEVES			% BY WEIGHT							
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PL	PI	%
EB1-A		SS-1											
A-4			99	81	40	32	32	13	24	21	17	4	26
17+48	24' LT	3.5-5.0											
B1-A		SS-2											
A-7-6			98	69	42	45	15	25	16	58	22	36	19
18+03	27' LT	33.5-35.0											
B2-B		SS-3											
A-2-7			99	57	30	61	9	2	28	59	21	38	-
19+29	39' RT	28.5-30.0											
EB2-A		SS-4											
A-2-4			99	53	27	62	13	12	13	25	22	3	-
19+87	9' LT	6.0-7.5											
EB2-B		SS-5											
A-2-6			94	51	16	71	13	3	13	29	18	11	-
19+98	22' RT	6.0-7.5											

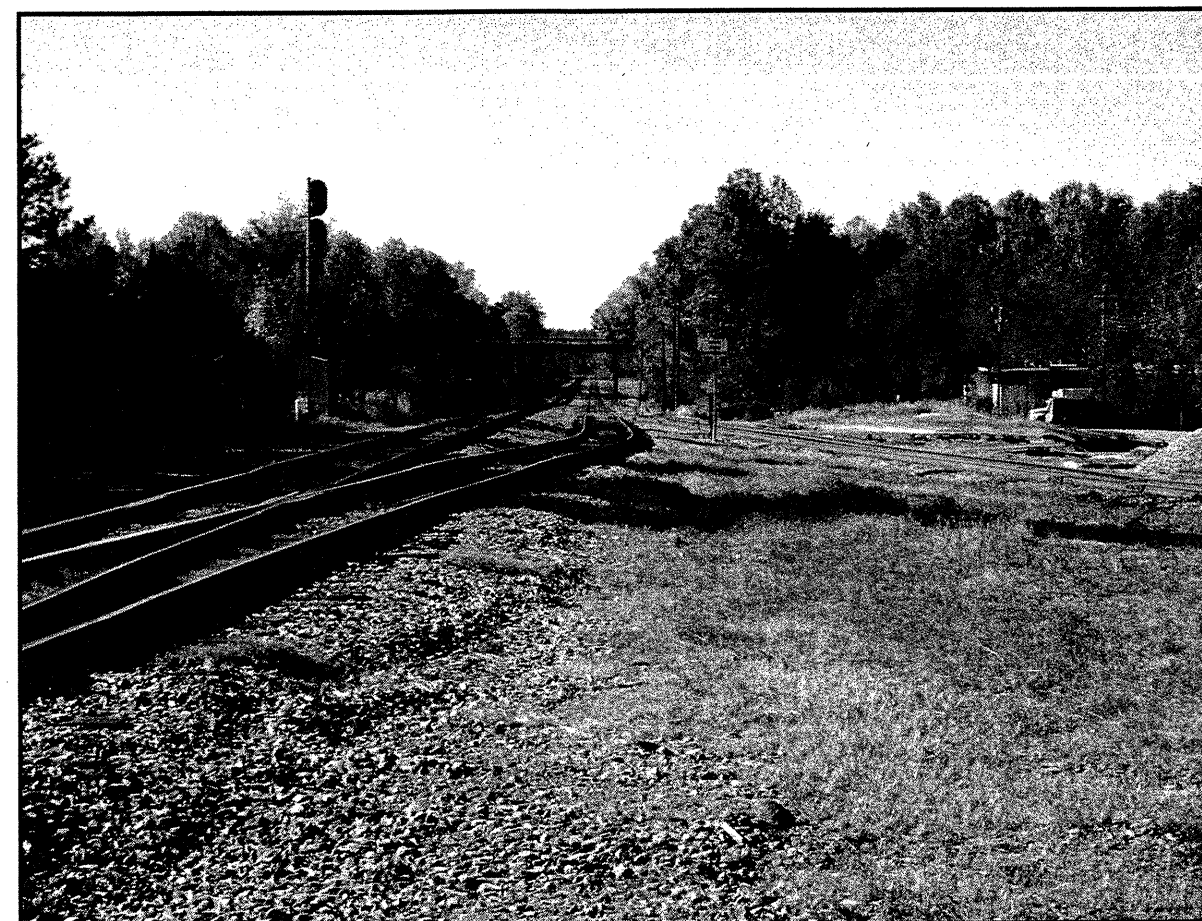
SIGNATURE 

NCDOT NO. 129-01-0411

Notes: LL = Liquid limit
 PL = Plastic limit
 PI = Plasticity index = LL - PL



PROFILE (-L-), LOOKING UPSTATION FROM END BENT 1.



CSX RAILROAD, LOOKING SOUTH TOWARDS EXISTING BRIDGE.

SITE PHOTOGRAPHS

**BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD
MOORE COUNTY, NORTH CAROLINA
WBS NO.: 33222.1.1, TIP NO.: B-3680**



URS Corporation – North Carolina
1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560
Tel: 919-461-1100 Fax: 919-46-1415



END BENT 1, LOOKING FROM LT TO RT.



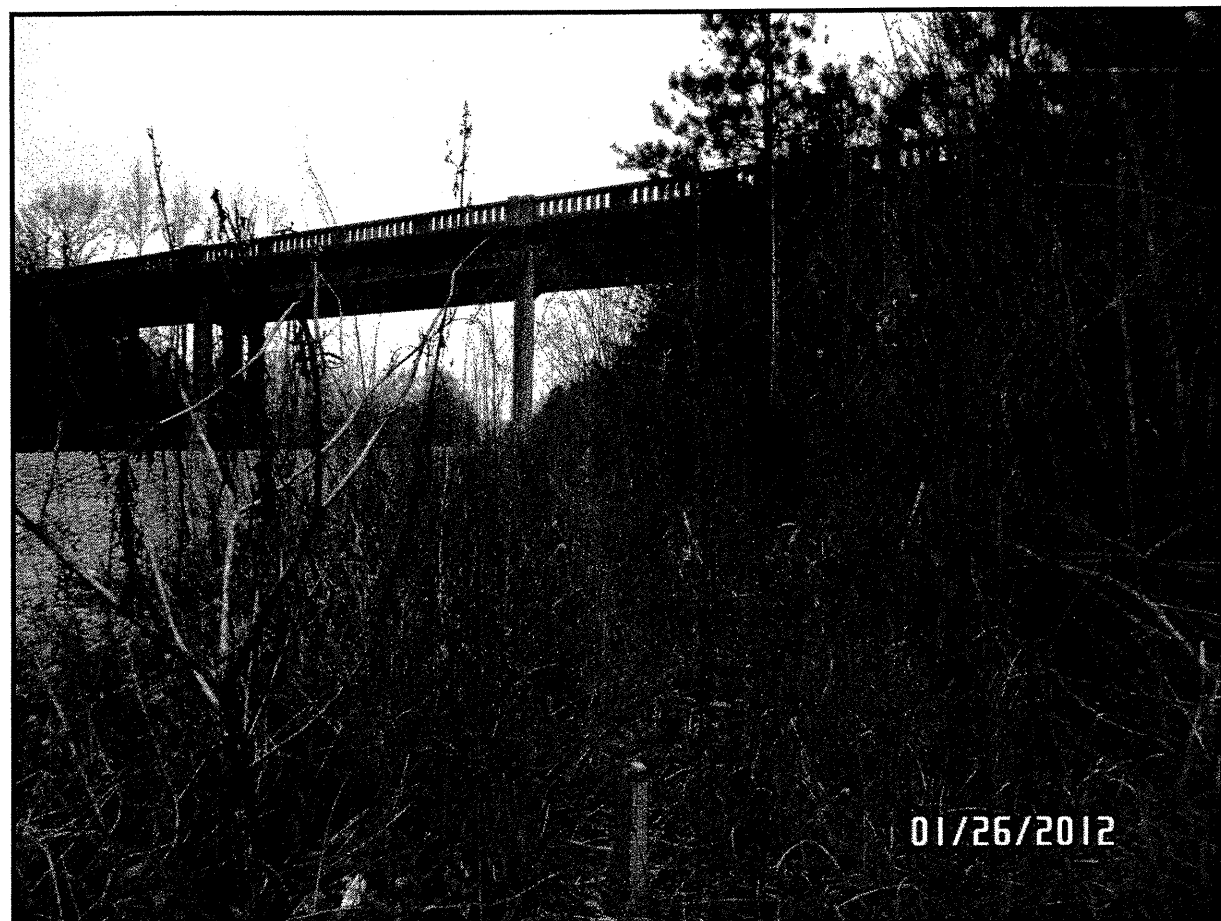
BENT 1, LOOKING FROM RT TO LT.

SITE PHOTOGRAPHS

BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD
MOORE COUNTY, NORTH CAROLINA
WBS NO.: 33222.1.1, TIP NO.: B-3680



URS Corporation - North Carolina
1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560
Tel: 919-461-1100 Fax: 919-46-1415



BENT 2, LOOKING FROM RT TO LT.



END BENT 2, LOOKING FROM LT TO RT.

SITE PHOTOGRAPHS

**BRIDGE NO. 2 ON US 15/501 OVER CSX RAILROAD
MOORE COUNTY, NORTH CAROLINA
WBS NO.: 33222.1.1, TIP NO.: B-3680**



URS Corporation – North Carolina
1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560
Tel: 919-461-1100 Fax: 919-46-1415