

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33810.1.1 (B-4642) F.A. PROJ. BRSTP-1433(2)

COUNTY SCOTLAND

PROJECT DESCRIPTION BRIDGE OVER JUNIPER CREEK
ON SR 1433 BETWEEN SR 1369 AND SR 1472

SITE DESCRIPTION BRIDGE NO. 28 ON SR 1433
OVER JUNIPER CREEK

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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 (ON-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: 33810.1.1 ID: B-4642

PERSONNEL

C. C. MURRAY

J. E. ESTEP

L. N. HARPER

R. W. TODD

M. L. SMITH

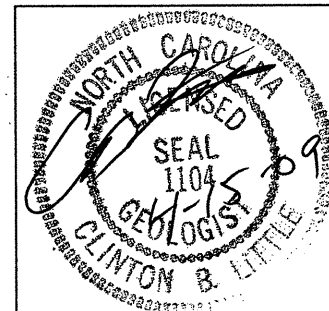
A. C. SMITH

INVESTIGATED BY J. P. ROGERS

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE APRIL, 2009



DRAWN BY: J. E. ROLFSMEYER

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

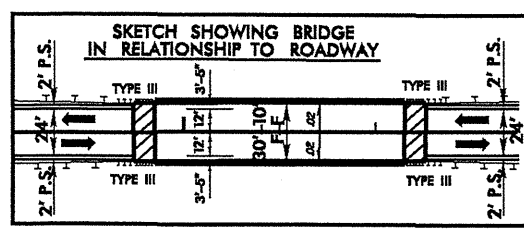
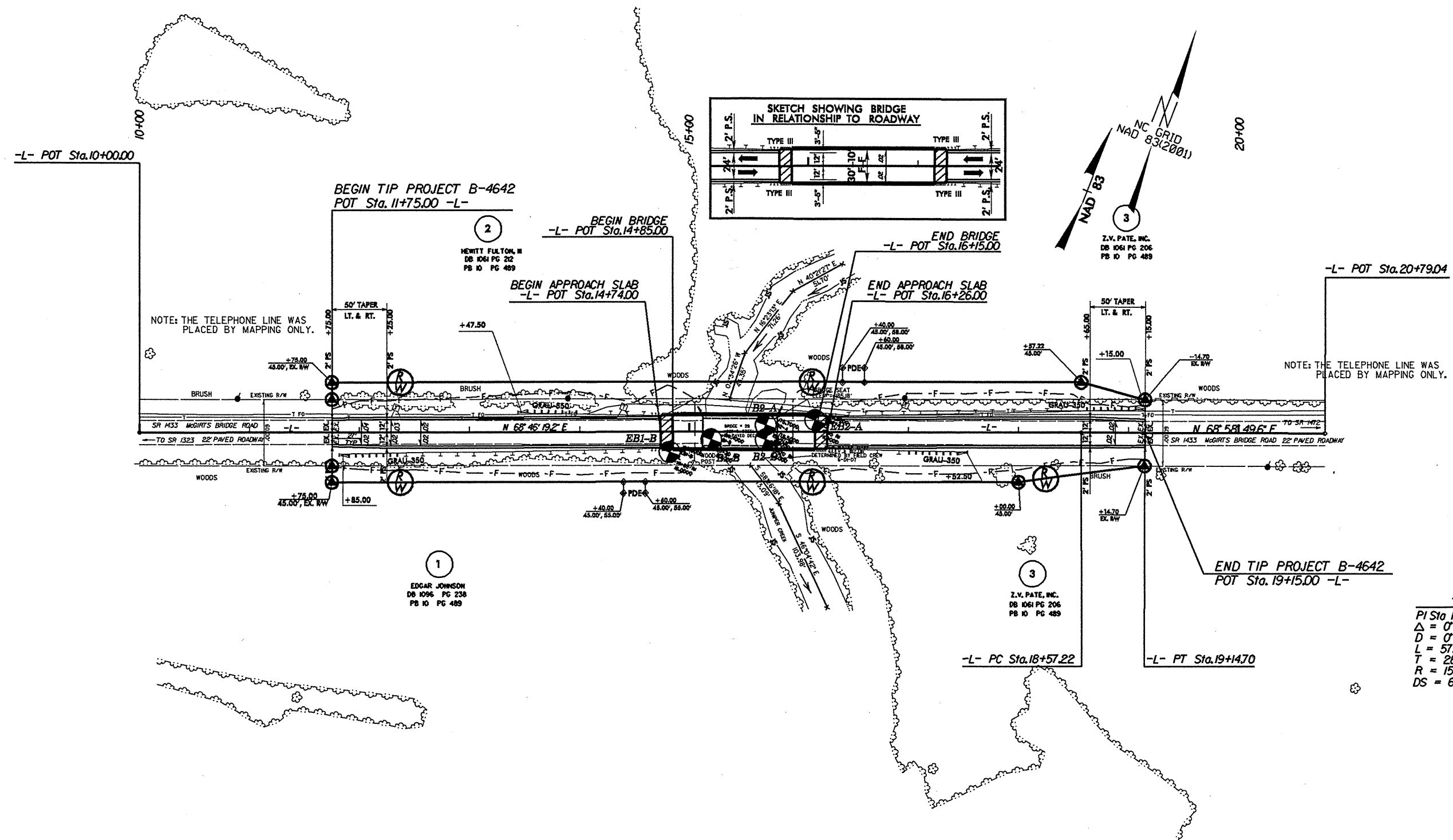
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

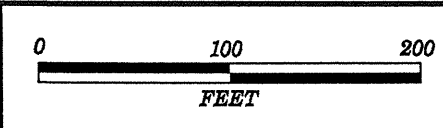
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM 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) 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) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFIER - 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 - 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 (MOTJ) - 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 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-4, A-5, A-6, A-7 SYMBOL % PASSING: 10, 40, 200 LIQUID LIMIT PLASTIC INDEX GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATINGS AS A SUBGRADE	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 MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE PERCENTAGE OF MATERIAL ORGANIC MATERIAL TRACE OF ORGANIC MATTER LITTLE ORGANIC MATTER MODERATELY ORGANIC HIGHLY ORGANIC GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE LITTLE SOME HIGHLY LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50	WEATHERING FRESH VERY SLIGHT (V SLJ) SLIGHT (SLJ) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE	
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	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	
TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)	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 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	WEATHERING ROCK FRESH, CRYSTALLINE SHELL, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. 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. 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. 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.	
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:	ROCK HARDNESS VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT	
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH	FRACTURE SPACING TERM SPACING	ROCK HARDNESS VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT	
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.	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	ROCK HARDNESS VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT	



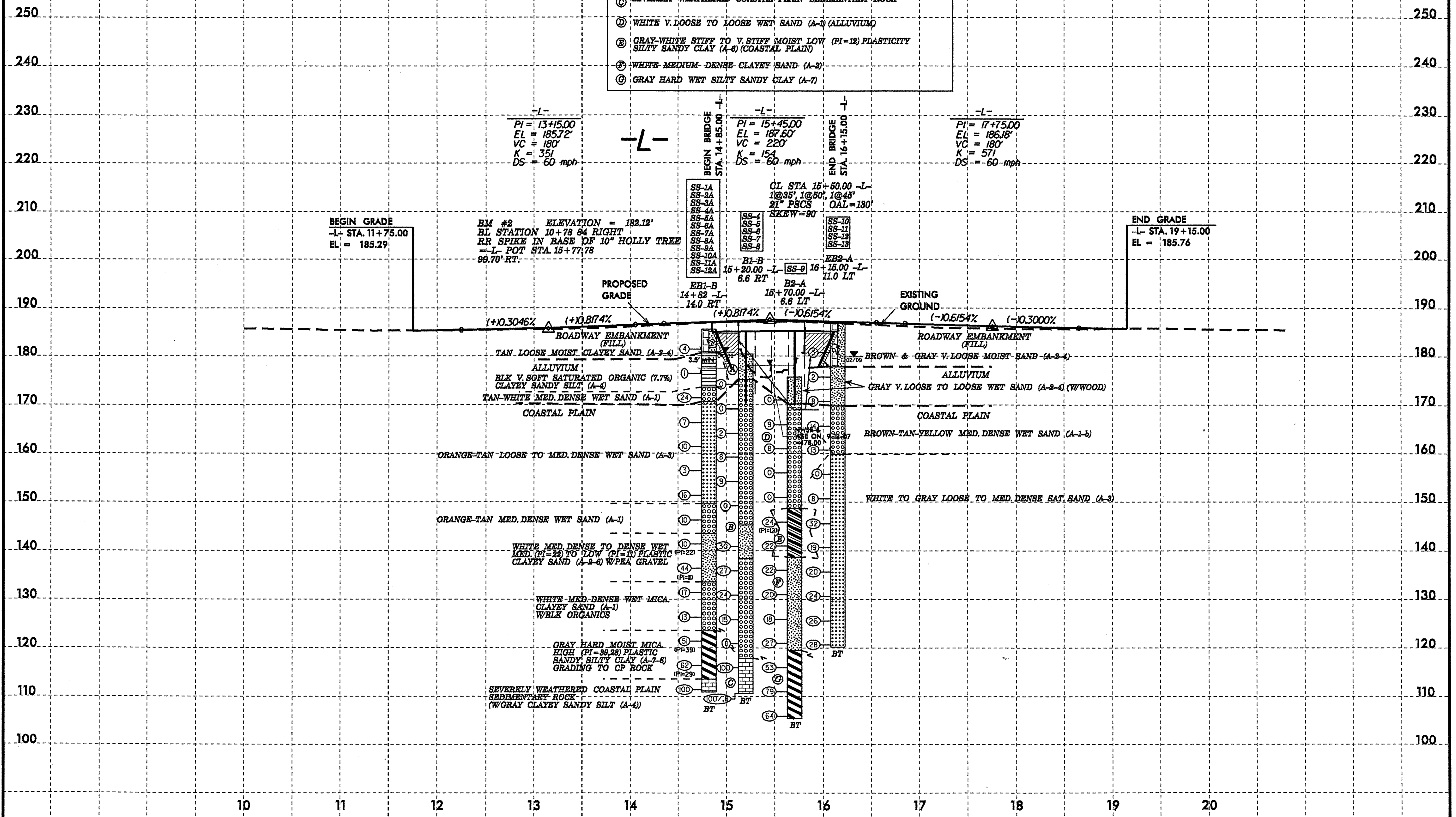
NOTE: THE TELEPHONE LINE WAS PLACED BY MAPPING ONLY.

NOTE: THE TELEPHONE LINE WAS PLACED BY MAPPING ONLY.

-L-
 PI Sta 18+85.96
 $\Delta = 0' 12' 30.3" (RT)$
 $D = 0' 21' 45.5"$
 $L = 57.48'$
 $T = 28.74'$
 $R = 15,800.00'$
 $DS = 60MPH$



- BORING DESCRIPTIONS**
- (A) TAN & BROWN V. LOOSE TO LOOSE SAT. SILTY SAND (A-2) W/TRASH 0.0-2.0 (ALLUVIUM)
 - (B) BROWN-TAN-GRAY TO WHITE V. LOOSE TO MED. DENSE WET CLAYEY SAND (A-1-B) & (A-2-4) (COASTAL PLAIN)
 - (C) SEVERELY WEATHERED COASTAL PLAIN SEDIMENTARY ROCK
 - (D) WHITE V. LOOSE TO LOOSE WET SAND (A-1) (ALLUVIUM)
 - (E) GRAY-WHITE STIFF TO V. STIFF MOIST LOW (PI=12) PLASTICITY SILTY SANDY CLAY (A-6) (COASTAL PLAIN)
 - (F) WHITE-MEDIUM-DENSE CLAYEY SAND (A-2)
 - (G) GRAY HARD WET SILTY SANDY CLAY (A-7)



-L-
PI = 13+15.00
EL = 185.72
VC = 180'
K = 351
DS = -60 mph

-L-
PI = 15+45.00
EL = 187.50
VC = 220'
K = 154
DS = -60 mph

-L-
PI = 17+75.00
EL = 186.18
VC = 180'
K = 571
DS = -60 mph

BEGIN GRADE
-L- STA. 11+75.00
EL = 185.29

BM #2 ELEVATION = 182.12'
BL STATION 10+78.84 RIGHT
RR SPIKE IN BASE OF 10" HOLLY TREE
-L- POT STA. 15+77.78
99.78' RT.

SS-1A
SS-2A
SS-3A
SS-4A
SS-5A
SS-6A
SS-7A
SS-8A
SS-9A
SS-10A
SS-11A
SS-12A
SS-1
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SS-10
SS-11
SS-12

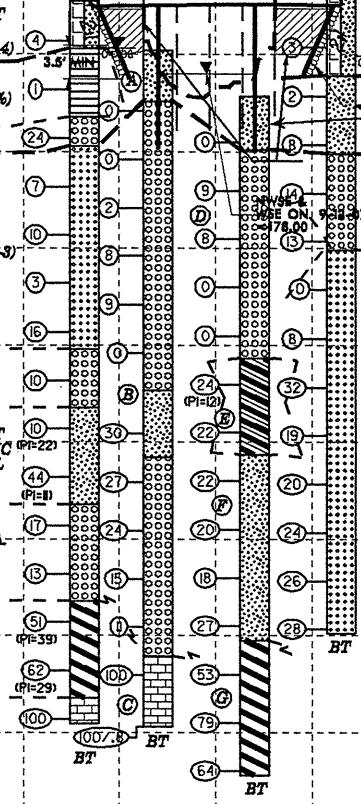
END GRADE
-L- STA. 19+15.00
EL = 185.76

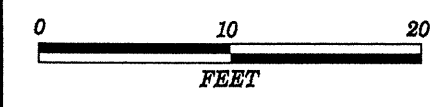
PROPOSED GRADE

EXISTING GROUND

ROADWAY EMBANKMENT (FILL)
TAN LOOSE MOIST CLAYEY SAND (A-2-4)
ALLUVIUM
BLK V. SOFT SATURATED ORGANIC (7.7%)
CLAYEY SANDY SILT (A-4)
TAN-WHITE MED. DENSE WET SAND (A-1)
COASTAL PLAIN
ORANGE-TAN LOOSE TO MED. DENSE WET SAND (A-3)
ORANGE-TAN MED. DENSE WET SAND (A-1)
WHITE MED. DENSE TO DENSE WET MED. (PI=24) TO LOW (PI=11) PLASTIC CLAYEY SAND (A-2-6) W/PEA GRAVEL
WHITE-MED. DENSE WET MICA CLAYEY SAND (A-1) W/BLK ORGANICS
GRAY HARD MOIST MICA HIGH (PI=38.28) PLASTIC SANDY SILTY CLAY (A-7-8) GRADING TO CP ROCK
SEVERELY WEATHERED COASTAL PLAIN SEDIMENTARY ROCK (W/GRAY CLAYEY SANDY SILT (A-4))

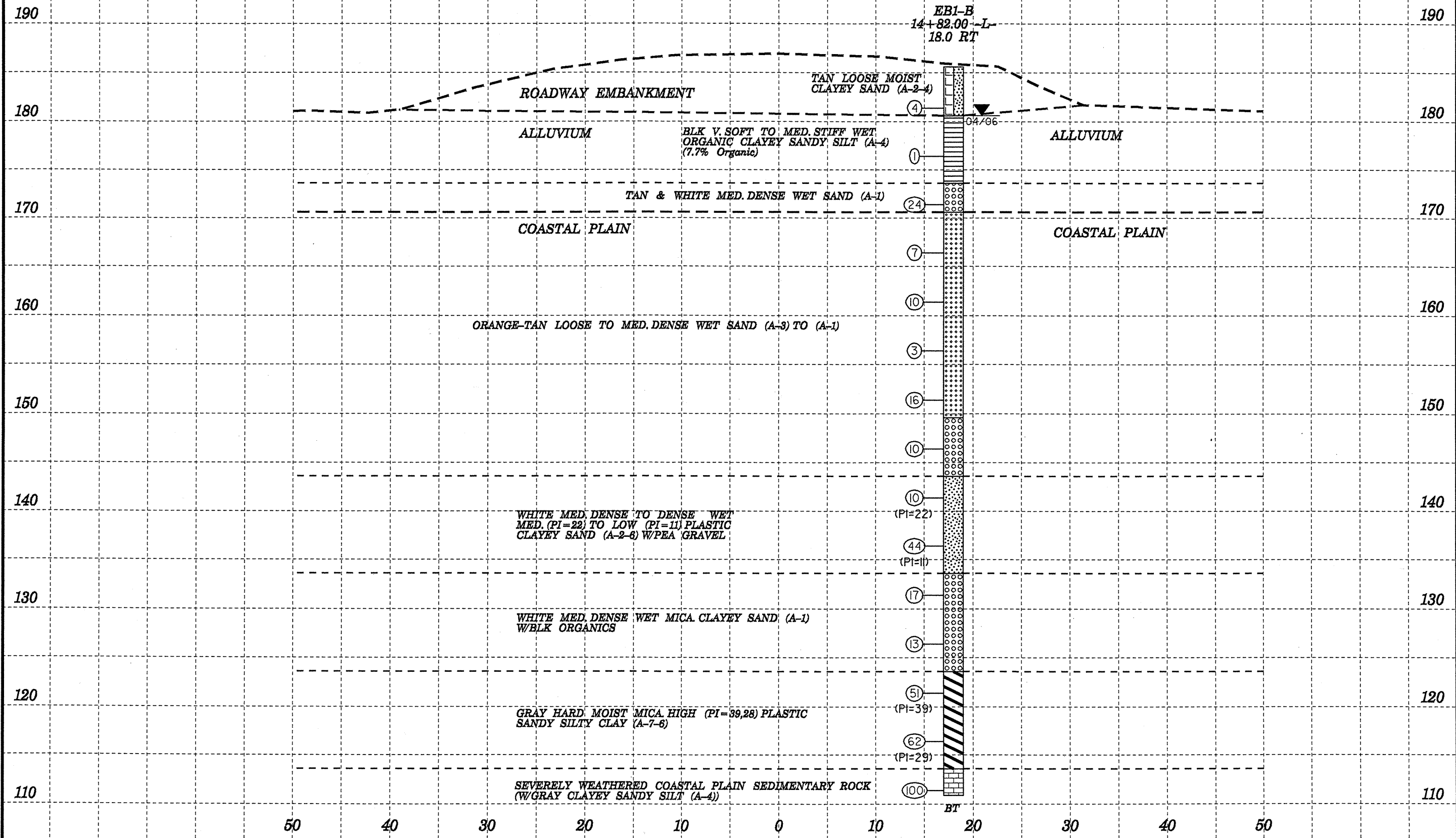
ROADWAY EMBANKMENT (FILL)
BROWN & GRAY V. LOOSE MOIST SAND (A-2-4)
ALLUVIUM
GRAY V. LOOSE TO LOOSE WET SAND (A-2-4) (W/WOOD)
COASTAL PLAIN
BROWN-TAN-YELLOW MED. DENSE WET SAND (A-1-5)
WHITE TO GRAY LOOSE TO MED. DENSE SAT. SAND (A-3)

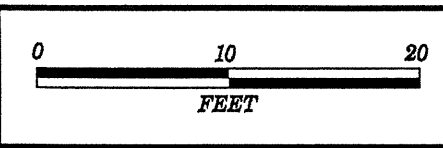




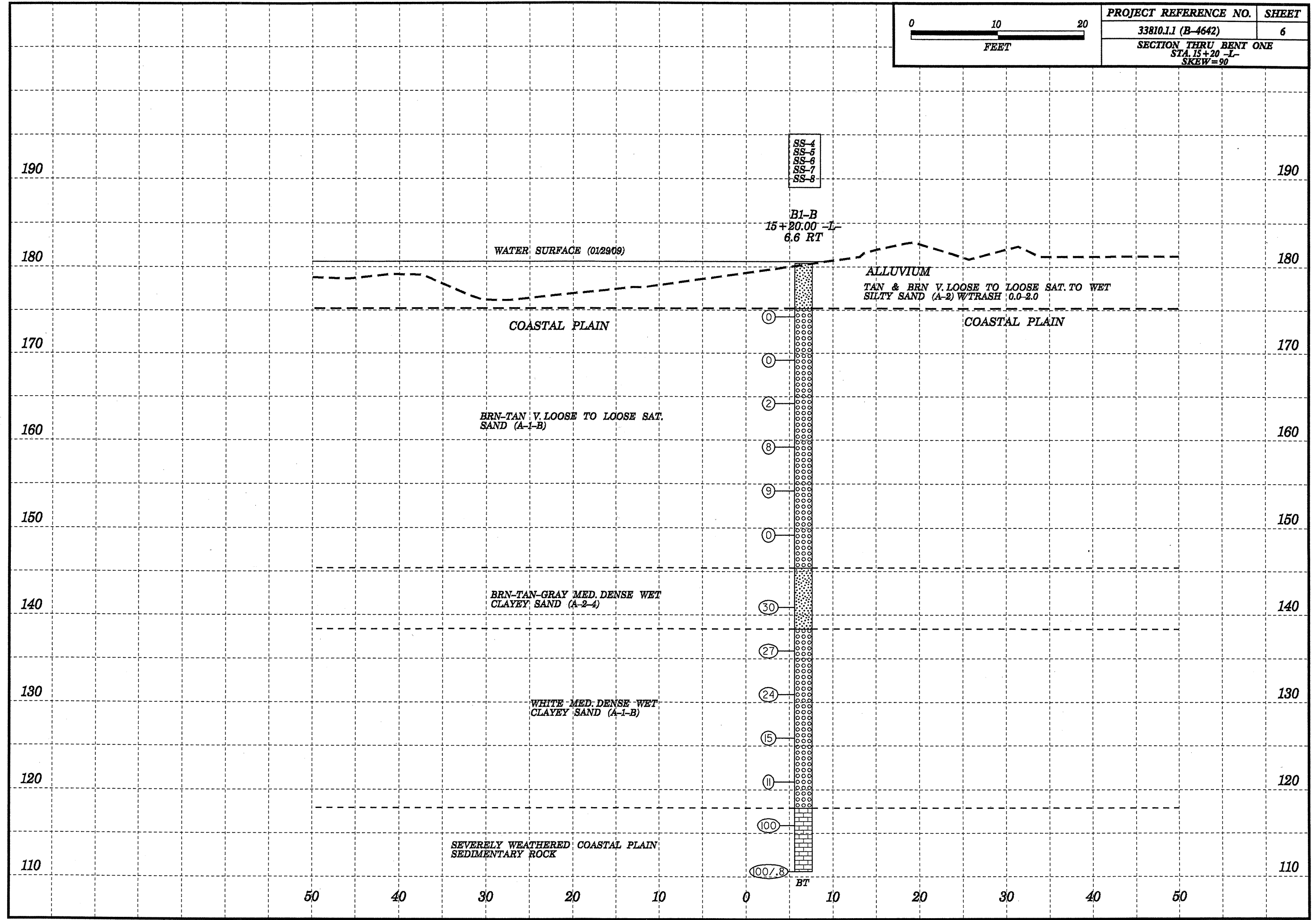
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- SS-2A
- SS-3A
- SS-4A
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- SS-8A
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- SS-10A
- SS-11A
- SS-12A

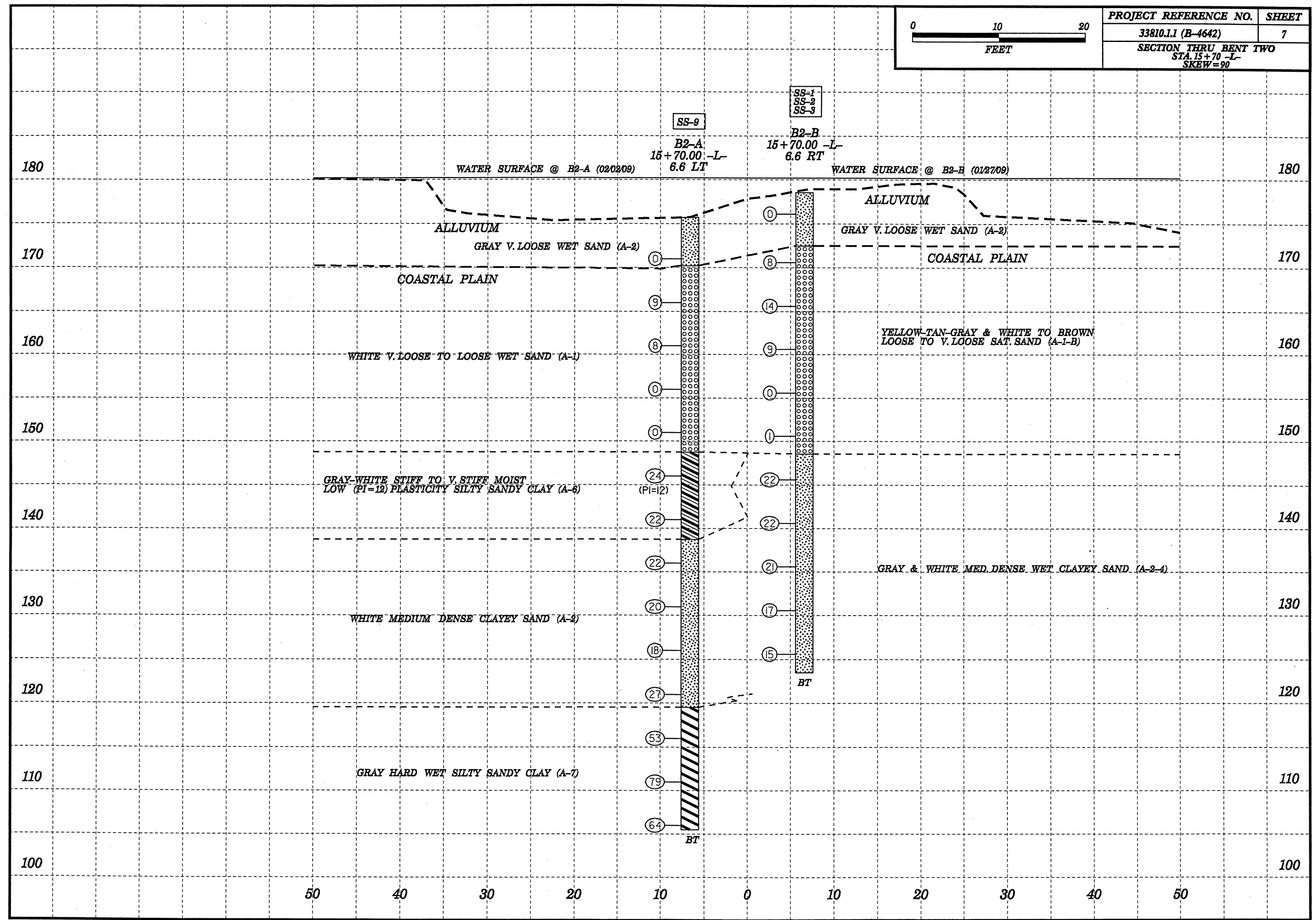
EB1-B
14+82.00 -L-
18.0 RT

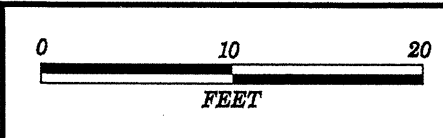




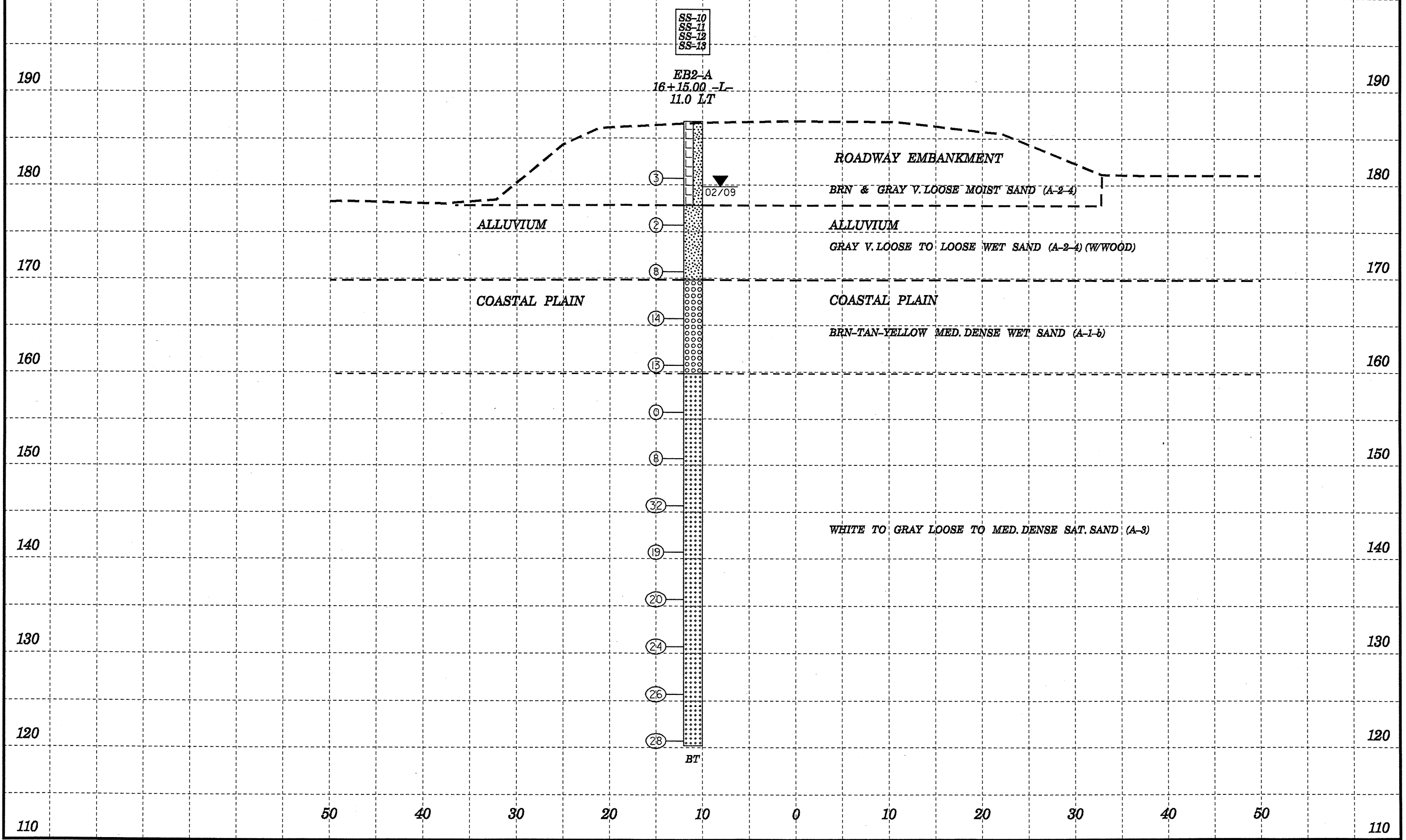
PROJECT REFERENCE NO.	SHEET
33810.1.1 (B-4642)	6
SECTION THRU BENT ONE	
STA 15+20 -L-	
SKEW=90	







PROJECT REFERENCE NO.	SHEET
33810.1.1 (B-4642)	8
SECTION THRU END BENT TWO	
STA. 16+15 -L-	
SKEW=90	



PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+82	OFFSET 18ft RT	ALIGNMENT -L-
COLLAR ELEV. 185.6 ft	TOTAL DEPTH 74.7 ft	NORTHING 381,495	EASTING 1,880,607
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 04/25/06	COMP. DATE 04/25/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 72.0 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
190													GROUND SURFACE	0.0
185													ROADWAY EMBANKMENT	
182.4	3.2		1	2	2							SS-1A	TAN LOOSE MOIST CLAYEY SAND (A-2-4)	5.0
180													ALLUVIAL	
177.4	8.2		0	0	1							SS-2A	BLK V. SOFT SATURATED ORGANIC CLAYEY SANDY SILT (A-4) (7.7% Organic)	12.0
175													ALLUVIAL	
172.4	13.2		6	10	14							SS-3A	TAN & WHITE MED. DENSE WET SAND (A-1)	15.0
170													COASTAL PLAIN	
167.4	18.2		3	2	5								ORANGE-TAN LOOSE TO MED. DENSE WET SAND (A-3)	
165														
162.4	23.2		3	5	5									
160														
157.4	28.2		1	2	1							SS-4A		
155														
152.4	33.2		1	3	13									
150														
147.4	38.2		4	6	4							SS-5A	COASTAL PLAIN	36.0
145													ORANGE-TAN MED. DENSE WET SAND (A-1)	
142.4	43.2		3	6	4							SS-6A	COASTAL PLAIN	42.0
140													WHITE MED. DENSE TO DENSE WET MED. (PI=22) TO LOW (PI=11) PLASTIC CLAYEY SAND (A-2-6) W/ PEA GRAVEL	
137.4	48.2		7	13	31							SS-7A		
135														
132.4	53.2		6	8	9							SS-8A	COASTAL PLAIN	52.0
130													WHITE MED. DENSE WET MICA. CLAYEY SAND (A-1) W/ BLK ORGANICS	
127.4	58.2		4	4	9							SS-9A		
125														
122.4	63.2		10	21	30							SS-10A	COASTAL PLAIN	62.0
120													GRAY HARD MOIST MICA. HIGH (PI=39,28) PLASTIC SANDY SILTY CLAY (A-7-6)	
117.4	68.2		11	24	38							SS-11A	GRADING TO CP ROCK	
115														
112.4	73.2		23	44	56							SS-12A	COASTAL PLAIN	72.0
110													SEVERELY WEATHERED COASTAL PLAIN SEDIMENTARY ROCK (W/ GRAY CLAYEY	74.7

NCDOT BORE SINGLE B-4642_GEO_BRDG0028.GPJ NC_DOT_GDT 04/13/09

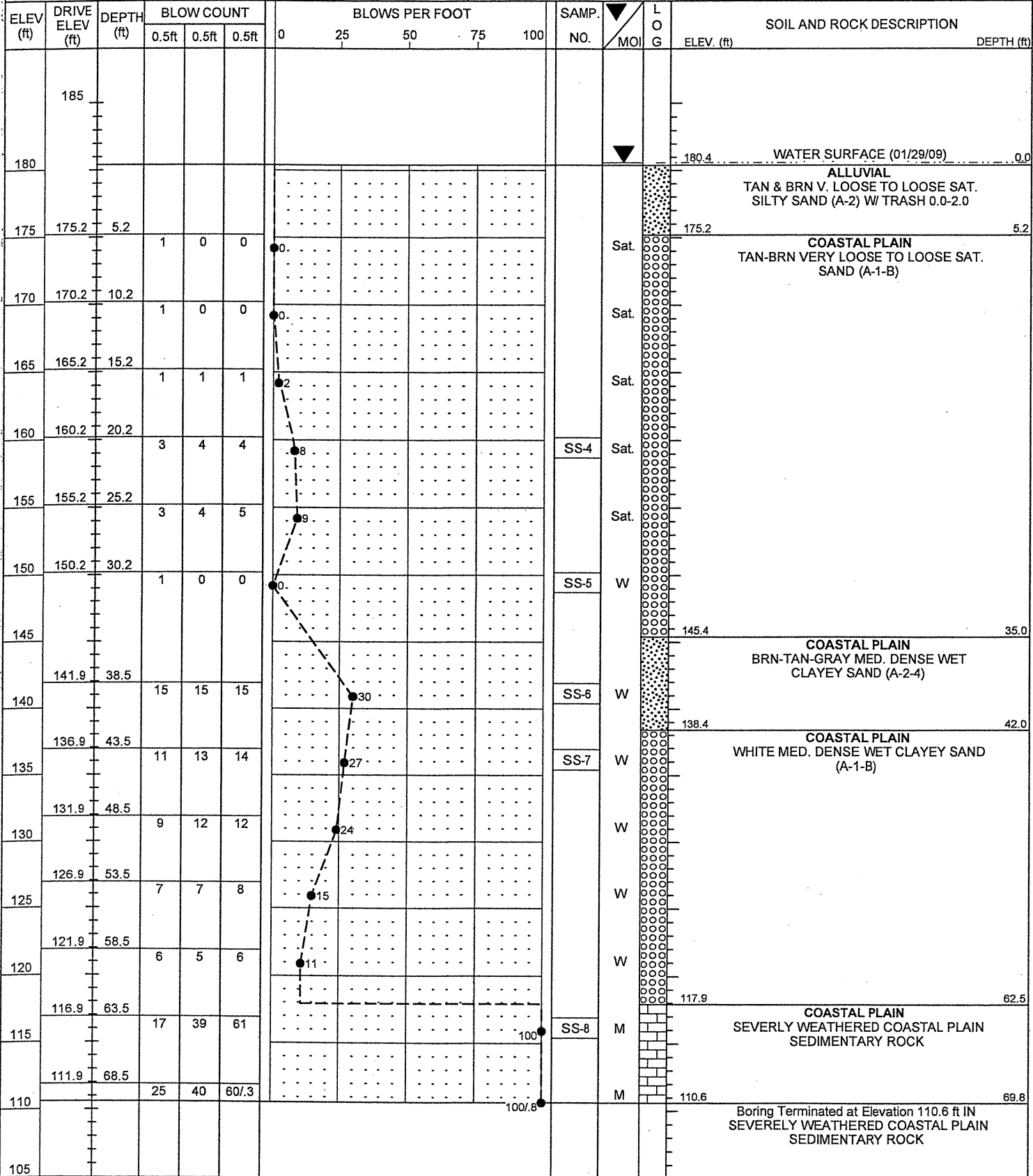
PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+82	OFFSET 18ft RT	ALIGNMENT -L-
COLLAR ELEV. 185.6 ft	TOTAL DEPTH 74.7 ft	NORTHING 381,495	EASTING 1,880,607
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 04/25/06	COMP. DATE 04/25/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 72.0 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
110													Match Line	
105														
100														
95														
90														
85														
80														
75														
70														
65														
60														
55														
50														
45														
40														
35														
30														

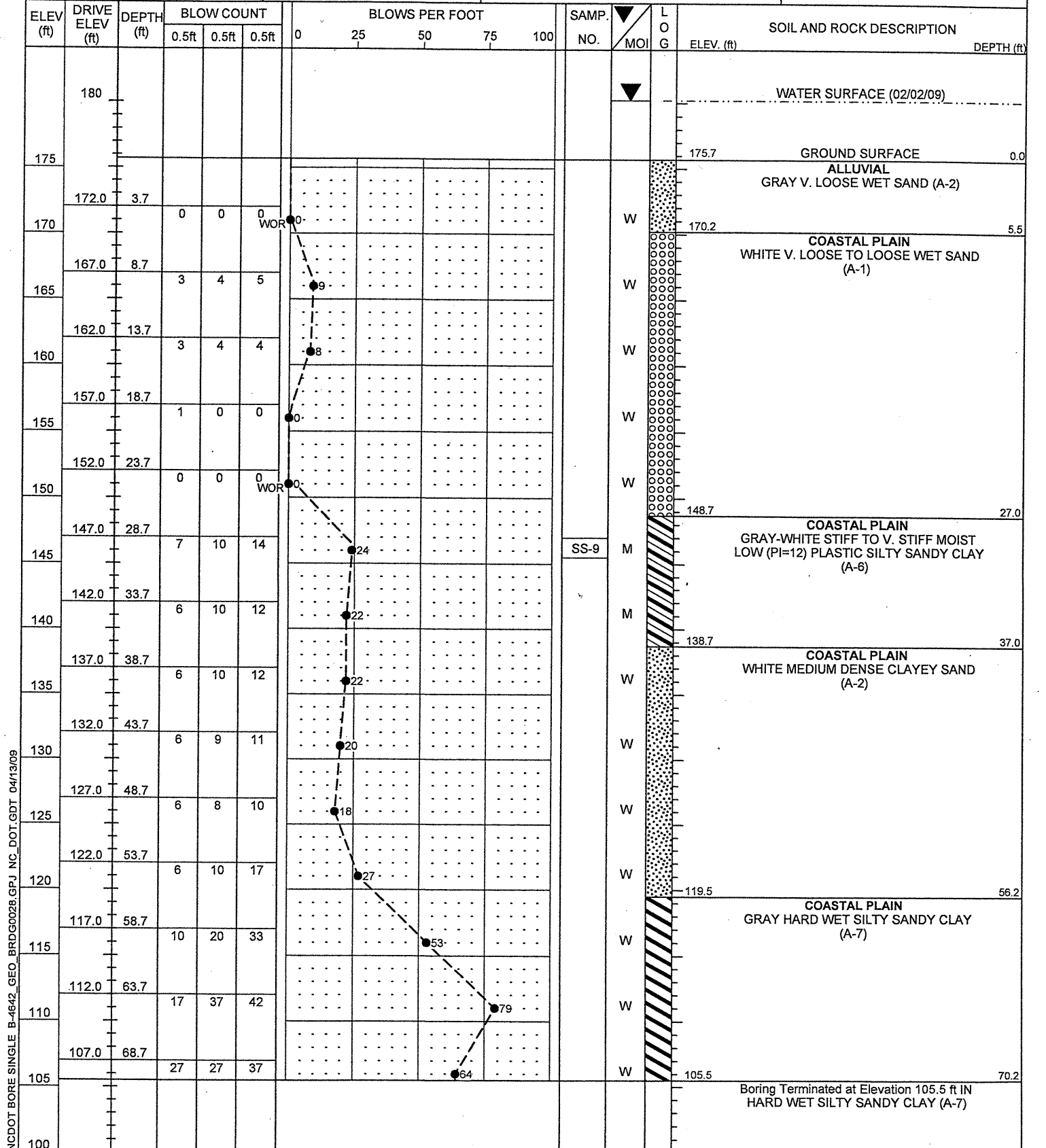
NCDOT BORE SINGLE B-4642_GEO_BRDG0028.GPJ NC_DOT_GDT 04/13/09

SANDY SILT (A-4)
Boring Terminated at Elevation 110.9 ft IN SEVERELY WEATHERED COASTAL PLAIN SEDIMENTARY ROCK

PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+20	OFFSET 7ft RT	ALIGNMENT -L-
COLLAR ELEV. 180.4 ft	TOTAL DEPTH 69.8 ft	NORTHING 381,519	EASTING 1,880,638
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 01/29/09	COMP. DATE 01/29/09	SURFACE WATER DEPTH 0.2ft	DEPTH TO ROCK 62.5 ft



PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. B2-A	STATION 15+70	OFFSET 7ft LT	ALIGNMENT -L-
COLLAR ELEV. 175.7 ft	TOTAL DEPTH 70.2 ft	NORTHING 381,549	EASTING 1,880,680
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 02/02/09	COMP. DATE 02/02/09	SURFACE WATER DEPTH 4.5ft	DEPTH TO ROCK N/A



NCDOT BORE SINGLE B-4642 GEO. BRDG0028.GPJ NC_DOT.GDT 04/13/09

NCDOT BORE SINGLE B-4642 GEO. BRDG0028.GPJ NC_DOT.GDT 04/13/09

PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. B2-B	STATION 15+70	OFFSET 7ft RT	ALIGNMENT -L-
COLLAR ELEV. 178.5 ft	TOTAL DEPTH 55.0 ft	NORTHING 381,537	EASTING 1,880,685
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 01/27/09	COMP. DATE 01/27/09	SURFACE WATER DEPTH 1.7ft	DEPTH TO ROCK N/A

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					
180															
175	176.6	1.9	1	0	0							Sat.	ALLUVIAL GRAY V. LOOSE WET SILTY SAND (A-2)	0.0	
170	171.6	6.9	3	4	4							SS-1 Sat.	COASTAL PLAIN YELLOW-TAN-GRAY & WHITE TO BRN LOOSE TO V. LOOSE SAT. SAND (A-1-B)	6.0	
165	166.6	11.9	7	6	8							Sat.			
160	161.6	16.9	4	4	5							Sat.			
155	156.6	21.9	1	0	0							SS-2 Sat.			
150	151.6	26.9	1	1	0							Sat.			
145	146.6	31.9	11	10	12							SS-3 W	COASTAL PLAIN GRAY & WHITE MED. DENSE WET CLAYEY SAND (A-2-4)	30.0	
140	141.6	36.9	8	11	11							W			
135	136.6	41.9	7	9	12							W			
130	131.6	46.9	6	8	9							W			
125	126.6	51.9	5	7	8							W			
120															
115															
110															
105															
100															

Boring Terminated at Elevation 123.5 ft IN MED. DENSE WET CLAYEY SAND (A-2-4)

NOTES: BORING TERMINATED @ 55.0' DUE TO CAVE IN PREVENTED CASING ADVANCEMENT.

NCDOT BORE SINGLE B-4642_GEO_BRD0028.GPJ_NC_DOT_GDT_04/13/09

PROJECT NO. 33810.1.1	ID. B4642	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE #28 OVER JUNIPER CRK ON SR 1433			GROUND WTR (ft)
BORING NO. EB2-A	STATION 16+15	OFFSET 11ft LT	ALIGNMENT -L-
COLLAR ELEV. 186.8 ft	TOTAL DEPTH 66.6 ft	NORTHING 381,570	EASTING 1,880,720
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer/ TRI-CONE	HAMMER TYPE Automatic	
START DATE 02/03/09	COMP. DATE 02/03/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
190															
185															
180	181.7	5.1	1	2	1							SS-10 W	ROADWAY EMBANKMENT BRN & GRAY V. LOOSE MOIST SAND (A-2-4) (ROADWAY EMBANKMENT)	0.0	
175	176.7	10.1	1	1	1							SS-11 W	ALLUVIAL GRAY V. LOOSE TO LOOSE WET SAND (A-2-4) (W/ WOOD)	9.0	
170	171.7	15.1	3	4	4							W			
165	166.7	20.1	5	6	8							SS-12 W	COASTAL PLAIN BRN-TAN-YELLOW MED. DENSE WET SAND (A-1-b)	17.0	
160	161.7	25.1	4	5	8							W			
155	156.7	30.1	1	0	0							SS-13 W	COASTAL PLAIN WHITE TO GRAY LOOSE TO MED. DENSE SAT. SAND (A-3)	27.0	
150	151.7	35.1	4	4	4							Sat.			
145	146.7	40.1	17	17	15							Sat.			
140	141.7	45.1	4	8	11							Sat.			
135	136.7	50.1	5	7	13							Sat.			
130	131.7	55.1	7	11	13							Sat.			
125	126.7	60.1	8	13	13							Sat.			
120	121.7	65.1	9	13	15							Sat.			
115															
110															

Boring Terminated at Elevation 120.2 ft IN MED. DENSE SAT. SAND (A-3)

NCDOT BORE SINGLE B-4642_GEO_BRD0028.GPJ_NC_DOT_GDT_04/13/09



FIELD SCOUR REPORT

WBS: 33810.1.1 TIP: B-4642 COUNTY: SCOTLAND

DESCRIPTION(1): BRIDGE NO. 28 ON SR 1433 OVER JUNIPER CREEK.

EXISTING BRIDGE

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

Bridge No.: 28 Length: 68' Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 2
 Foundation Type: _____

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE

Interior Bents: NONE

Channel Bed: NONE

Channel Bank: NONE

EXISTING SCOUR PROTECTION

Type(3): NONE

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): NONE VISIBLE (BRIDGE MAINT. RECORDS INDICATE CUT-OFF PILES ARE PRESENT)

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): GRAY COARSE SILTY SAND AS SS-11.

Channel Bank Material(8): GRAY COARSE CLAYEY SAND AS SS-10.

Channel Bank Cover(9): TREES

Floodplain Width(10): ENTIRE PROJECT CORRIDOR

Floodplain Cover(11): WOODS AND PASTURE

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): NO OBSERVABLE TENDENCY

Observations and Other Comments: VERY LITTLE OBSERVABLE FLOW IN CREEK AT TIME OF INVESTIGATION. NO DEBRIS WITHIN BRIDGE AREA.

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

		BENTS											
		B1	B2										
100 YR.	165	165											

Comparison of DSE to Hydraulics Unit theoretical scour:
 Design Scour Elevations are approximately five feet higher than Theoretical based on historical scour depths.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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

Reported by: RW TODD Date: 2/4/2009