

REFERENCE: U-5798A

PROJECT: 44369

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

ROADWAY

SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
PROJECT DESCRIPTION WIDEN SR 1102 (GILLIS HILL ROAD) TO MULTI-LANES FROM US 401 (RAEFORD ROAD) TO SR 1112 (STONY POINT ROAD)

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5798A	1	67

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) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

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

PERSONNEL

BUNCH, C. M.

BLYTHE, A. (S&ME)

WILLIAMS, T. (S&ME)

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DATE MARCH 2020

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NC REGISTERED ENGINEERING FIRM: F-0869

NC REGISTERED GEOLOGIC FIRM: C-367



SIGNATURE

DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR 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. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH 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 (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 (SROD) - 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.																																																																																																																																																																																																																																																																																			
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GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> </table>										GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL																	% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT			MATERIAL PASSING #40 LL PI	-	-	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 10 MX	41 MN 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS				GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX									USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS									GEN. 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ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p> <p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>MONITORING WELL</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>PIEZOMETER INSTALLATION</td> </tr> <tr> <td></td> <td></td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td></td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td></td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td></td> <td></td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td></td> <td></td> <td></td> <td>SPT N-VALUE</td> </tr> </table>										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		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		DIP & DIP DIRECTION OF ROCK STRUCTURES		SOIL SYMBOL		TEST BORING		ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		AUGER BORING		INFERRED SOIL BOUNDARY		CORE BORING		INFERRED ROCK LINE		MONITORING WELL		ALLUVIAL SOIL BOUNDARY		PIEZOMETER INSTALLATION				SLOPE INDICATOR INSTALLATION				CONE PENETROMETER TEST				SOUNDING ROD				TEST BORING WITH CORE				SPT N-VALUE	<p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>MEDIUM HARD CAN BE GROOVED OR GOUGED 0.25 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>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.</p> <p>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.</p>										<p style="text-align: center;">RECOMMENDATION SYMBOLS</p> <p> UNDERCUT</p> <p> UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p> UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p> SHALLOW UNDERCUT</p> <p> UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p> <p style="text-align: center;">ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL - CLAY</td> <td>MOD. - MODERATELY</td> <td>UW - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>DUW - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAG. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </table>										AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST	BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED	CL - CLAY	MOD. - MODERATELY	UW - UNIT WEIGHT	CPT - CONE PENETRATION TEST	NP - NON PLASTIC	DUW - DRY UNIT WEIGHT	CSE - COARSE	ORG. - ORGANIC		DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST		DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC		e - VOID RATIO	SD. - SAND, SANDY		F - FINE	SL. - SILT, SILTY		FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY		FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL		FRAG. - FRAGMENTS	w - MOISTURE CONTENT		HI. - HIGHLY	V - VERY	
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<p>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.</p>																																																																																																																																																																																																																																																																																																																	

09/08/99

TIP PROJECT: U-5798A

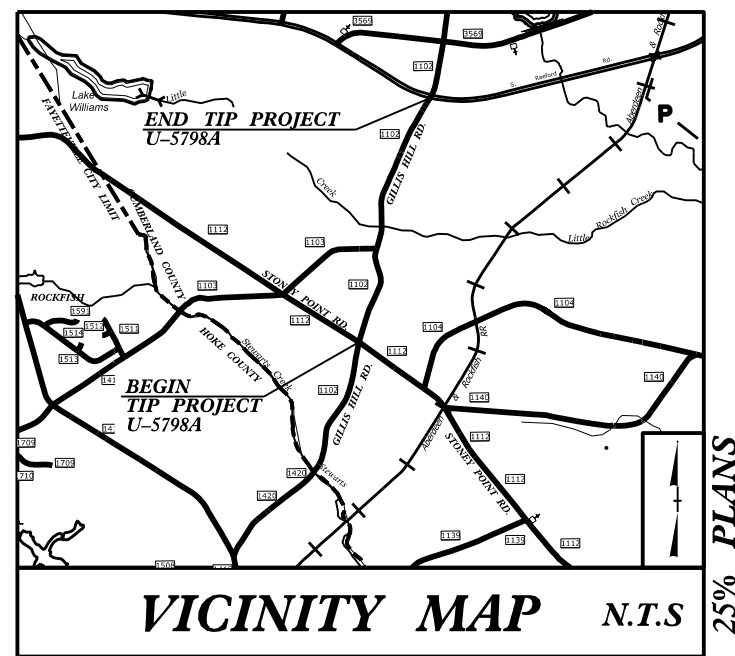
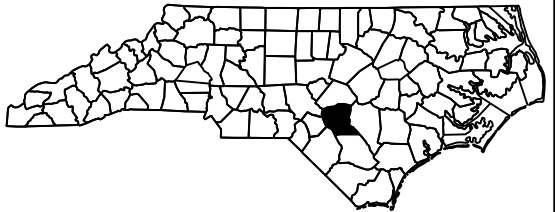
CONTRACT: 44369.1.2

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

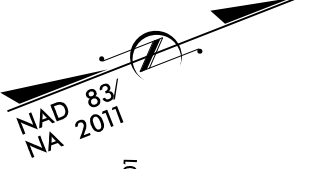
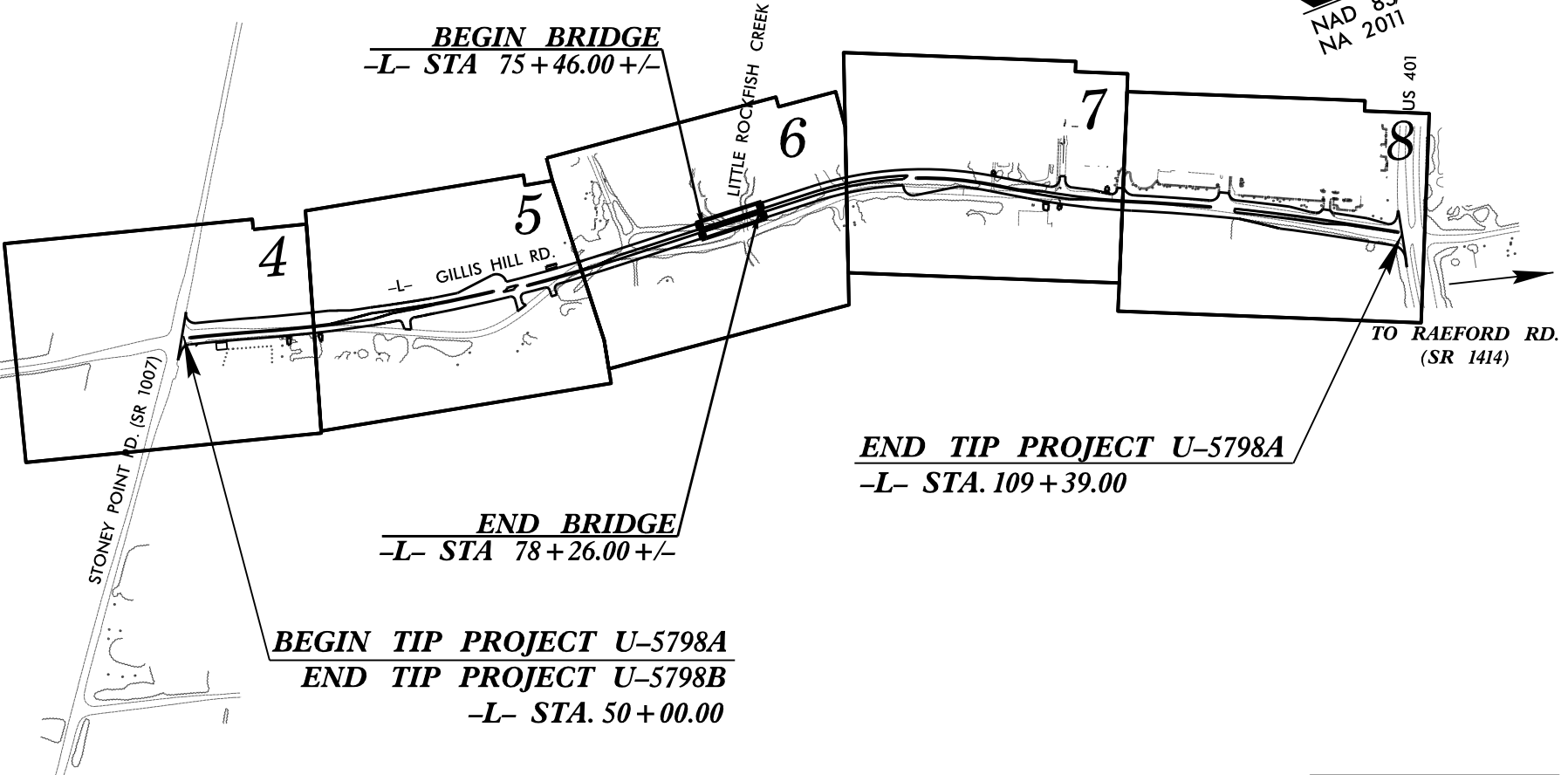
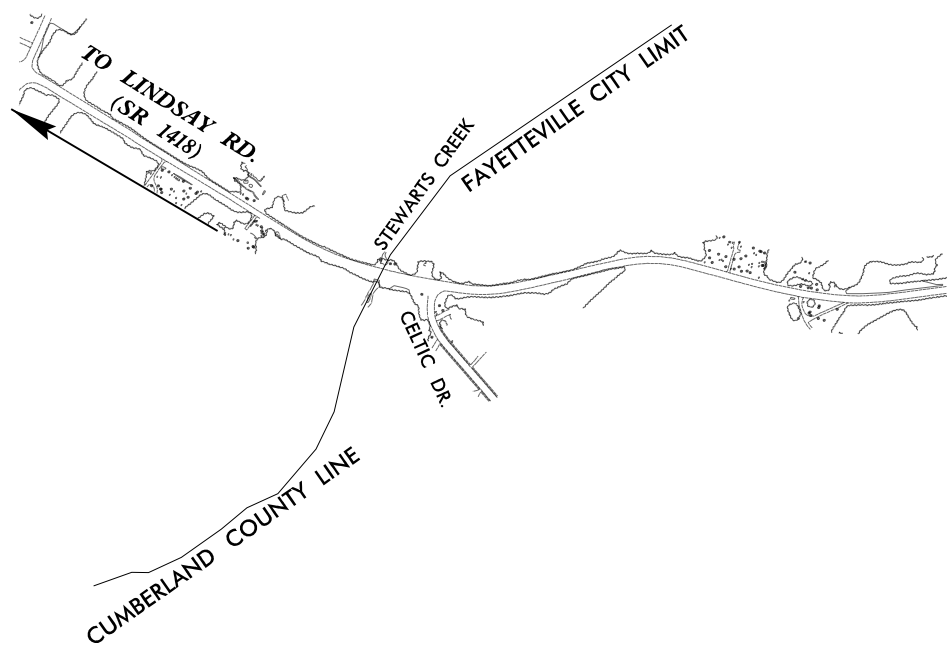
CUMBERLAND COUNTY

LOCATION: WIDEN SR 1102 (GILLIS HILL ROAD) TO MULTI-LANES FROM US 401 (RAEFORD ROAD) TO SR 1112 (STONEY POINT ROAD)
TYPE OF WORK: PAVING, GRADING, DRAINAGE, STRUCTURES, AND SIGNALS.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5798A	3	67
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
44369.1.2	N/A	PE	

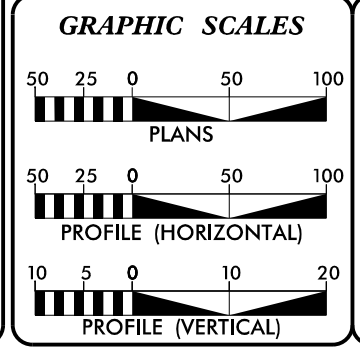


VICINITY MAP N.T.S. 25% PLANS



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF FAYETTEVILLE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2021	=	24,700
ADT 2041	=	30,400
K	=	8 %
D	=	60 %
T	=	3 % *
V	=	50 MPH
*(TTST=1 + DUAL=2)		
FUNC CLASS	=	MINOR COLLECTOR REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5798A	=	1.125 MILES
LENGTH STRUCTURE TIP PROJECT U-5798A	=	0.053 MILES
TOTAL LENGTH TIP PROJECT U-5798A	=	1.072 MILES

PREPARED IN THE OFFICE OF:

RS&H
8521 SIX FORKS ROAD, SUITE 400
RALEIGH, NC 27615
NC FIRM LICENSE No: F-0493

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 20, 2020

LETTING DATE:
MARCH 16, 2021

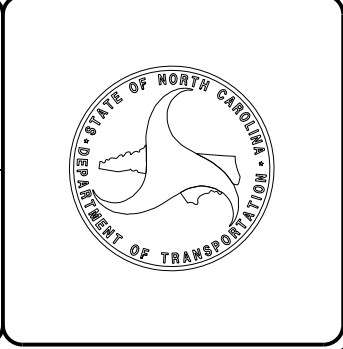
CHARLES YOUNG, PE PROJECT ENGINEER
ERIC BUSH, EI PROJECT DESIGN ENGINEER
NICOLE HACKLER, PE NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



Date: March 2020
 WBS Number: 44369.2.1
 TIP Number: U-5798A
 County: Cumberland
 Description: Widen SR 1102 (Gillis Hill Road) From US 401 (Raeford Road) to SR 1112 (Stoney Point Road)

Subject: Roadway Geotechnical Report - Inventory

Project Description

The project is located along SR 1102 (Gillis Hill Road) in Fayetteville, North Carolina. The total roadway length is approximately 1.125 miles. The project consists of realigning and widening the existing two-lane roadway to a multi-lane roadway. Additionally, two-span, dual bridge structures will be constructed between approximately Stations 74+46 -L- and 78+26 -L- at the crossing of Little Rockfish Creek. The project corridor is in a rural setting with residential houses, cultivated fields and a Walmart.

The initial geotechnical subsurface investigation was performed by S&ME, Inc. in May and June of 2019 for an anticipated Design-Build Let. The roadway was investigated with five (5) hand auger borings and thirteen (13) standard penetration test (SPT) borings. The new bridge structure was also investigated at this time with seven (7) SPT borings. Only the four end bent borings for the bridge are included in the roadway report. The hand auger borings were advanced to depths of 9.5 to 10 feet beneath the ground surface. The SPT borings were advanced using a D-50 Diedrich track mounted rotary drill rig equipped with a recently calibrated automatic hammer. The SPT borings were advanced with mud-rotary and hollow stem auger drilling techniques to depths of 9.3 to 74.8 feet beneath the ground surface. A supplemental subsurface investigation was performed by Terracon in November 2019. This additional subsurface investigation consisted of nineteen (19) hand auger borings advanced to depths of 5 to 10 feet beneath the ground surface. Representative soil samples were collected in the field during both investigations for visual classification and selected samples were submitted for laboratory analysis by S&ME's and Terracon's soil testing laboratory. Laboratory testing was performed in accordance with the AASHTO Soil Classification System.

The following alignment was investigated by soil testing and visual reconnaissance:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	50+00 to 109+39

Physiography and Geology

The site is located within the Coastal Plain Physiographic and Geologic Province of North Carolina in Cumberland County. The Coastal Plain Province is characterized by subdued topographic features. The existing elevations along the investigated corridor range from approximately 225 feet at the north and south ends of the project to approximately 144 feet adjacent to Little Rockfish Creek. In general, the topography at this site is generally flat and gently sloping except for about 20 to 25 feet of relief at the south approach to the bridge.

The Inner Coastal Plain Physiographic Province consists of a wedge of unconsolidated sands, silt, marl, and other clays interbedded with occasional limestone strata, which rests atop crystalline basement rocks.

Based on previous mapping (N.C. Geologic Map 1985) and our knowledge of the local geology, the site falls within the Middendorf Formation of Tertiary age overlying the Cape Fear Formation of Cretaceous age. The Middendorf Formation consists of beds of sands and clays of alluvial origin. The lithology of the materials and mica content indicates that these sediments are derived from weathered crystalline granitic and metamorphosed gneiss rocks of the Piedmont. The sands consist of angular grains that are fine to coarse in texture and the clays are arenaceous. Iron-cemented concretions are common. Cross-bedding is common, and beds are laterally discontinuous.

The deeper borings performed at the proposed bridge structure were terminated in the Cape Fear Formation. The Cape Fear Formation consists of alternating beds of indurated sandstone and mudstone that are generally laterally continuous with some faint cross-bedding. Fine grained to pebble sized quartz are scattered though out the mudstone which grades to a silty clayey soil. Feldspar and mica are also common

Soil Properties

Soils encountered during this investigation are separated into four categories based on their origin. The soils encountered consist of roadway embankment fill, artificial fill, alluvial deposits and Coastal Plain formational soils.

Roadway embankment soils were encountered at the following approximate locations:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	75+90 to 76+90 RT
-L-	77+75 to 79+30 RT
-L-	106+40 to 109+39

The roadway embankment soils encountered appear to be derived from the on-site soils along the -L- alignment. Roadway embankment fill was encountered up to a maximum depth of about 5 to 6 feet at the existing bridge approaches. The roadway embankment soils consist of loose, moist, silty with trace of gravel (A-2-4). These soils appeared to be non-plastic and no laboratory testing was performed on them.

Artificial fill soils were encountered at the following approximate location:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	67+65 to 68+60

Artificial fill soils, associated with an access road, were encountered to a depth of about 2 feet adjacent to Gillis Hill Road. The artificial fill soils consist of loose, wet, silty fine sand with little gravel (A-2-4). These soils appeared to be non-plastic and no laboratory testing was performed on them.



Alluvial soils were encountered at the following approximate location:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	75+55 to 80+05

Alluvial deposits are present adjacent to Little Rockfish Creek at the proposed bridge crossing beneath the roadway embankment and at the surface on both sides of the adjacent roadway embankment. The alluvial soils along the -L- alignment consist of very loose to loose, wet to saturated, relatively clean to silty and clayey fine sands (A-3, A-2-4, A-2-6) with trace of organics and very soft, wet, fine sandy to silty clays (A-6, A-7-6) with trace of organic matter. The clay soils appear to be moderately to highly plastic.

The Middendorf Formation soils are present at the surface along the shoulders and beneath the roadway embankment and alluvial soils. The Middendorf soils can be generalized as alternating layers of sand and clay. The Middendorf soils along the alignment, generally consist of very loose to very dense, moist to saturated, silty and clayey fine to coarse sand (A-1-b, A-3, A-2-4, A-2-6 and A-2-7) with trace of gravel. Some of the clayey sands were moderately to highly plastic and exhibited plasticity indices of 16 to 26 percent with 20 to 35 percent passing the #200 sieve. The cohesive soils consist of soft to very stiff, moist to wet, slightly plastic fine sandy silt (A-4), slightly to moderately plastic fine sandy clay (A-6) and moderately to highly plastic silty clay (A-7-6). These cohesive soils were encountered at or near the existing ground surface on a majority of the project. The plasticity indices of the clayey soils range from 11 to 43 percent with 36 to 91 percent passing the #200 sieve and natural moisture contents of 12 to 29 percent based on laboratory testing.

Groundwater

In general, groundwater and surface water run off along the project drains towards Little Rockfish Creek which flows southeast and empties into the Cape Fear River. Groundwater was encountered during drilling and sampling along the alignment investigated at depths as shallow as 1 to 2 feet adjacent to Little Rockfish Creek to greater than 20 feet beneath the ground surface. Groundwater where encountered, was typically 4 to 9 feet beneath the existing ground surface.

The depth of groundwater, beneath the ground surface, will fluctuate with seasonal precipitation and may occur at higher levels at other times of the year above less permeable clayey soils.

Areas of Special Geotechnical Interest

- 1) Plastic Soils - Moderately to highly plastic soils with plastic indices (PI) of 16 and greater were encountered at the following locations:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	50+00 to 69+50
-L-	75+25 to 81+75
-L-	86+25 to 87+75
-L-	92+25 to 96+75
-L-	101+25 to 105+75

A discussion of these plastic soils is located above in the section titled "Soil Properties".

- 2) Alluvial Soils - Relatively Recent flood plain deposits typically consisting of very soft clays and silts and very loose to loose sands which have the potential to cause embankment stability/settlement problems occur through the following sections:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	75+55 to 80+05

A discussion of these alluvial soils is located above in the section titled "Soil Properties".

- 3) Groundwater - The following intervals were found to exhibit a high-water table, seasonal high ground water or the potential for ground water related construction problems:

<u>Alignment</u>	<u>Stations (±)</u>
-L-	75+55 to 80+05

PROJECT REFERENCE NO.	SHEET NO.
U-5798A	3C

Closing

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service. Please contact us at your convenience.

BULK SAMPLES

No bulk samples were collected.

UNDISTRUBED SAMPLES

“Shelby” tube samples were taken at the following location.

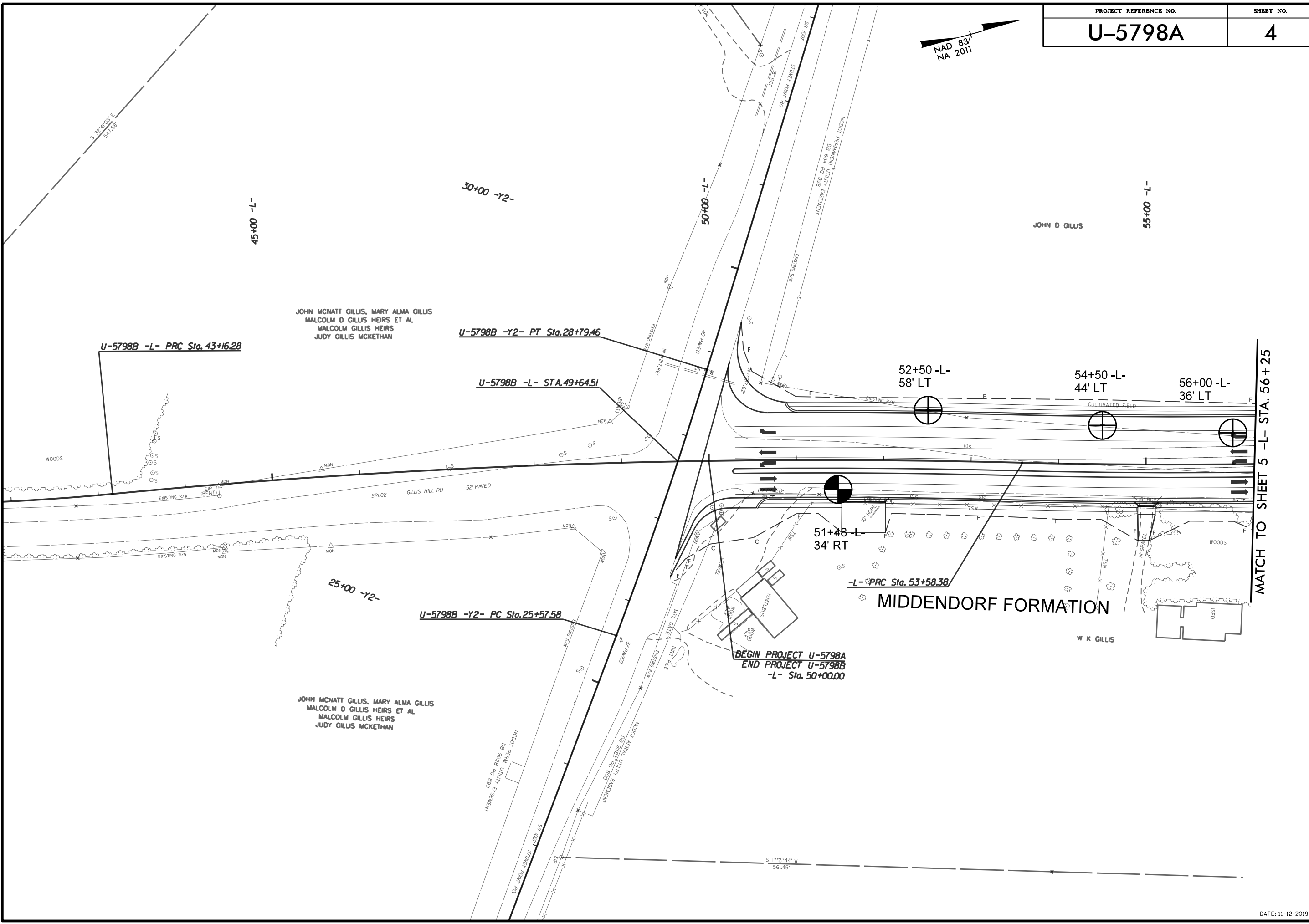
<u>Sample No.</u>	<u>Location</u>	<u>Depth (ft.)</u>	<u>Test</u>
ST-2	78+46 -L- 13' RT	16.0-18.0	Consolidation/Triaxial

Sincerely,
Terracon Consultants, Inc.



Abner F. Riggs, Jr., PE
Senior Geotechnical Engineer
N.C. Registration No. 14155

ANDREW NASH
Andrew A. Nash, PE
Geotechnical Department Manager
N.C Registration No. 31022



JOHN MCNATT GILLIS, MARY ALMA GILLIS
MALCOLM D GILLIS HEIRS ET AL
MALCOLM GILLIS HEIRS
JUDY GILLIS MCKETHAN

JOHN D GILLIS

U-5798B -L- PRC Sta. 43+16.28

U-5798B -Y2- PT Sta. 28+79.46

U-5798B -L- STA. 49+64.51

52+50 -L-
58' LT

54+50 -L-
44' LT

56+00 -L-
36' LT

WOODS

EXISTING R/W
(BENT)

GILLIS HILL RD
52' PAVED

25+00 -Y2-

U-5798B -Y2- PC Sta. 25+57.58

51+48 -L-
34' RT

-L- PRC Sta. 53+58.38

MIDDENDORF FORMATION

W K GILLIS

BEGIN PROJECT U-5798A
END PROJECT U-5798B
-L- Sta. 50+00.00

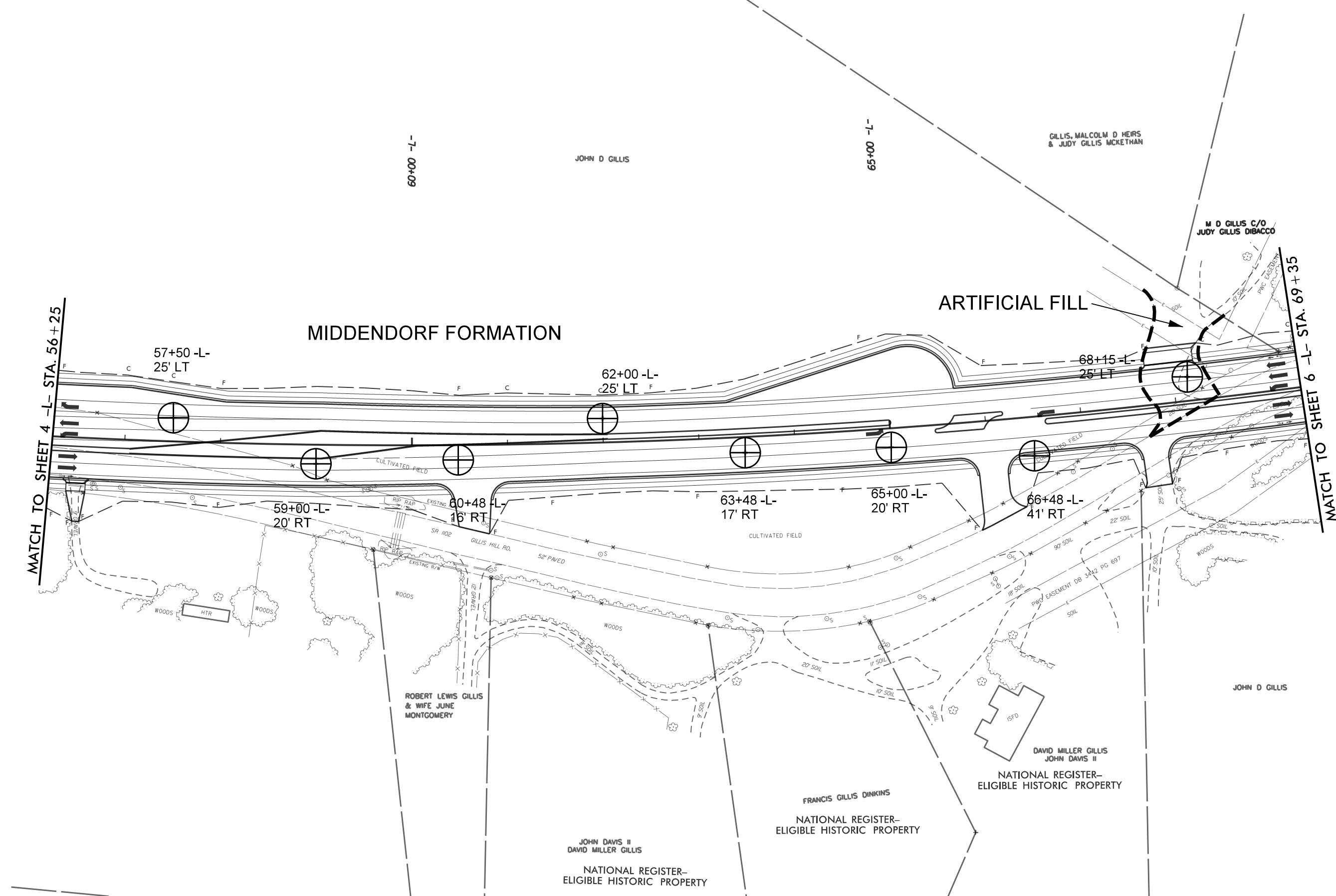
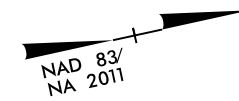
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MALCOLM D GILLIS HEIRS ET AL
MALCOLM GILLIS HEIRS
JUDY GILLIS MCKETHAN

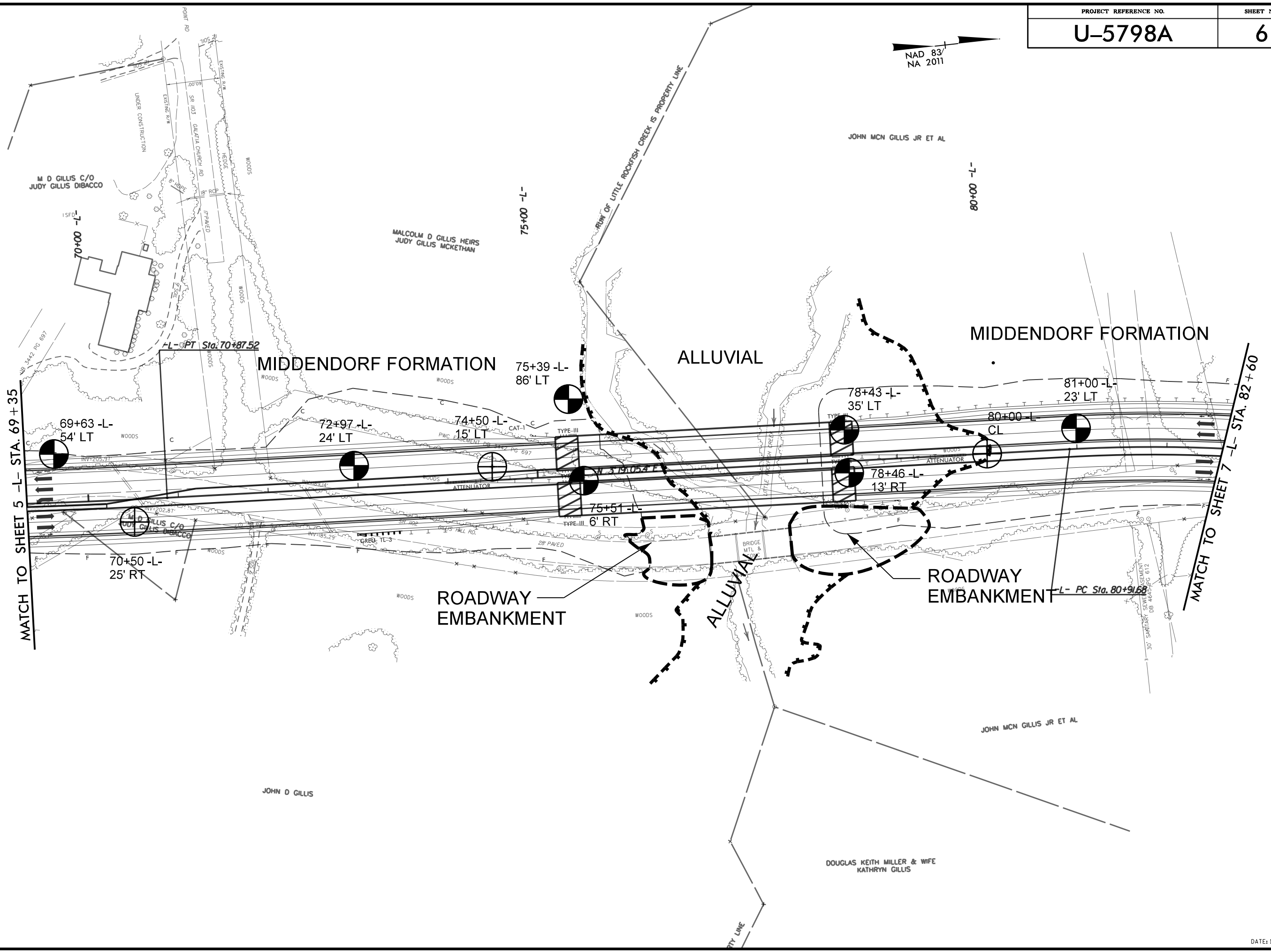
NCDOT PERMANENT UTILITY EASEMENT
DB 9928 PC 893

NCDOT PERMANENT UTILITY EASEMENT
DB 9928 PC 893

S 17°21'44" W
561.45'

MATCH TO SHEET 5 -L- STA. 56+25





MATCH TO SHEET 5 -L- STA. 69+35

MATCH TO SHEET 7 -L- STA. 82+60

MIDDENDORF FORMATION

ALLUVIAL

MIDDENDORF FORMATION

ROADWAY EMBANKMENT

ROADWAY EMBANKMENT

ALLUVIAL

M D GILLIS C/O JUDY GILLIS DIBACCO

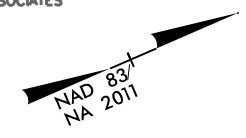
MALCOLM D GILLIS HEIRS JUDY GILLIS MCKETHAN

JOHN MCN GILLIS JR ET AL

JOHN D GILLIS

DOUGLAS KEITH MILLER & WIFE KATHRYN GILLIS

WEST FAYETTEVILLE PLACE ASSOCIATES
LIMITED PARTNERSHIP



JOHN MCN GILLIS JR ET AL

JOHN MCN GILLIS JR ET AL

GILBERT LINDSAY & WIFE LAURA

LEWIS LINDSEY & WIFE LAURIE

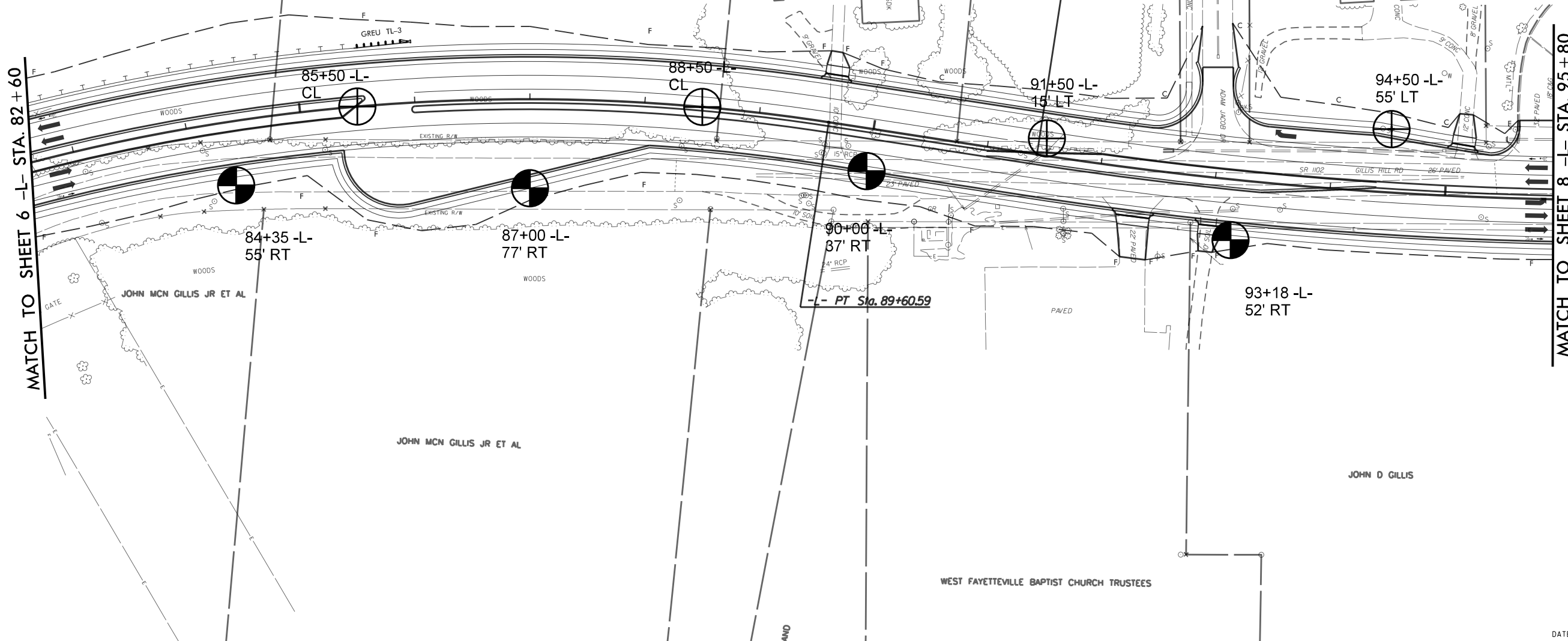
GT RECREATION

MIDDENDORF FORMATION

-L- PC Sta. 91+43.64

MATCH TO SHEET 6 -L- STA. 82 + 60

MATCH TO SHEET 8 -L- STA. 95 + 80



85+00 -L-

90+00 -L-

95+00 -L-

85+50 -L-
CL

88+50 -L-
CL

91+50 -L-
15' LT

94+50 -L-
55' LT

84+35 -L-
55' RT

87+00 -L-
77' RT

90+00 -L-
37' RT

93+18 -L-
52' RT

-L- PT Sta. 89+60.59

WAL-MART REAL ESTATE BUSINESS TRUST (#3595)

NAD 83
NA 2011

MICHAEL LYNN HELMS

NATIONAL RETAIL PROPERTIES LP

W H CAPITAL LLC

CUMBERLAND COUNTY ABC BOARD

-L- PT Sta. 106+12.50

END PROJECT U-5798A
-L- Sta. 109+39.00

MATCH TO SHEET 7 -L- STA. 95+80

-L- PRC Sta. 96+37.54

96+15 -L-
39' RT

97+50 -L-
30' RT

99+00 -L-
4' RT

100+50 -L-
20' RT

102+14 -L-
31' LT

103+50 -L-
45' RT

105+14 -L-
55' RT

107+00 -L-
50' RT

108+14 -L-
58' RT

109+00 -L-
64' RT

PAVED

PAVED

PAVED

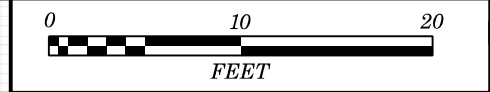
MIDDENDORF FORMATION

ROADWAY EMANKMENT

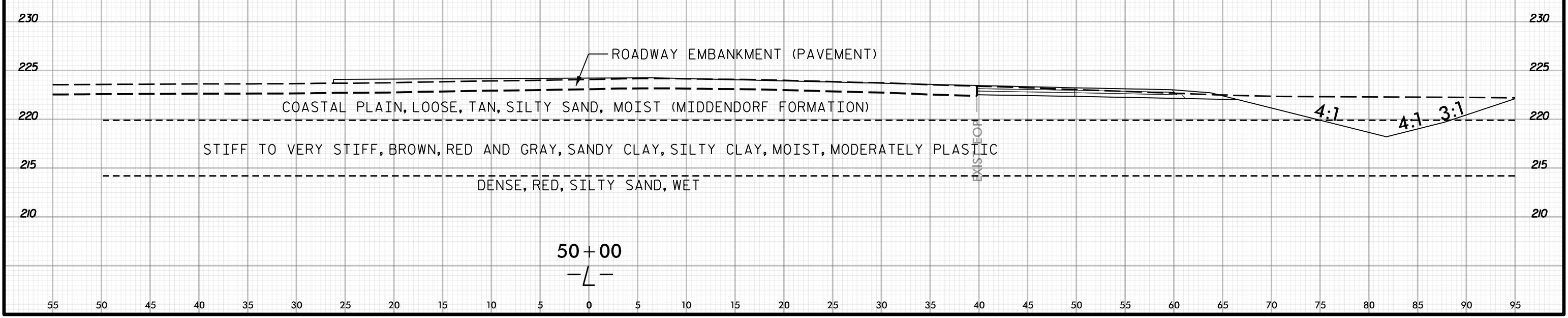
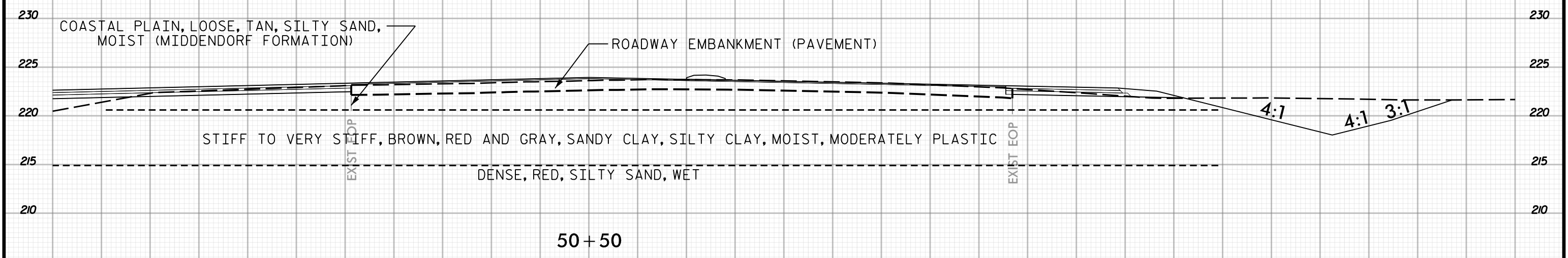
BARKER PARTNERS LLC

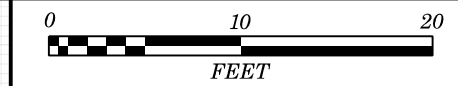
BARKER PARTNERS LLC

JOHN D GILLIS

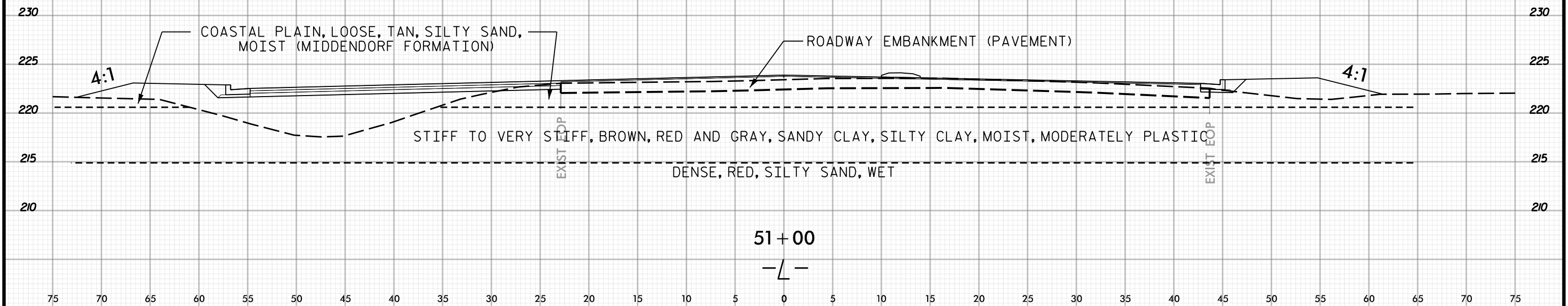
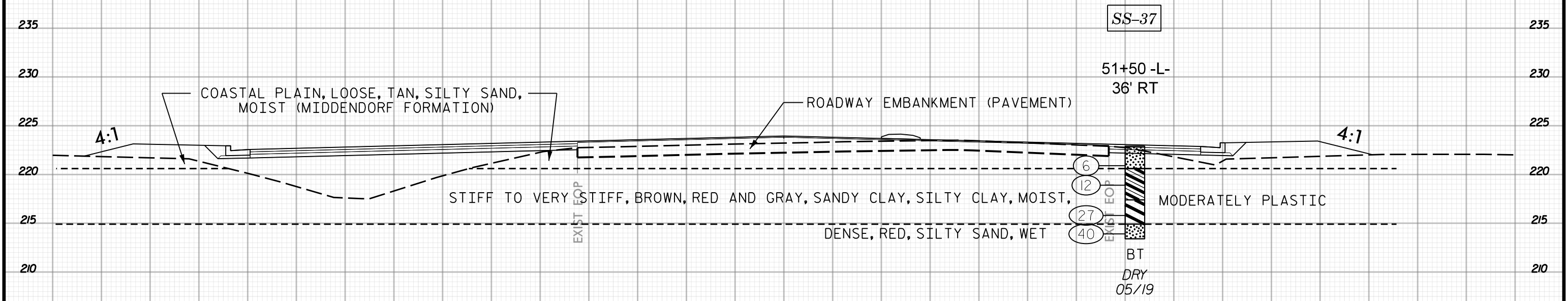


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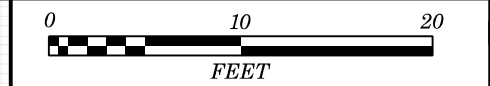




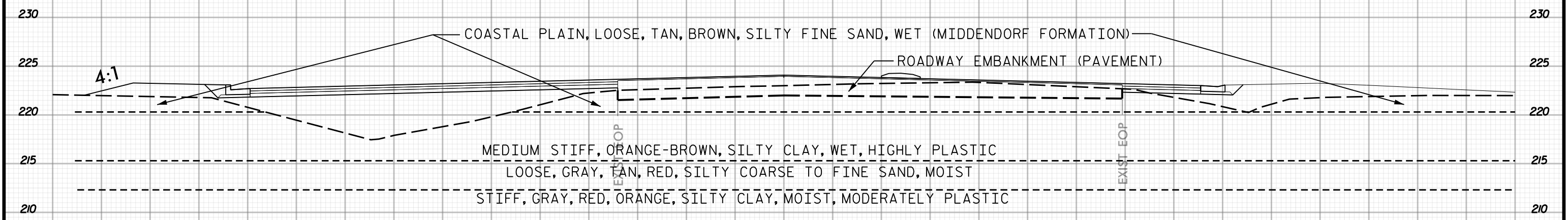
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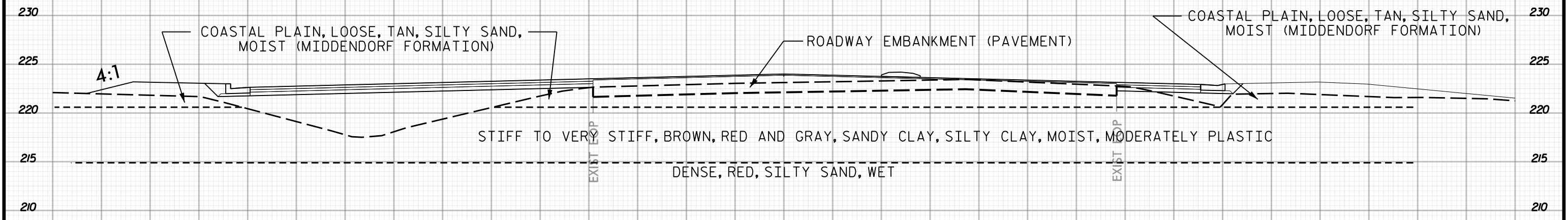
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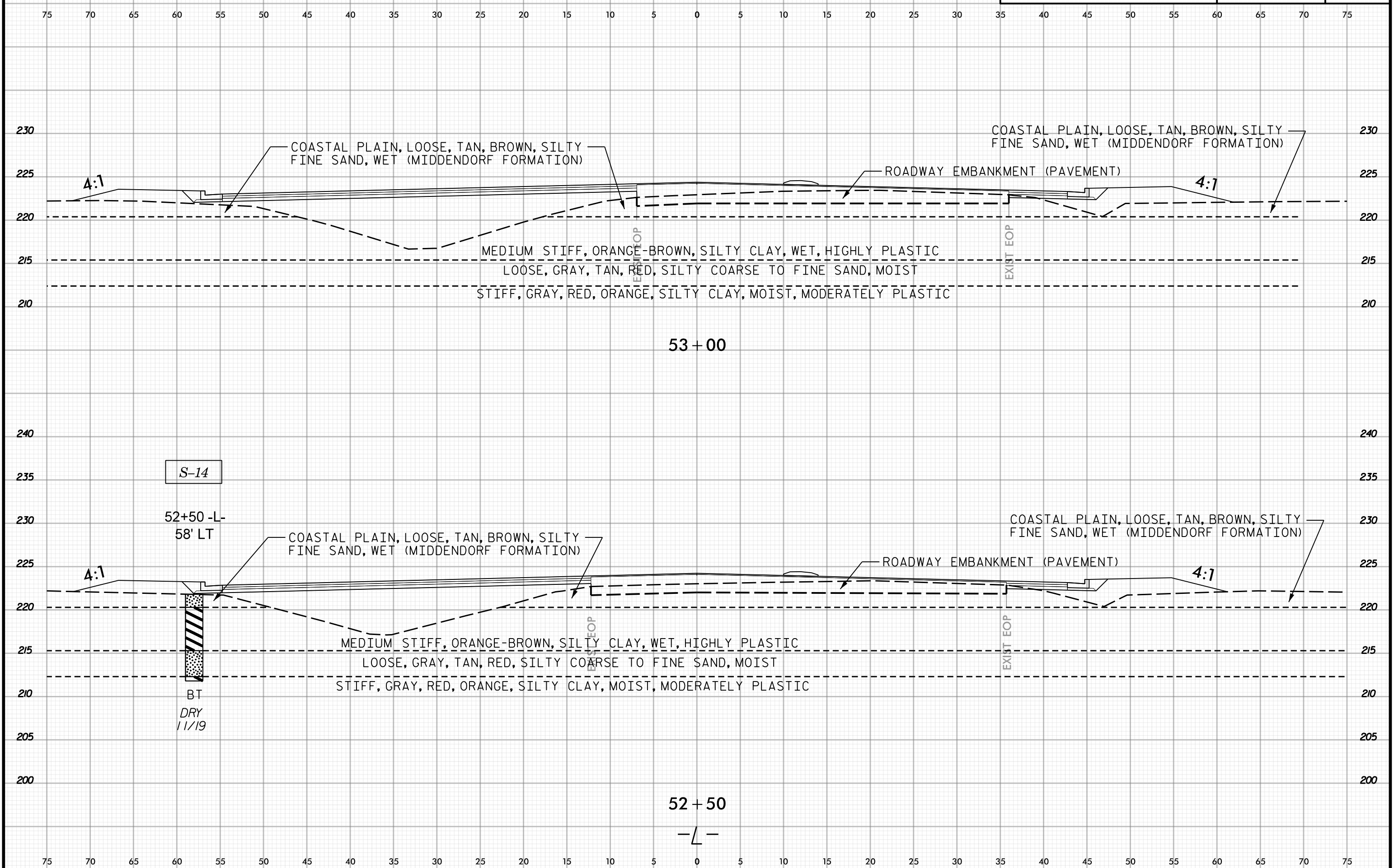
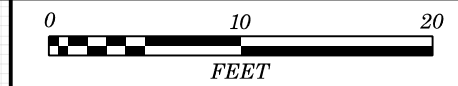


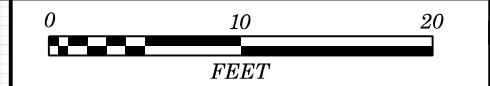
52 + 00



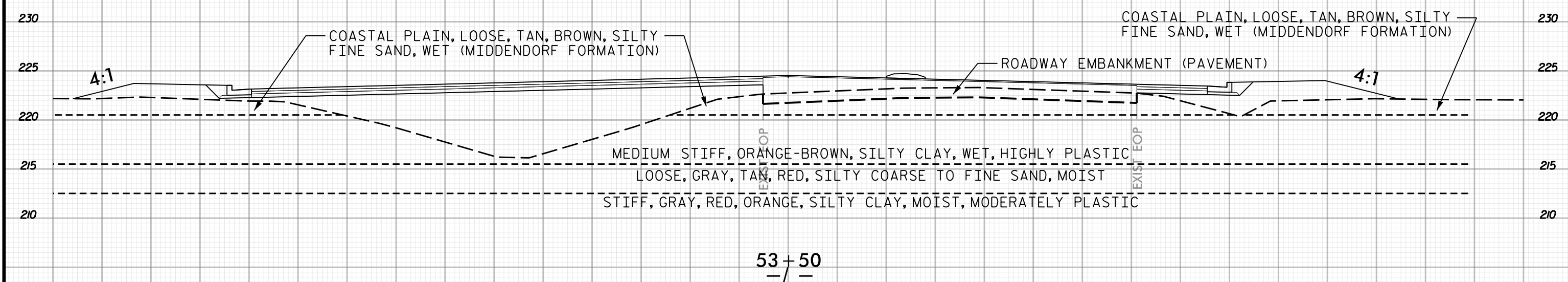
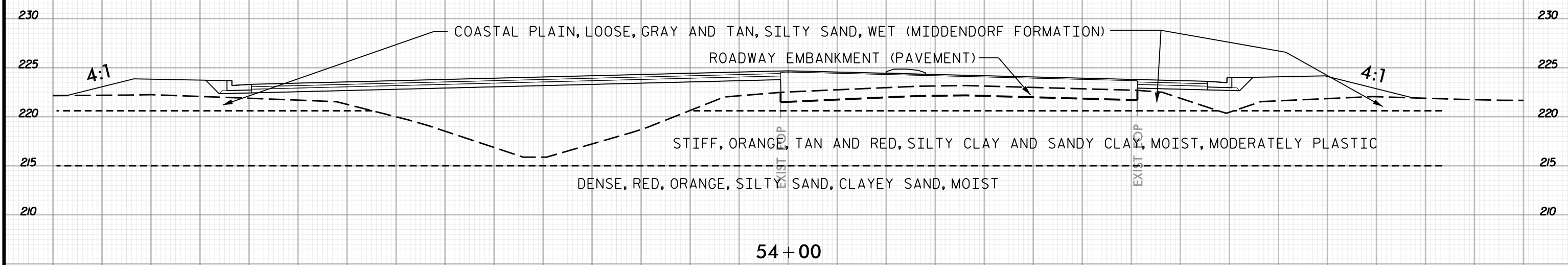
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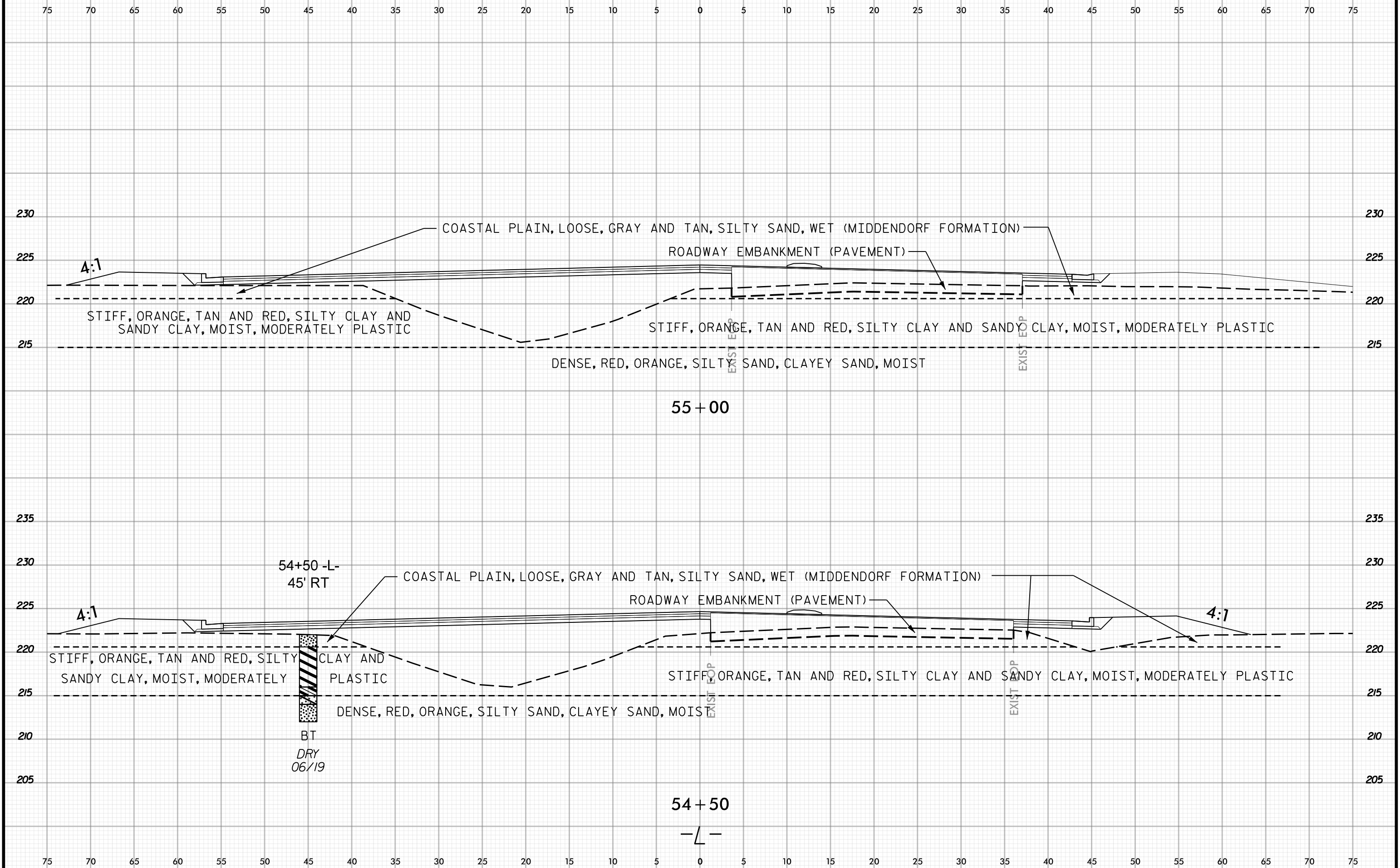
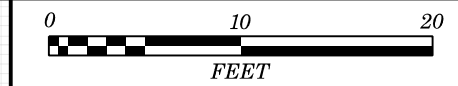


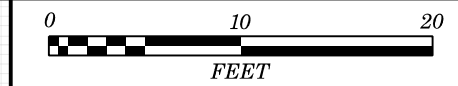


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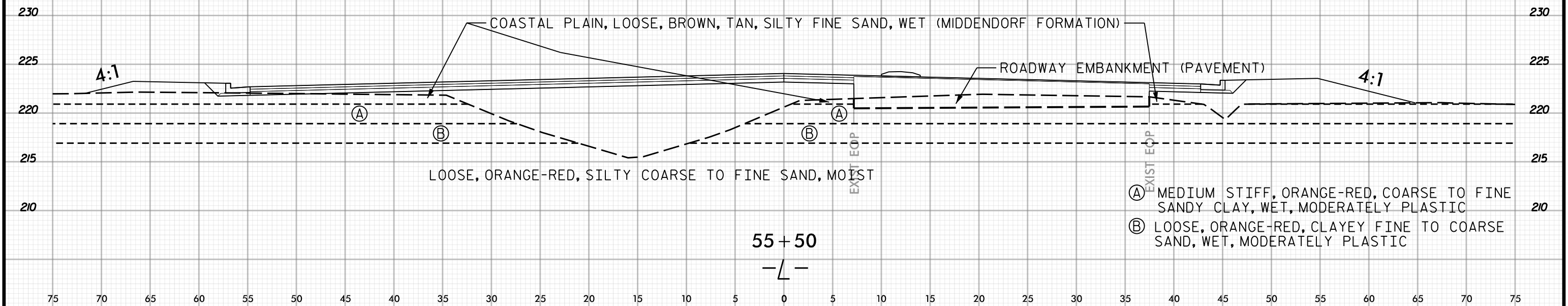
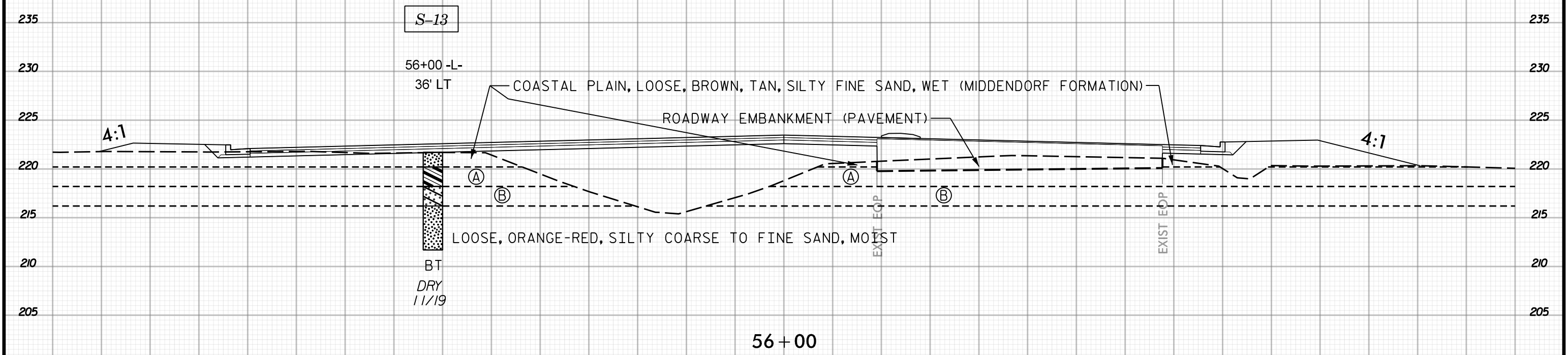


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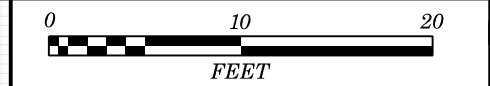




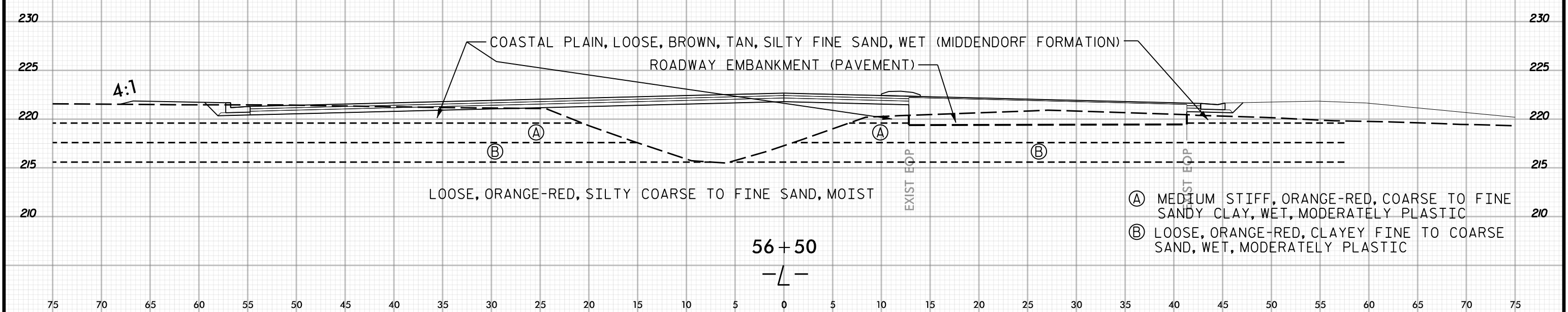
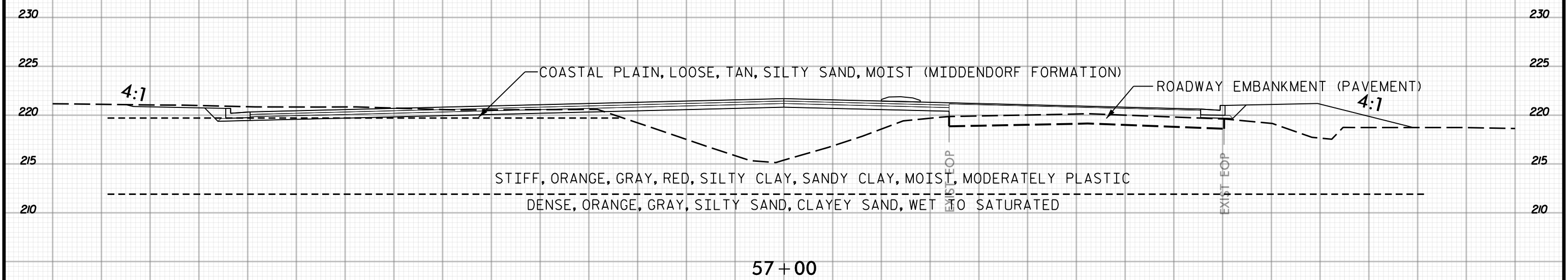
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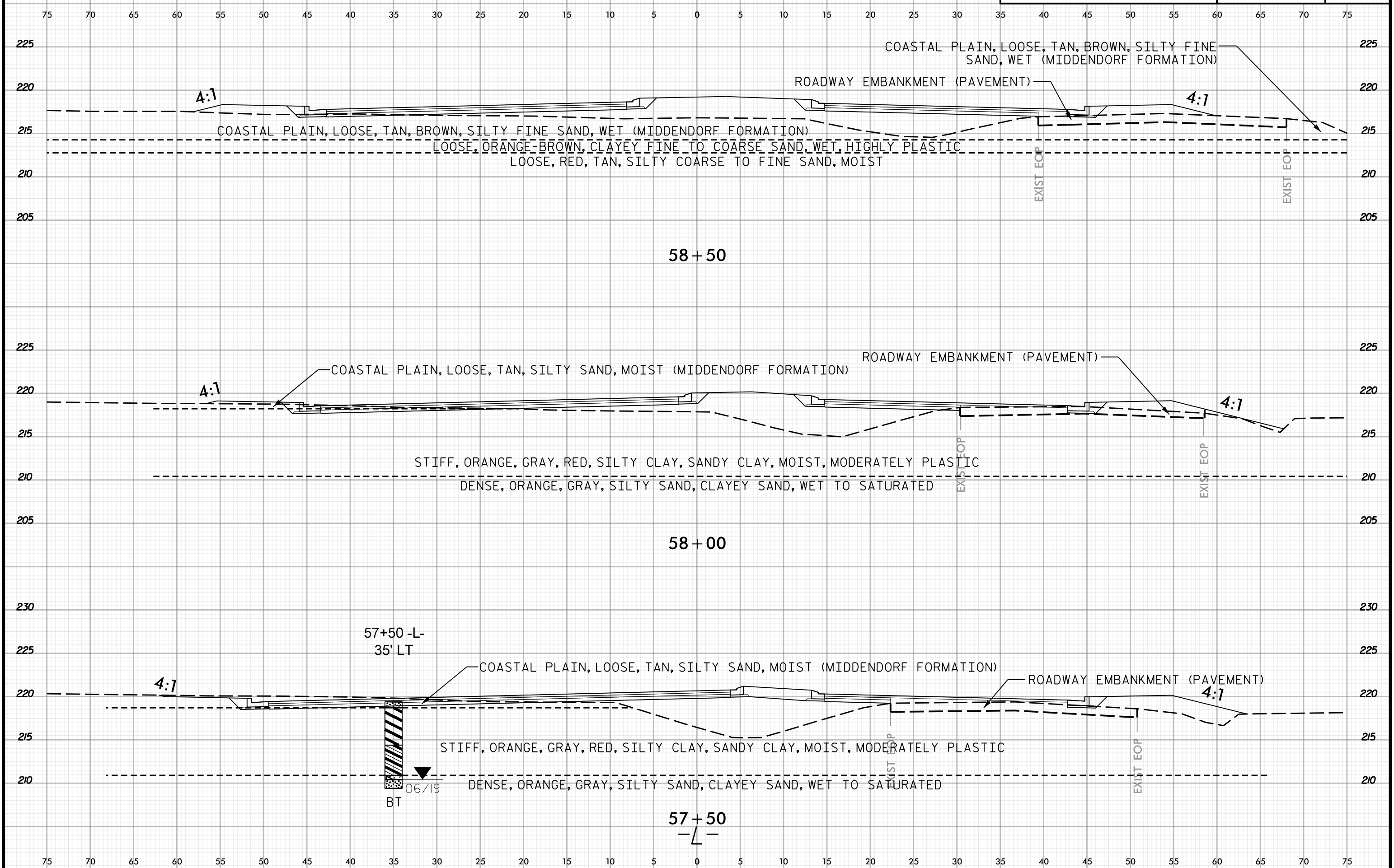
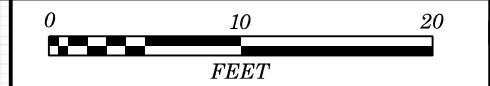
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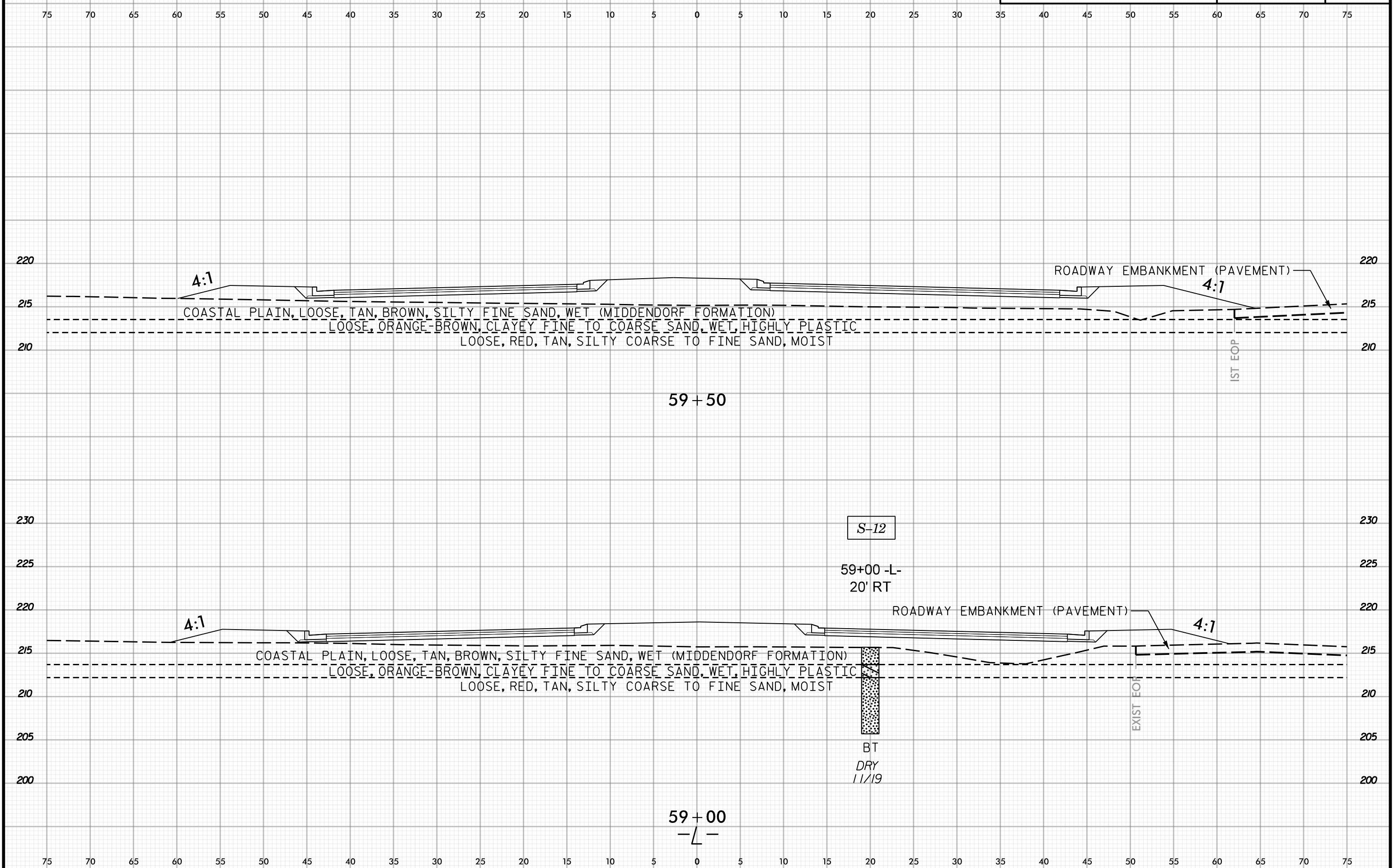
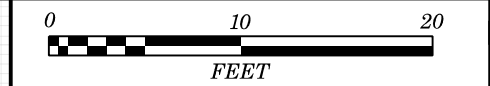


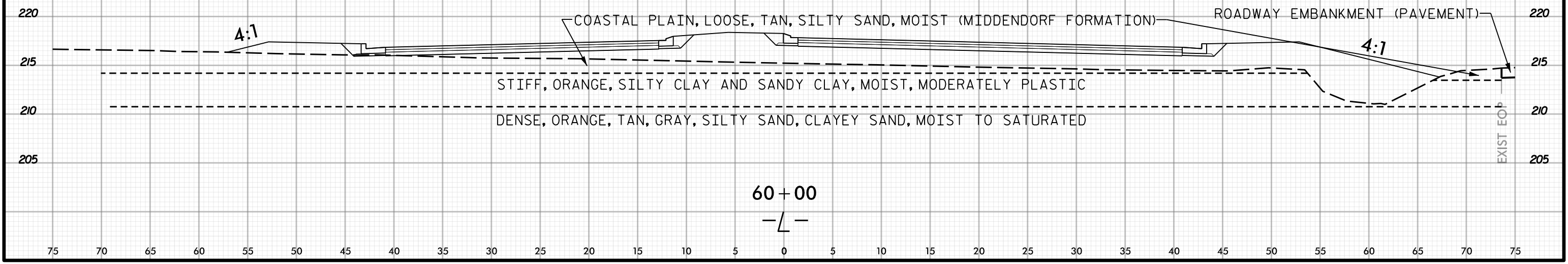
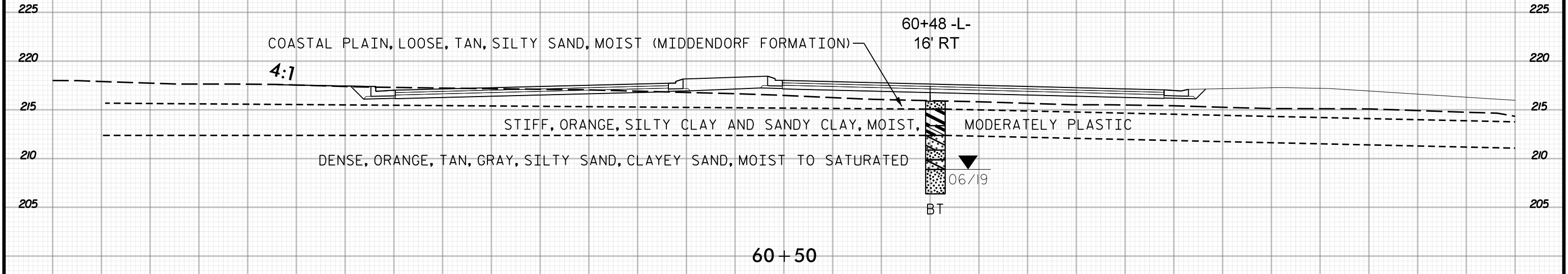
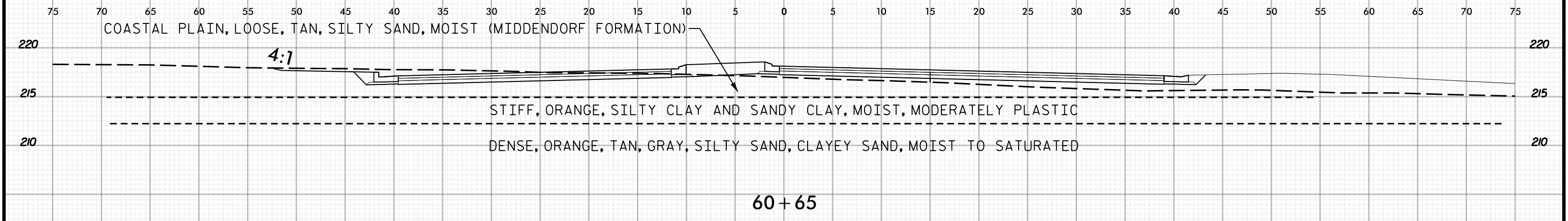
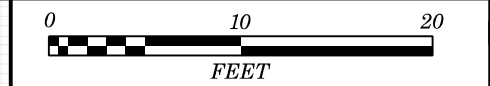
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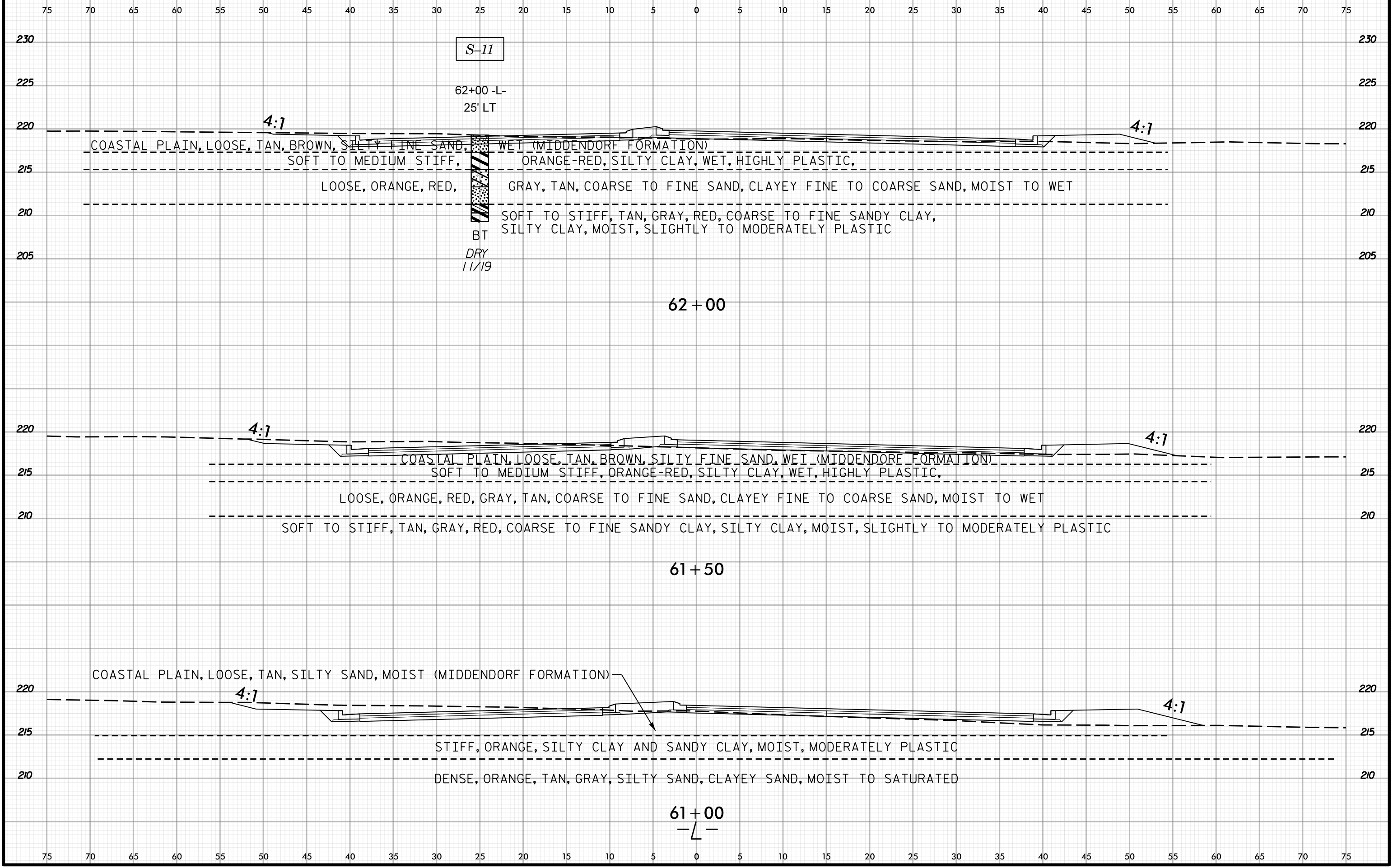
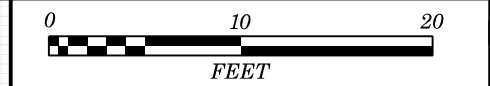


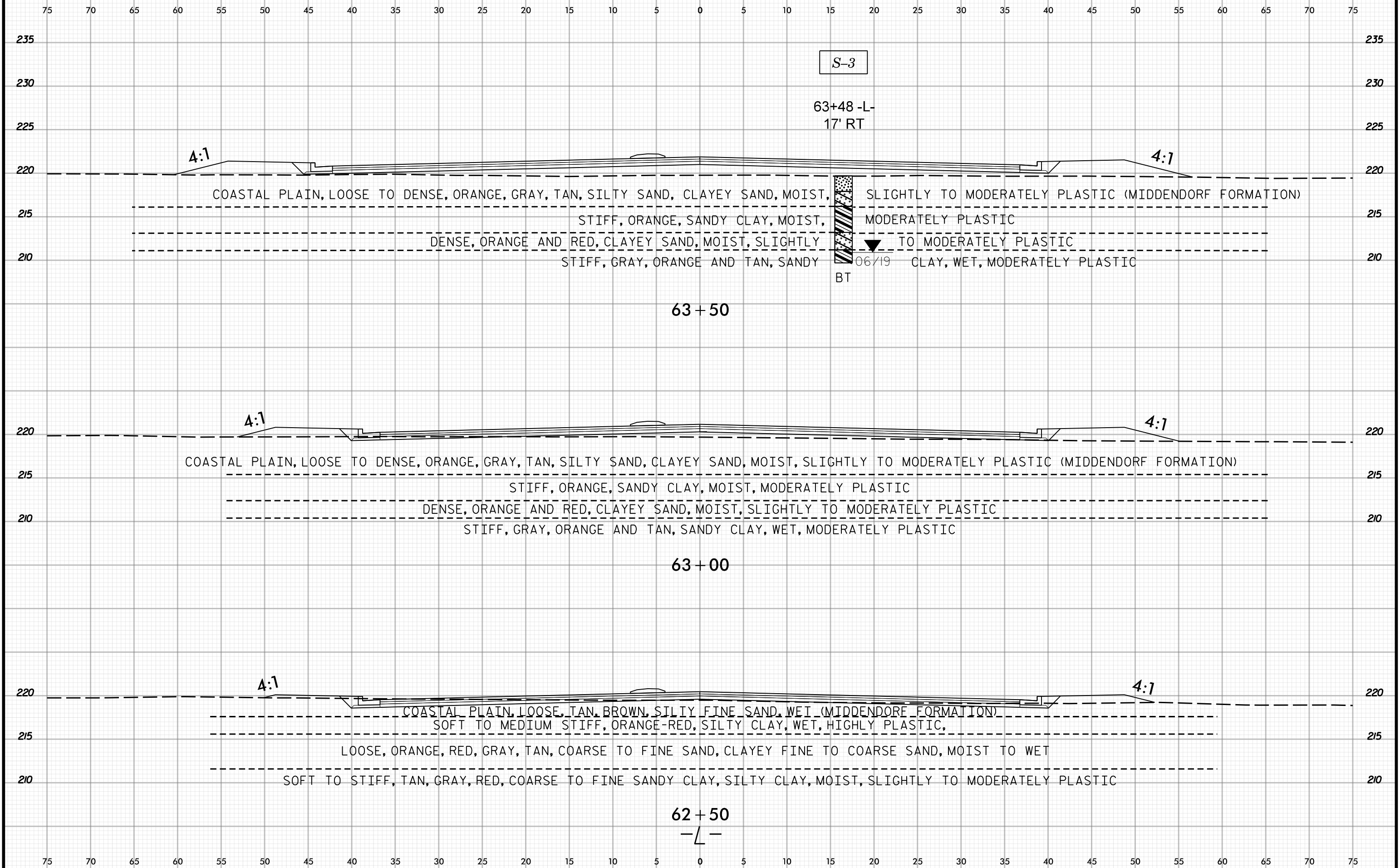
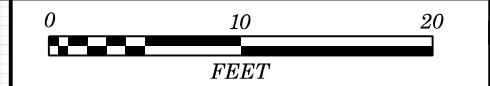
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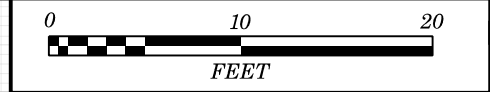




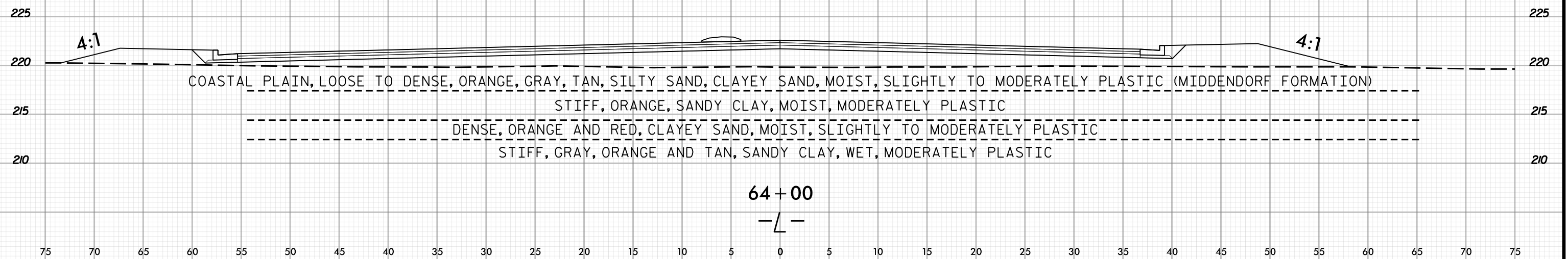


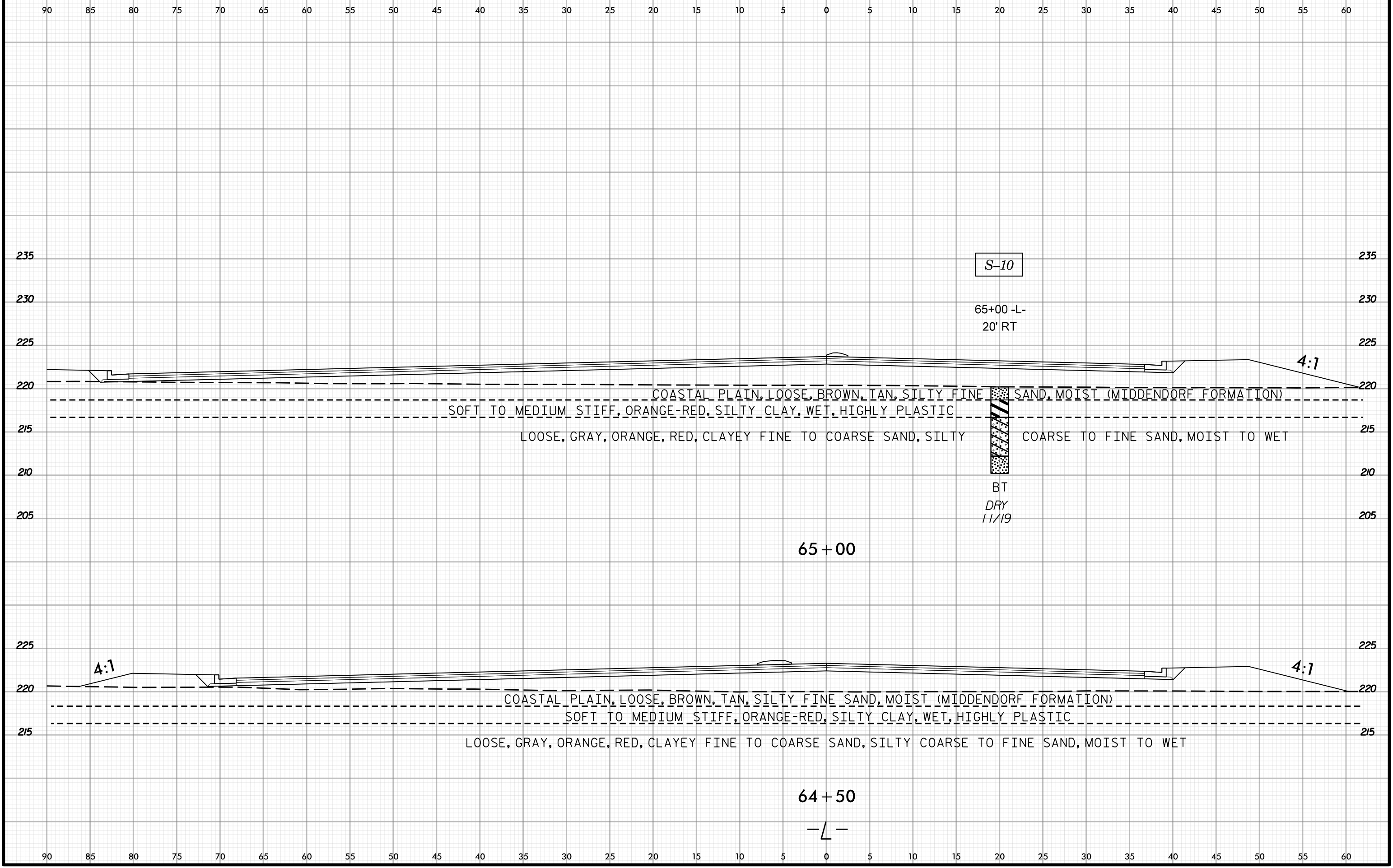
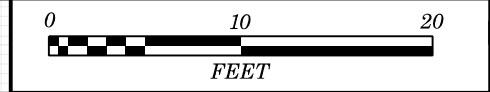


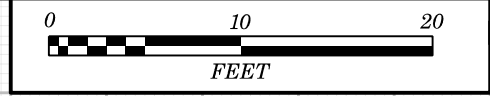




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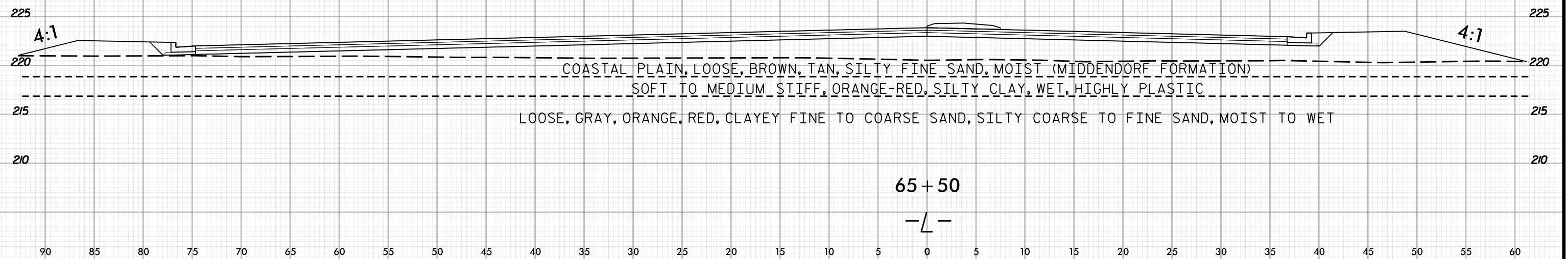


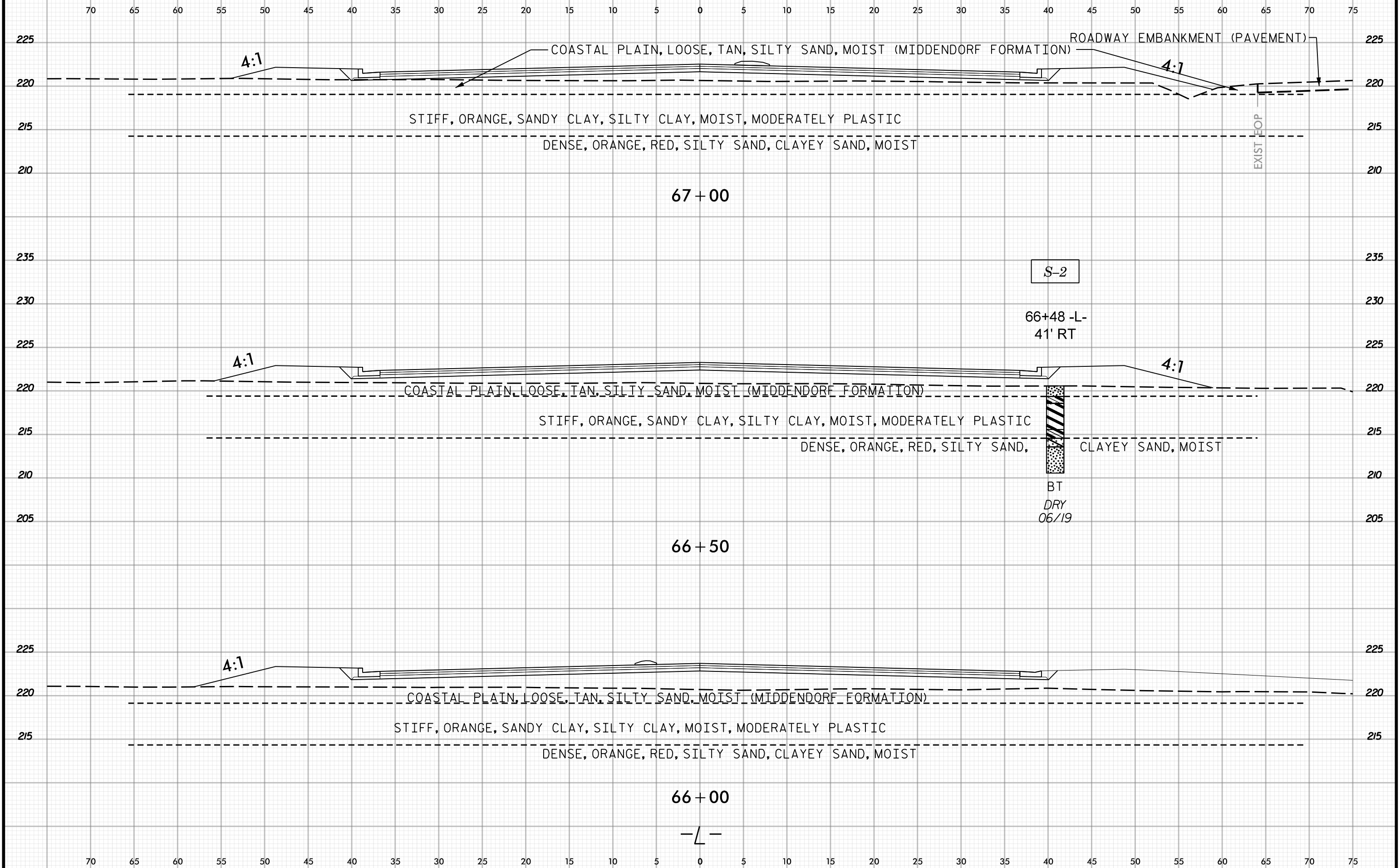
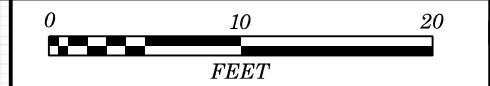


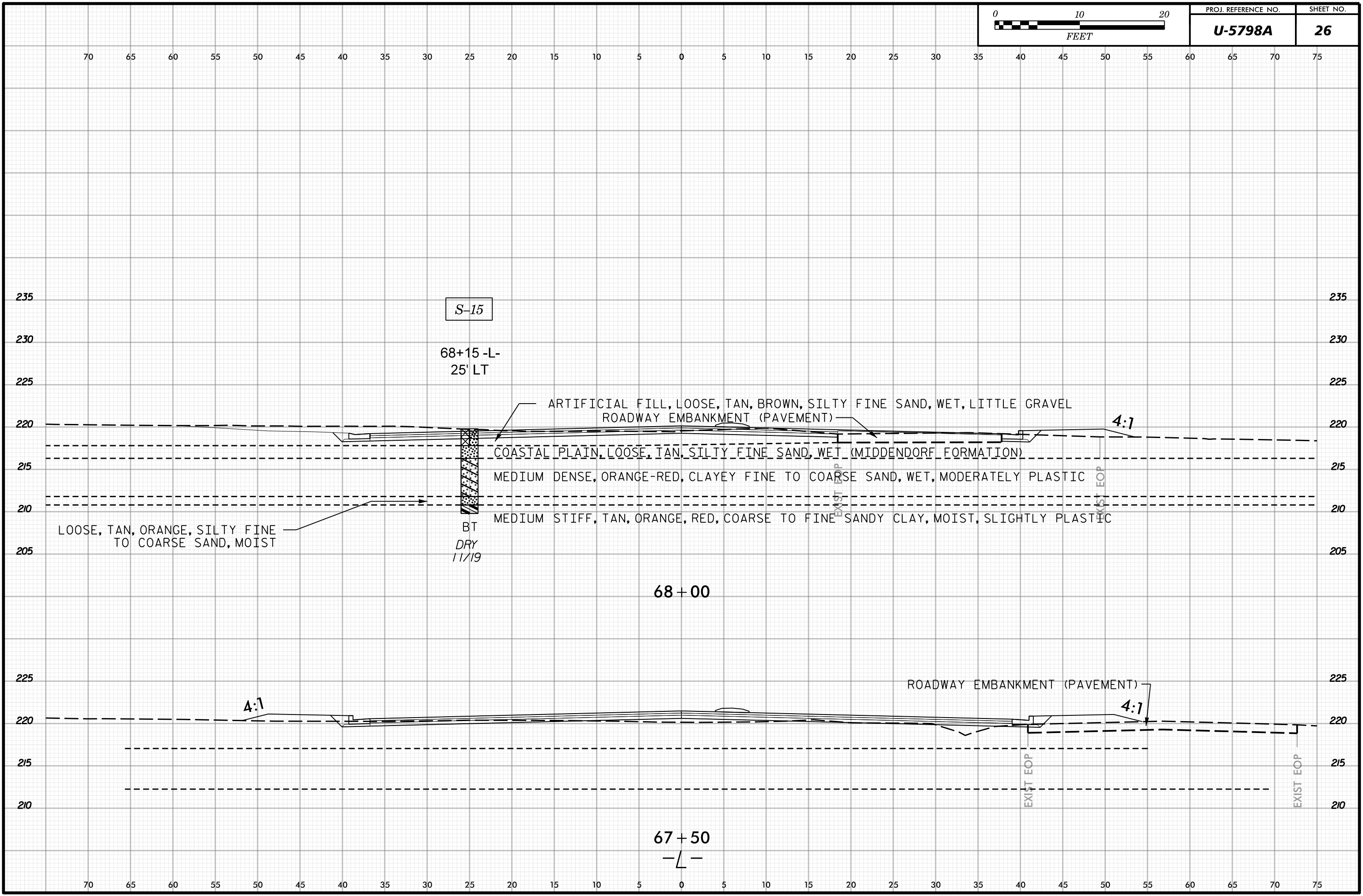
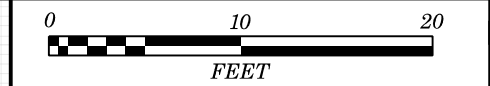


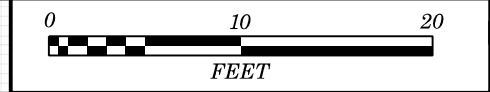
PROJ. REFERENCE NO.	SHEET NO.
U-5798A	24

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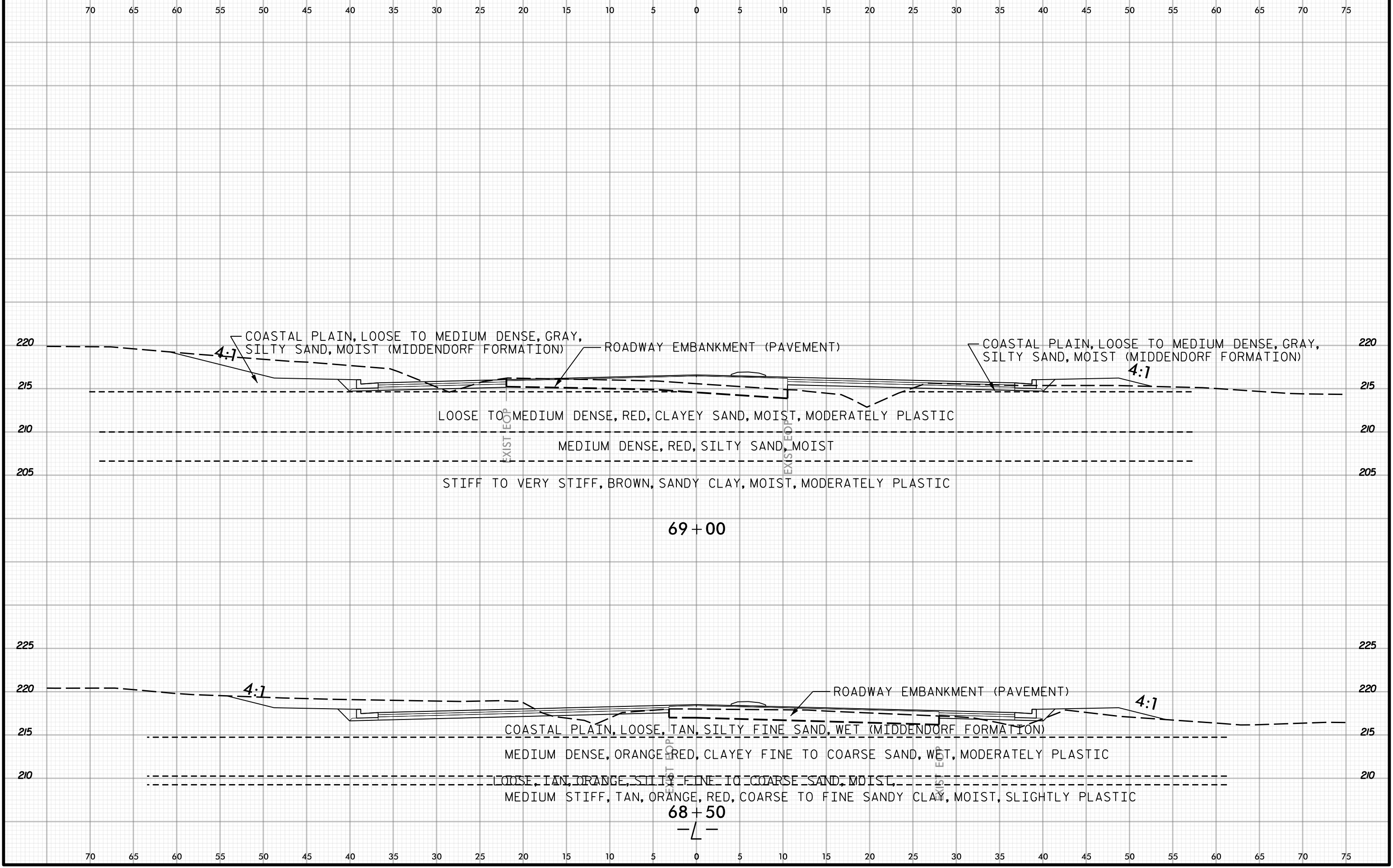


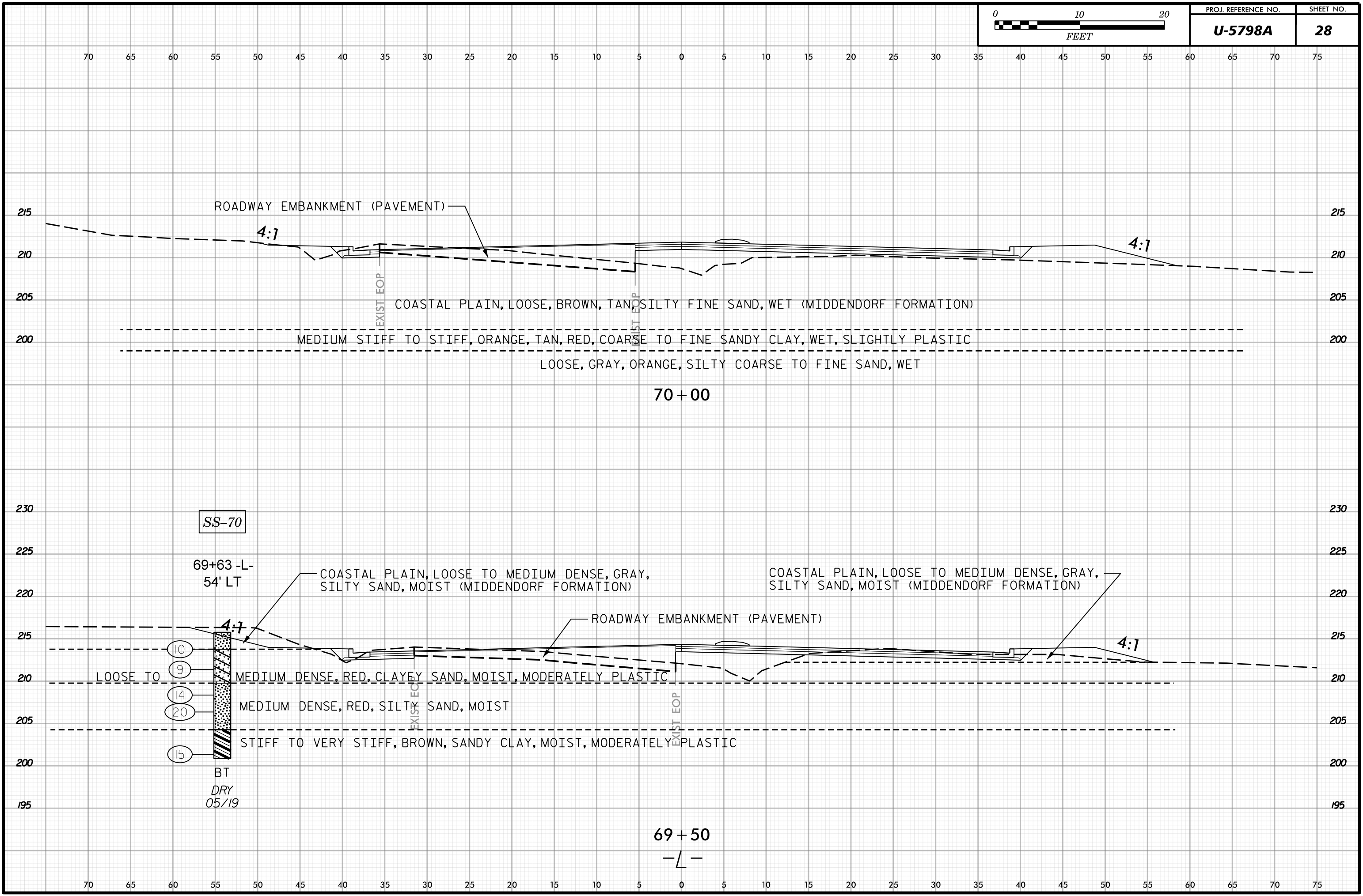
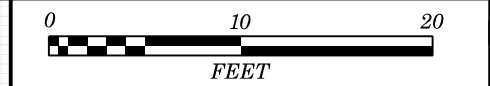


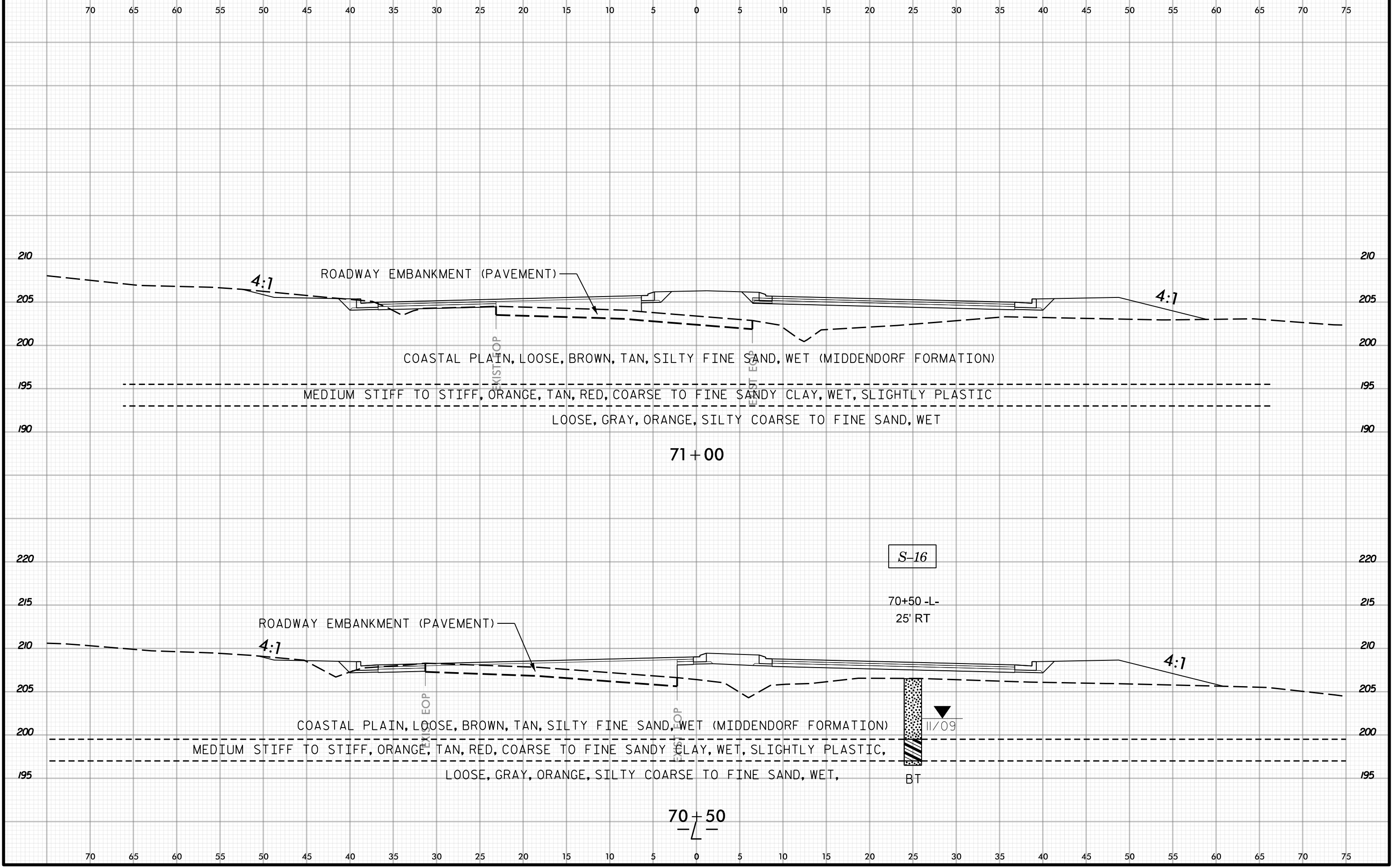
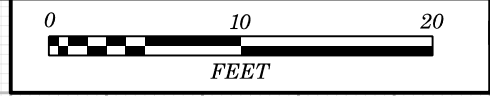


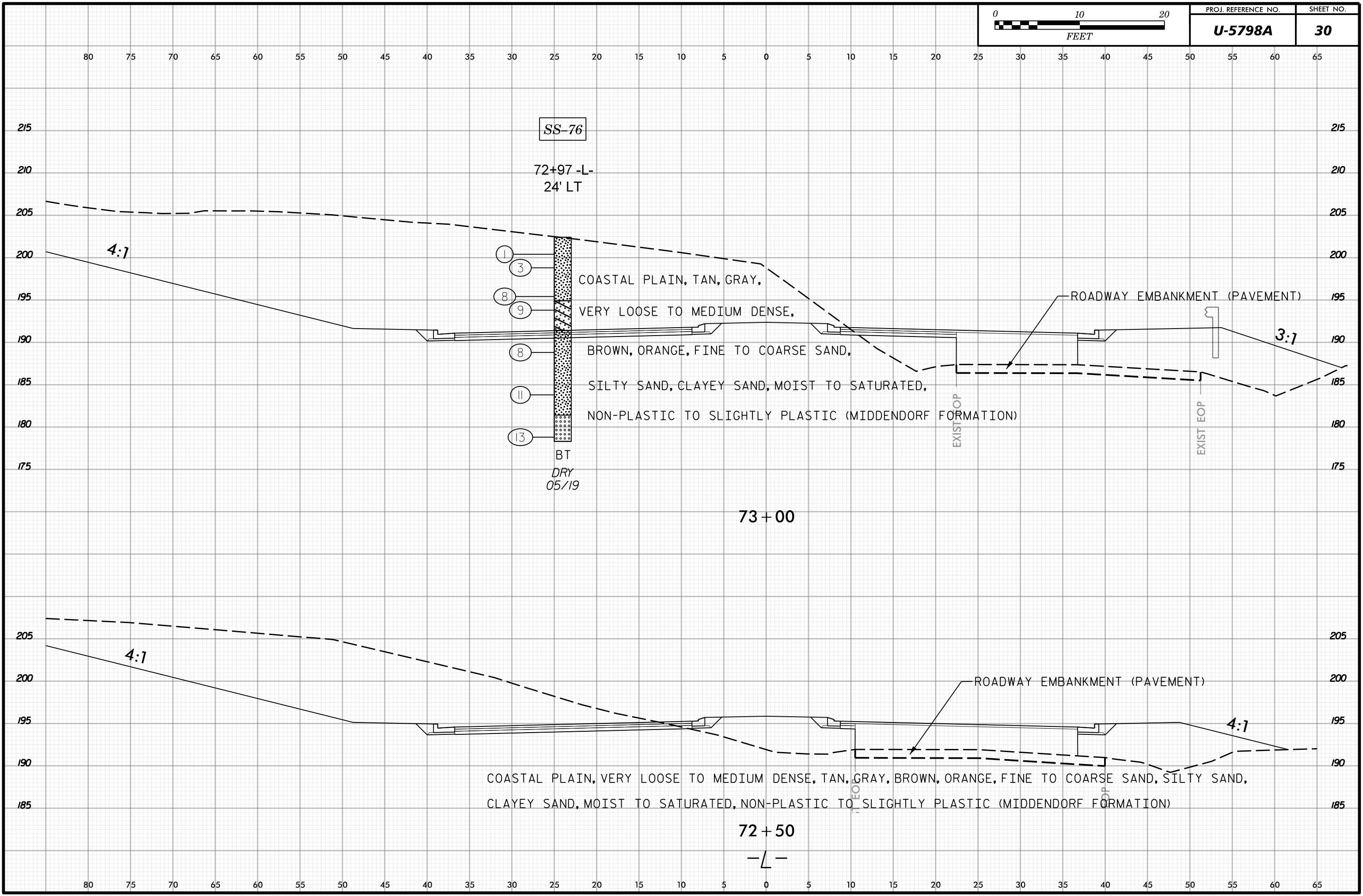
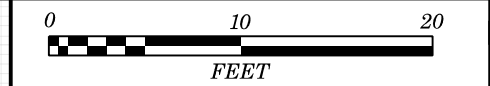


PROJ. REFERENCE NO.	SHEET NO.
U-5798A	27









SS-76

72+97 -L-
24' LT

4:1

- ①
- ③
- ⑧
- ⑨
- ⑧
- ⑪
- ⑬

COASTAL PLAIN, TAN, GRAY,
 VERY LOOSE TO MEDIUM DENSE,
 BROWN, ORANGE, FINE TO COARSE SAND,
 SILTY SAND, CLAYEY SAND, MOIST TO SATURATED,
 NON-PLASTIC TO SLIGHTLY PLASTIC (MIDDENDORF FORMATION)

BT
 DRY
 05/19

EXIST' OP

EXIST' EOP

ROADWAY EMBANKMENT (PAVEMENT)

3:1

73+00

4:1

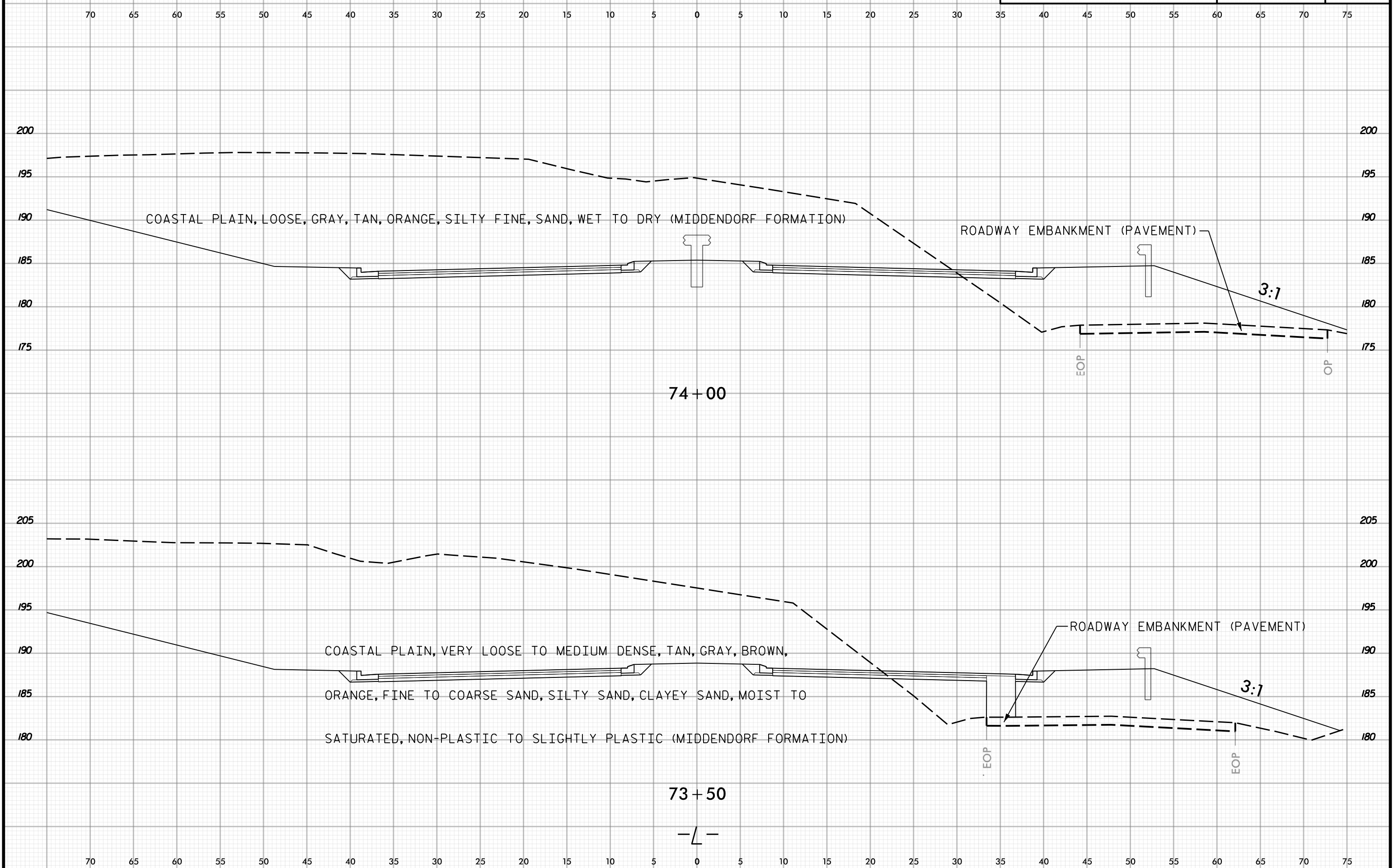
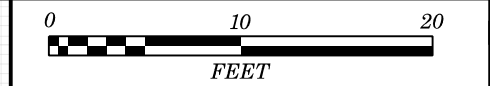
ROADWAY EMBANKMENT (PAVEMENT)

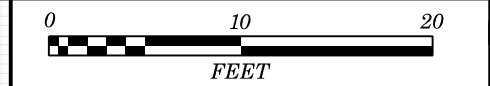
4:1

COASTAL PLAIN, VERY LOOSE TO MEDIUM DENSE, TAN, GRAY, BROWN, ORANGE, FINE TO COARSE SAND, SILTY SAND,
 CLAYEY SAND, MOIST TO SATURATED, NON-PLASTIC TO SLIGHTLY PLASTIC (MIDDENDORF FORMATION)

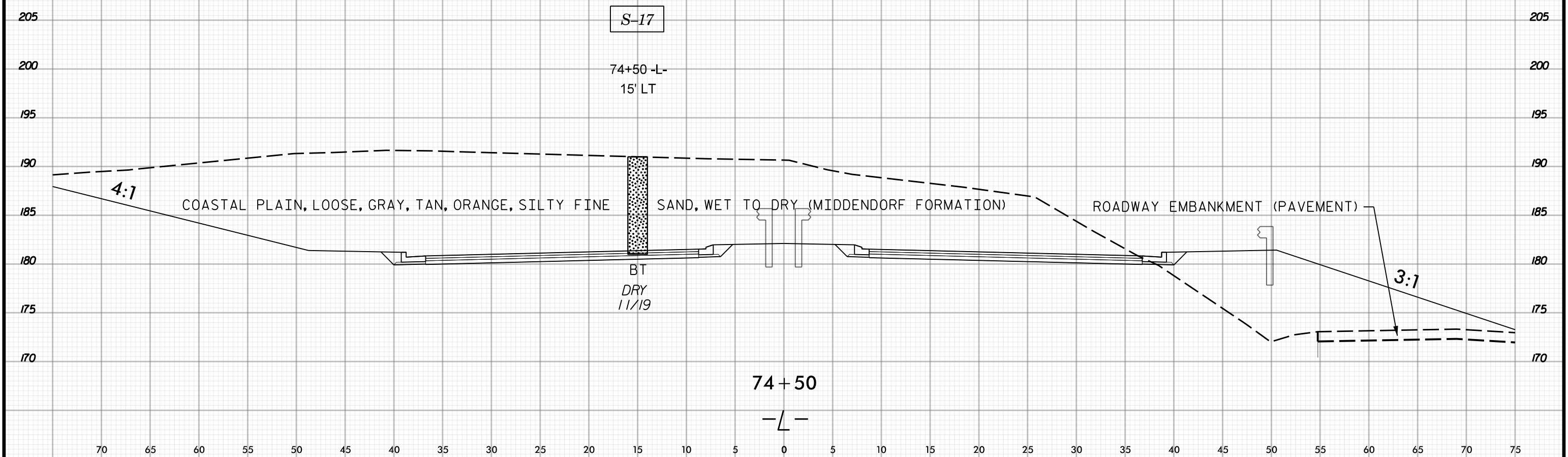
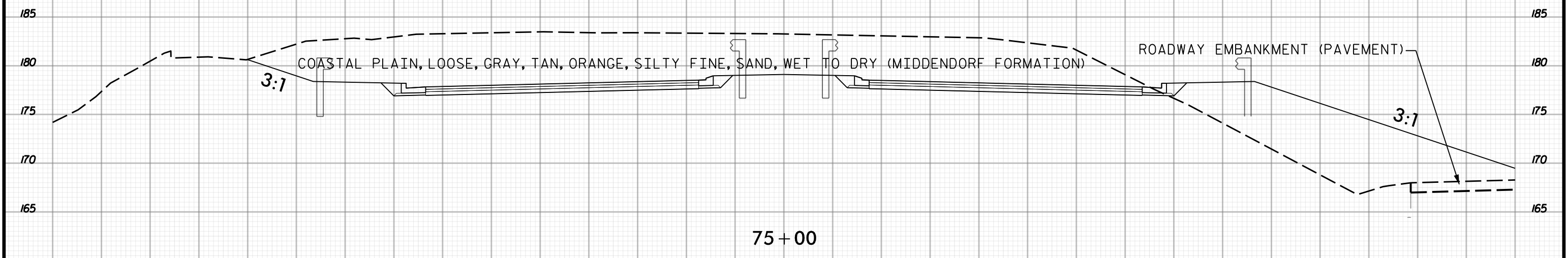
72+50

-L-

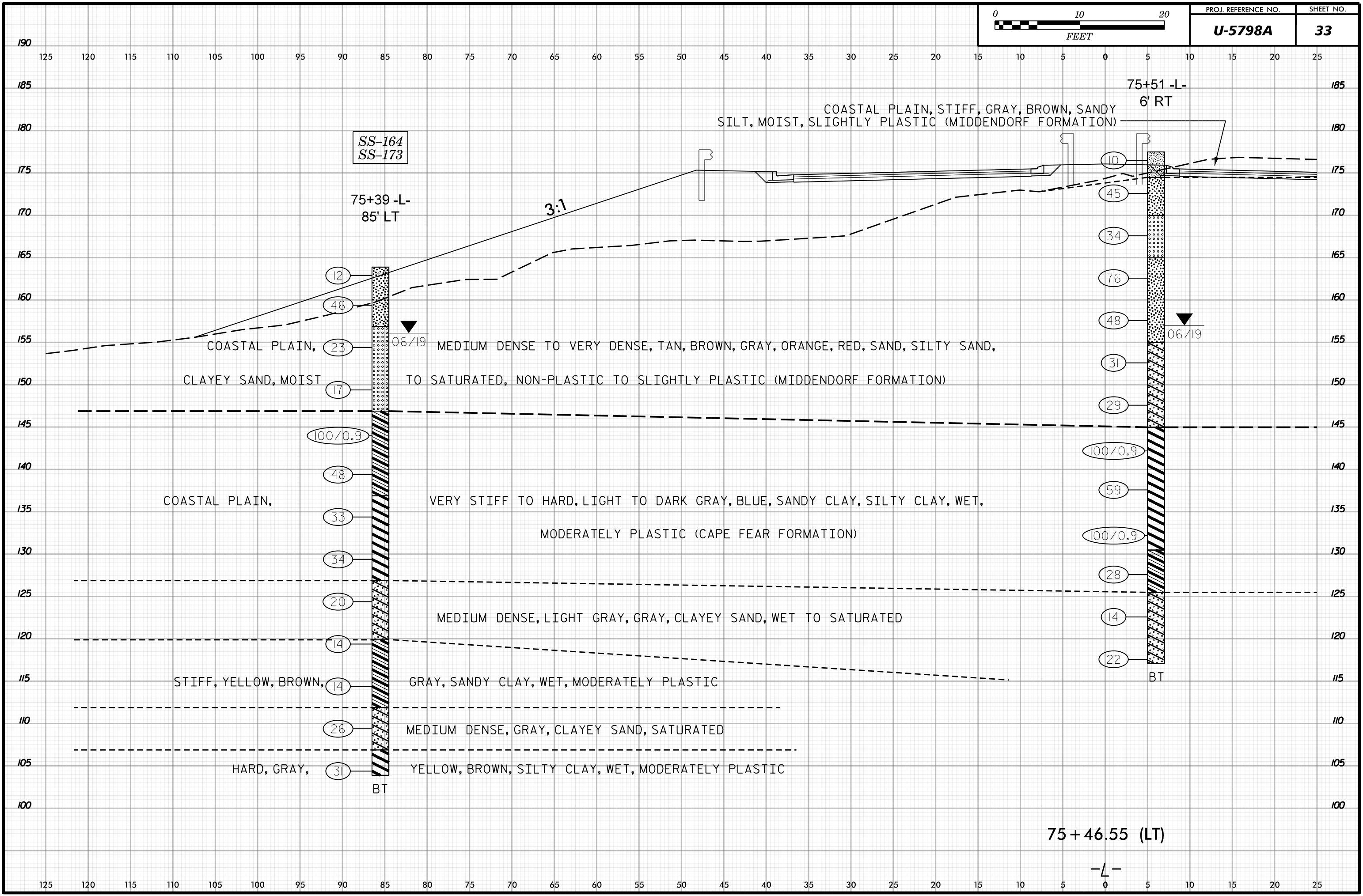
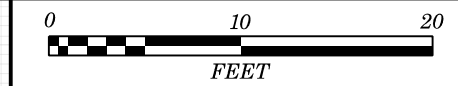




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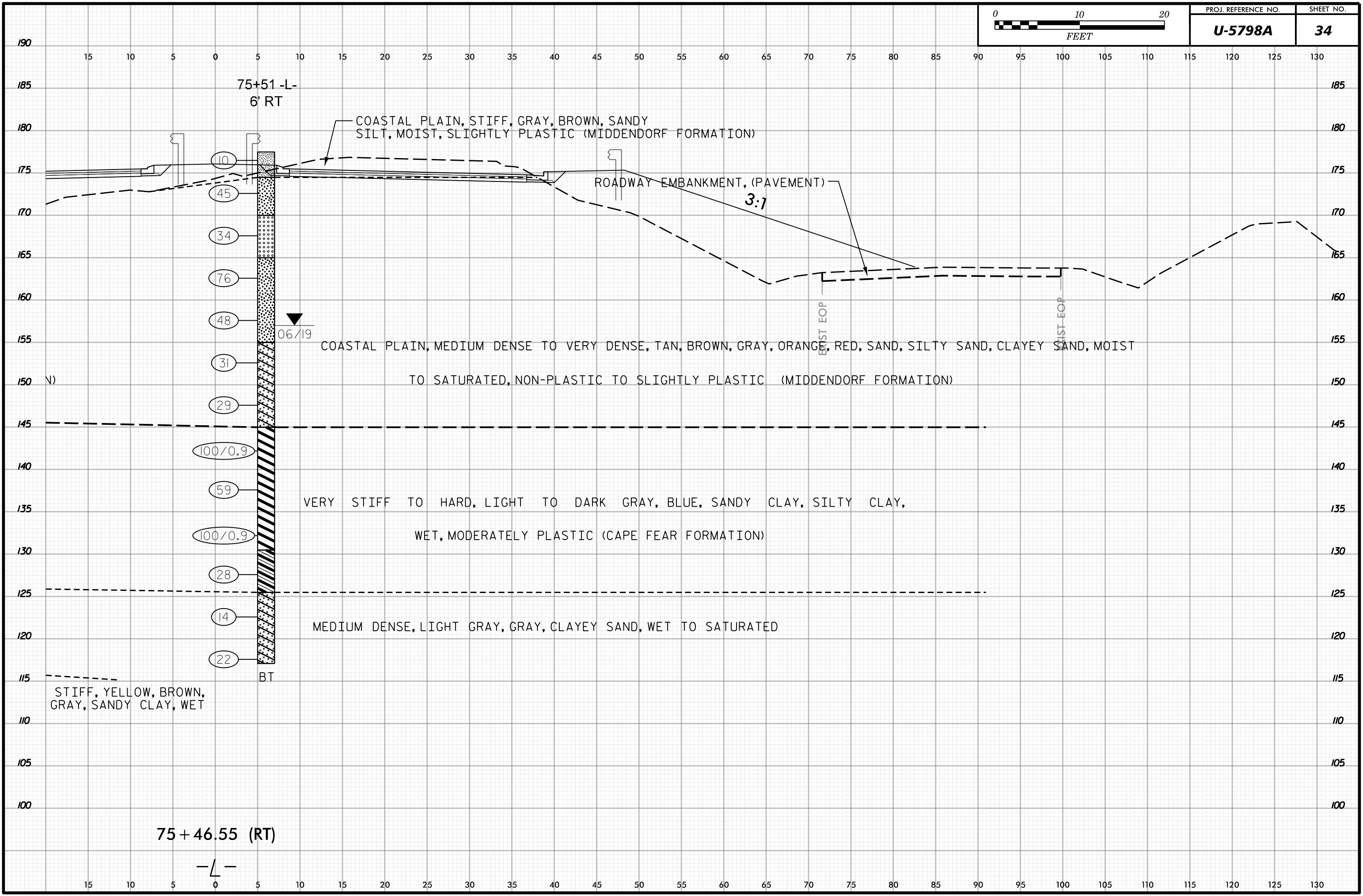
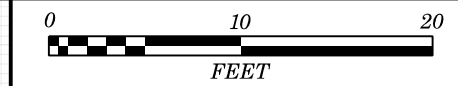


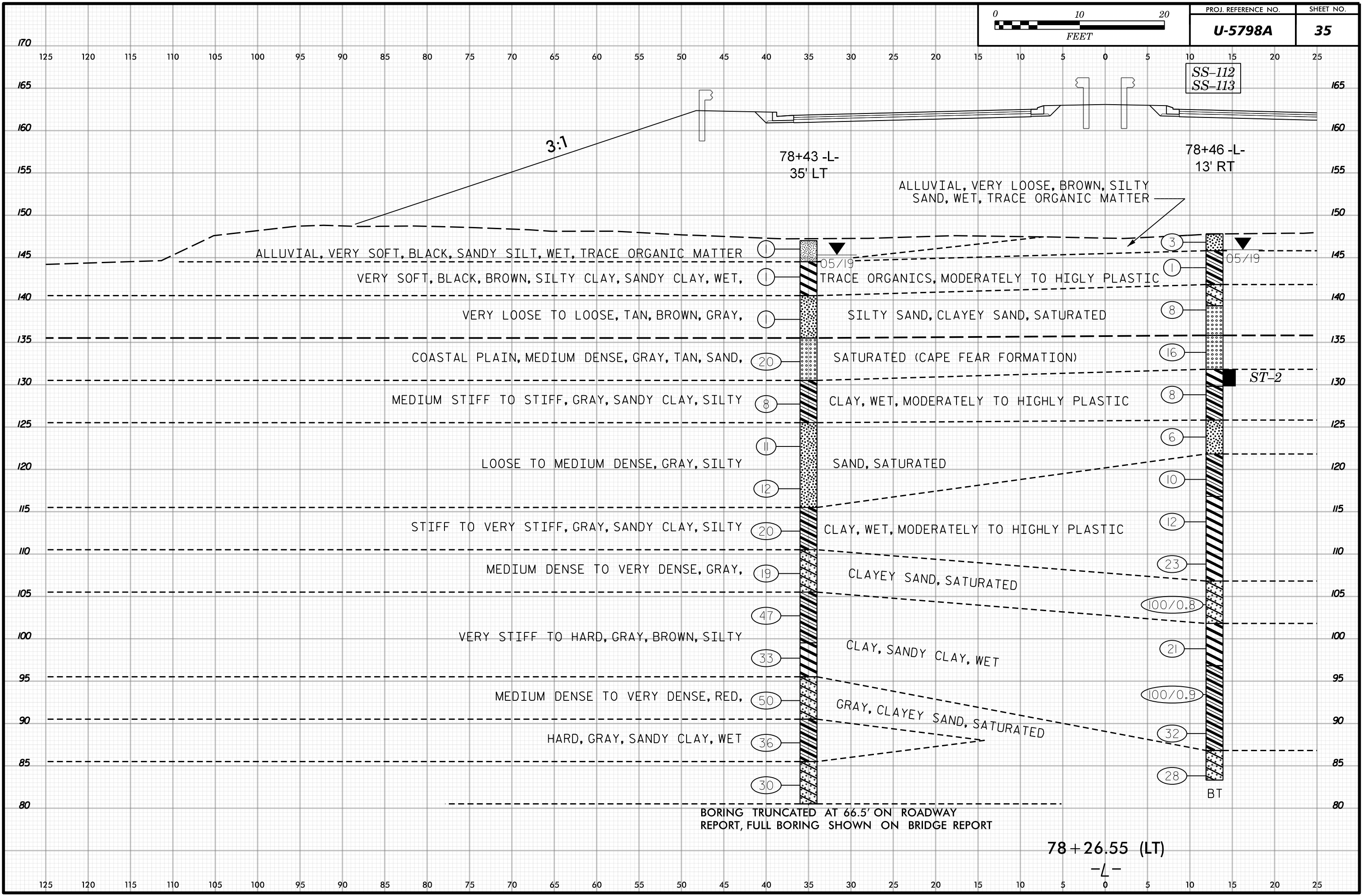
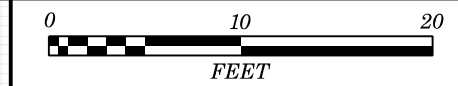
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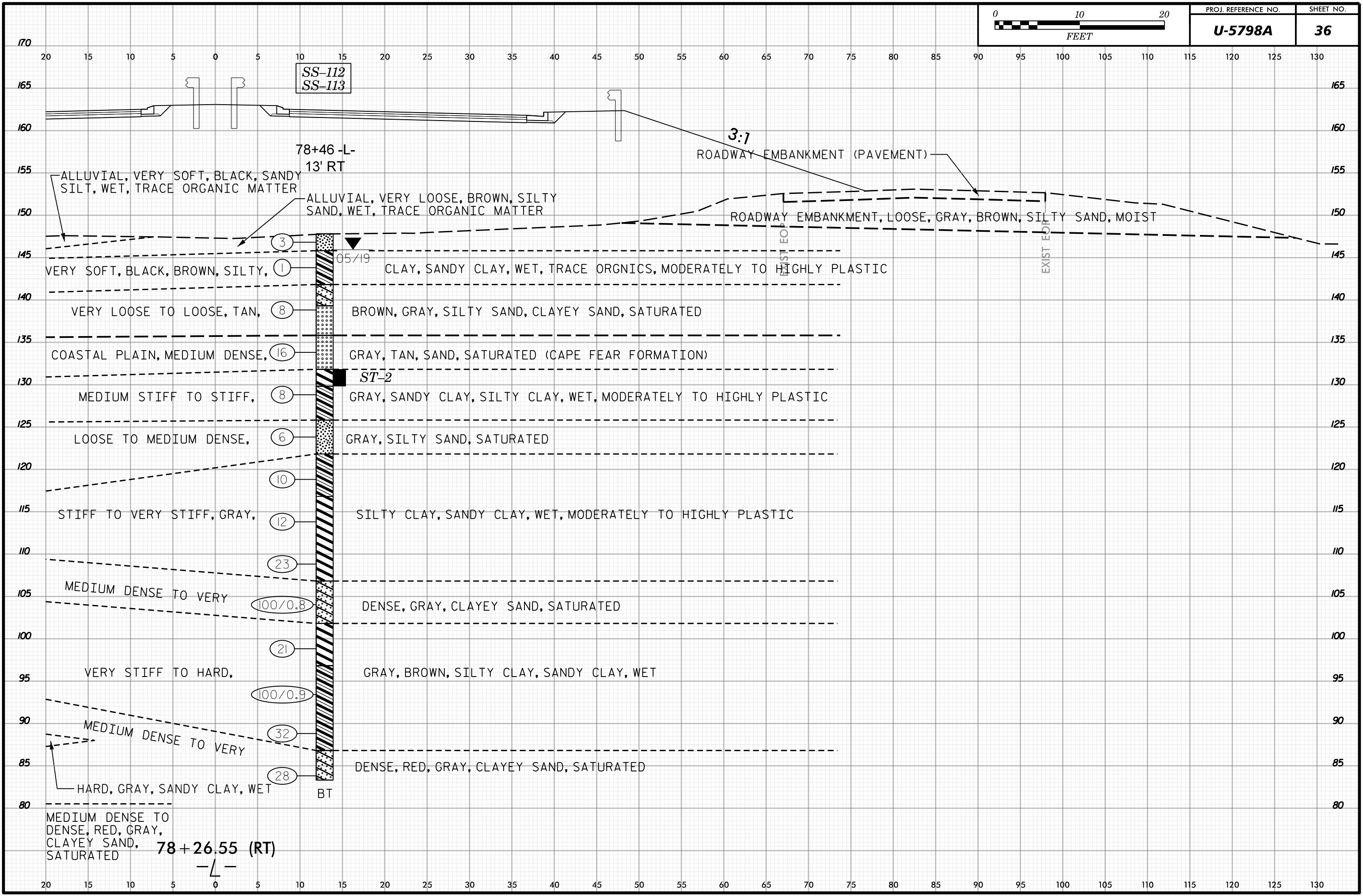
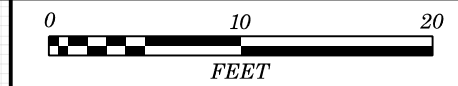


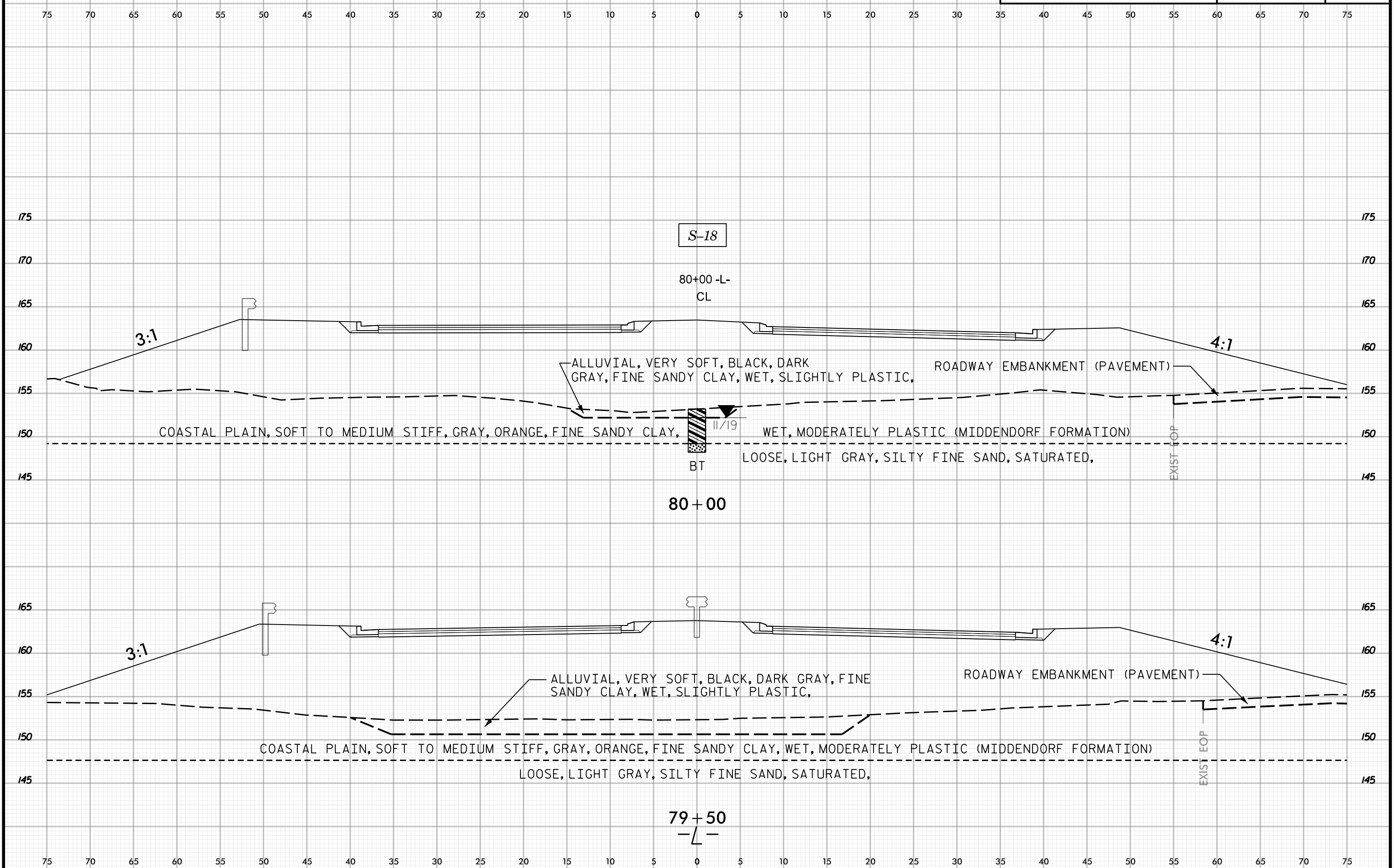
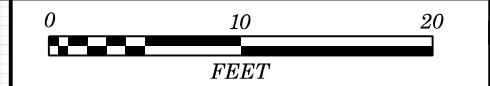
75 + 46.55 (LT)

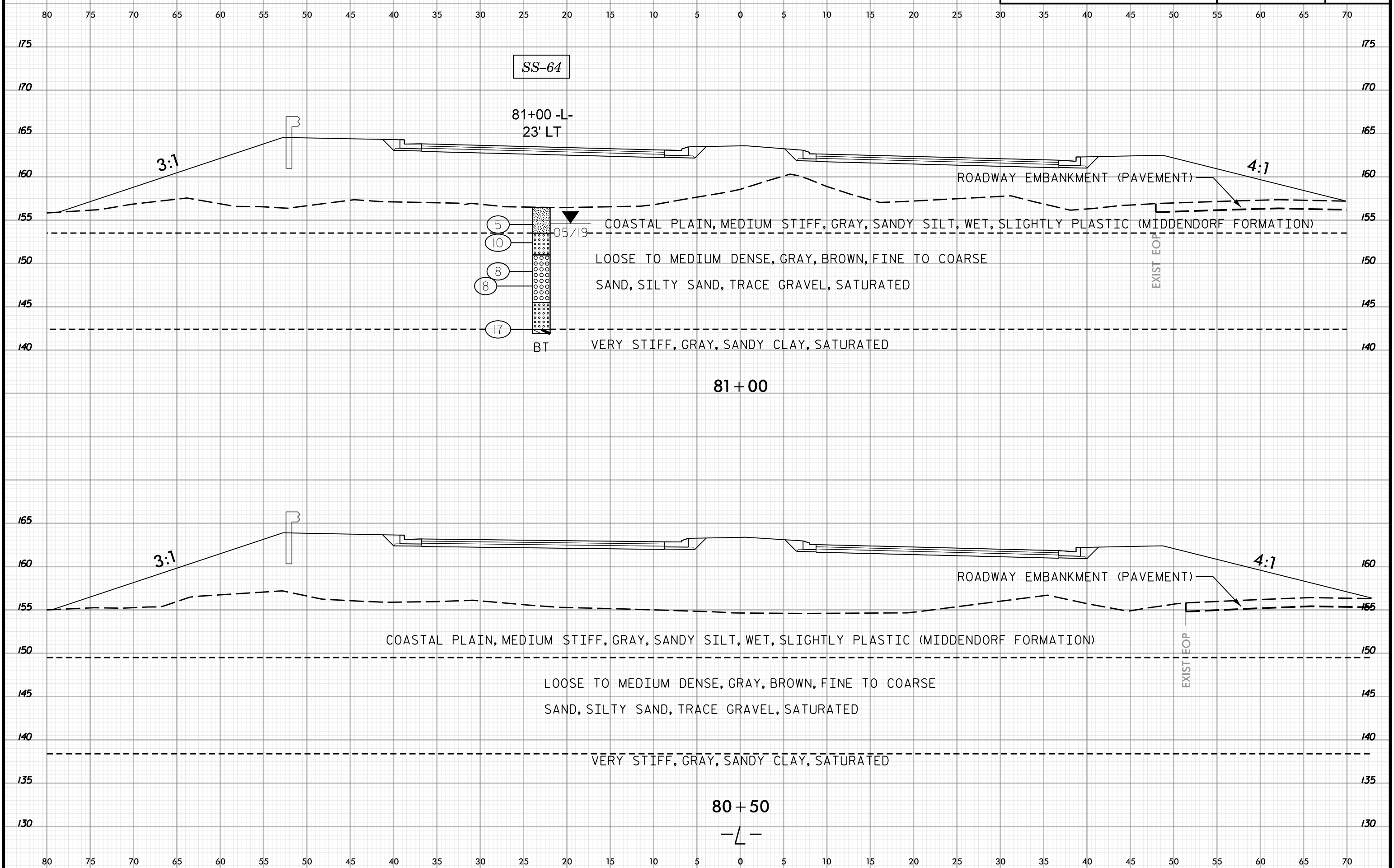
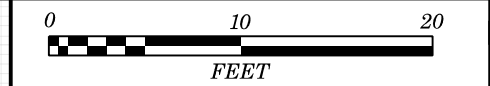
-L-

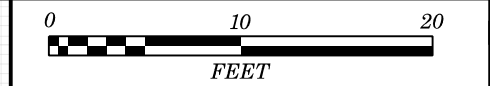




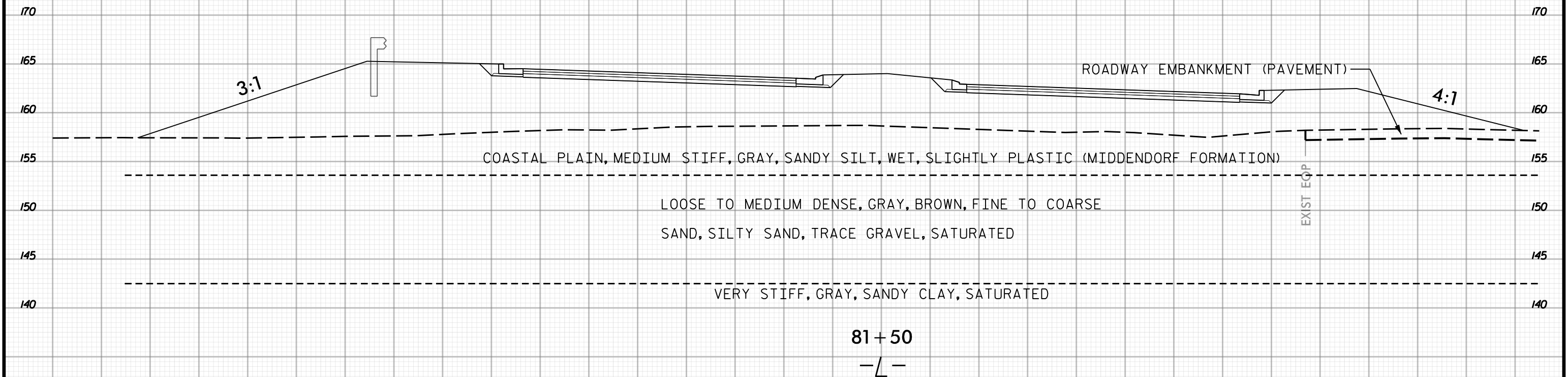
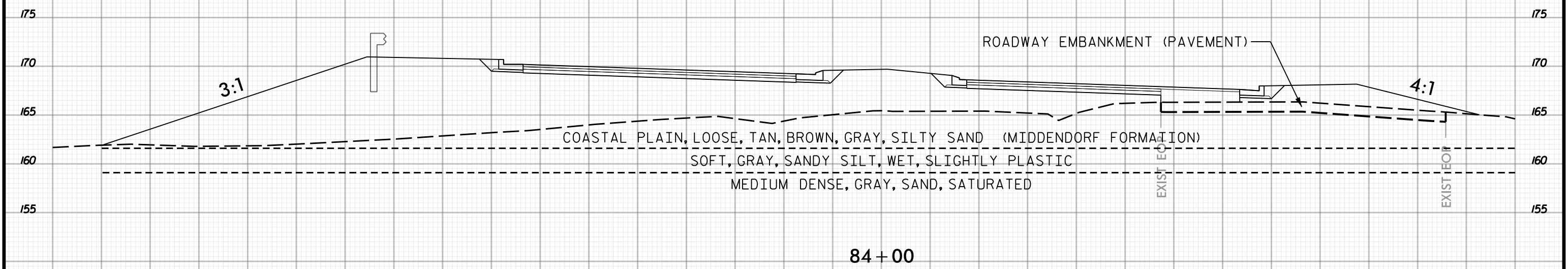




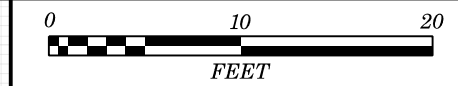




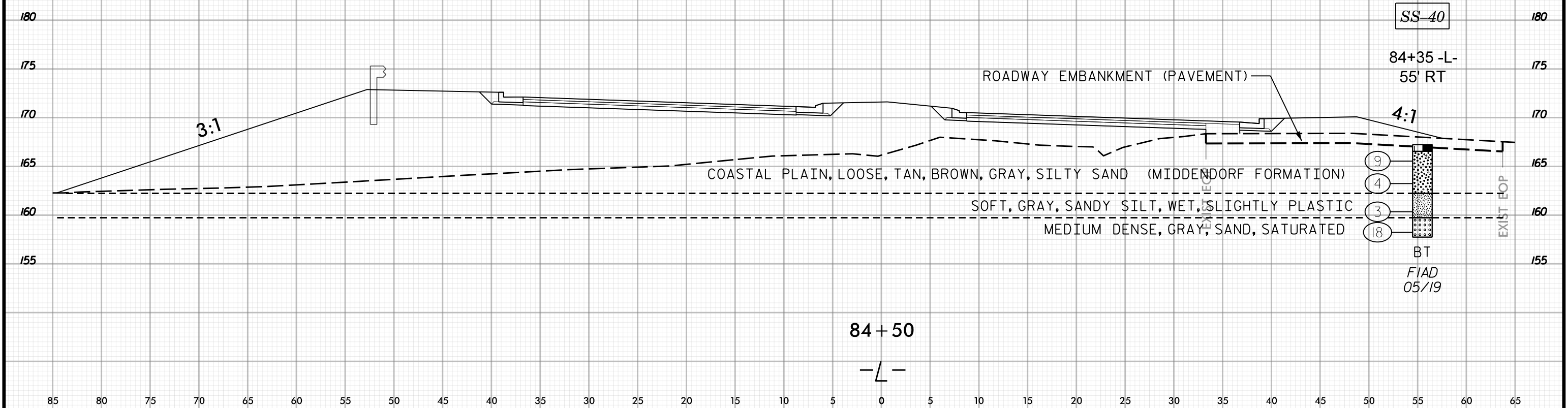
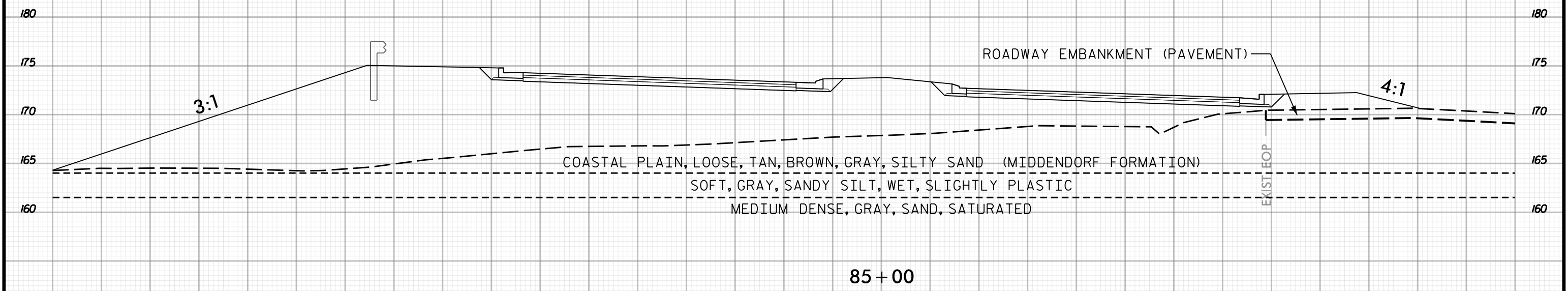
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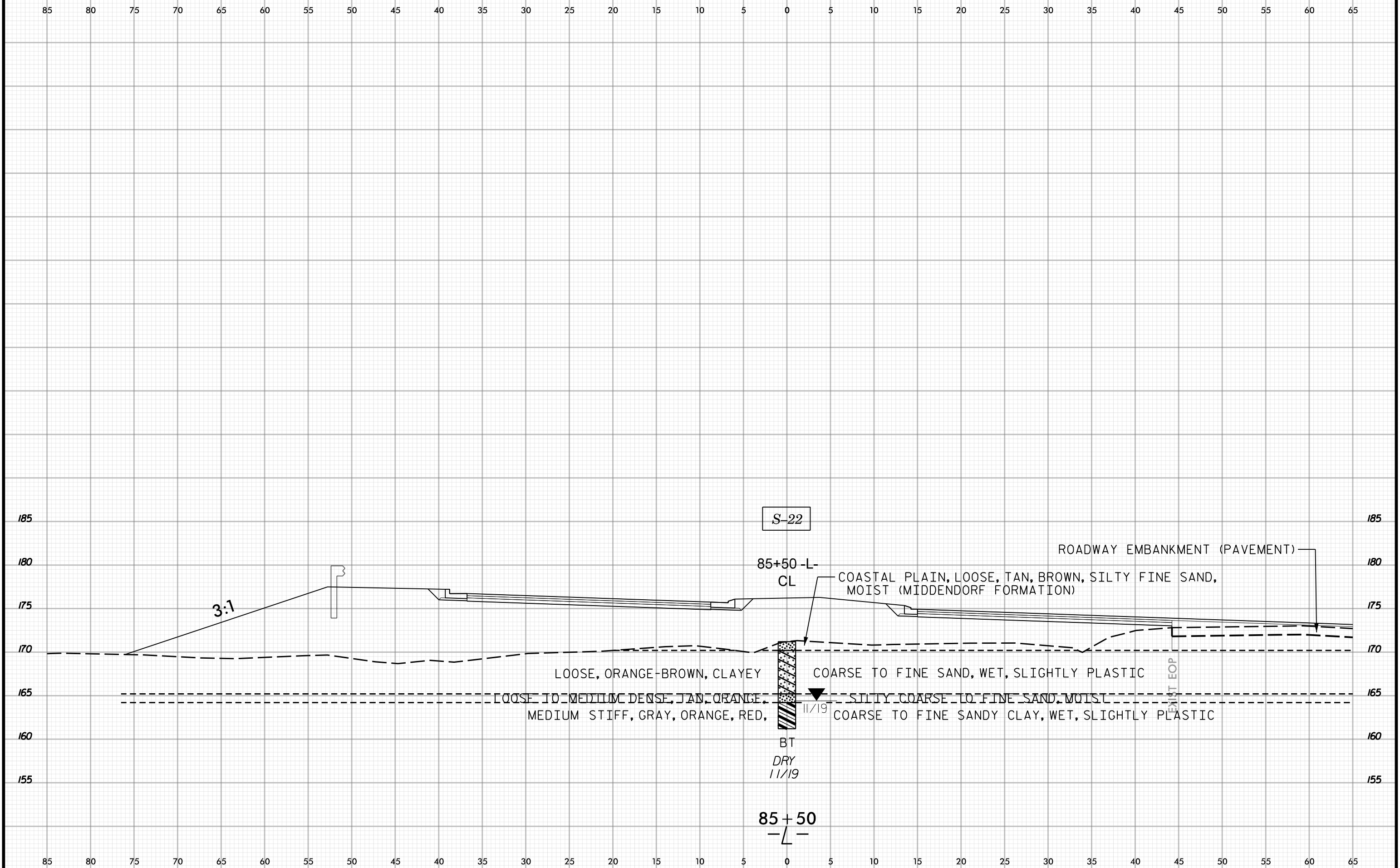
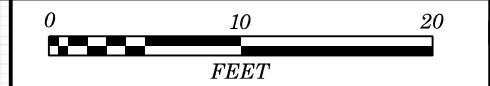
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85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65



85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65



S-22

ROADWAY EMBANKMENT (PAVEMENT)

85+50 -L-
CL

COASTAL PLAIN, LOOSE, TAN, BROWN, SILTY FINE SAND, MOIST (MIDDENDORF FORMATION)

3:1

LOOSE, ORANGE-BROWN, CLAYEY
LOOSE TO MEDIUM DENSE, TAN, ORANGE,
MEDIUM STIFF, GRAY, ORANGE, RED,

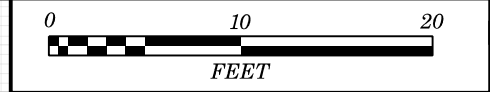
COARSE TO FINE SAND, WET, SLIGHTLY PLASTIC

SILTY COARSE TO FINE SAND, MOIST
COARSE TO FINE SANDY CLAY, WET, SLIGHTLY PLASTIC

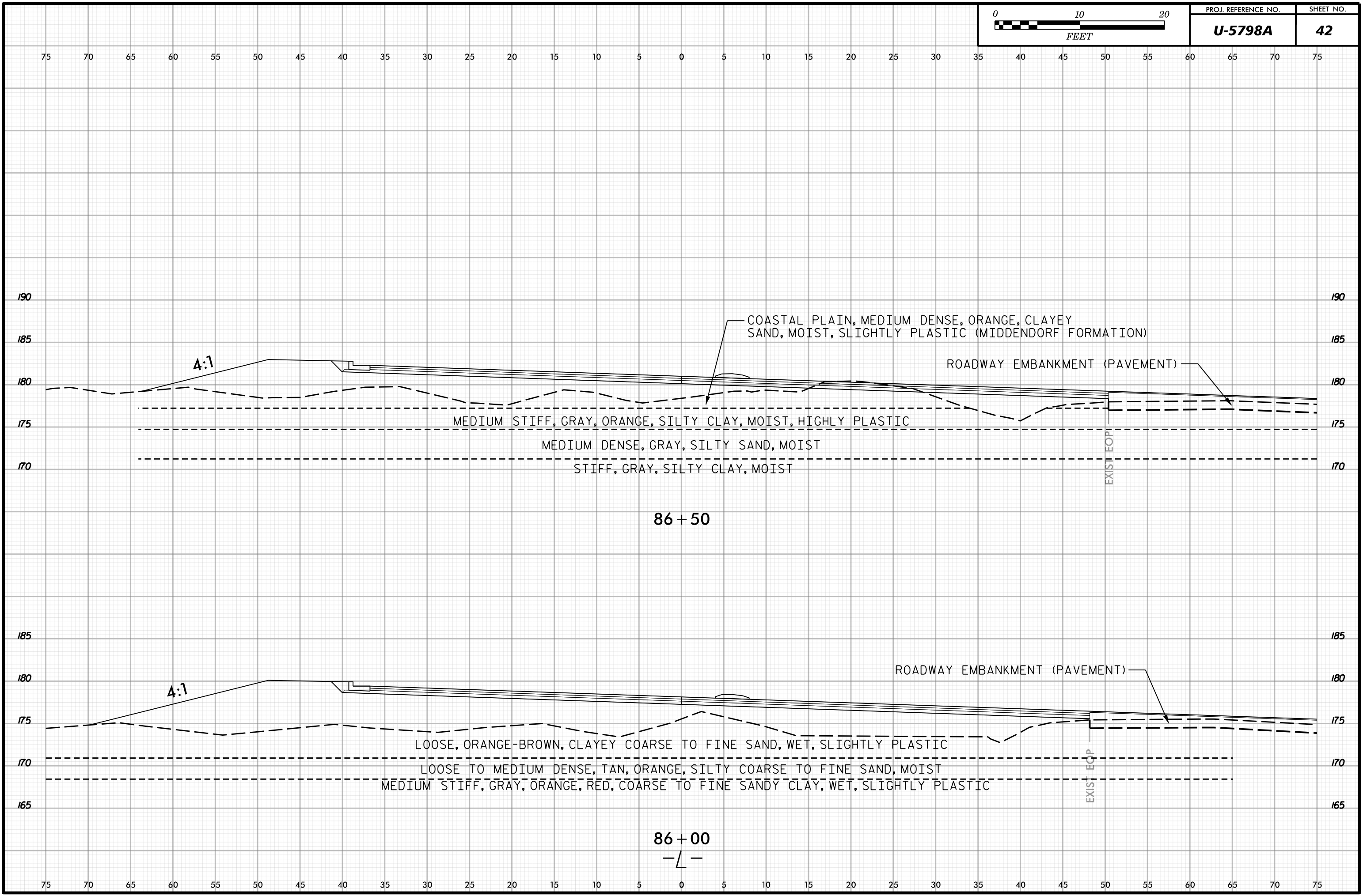
BT
DRY
11/19

LIMIT EOP

85 + 50
-L-



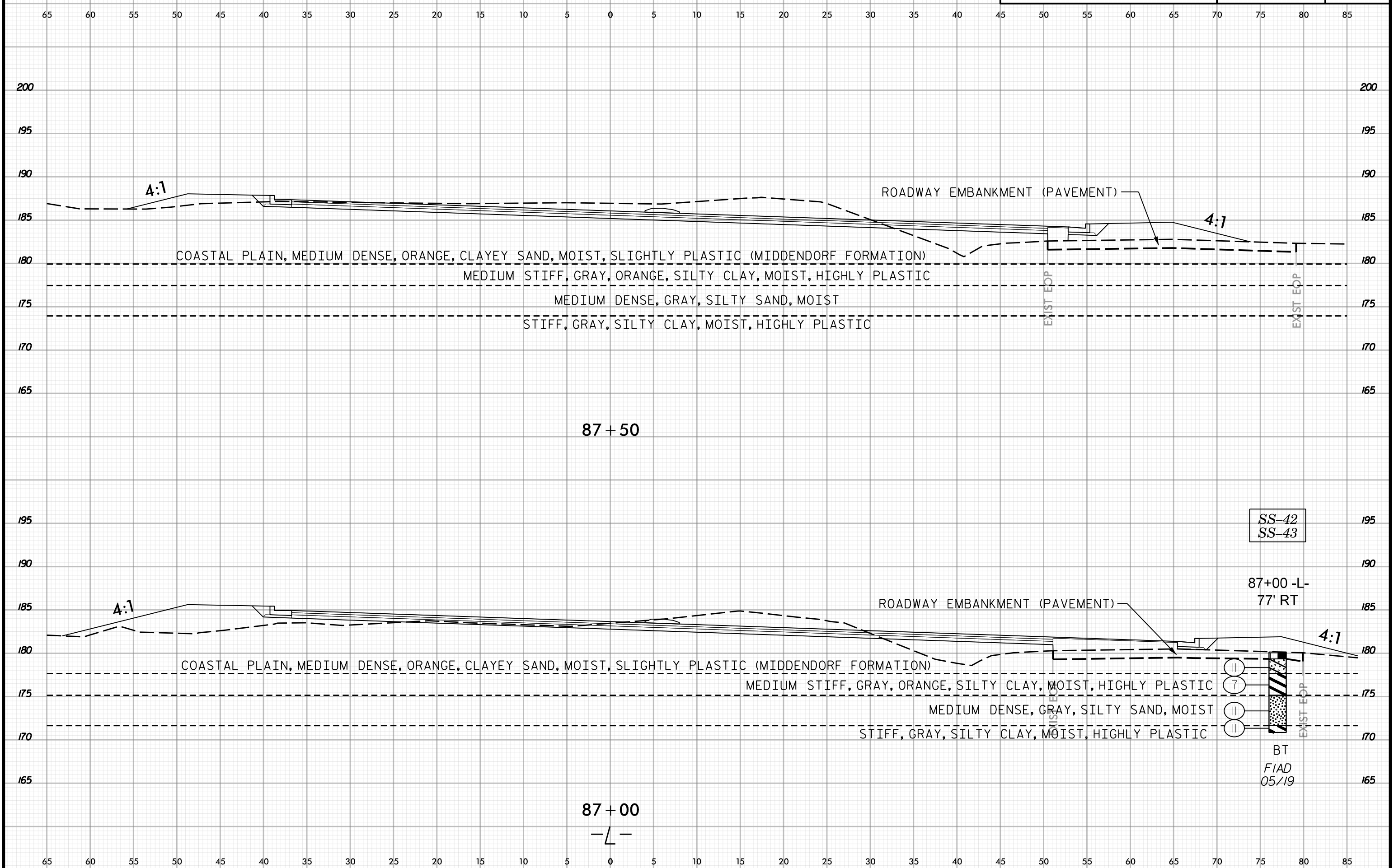
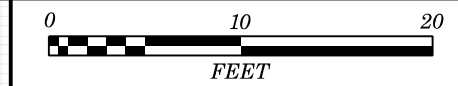
PROJ. REFERENCE NO.	SHEET NO.
U-5798A	42

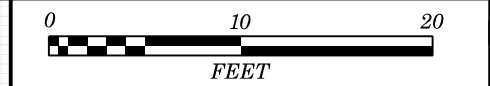


86 + 50

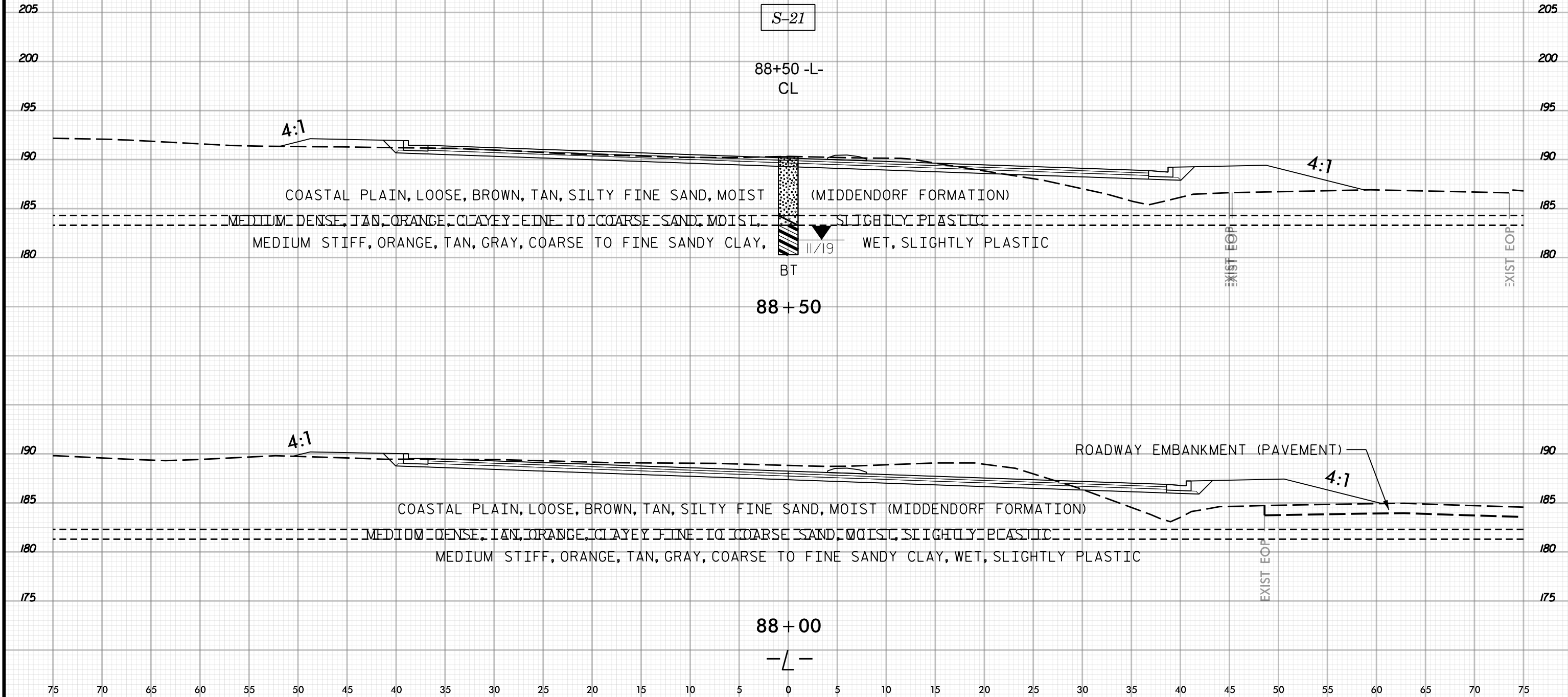
86 + 00

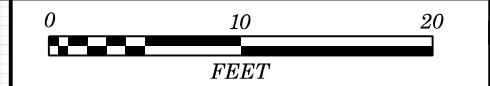




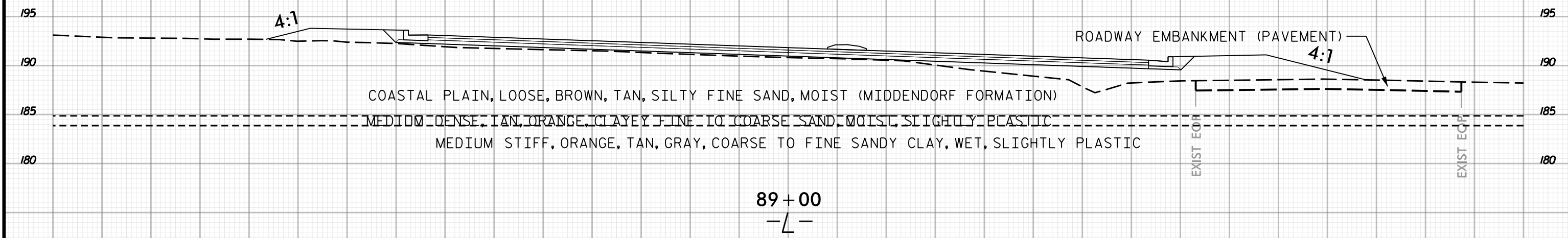
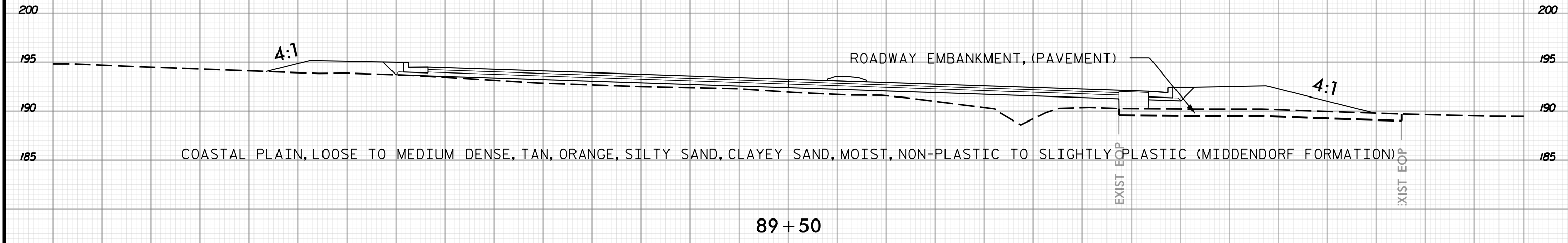


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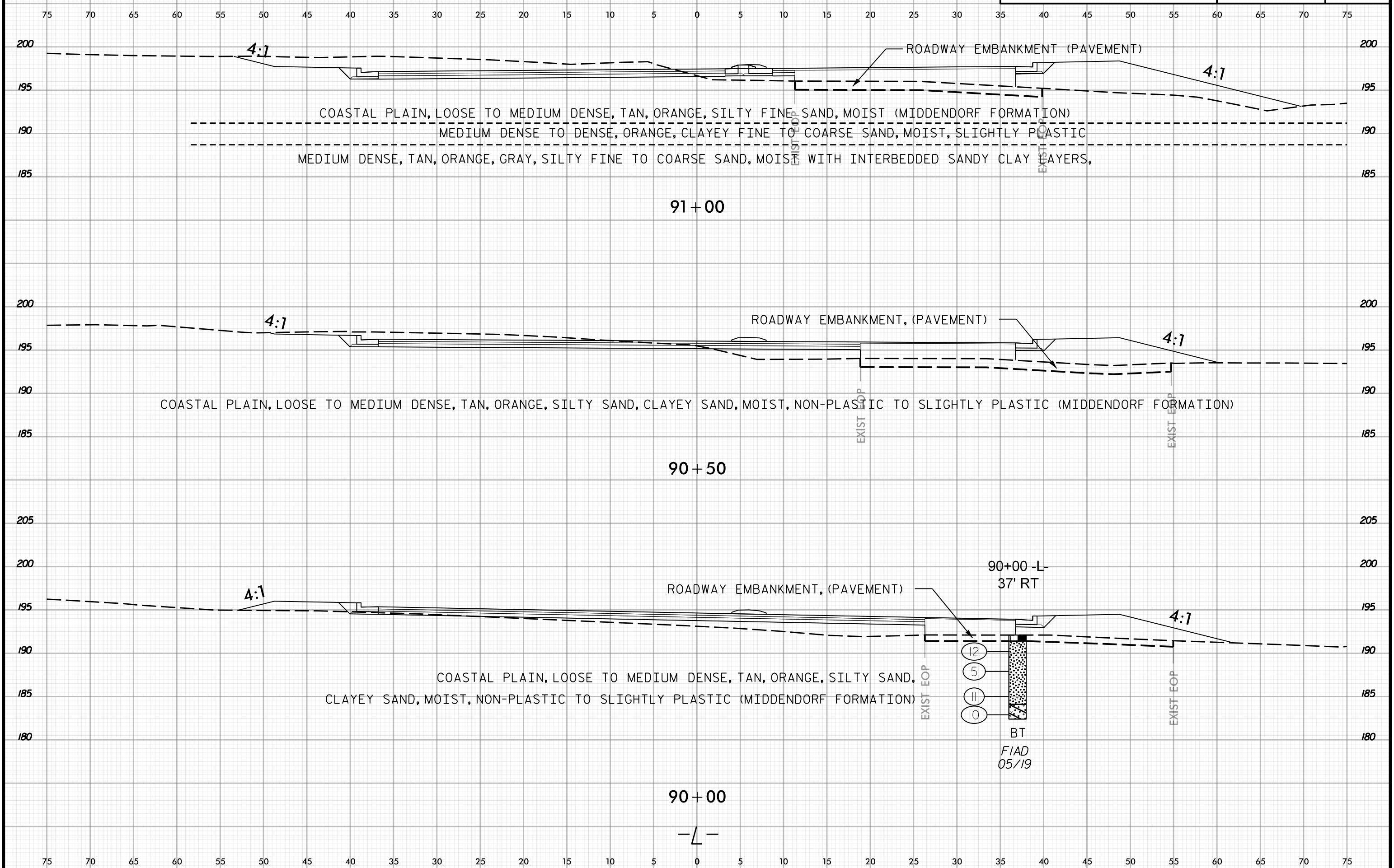
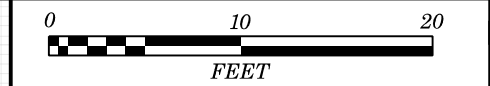


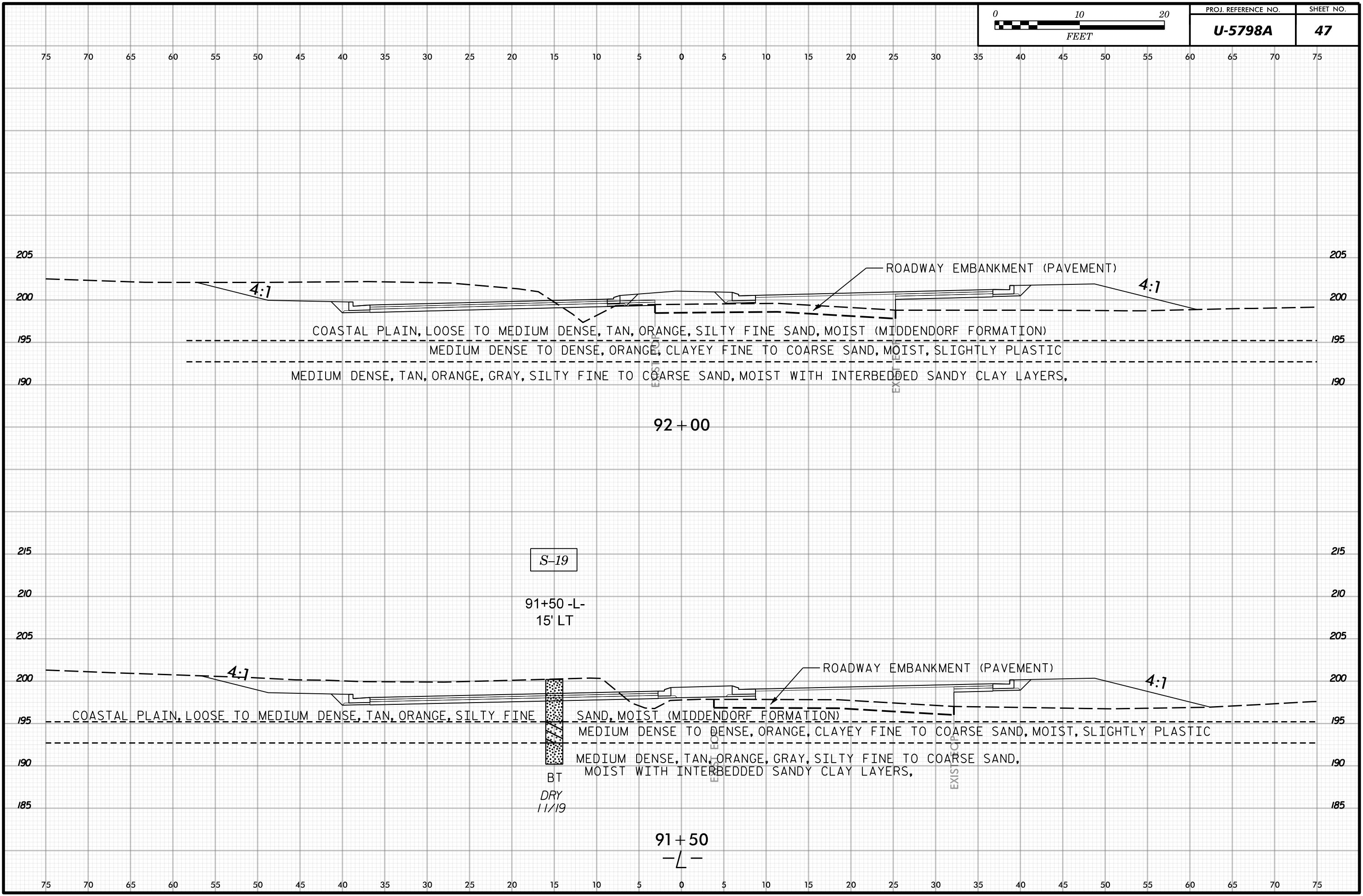
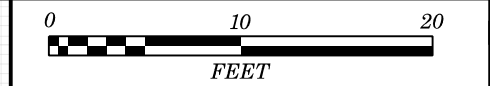


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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75





92 + 00

S-19

91+50 -L-
15' LT

91 + 50

BT
DRY
11/19

ROADWAY EMBANKMENT (PAVEMENT)

COASTAL PLAIN, LOOSE TO MEDIUM DENSE, TAN, ORANGE, SILTY FINE SAND, MOIST (MIDDENDORF FORMATION)
 MEDIUM DENSE TO DENSE, ORANGE, CLAYEY FINE TO COARSE SAND, MOIST, SLIGHTLY PLASTIC
 MEDIUM DENSE, TAN, ORANGE, GRAY, SILTY FINE TO COARSE SAND, MOIST WITH INTERBEDDED SANDY CLAY LAYERS,

ROADWAY EMBANKMENT (PAVEMENT)

COASTAL PLAIN, LOOSE TO MEDIUM DENSE, TAN, ORANGE, SILTY FINE SAND, MOIST (MIDDENDORF FORMATION)
 MEDIUM DENSE TO DENSE, ORANGE, CLAYEY FINE TO COARSE SAND, MOIST, SLIGHTLY PLASTIC
 MEDIUM DENSE, TAN, ORANGE, GRAY, SILTY FINE TO COARSE SAND, MOIST WITH INTERBEDDED SANDY CLAY LAYERS,

4:1

4:1

4:1

4:1

75

70

65

60

55

50

45

40

35

30

25

20

15

10

5

0

5

10

15

20

25

30

35

40

45

50

55

60

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200

195

190

215

210

205

200

195

190

185

215

210

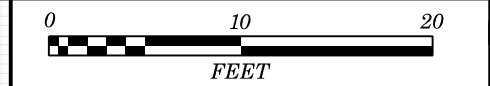
205

200

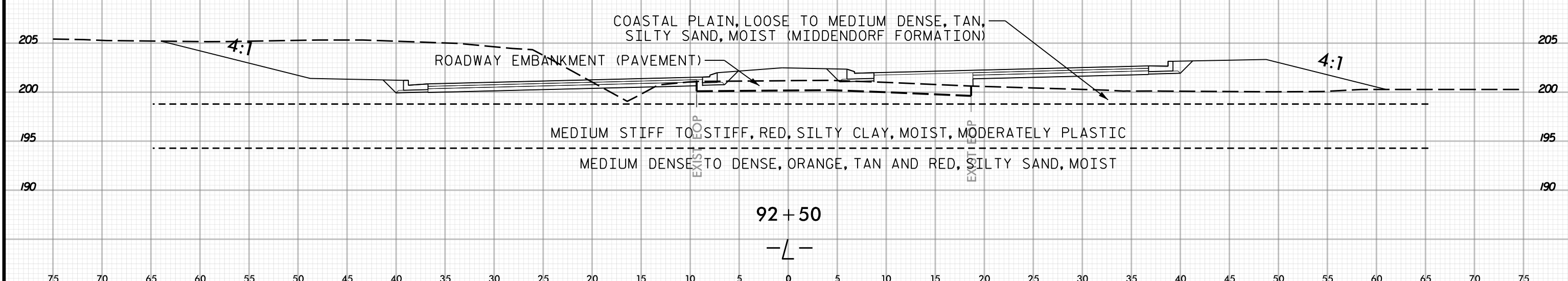
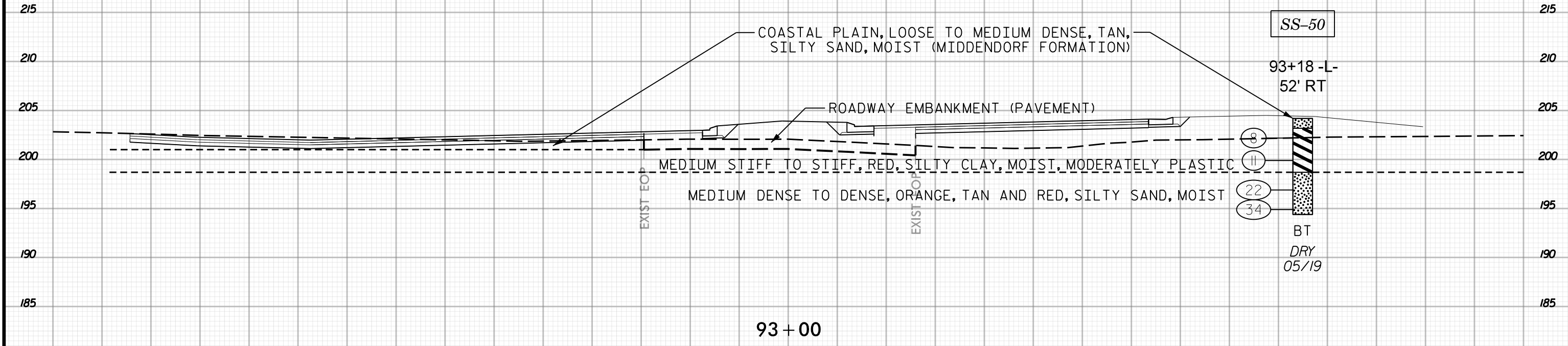
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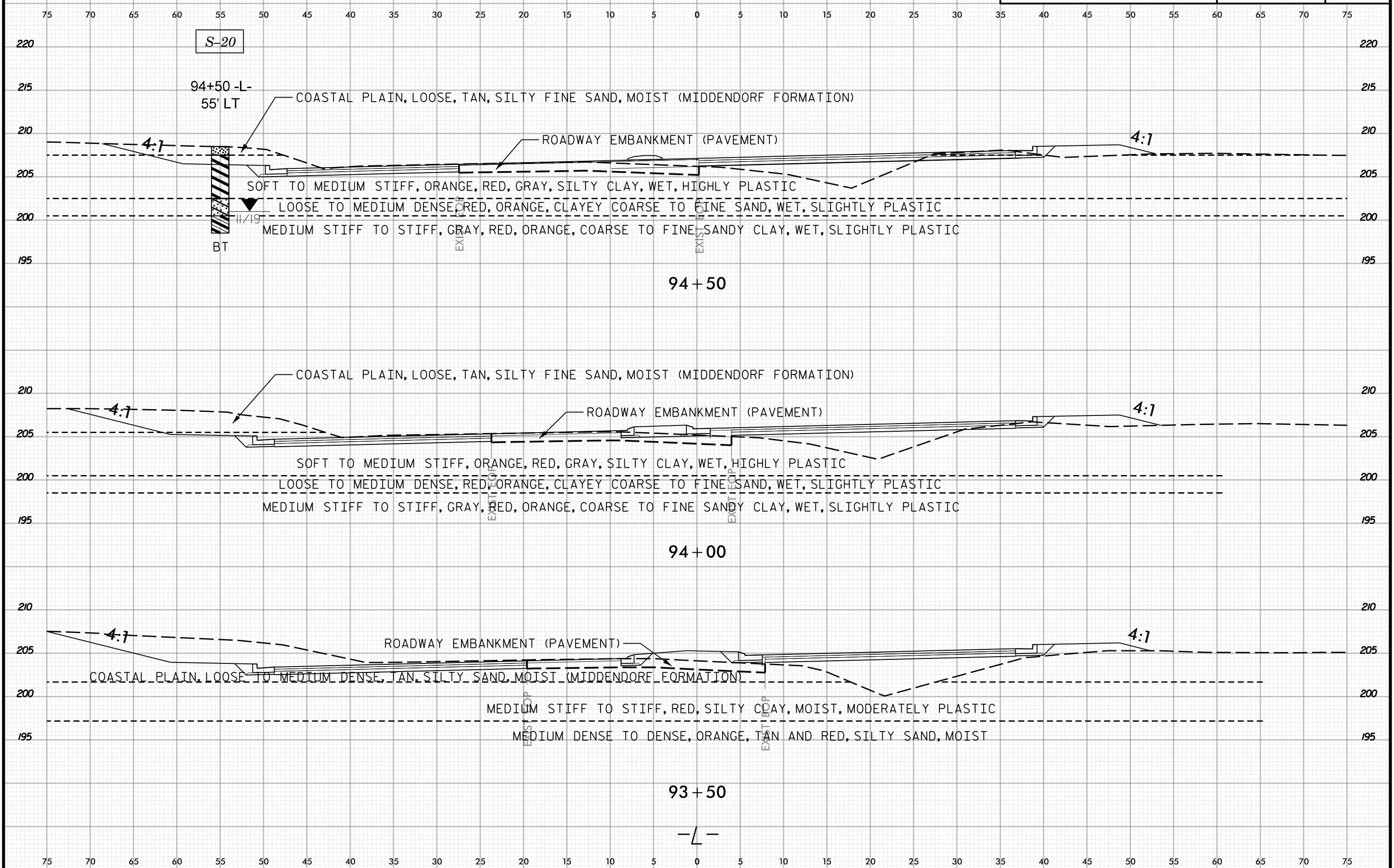
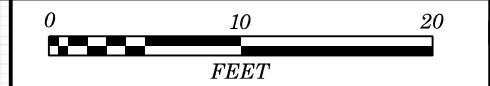
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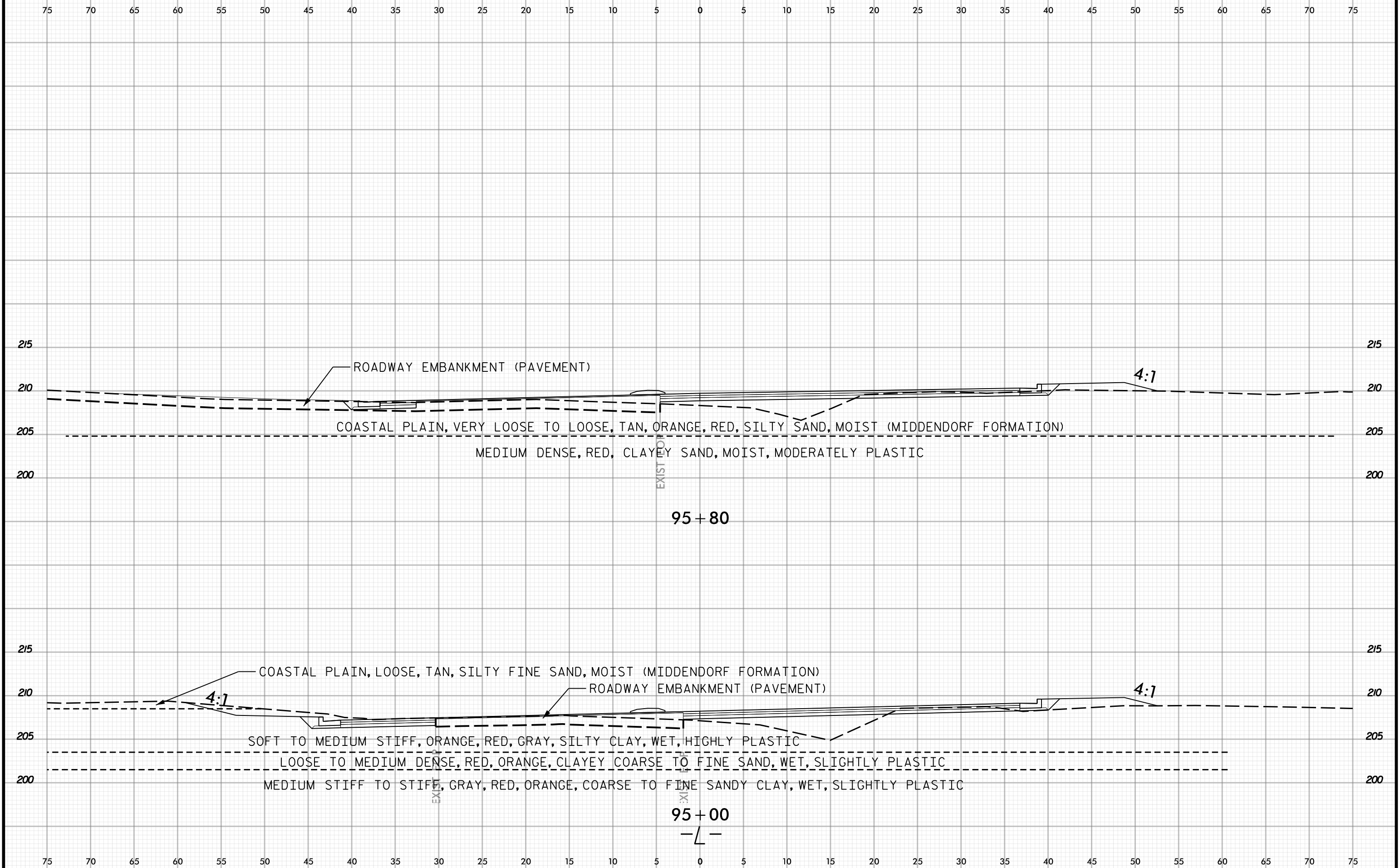
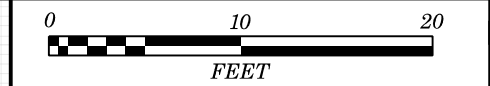


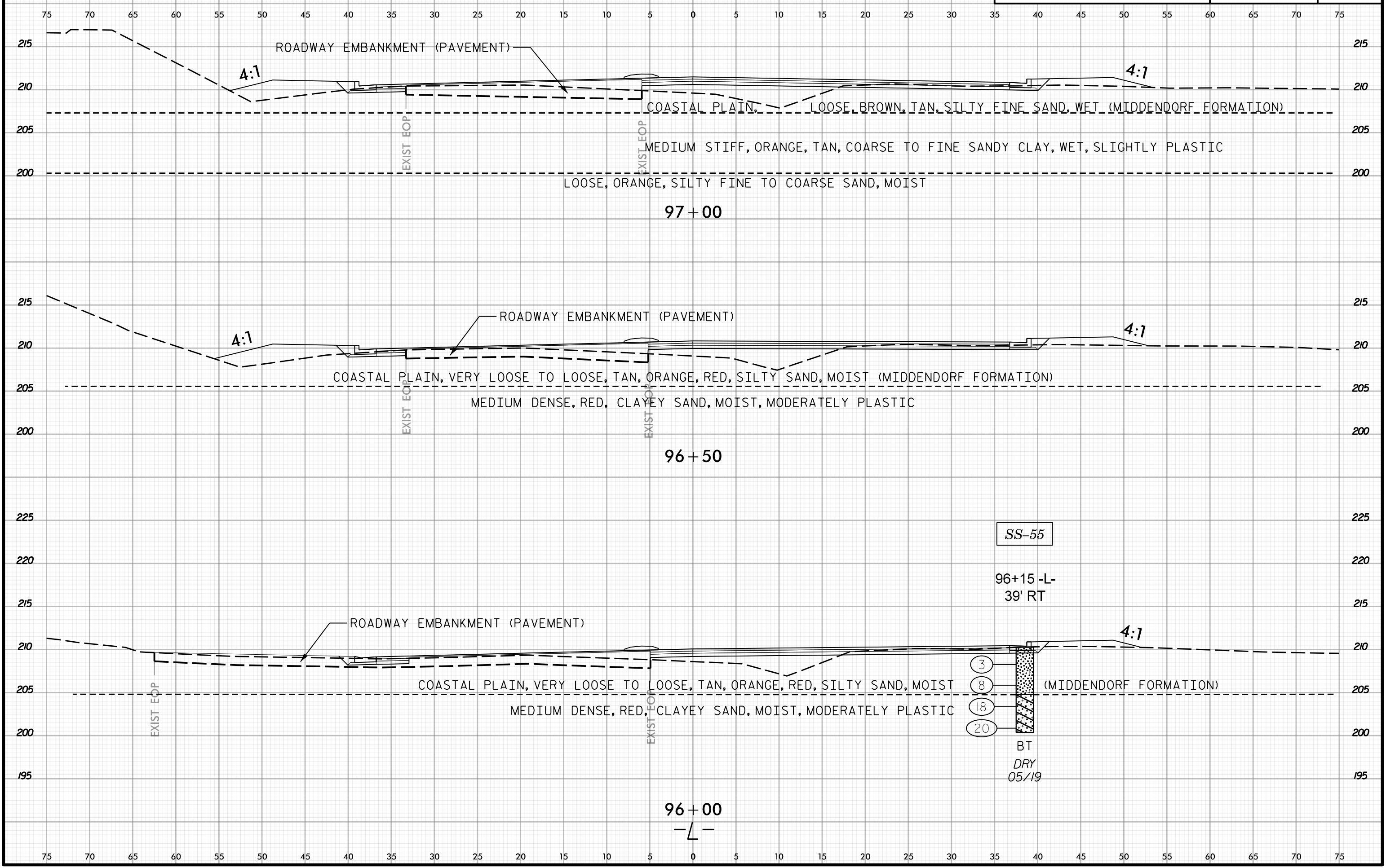
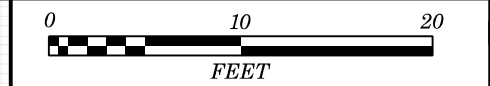
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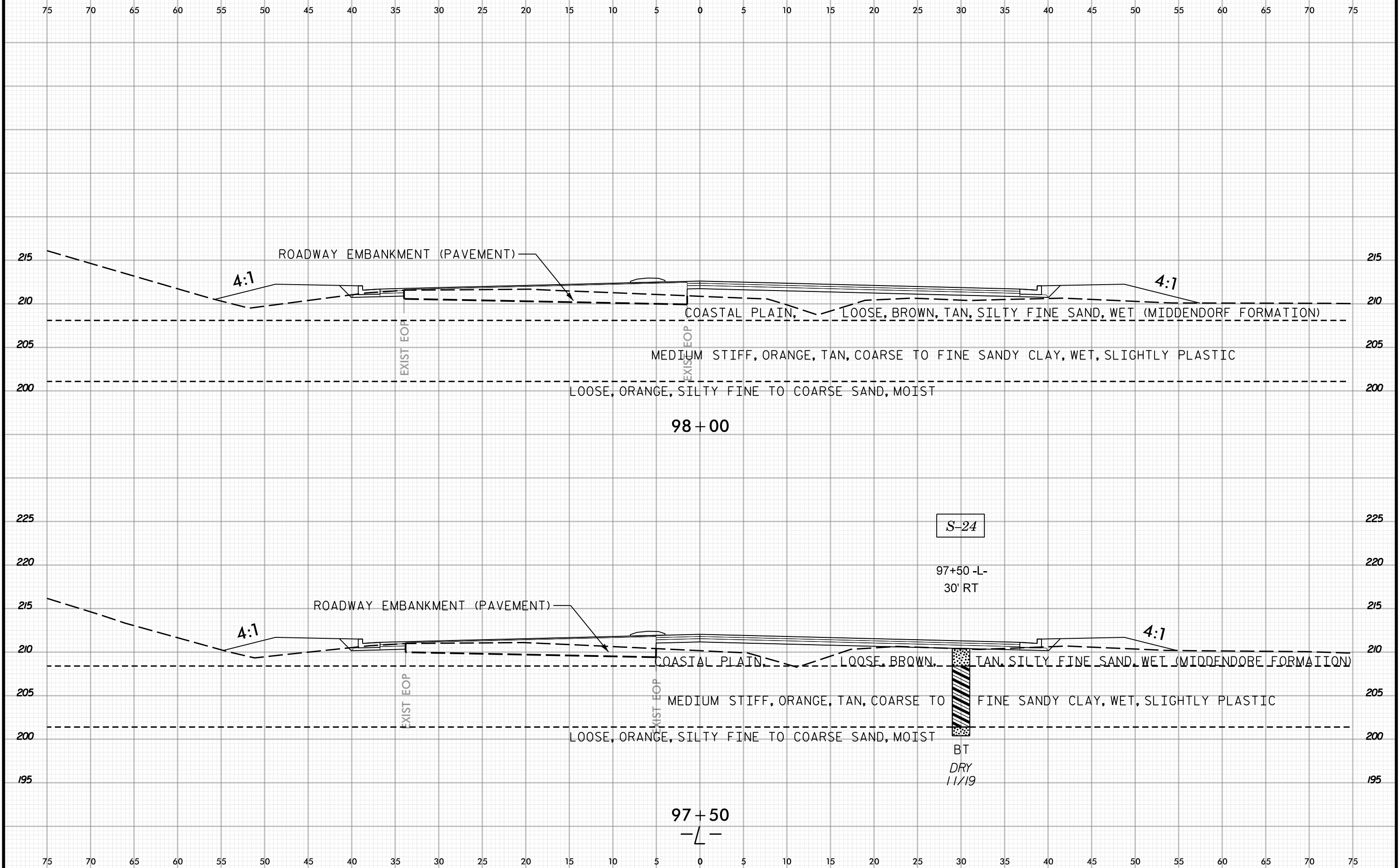
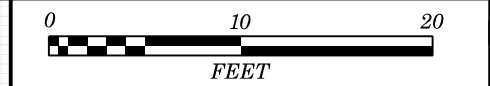


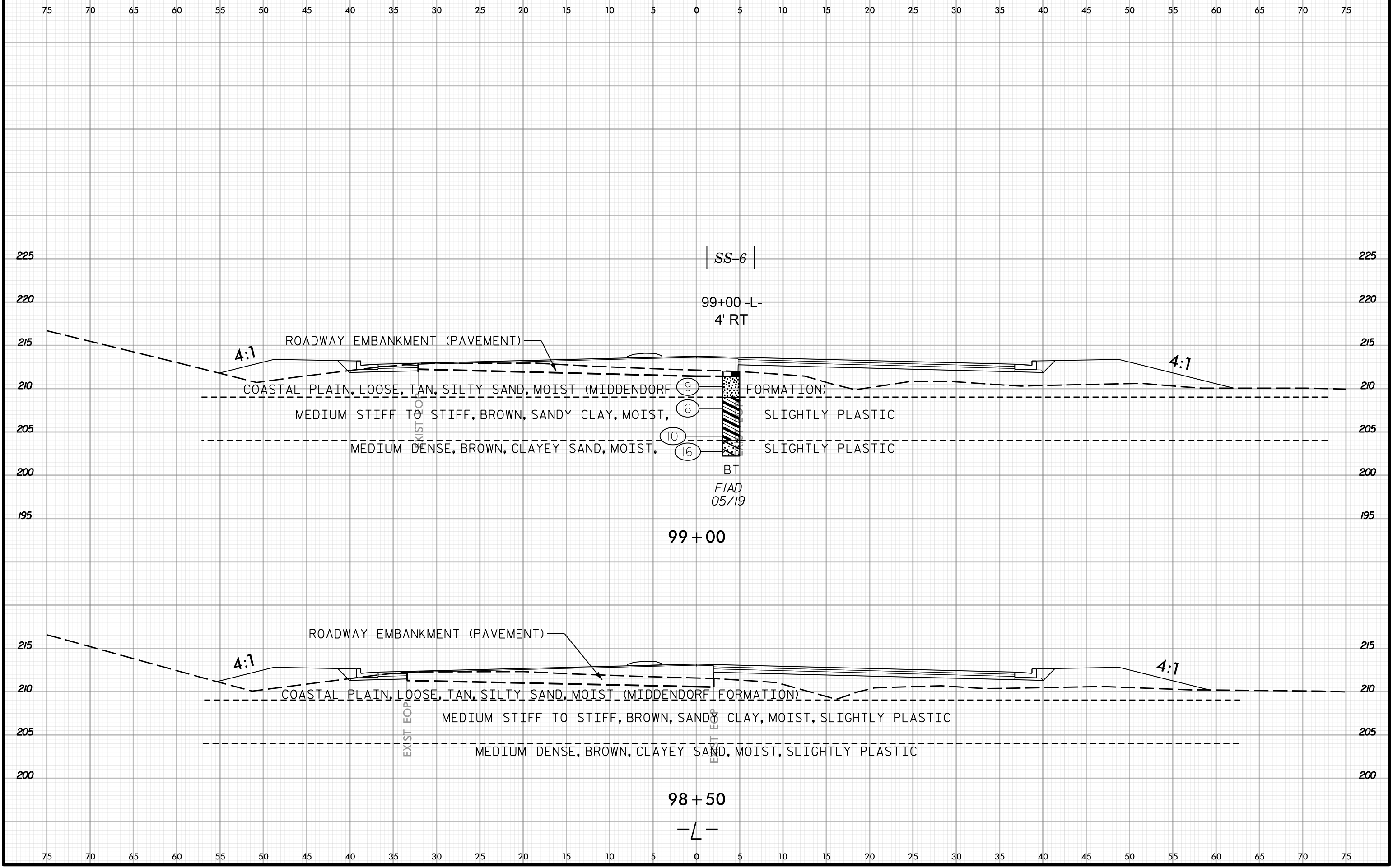
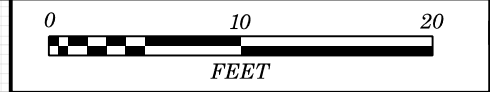
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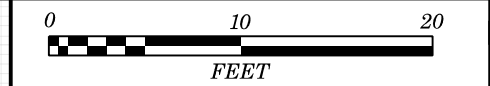




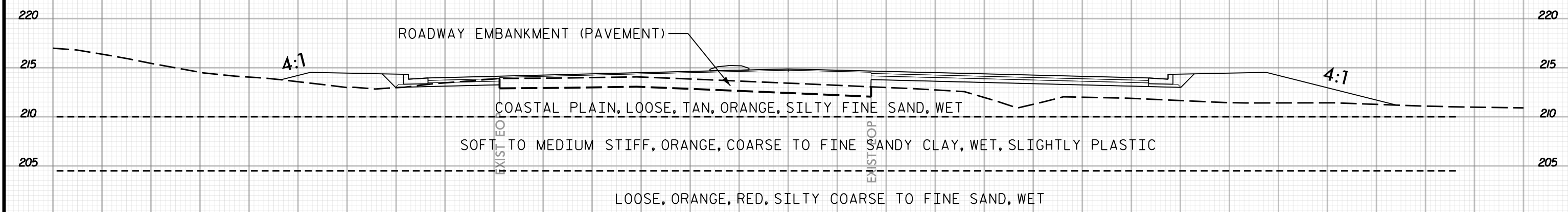




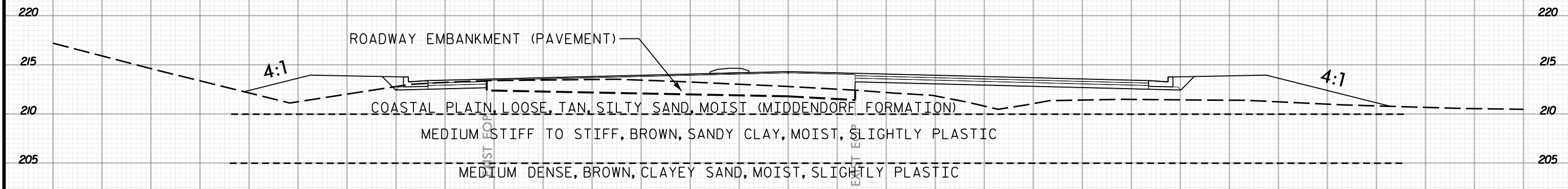




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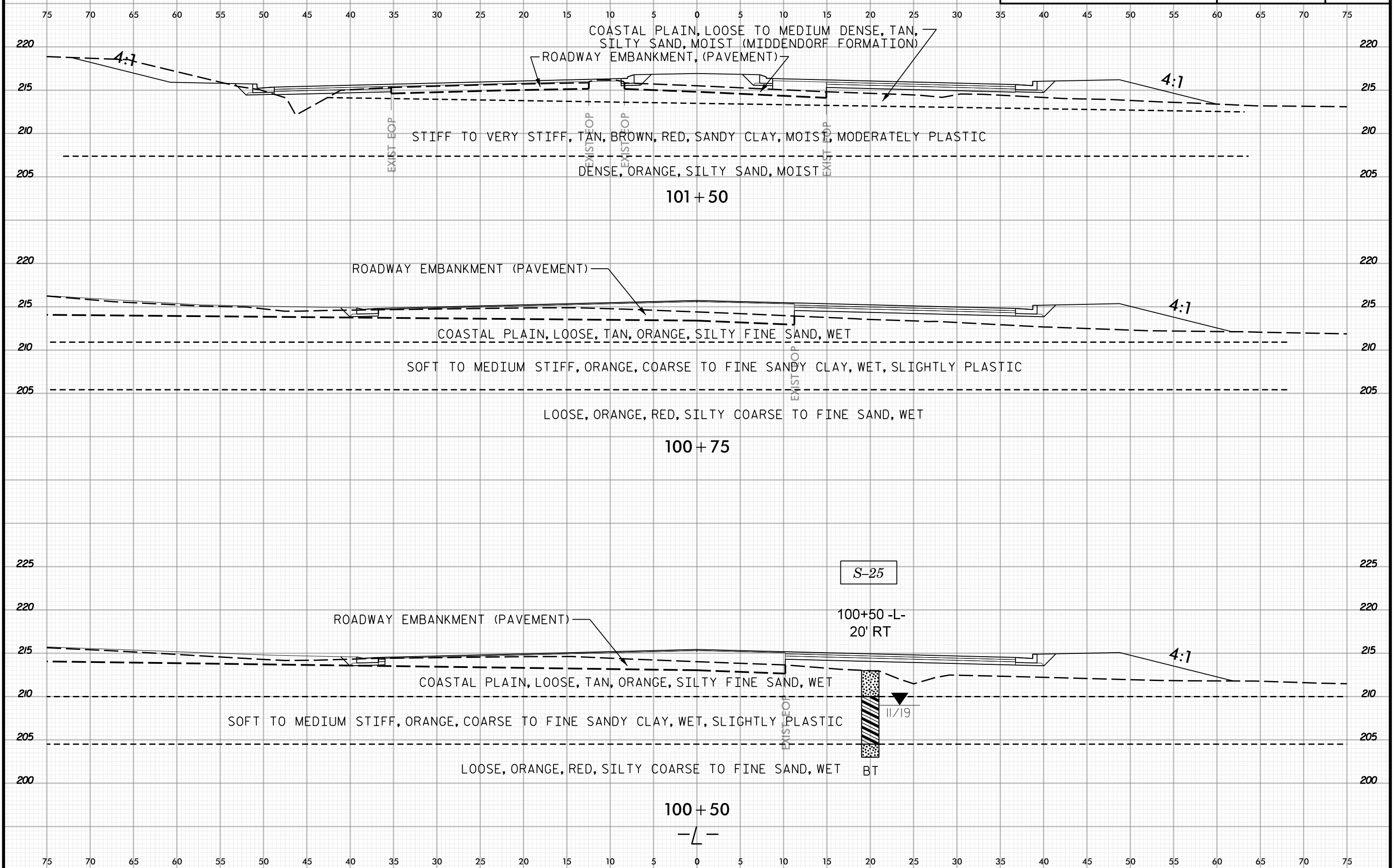
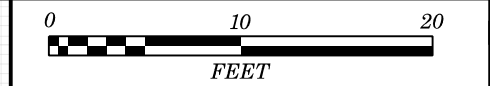
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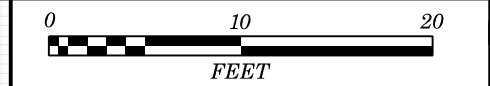


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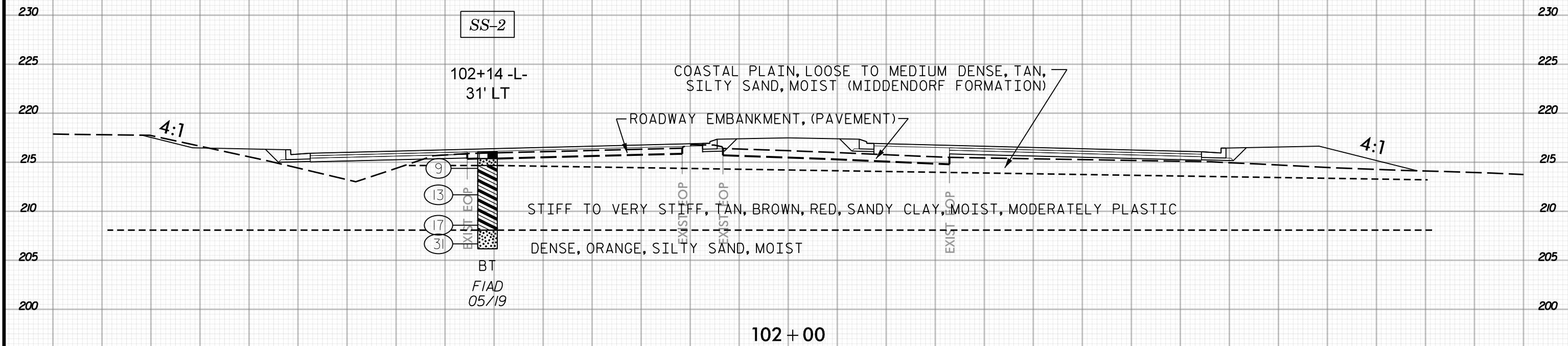
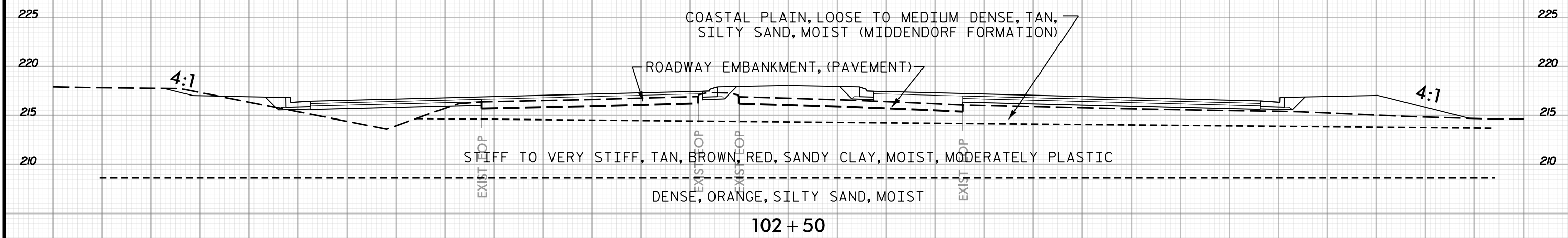
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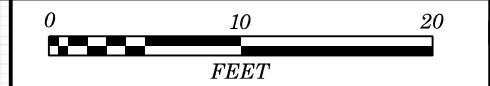




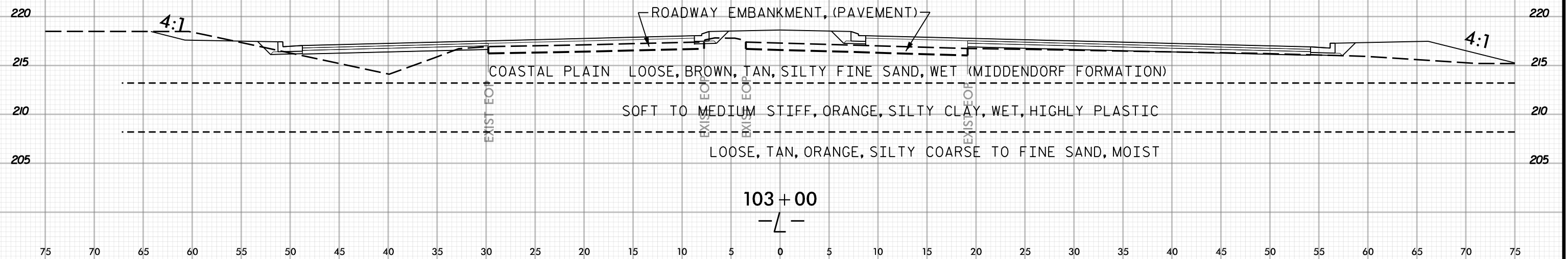
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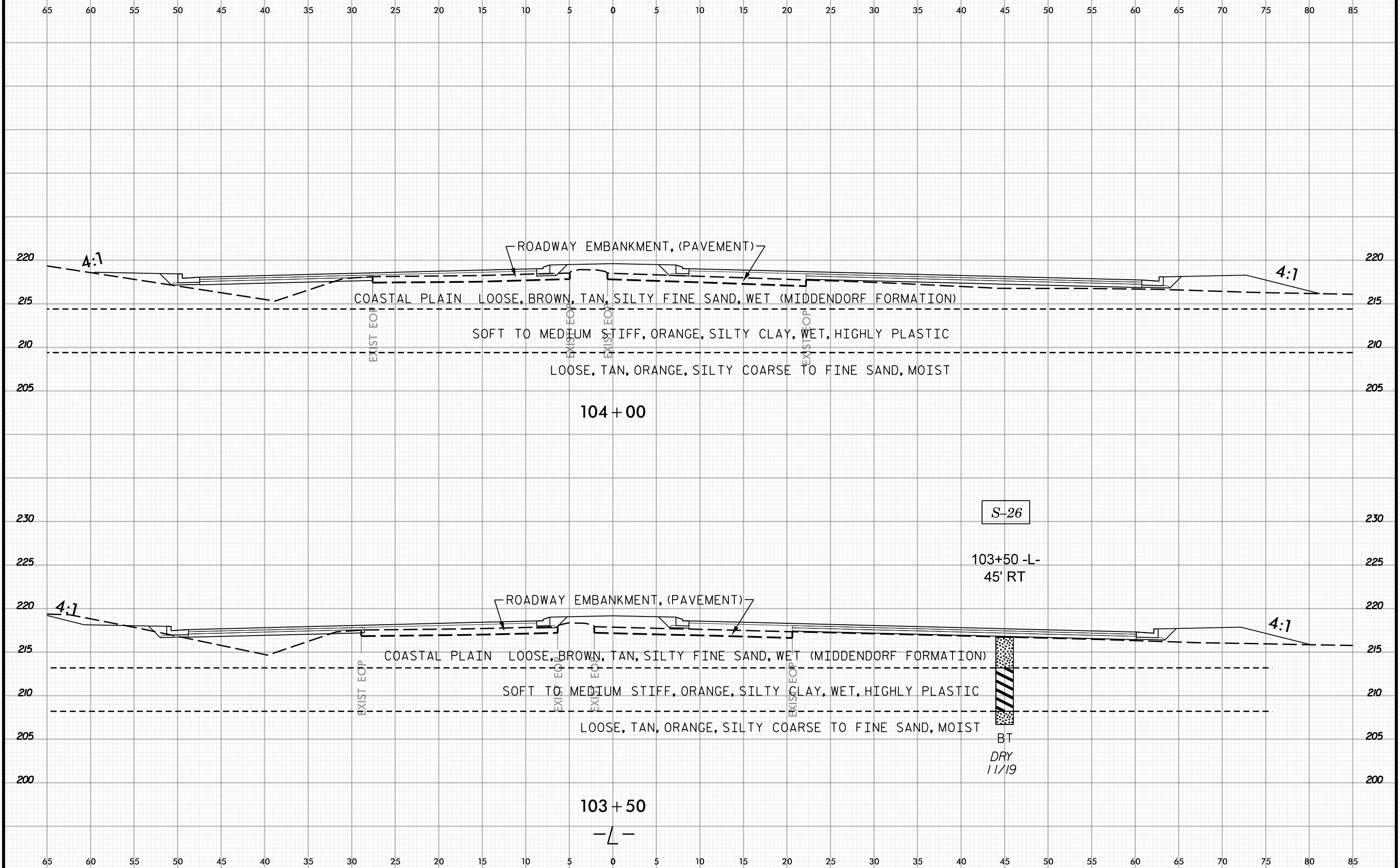
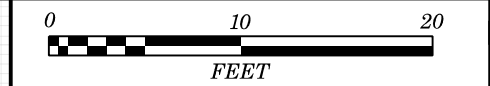


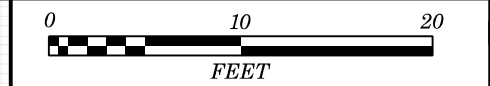
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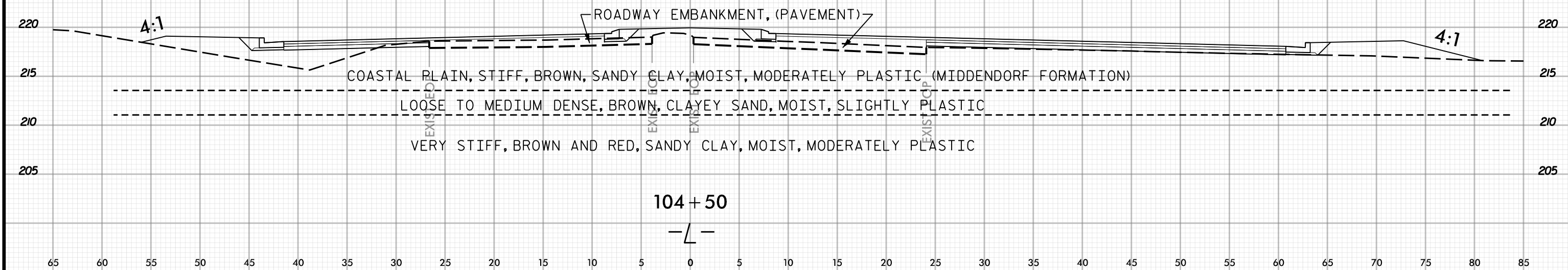
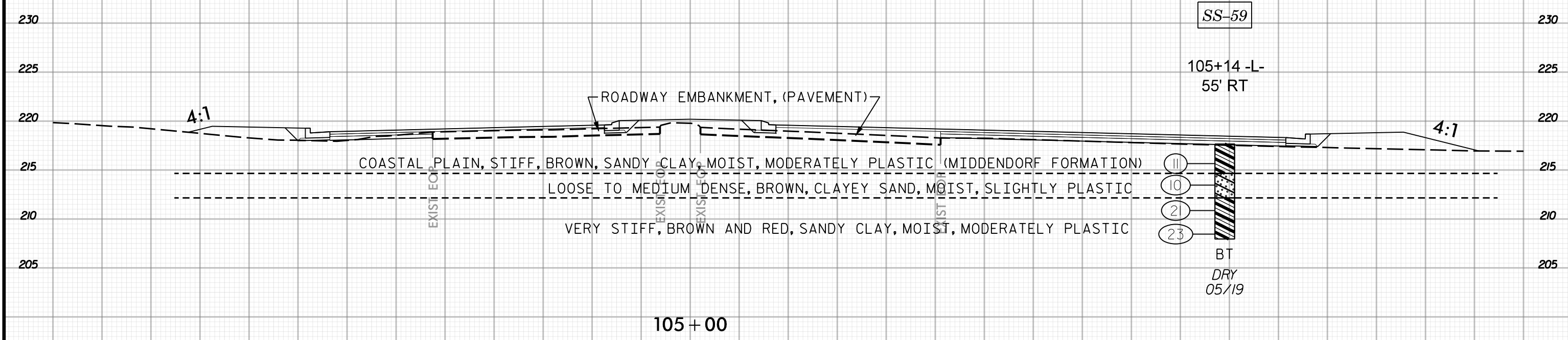
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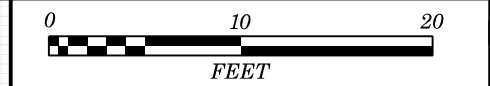




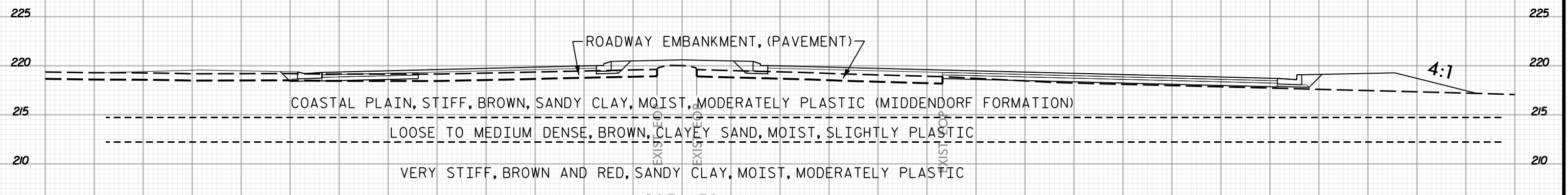
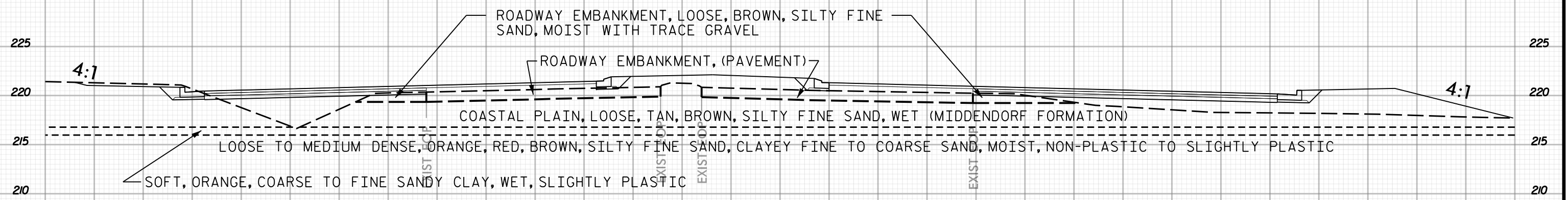
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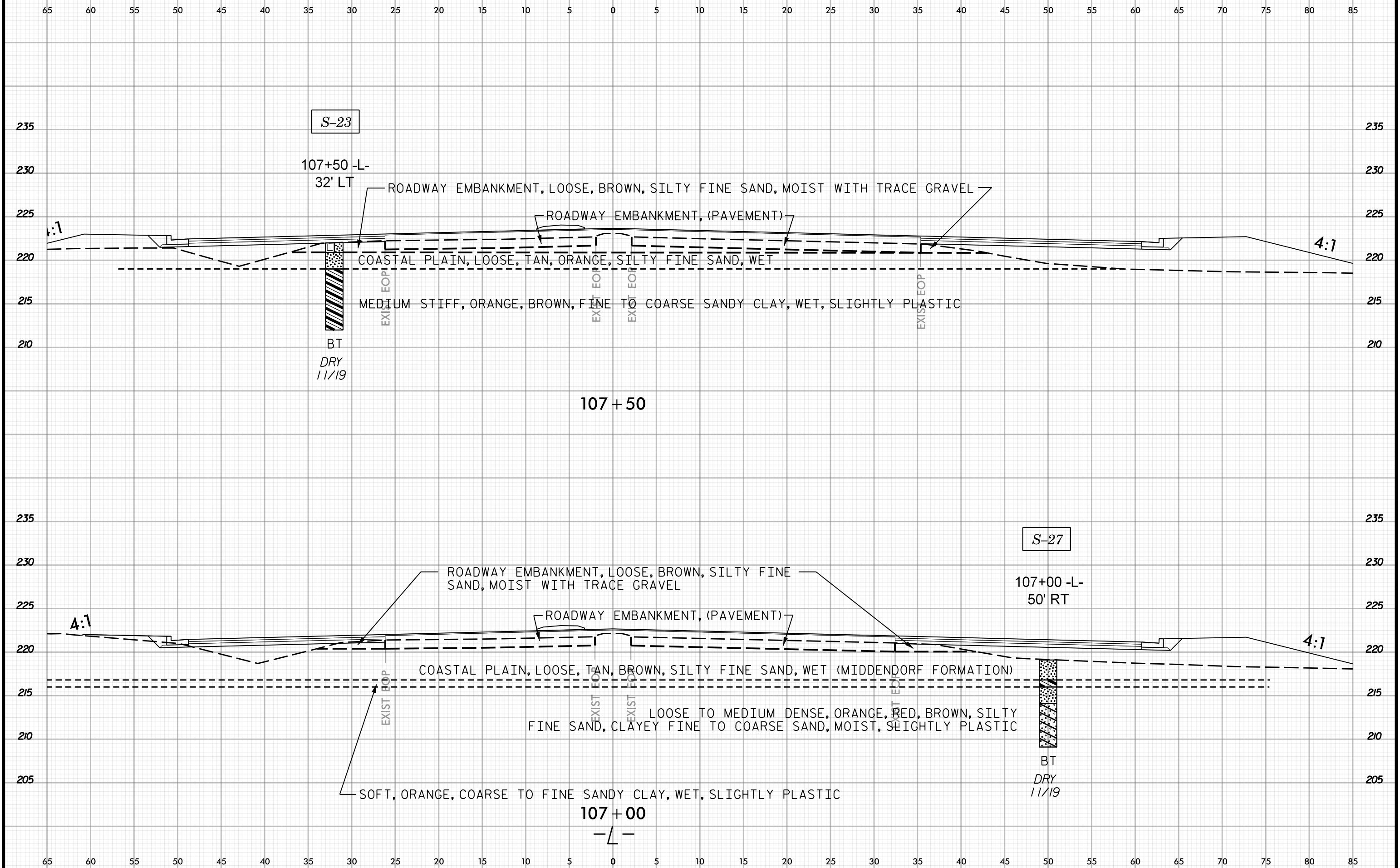
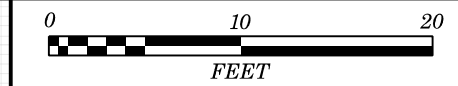
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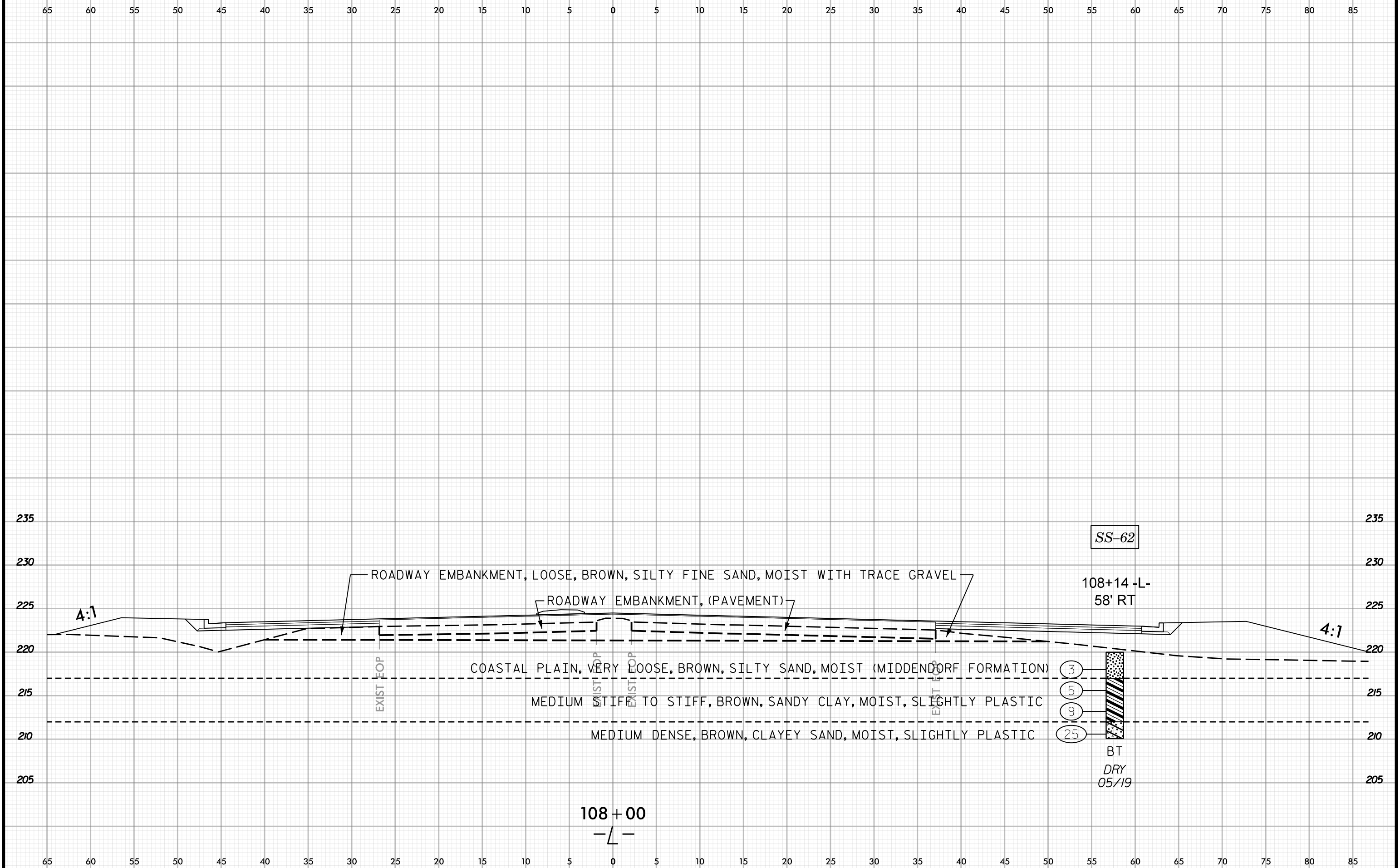
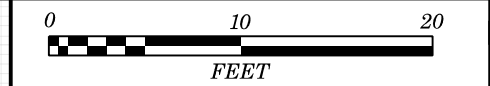


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65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85





ROADWAY EMBANKMENT, LOOSE, BROWN, SILTY FINE SAND, MOIST WITH TRACE GRAVEL

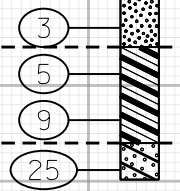
ROADWAY EMBANKMENT, (PAVEMENT)

EXIST EOP

COASTAL PLAIN, VERY LOOSE, BROWN, SILTY SAND, MOIST (MIDDENDORF FORMATION)

MEDIUM STIFF TO STIFF, BROWN, SANDY CLAY, MOIST, SLIGHTLY PLASTIC

MEDIUM DENSE, BROWN, CLAYEY SAND, MOIST, SLIGHTLY PLASTIC



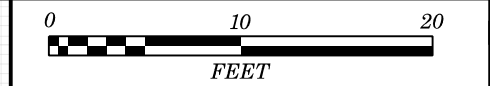
BT
DRY
05/19

SS-62

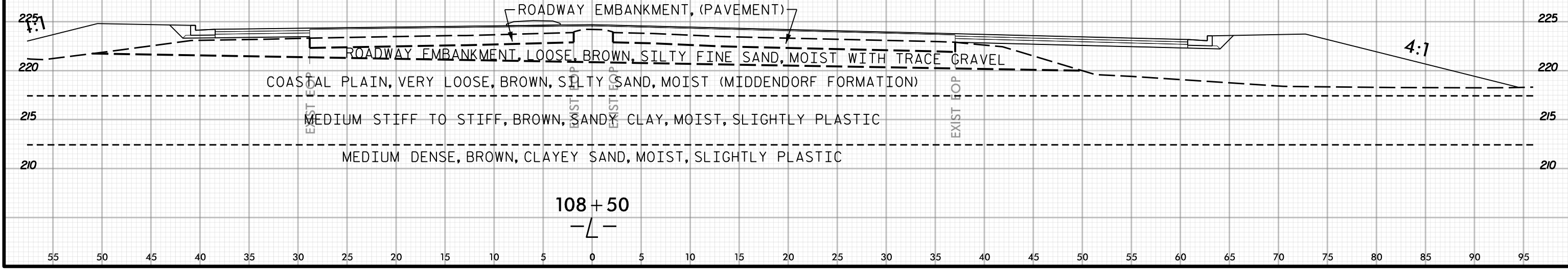
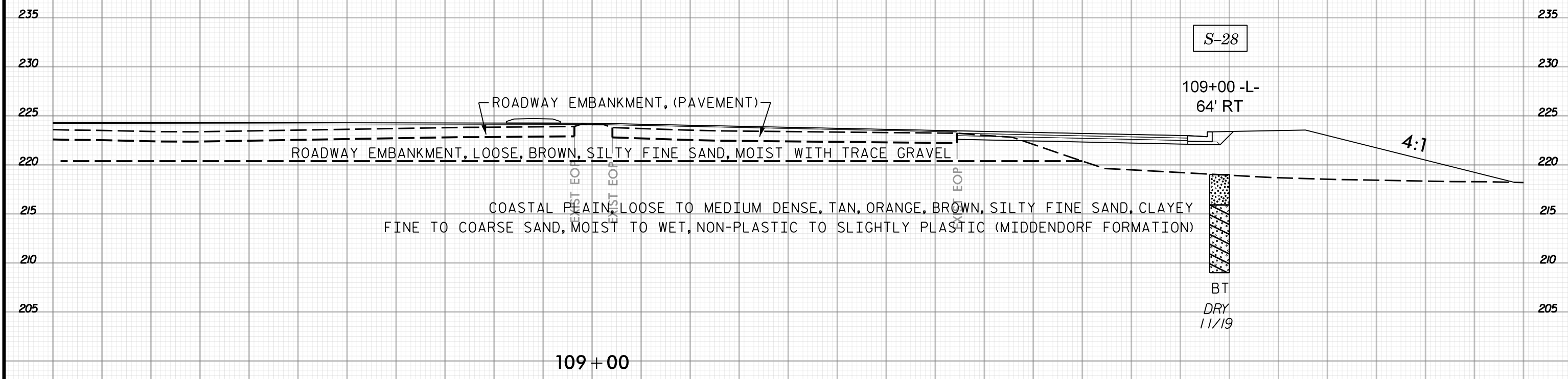
108+14 -L-
58' RT

108+00

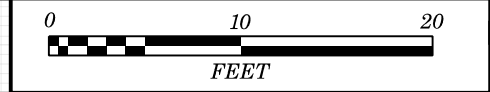
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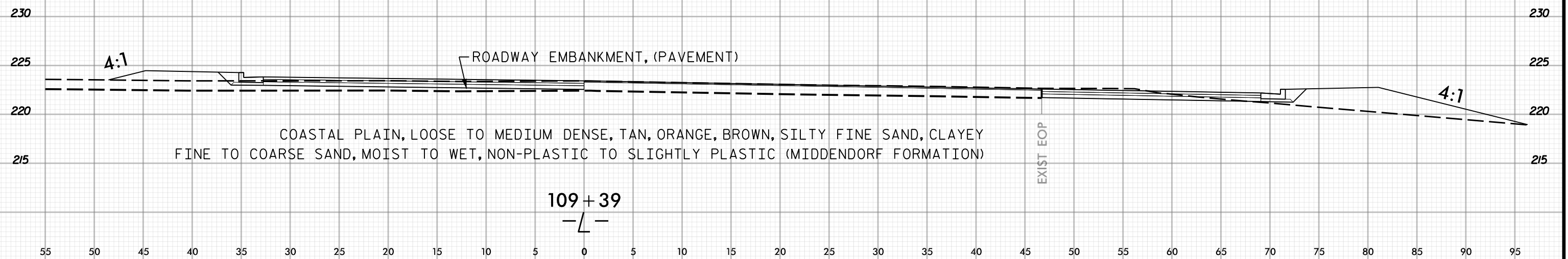
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55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95



55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95



PROJECT: 44369.1.2

REFERENCE: U-5798A

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5798A	65	67

APPENDIX A
LABORATORY TESTING SUMMARY

SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation



S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
S&ME Project #:	6235-19-007	Date Report:	6/21/2019
State Project No.:	44369.1.2	County:	Cumberland/Hoke
Federal ID No.:	N/A	TIP No.:	U-5798A
Project Name: Widening of SR 1102/1420 (Gillis Hill Rd.) from North of SR 1112 (Stoney Point Rd.) to US 401 (Raeford Rd.)			
Client Name: NCDOT GEU		Client Address: Raleigh, NC	

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
						Sieve #				Coarse Sand	Fine Sand	Silt	Clay				
						10	40	60	200								
SS-2	102+14	31 LT	-L-	1.4-2.2	A-6(3)	100	81	68	43.3	32	28	10	30	34	17	17	15.5
SS-6	99+00	4 RT	-L-	3.3-4.8	A-6(1)	100	86	70	38.4	30	36	5	29	31	18	13	14.5
SS-37	51+50	36 RT	-L-	6.1-7.6	A-7-6(4)	100	78	61	40.5	39	23	4	34	43	21	22	14.7
SS-40	84+35	55 RT	-L-	5.9-7.4	A-4(2)	100	97	93	53.8	7	49	16	28	24	14	10	22.1
SS-42	87+00	77 LT	-L-	0.8-2.3	A-2-6(0)	99	63	40	20.3	60	21	5	14	32	18	14	-
SS-43	87+00	77 LT	-L-	2.8-4.3	A-7-6(45)	100	99	98	90.8	2	11	15	72	70	27	43	27.7
SS-50	93+18	52 RT	-L-	1.0-2.5	A-7-6(7)	100	85	73	46.8	27	30	6	37	44	21	23	18.2
SS-55	96+15	39 RT	-L-	5.9-7.4	A-2-7(0)	98	63	42	27.1	58	16	5	21	41	22	19	-
SS-59	105+14	55 RT	-L-	5.8-7.3	A-6(4)	100	84	74	47.0	26	33	12	29	35	19	16	12.0
SS-62	108+14	58 RT	-L-	3.4-4.9	A-6(1)	100	80	62	36.0	38	31	8	23	27	14	13	12.4
SS-64	81+00	23 LT	-L-	1.0-2.5	A-4(1)	100	96	90	50.0	10	50	19	21	21	14	7	19.0
SS-70	69+63	54 LT	-L-	3.4-4.9	A-2-6(1)	100	79	60	34.0	40	29	6	25	35	19	16	-
SS-76	72+97	24 LT	-L-	6.0-7.5	A-2-4(0)	100	81	66	25.4	34	44	6	16	23	15	8	-
SS-112	78+46	13 RT	-L-	28.0-29.5	A-6(5)	99	72	55	42	44	14	5	37	37	15	22	20.7
SS-113	78+46	13 RT	-L-	33.0-34.5	A-7-6(41)	100	100	100	98	1	3	24	72	57	19	38	28.0
SS-164	75+39	85 LT	-L-	0.0-1.5	A-2-4(0)	96	67	53	25	45	31	12	12	23	15	8	-
SS-173	75+39	85 LT	-L-	44.0-45.0	A-6(18)	100	94	93	86	8	10	30	52	40	19	21	19.9
S-2	66+48	41 RT	-L-	1.2-2.0	A-6(6)	100	86	73	49.4	27	28	13	32	35	14	21	16.0
S-3	63+48	17 RT	-L-	4.0-5.0	A-6(4)	100	84	72	40.3	28	36	9	27	38	17	21	20.4
ST-2	78+46	13 RT	-L-	16.0-18.0	A-7-6(27)	100	87	81	67	19	15	4	62	64	22	42	27.7

References / Comments / Deviations: ND=Not Determined. NP=Non-Plastic.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET

Technician Name:

Signature

104-01-0703

Certification #

Thomas J. Daily, PE

Technical Responsibility:

Project Manager

Position

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