

PROJECT: 17BP.8.R.119 REFERENCE: SF-620014

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-620014	1	21

**ROADWAY**  
**SUBSURFACE INVESTIGATION**

COUNTY MOORE  
 PROJECT DESCRIPTION BRIDGE NO. 14 IN SR 1102  
(THUNDER RD.) OVER HORSE CREEK

**INVENTORY**

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3	ROADWAY TITLE SHEET
3A	GEOTECHNICAL REPORT - INVENTORY
4	PLAN SHEET
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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) 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:
1. 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.
  2. 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

B. JOHNSON  
R. TOOTHMAN  
W. ALLEN

INVESTIGATED BY B. JOHNSON  
 DRAWN BY B. JOHNSON  
 CHECKED BY X. BARRETT  
 SUBMITTED BY KLEINFELDER, INC.  
 DATE APRIL 2017

Prepared in the Office of:



**KLEINFELDER**  
 Bright People. Right Solutions.

7343 WEST FRIENDLY AVE, SUITE B  
 GREENSBORO, NC 27410  
 NC FIRM LICENSE NO. F-1134



DocuSigned by:  
Xavier Barrett 5/4/2017  
 2D00374F688E407 SIGNATURE DATE

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

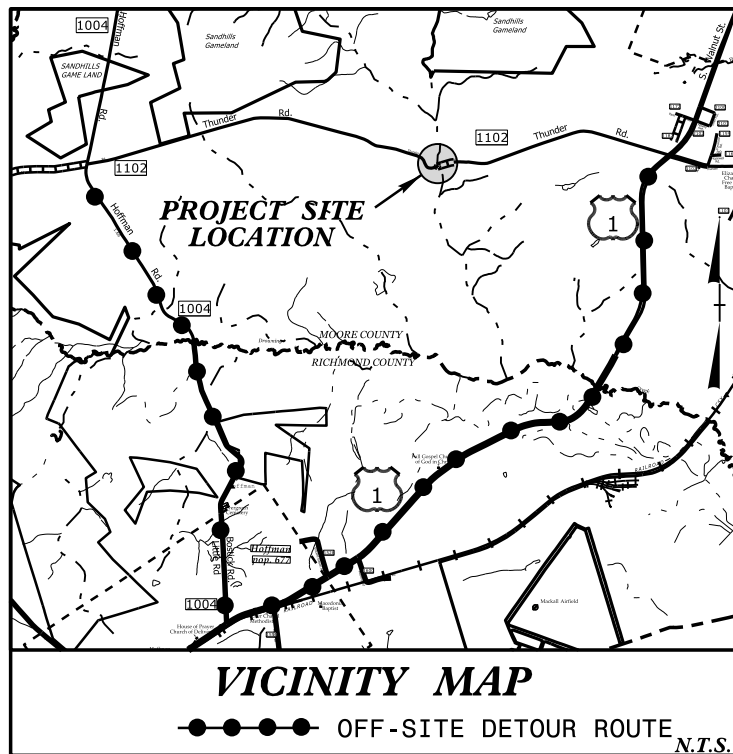


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**CONTRACT: TIP PROJECT: 17BP.8.R.119**

**CONTRACT:**

See Sheet 1A For Index of Sheets



CFI Plans 11/17/16

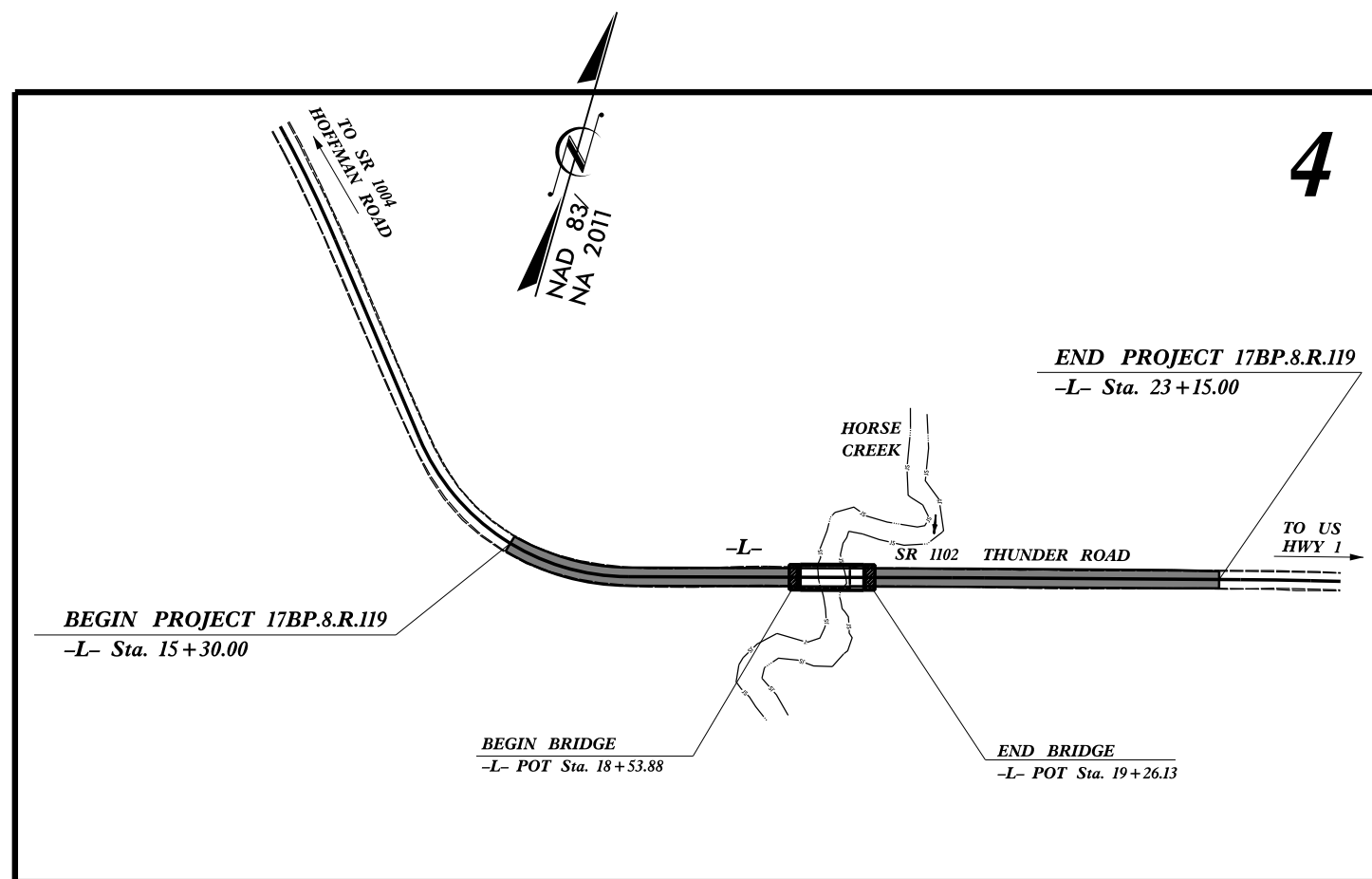
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**MOORE COUNTY**

**LOCATION: BRIDGE NO. 620014 ON SR 1102 (THUNDER ROAD)  
OVER HORSE CREEK**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.8.R.119	3	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
17BP.8.R.119		PE	



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO LIMITS ESTABLISHED BY METHOD \_\_\_\_.

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

<p style="text-align: center;"><b>GRAPHIC SCALES</b></p> <p style="text-align: center;">50 0 50 100 PLANS</p> <p style="text-align: center;">50 0 50 100 PROFILE (HORIZONTAL)</p> <p style="text-align: center;">10 0 10 20 PROFILE (VERTICAL)</p>	<p style="text-align: center;"><b>DESIGN DATA</b></p> <p>ADT 2013 = 1200 ADT 2025 = 2400</p> <p>K = % D = % T = 6 % * V = 60 MPH</p> <p>* TTST = DUAL FUNC CLASS = LOCAL SUBREGIONAL TIER</p>	<p style="text-align: center;"><b>PROJECT LENGTH</b></p> <p>LENGTH ROADWAY PROJECT 17BP.8.R.119 = 0.135 mi</p> <p>LENGTH STRUCTURE PROJECT 17BP.8.R.119 = 0.014 mi</p> <p>TOTAL LENGTH OF PROJECT 17BP.8.R.119 = 0.149 mi</p>	<p style="text-align: center;"><small>PLANS PREPARED BY:</small> <b>CH ENGINEERING</b> <small>3220 GLEN ROYAL RD. RALEIGH, NC 27617 TELE: 919.788.0224 FAX: 919.788.0232 NC LICENSE #19189</small></p> <p style="text-align: center;"><small>PLANS PREPARED FOR:</small> <b>DIVISION OF HIGHWAYS DIVISION 8</b> <small>902 N Sandhills Blvd Aberdeen, NC 28315</small></p> <hr/> <p style="text-align: center;"><small>RIGHT OF WAY DATE:</small> DECEMBER 2016</p> <hr/> <p style="text-align: center;"><small>LETTING DATE:</small> JUNE 2017</p>	<p style="text-align: center;"><small>BRIAN A. WILES, PE</small> PROJECT ENGINEER</p> <hr/> <p style="text-align: center;"><small>TIM WELCH, PE</small> NCDOT CONTACT DIV 8 BRIDGE PROGRAM MANAGER</p>	<p style="text-align: center;"><b>HYDRAULICS ENGINEER</b></p> <p style="text-align: center;">SIGNATURE: _____ P.E.</p> <p style="text-align: center;"><b>ROADWAY DESIGN ENGINEER</b></p> <p style="text-align: center;">SIGNATURE: _____ P.E.</p>	
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April 10, 2017

**STATE PROJECT:** 17BP.8.R.119 (SF-620014)  
**PROJECT ID:** 29448  
**COUNTY:** Moore  
**DESCRIPTION:** Bridge No. 14 on SR 1102 (Thunder Rd.) over Horse Creek

**SUBJECT:** GEOTECHNICAL REPORT - INVENTORY

**PROJECT DESCRIPTION**

This project consists of the reconstruction of SR 1102 (-L-) which is a two lane roadway as part of the replacement of Bridge No. 14 over Horse Creek.

The geotechnical investigation was conducted in January of 2017. Standard Penetration Test borings were advanced with a CME 55 utilizing an automatic hammer. Hand auger borings were also completed. Representative soil samples were collected for visual classification in the field.

The following alignment, totaling 785 feet, was investigated. Subsurface profiles and cross sections of these alignments are included in this report.

<u>LINE</u>	<u>STATIONS</u>
-L-	15+30 to 23+15

**AREAS OF SPECIAL GEOTECHNICAL INTEREST**

Moderately to Highly Plastic Clays: Moderate to Highly plastic clays (PI > 15) were encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	15+30 to 21+50	LT to RT

A discussion of these moderate to highly plastic clay soils is located below in the section titled "Soil Properties".

Moderately to Highly Organic Soils: Moderate to Highly organic soils were encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	15+70 to 21+30	LT to RT

**PHYSIOGRAPHY AND GEOLOGY**

The project is located in the Coastal Plain Physiographic Province. The project corridor is comprised primarily of undeveloped properties. The general topography along the project consists of moderate slopes.

Geologically, materials in the project area generally consist of Cape Fear Formation soils underlain by residual soils, weathered rock, and crystalline rock. The underlying bedrock primarily consists of granite.

**SOIL PROPERTIES**

Materials encountered during this investigation are separated into four categories based on origin. They consist of roadway embankment, alluvial, coastal plain – Cape Fear Formation, and residual.

Roadway Embankment soils are present along the existing roadway (-L-) on the project. These soils consist of moist, very loose to medium dense, non-plastic to slightly plastic, fine to coarse sands, and clayey, fine to coarse sands (A-1,A-3, A-2-6).

Soils identified as alluvial consist of moist to wet, very soft to soft, slightly plastic to highly plastic, fine sandy clays and silty clays (A-6, A-7), moist to wet, loose to medium dense, non-plastic to slightly plastic, fine to coarse sandy gravels, fine to coarse sands, clayey, fine to coarse sands (A-1, A-3,A-2-6), and muck.

Soils identified as coastal plain – Cape Fear Formation consist of moist, very stiff to hard, slightly to moderately plastic, fine to coarse sandy clays (A-6) and moist to wet, very dense, slightly plastic, clayey, fine to coarse sands (A-2-6).

Soils identified as residual consist of moist, very dense, slightly plastic, silty, fine to coarse sands and clayey, fine to coarse sands (A-2-4, A-2-6), and moist, hard, slightly plastic, fine to coarse sandy clays (A-6).

**ROCK PROPERTIES**

Weathered rock was encountered along the existing roadway (-L-) at elevations ranging from 256.0 to 265.8 feet (MSL). The weathered rock consists of gray granite. Crystalline rock was encountered along the existing roadway (-L-) at elevations ranging from 249.5 to 280.6 feet (MSL). The crystalline rock consists of granite.

**GROUNDWATER**

Groundwater was encountered along the existing roadway (-L-) at elevations ranging from 289.9 to 290.7 feet (MSL). Some fluctuation in groundwater levels can occur with climatic and seasonal variations. Therefore, subsurface water conditions at other times may be different from those described in this report.

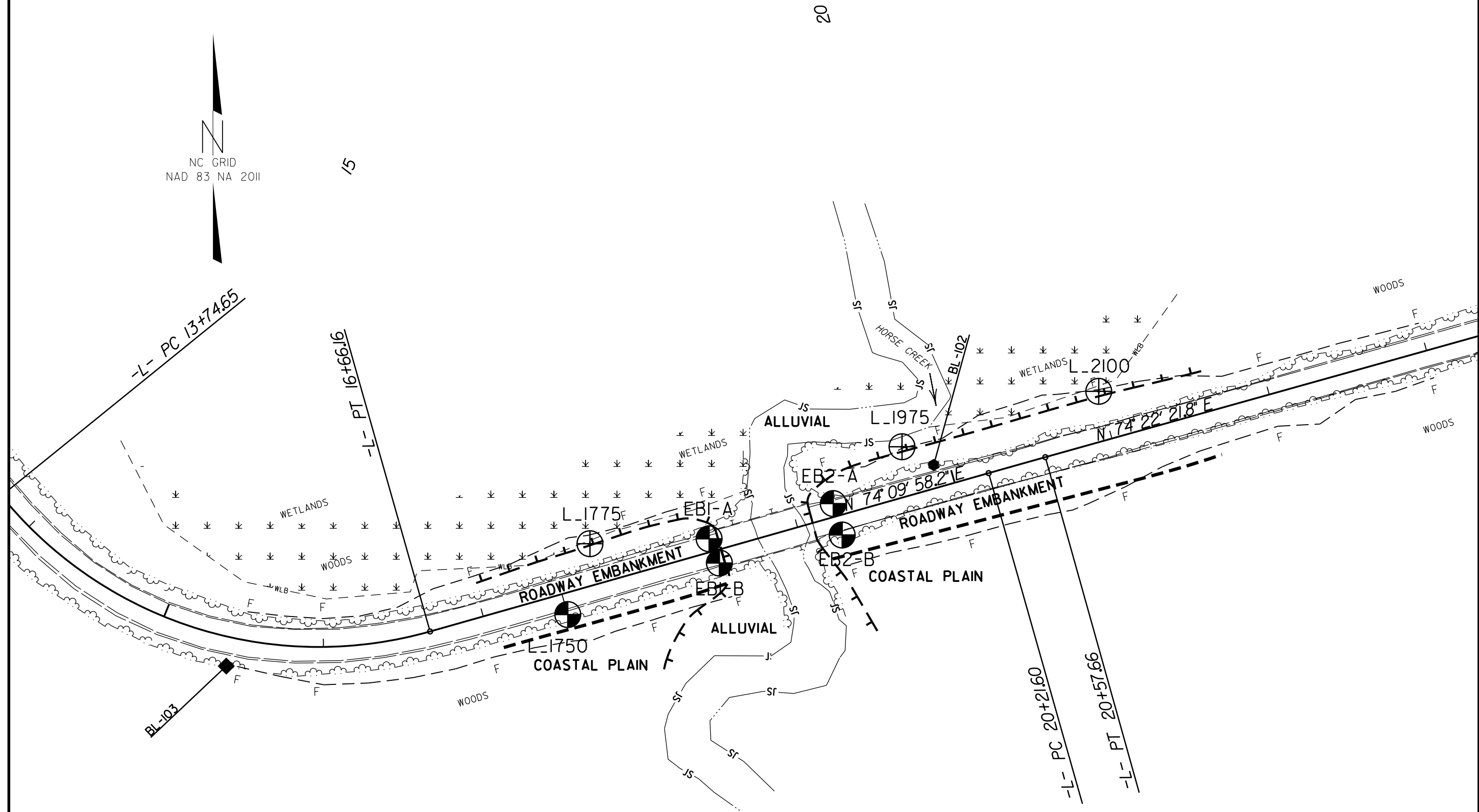
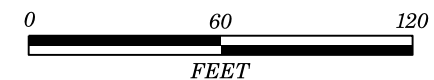
**KLEINFELDER**  
Prepared by,

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*Ben Johnson*  
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Benjamin A. Johnson, EI  
Staff Professional

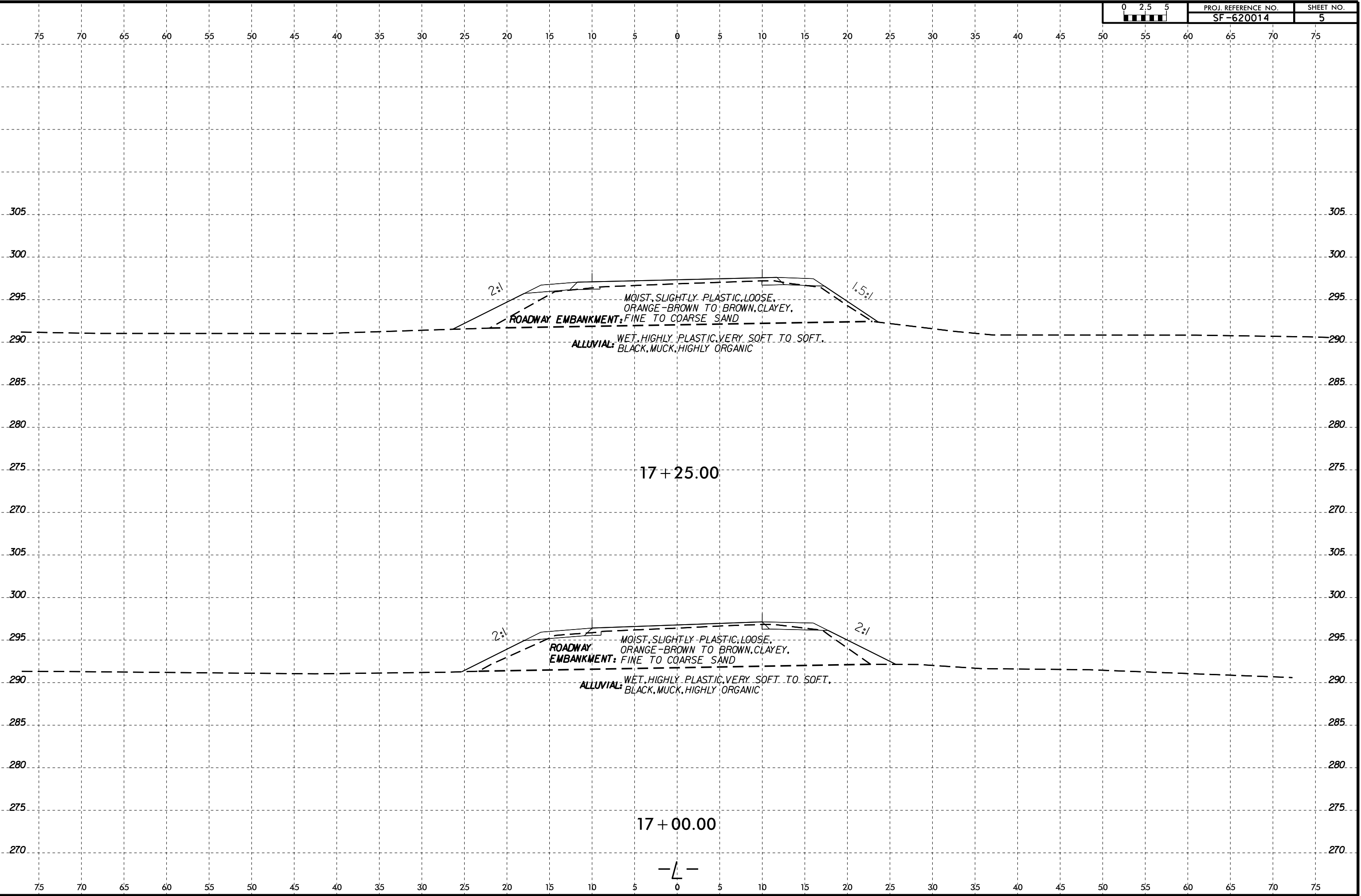
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*Xavier Barrett*  
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Xavier C. Barrett, PE  
Principal Professional

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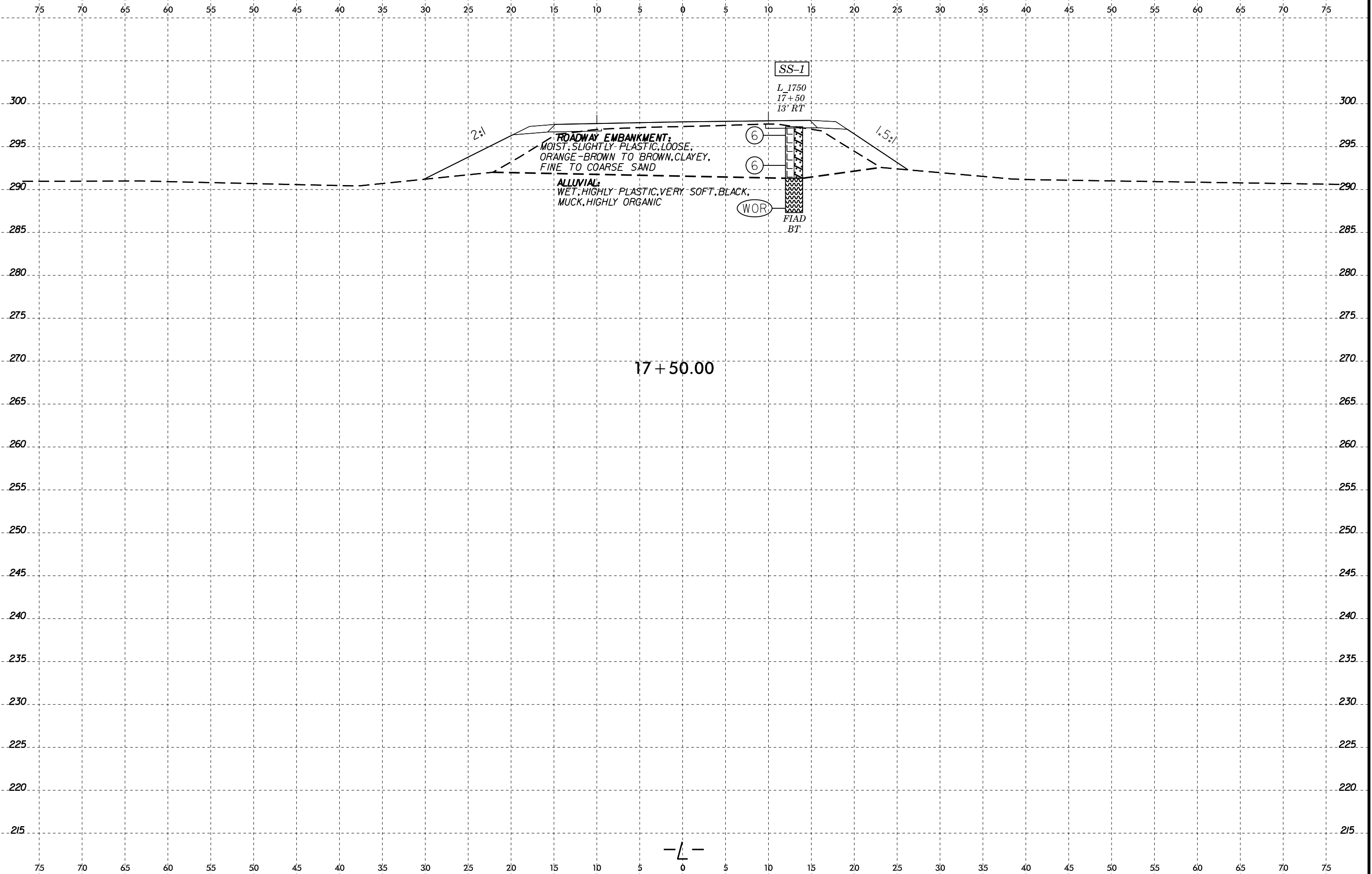
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Wells At KA20215



**ROADWAY EMBANKMENT:**  
MOIST, SLIGHTLY PLASTIC, LOOSE,  
ORANGE-BROWN TO BROWN, CLAYEY,  
FINE TO COARSE SAND

**ALLUVIAL:**  
WET, HIGHLY PLASTIC, VERY SOFT, BLACK,  
MUCK, HIGHLY ORGANIC

SS-1

L 1750  
17+50  
13' RT

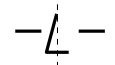
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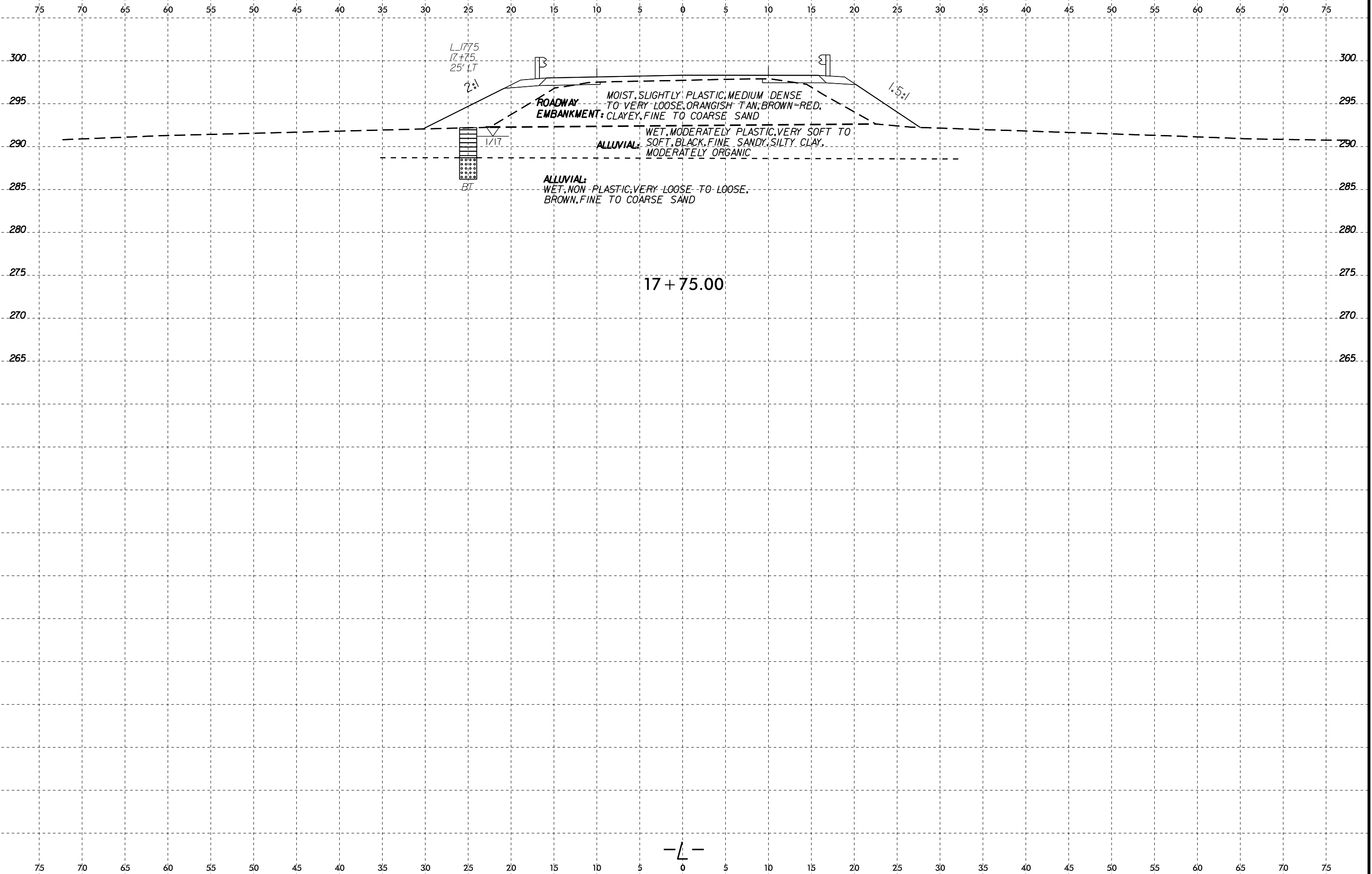
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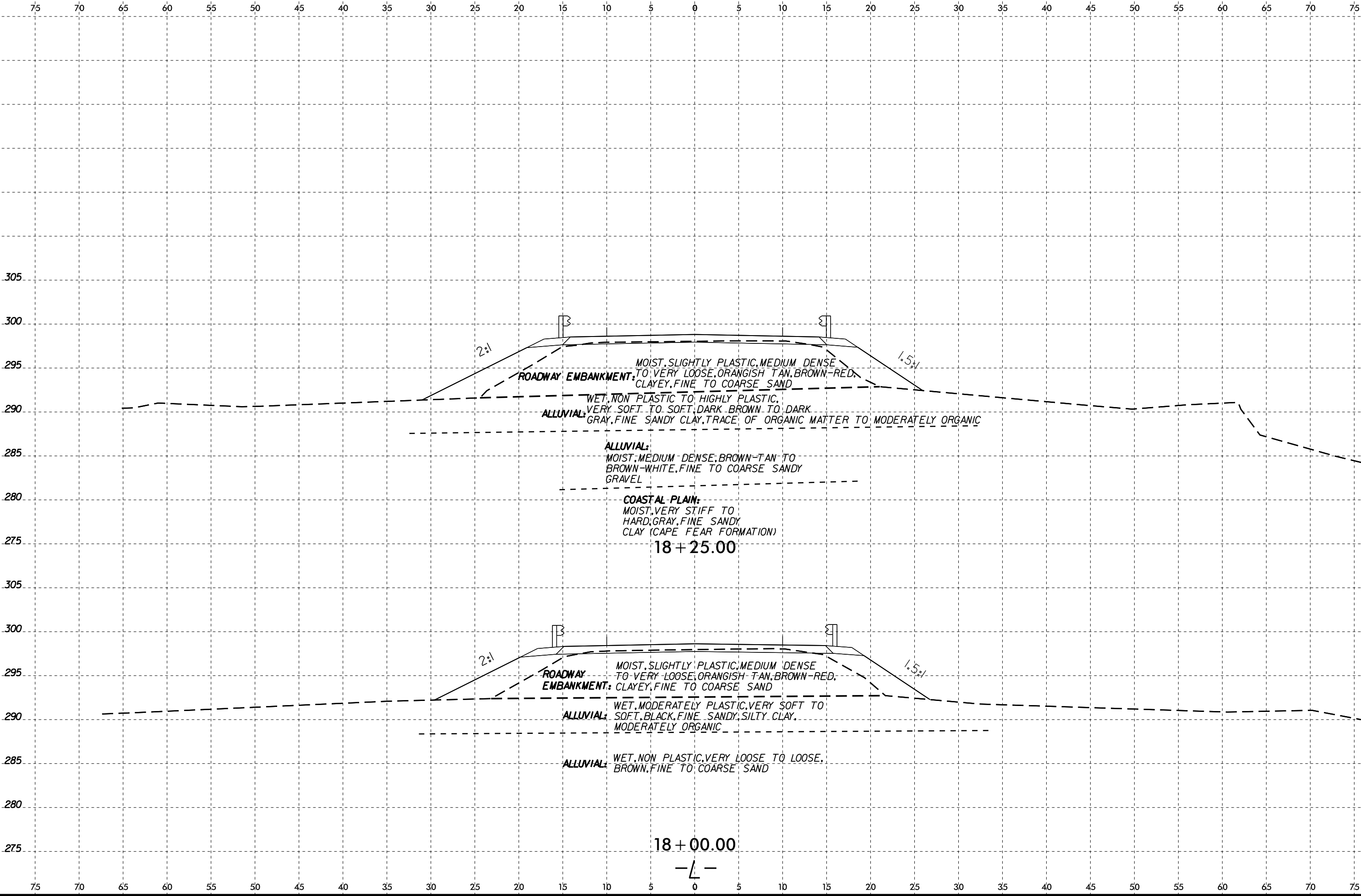
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17 + 75.00

-L-





**ROADWAY EMBANKMENT:** MOIST, SLIGHTLY PLASTIC, MEDIUM DENSE TO VERY LOOSE, ORANGISH TAN, BROWN-RED, CLAYEY, FINE TO COARSE SAND

**ALLUVIAL:** WET, NON PLASTIC TO HIGHLY PLASTIC, VERY SOFT TO SOFT, DARK BROWN TO DARK GRAY, FINE SANDY CLAY, TRACE OF ORGANIC MATTER TO MODERATELY ORGANIC

**ALLUVIAL:** MOIST, MEDIUM DENSE, BROWN-TAN TO BROWN-WHITE, FINE TO COARSE SANDY GRAVEL

**COASTAL PLAIN:** MOIST, VERY STIFF TO HARD, GRAY, FINE SANDY CLAY (CAPE FEAR FORMATION)

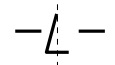
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**ROADWAY EMBANKMENT:** MOIST, SLIGHTLY PLASTIC, MEDIUM DENSE TO VERY LOOSE, ORANGISH TAN, BROWN-RED, CLAYEY, FINE TO COARSE SAND

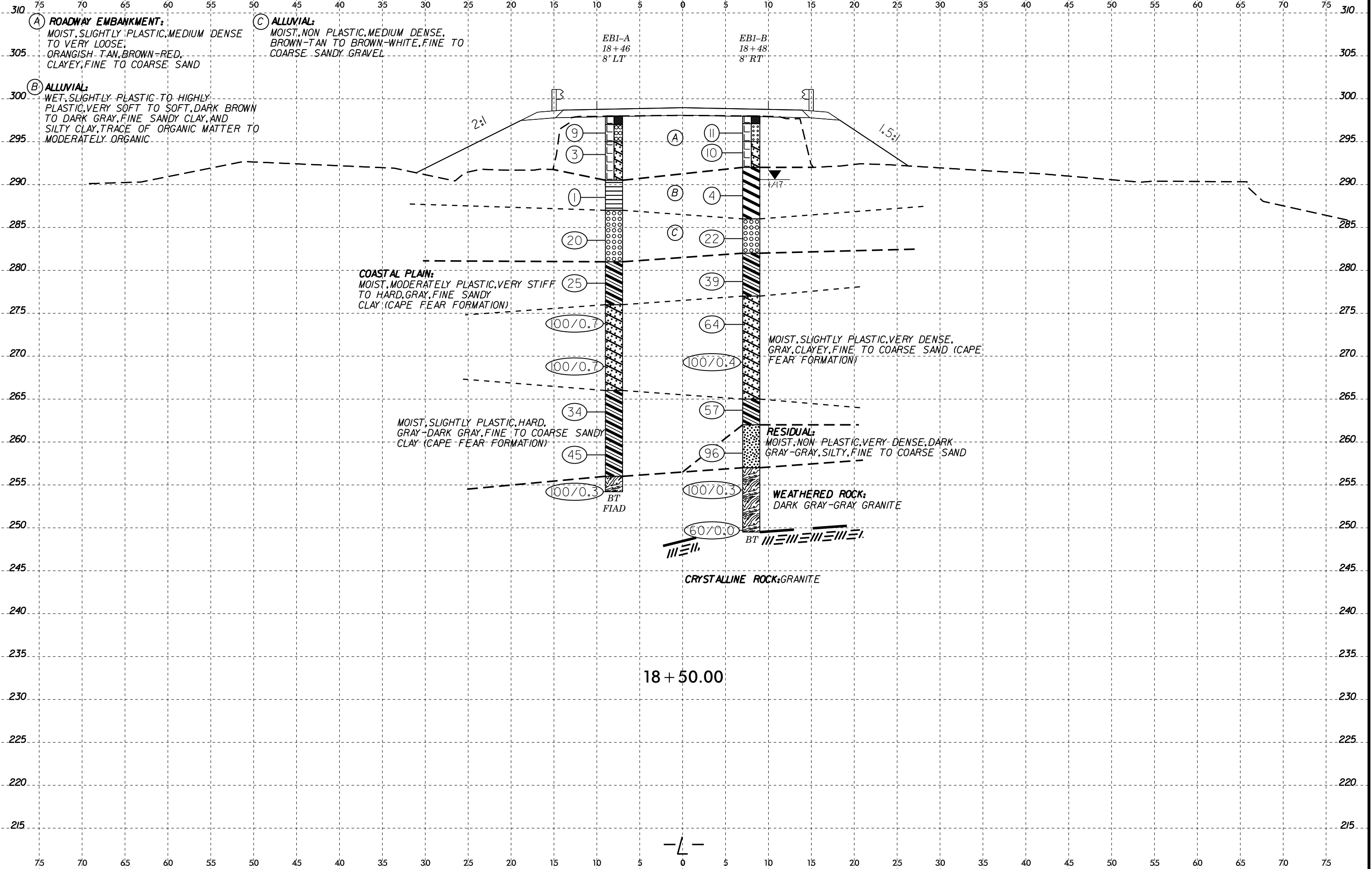
**ALLUVIAL:** WET, MODERATELY PLASTIC, VERY SOFT TO SOFT, BLACK, FINE SANDY, SILTY CLAY, MODERATELY ORGANIC

**ALLUVIAL:** WET, NON PLASTIC, VERY LOOSE TO LOOSE, BROWN, FINE TO COARSE SAND

18 + 00.00



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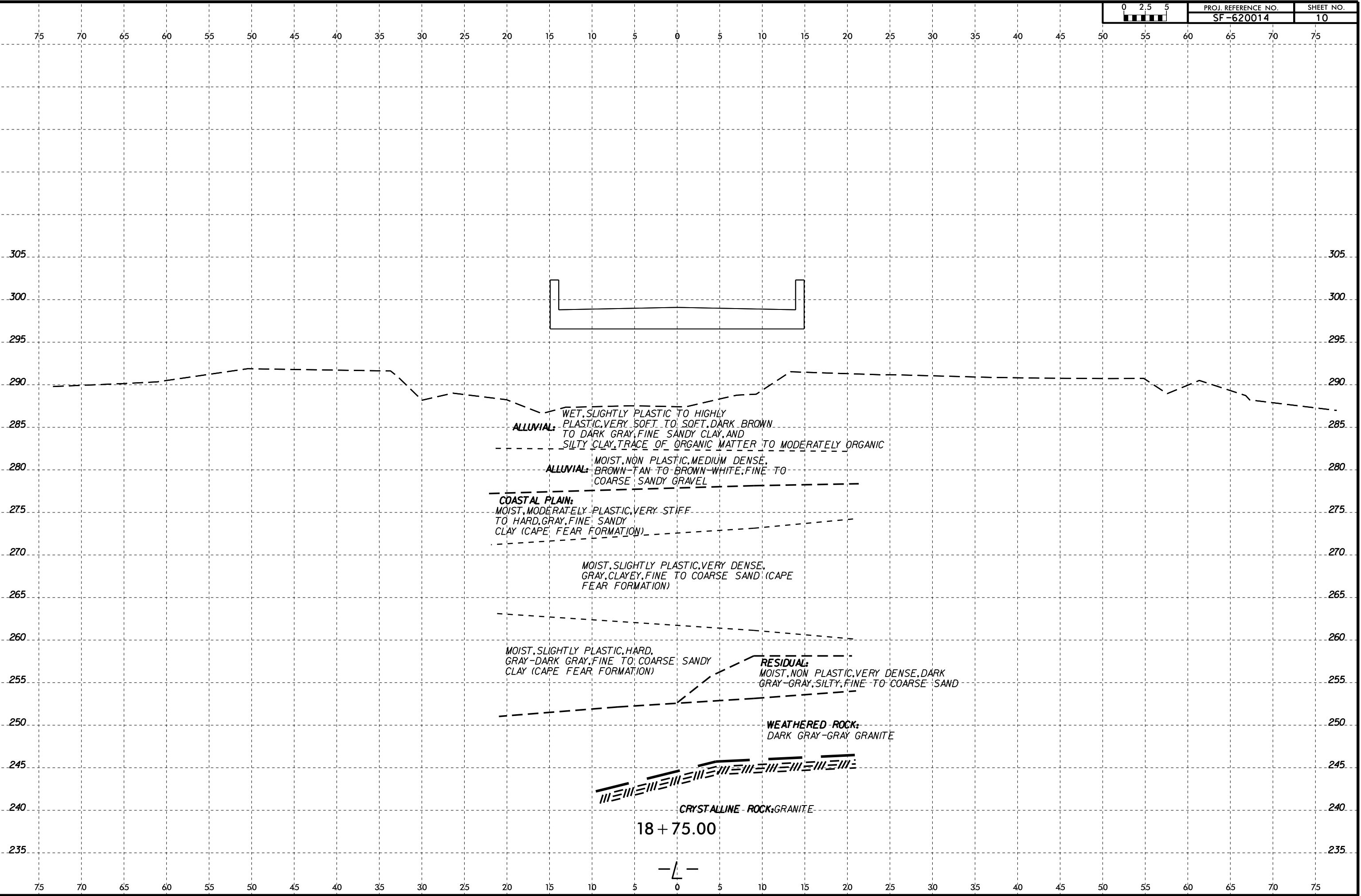


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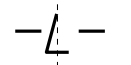
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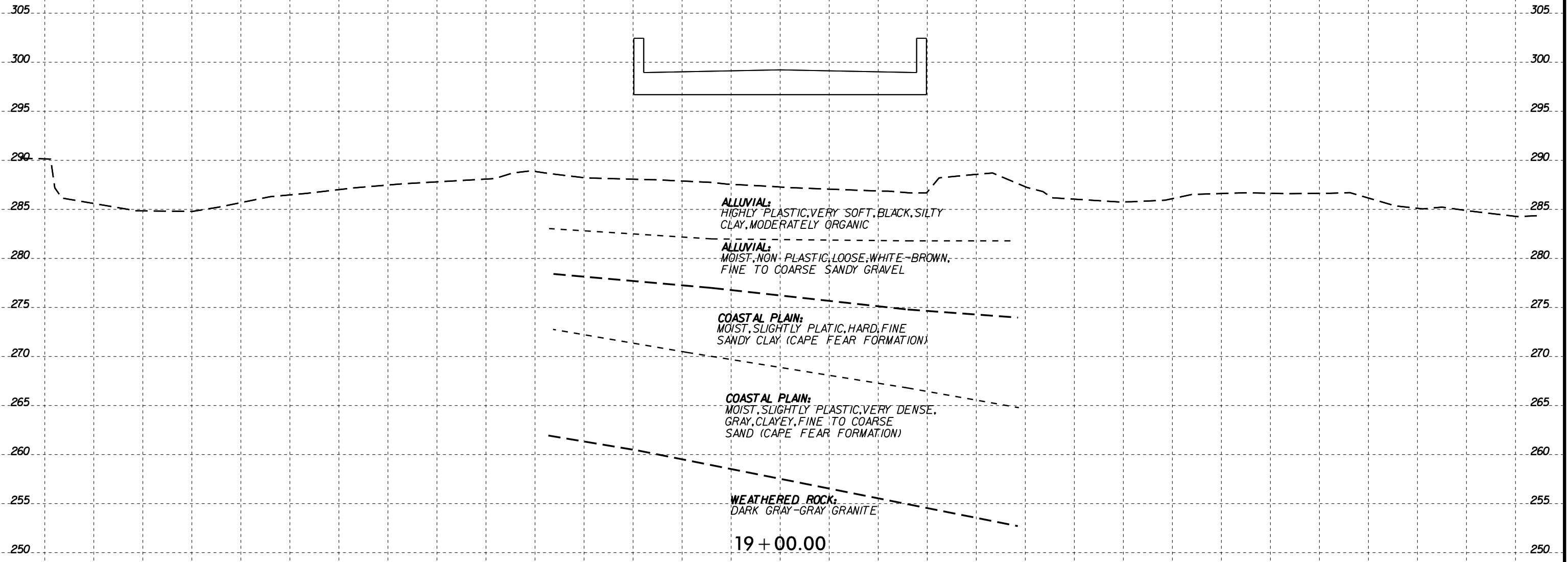


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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



**ALLUVIAL:**  
HIGHLY PLASTIC, VERY SOFT, BLACK, SILTY CLAY, MODERATELY ORGANIC

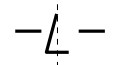
**ALLUVIAL:**  
MOIST, NON-PLASTIC, LOOSE, WHITE-BROWN, FINE TO COARSE SANDY GRAVEL

**COASTAL PLAIN:**  
MOIST, SLIGHTLY PLASTIC, HARD, FINE SANDY CLAY (CAPE FEAR FORMATION)

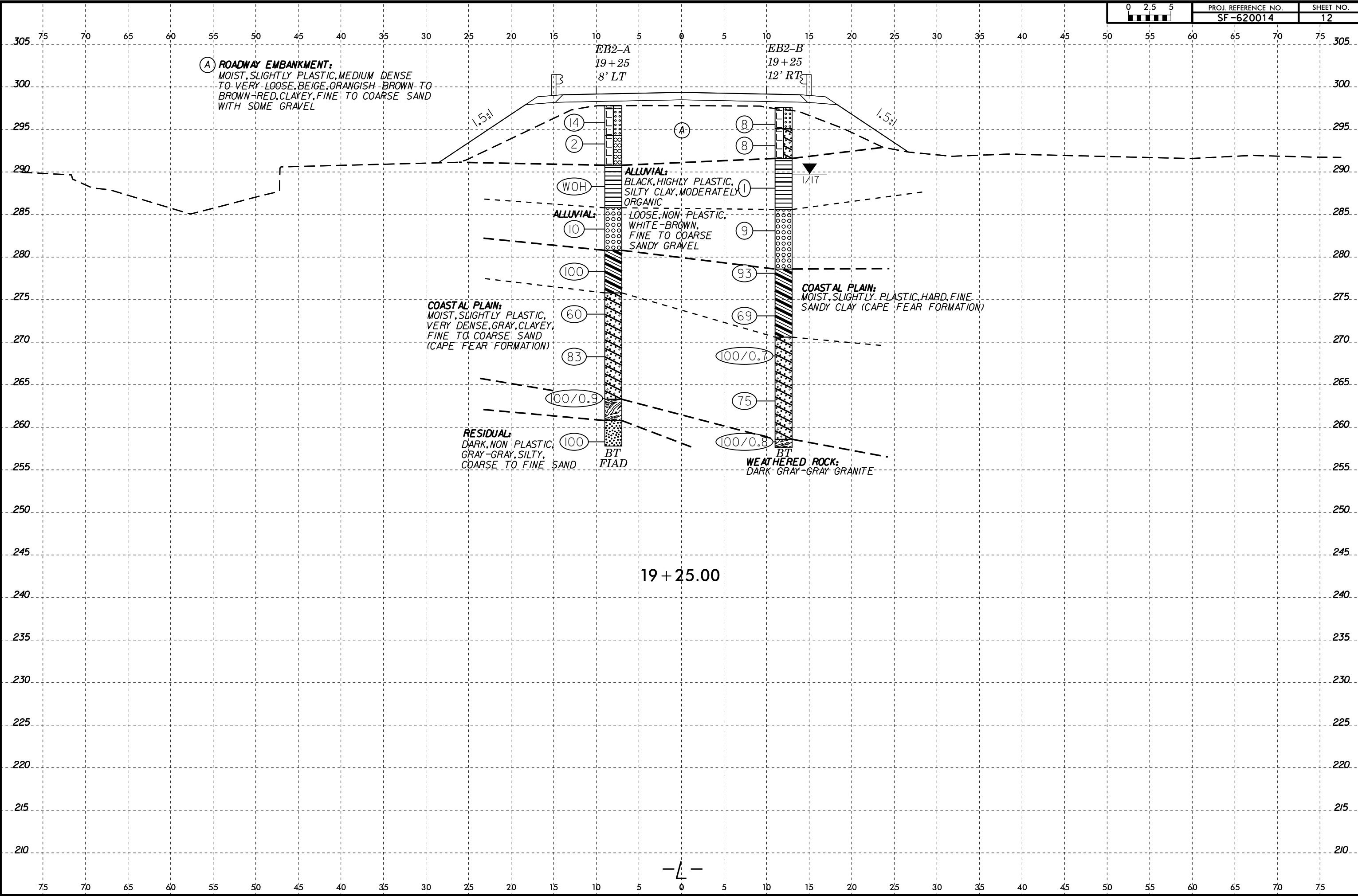
**COASTAL PLAIN:**  
MOIST, SLIGHTLY PLASTIC, VERY DENSE, GRAY, CLAYEY, FINE TO COARSE SAND (CAPE FEAR FORMATION)

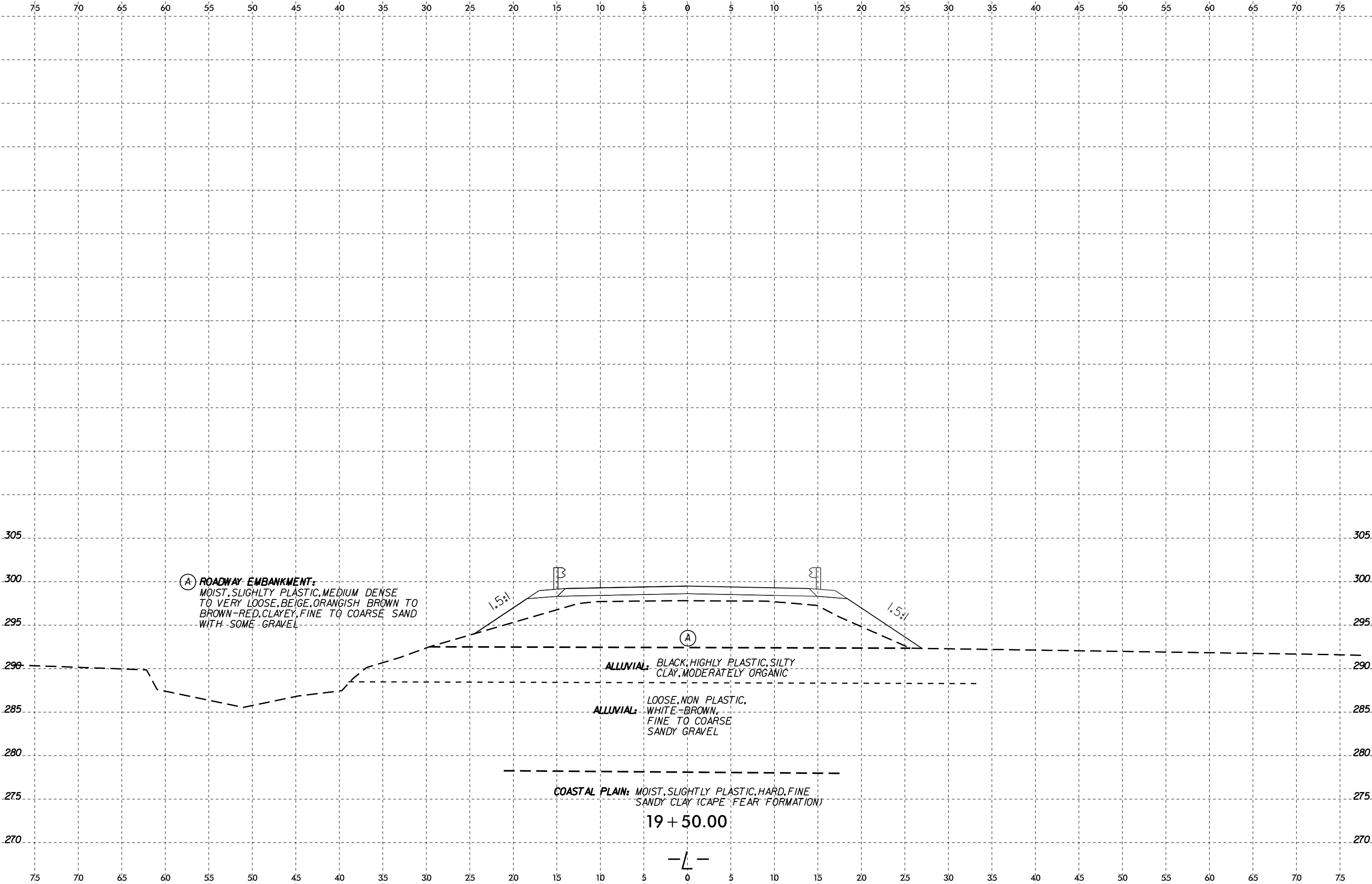
**WEATHERED ROCK:**  
DARK GRAY-GRAY GRANITE

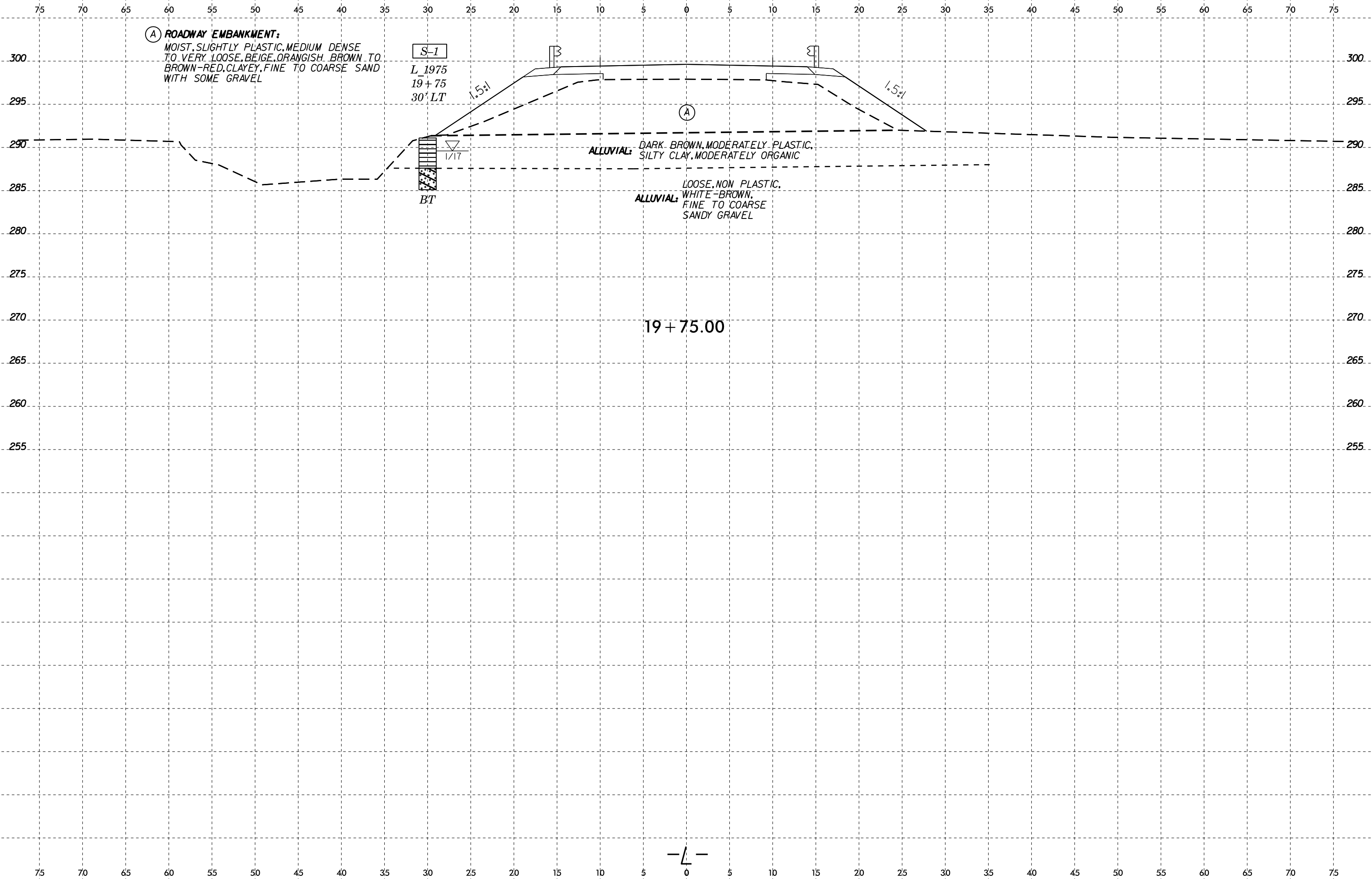
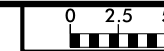
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**(A) ROADWAY EMBANKMENT:**  
 MOIST, SLIGHTLY PLASTIC, MEDIUM DENSE  
 TO VERY LOOSE, BEIGE, ORANGISH BROWN TO  
 BROWN-RED, CLAYEY, FINE TO COARSE SAND  
 WITH SOME GRAVEL

**S-1**  
 L 1975  
 19+75  
 30' LT

**ALLUVIAL:** DARK BROWN, MODERATELY PLASTIC,  
 SILTY CLAY, MODERATELY ORGANIC

**ALLUVIAL:** LOOSE, NON PLASTIC,  
 WHITE-BROWN,  
 FINE TO COARSE  
 SANDY GRAVEL

19+75.00

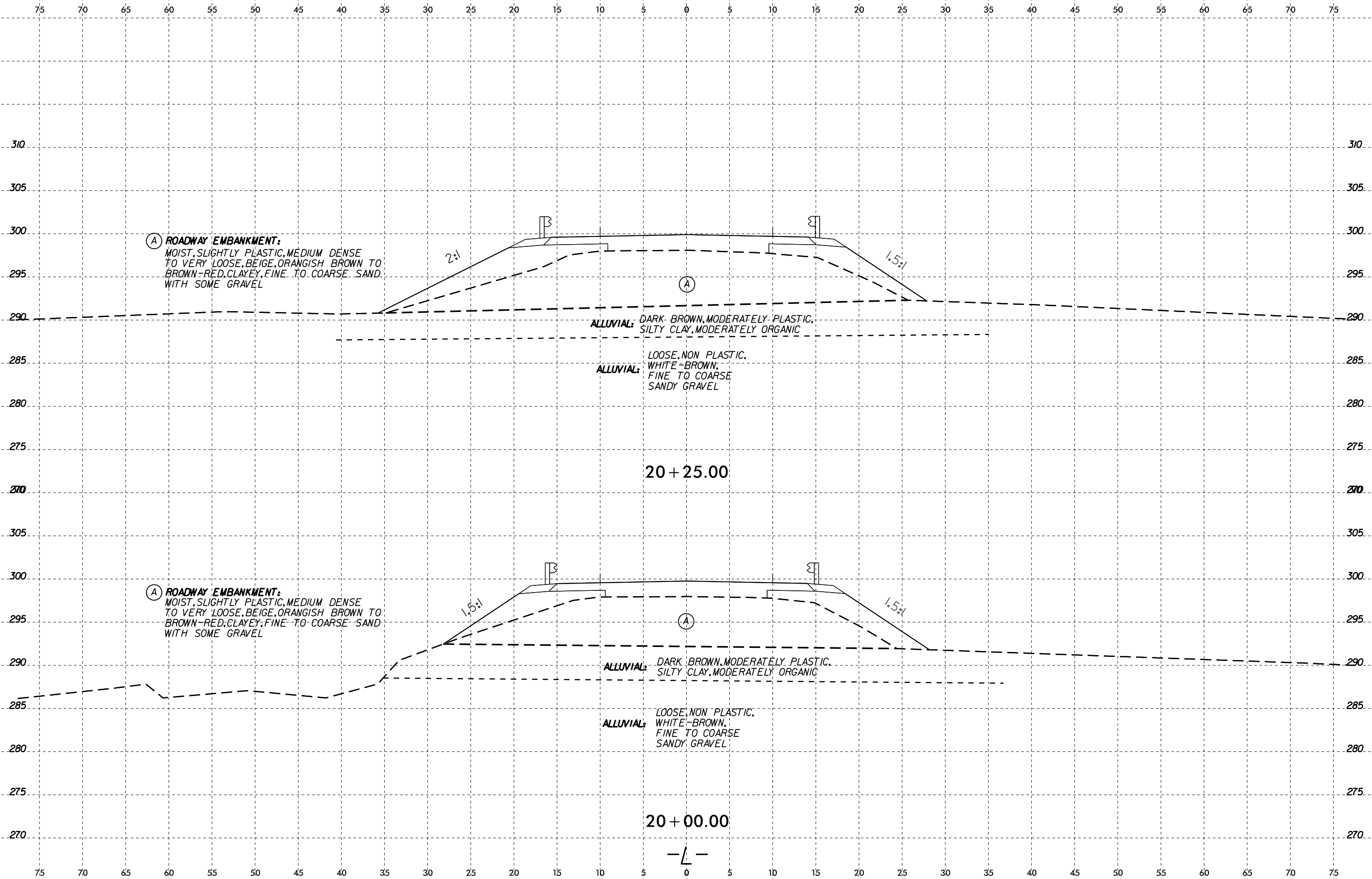
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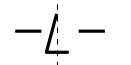
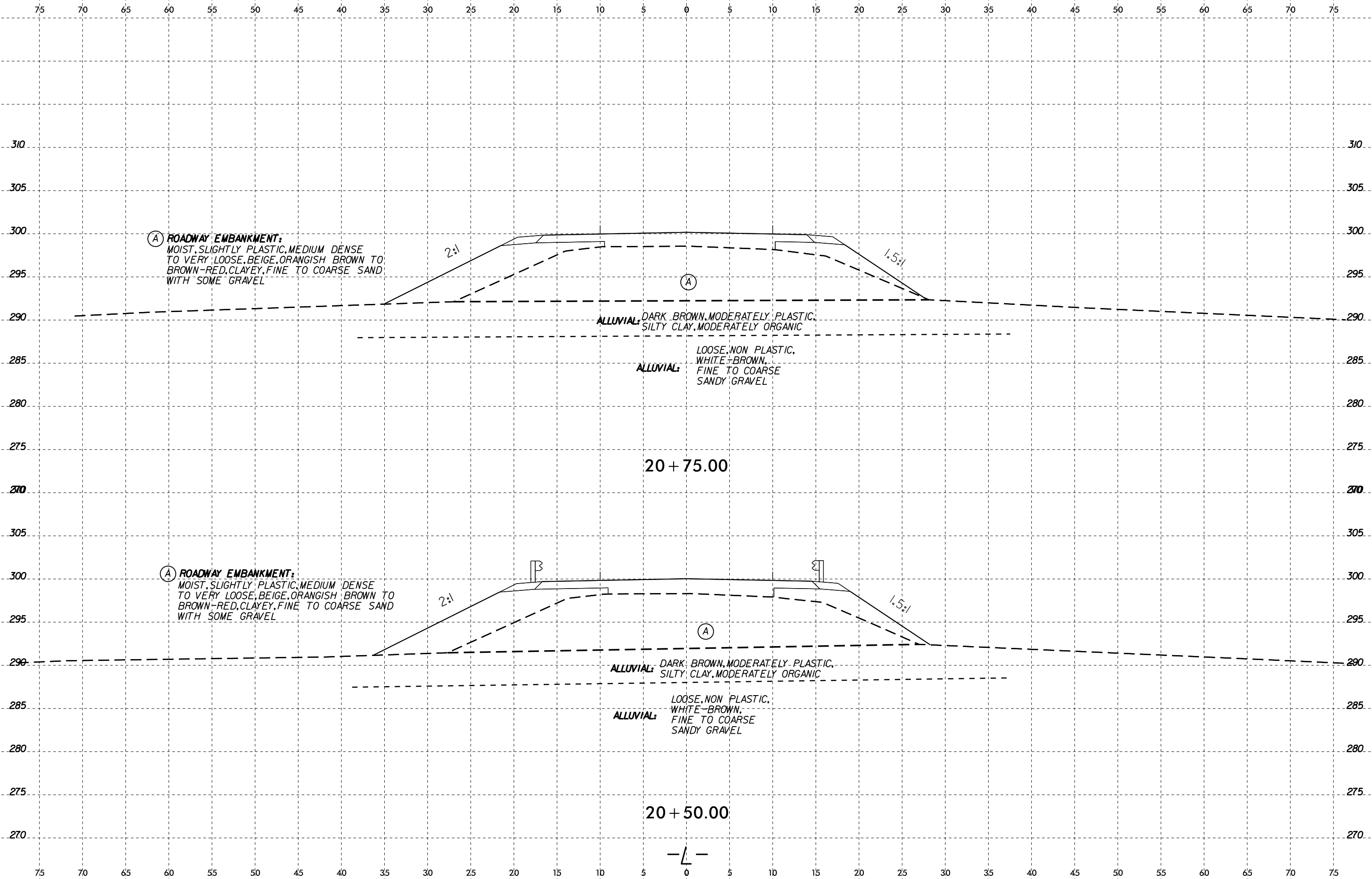
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Wells At KA20215

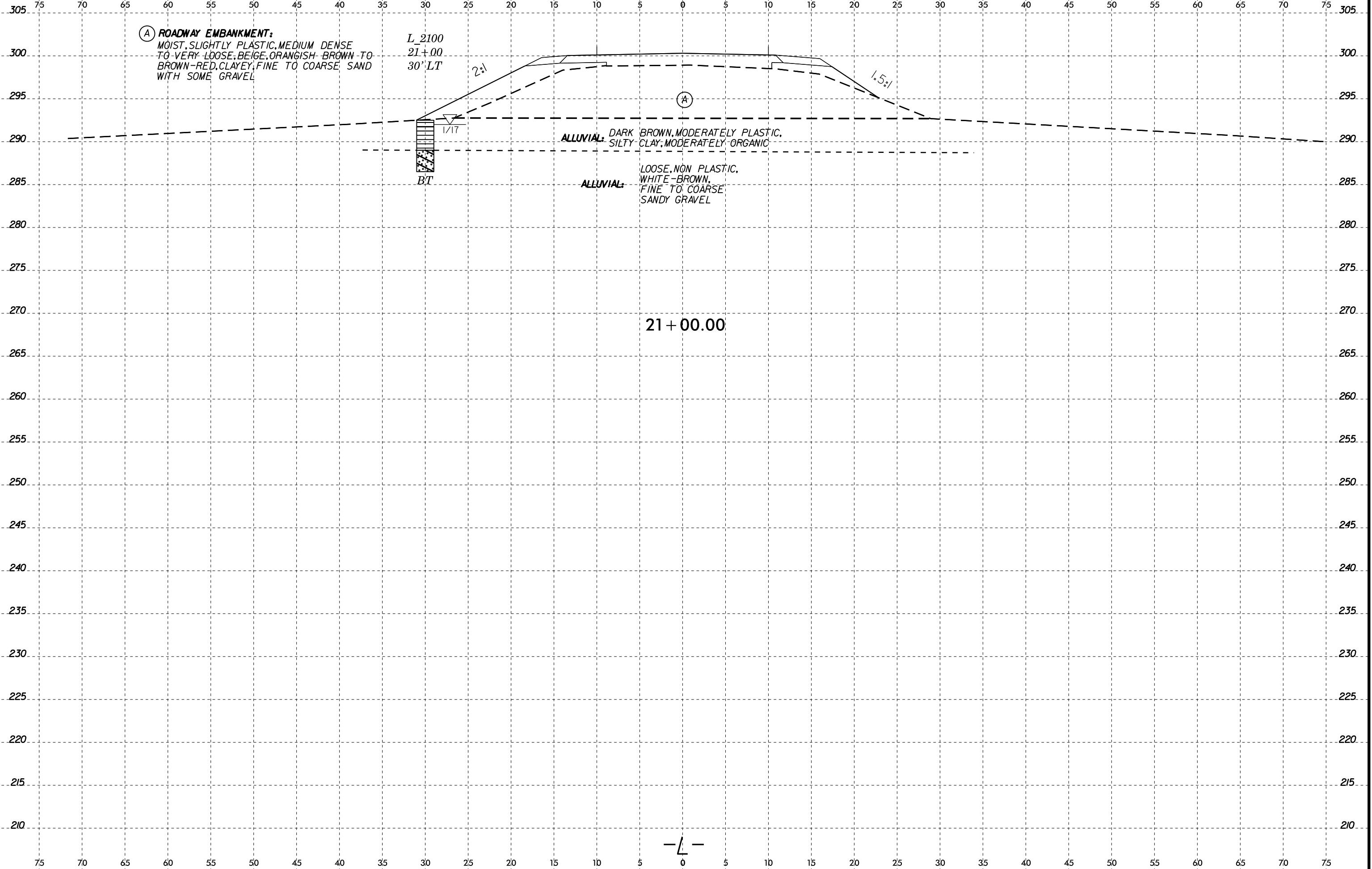




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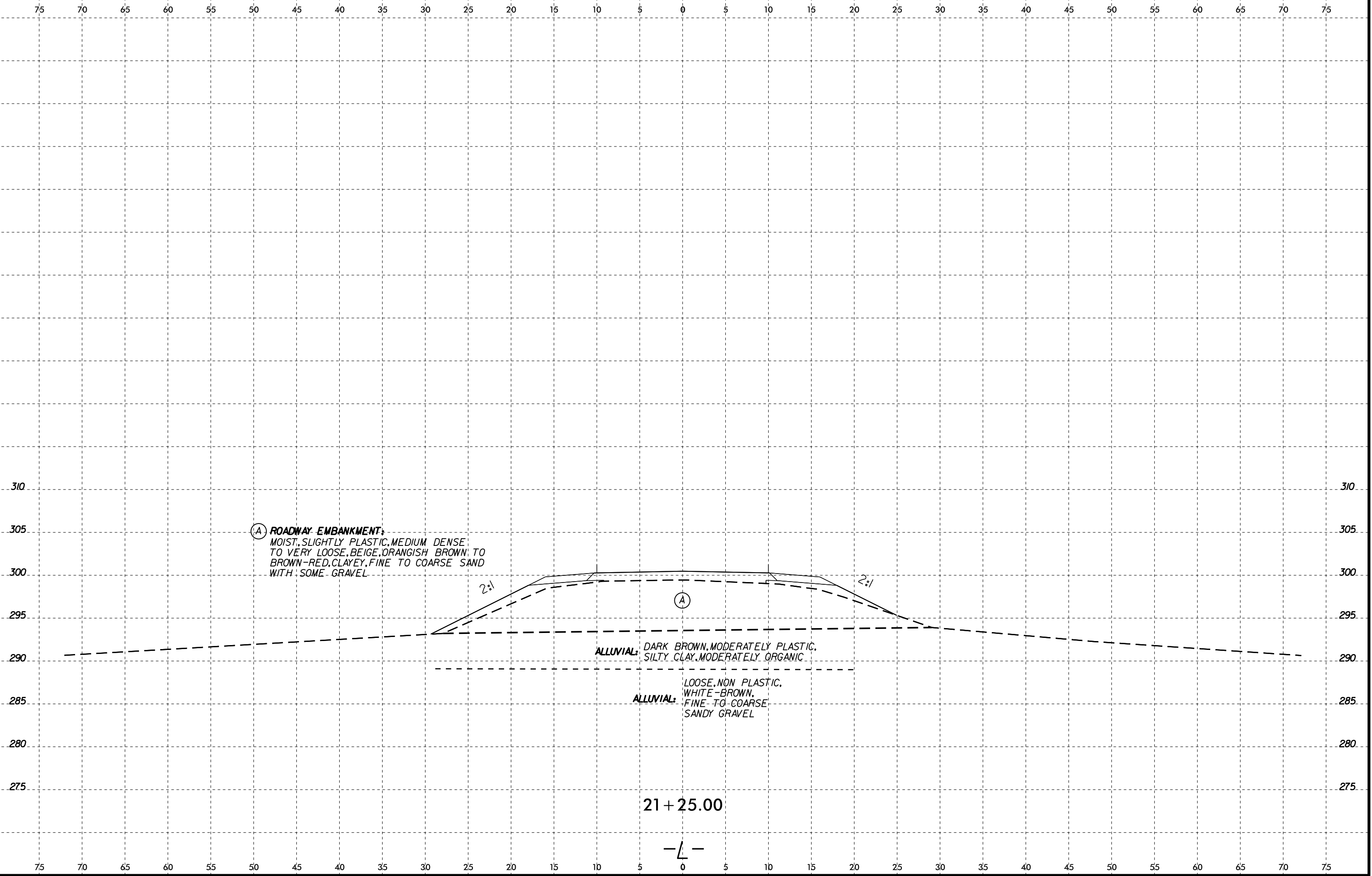


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*NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
APPENDIX A  
LABORATORY RESULTS*

*REFERENCE: SF-620014*

*PROJECT: 17BP.8.R.119*

XCB 2/17/17  
INITIALS DATE

**SUMMARY OF LABORATORY TEST DATA**

**PROJECT NO. 17BP.8.R.119 (SF-620014)**  
**COUNTY: MOORE**  
**BRIDGE NO. 14 ON SR 1102 (THUNDER ROAD) OVER HORSE CREEK**

Sample No.	Boring Number	Sta.	Off.	Align.	Sample Depth (ft.)	Natural Moisture Content (%)	Organic Matter (%)	AASHTO Class (Group Index)	N-Value (blows/ft.)	Atterberg Limits			Gradation Results							
										L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Ret. #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
SS-1	L_1750	17+50	13' RT	-L-	8.5-10.0	235	35.4	A-7-5 (5) (Muck)	WOR	88	62	26	100	95	38	5.9	14.8	53.6	25.0	6.6
S-1	L_1975	19+75	30' LT	-L-	1.0-1.5	-	-	A-7-6 (12)	-	45	28	17	100	98	71	8.7	3.1	34.7	35.0	27.3

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample  
 S = Grab Sample  
 NP -- Non Plastic                      NA-- Non Applicable

Lab Technician: NCDOT Certification No.: 129-01-0411 – Geotechnics, Raleigh, NC



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