

REFERENCE: B-4654

PROJECT: 38454

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4654	1	42

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY WAKE
PROJECT DESCRIPTION BRIDGE NO. 69 ON NC-50
(BENSON ROAD) OVER US-70

INVENTORY

CONTENTS

LINE	STATION	PLAN
-L-	10+00-17+00	5
-L-	17+00-31+00	6
-L-	31+00-36+27	7
-LPB-	12+50-14+00	6
-RPB-	10+00-14+50	6
-RPC-	11+50-13+50	6
-RPD-	11+00-12+50	6
-		

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	14+00-35+00	8-22
-LPB-	12+50-14+00	23-24
-RPB-	10+00-14+50	25-29
-RPC-	11+50-13+50	30-31
-RPD-	11+00-12+50	32-33

STRUCTURE LOGS

LINE	STATION	SHEETS
-L-	21+65-24+03	34-39
YI-	25+79-30+07	39-42

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 TOT-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

N.O. MOORE

D.G. PINTER

R.E. CLARKE

A.N. KINTNER

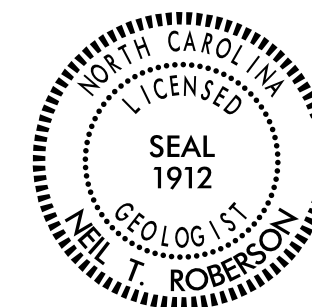
INVESTIGATED BY N.O. MOORE

DRAWN BY N.O. MOORE

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE NOVEMBER 2018



DocuSigned by:
Neil T. Roberson 11/19/2018

4061D9A8C6680A 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

Main table containing sections: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION.

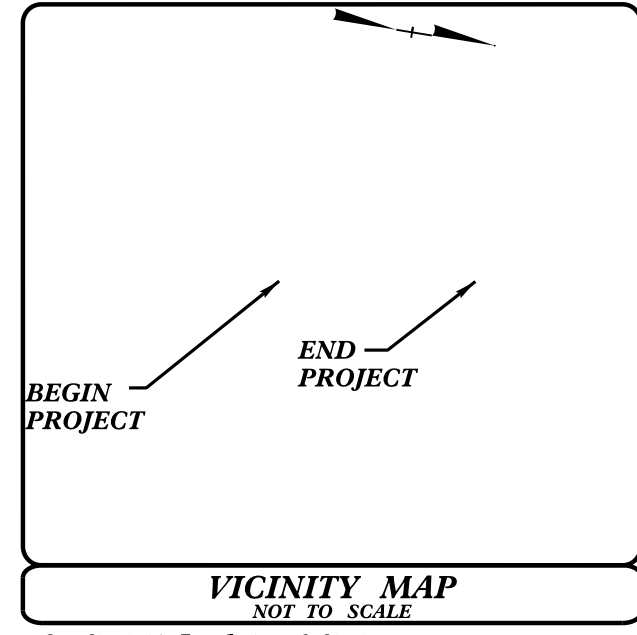
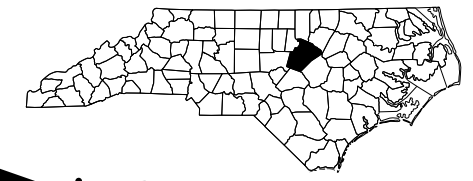
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4654	3	42
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38454.1.2		PE	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

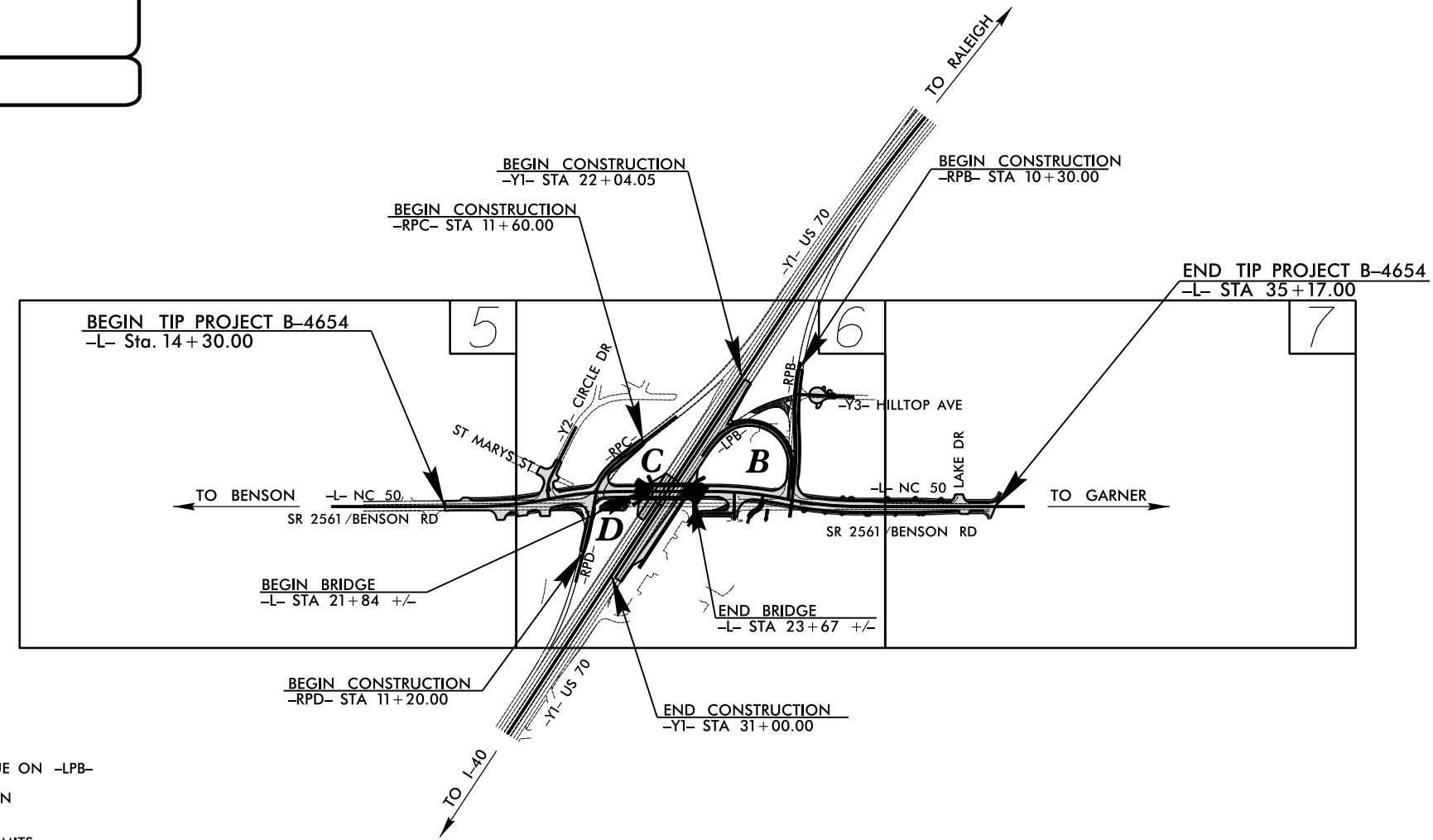
WAKE COUNTY

LOCATION: REPLACE BRIDGE 69 OVER US 70 ON NC 50 (BENSON ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, RETAINING WALLS & STRUCTURES



See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



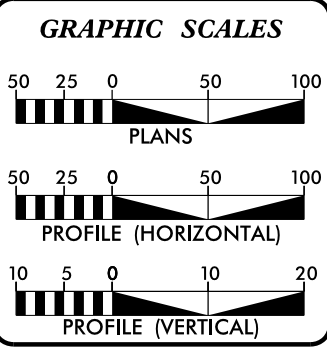
*DESIGN EXCEPTION REQUIRED FOR MIN. K VALUE ON -LPB-
US 70 IS A CONTROLLED ACCESS FACILITY WITHIN THE PROJECT LIMITS
CLEARING ON THE PROJECT SHALL BE TO THE LIMITS ESTABLISHED USING METHOD _
THIS PROJECT IS WITHIN THE GARNER TOWN LIMITS

SUBMITTAL: 25% APPROVED PLANS
DATE: JUNE 20, 2018

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

TIP PROJECT: B-4654

CONTRACT:



DESIGN DATA

ADT 2015 =	13,100
ADT 2040 =	14,700
K =	10%
D =	55%
T =	6 % *
V =	40 MPH
* TTST =	1% DUAL 5%
FUNC CLASS =	MINOR ARTERIAL REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4654 =	0.361 MILES
LENGTH BRIDGE TIP PROJECT B-4654 =	0.035 MILES
TOTAL LENGTH OF TIP PROJECT B-4654 =	0.396 MILES

Prepared in the Office of:
AECOM NC FIRM LICENSE No: F-0342
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607
(919) 854-6200 - (919) 854-6259(FAX)

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 27, 2018

LETTING DATE:
JUNE 18, 2019

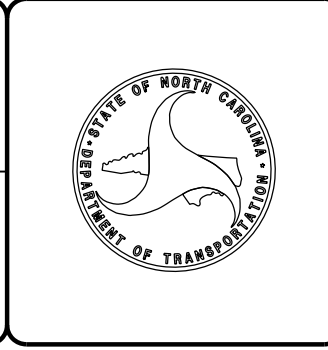
LAURA C. FISHER, PE PROJECT ENGINEER
KIMBERLY A. KOIVUNIEMI, PE PROJECT DESIGN ENGINEER
DAVID S. STUTTS, PE NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



15-NOV-2018 14:18 S:\EPO\RA\Investigation\TIP\B4654_GEO_RDWY\CADD_GEO\TECH\PlanProj\B4654_GEO_RDWY_tsh.dgn



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

November XX, 2018

STATE PROJECT: 38454.1.2 (B-4654)
 FEDERAL PROJECT:
 COUNTY: WAKE
 DESCRIPTION: Replace Bridge Number 69 on NC-50 (Benson Road) over US-70
 SUBJECT: Geotechnical Report – Inventory

The Geotechnical Engineering Unit has completed a subsurface investigation for this project and presents the following inventory.

Project Description

This project consists of replacing Bridge Number 69 on NC-50 (Benson Road) over US-70, widening and rerouting US-50, and construction of retaining walls on US-70.

A geotechnical investigation was conducted during August of 2018. Fifteen hand auger borings, six SPT retaining wall borings, and 6 SPT structure borings were performed by the Geotechnical Engineering Unit. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by the Materials and Tests Unit.

The following alignments, totaling 0.36 miles, were investigated. Subsurface plans and cross sections of these alignments are included in this report.

<u>Line</u>	<u>Stations</u>
-L-	14+30 to 35+17
-LPB-	12+50 to 14+00
-RPB-	10+00 to 14+50
-RPC-	11+50 to 13+50
-RPD-	11+00 to 12+50

Physiography and Geology

The project is located within the city limits of the town of Garner, and within the Piedmont physiographic province of North Carolina. Cambrian-aged residual clays and silts of the Raleigh Belt overlay weathered and crystalline rock. The topography is gently rolling. The widening project is a mixture of small businesses, single-family homes, and woods.

Mailing Address:
 NC DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL ENGINEERING UNIT
 1589 MAIL SERVICE CENTER
 RALEIGH NC 27699-1589

Telephone: 919-707-6850
 Fax: 919-250-4237
 Customer Service: 1-877-368-4968
 Website: www.ncdot.gov

Location:
 CENTURY CENTER COMPLEX
 ENTRANCE B-2
 1020 BIRCH RIDGE DRIVE
 RALEIGH NC

Soils Properties

Soils encountered during this investigation are roadway embankment and residual.

Roadway Embankment soils are present throughout the entire project. These soils primarily consist of brown, moist, medium stiff to stiff, sandy silt (A-4), red, orange, and gray, moist, medium stiff to stiff, silty clay (A-7) and sandy clay (A-6), and brown and orange, moist, medium stiff to stiff, silty sand (A-2-4). Plastic indices for these soils range from 3-20.

Residual soils of the Raleigh Belt are also present throughout the entire project. These soils are characterized by orange, red, brown, and gray, moist, medium stiff to stiff, silty clay (A-7) and sandy clay (A-6), and orange and gray, moist, very loose to loose, clayey sand (A-2-6). Plastic indices for these soils range from 8 to 33.

Groundwater

Groundwater measurements were taken in August 2018 during average rainfall conditions. Groundwater was present in some borings and ranged from 2.7 to 4.8 feet from the ground surface.

Areas of Special Geotechnical Interest

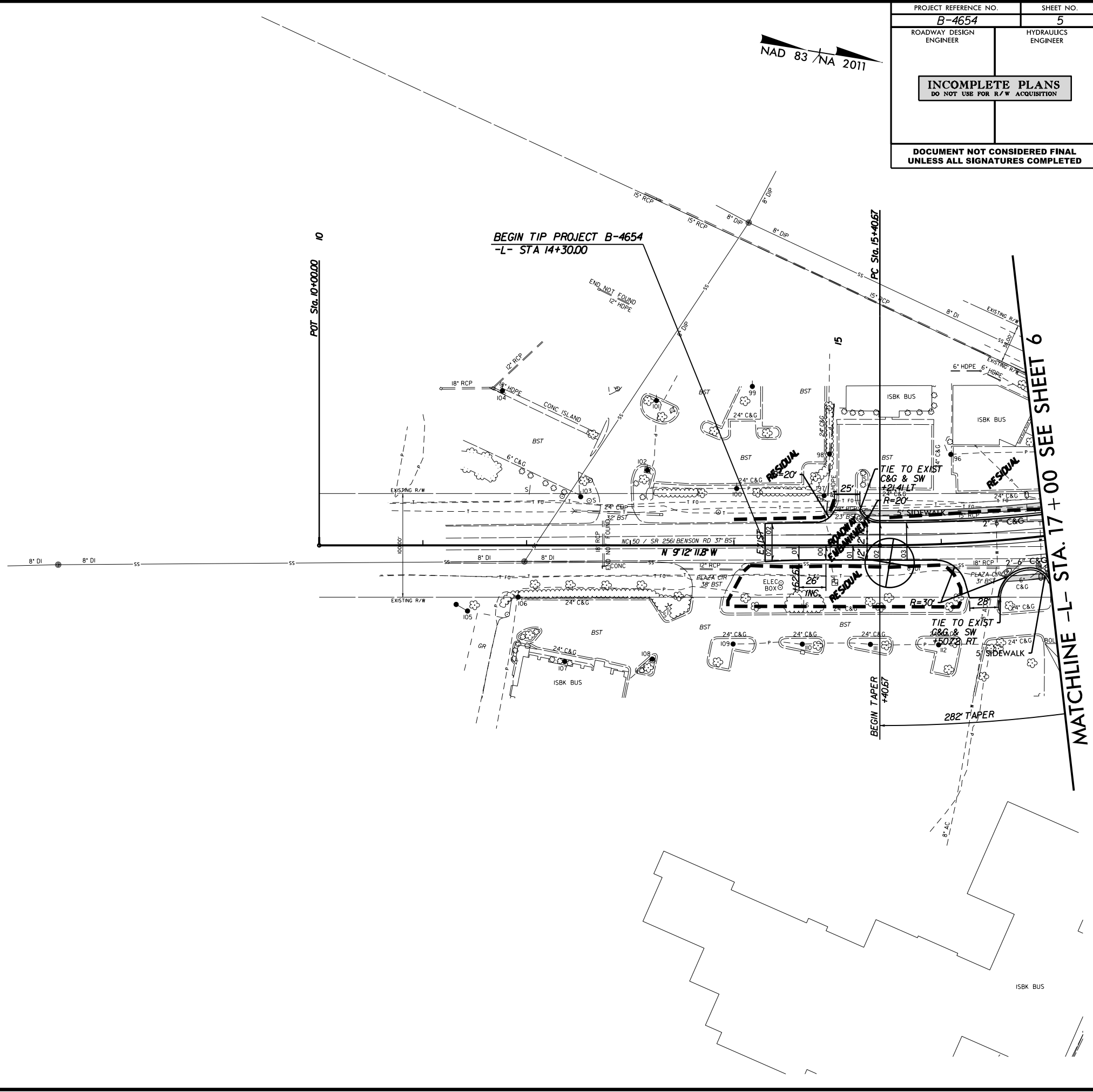
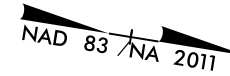
1) High Groundwater: The following areas exhibit groundwater within 6.0 feet of proposed grade:

<u>Line</u>	<u>Stations</u>	<u>Offsets</u>
-L-	17+50	40' RT
-L-	19+00	30' LT
-L-	21+00	23' RT
-L-	30+50	22' RT
-L-	32+50	18' LT
-L-	34+50	18' LT
-RPB-	11+00	27' LT

2) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets</u>
-L-	19+00	30' LT
-L-	24+50	30' LT

PROJECT REFERENCE NO. B-4654	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

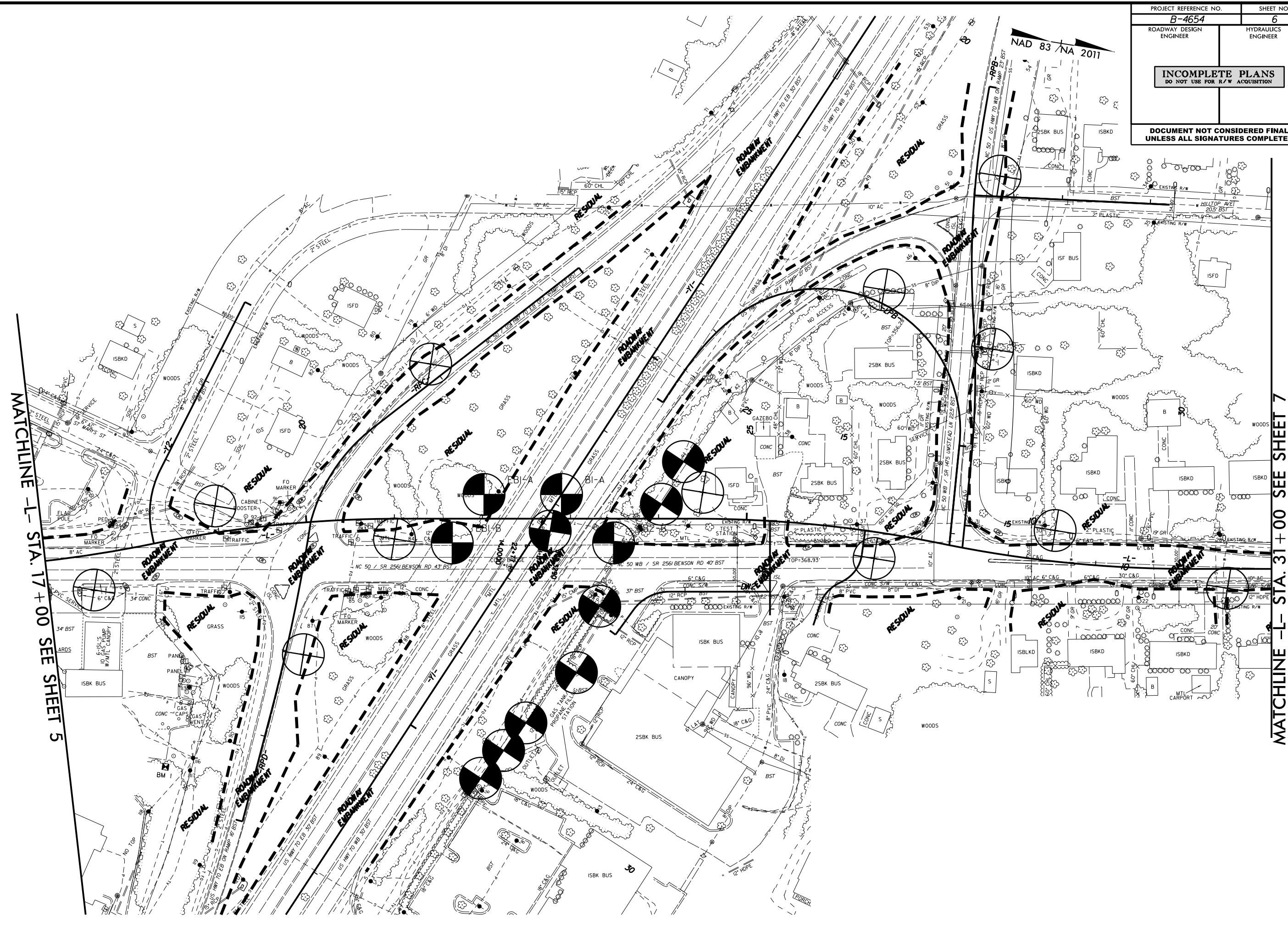


MATCHLINE -L- STA. 17+00 SEE SHEET 6

ISBK BUS

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PROJECT REFERENCE NO. B-4654	SHEET NO. 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



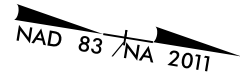
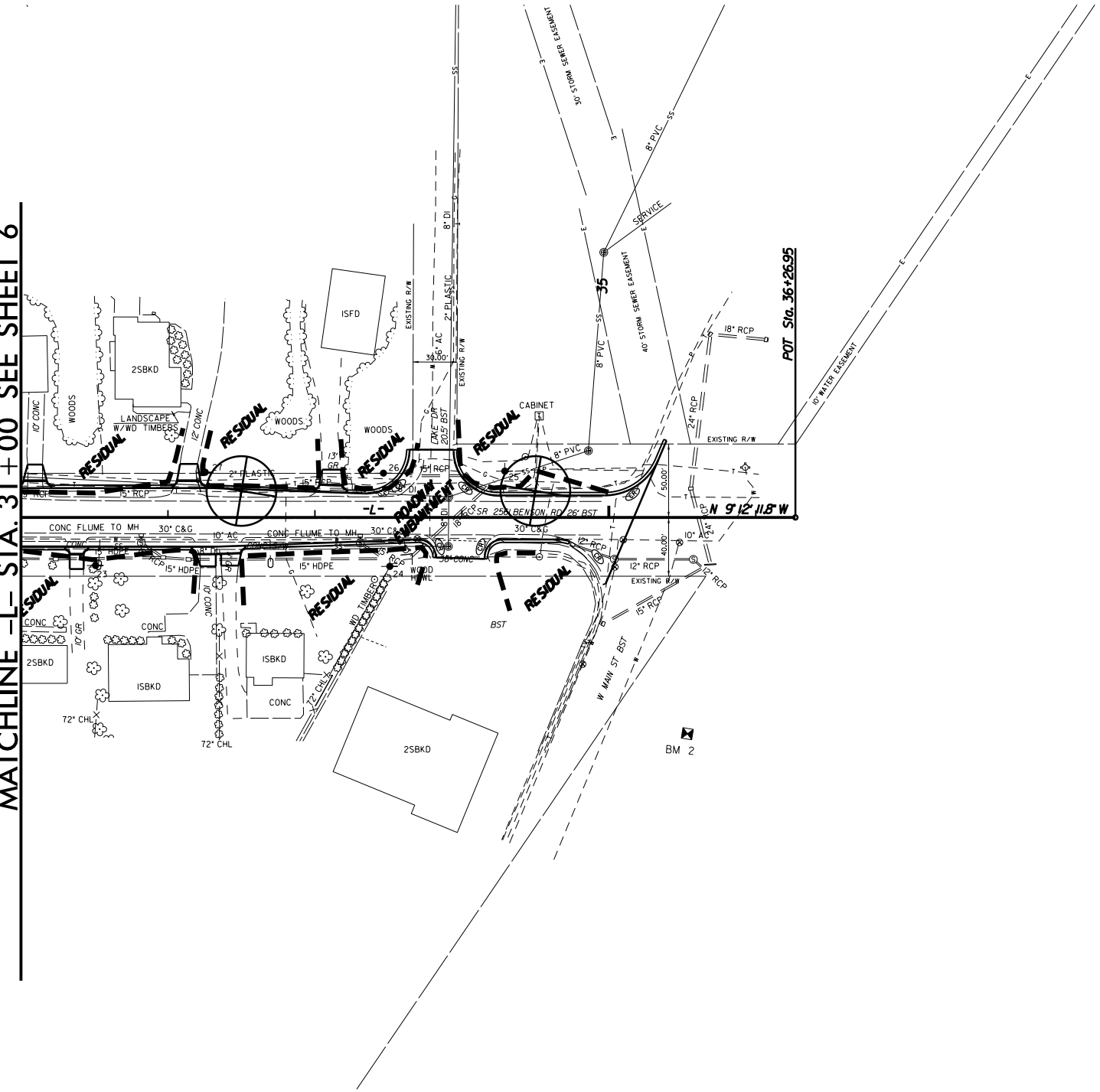
MATCHLINE -L- STA. 17+00 SEE SHEET 5

MATCHLINE -L- STA. 31+00 SEE SHEET 7

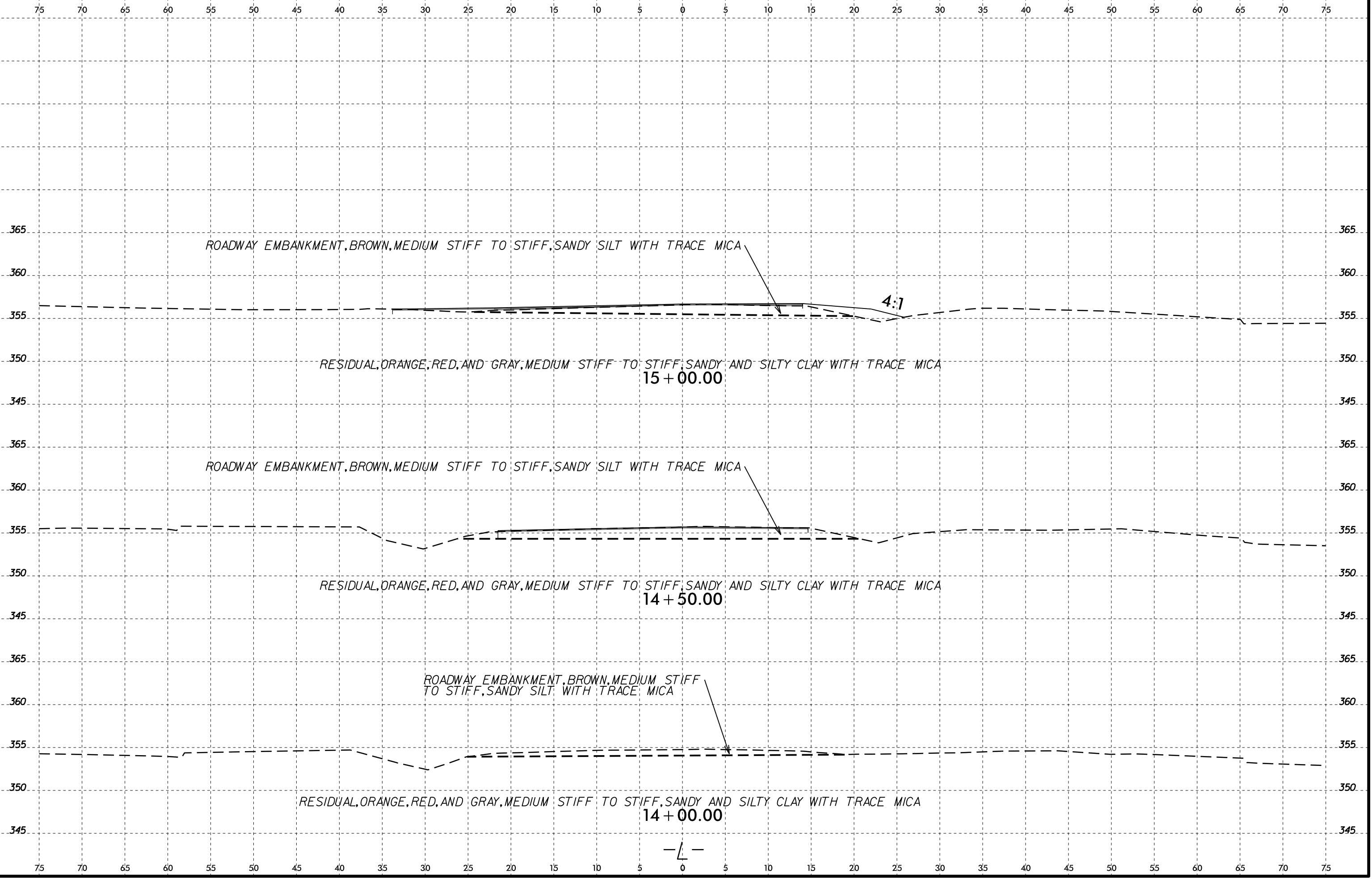
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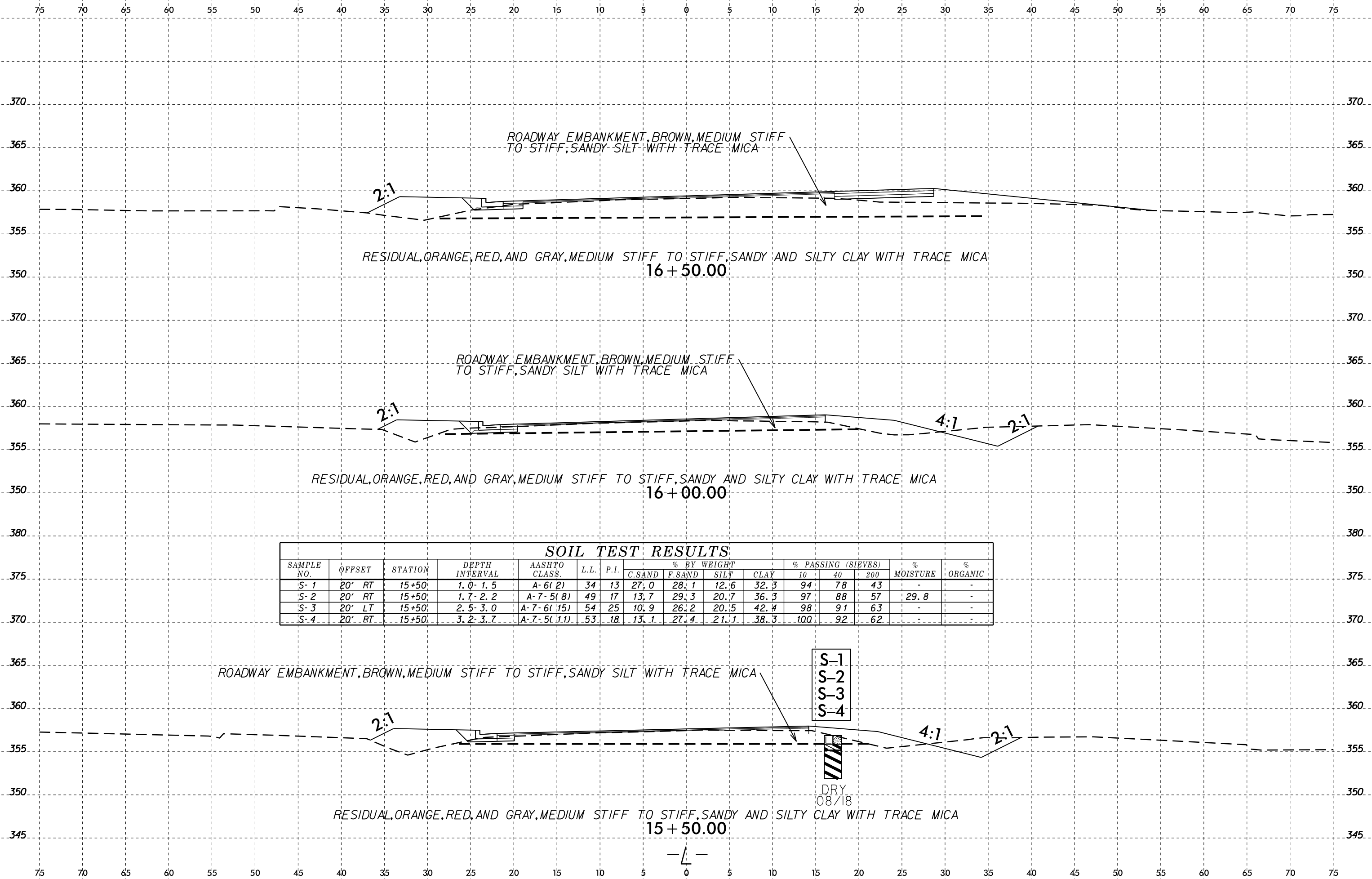
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MATCHLINE -L- STA. 31+00 SEE SHEET 6



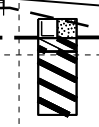
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	





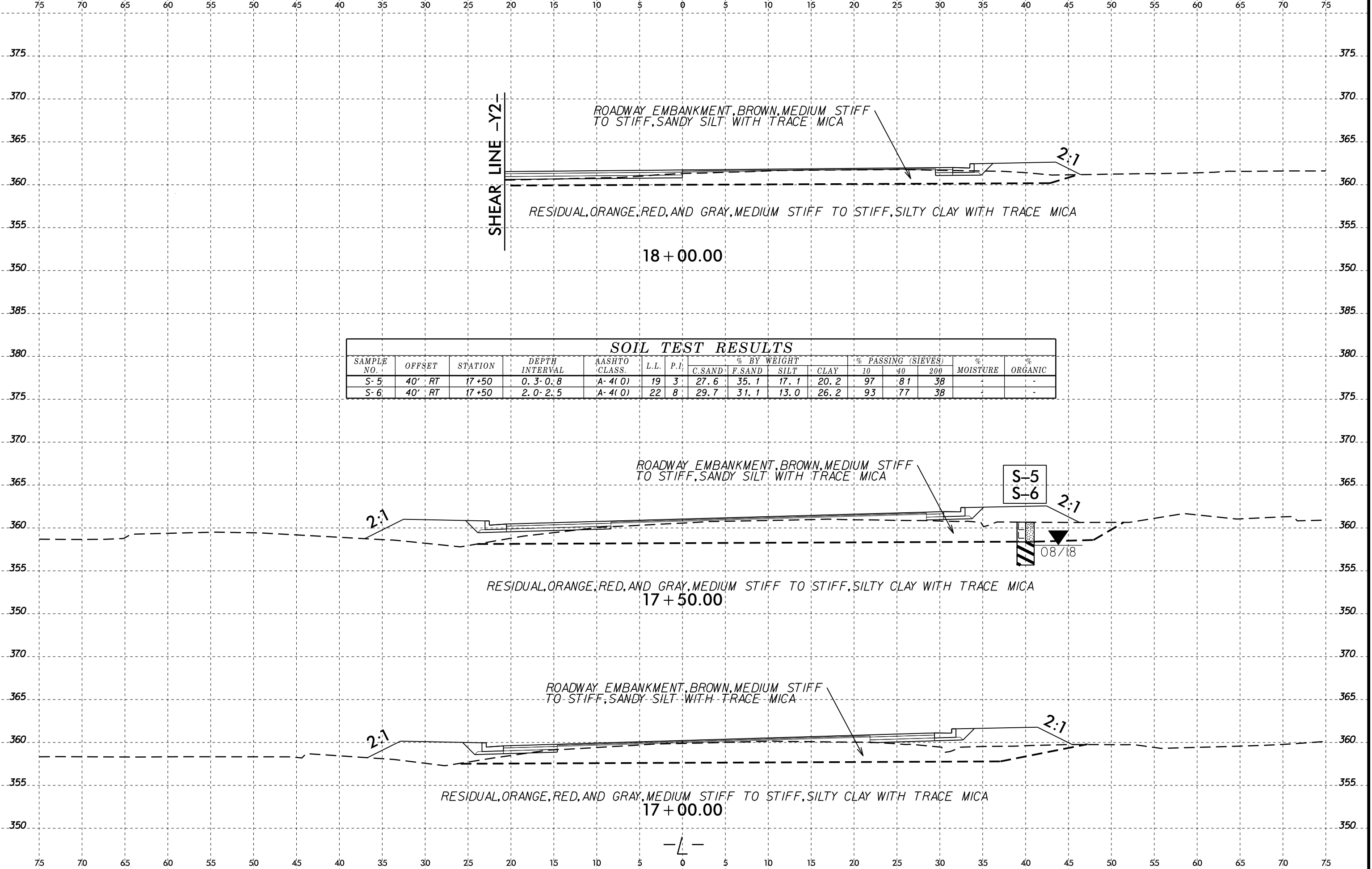
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-1	20' RT	15+50	1.0-1.5	A-6(2)	34	13	27.0	28.1	12.6	32.3	94	78	43	-	-
S-2	20' RT	15+50	1.7-2.2	A-7-5(8)	49	17	13.7	29.3	20.7	36.3	97	88	57	29.8	-
S-3	20' LT	15+50	2.5-3.0	A-7-6(15)	54	25	10.9	26.2	20.5	42.4	98	91	63	-	-
S-4	20' RT	15+50	3.2-3.7	A-7-5(11)	53	18	13.1	27.4	21.1	38.3	100	92	62	-	-

- S-1
- S-2
- S-3
- S-4

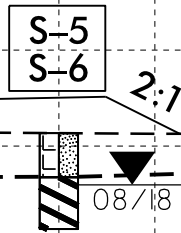


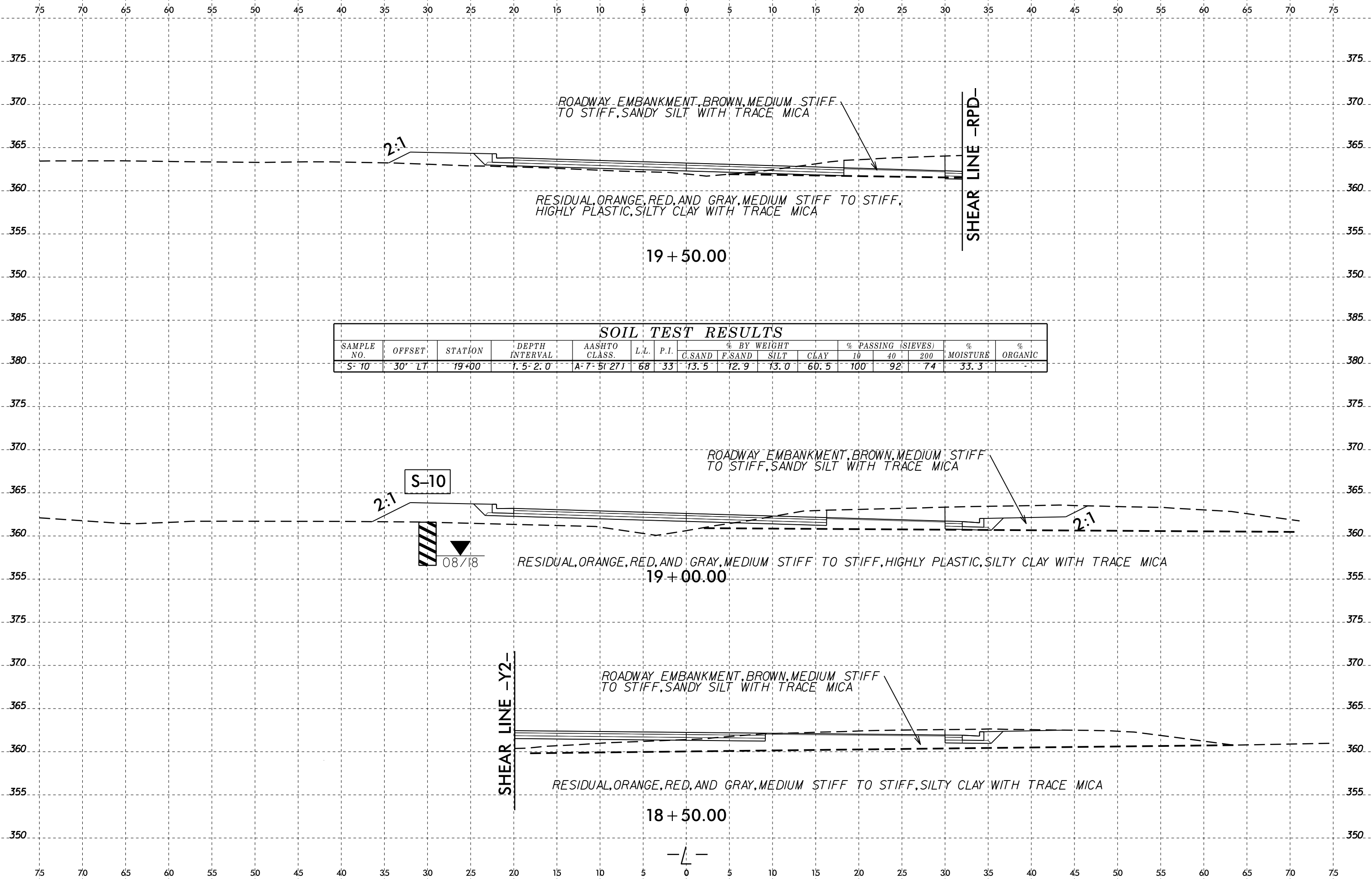
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 \$\$\$SUBSERIALNAME\$\$\$



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-5	40' RT	17+50	0.3-0.8	A-4(0)	19	3	27.6	35.1	17.1	20.2	97	81	38	-	-
S-6	40' RT	17+50	2.0-2.5	A-4(0)	22	8	29.7	31.1	13.0	26.2	93	77	38	-	-





SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-10	30' LT	19+00	1.5-2.0	A-7-5(27)	68	33	13.5	12.9	13.0	60.5	100	92	74	33.3	

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-12	25' RT	21+00	0.7-1.2	A-6(2)	39	17	35.7	23.0	11.0	30.3	87	66	37	-	-
S-13	25' RT	21+00	2.5-3.0	A-6(6)	40	20	25.6	23.4	8.6	42.4	94	78	48	21.2	-

ROADWAY EMBANKMENT, RED-BROWN, MEDIUM STIFF TO STIFF, SANDY CLAY WITH TRACE MICA AND GRAVEL

S-12
S-13

2:1

3:1

08/18

RESIDUAL, ORANGE AND RED, MEDIUM STIFF TO STIFF, SANDY CLAY WITH TRACE MICA
21+00.00

ROADWAY EMBANKMENT, BROWN, MEDIUM STIFF TO STIFF, SANDY SILT WITH TRACE MICA

2:1

SHEAR LINE -RPC-

RESIDUAL, ORANGE, RED, AND GRAY, MEDIUM STIFF TO STIFF, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA
20+50.00

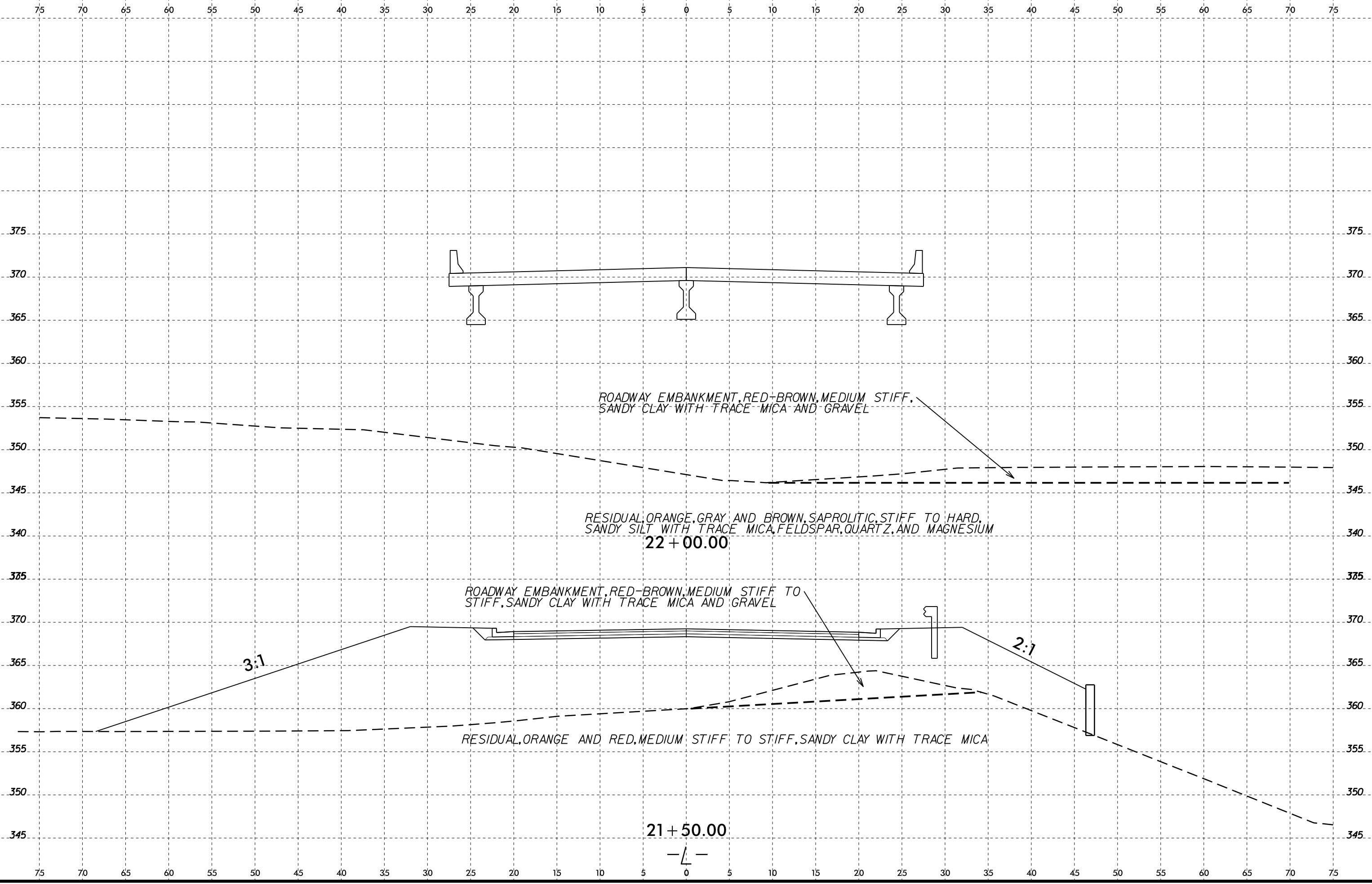
ROADWAY EMBANKMENT, BROWN, MEDIUM STIFF TO STIFF, SANDY SILT WITH TRACE MICA

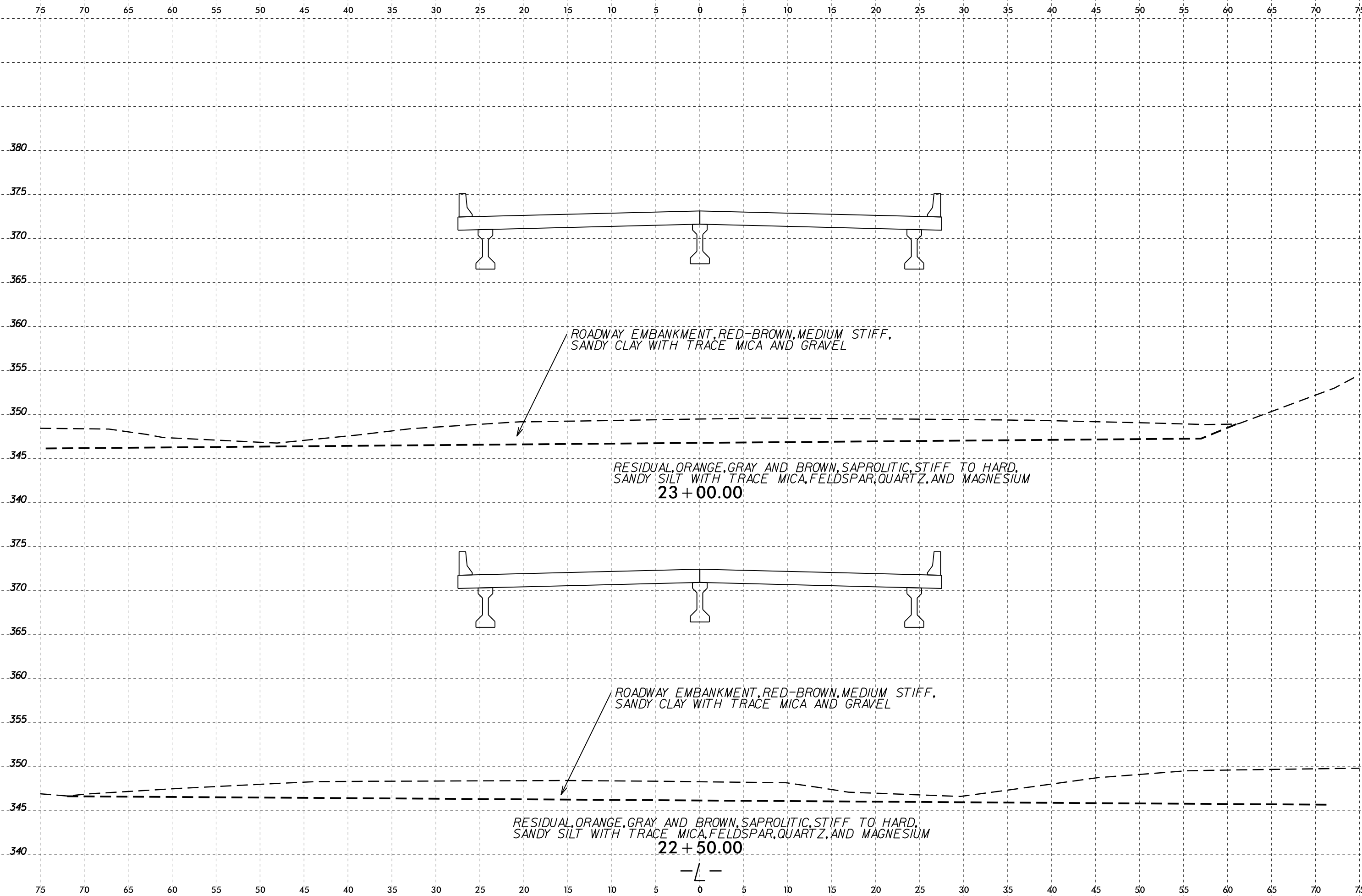
SHEAR LINE -RPD-

SHEAR LINE -RPC-

RESIDUAL, ORANGE, RED, AND GRAY, MEDIUM STIFF TO STIFF, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA
20+00.00

—L—





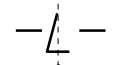
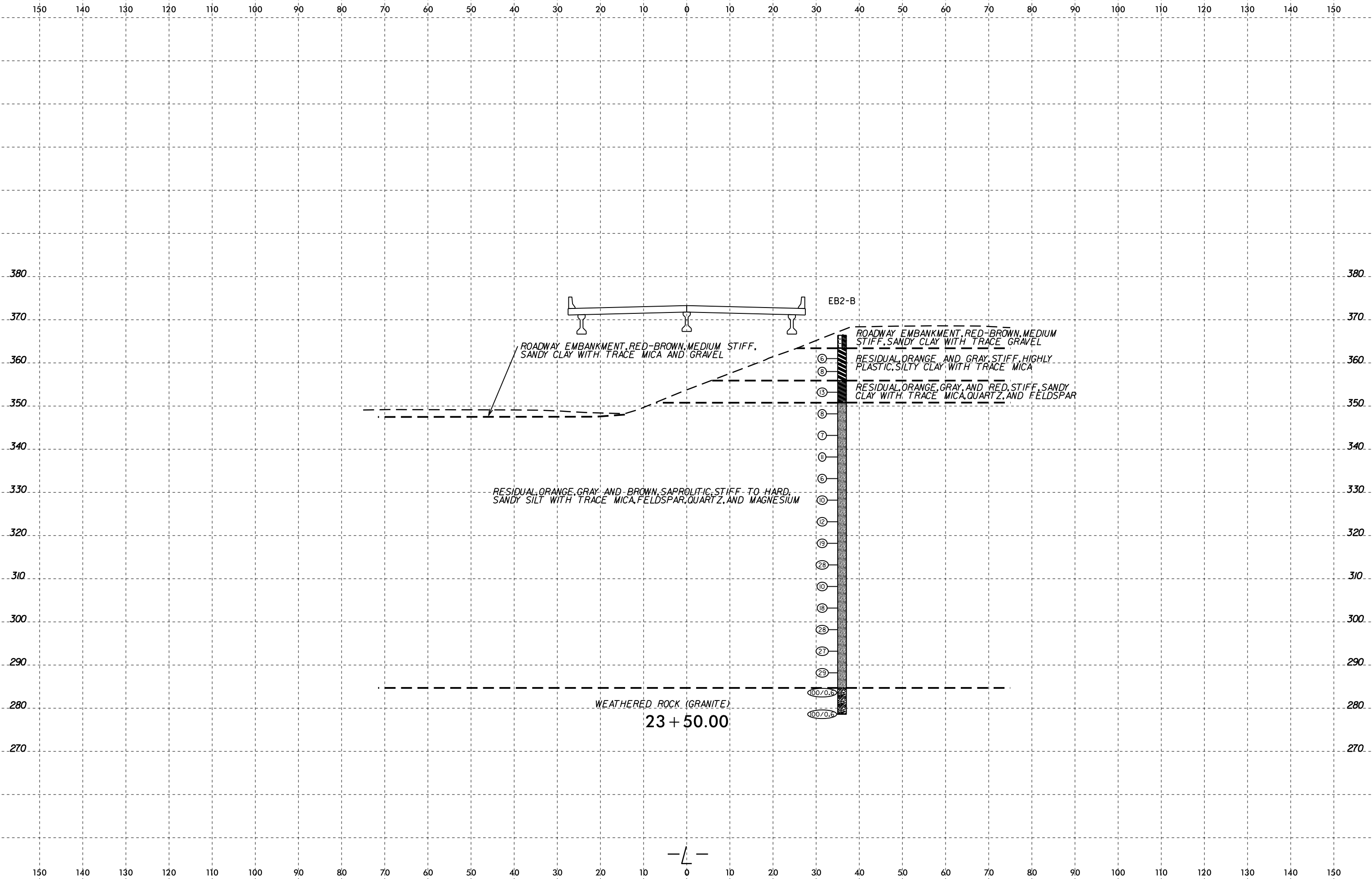
ROADWAY EMBANKMENT, RED-BROWN, MEDIUM STIFF,
SANDY CLAY WITH TRACE MICA AND GRAVEL

RESIDUAL, ORANGE, GRAY AND BROWN, SAPROLITIC, STIFF TO HARD,
SANDY SILT WITH TRACE MICA, FELDSPAR, QUARTZ, AND MAGNESIUM
23 + 00.00

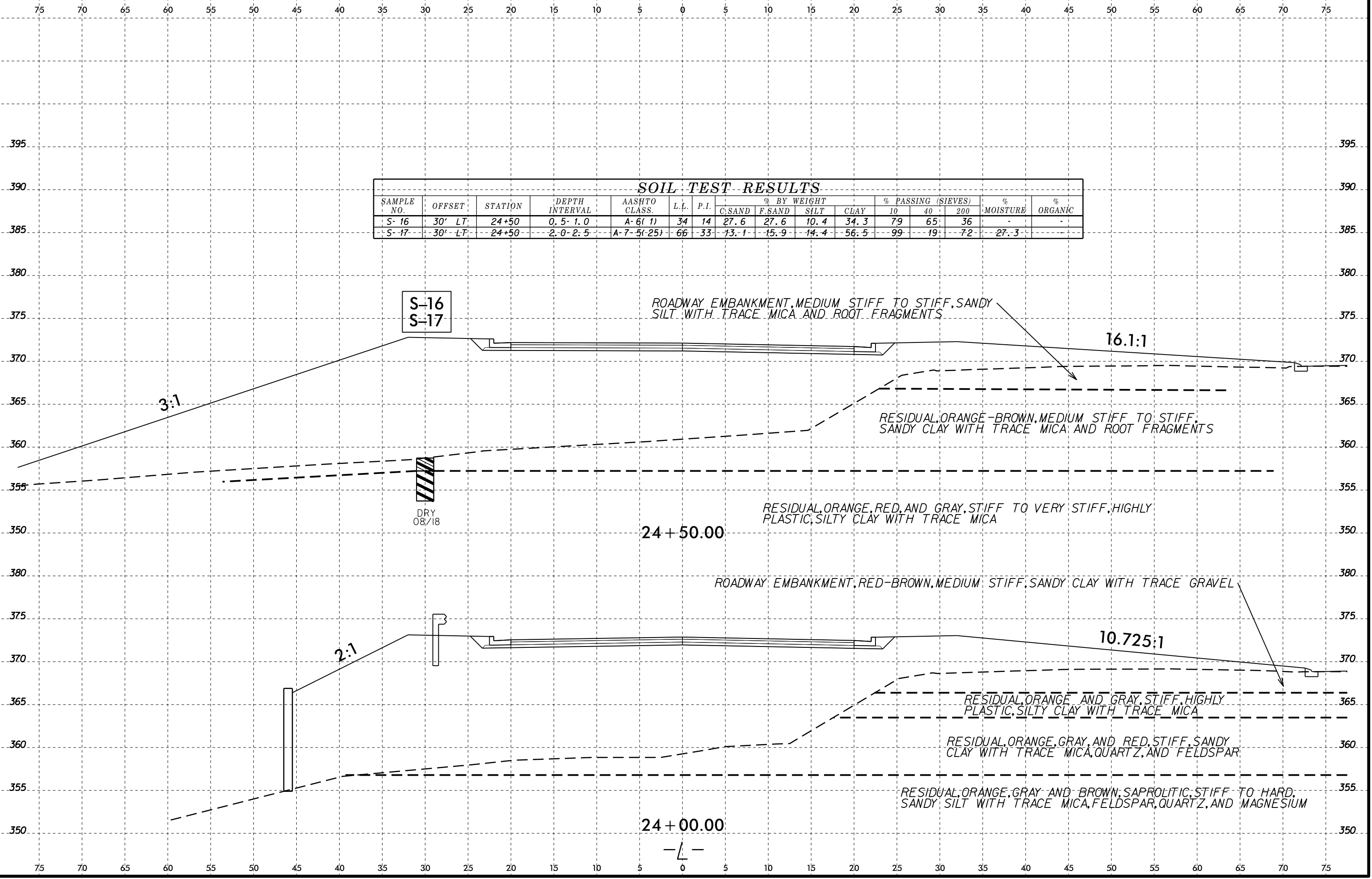
ROADWAY EMBANKMENT, RED-BROWN, MEDIUM STIFF,
SANDY CLAY WITH TRACE MICA AND GRAVEL

RESIDUAL, ORANGE, GRAY AND BROWN, SAPROLITIC, STIFF TO HARD,
SANDY SILT WITH TRACE MICA, FELDSPAR, QUARTZ, AND MAGNESIUM
22 + 50.00

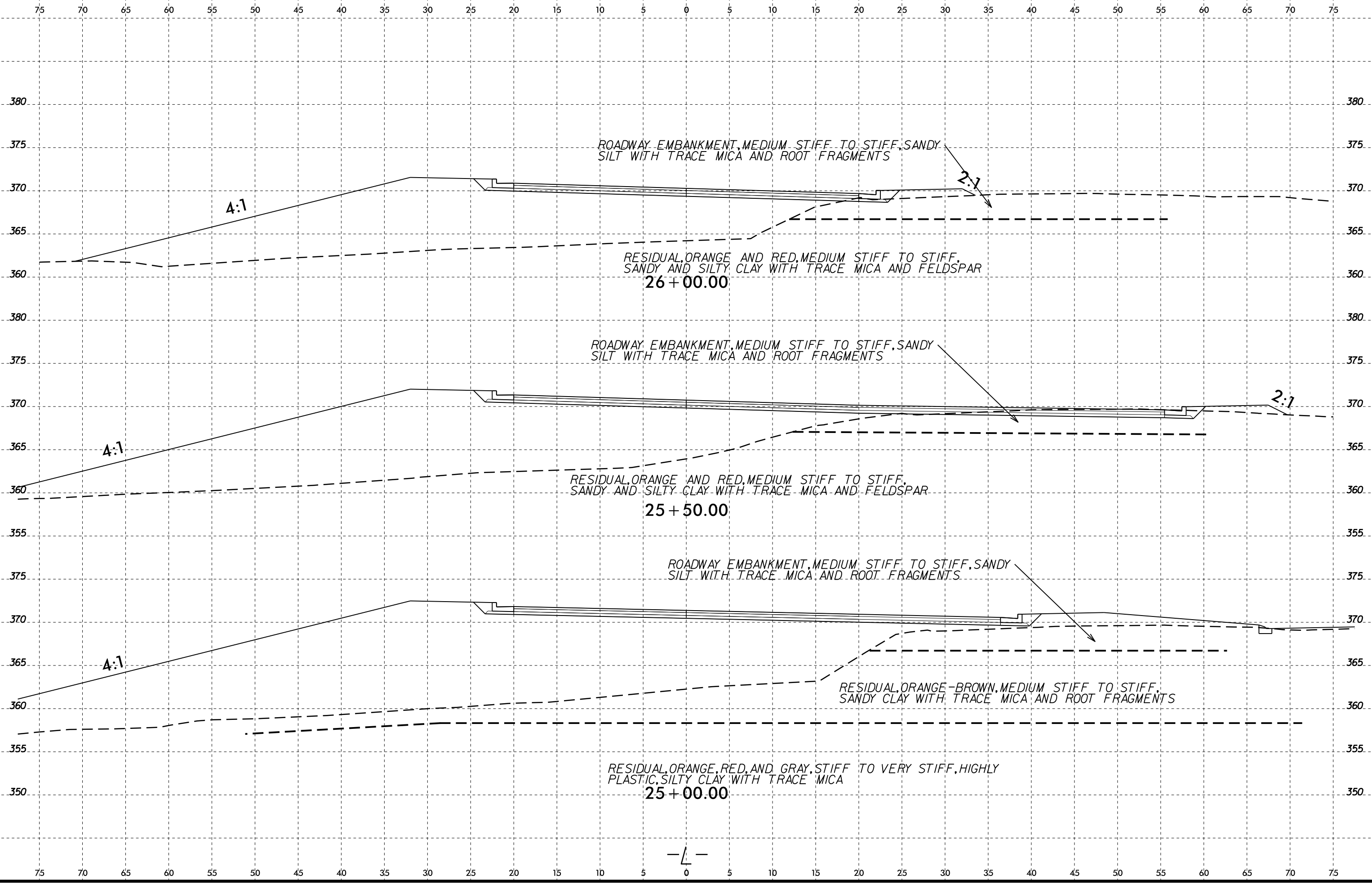
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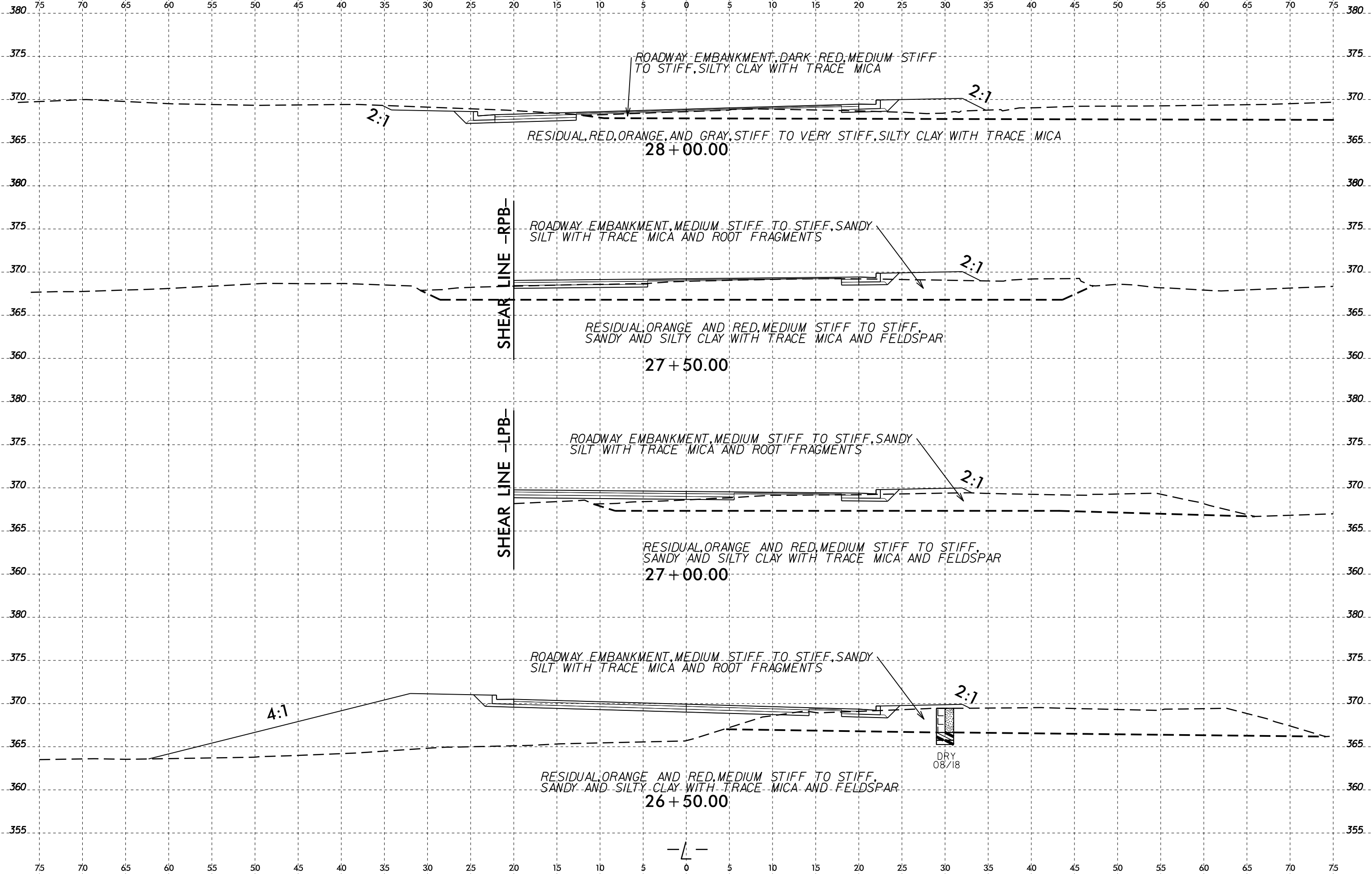
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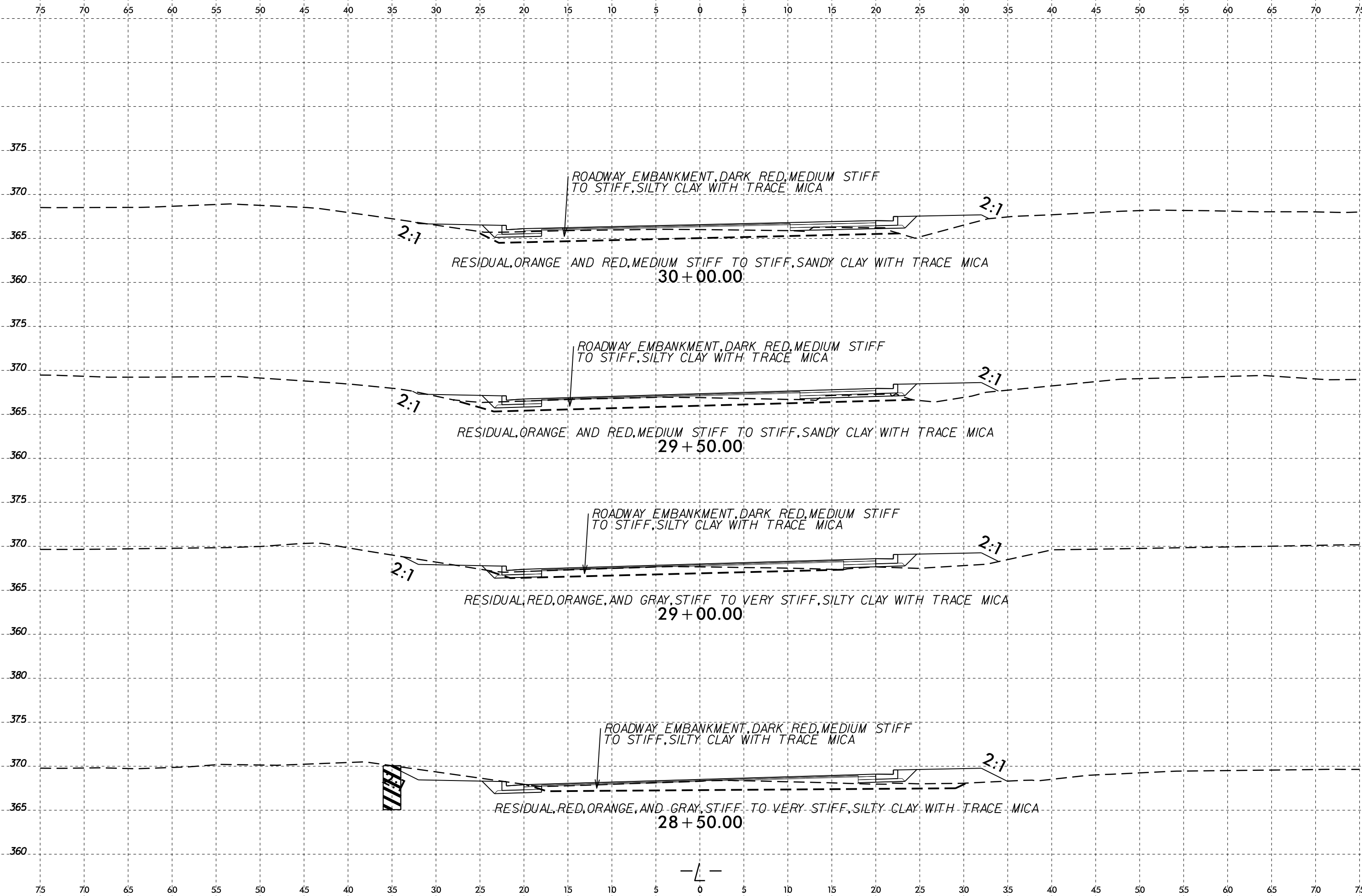


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-16	30' LT	24+50	0.5-1.0	A-6(1)	34	14	27.6	27.6	10.4	34.3	79	65	36	-	-
S-17	30' LT	24+50	2.0-2.5	A-7-5(25)	66	33	13.1	15.9	14.4	56.5	99	19	72	27.3	-

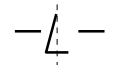


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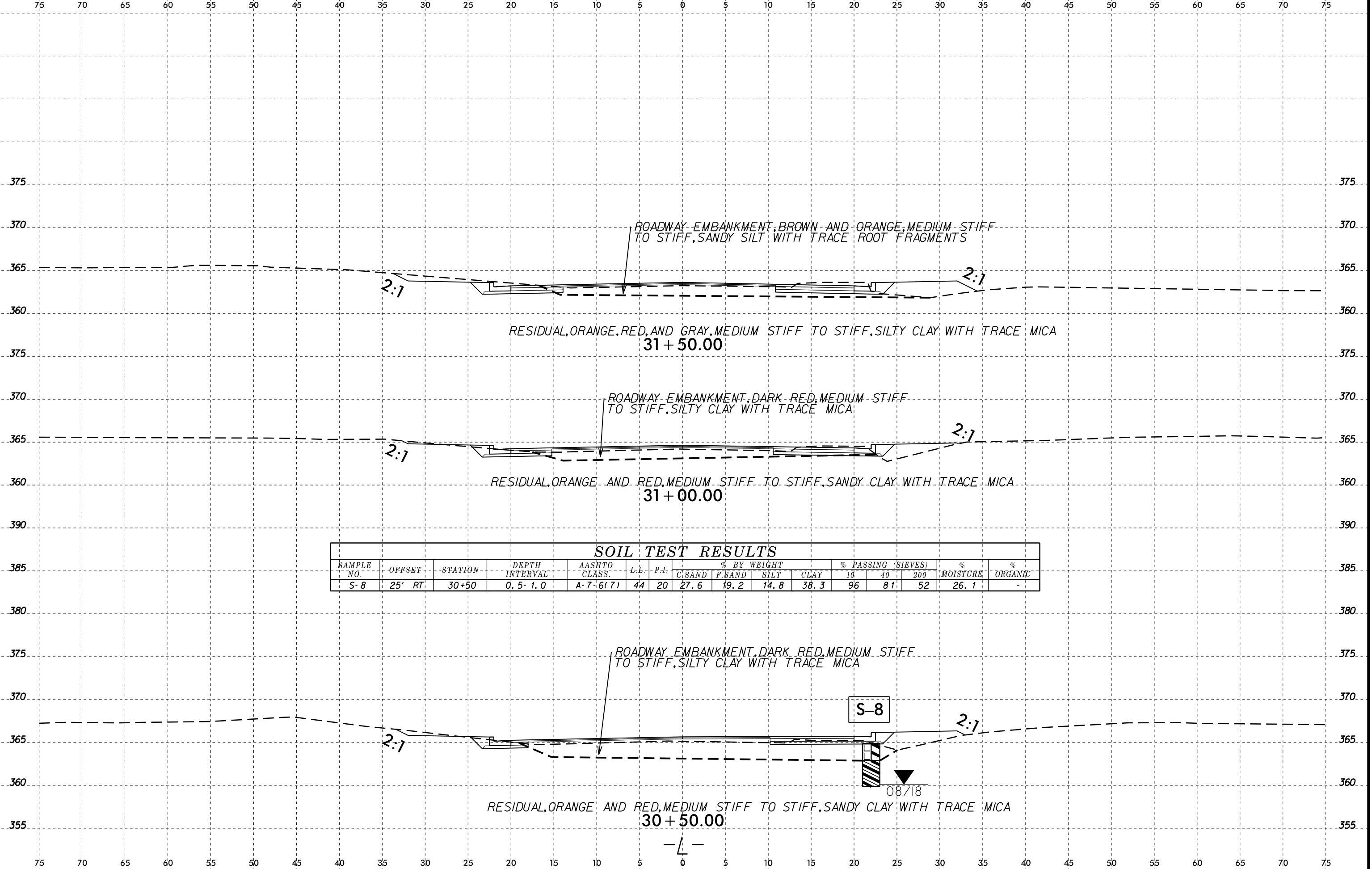




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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-8	25' RT	30+50	0.5-1.0	A-7-6(7)	44	20	27.6	19.2	14.8	38.3	96	81	52	26.1	-

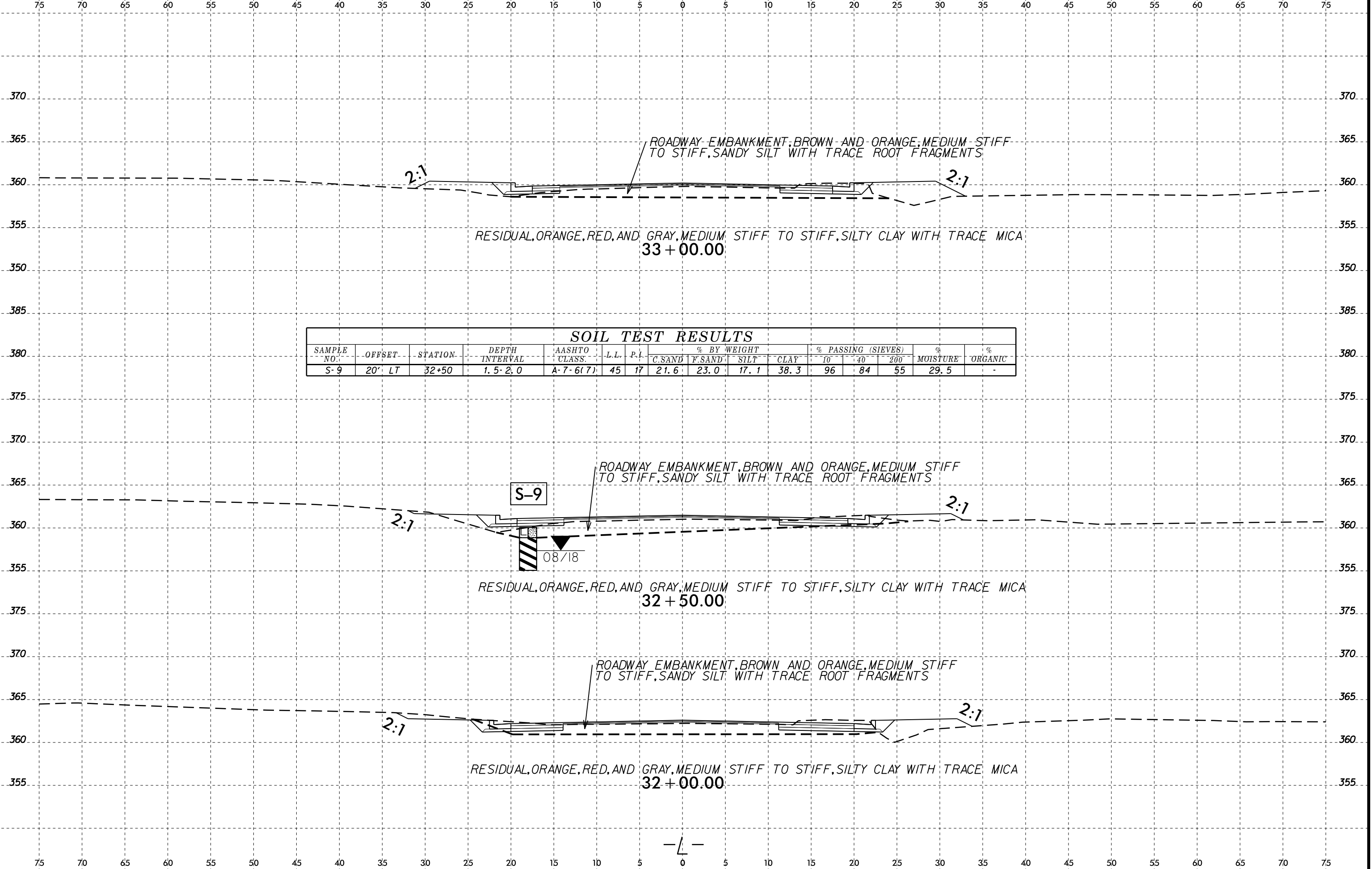
ROADWAY EMBANKMENT, DARK RED, MEDIUM STIFF TO STIFF, SILTY CLAY WITH TRACE MICA

RESIDUAL, ORANGE AND RED, MEDIUM STIFF TO STIFF, SANDY CLAY WITH TRACE MICA

S-8

08/18

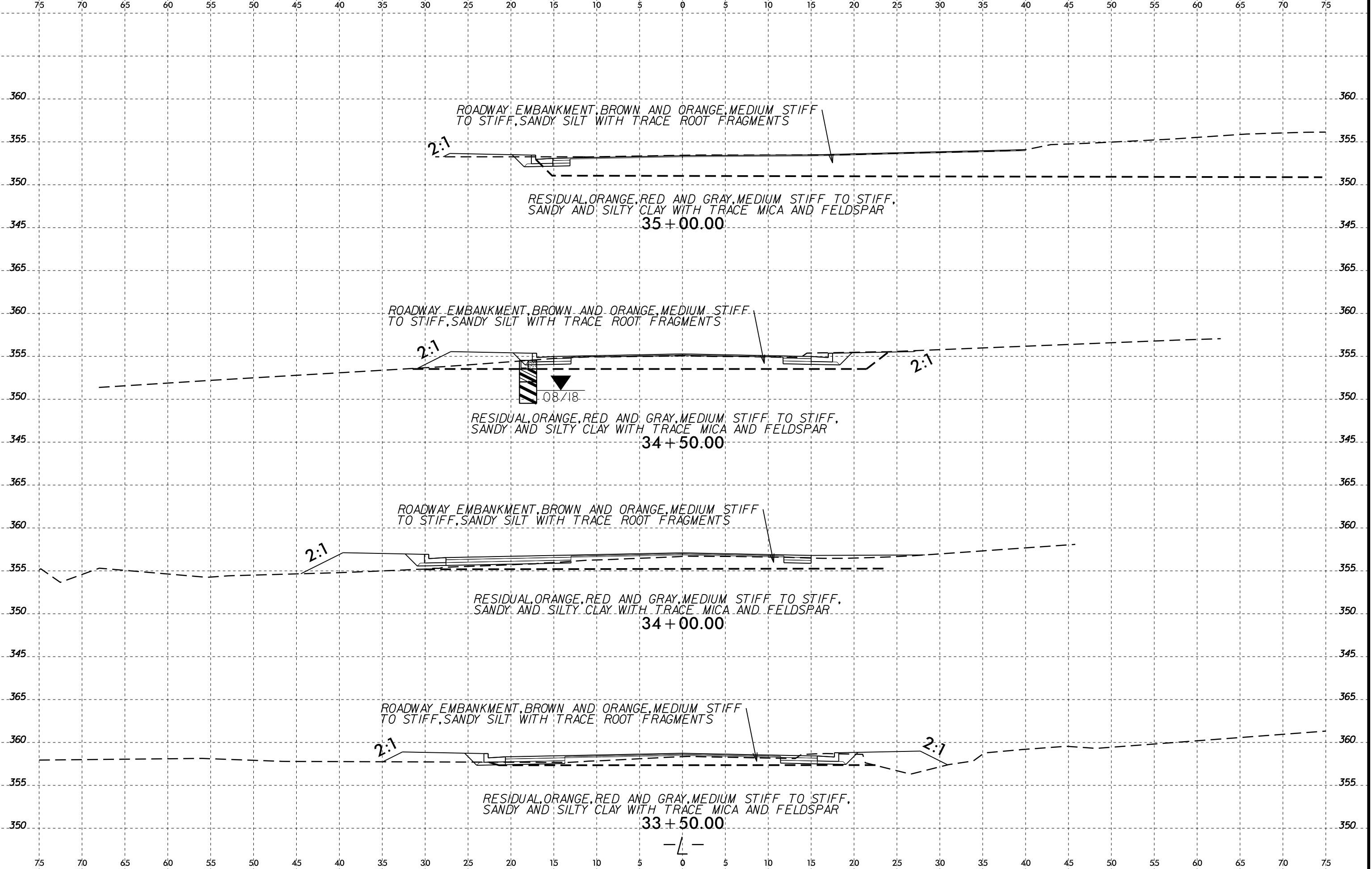
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.L.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-9	20' LT	32+50	1.5-2.0	A-7-6(7)	45	17	21.6	23.0	17.1	38.3	96	84	55	29.5	-

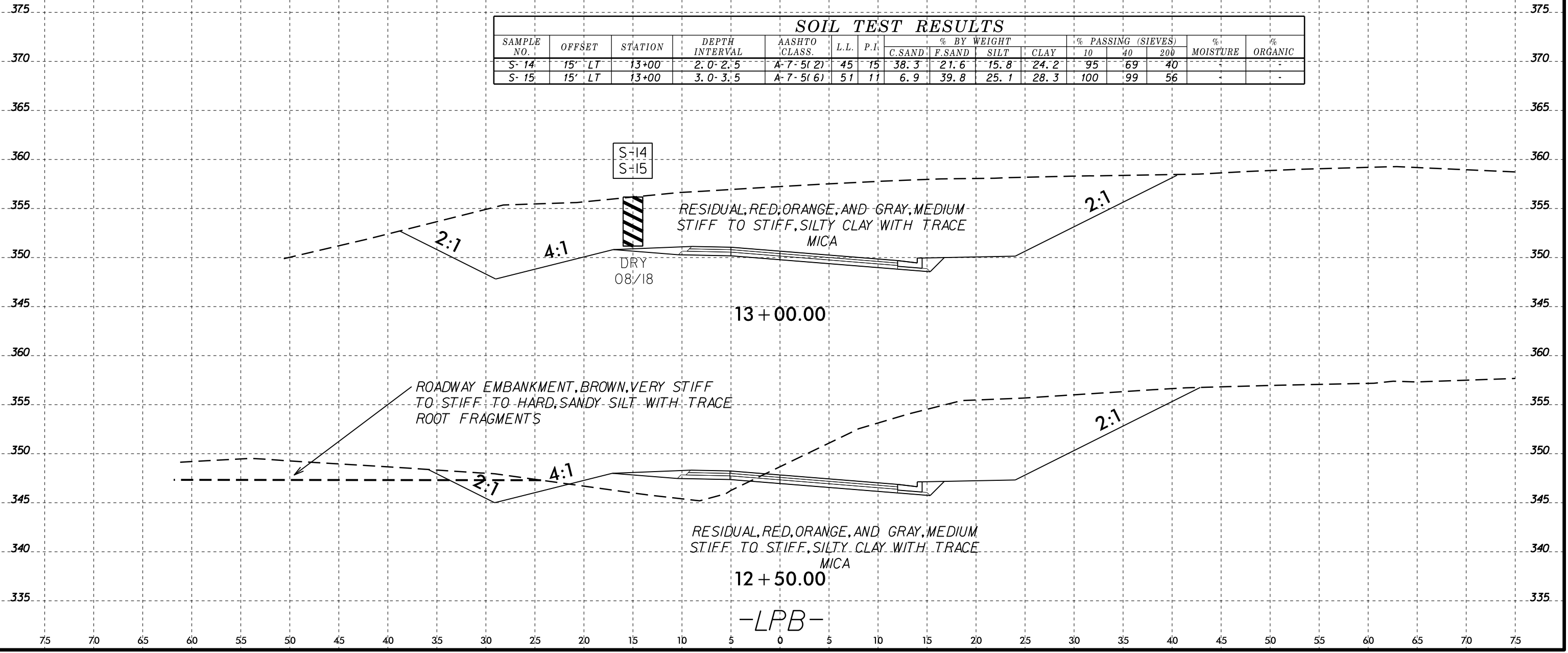
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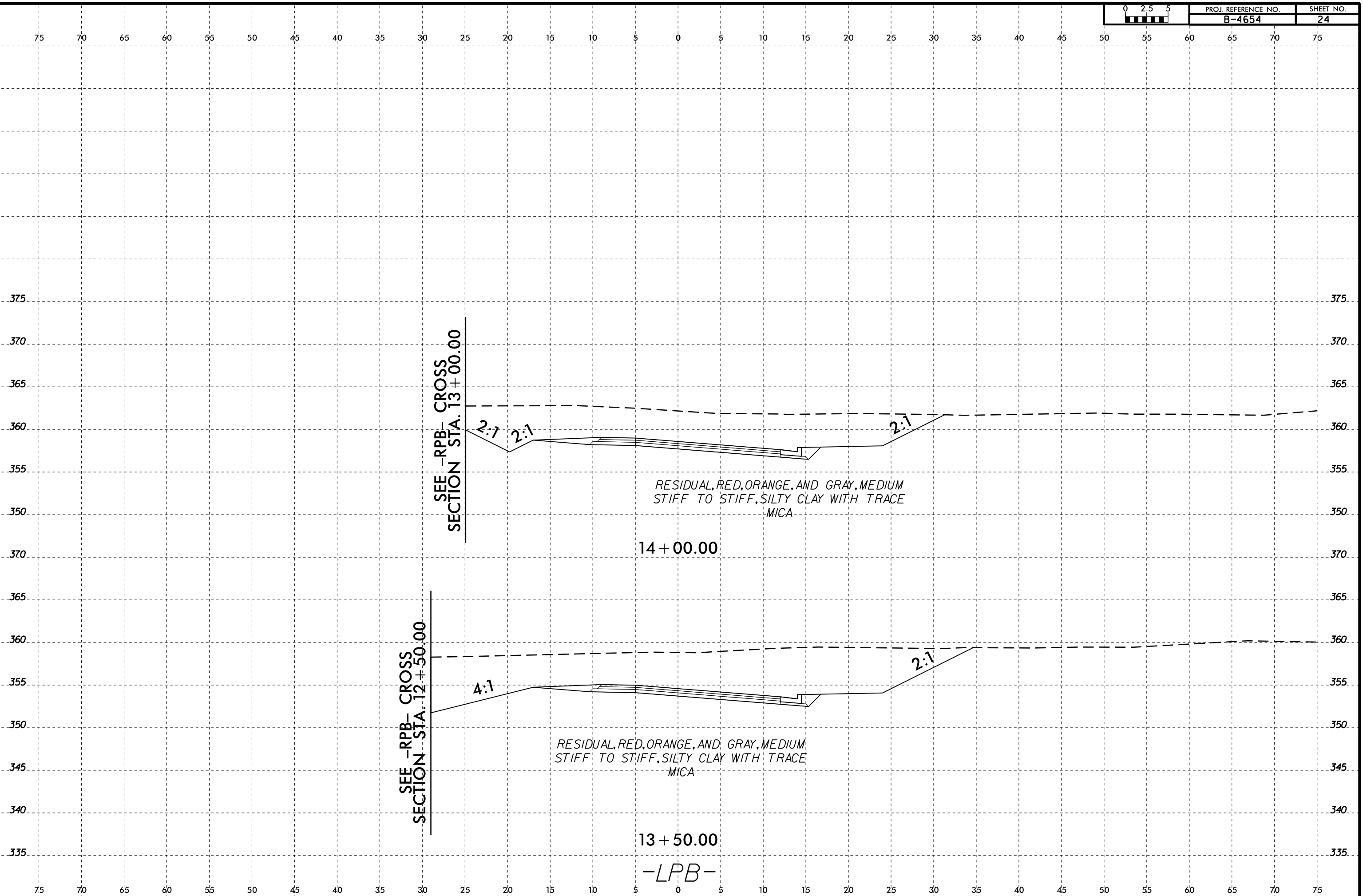


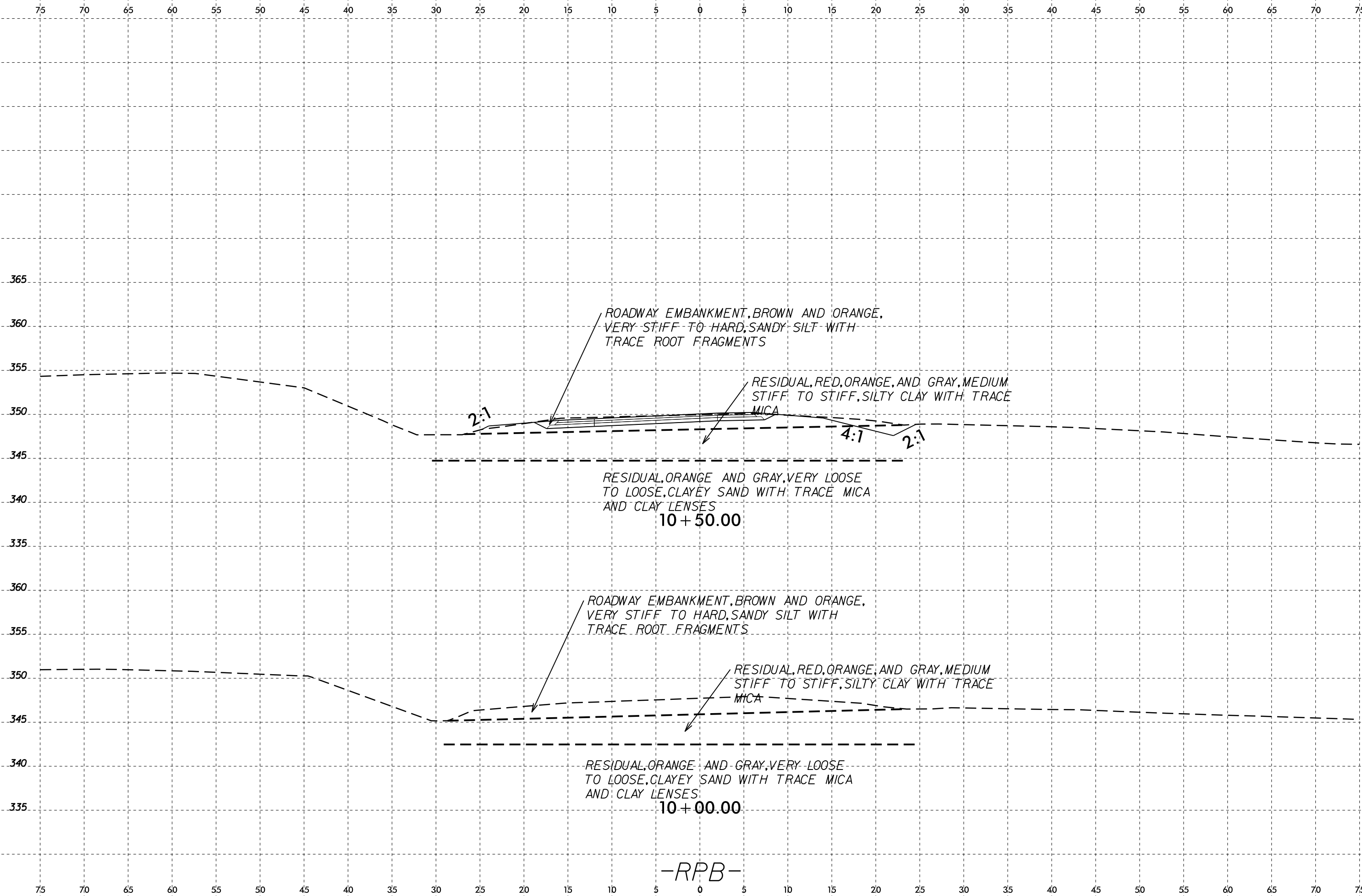
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-14	15' LT	13+00	2.0-2.5	A-7-5(2)	45	15	38.3	21.6	15.8	24.2	95	69	40	-	-
S-15	15' LT	13+00	3.0-3.5	A-7-5(6)	51	11	6.9	39.8	25.1	28.3	100	99	56	-	-



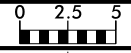
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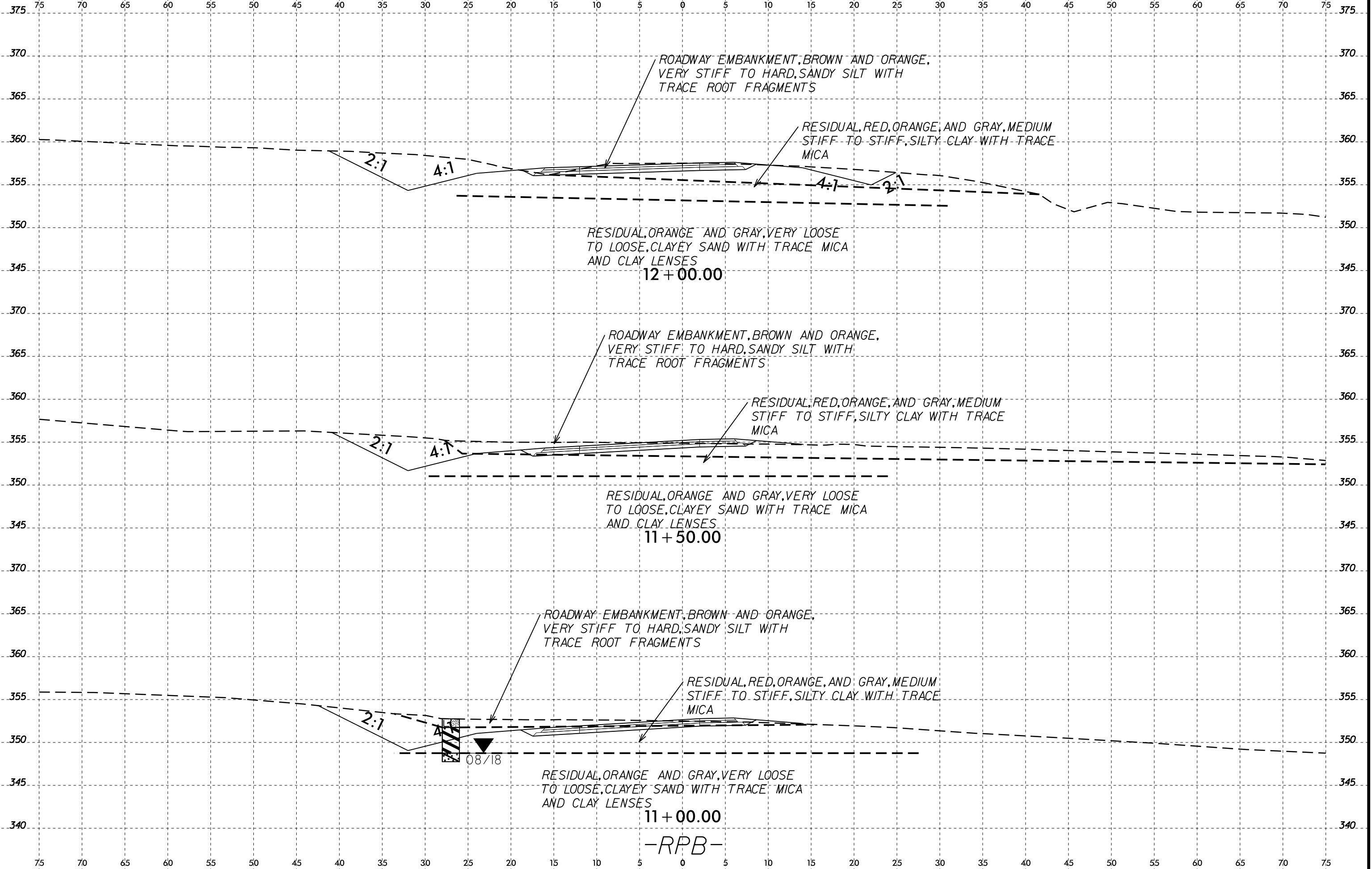


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6/23/16



PROJ. REFERENCE NO.	SHEET NO.
B-4654	26



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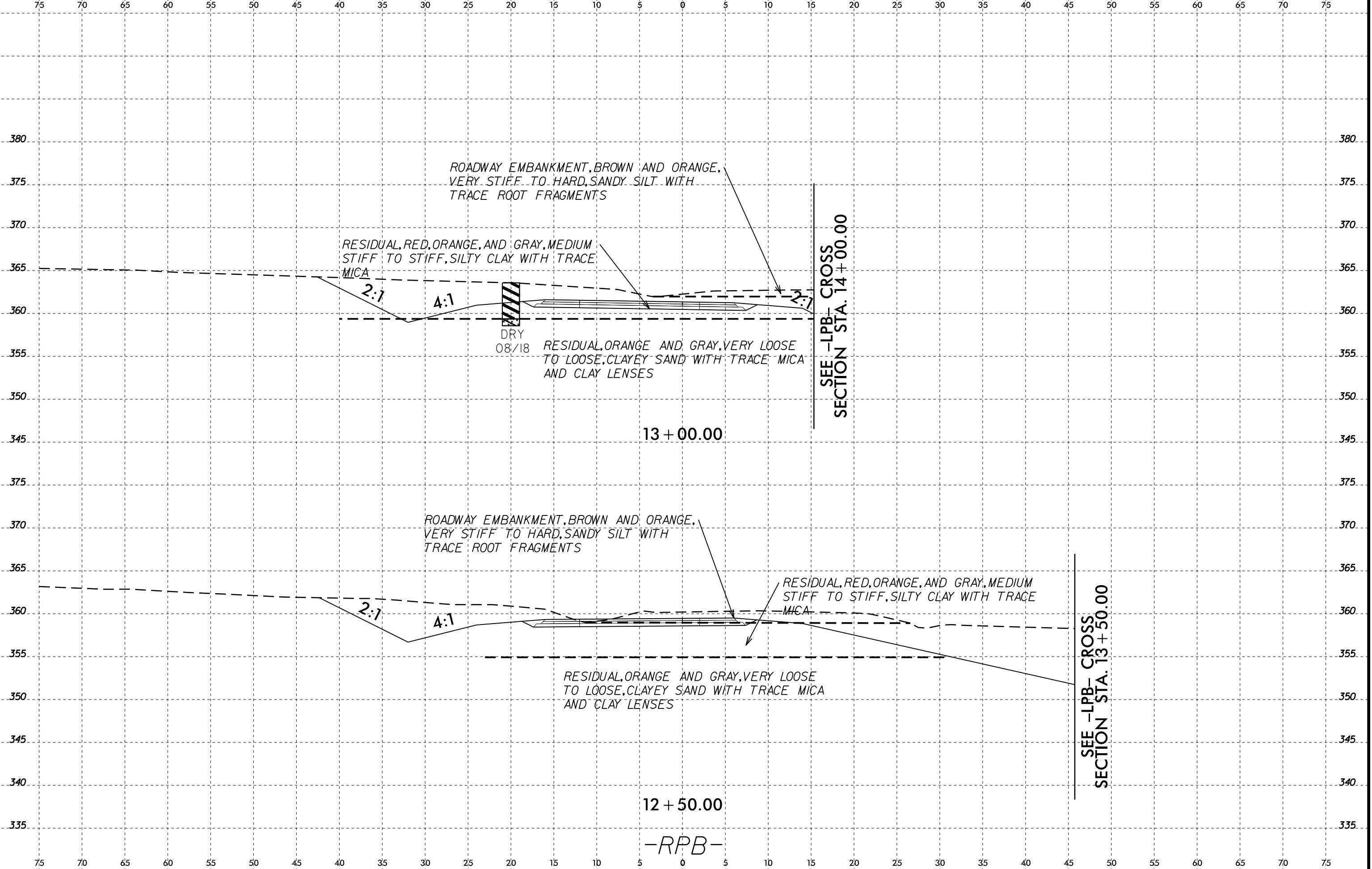
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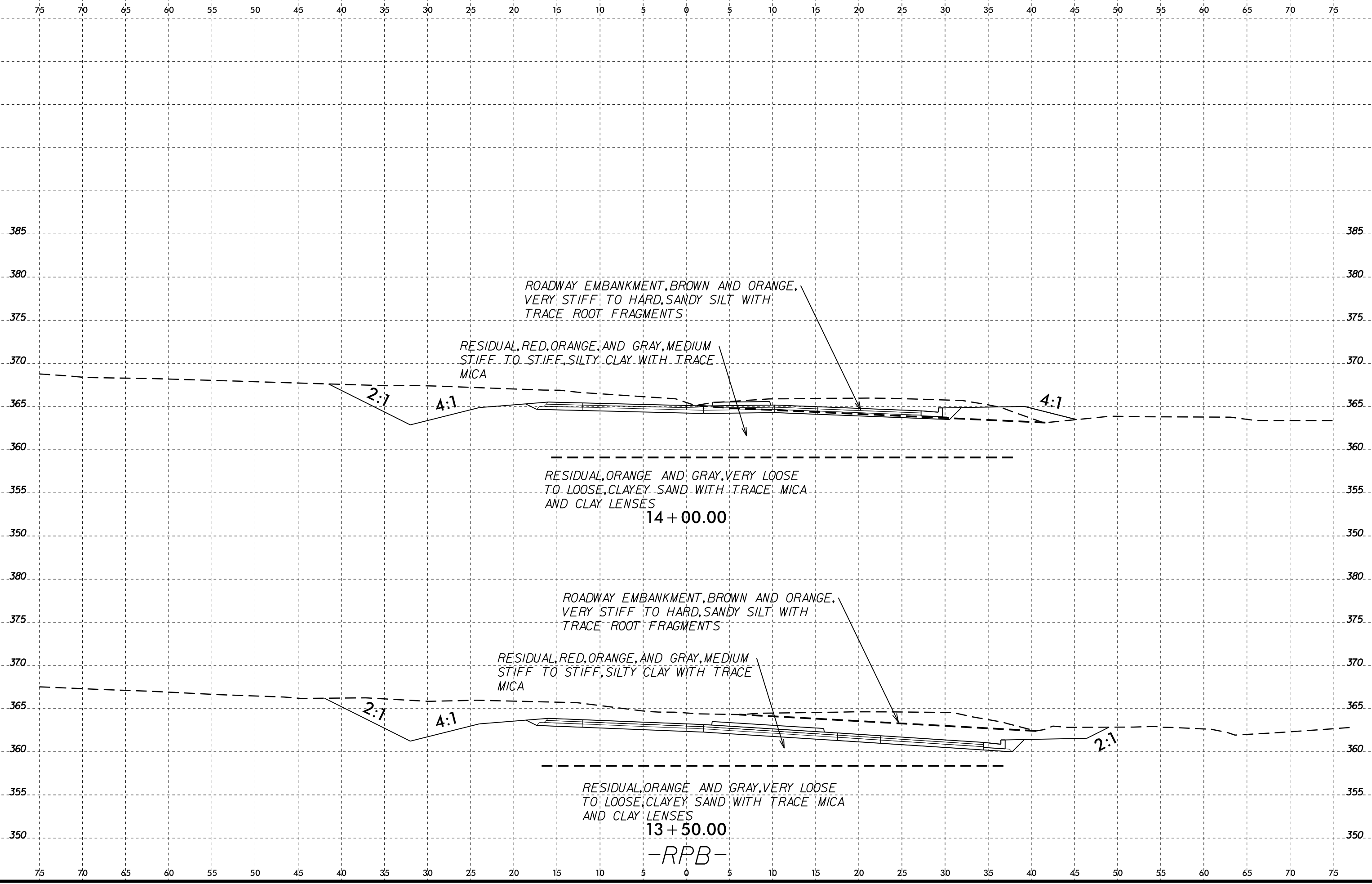
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-RPB-



ROADWAY EMBANKMENT, BROWN AND ORANGE, VERY STIFF TO HARD, SANDY SILT WITH TRACE ROOT FRAGMENTS

RESIDUAL, RED, ORANGE, AND GRAY, MEDIUM STIFF TO STIFF, SILTY CLAY WITH TRACE MICA

RESIDUAL, ORANGE AND GRAY, VERY LOOSE TO LOOSE, CLAYEY SAND WITH TRACE MICA AND CLAY LENSES

14 + 00.00

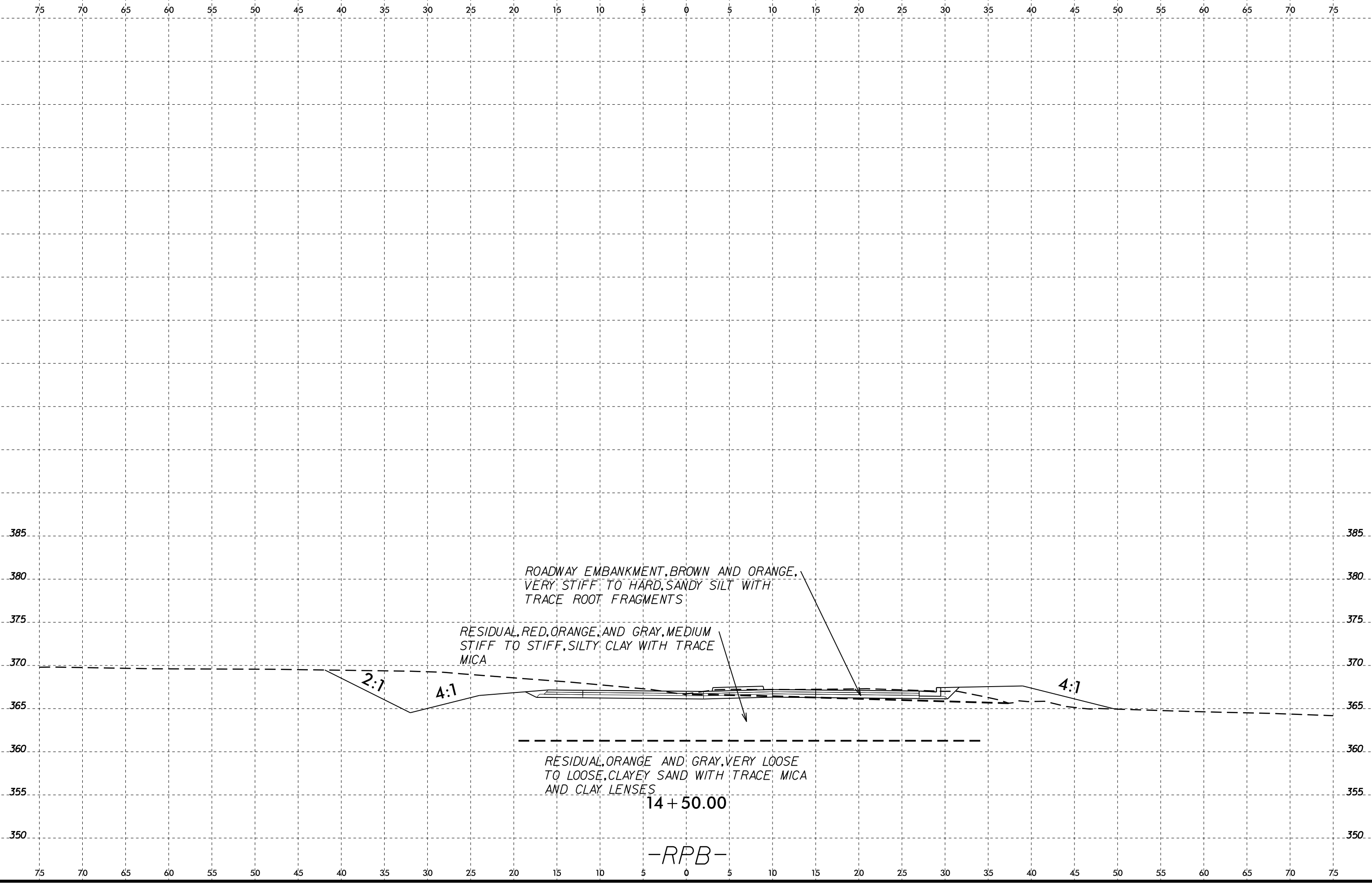
ROADWAY EMBANKMENT, BROWN AND ORANGE, VERY STIFF TO HARD, SANDY SILT WITH TRACE ROOT FRAGMENTS

RESIDUAL, RED, ORANGE, AND GRAY, MEDIUM STIFF TO STIFF, SILTY CLAY WITH TRACE MICA

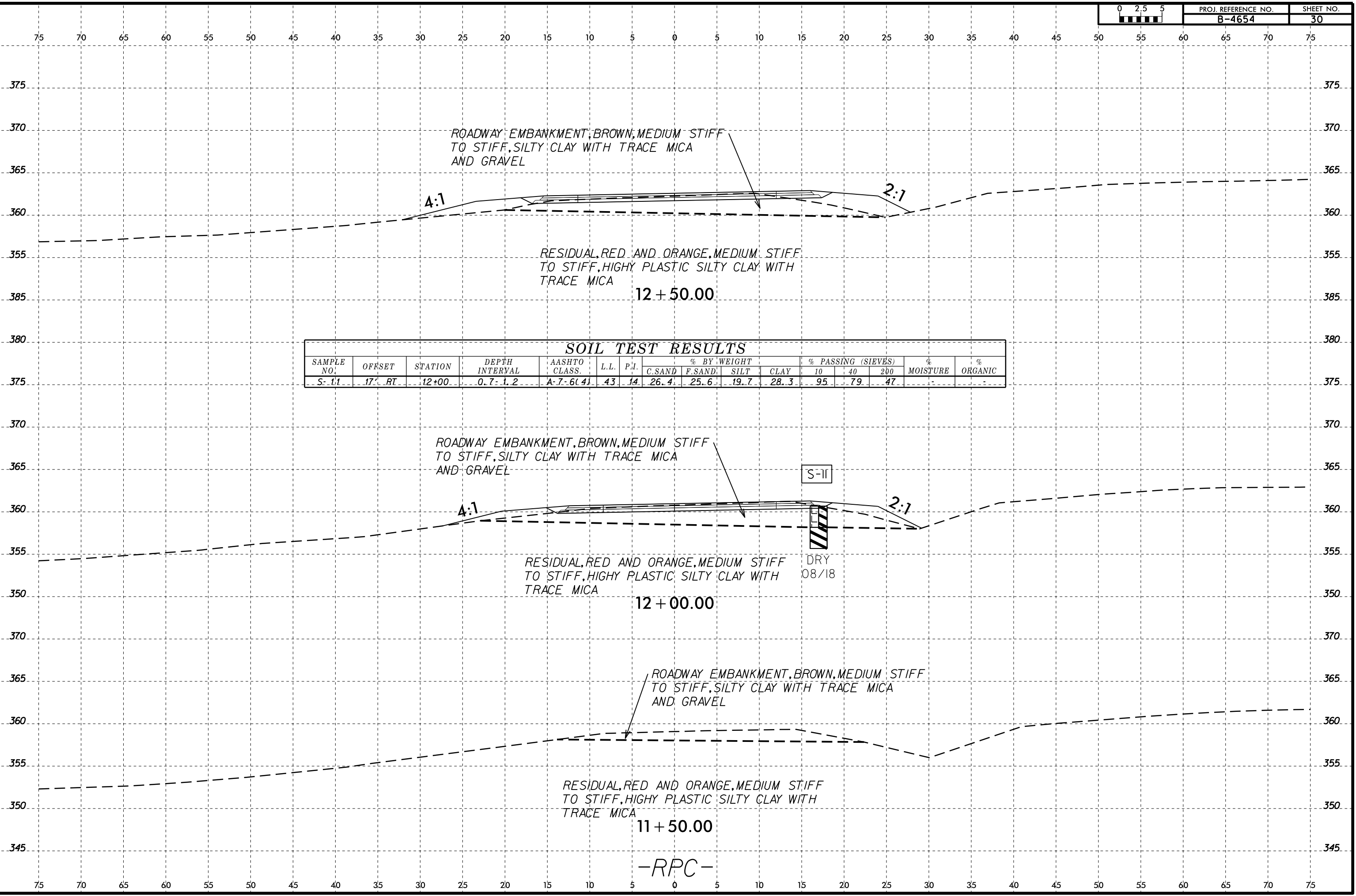
RESIDUAL, ORANGE AND GRAY, VERY LOOSE TO LOOSE, CLAYEY SAND WITH TRACE MICA AND CLAY LENSES

13 + 50.00

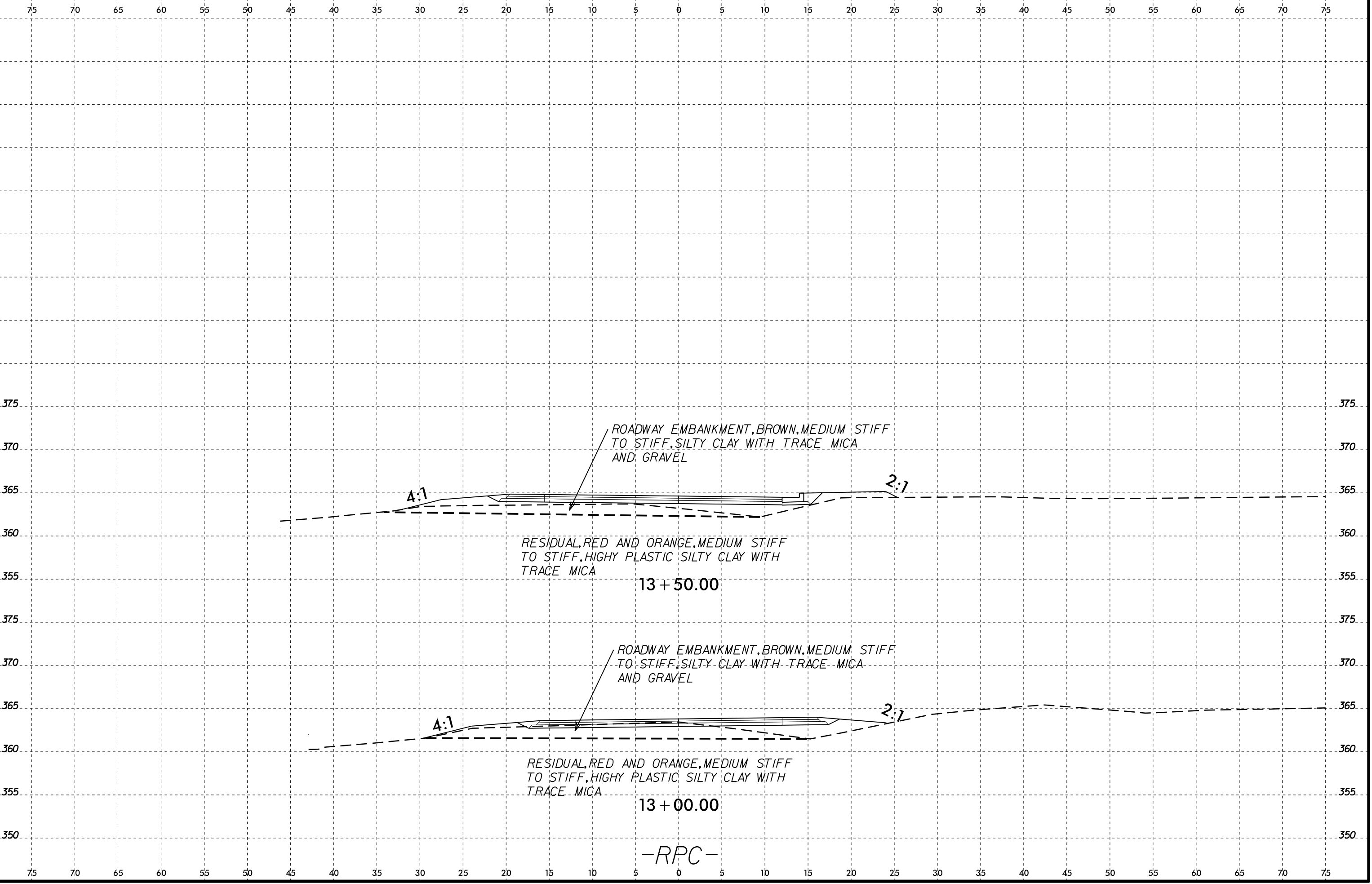
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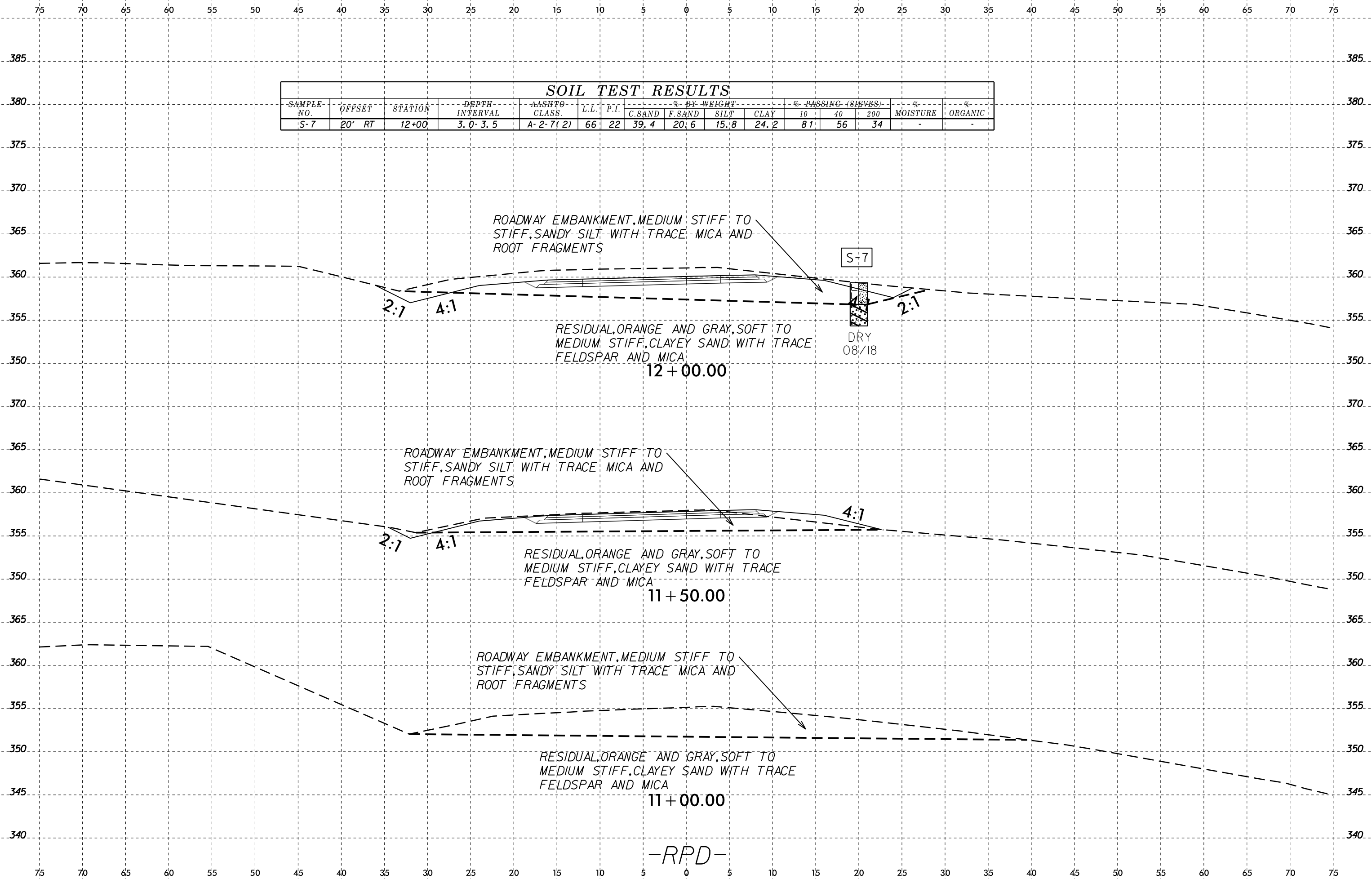
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-11	17' RT	12+00	0.7 - 1.2	A-7-6(4)	43	14	26.4	25.6	19.7	28.3	95	79	47		

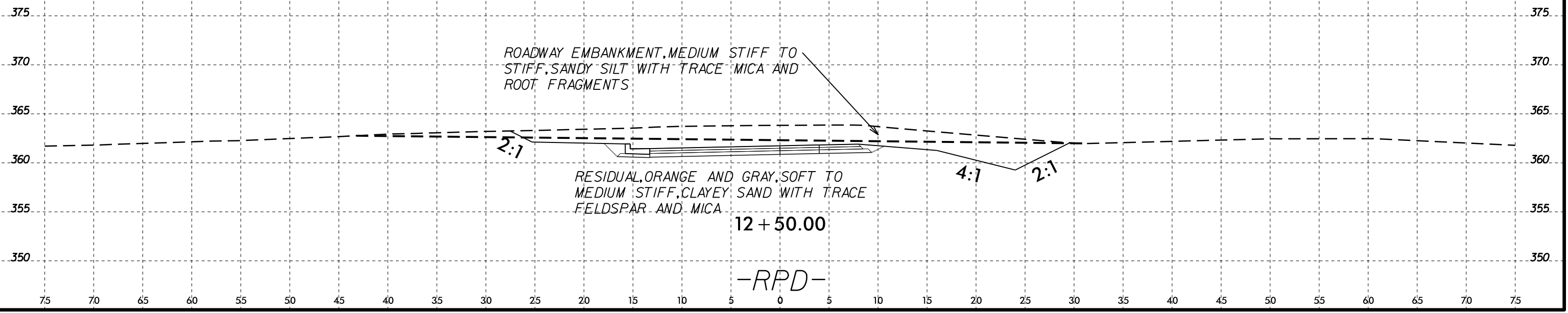


SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
S-7	20' RT	12+00	3.0-3.5	A-2-7(2)	66	22	39.4	20.6	15.8	24.2	81	56	34	-	-	



-RPD-

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



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70						GROUND WTR (ft)									
BORING NO. EB1-B		STATION 21+65		OFFSET 26 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 356.5 ft		TOTAL DEPTH 78.5 ft		NORTHING 712,183		EASTING 2,114,783									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Clarke, R. E.		START DATE 08/30/18		COMP. DATE 08/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
360															
355	354.3	2.2	2	3	4	7						M	ROADWAY EMBANKMENT RED, ORANGE, AND BROWN, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA	0.0	
350	349.3	7.2	4	7	9	16						SS-23			
345	344.3	12.2	3	3	5	8						SS-24	RESIDUAL ORANGE-PINK, SANDY SILT WITH TRACE MICA AND FELDSPAR	10.5	
340	339.3	17.2	2	3	4	7						M			
335	334.3	22.2	2	3	5	8						M			
330	329.3	27.2	2	2	4	6						SS-25	ORANGE-PINK, AND GRAY, SAPROLITIC, CLAYEY SILT WITH TRACE MICA	25.5	
325	324.3	32.2	1	2	4	6						M			
320	319.3	37.2	3	2	5	7						M	BROWN AND GRAY, SAPROLITIC, SILTY SAND WITH TRACE MICA AND FELDSPAR	35.5	
315	314.3	42.2	3	2	6	8						M			
310	309.3	47.2	4	6	8	14						M	RED, BROWN, ORANGE, AND GRAY, SAPROLITIC, SANDY SILT WITH TRACE MICA	45.5	
305	304.3	52.2	3	5	8	13						M			
300	299.3	57.2	2	4	5	9						SS-26			
295	294.3	62.2	3	4	6	10						M	GRAY AND BROWN, SAPROLITIC, SILTY SAND WITH TRACE MICA	60.5	
290	289.3	67.2	6	11	14	25						M			
285	284.3	72.2	18	40	60/0.4								WEATHERED ROCK GRANITE	68.8	
280															100/0.9

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70						GROUND WTR (ft)									
BORING NO. EB1-B		STATION 21+65		OFFSET 26 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 356.5 ft		TOTAL DEPTH 78.5 ft		NORTHING 712,183		EASTING 2,114,783									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Clarke, R. E.		START DATE 08/30/18		COMP. DATE 08/30/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
280															
	278.8	77.7	39	61/0.3										Match Line	
															100/0.8
															278.0
															78.5

NCDOT BORE DOUBLE B4654_GEO_RWALLS_BH.GPJ NC_DOT.GDT 11/5/18

GEOTECHNICAL BORING REPORT BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)									
BORING NO. B1-A		STATION 22+89		OFFSET 28 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 347.0 ft		TOTAL DEPTH 96.9 ft		NORTHING 712,297		EASTING 2,114,709										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/19/18		COMP. DATE 10/19/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
350																
	347.0	0.0	2	3	4											
345	345.3	1.7	4	7	9											
340	340.2	6.8	1	2	1											
335	335.2	11.8	2	1	2											
330	330.2	16.8	1	3	5											
325	325.2	21.8	6	8	12											
320	320.2	26.8	5	7	10											
315	315.2	31.8	3	3	5											
310	310.2	36.8	2	2	3											
305	305.2	41.8	3	8	12											
300	300.2	46.8	13	22	29											
295	295.2	51.8	21	25	29											
290	290.2	56.8	25	37	63/0.4											
285	285.2	61.8	22	46	39											
280	280.2	66.8	100/0.4													
275	275.2	71.8	16	31	33											
270	270.2	76.8														

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)									
BORING NO. B1-A		STATION 22+89		OFFSET 28 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 347.0 ft		TOTAL DEPTH 96.9 ft		NORTHING 712,297		EASTING 2,114,709										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/19/18		COMP. DATE 10/19/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
270																
			26	19	15											
265	265.2	81.8	13	19	22											
260	260.2	86.8	100/0.4													
255	255.2	91.8	60/0.1													
	250.2	96.8	60/0.1													

NCDOT BORE DOUBLE B4654_GEO_RWALLS_BH.GPJ NC_DOT.GDT 11/5/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. B1-B		STATION 22+77		OFFSET 14 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 349.2 ft		TOTAL DEPTH 82.1 ft		NORTHING 712,270		EASTING 2,114,769									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/18/18		COMP. DATE 10/18/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
350														GROUND SURFACE	0.0
														ROADWAY EMBANKMENT	
														TAN-BROWN, MEDIUM DENSE, COARSE SAND WITH TRACE GRAVEL	2.0
345	345.2	4.0	4	5	5									RESIDUAL	
														GRAY AND BROWN, SAPROLITIC, SILTY SAND WITH TRACE TO LITTLE MICA AND TRACE FELDSPAR AND MAGNESIUM	
340	342.2	7.0	2	2	3										
335	337.2	12.0	3	3	4										
330	332.2	17.0	2	4	6										
325	327.2	22.0	3	5	6										
320	322.2	27.0	4	7	12										
315	317.2	32.0	4	5	10										
310	312.2	37.0	4	7	11										
305	307.2	42.0	28	72/0.4										WEATHERED ROCK	39.5
														GRANITE	
300	302.2	47.0	13	20	27									RESIDUAL	45.3
														GRAY AND BROWN, SAPROLITIC, SILTY SAND WITH TRACE TO LITTLE MICA AND TRACE MAGNESIUM AND QUARTZ VEINS	
295	297.2	52.0	9	16	17										
290	292.2	57.0	8	12	19										
285	287.2	62.0	12	24	31										
280	282.2	67.0	21	26	52										
275	277.2	72.0	100/0.3											WEATHERED ROCK	69.1
														GRANITE	
270	272.2	77.0	100/0.3												

NCDOT BORE DOUBLE B4654_GEO_RWALLS_BH.GPJ NC_DOT.GDT 11/5/18

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. B1-B		STATION 22+77		OFFSET 14 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 349.2 ft		TOTAL DEPTH 82.1 ft		NORTHING 712,270		EASTING 2,114,769									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/18/18		COMP. DATE 10/18/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
270														Match Line	
														CRYSTALLINE ROCK	80.3
														GRANITE	82.1
														Boring Terminated at Elevation 267.1 ft IN CRYSTALLINE ROCK (GRANITE)	

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 23+48		OFFSET 36 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 366.4 ft		TOTAL DEPTH 87.8 ft		NORTHING 712,364		EASTING 2,114,754										
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/17/18		COMP. DATE 10/17/18		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
290	289.2	77.2											M	GRAY-GREEN, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA AND CLAY LENSES (continued)		
			9	12	17											
285	284.2	82.2	39	60/0.1												81.7
280	279.2	87.2	78	22/0.1										278.6	87.8	
Boring Terminated at Elevation 278.6 ft IN WEATHERED ROCK (GRANITE)																

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. RW-1		STATION 25+79		OFFSET 95 ft LT		ALIGNMENT -Y1-									
COLLAR ELEV. 355.7 ft		TOTAL DEPTH 39.8 ft		NORTHING 712,428		EASTING 2,114,650									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER Clarke, R. E.		START DATE 09/04/18		COMP. DATE 09/04/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
360															
355														355.7	0.0
	352.5	3.2	6	7	11								SS-29 M	RESIDUAL GRAY, ORANGE, AND BROWN, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA	
350			3	5	9										
	347.5	8.2	3	5	9								SS-30 M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
345			4	4	6										
	342.5	13.2	4	4	6								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
340			1	2	5										
	337.5	18.2	1	2	5								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
335			3	4	7										
	332.5	23.2	3	4	7								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
330			1	4	5										
	327.5	28.2	1	4	5								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
325			4	9	14										
	322.5	33.2	4	9	14								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
320			7	11	17										
	317.4	38.3	7	11	17								M	BROWN, ORANGE, GRAY, AND DARK GREEN, SAPROLITIC, SANDY SILT WITH TRACE MICA	
Boring Terminated at Elevation 315.9 ft IN RESIDUAL (SANDY SILT)															

NCDOT BORE DOUBLE B4654_GEO_RWALLS_BH.GPJ NC_DOT.GDT 11/5/18

GEOTECHNICAL BORING REPORT BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. RW-4		STATION 29+26		OFFSET 108 ft LT		ALIGNMENT -Y1-									
COLLAR ELEV. 368.2 ft		TOTAL DEPTH 44.8 ft		NORTHING 712,299		EASTING 2,114,972									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 09/06/18		COMP. DATE 09/06/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
370															368.2 GROUND SURFACE 0.0
365	364.9	3.3	6	6	11										
360	359.9	8.3	4	6	9										
355	354.9	13.3	3	4	4										
350	349.9	18.3	2	3	5										351.6 16.6
345	344.9	23.3	2	2	3										
340	339.9	28.3	2	2	3										
335	334.9	33.3	WOH 2 2												
330	329.9	38.3	2	3	3										331.6 36.6
325	324.9	43.3	2	3	4										323.4 44.8
															Boring Terminated at Elevation 323.4 ft IN RESIDUAL (SILTY CLAY)

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. RW-5		STATION 29+66		OFFSET 104 ft LT		ALIGNMENT -Y1-									
COLLAR ELEV. 366.5 ft		TOTAL DEPTH 49.5 ft		NORTHING 712,279		EASTING 2,115,007									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Clarke, R. E.		START DATE 09/05/18		COMP. DATE 09/05/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
370															366.5 GROUND SURFACE 0.0
365	363.5	3.0	5	7	8										
360	358.5	8.0	2	4	5										
355	353.5	13.0	3	3	4										355.2 11.3
350	348.5	18.0	2	2	3										350.2 16.3
345	343.5	23.0	2	2	3										
340	338.5	28.0	1	1	2										
335	333.5	33.0	2	2	3										335.2 31.3
330	328.5	38.0	1	2	3										
325	323.5	43.0	WOR 1 3												
320	318.5	48.0	4	5	12										320.2 46.3
															317.0 49.5
															Boring Terminated at Elevation 317.0 ft IN RESIDUAL (SILTY SAND)

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38454.1.2		TIP B-4654		COUNTY WAKE		GEOLOGIST Moore, N. O.									
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70							GROUND WTR (ft)								
BORING NO. RW-6		STATION 30+07		OFFSET 99 ft LT		ALIGNMENT -Y1-									
COLLAR ELEV. 365.3 ft		TOTAL DEPTH 44.7 ft		NORTHING 712,258		EASTING 2,115,042									
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 09/05/18		COMP. DATE 09/05/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
370															
365														365.3	0.0
360	362.1	3.2	5	7	9	1					SS-31	M	RESIDUAL BROWN, GRAY, AND RED, SAPROLITIC, SILTY CLAY WITH TRACE MICA		
355	357.1	8.2	3	4	6	10					SS-32	41%			
350	352.1	13.2	2	3	5	8					SS-33	M	BROWN, GRAY, AND RED, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA, AND TRACE QUARTZ AND POTASSIUM FELDSPAR	11.5	
345	347.1	18.2	2	2	3	5						M			
340	342.1	23.2	2	2	2	4						M			
335	337.1	28.2	2	3	4	7						M			
330	332.1	33.2	2	2	4	6						M			
325	327.1	38.2	3	5	6	11						W			
	322.1	43.2	6	12	12	24						M		320.6	44.7
Boring Terminated at Elevation 320.6 ft IN RESIDUAL (SANDY SILT)															

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