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REFERENCE: F-14288

PROJECT: 80000

SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION

**CROSS SECTIONS  
CONTENTS**

LINE	STATION	PLAN	CROSS SECTION
-L-	18+00	4	8
-L-	20+00 to 20+50	4	9
-L-	21+50	4	10
-L-	23+50	5	11
-L-	25+50	5	12
-L-	28+50	5	13
-L-	31+00	5	14
-L-	32+00	5	15
-L-	33+50	5	16
-L-	34+50	5	17
-L-	36+50	5	18
-L-	38+50	5	19
-L-	40+50	6	20
-L-	42+50	6	21
-L-	46+50	6	22
-L-	49+00	6	23
-Y1-	18+00	7	24
-Y2-	10+50	6	25
-Y2-	12+50	6	26

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

**ROADWAY  
SUBSURFACE INVESTIGATION**

COUNTY UNION  
PROJECT DESCRIPTION TORY PATH ROAD ALTERNATE  
ACCESS TO SR 1300 (HELMS ROAD)

**INVENTORY**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	F-14288	1	26

**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

J.K. STICKNEY  
B.E. FOSTER  
C.L. SMITH

INVESTIGATED BY C.R. LAVENDER, III  
DRAWN BY T.T. WALKER, F&R INC.  
CHECKED BY J.E. BEVERLY  
SUBMITTED BY K.B. MILLER  
DATE AUGUST 2020



DocuSigned by:  
[Signature] 9/9/2020  
8EEA8D1BB42E438 SIGNATURE DATE

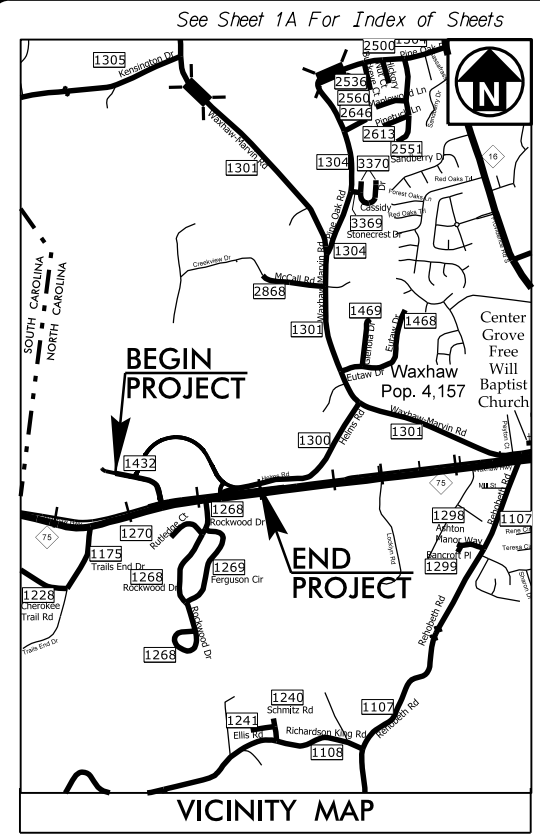
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 05/08/99

**TIP PROJECT: F-14288**

**CONTRACT:**



STATE OF NORTH CAROLINA  
 RAIL DIVISION  

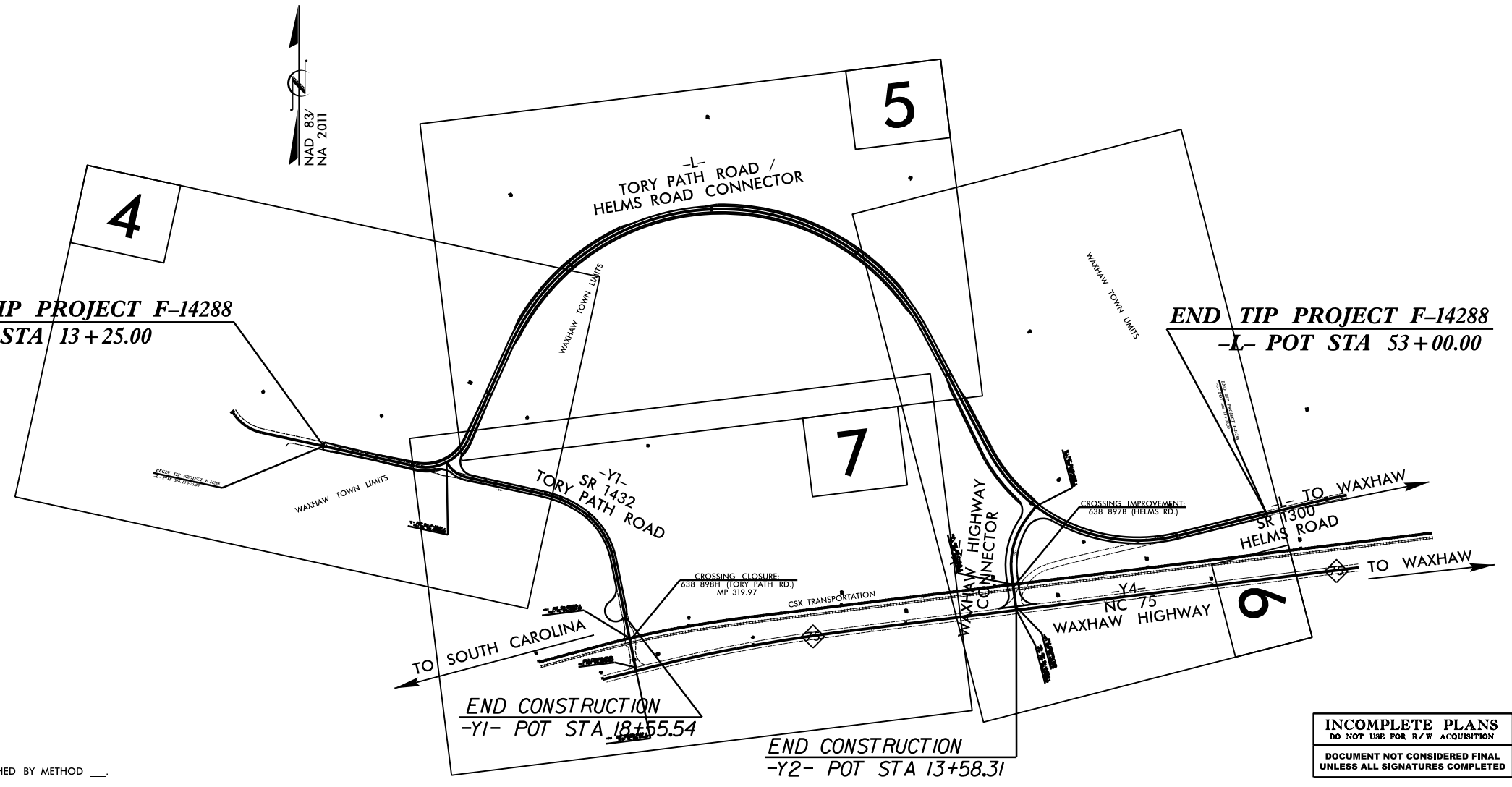

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**UNION COUNTY**


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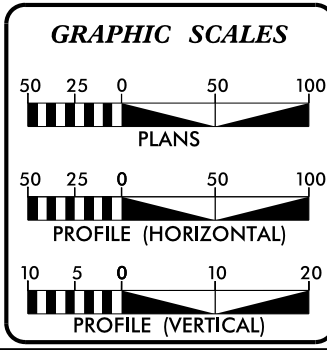
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	F-14288	3	26
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
80000.2.1.20		PE	

**LOCATION:** SR 1432 (TORY PATH ROAD)(CROSSING NUMBER 638 898H, MP 319.97) **25% PLANS**  
**CROSSING CLOSURE AT CSX TRANSPORTATION, AND EXTENSION TO SR 1300 (HELMS ROAD) IN WAXHAW**  
**TYPE OF WORK:** GRADING, PAVING, DRAINAGE, RAIL CROSSING CLOSURE, AND RAIL CROSSING IMPROVEMENT



THIS PROJECT IS PARTIALLY WITHIN THE MUNICIPAL LIMITS OF WAXHAW, NC.  
 CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_\_.

**INCOMPLETE PLANS**  
 DO NOT USE FOR R/W ACQUISITION  
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**DESIGN DATA**

ADT 2019 =	200
ADT 2045 =	400
K =	10 %
D =	55 %
T =	9 % *
V =	50 MPH
* (TTST 1% + DUAL 8%)	
FUNC CLASS =	LOCAL
REGIONAL TIER	

**PROJECT LENGTH**

TOTAL LENGTH TIP PROJECT F-14288 = 0.753 MILES

PLANS PREPARED FOR THE NCDOT BY:

<b>M M</b> MOTT MACDONALD LICENSE NO. F-8669	PO Box 700 Fuquay-Varina, NC 27526 (919) 553-2253 (919) 553-2254 (Fax) www.mottmac.com/america
	2018 STANDARD SPECIFICATIONS
<b>RIGHT OF WAY DATE:</b> MAY 26, 2020	<b>BRYON PALMER, PE</b> PROJECT ENGINEER PEF ENGINEER
<b>LETTING DATE:</b> DECEMBER 15, 2020	<b>JEFFREY COOKE, EI</b> PROJECT DESIGN ENGINEER PEF ENGINEER
	<b>BRIAN GACKSTETTER, EI</b> NCDOT DIVISION PROJECT ENGINEER

**HYDRAULICS ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.

**ROADWAY DESIGN ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.

**NC DEPARTMENT OF TRANSPORTATION**  
**RAIL DIVISION**

1556 MAIL SERVICE CENTER  
 RALEIGH, NC 27699-1556  
 (919) 707 4110  
 (919) 707-4154 (FAX)



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

ROY COOPER  
GOVERNOR

J. ERIC BOYETTE  
SECRETARY

SHEET 3A

August 17, 2020

WBS NO: 80000.2.1.20  
TIP NO: F-14288  
COUNTY: Union

DESCRIPTION: Tory Path Road Alternate Access to SR 1300 (Helms Road)

SUBJECT: Geotechnical Inventory Report

**Project Description**

This report presents findings for the proposed roadway revisions associated with the rail crossing closure at CSX transport Crossing Number 638 898H, MP 319.97 and the extension to SR 1300 (Helms Rd.) in Waxhaw. The alternate access and extension will be on new location to the North of the CSX Transport Rail and NC Highway 75. In addition to the rail crossing closure and rail crossing improvement, there will also be drainage improvements. The roadway project trends west to east and lies in the southwest quadrant of Union County. Beginning and ending station limits along -L- are between 13+25 – 53+00. Total length of project is 0.75 miles.

The geotechnical field investigation was conducted during the months of March and April 2020. An ATV mounted CME 550X drill machine equipped with automatic drop hammer was utilized to perform 21 test borings along the proposed corridor. The following survey lines are addressed in this report.

<u>Line</u>	<u>Station</u>
-L-	13+25 – 53+00
-Y1-	10+00 – 18+55.5
-Y2-	10+00 – 13+58.3

**Physiography and Geography**

The project area lies in southwestern Union County north of NC Highway 75 and the CXT Transport Rail between the town of Waxhaw and the State Boundary with South Carolina. Topography ranges between flat to gently rolling and traverses along wooded areas and residential structures. Elevation ranges from approximately 545 to 645 feet above Mean Sea Level (MSL).

Geologically, the project area falls within the Carolina Slate Belt and is underlain by Cambrian to Late Proterozoic age rock types (Czfv) comprised of Felsic Metavolcanic rocks, metamorphosed dacite to rhyolite flows and tuffs, that is interlayered with meta-argillite and metamudstone.

**Soil Properties**

1. Residual Soils:

These soils are derived from in place weathering of parent materials. They occur in a variety of consistencies, classifications, and stratigraphic sequences. Residual soils are further subdivided into clays, silts, and sands. Predominant residual soils encountered were clayey fine sandy silt (A-4), fine sandy clayey silt (A-5), and fine sandy silty clay (A-7-5, A-7-6). Generally residual soils seem to contain high percentages of sand with fair to good consistency. Plasticity index for clay soils range from 15 to 29.

2. Alluvial Soils:

Alluvial soils originate from the transportation and deposition of sediments by water in a floodplain environment. The potential for alluvial soils along the project is confined to the Wetland Area which crosses the proposed roadway, left and right of -L- Stations 42+65 and 42+70 and left and right of -L- Station 23+45. Alluvial soil samples collected consisted of soft to medium stiff clayey fine sandy silt (A-4).

**Rock Properties**

Crystalline rock and weathered crystalline rock were not encountered during this investigation.

**Areas of Special Geotechnical Interest**

1. Groundwater:

There were two instances in which groundwater was encountered during this investigation, specifically, the area left and right of -L- Stations 42+65 and 42+70. This area is denoted as a wetland. Static groundwater was encountered at 1.0 feet below ground surface (BGS) and 1.6 feet BGS, respectively. Groundwater in this location will be well below proposed grade.

2. Alluvial Soils:

The proposed roadway to the left and right of -L- Stations 42+65 and 42+70 will encounter some alluvial soils associated with an un-named tributary and wetland area. This small area of alluvial soils should have little impact on road improvements in this location. Additionally, alluvial soils associated with a detention pond will be encountered left and right of -L- Station 23+45. This area has the potential to contain soft, wet soil deposits.

Drainage improvements installed in the fill beneath the roadway should mitigate any major impact. Maximum fill height at -L- 42+65 and 42+70 is approximately 18 feet to 22 feet. Fill thickness at -L- Station 23+45 is approximately 14 feet.

3. Artificial Fill:

There is an area of artificial fill that was generated during the construction of the adjacent residential housing development. Artificial fill soils encountered are locally disturbed residual soils stripped and transported from the residential construction area during construction, transported by construction vehicles and deposited in the current location. This area essentially considered a spoils pile, and/or waste pile extends from -L- Station 19+38 to -L- Station 23+50. The approximate area is 96,290 square feet and the approximately height of the pile is 36 feet. The pile is a mixture of sand, silt and clay with varying amounts of decaying tree debris and various construction debris.

4. Water Wells:

During the investigation a water well was observed within the construction limits of this project. The observed well is in the approximate centerline of -Y2- Station 11+13 and is associated with a single-story brick dwelling. The possibility exists for other water wells to be within the construction limits that may not have been observed during the performance of this investigation.

5. Detention Pond:

A man-made detention pond was observed within the construction limits of this project. The observed detention pond is located left and right of -L- station 23+45. Soils within the detention pond would be considered alluvial, soft, wet sands, silts and clays that potentially could contain organic debris.

Respectfully Submitted,

DocuSigned by:



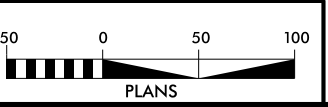
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Charles R. Lavender, III, LG  
Geologic Engineer



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Walker - AT 662621102

Prepared in the Office of:  
**F&R**  
FROEHLING & ROBERTSON, INC.  
Engineering Stability Since 1881  
310 Hubert Street  
Raleigh, North Carolina 27603-2303 USA  
T 919.828.3441 F 919.828.5751  
www.fandri.com

PROJECT REFERENCE NO. <b>F-14288</b>	SHEET NO. <b>4</b>
R/W SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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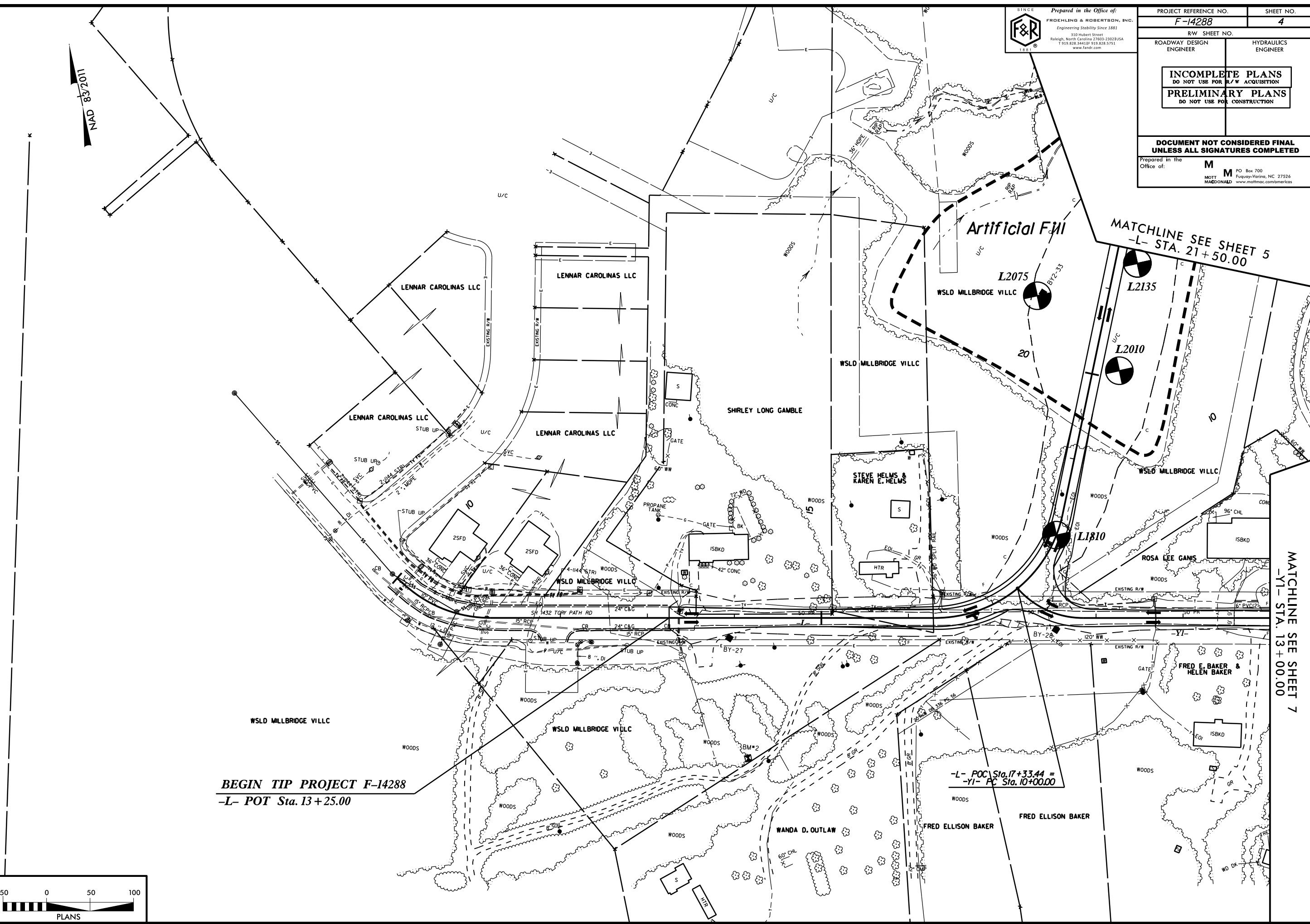


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**-L- POC Sta. 17 + 33.44 =**  
**-YI- PC Sta. 10 + 00.00**

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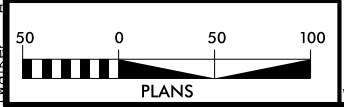
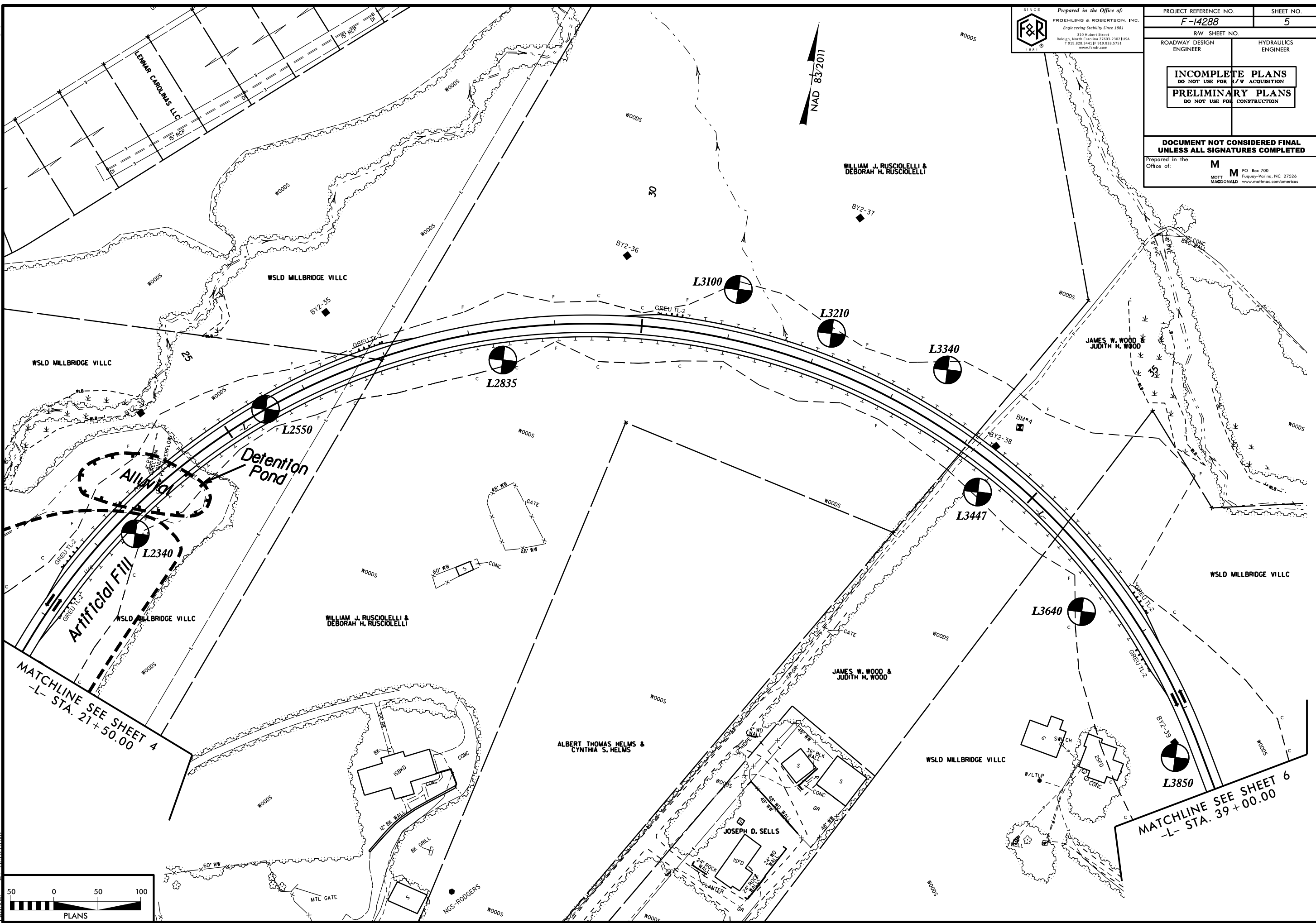
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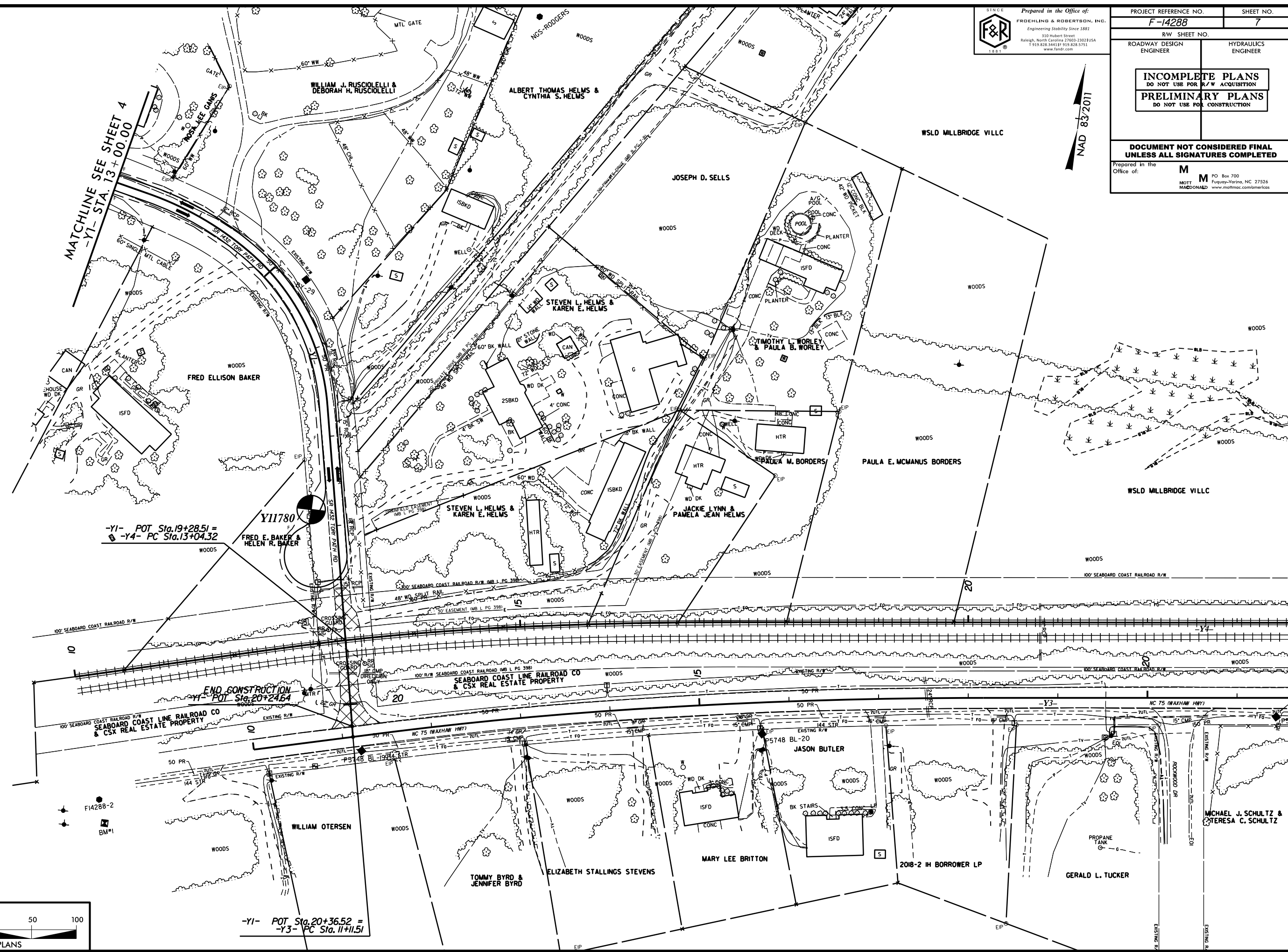
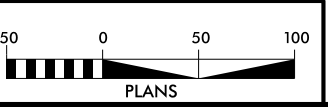


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PROJECT REFERENCE NO. <b>F-14288</b>	SHEET NO. <b>7</b>
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MATCHLINE SEE SHEET 4  
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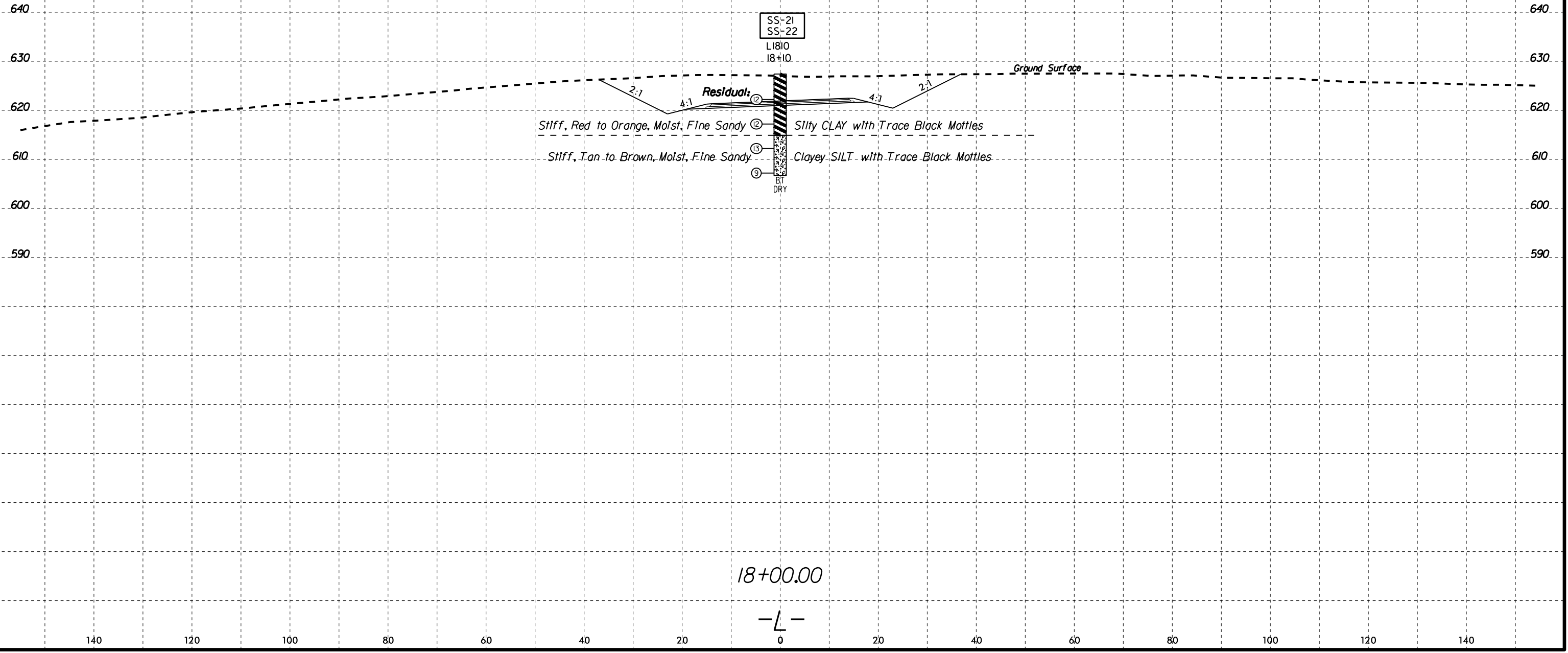
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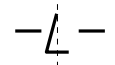
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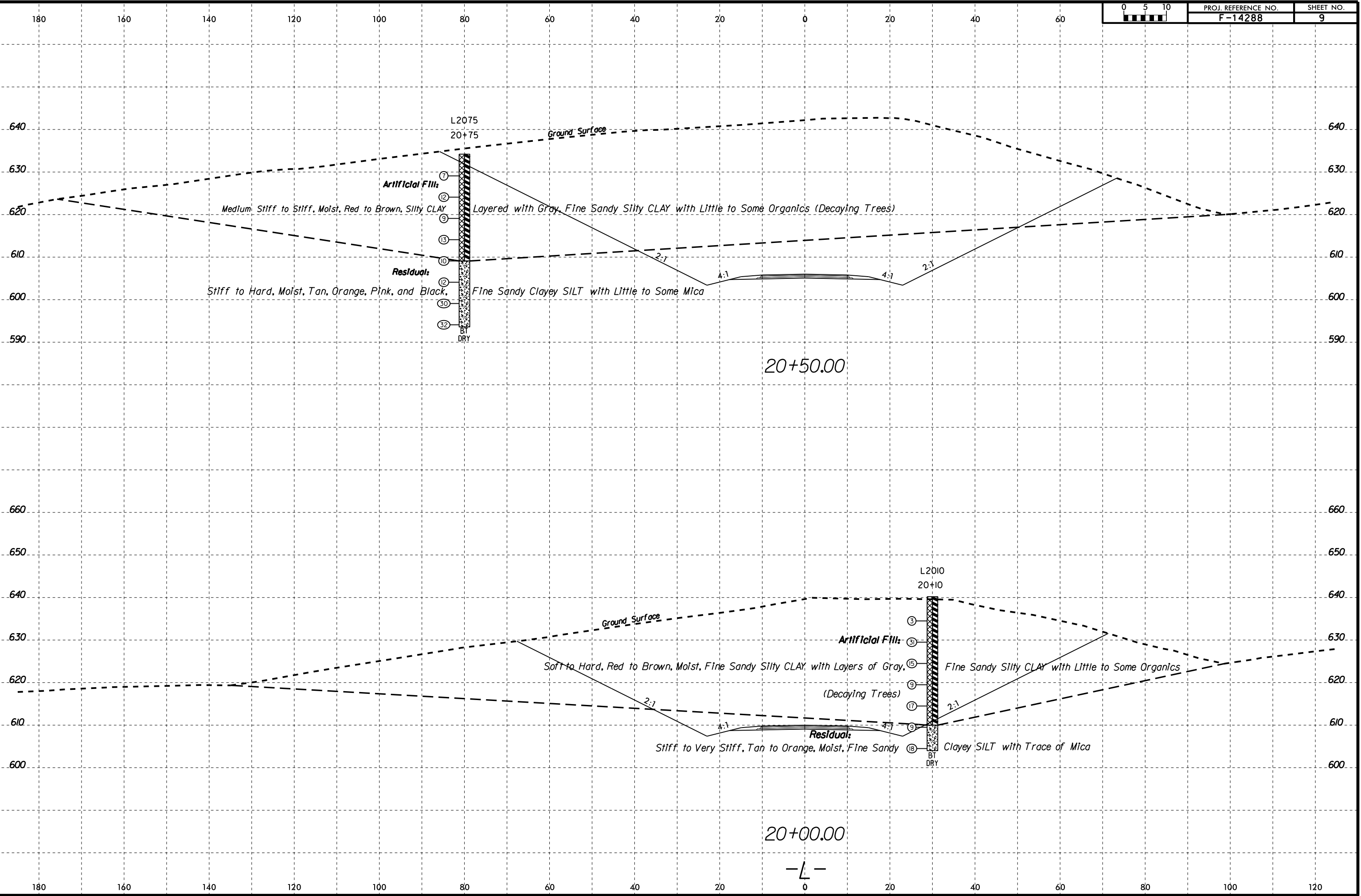
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-21	18+10	CL	4.2-5.7	A-7-5(19)	52	17	4.6	13.1	44.1	38.2	100	97	88	-	-
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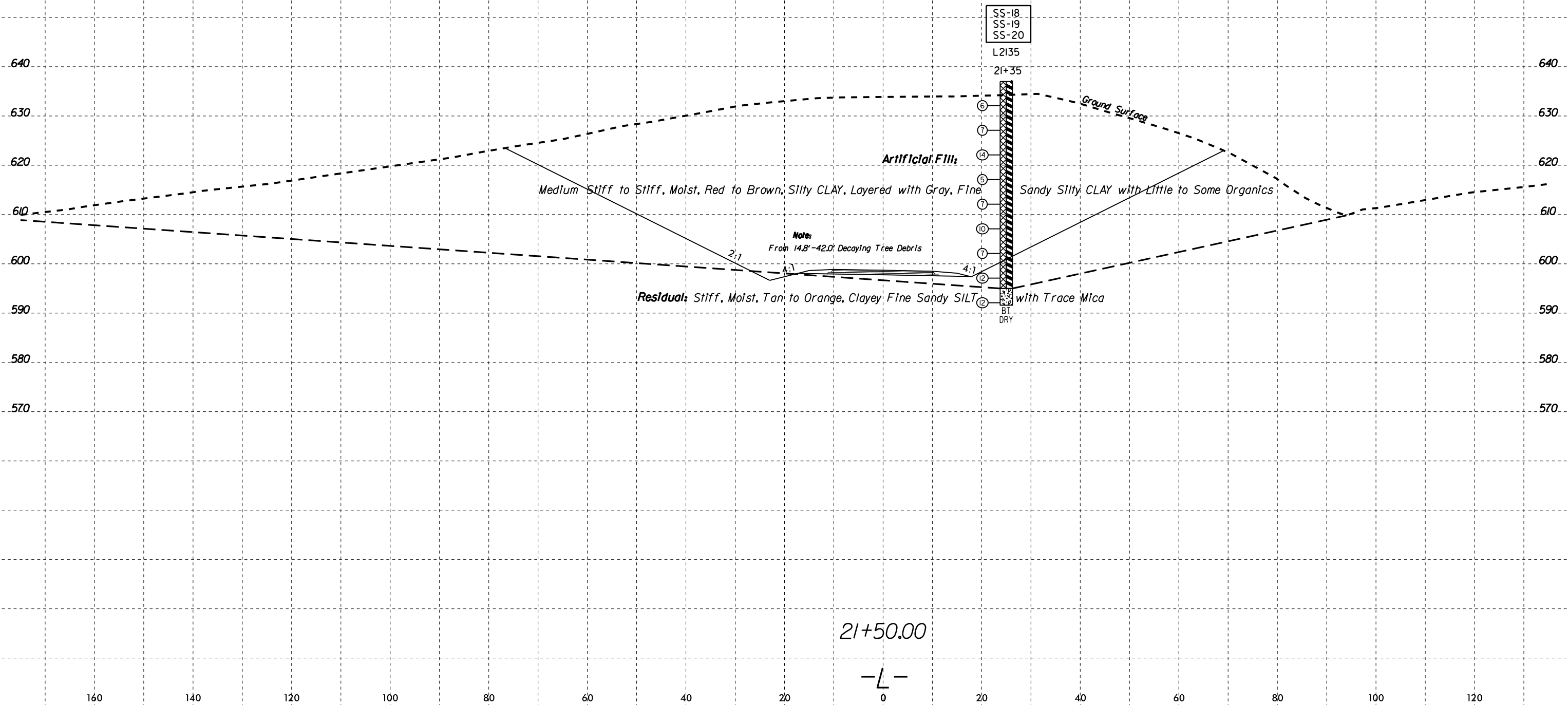
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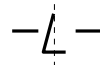
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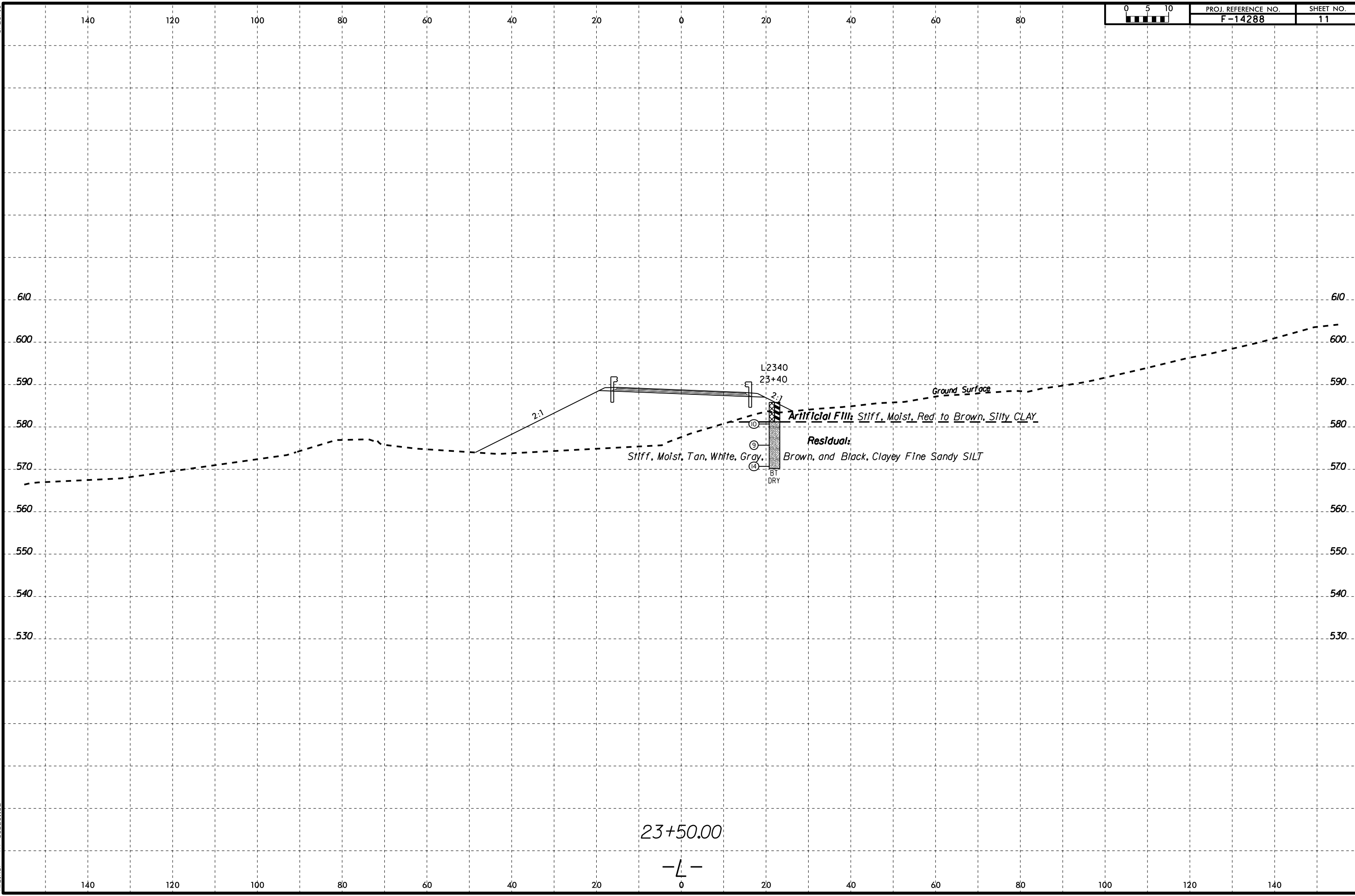


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SS-19	21+35	25' RT	33.9- 35.4	A-7-6(13)	44	15	5.6	13.5	44.7	36.2	93	89	81	-	-
SS-20	21+35	25' RT	43.9- 45.4	A-5(8)	44	8	2.4	30.6	44.9	22.1	100	99	79	-	-



21+50.00

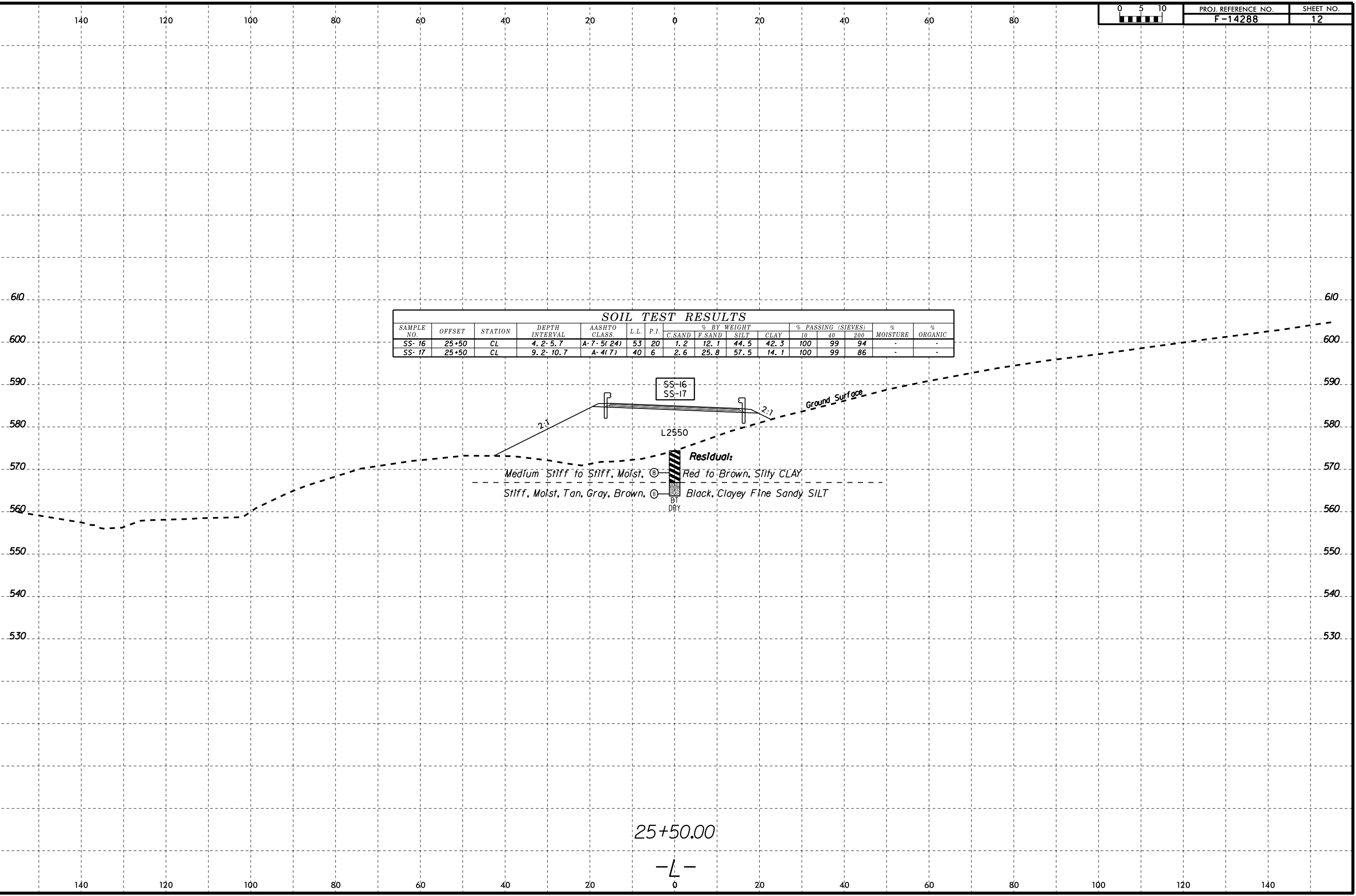
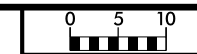




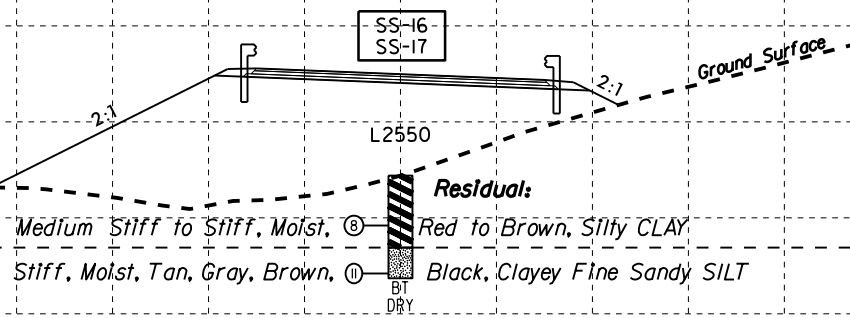
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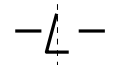


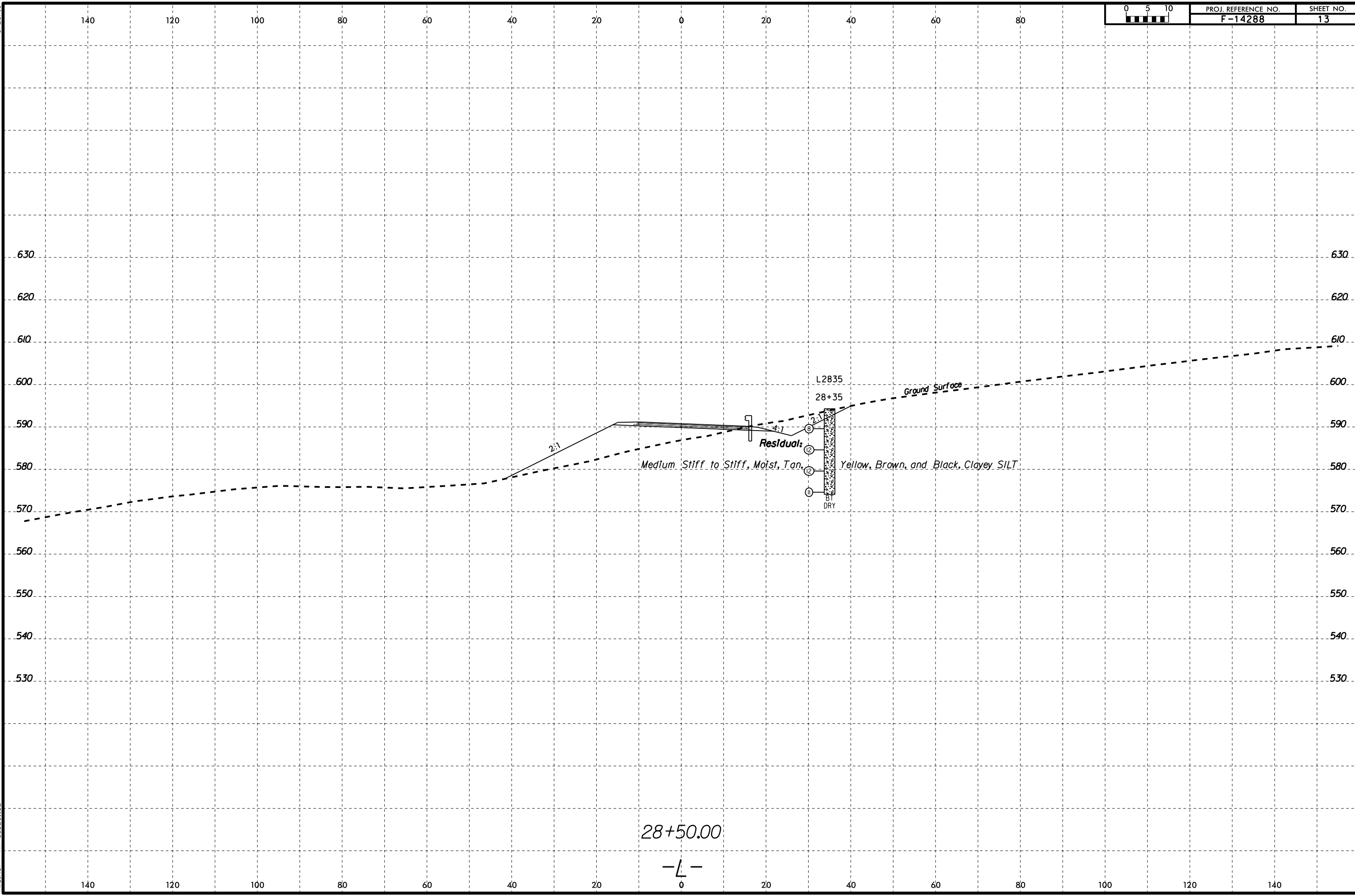


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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-16	25+50	CL	4.2-5.7	A-7-5(24)	53	20	1.2	12.1	44.5	42.3	100	99	94	-	-
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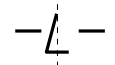


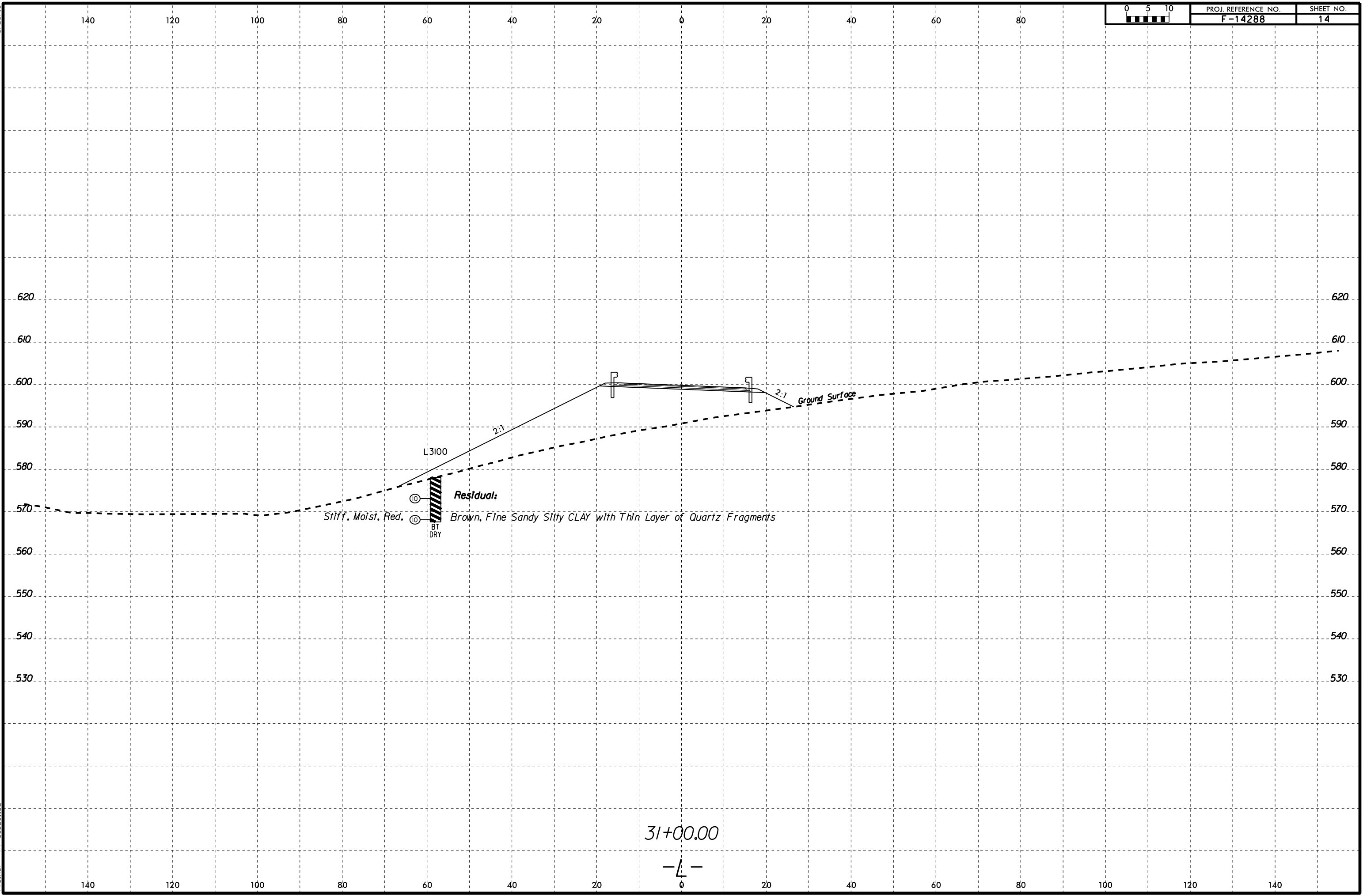
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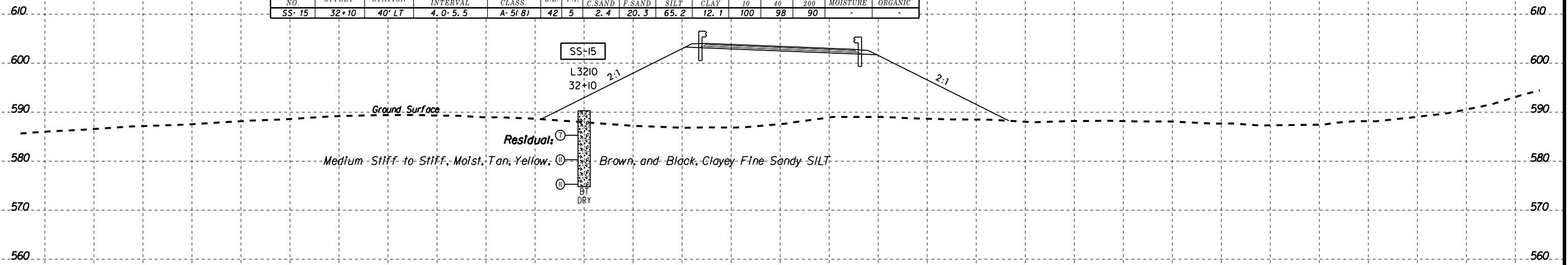
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—L—



140 120 100 80 60 40 20 0 20 40 60 80

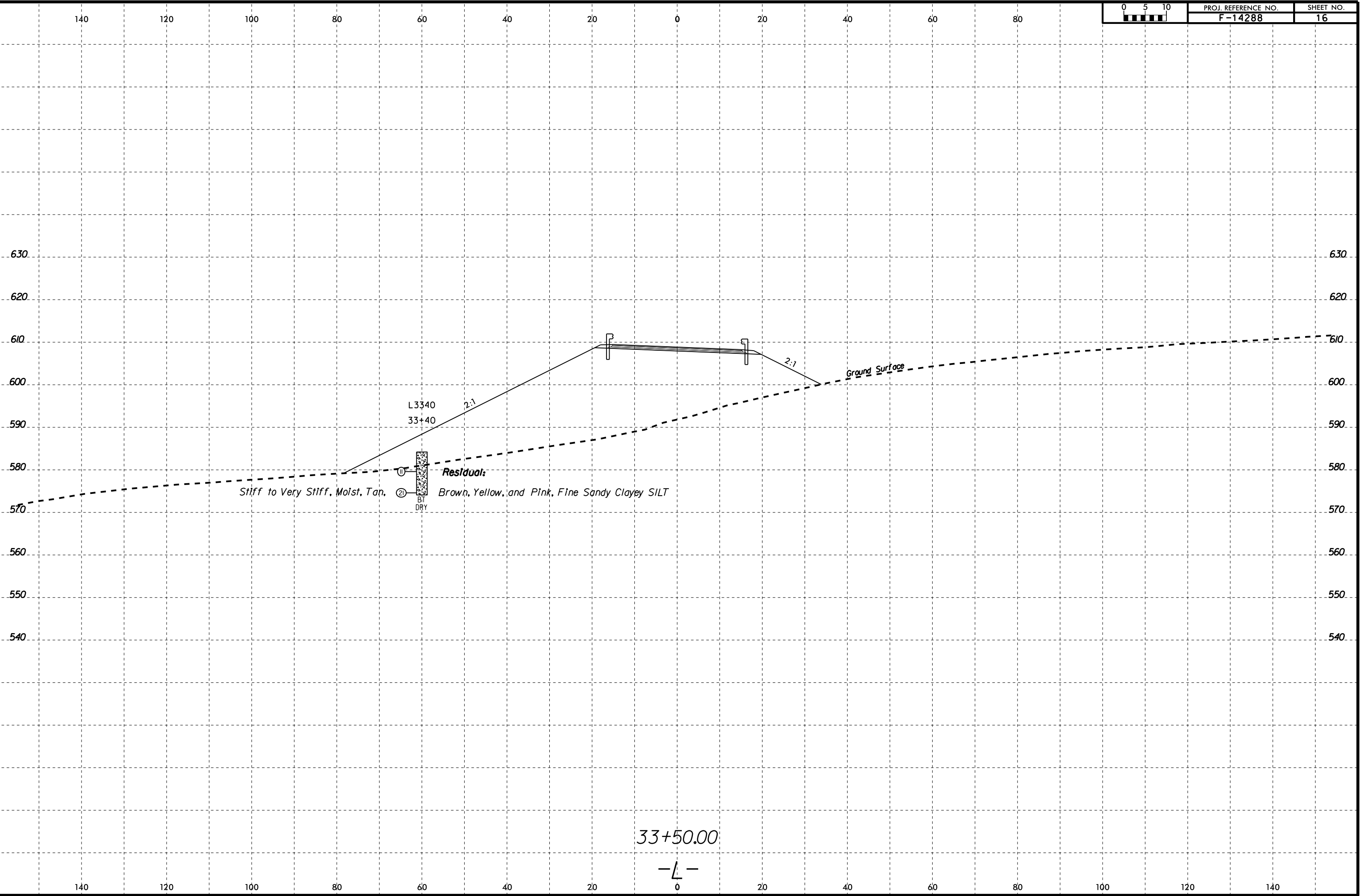
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-15	32+10	40' LT	4.0-5.5	A-5(8)	42	5	2.4	20.3	65.2	12.1	100	98	90	-	-



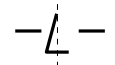
32+00.00

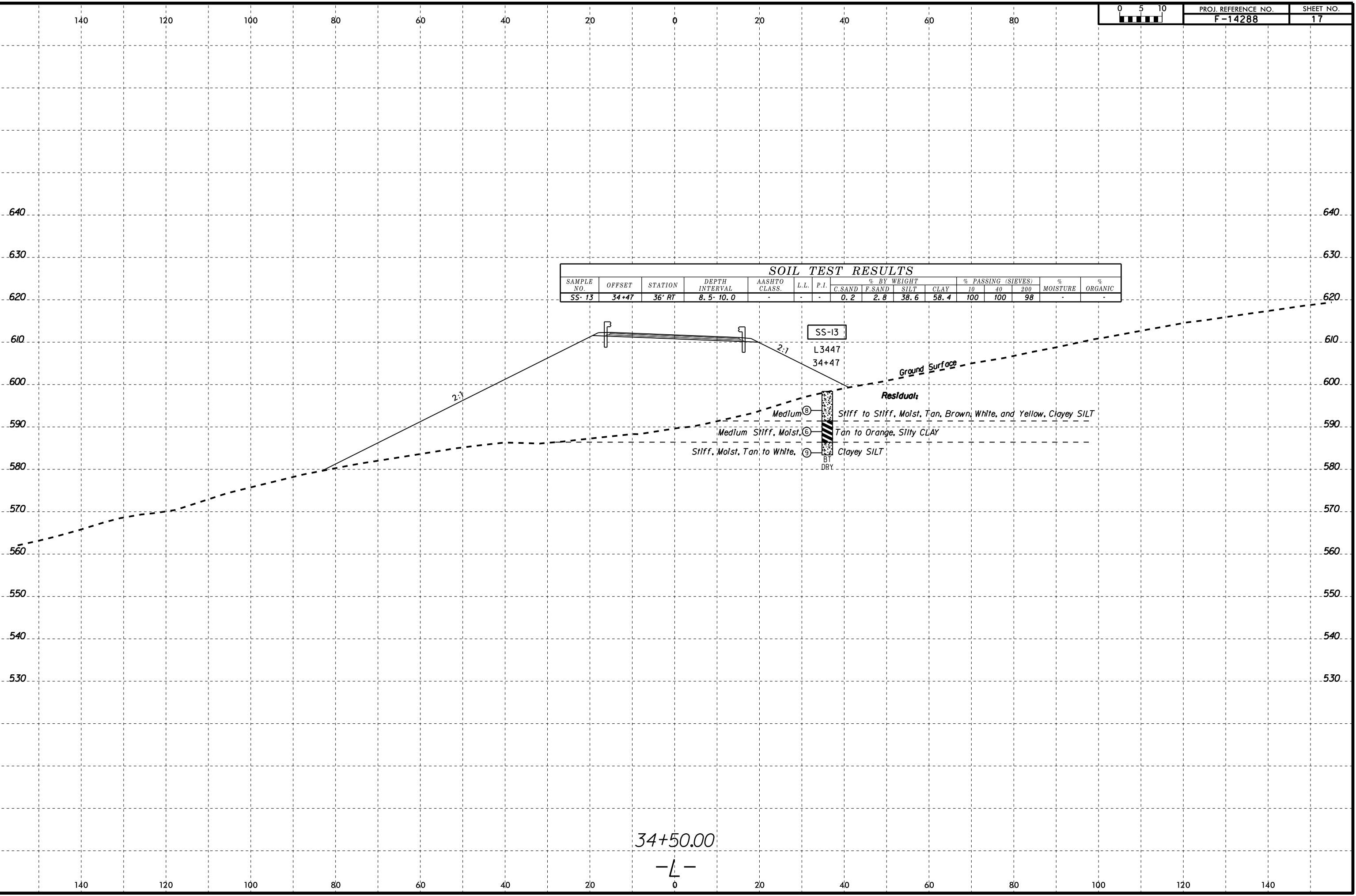
-L-

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140



33+50.00





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		
SS-13	34+47	36' RT	8.5'-10.0'	-	-	-	0.2	2.8	38.6	58.4	100	100	98	-	-

SS-13

L3447

34+47

Medium (B)

Stiff to Stiff, Moist, Tan, Brown, White, and Yellow, Clayey SILT

Medium Stiff, Moist, (C)

Tan to Orange, Silty CLAY

Stiff, Moist, Tan to White, (D)

Clayey SILT

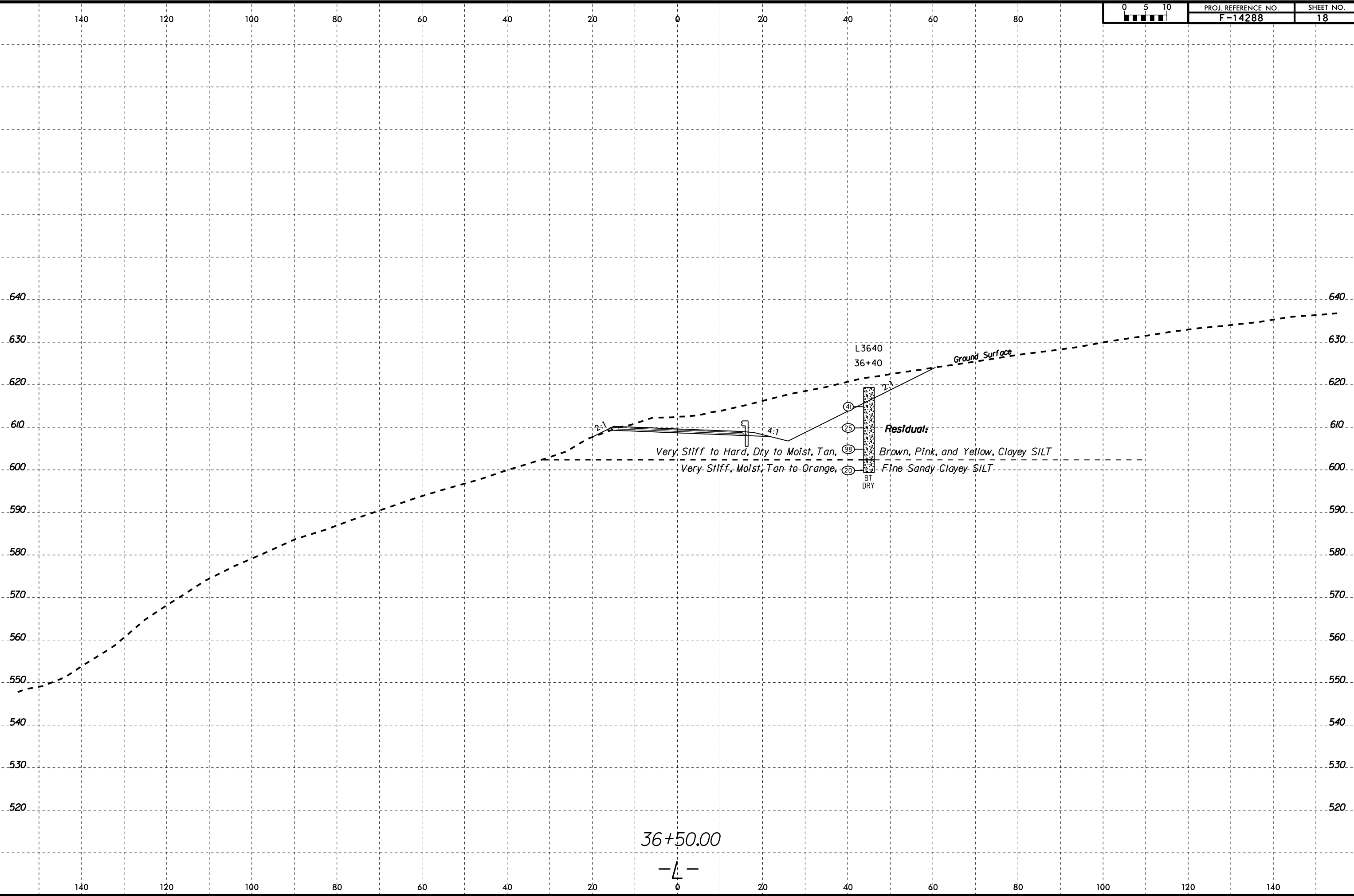
BT DRY

34+50.00

-L-



6/23/16  
27-Jul-2020 15:37  
F:\Projects\2020\2066 Transportation (Roadways & Bridges)\2066-001\90 (NCDDT-F-14288 Union Co CADD-Only)\F14288\_GEO\_RDWY\CADD\_GEO TECH\XSEC\F-14288\_geo\_xsl.Ldgn  
Walker AT 66026102



140

120

100

80

60

40

20

0

20

40

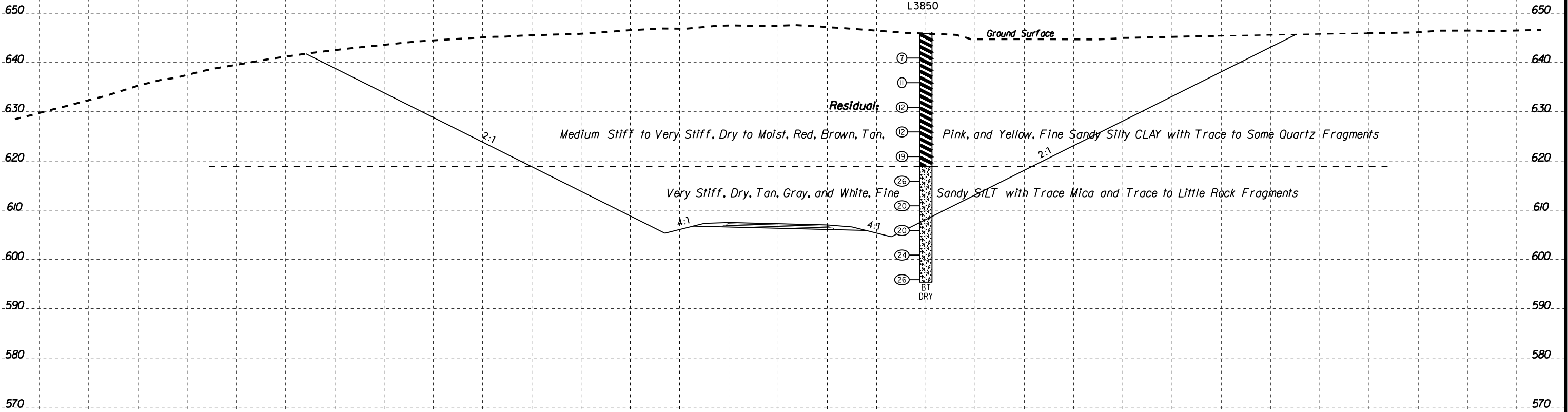
60

80

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		
SS-10	38+50	30' RT	9.0'-10.5'	A-7-5(17)	56	12	0.6	21.1	58.1	20.1	100	100	90	-	-
SS-12	38+50	30' RT	39.0'-40.5'	A-5(8)	42	9	9.7	24.3	49.9	16.1	100	94	76	-	-

SS+10  
SS+12

L3850



38+50.00

-L-

140

120

100

80

60

40

20

0

20

40

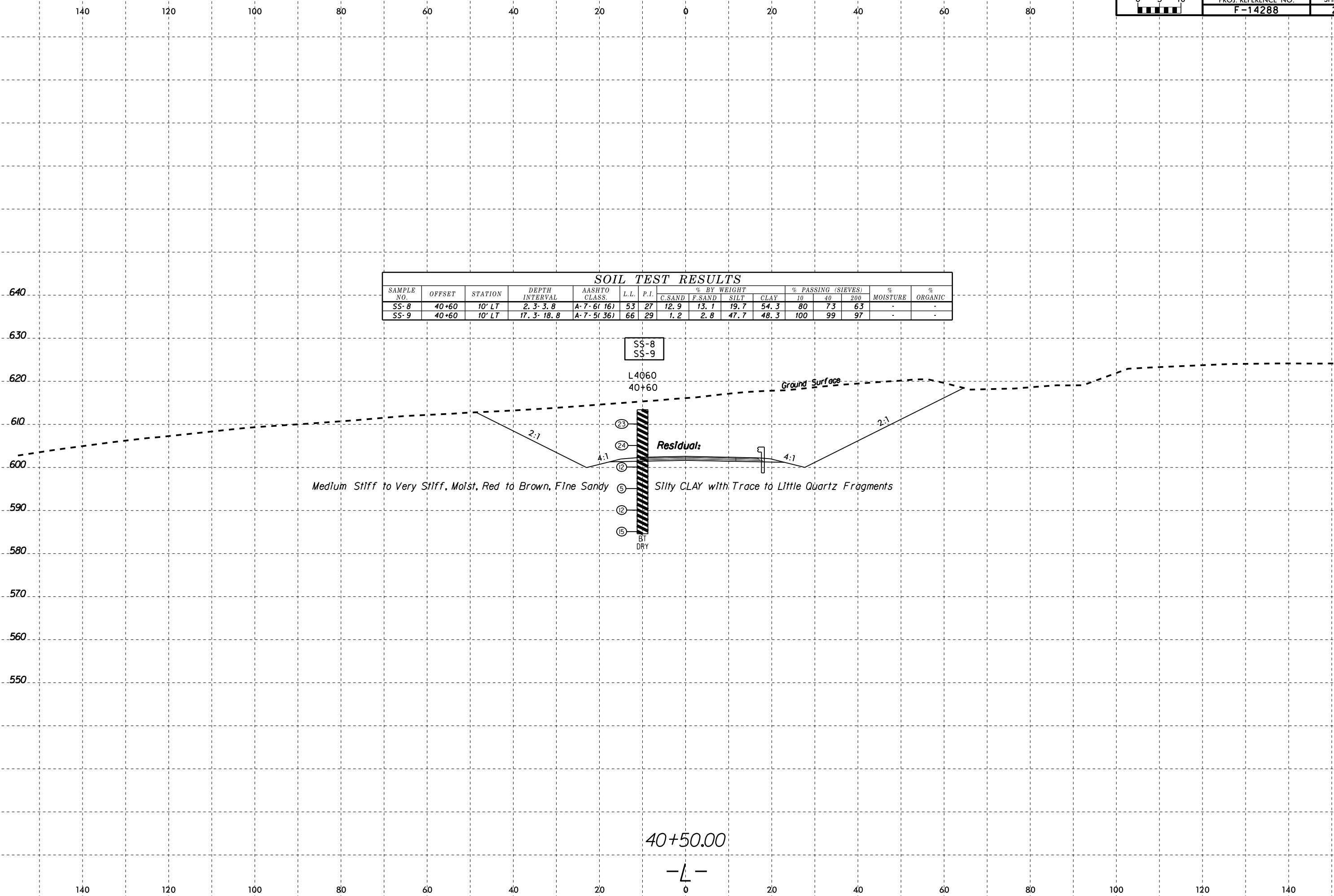
60

80

100

120

140



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		
SS-8	40+60	10' LT	2.3-3.8	A-7-6(16)	53	27	12.9	13.1	19.7	54.3	80	73	63	-	-
SS-9	40+60	10' LT	17.3-18.8	A-7-5(36)	66	29	1.2	2.8	47.7	48.3	100	99	97	-	-

SS-8  
SS-9

L4060  
40+60

Ground Surface

2:1

4:1

Residual:

2:1

4:1

Medium Stiff to Very Stiff, Moist, Red to Brown, Fine Sandy

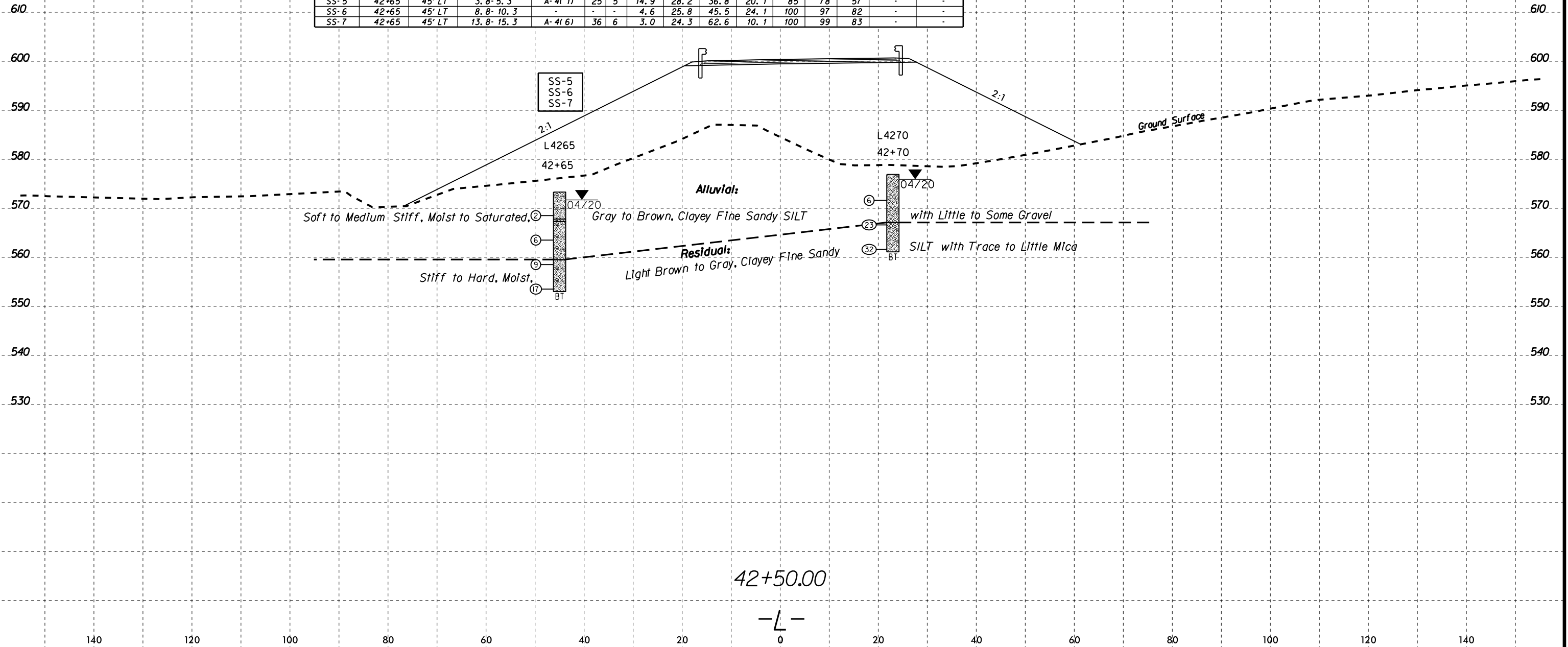
Silty CLAY with Trace to Little Quartz Fragments

BT  
DRY

40+50.00

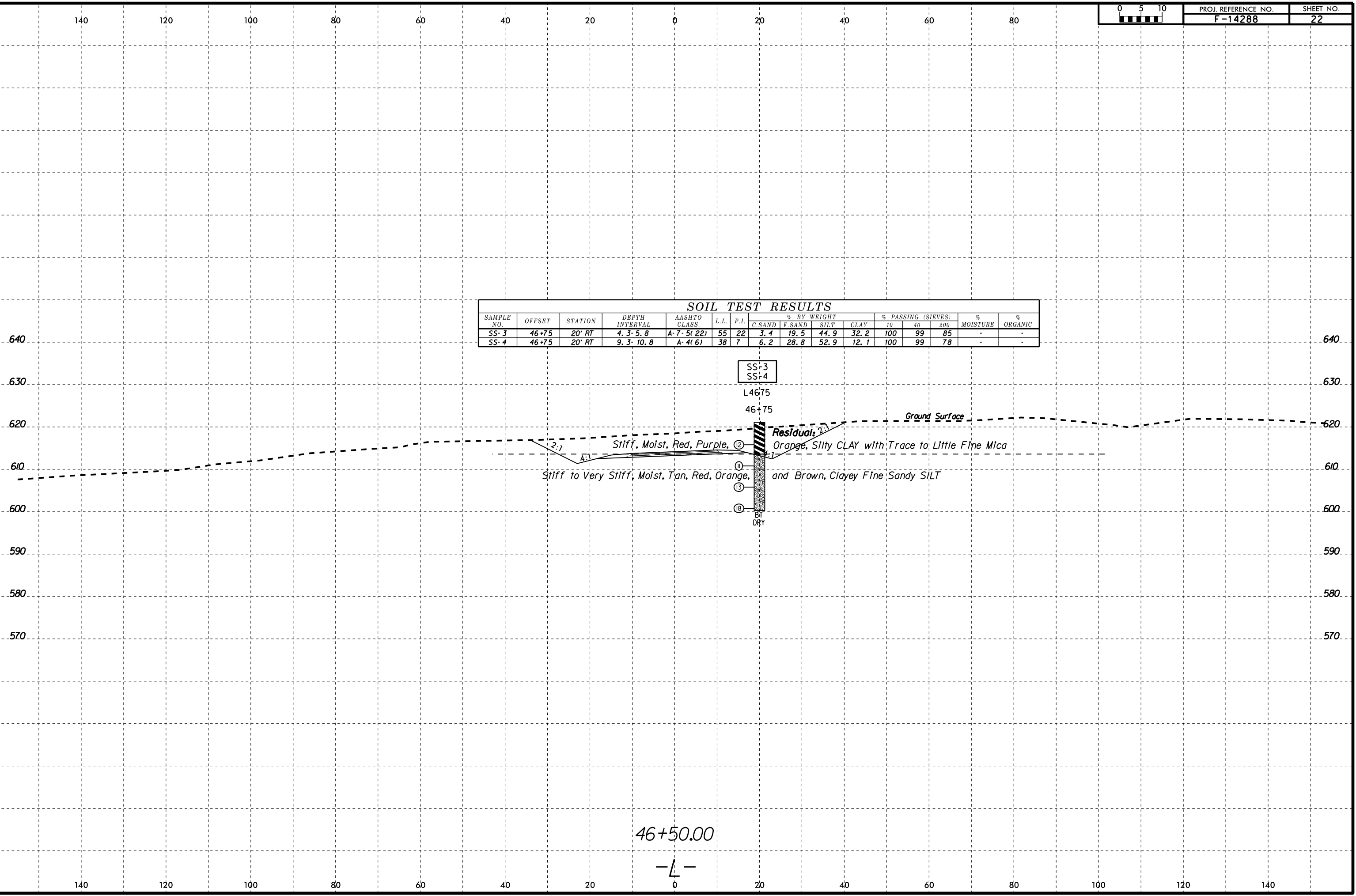
-L-

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		
SS-5	42+65	45' LT	3.8- 5.3	A-4(1)	25	5	14.9	28.2	36.8	20.1	85	78	57	-	-
SS-6	42+65	45' LT	8.8- 10.3	-	-	-	4.6	25.8	45.5	24.1	100	97	82	-	-
SS-7	42+65	45' LT	13.8- 15.3	A-4(6)	36	6	3.0	24.3	62.6	10.1	100	99	83	-	-



27-Jul-2020 15:38 F:\Projects\2020\2066 Transportation (Roadways & Bridges)\2066-001\90 (NCDDT-F-14288 Union Co CADD-Only)\F14288\_GEO\CADD\_GEO\TECH\ssc\F-14288\_geo\_xst.L.dgn Walker AT 66026102

42+50.00  
-L-

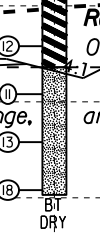


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-3	46+75	20' RT	4.3-5.8	A-7-5(22)	55	22	3.4	19.5	44.9	32.2	100	99	85	-	-
SS-4	46+75	20' RT	9.3-10.8	A-4(6)	38	7	6.2	28.8	52.9	12.1	100	99	78	-	-

SS-3  
SS-4

L4675

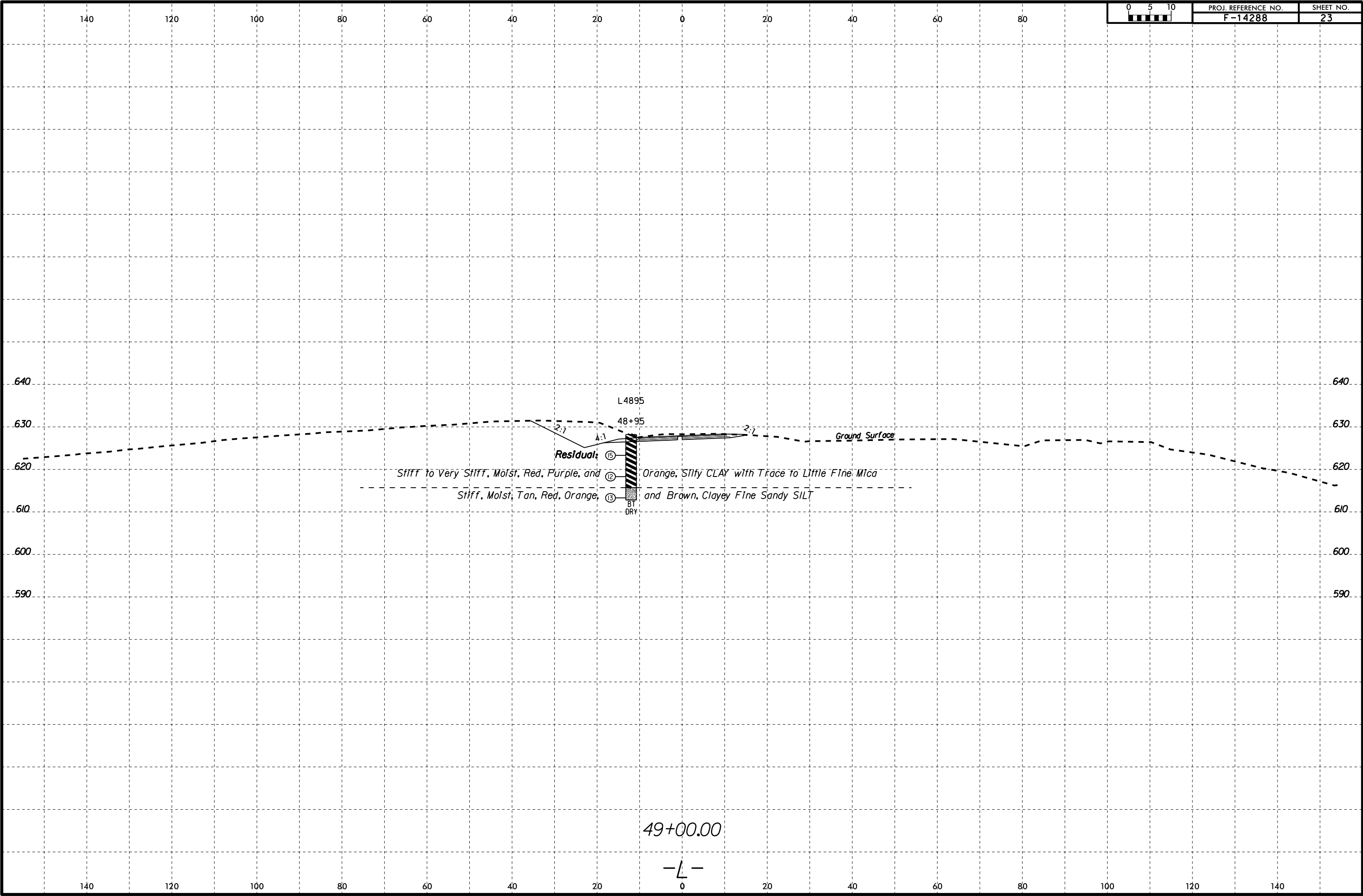
46+75



Stiff, Moist, Red, Purple, (2)  
Orange, Silty CLAY with Trace to Little Fine Mica  
Stiff to Very Stiff, Moist, Tan, Red, Orange, and Brown, Clayey Fine Sandy SILT  
Residual, (1)  
Ground Surface

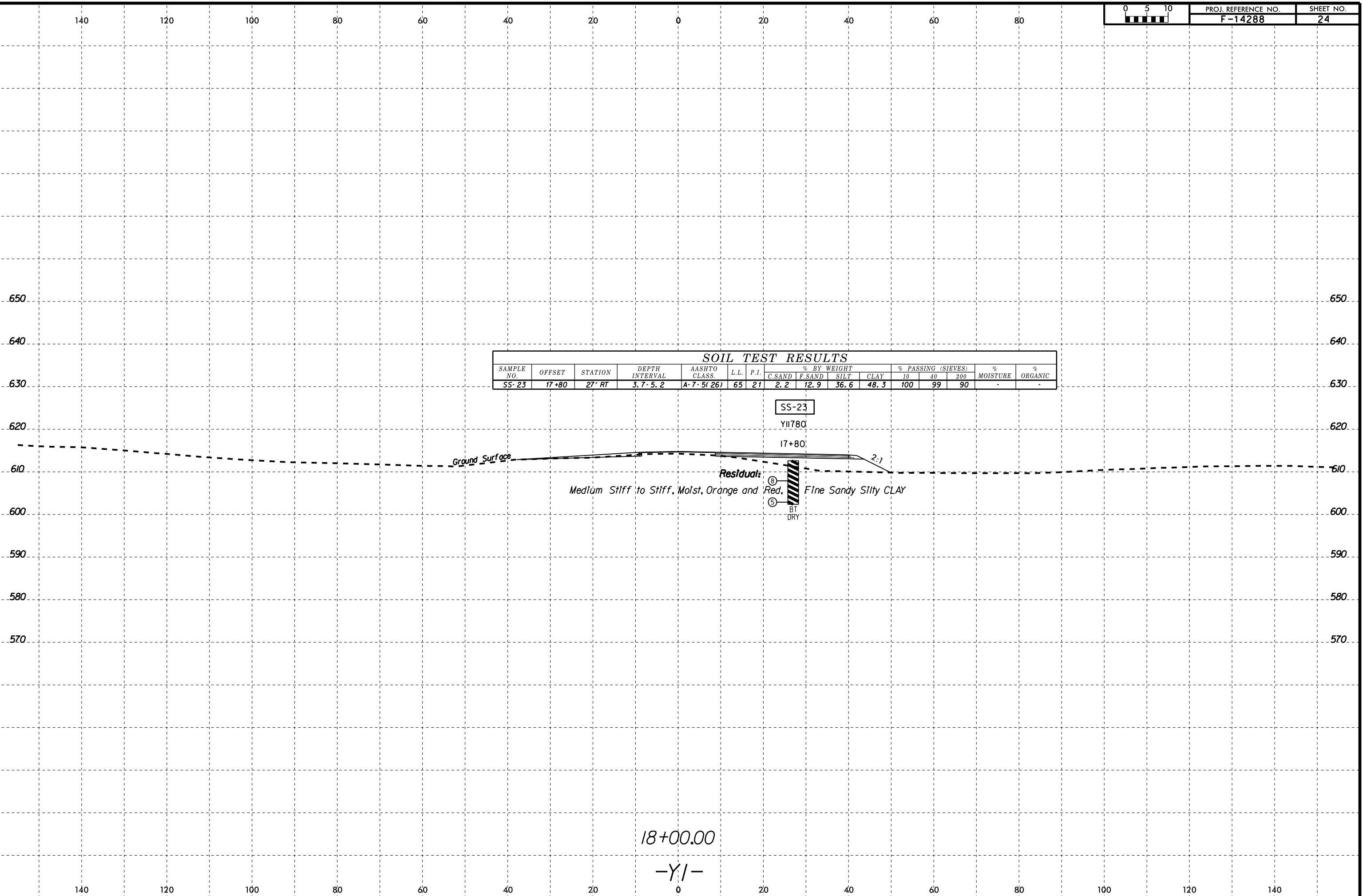
46+50.00

-L-





27-JUL-2020 15:38  
 F:\Projects\2020\2066 Transportation (Roadways & Bridges)\2066-001\10 (NCDDT-F-14288 Union Co CADD-Only)\F14288\_GEO\_RDWY\CADD\_GEO\_TECH\XSEC\F-14288\_geo\_xsl\_Y1.dgn  
 Walker AT 66026102



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		
SS-23	17+80	27' RT	3.7-5.2	A-7-5(26)	65	21	2.2	12.9	36.6	48.3	100	99	90	-	-

SS-23

Y11780

17+80

2:1

Residual:

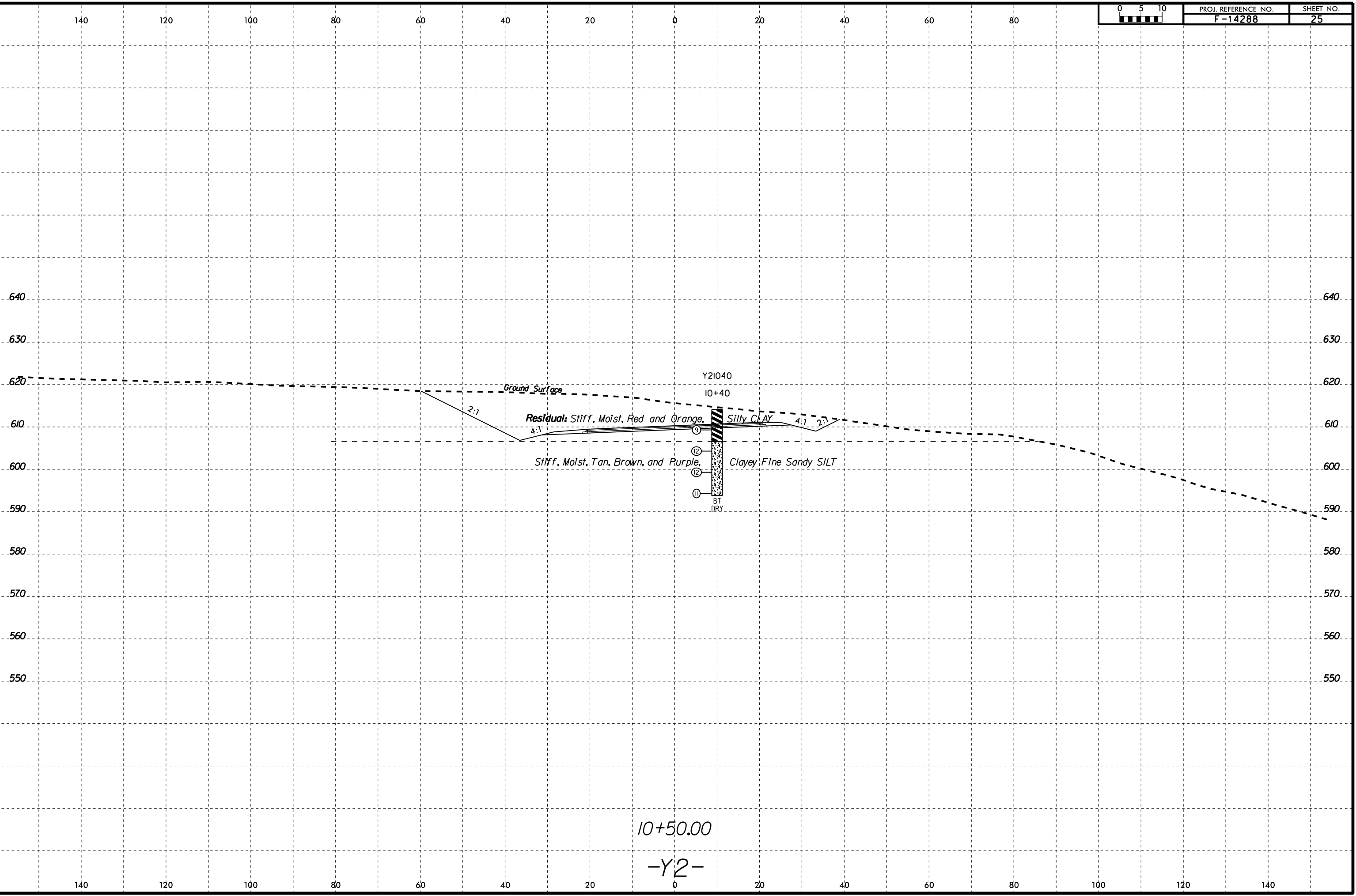
Medium Stiff to Stiff, Moist, Orange and Red, Fine Sandy Silty CLAY

BT

DRY

18+00.00

-Y1-



10+50.00  
-Y2-



140

120

100

80

60

40

20

0

20

40

60

80

### 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		
SS-1	12+27	CL	3.9-5.4	A-7-6(20)	49	21	6.0	13.3	42.5	38.2	100	97	84	-	-
SS-2	12+27	CL	8.9-10.4	A-5(8)	41	8	5.8	20.9	53.1	20.1	100	99	80	-	-

630

620

610

600

590

580

570

630

620

610

600

590

580

570

Ground Surface

2:1

4:1

SS-1  
SS-2

Y2|227

12+27

Residual: Stiff, Moist, Red and Orange, (9)

Fine Sandy Silty CLAY

Medium Stiff, Moist, Tan and White, (7)

Clayey, Fine Sandy SILT

BT

DRY

12+50.00

-Y2-

140

120

100

80

60

40

20

0

20

40

60

80

100

120

140