

REFERENCE: U-4700CB

PROJECT: N/A

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	593+50 TO 622+47	4-6	N/A
-RPA-	5+00 TO 9+83	6	N/A
-Y38NE-	19+00 TO 25+85	5-6	N/A
-Y38SW-	10+00 TO 18+38	5-6	N/A

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	593+50 TO 622+00	7-19
-RPA-	7+50 TO 9+00	20
-Y38NE-	20+50 TO 24+50	21-23
-Y38SW-	16+50	24

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY TEST RESULTS	25-26

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

COUNTY CALDWELL
PROJECT DESCRIPTION US-321 AT SR 1809
(PINE MOUNTAIN ROAD) INTERSECTION PROJECT

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4700CB	1	28

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.

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- 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

A. SUTTLE, GIT

INVESTIGATED BY ECS SOUTHEAST, LLP

DRAWN BY K. DE MONTBRUN, P.E.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS SOUTHEAST, LLP

DATE JULY 2021

Prepared in the Office of:
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ENGINEERING
FIRM # F-1078



Kelly De Montbrun
SIGNATURE
7/22/21
DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

DATE: 8-15-14

TIP PROJECT: U-4700CB

HUDSON
POP. 3,100

END PROJECT

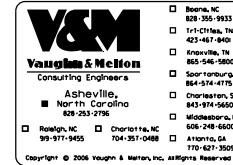
BEGIN PROJECT

VICINITY MAP

25% PRELIMINARY PLANS

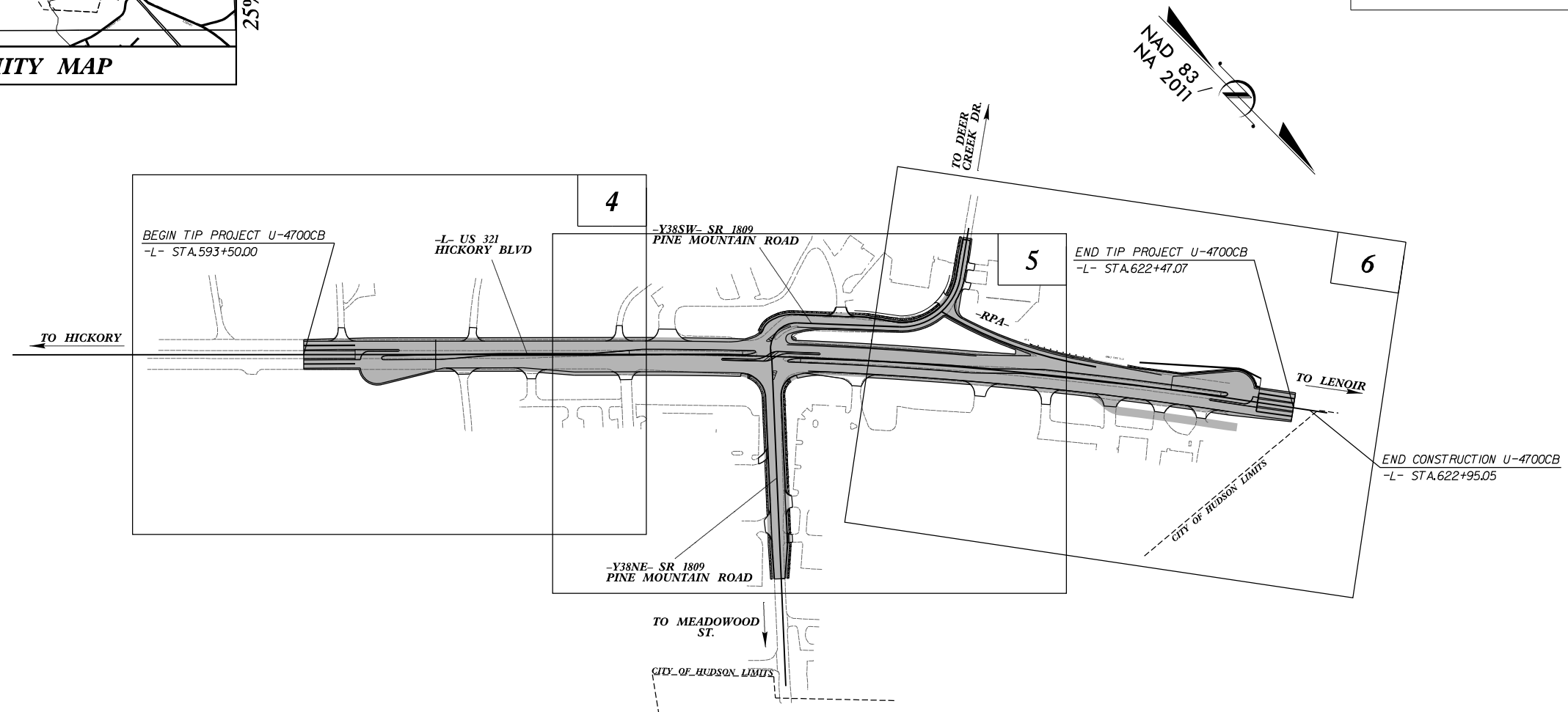
CALDWELL COUNTY

TYPE OF WORK: DRAINAGE, GRADING, PAVING AND SIGNALS



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4700CB	3	28
STATE PROJ.NO.	F.A.PROJ.NO.	DESCRIPTION	
35993.1.11	NHF-321(18)	P.E.	

A map of North Carolina with its county boundaries outlined. One county in the western part of the state is filled with black ink, highlighting the project location.



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

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ADT 2019 = 34100
ADT 2039 = 45900
K = 8 %
D = 55 %
T = 6 % *
V = 60 MPH
* TTST = 3 DUAL 3
FUNC CLASS =
PRINCIPAL ARTERIAL
STATEWIDE TIER

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LENGTH ROADWAY PROJECT U-4700CB= 0.549 MI.
LENGTH STRUCTURE PROJECT U-4700CB= 0.000 MI.
TOTAL LENGTH OF PROJECT U-4700CB= 0.549 MI.

2018 STANDARD SPECIFICATIONS

LETTING DATE:
JUNE 2019

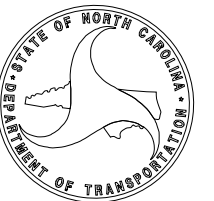
JARED PHILPOT
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

**ROADWAY DESIGN
ENGINEER**

SIGNATURE: _____ P.E.





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July 22, 2021

WBS NO: N/A
TIP NO: U-4700CA
COUNTY: Caldwell
DESCRIPTION: US 321 at Pine Mountain Road (SR 1809) Intersection Improvements

SUBJECT: Geotechnical Report – Inventory

Project Description

The project consists of interchange improvements along US 321 at Pine Mountain Road (SR 1809) in Caldwell County, North Carolina. Improvements include widening and resurfacing US 321 (-L-) and constructing two U-turn bulb outs along the L-alignment to the north and south of the Pine Mountain Road. Other improvements also consist of slightly widening and resurfacing Pine Mountain Road (-Y38SW- and -Y38NE-) and associated ramps (-RPA-). The project is approximately 0.55 miles in length, measured along the US 321 (-L-) alignment.

US 321 will be widened in the vicinity of SR 1809 (Pine Mountain Road) to accommodate 2 through lanes in each direction, with either a 30-foot wide median or a turning lane. Two (2) corresponding U-Turn bulb outs to the north and south of the intersection will also be constructed along the -L- alignment. Pine Mountain Road (-Y38NE- and -Y38SW- alignments) will consist of two 11-foot wide travel lanes in each direction along the -Y38NE- alignment and will have one 12-foot wide travel lane in each direction along the -Y38SW- alignment. Ramp A (-RPA-) will consist of one 12-foot wide travel lane.

At the beginning of the project, the proposed road grade along the -L- alignment centerline start at approximate elevation 1171 feet and slopes downward to a low elevation of approximately 1168 feet in the vicinity of Station 597+50. At Station 597+50, the road slopes upwards to a high of approximate elevation 1202 feet around Station 614+00. At Station 614+00 the alignment slopes downwards to approximate elevation 1186 feet at the end of the project. Soils encountered in the proposed construction areas generally consisted of roadway embankment underlain by residual soils. Mass grading will generally be limited to the widened areas with cut depths on the order of approximately 8 feet or less and fill heights on the order of 22 feet or less.

The following roads are included as part of this exploration:

Line	Road Name	Station (±)	Offsets
-L-	US 321	593+50 to 622+47	LT to RT
-Y38SW-	Pine Mountain Road (SR 1809)	10+00 to 18+38	LT to RT
-Y38NE-	Pine Mountain Road (SR 1809)	19+00 to 25+85	LT to RT
-RPA-	Ramp A	5+00 to 9+83	LT to RT

A geotechnical field investigation was performed by ECS from February to March 2018. During this time period, a total of twenty-five (25) hand auger borings supplemented with Dynamic Cone Penetrometer (DCP) tests were performed along the -L-, -Y38SW-, -Y38NE-, and -RPA- alignments. Representative soil samples were collected for visual classification in the field and for analysis by ECS’s testing laboratory.

Additionally, ECS performed a geotechnical field investigation along the proposed Retaining Wall No. 1 located between -L- Station 617+85 and 621+41, LT in September 2018. The Structure Subsurface Investigation Report for that exploration was issued as a separate report in December 2018. A total of three (3) soil test borings were performed during that investigation and pertinent subsurface information is included in this inventory.

Physiography and Geology

In accordance with the Geologic Map of North Carolina, 1985, the project corridor is located in the Piedmont Physiographic Provinces of North Carolina. Piedmont soils are the residual product of in-place chemical weathering of rock that is similar to the rock presently underlying the site. Bedrock at the site is mapped predominantly as mica schist, with local lenses of quartz schist, biotite gneiss, amphibolite, and phyllite.

Soil Properties

Soils within the area of this project have been divided into two categories: roadway embankment, and residual soils.

Roadway Embankment: Roadway Embankment (R.E.) soils generally consist of loose to medium dense silty fine to coarse sand (A-2-4), stiff to very stiff fine to coarse sandy silt (A-4), very soft to very stiff clayey silt (A-5), and medium stiff silty clay (A-7-5). Trace to little amounts of organics, mica, and gravel were

encountered throughout the roadway embankment. The roadway embankment extends to depths ranging from approximately 1.0 to 6.0 feet below existing grades.

Residual Soils: Residual soils throughout the project corridor are derived from the weathering of the underlying parent bedrock. A majority of the residual soils encountered generally consisted of loose to medium dense silty fine to coarse sand (A-2-4), loose to medium dense clayey fine to coarse sand (A-2-6), very soft to very stiff fine to coarse sandy silt (A-4), medium stiff to very stiff clayey silt (A-5), soft to stiff fine to coarse sandy clay (A-6), and soft to very stiff silty clay (A-7-5). Laboratory testing of the residual soils indicated Plasticity Indices (PI's) ranging from 3 to 10 for the silty (A-4) soils, and PI's ranging from 14 to 32 for the clayey (A-6, A-7-5) soils.

Groundwater Properties

Groundwater levels were measured in the borings both immediately after drilling (0-hr reading) and after a stabilization period of at least 24 hours. At the time of drilling, water was encountered in 4 borings at depths ranging from approximately 4.0 to 8.9 feet below existing grades, which corresponds to elevations ranging from 1,129.3 feet to 1,178.5 feet. The remaining borings were dry when groundwater readings were taken. After a stabilization period of at least 24 hours, groundwater was encountered in the same 4 borings at depths ranging from approximately 3.5 to 5.2 feet below existing grades which corresponds to elevations ranging from 1,132.4 feet to 1,179.8 feet. The recovered soil samples were generally described as moist above the groundwater level and moist to wet below the groundwater level

Areas of Special Geotechnical Interest

1) Soft/Very Loose Soils: The following areas contain relatively soft or very loose soils that have the potential for subgrade instability, embankment stability or long-term settlement problems during construction:

<u>Line</u>	<u>Station (±)</u>	<u>Offsets</u>
-L-	596+25 to 597+75	LT to RT
-Y38NE-	24+25 to 25+50	LT to RT

2) High Plasticity Soils: The following areas contain high plasticity soils with plasticity indices (PI's) in excess of 25. High plasticity soils have the potential to cause subgrade instability during construction, embankment stability or long term settlement problems.

<u>Line</u>	<u>Station (±)</u>	<u>Offsets</u>
-L-	597+75 to 599+75	LT to RT

3) High Groundwater: Groundwater was encountered within six feet of the proposed subgrade at the following locations. This has the potential to cause subgrade instability and/or constructability issues.

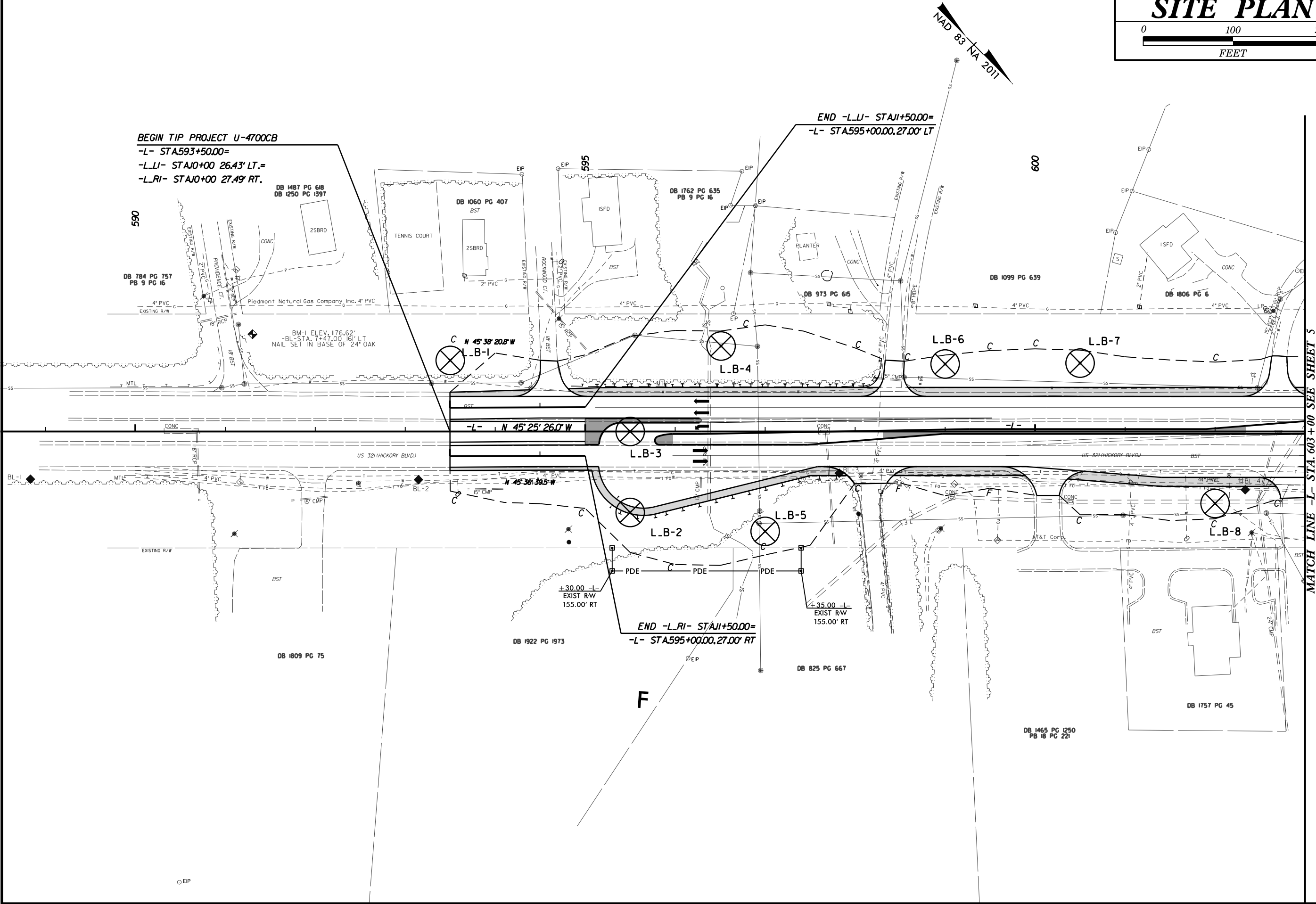
<u>Line</u>	<u>Station (±)</u>	<u>Offsets</u>
-L-	596+25 to 597+75	LT to RT

4) Shallow Rock: The following areas were found to contain rock above or within 6 feet of proposed subgrade:

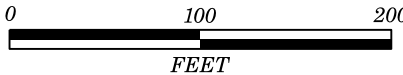
<u>Line</u>	<u>Station (±)</u>	<u>Offsets</u>
-L-	618+75 to 621+75	LT to RT

5) Hand Auger Refusal: The following areas encountered hand auger refusal above or within 6 feet of proposed subgrade. Hand auger refusal could indicate areas of rocky embankment fill, hard or dense residual soils layers, weathered rock or crystalline rock.

<u>Line</u>	<u>Station (±)</u>	<u>Offsets</u>
-L-	593+50 to 596+25	LT to RT
-L-	598+75 to 601+00	LT
-L-	603+00 to 605+00	LT
-L-	608+00 to 610+00	RT
-L-	618+25 to 622+47	LT to RT
-Y38SW-	16+00 to 18+38	RT

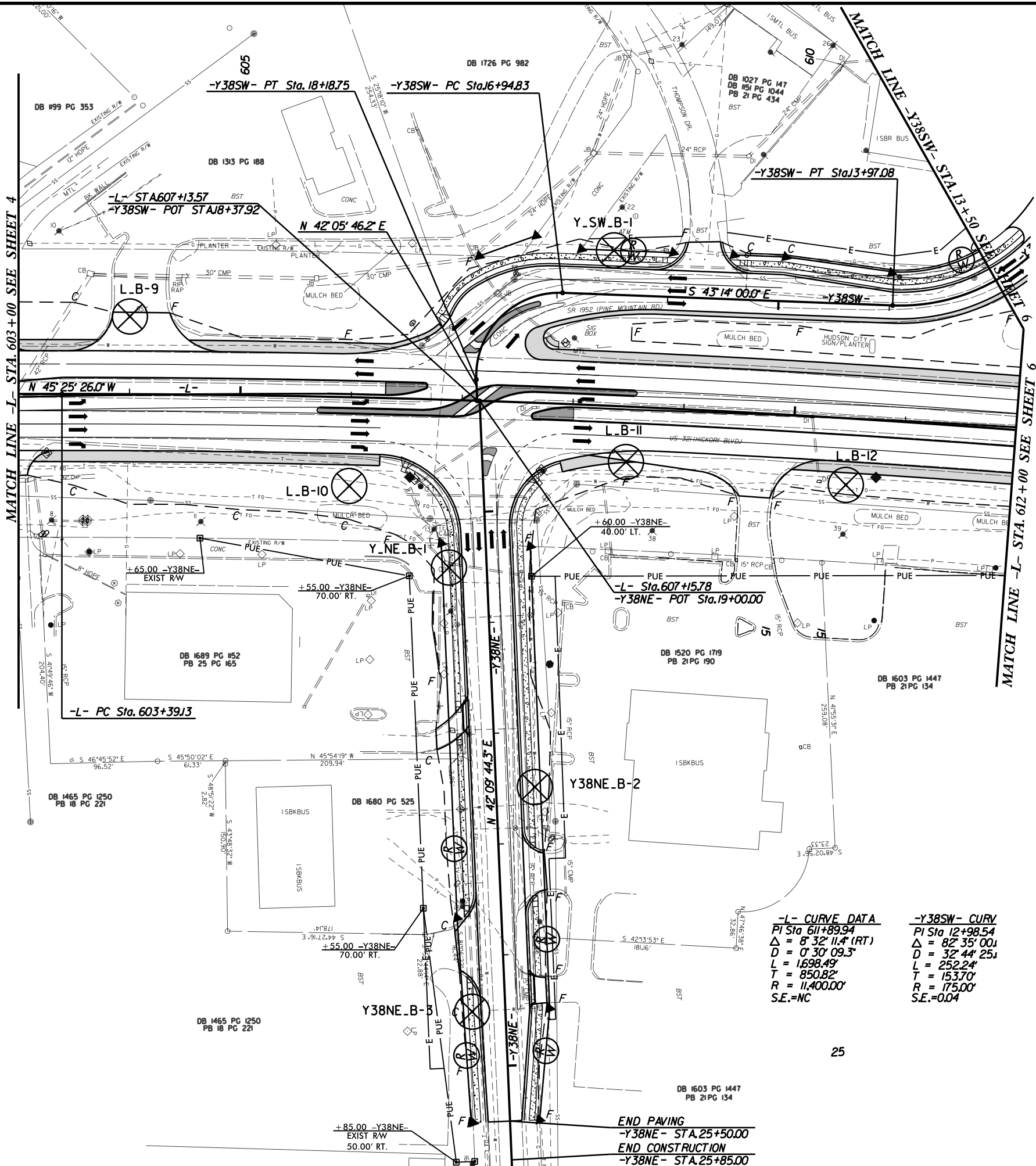


SITE PLAN



MATCH LINE -L- STA. 603+00 SEE SHEET 4

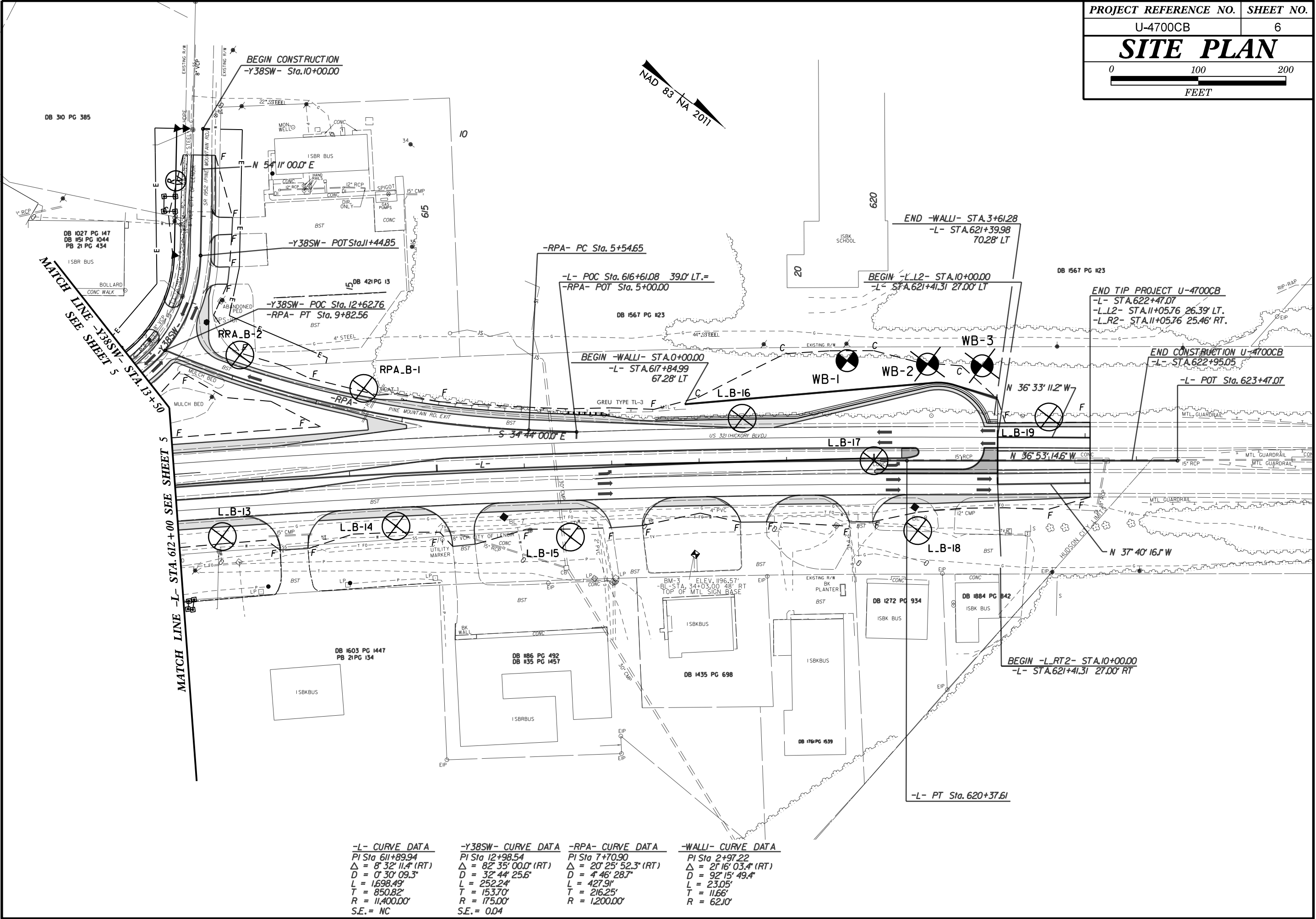
MATCH LINE -L- STA. 612+00 SEE SHEET 6



-L- CURVE DATA
PI Sta 611+89.94
 $\Delta = 8^\circ 32' 11.4''$ (RT)
D = 0' 30' 09.3"
L = 1,698.49'
T = 850.82'
R = 11,400.00'
S.E.=NC

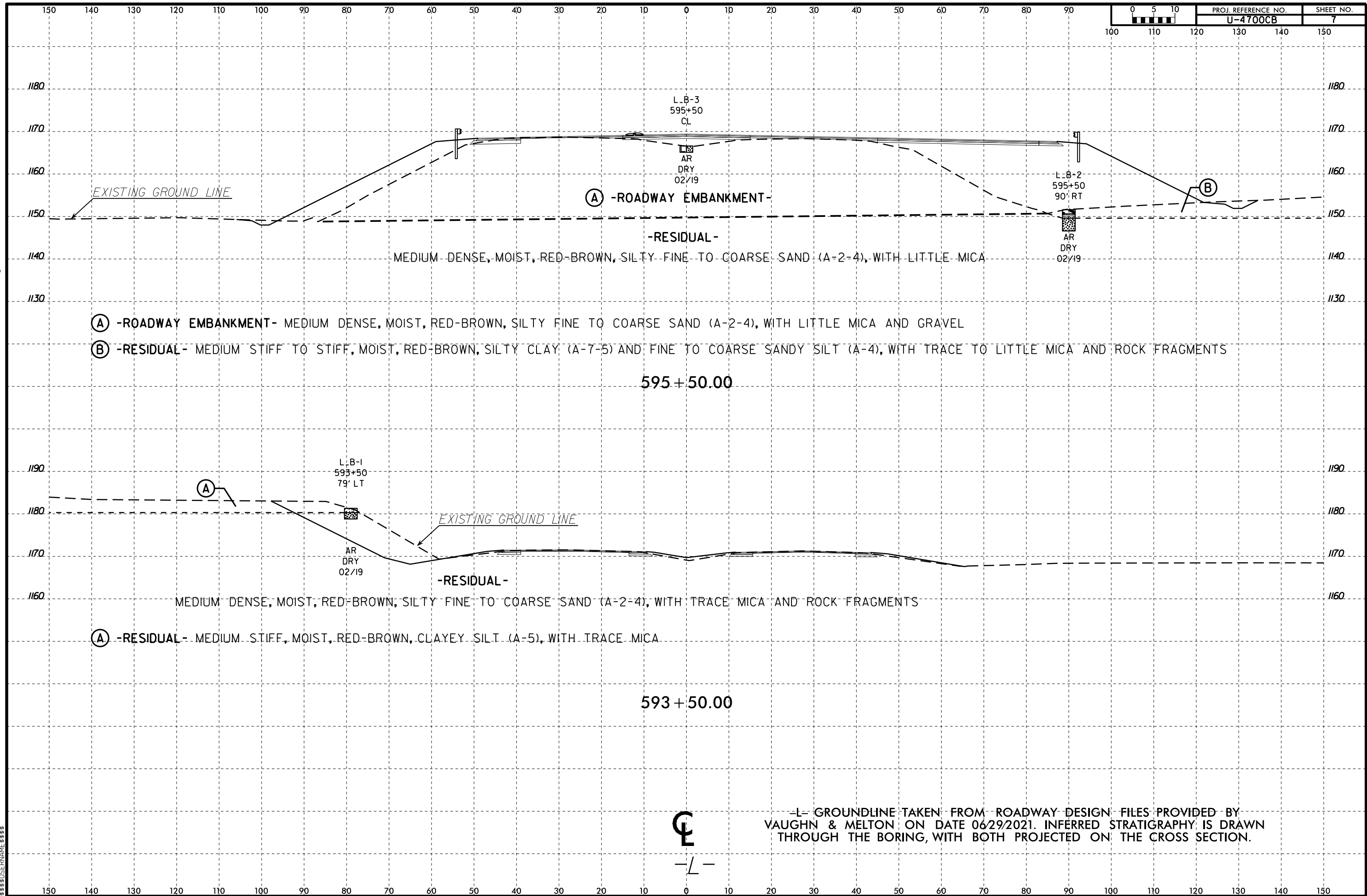
-Y38SW- CURV
PI Sta 12+98.54
 $\Delta = 82^\circ 35' 00.1''$
D = 32' 44' 25.1"
L = 252.24'
T = 153.70'
R = 175.00'
S.E.=0.04

END PAVING
-Y38NE- STA.25+50.00
END CONSTRUCTION
-Y38NE- STA.25+85.00

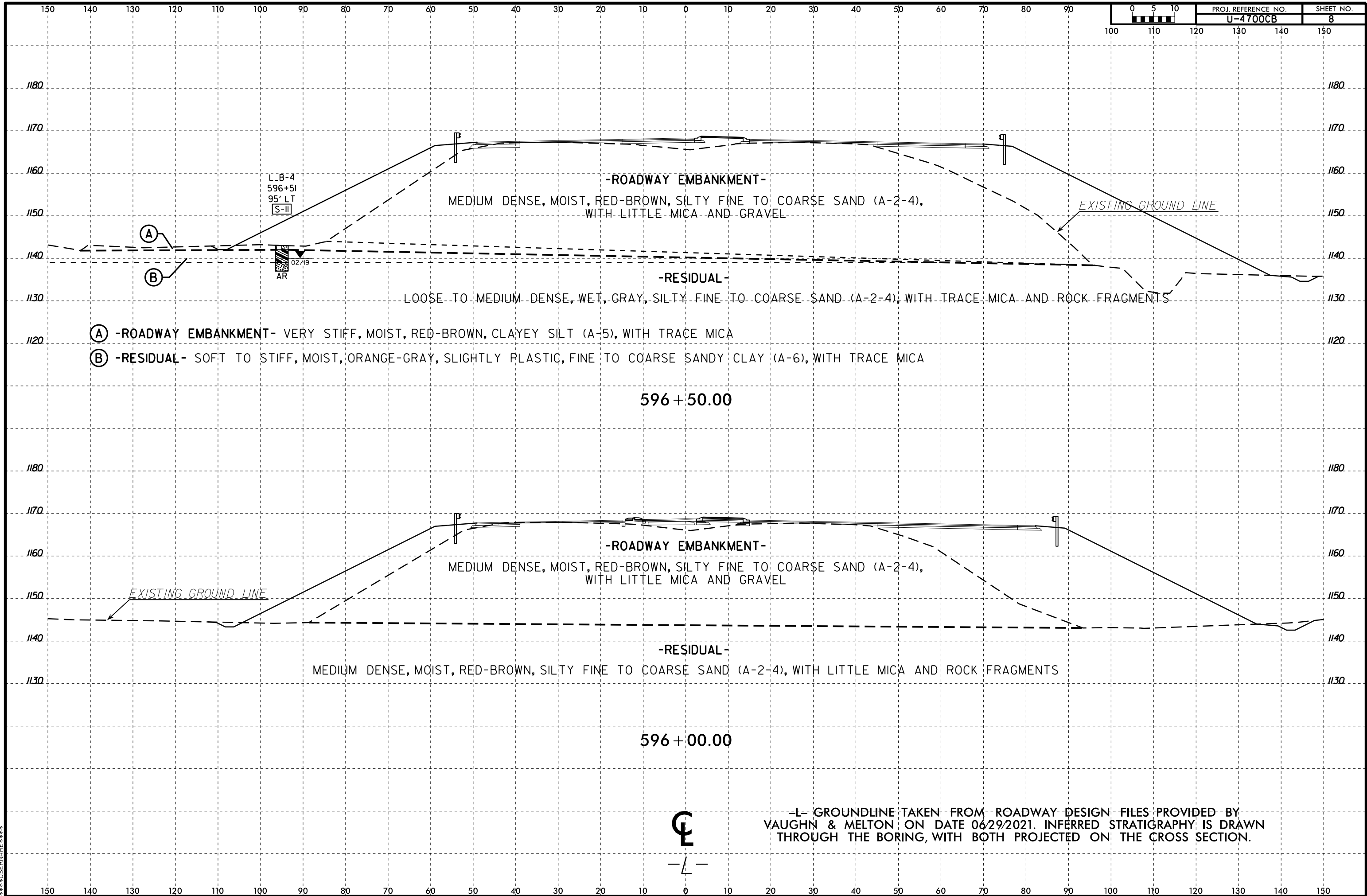


-L- CURVE DATA	-Y38SW- CURVE DATA	-RPA- CURVE DATA	-WALLI- CURVE DATA
PI Sta 611+89.94	PI Sta 12+98.54	PI Sta 7+70.90	PI Sta 2+97.22
$\Delta = 8^{\circ} 32' 11.4" (RT)$	$\Delta = 82^{\circ} 35' 00.0" (RT)$	$\Delta = 20^{\circ} 25' 52.3" (RT)$	$\Delta = 21^{\circ} 16' 03.4" (RT)$
$D = 0^{\circ} 30' 09.3"$	$D = 32^{\circ} 44' 25.6"$	$D = 4^{\circ} 46' 28.7"$	$D = 92^{\circ} 15' 49.4"$
$L = 1698.49'$	$L = 252.24'$	$L = 427.91'$	$L = 23.05'$
$T = 850.82'$	$T = 153.70'$	$T = 216.25'$	$T = 11.66'$
$R = 11,400.00'$	$R = 175.00'$	$R = 1,200.00'$	$R = 62.10'$
S.E. = NC	S.E. = 0.04		

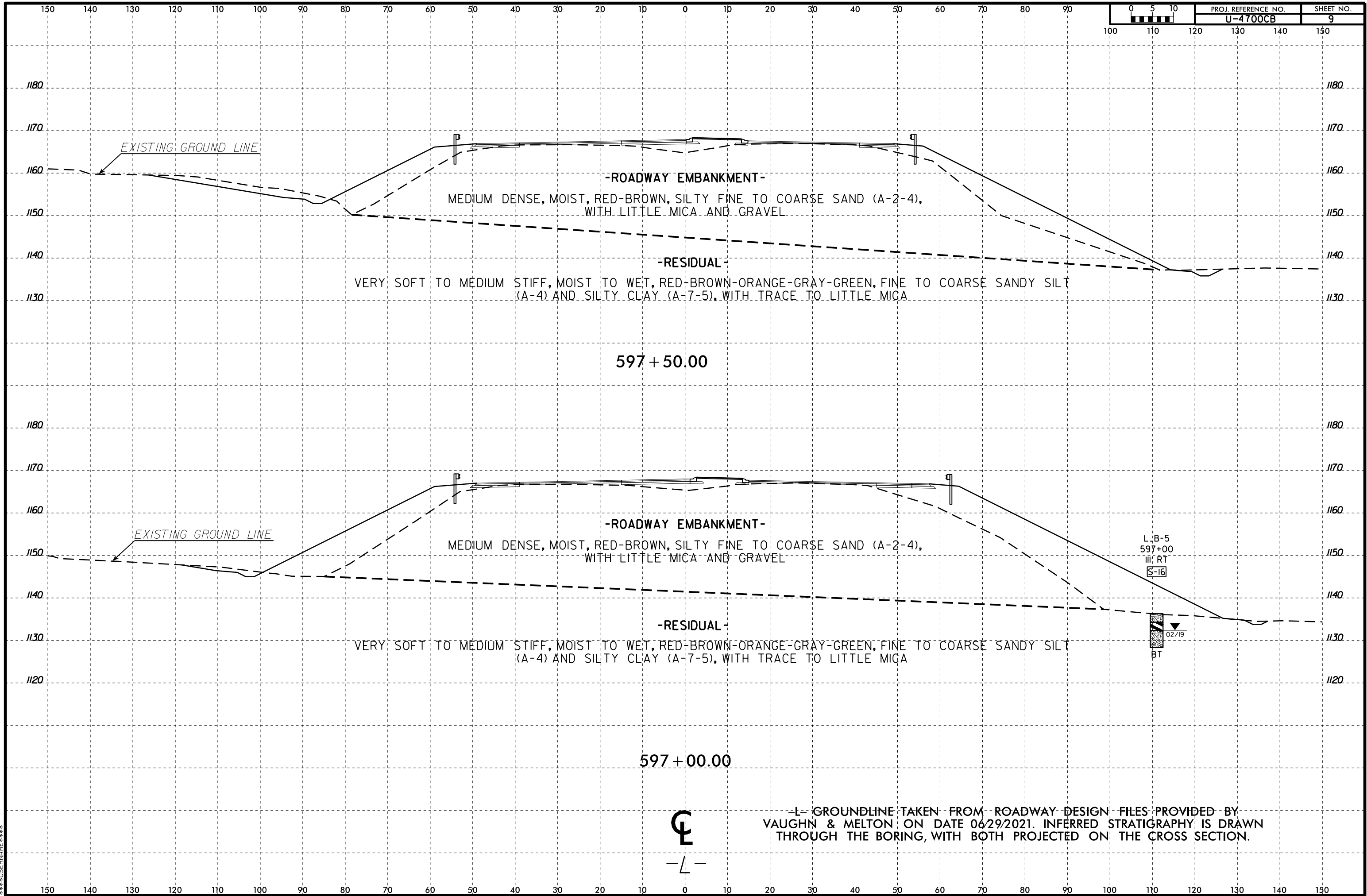
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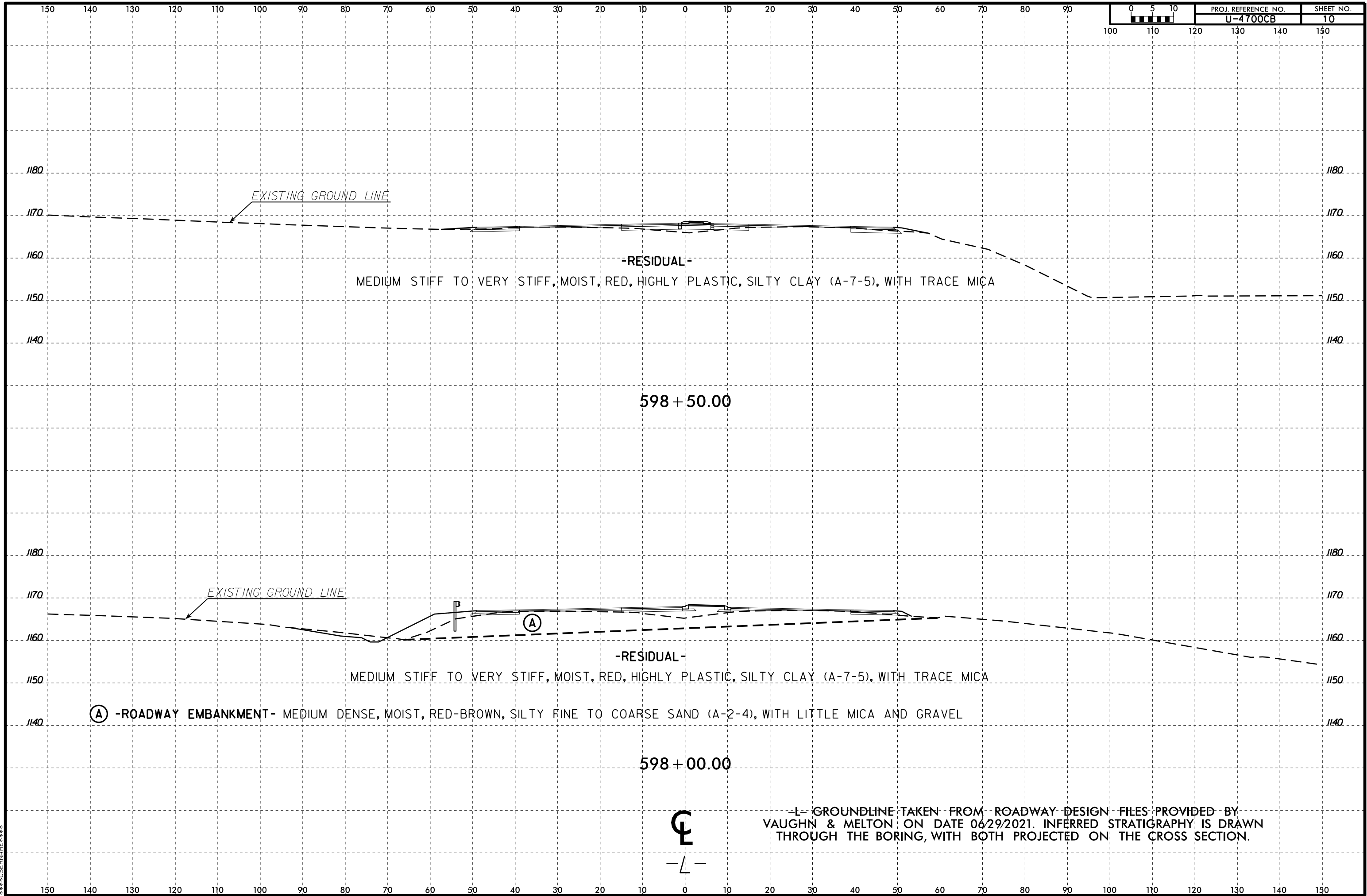
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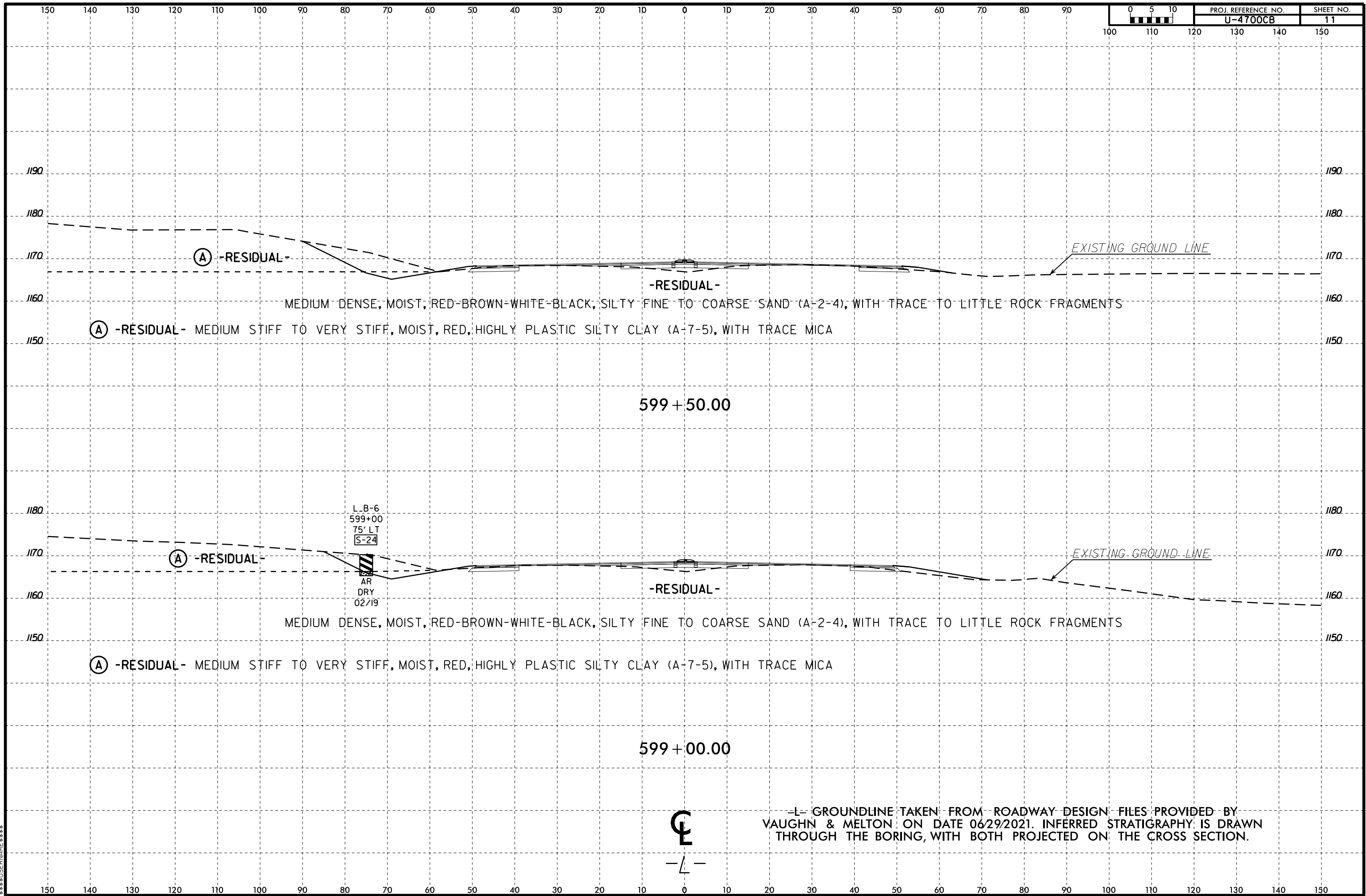
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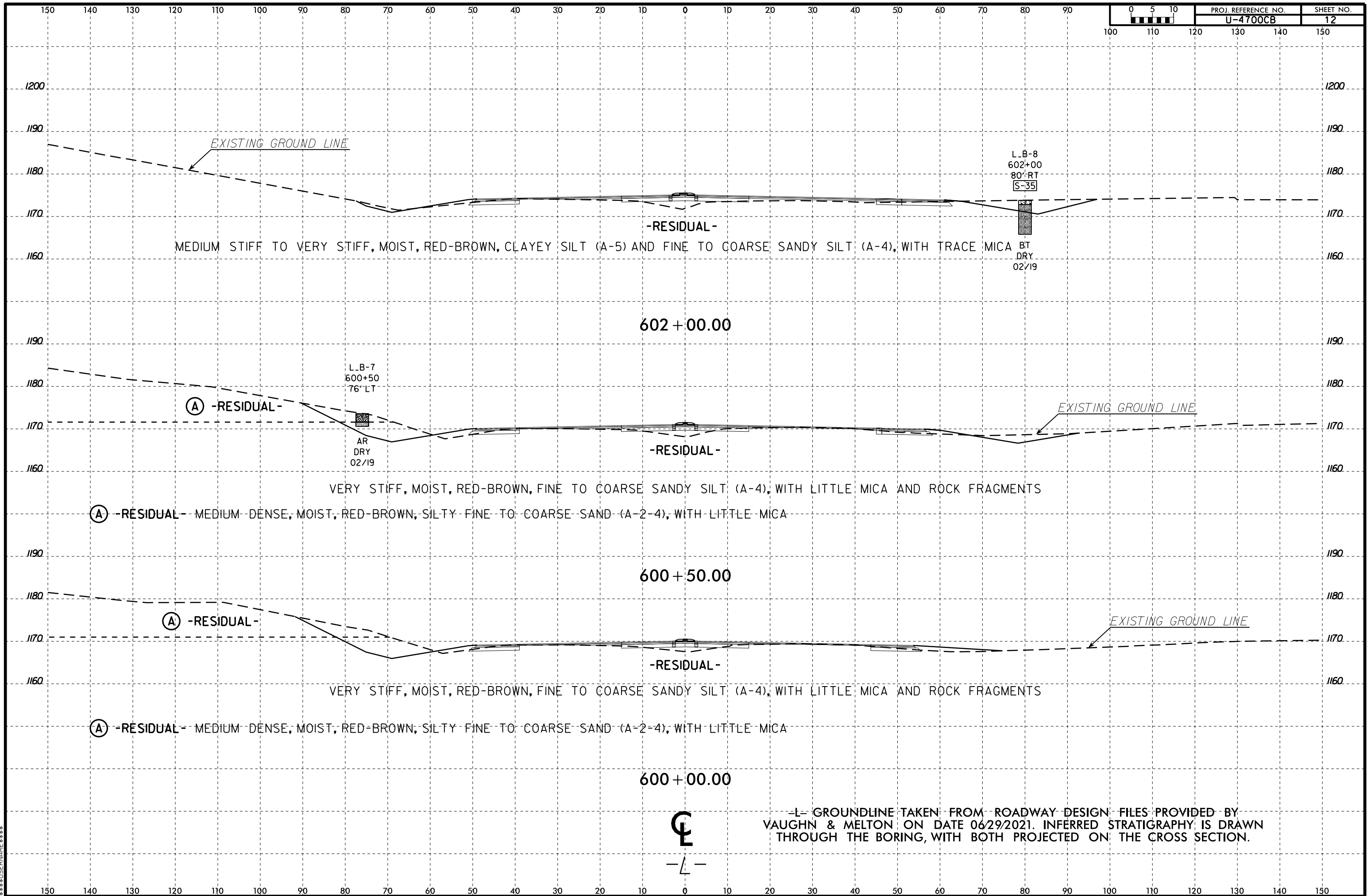
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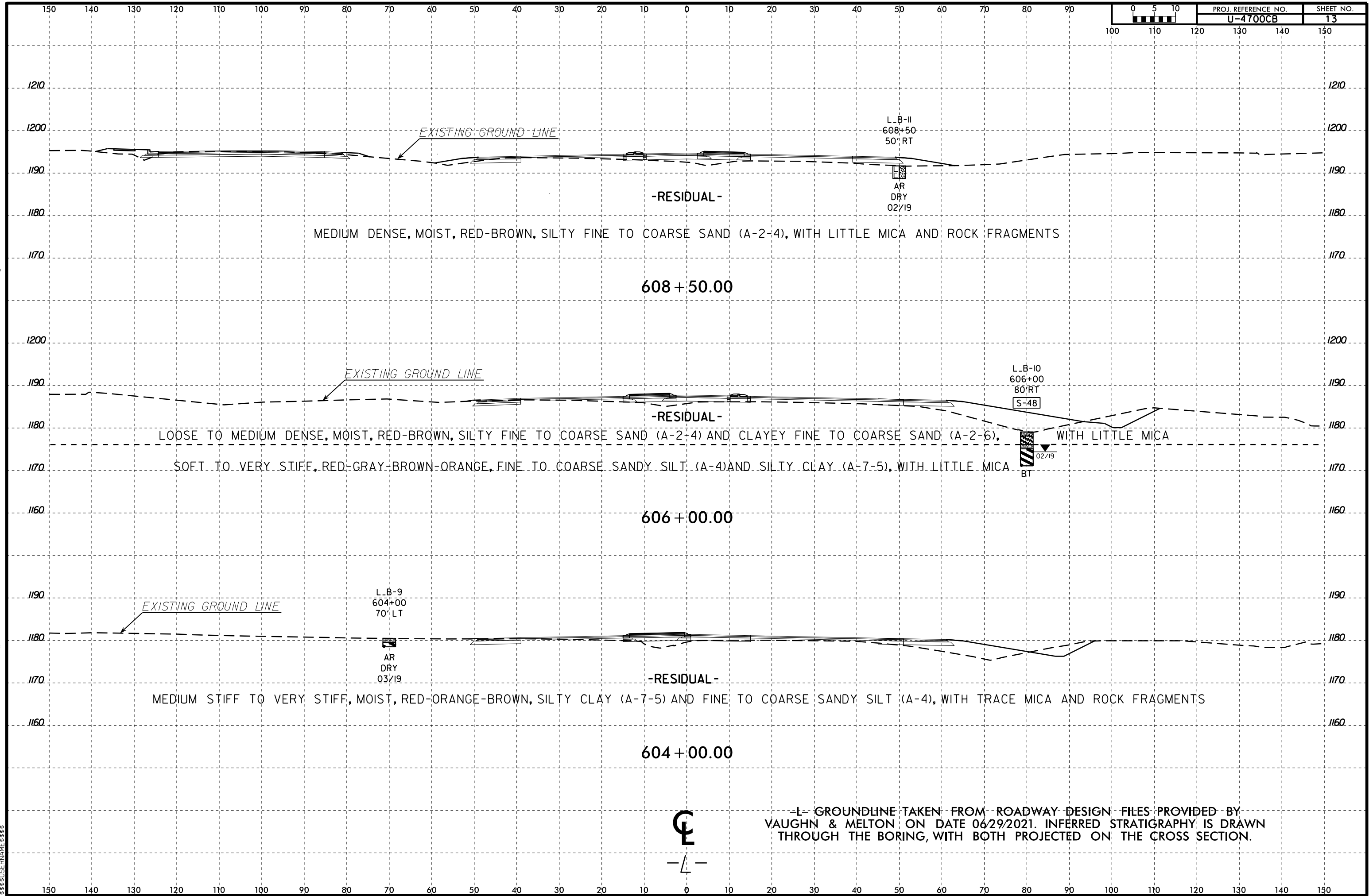
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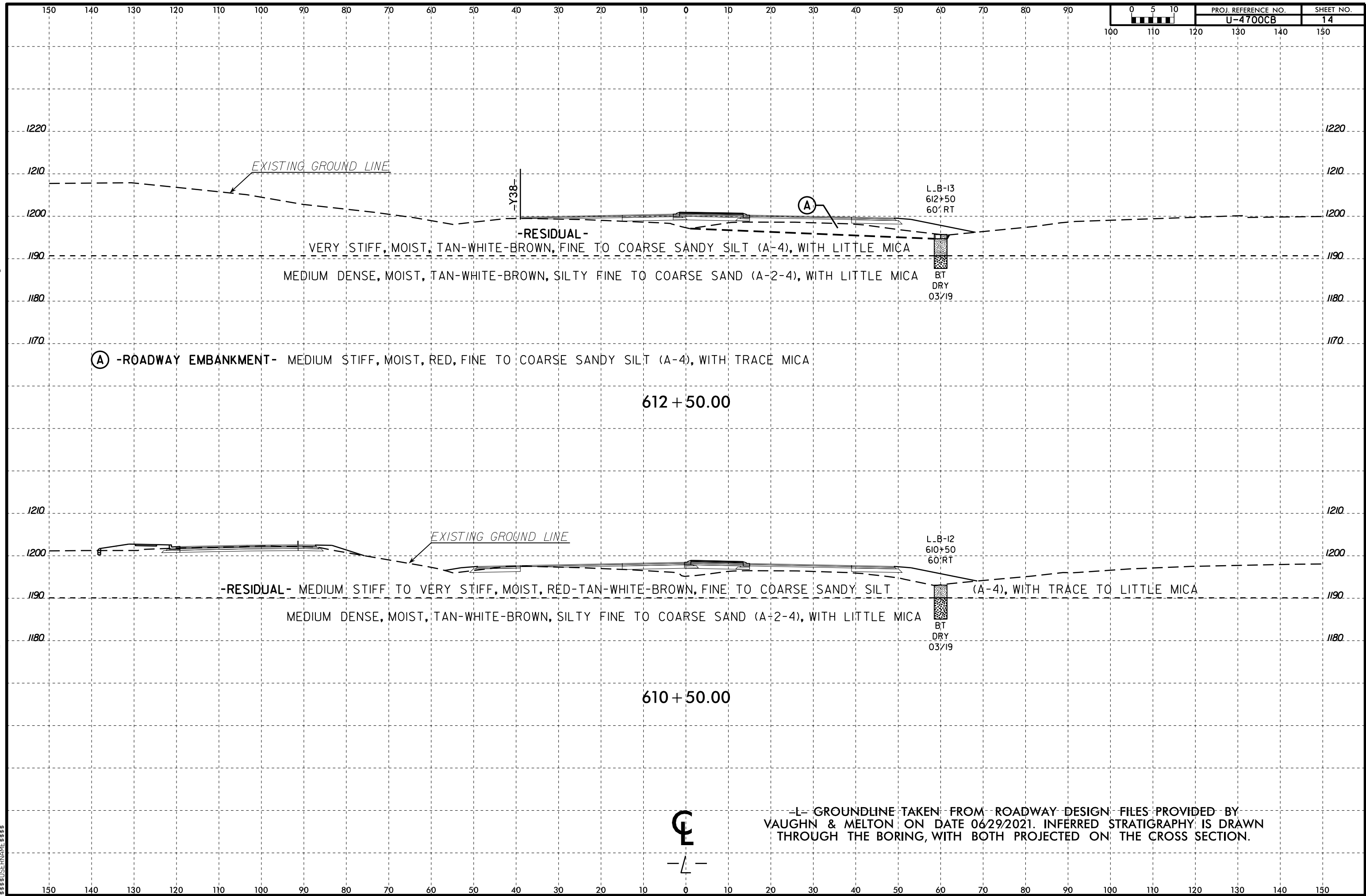
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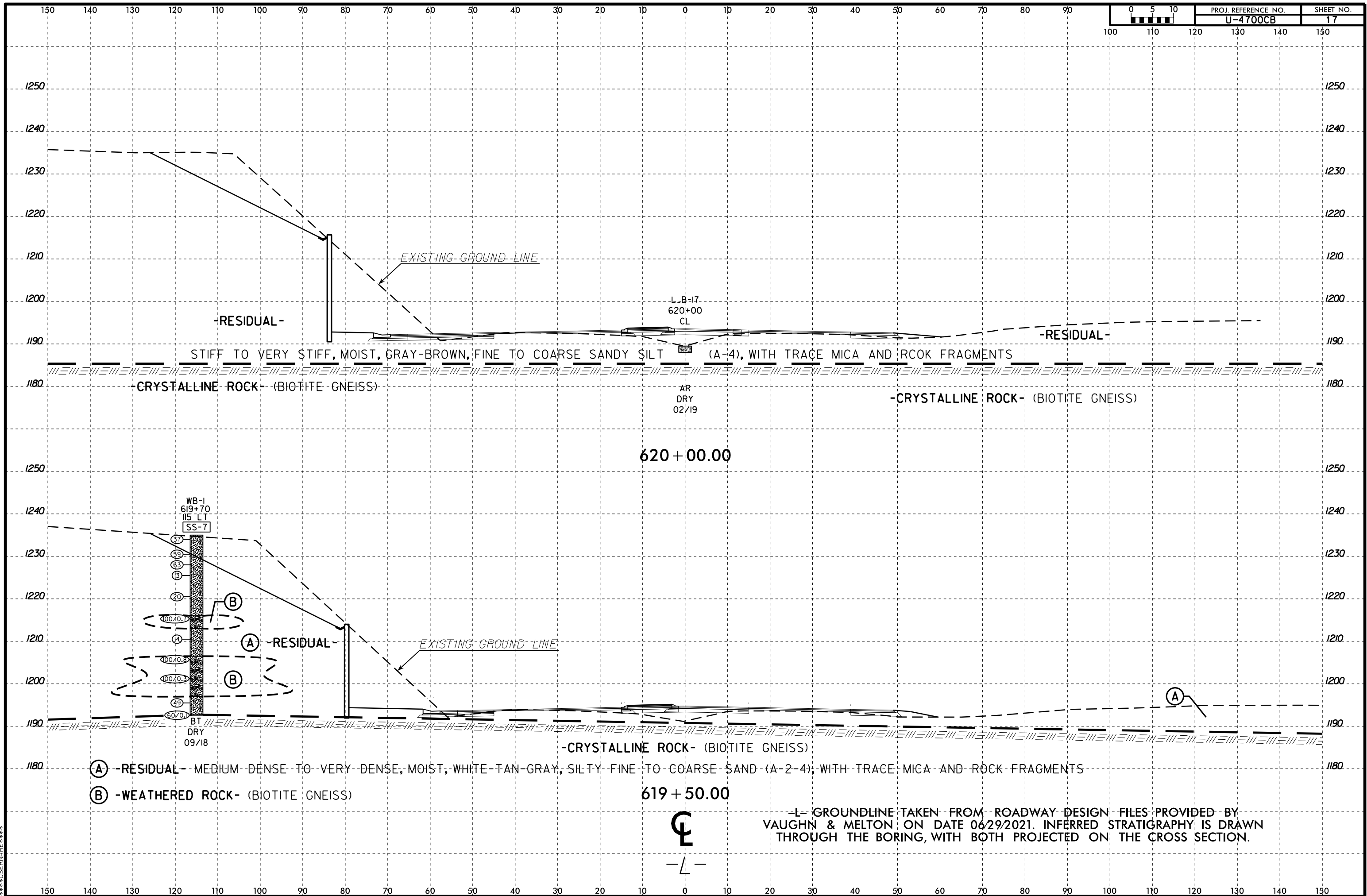
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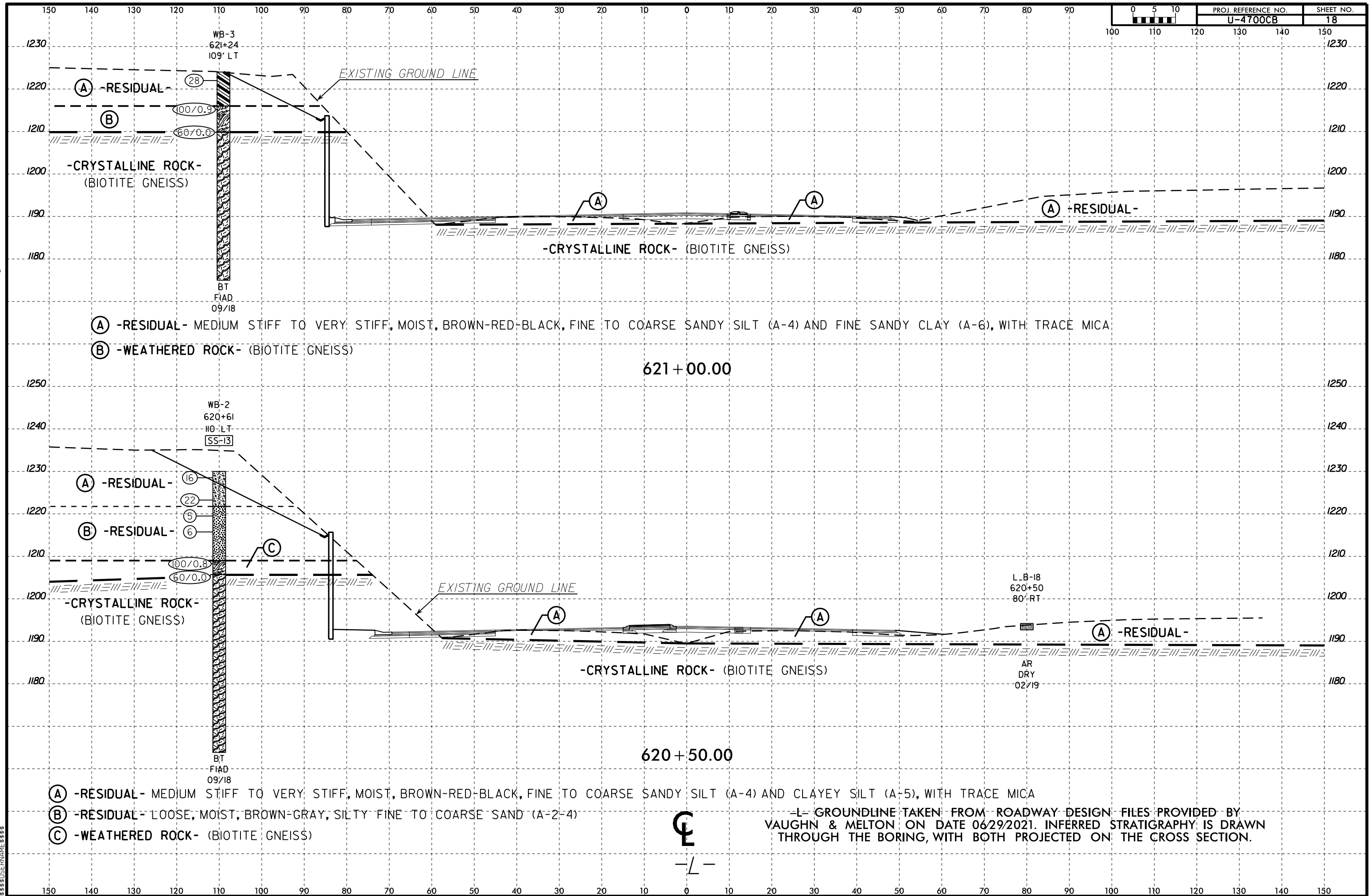
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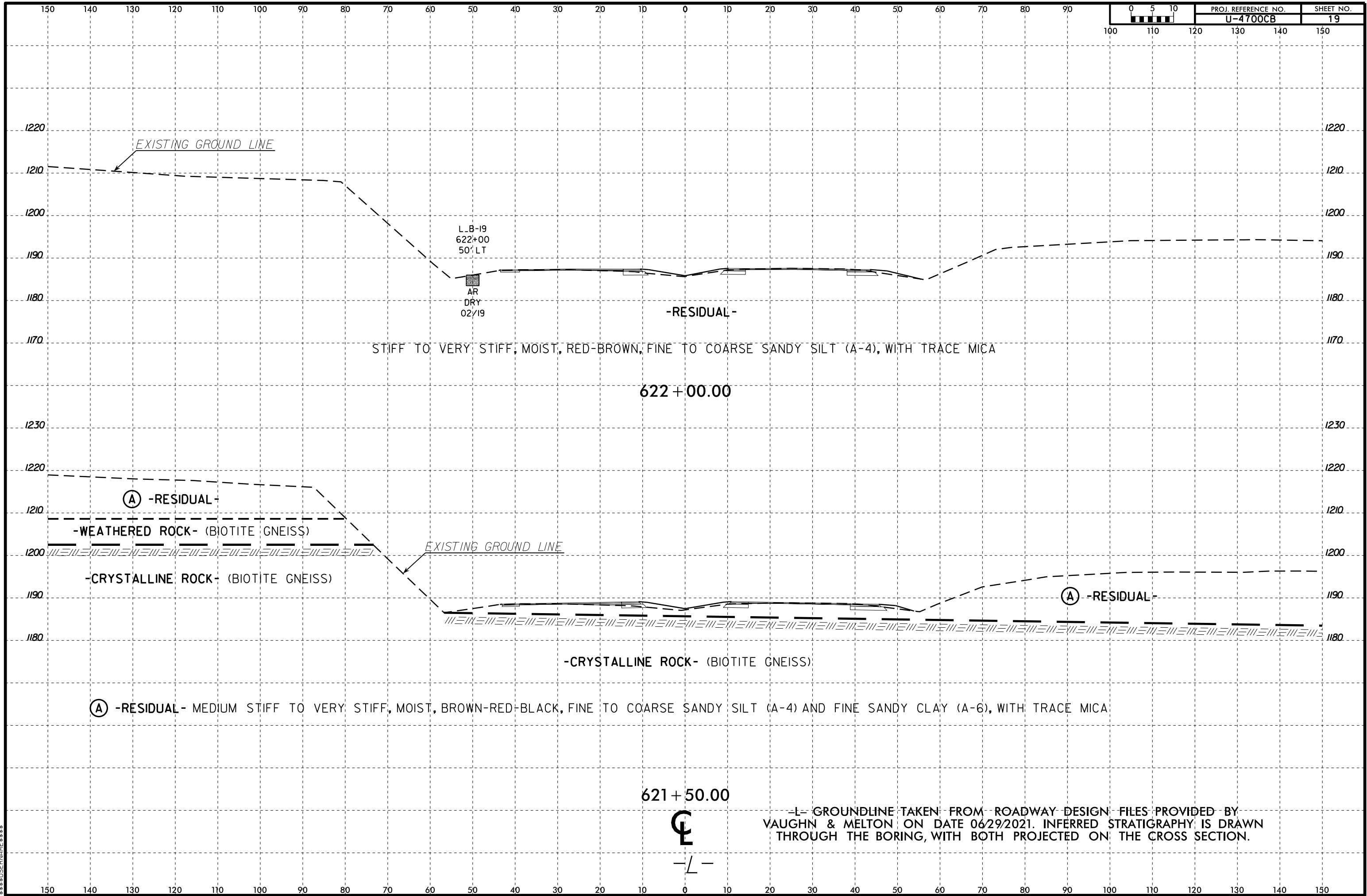
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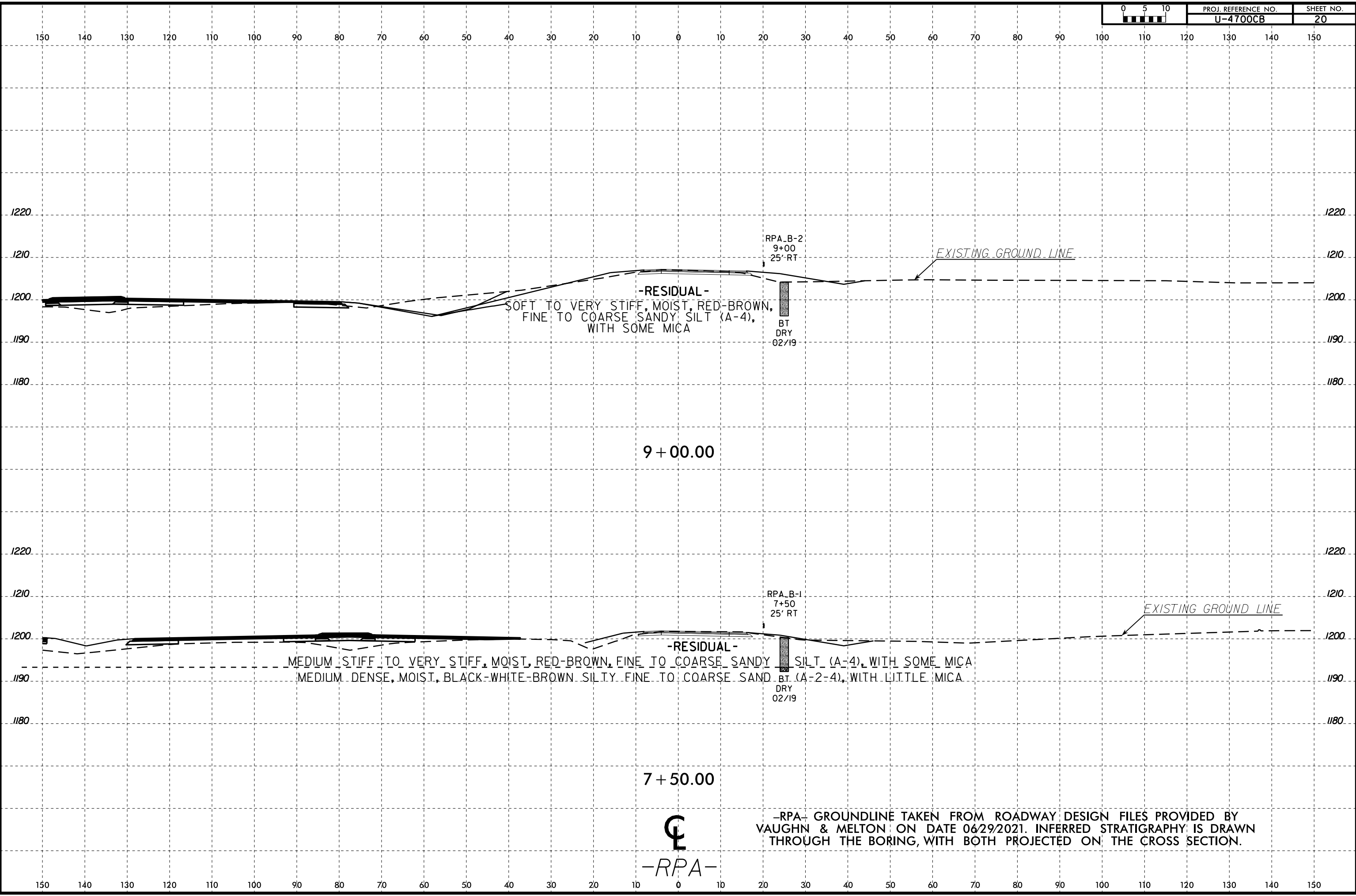


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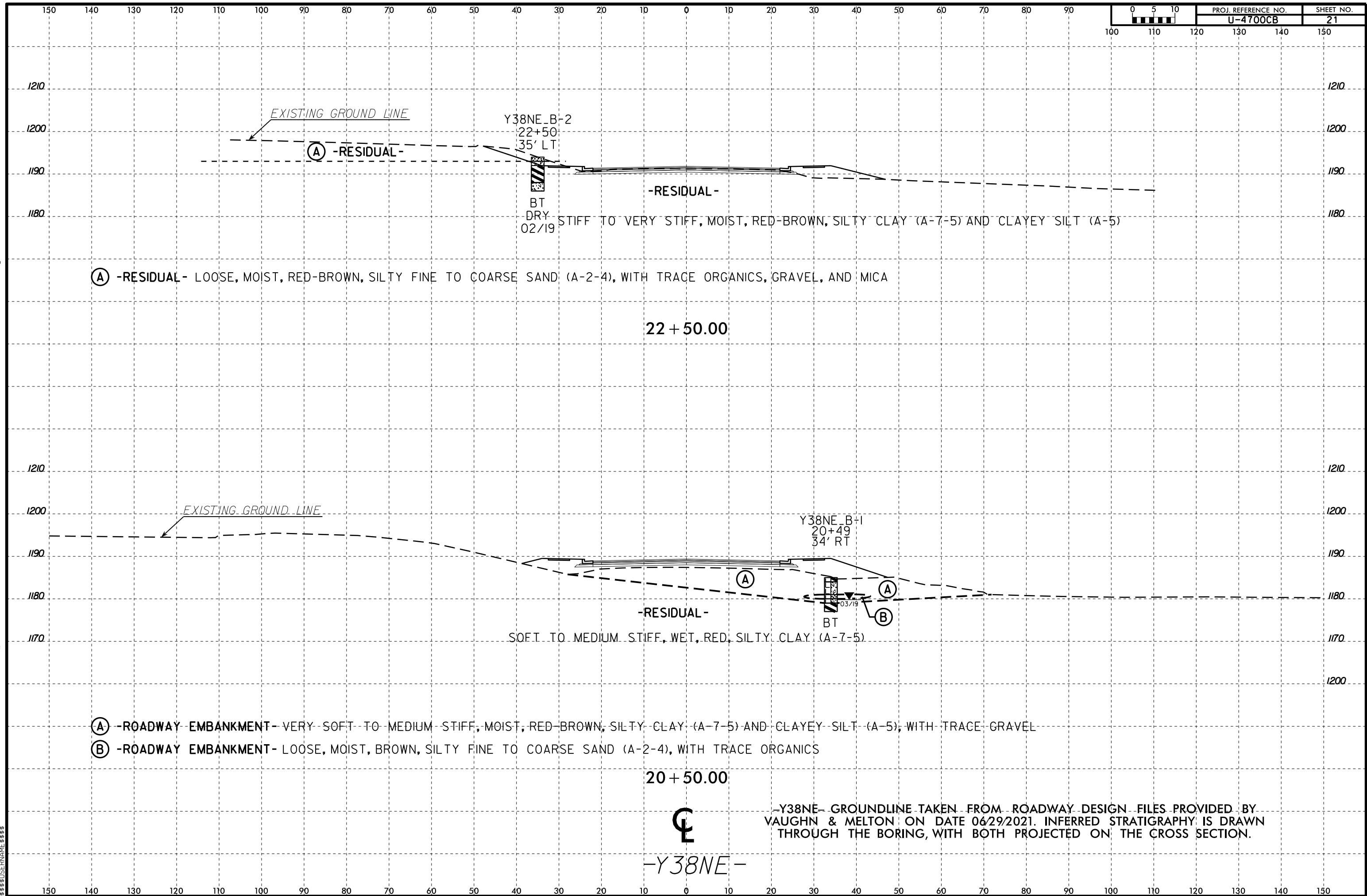


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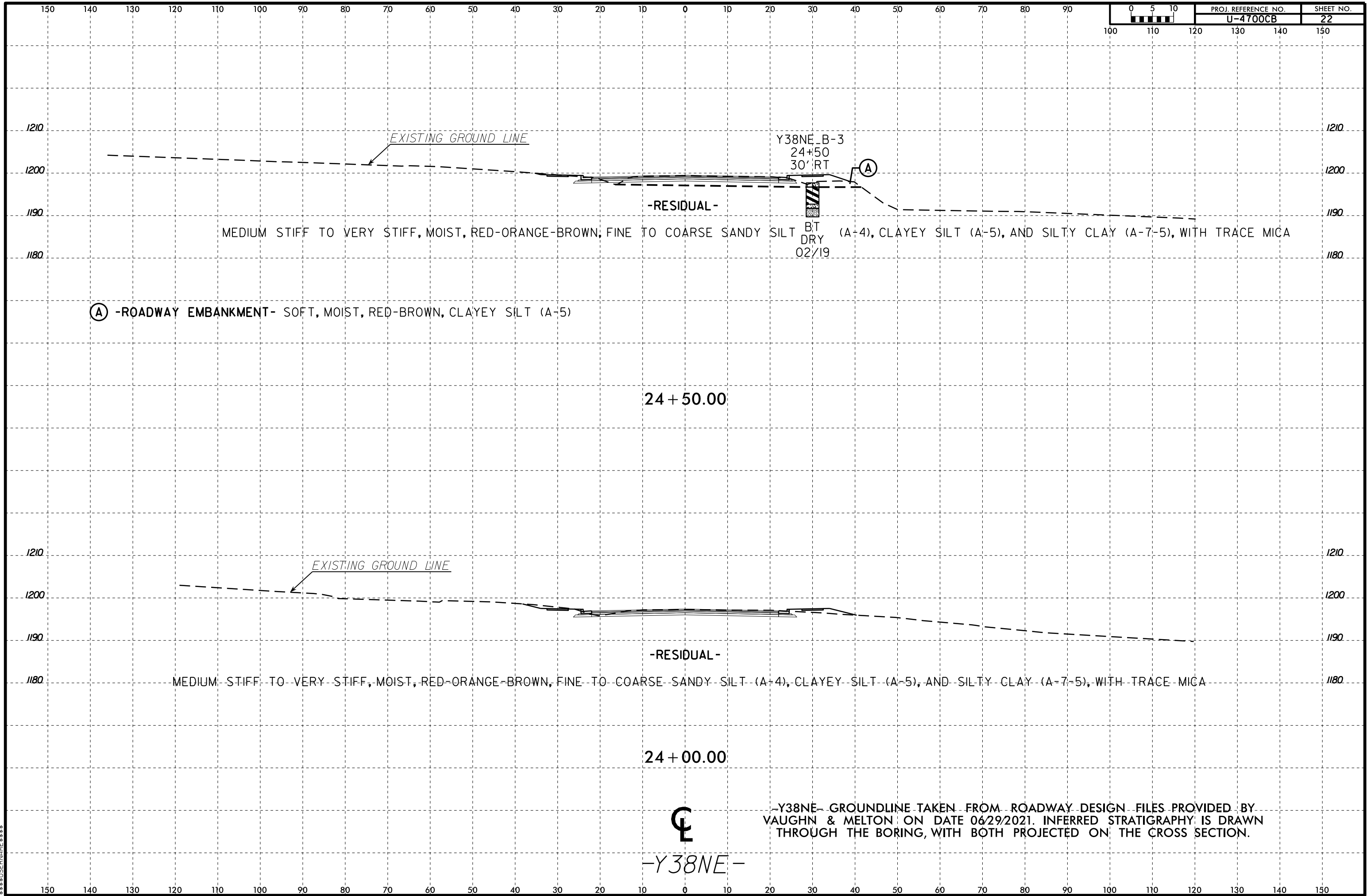
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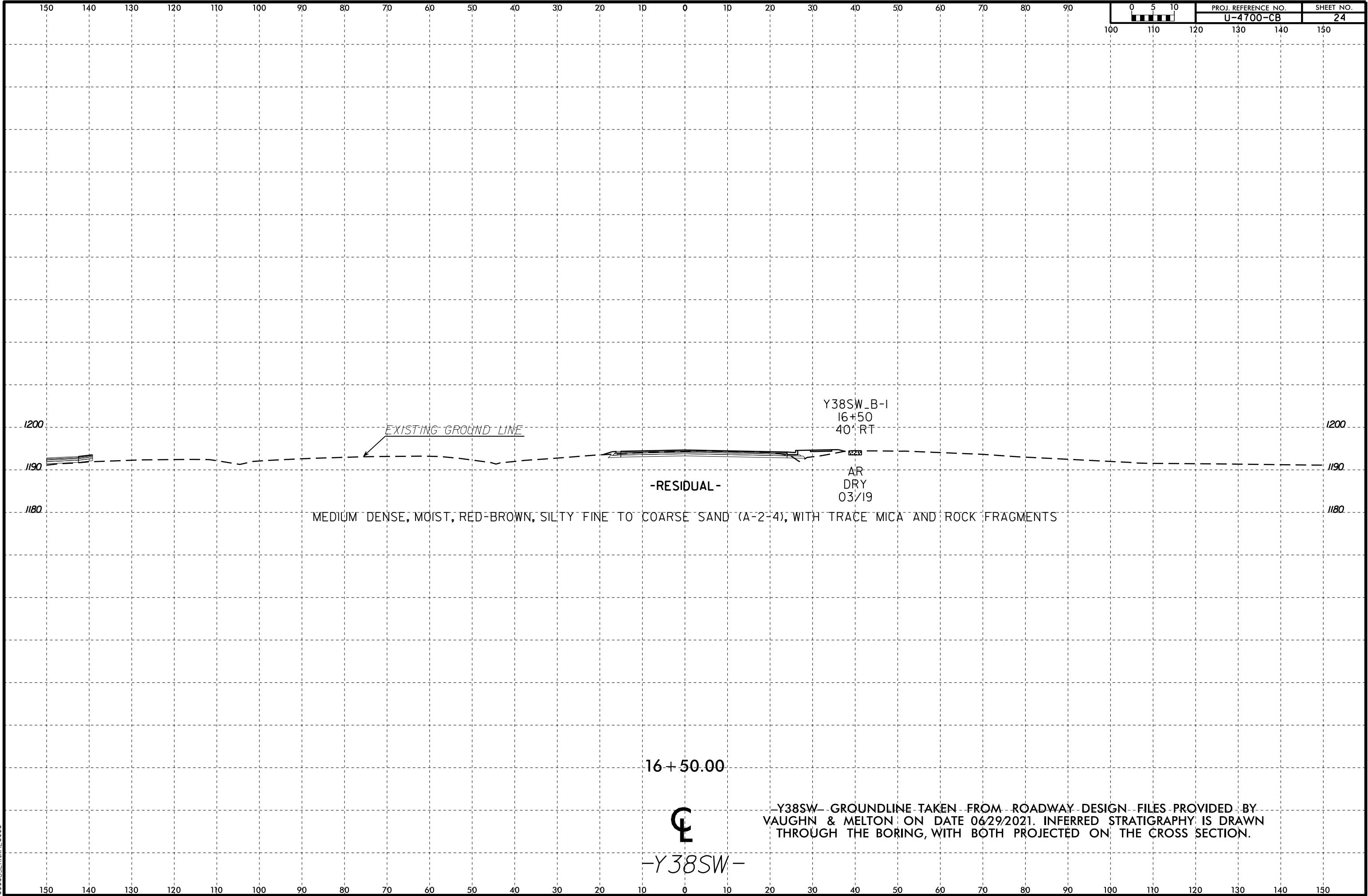
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SUBMITTAL
US 321 at Pine Mountain Road Intersection\CADD\GEOTECH\XSC\U4700CB_GEO_RDY_XSC_Y38_New.dgn



PROJECT: N/A

REFERENCE: U-4700CB

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

PROJECT REFERENCE NO.	SHEET NO.
U-4700CB	25

SOIL TEST RESULTS																
BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
L B-4	S-11	95' LT	596+51	2.0-3.0'	A-6(4)	38	14	30.6	24.6	2.9	41.9	98.9	80.5	49.1	29.5	-
L B-5	S-16	111' RT	597+00	1.0-2.0'	A-4(0)	39	3	31.9	31.4	5.3	31.3	95.1	76.9	40.7	26.5	-
L B-6	S-24	75' LT	599+00	1.0-2.0'	A-7-5(24)	66	32	19.6	9.6	4.8	66.0	95.0	80.3	69.6	31.4	-
L B-8	S-35	80' RT	602+00	4.0-5.0'	A-4(2)	34	10	34.8	21.8	8.2	35.2	90.8	68.8	43.1	18.8	-
L B-10	S-48	80' RT	606+00	7.0-8.0'	A-7-5(14)	57	24	21.9	17.0	12.1	49.0	95.1	82.0	60.7	34.5	-
WB-1	SS-7	115' LT	619+70	23.5-25.0'	A-2-4(0)	32	NP	55.3	38.5	1.5	4.7	95.7	59.7	11.7	17.0	-
WB-2	SS-13	110' LT	620+16	3.5-5.0'	A-5(2)	45	6	22.7	30.7	8.1	38.6	95.7	87.1	49.7	19.8	-

LAB TECHNICIAN: C. RUPERT

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