

REFERENCE: U-4700CC

PROJECT: N/A

SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION

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**APPENDICES**

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A	LABORATORY TEST RESULTS	20-21

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

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**ROADWAY**

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**SUBSURFACE INVESTIGATION**

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COUNTY CALDWELL  
PROJECT DESCRIPTION US-321 (HICKORY BLVD) AT  
MISSION ROAD

**RECOMMENDATIONS**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4700CC	1	21

**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

A. SUTTLE, GIT

INVESTIGATED BY ECS SOUTHEAST, LLP

DRAWN BY K. DE MONTBRUN, P.E.

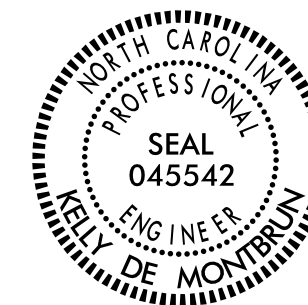
CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS SOUTHEAST, LLP

DATE AUGUST 2021

*Prepared in the Office of:*

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ENGINEERING  
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DocuSigned by:  
Kelly de Montbrun 8/27/2021

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

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

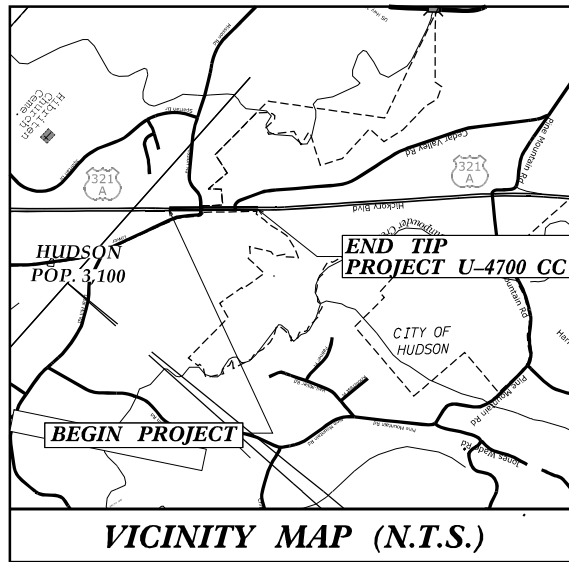
# SUBSURFACE INVESTIGATION

## SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																													
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (ASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</b></p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <p><b>WEATHERED ROCK (WR)</b> - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p> <p><b>CRYSTALLINE ROCK (CR)</b> - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> <p><b>NON-CRYSTALLINE ROCK (NCR)</b> - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p> <p><b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b> - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>		<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																													
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GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td></td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>		GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)			SILT-CLAY MATERIALS (> 35% PASSING #200)			ORGANIC MATERIALS			GROUP CLASS.	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RATING AS SUBGRADE		EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE			<p style="text-align: center;"><b>COMPRESSIBILITY</b></p> <p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>		<p style="text-align: center;"><b>PERCENTAGE OF MATERIAL</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt; 10%</td> <td>&gt; 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<p style="text-align: center;"><b>GROUND WATER</b></p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>		<p style="text-align: center;"><b>FRESH</b></p> <p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p style="text-align: center;"><b>VERY SLIGHT (V SLI.)</b></p> <p>ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p style="text-align: center;"><b>SLIGHT (SLI.)</b></p> <p>ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p style="text-align: center;"><b>MODERATE (MOD.)</b></p> <p>SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p style="text-align: center;"><b>MODERATELY SEVERE (MOD. SEV.)</b></p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p style="text-align: center;"><b>SEVERE (SEV.)</b></p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</i></p> <p style="text-align: center;"><b>VERY SEVERE (V SEV.)</b></p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i></p> <p style="text-align: center;"><b>COMPLETE</b></p> <p>ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>	
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COLOR		DATE: 8-15-14																																																																																																																																	
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>																																																																																																																																			

09/28/2019

**CONTRACT: U-4700CC**



**VICINITY MAP (N.T.S.)**

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

**25% PRELIMINARY PLANS**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**CALDWELL COUNTY**

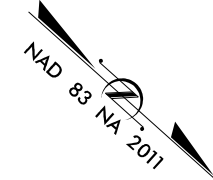
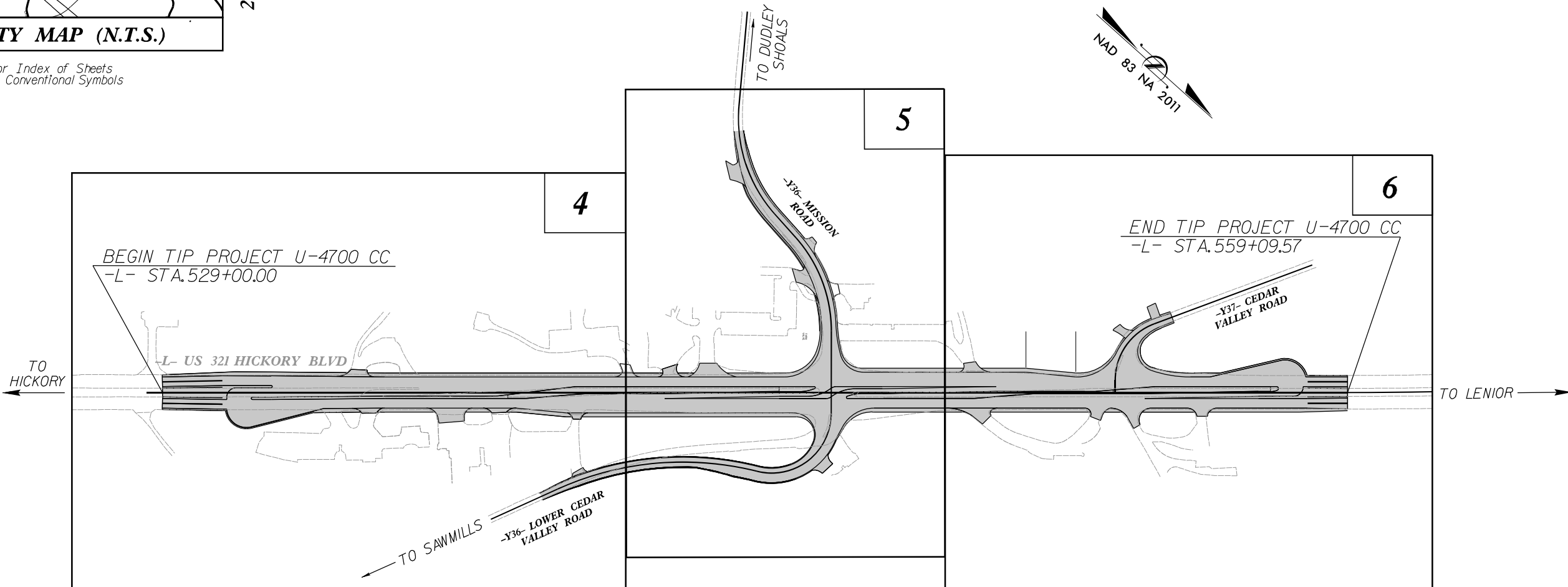
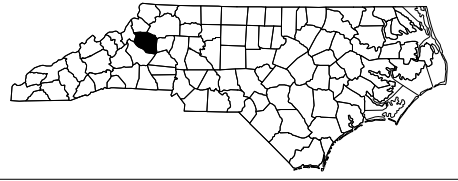
**LOCATION: US 321 (HICKORY BLVD) AT MISSION ROAD**  
**TYPE OF WORK: GRADING, DRAINAGE, PAVING AND SIGNALS**

**V&M**  
Vaughn & Melton  
Consulting Engineers  
Asheville, North Carolina  
828-253-2786

Boone, NC 828-255-9833  
 Charlotte, NC 704-521-8400  
 Durham, NC 919-286-5800  
 Greensboro, NC 336-744-4775  
 Raleigh, NC 919-877-9459  
 Winston-Salem, NC 703-757-0488  
 Asheville, NC 828-253-2786  
 Charleston, SC 803-514-5650  
 Charleston, SC 803-748-5600  
 Memphis, TN 901-514-5650  
 Miami, FL 305-427-3509

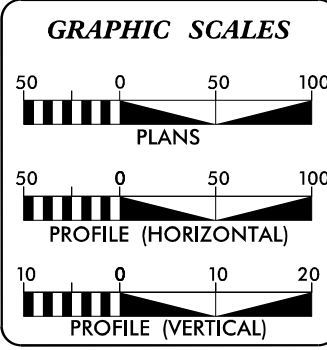
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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4700CC	3	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35993.1.12	NHF-321(18)	PE	



Clearing on this project shall be performed to the limits established by Method III.  
This project is within the municipal boundaries of the city of Hudson  
This is a partially Controlled-Access Project with access being limited to points as shown on the plans.

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



**DESIGN DATA**

ADT 2019 =	33,500
ADT 2039 =	43,900
K =	8 %
D =	55 %
T =	7 % *
V =	60 MPH
* TTST =	3 DUAL 4
FUNC CLASS =	PRINCIPAL ARTERIAL

**PROJECT LENGTH**

LENGTH ROADWAY PROJECT U-4700CC =	0.570 MI.
LENGTH STRUCTURE PROJECT U-4700CC =	0.000 MI.
TOTAL LENGTH OF PROJECT U-4700CC =	0.570 MI.

Prepared in the Office of:  
**VAUGHN & MELTON**  
1318-F PATTON AVE.  
ASHEVILLE NC, 28806  
FOR THE NORTH CAROLINA DIVISION OF HIGHWAYS  
2018 STANDARD SPECIFICATIONS

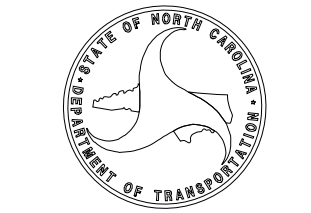
<b>RIGHT OF WAY DATE:</b>	REECE SCHULER, PE, PLS PROJECT ENGINEER
<b>LETTING DATE:</b>	DANIEL ALMUETI, EIT PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

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

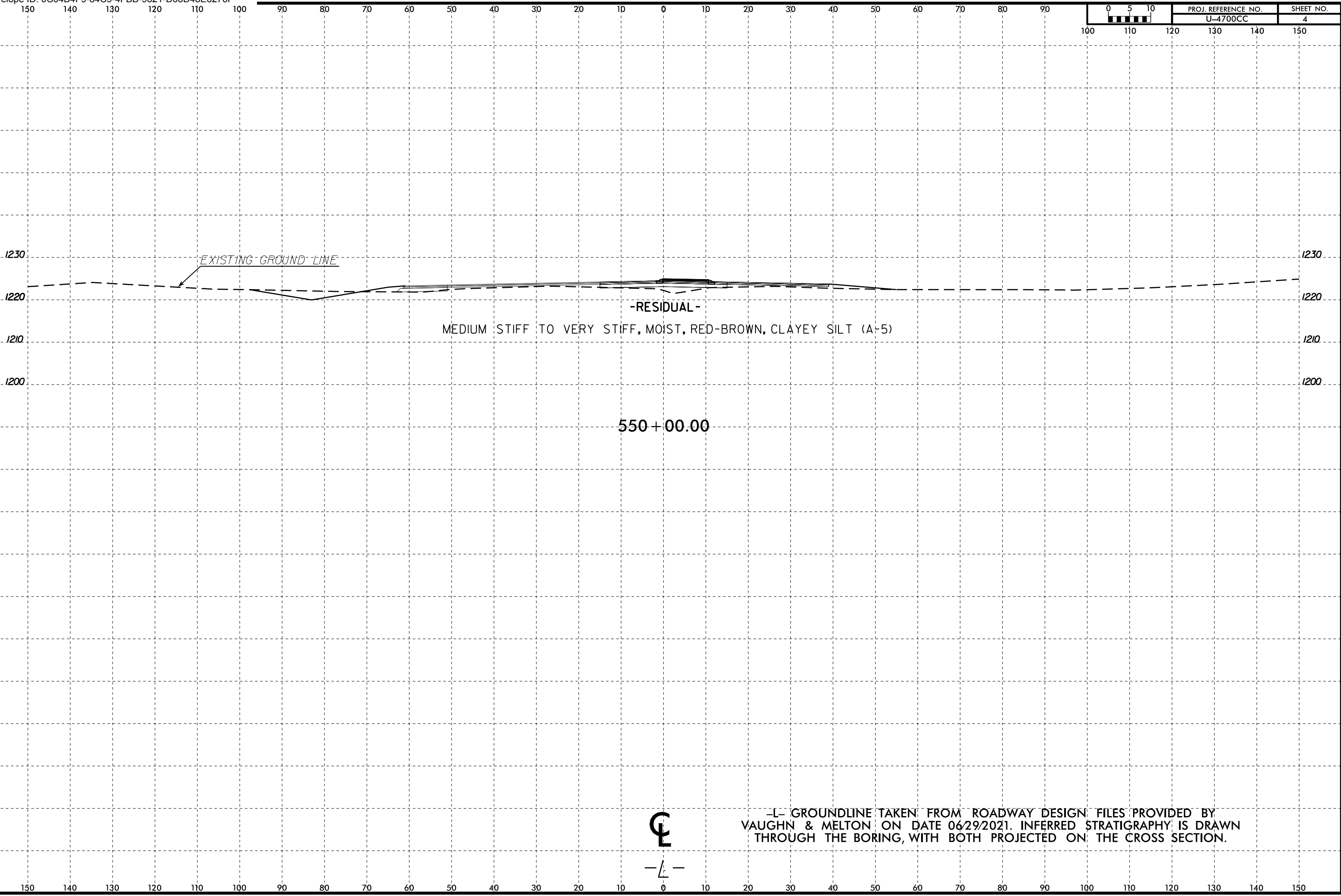
**ROADWAY DESIGN ENGINEER**

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



6/6/2019 2:45:15 PM V:\Asheville\Transportation\31535-15 U4700CC\Roadway\Proj\U4700CC-Rdy\_TSH.dgn User: jzimmerman

26-AUG-2021 17:08  
C:\Users\jason\OneDrive - ECS Corporate Services\08 Geo Projects\12000-12999\12400\12402 - U-4700CC %  
US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_L.dgn



EXISTING GROUND LINE

-RESIDUAL-

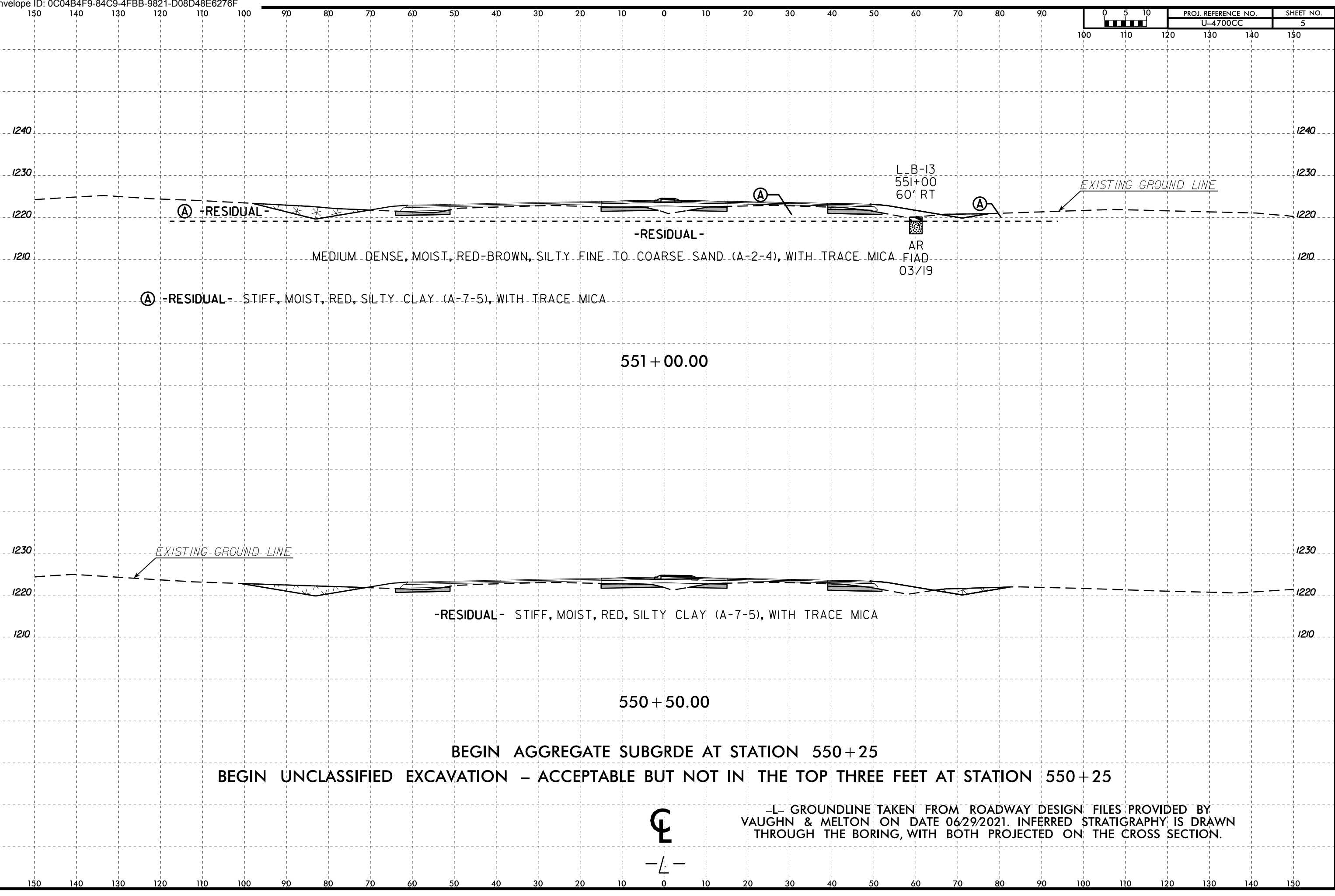
MEDIUM STIFF TO VERY STIFF, MOIST, RED-BROWN, CLAYEY SILT (A-5)

550+00.00



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

26-AUG-2021 17:08  
C:\Users\jason\OneDrive - ECS Corporate Services\08 Geo Projects\2000-1299\12400\12402 - U-4700CC %  
US 321 at Mission Road Intersection\CADD\GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_L.dgn



(A) -RESIDUAL-

MEDIUM DENSE, MOIST, RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA

L\_B-13  
551+00  
60' RT  
AR  
FIAD  
03/19

EXISTING GROUND LINE

551 + 00.00

EXISTING GROUND LINE

-RESIDUAL- STIFF, MOIST, RED, SILTY CLAY (A-7-5), WITH TRACE MICA

550 + 50.00

BEGIN AGGREGATE SUBGRDE AT STATION 550 + 25

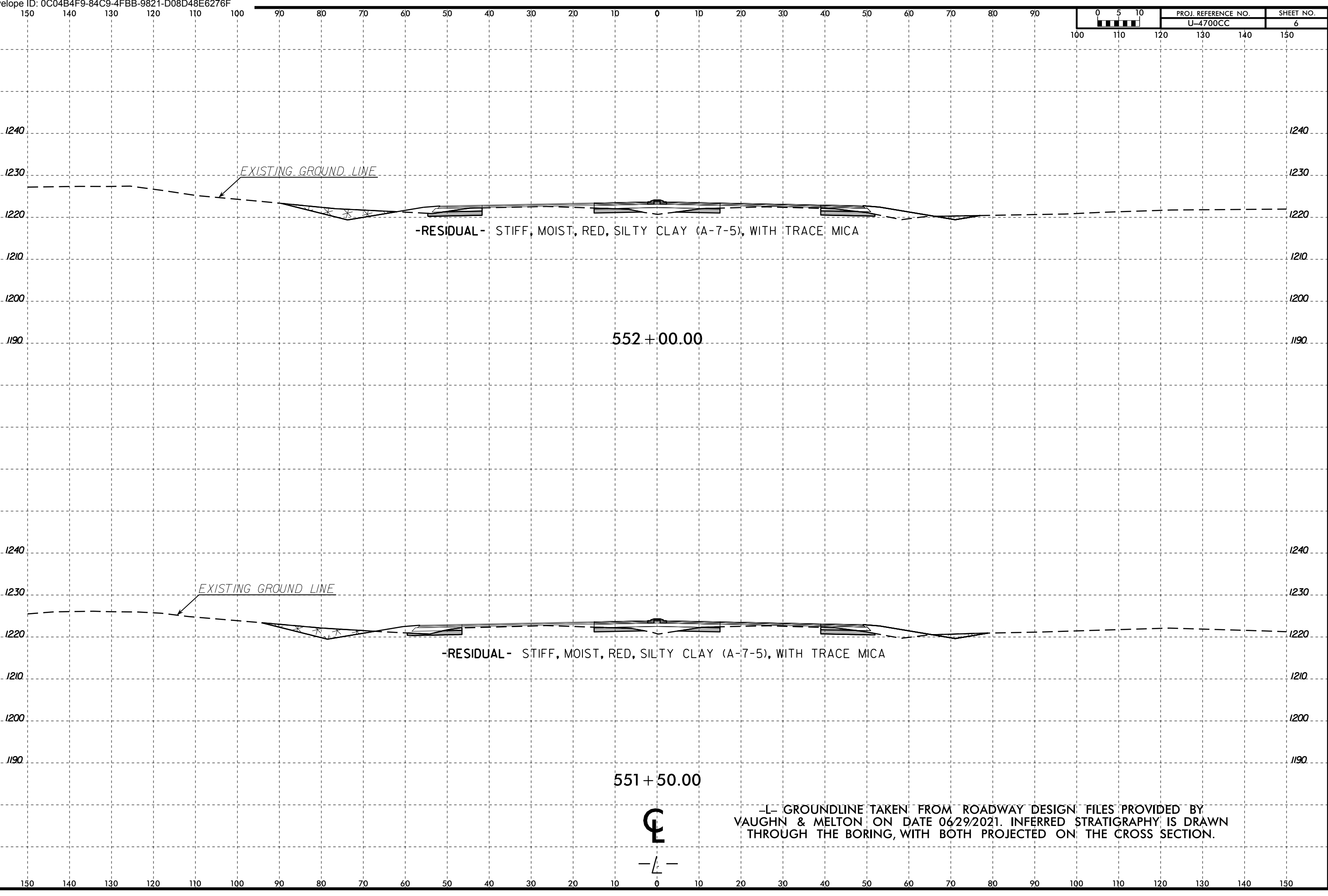
BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION 550 + 25



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

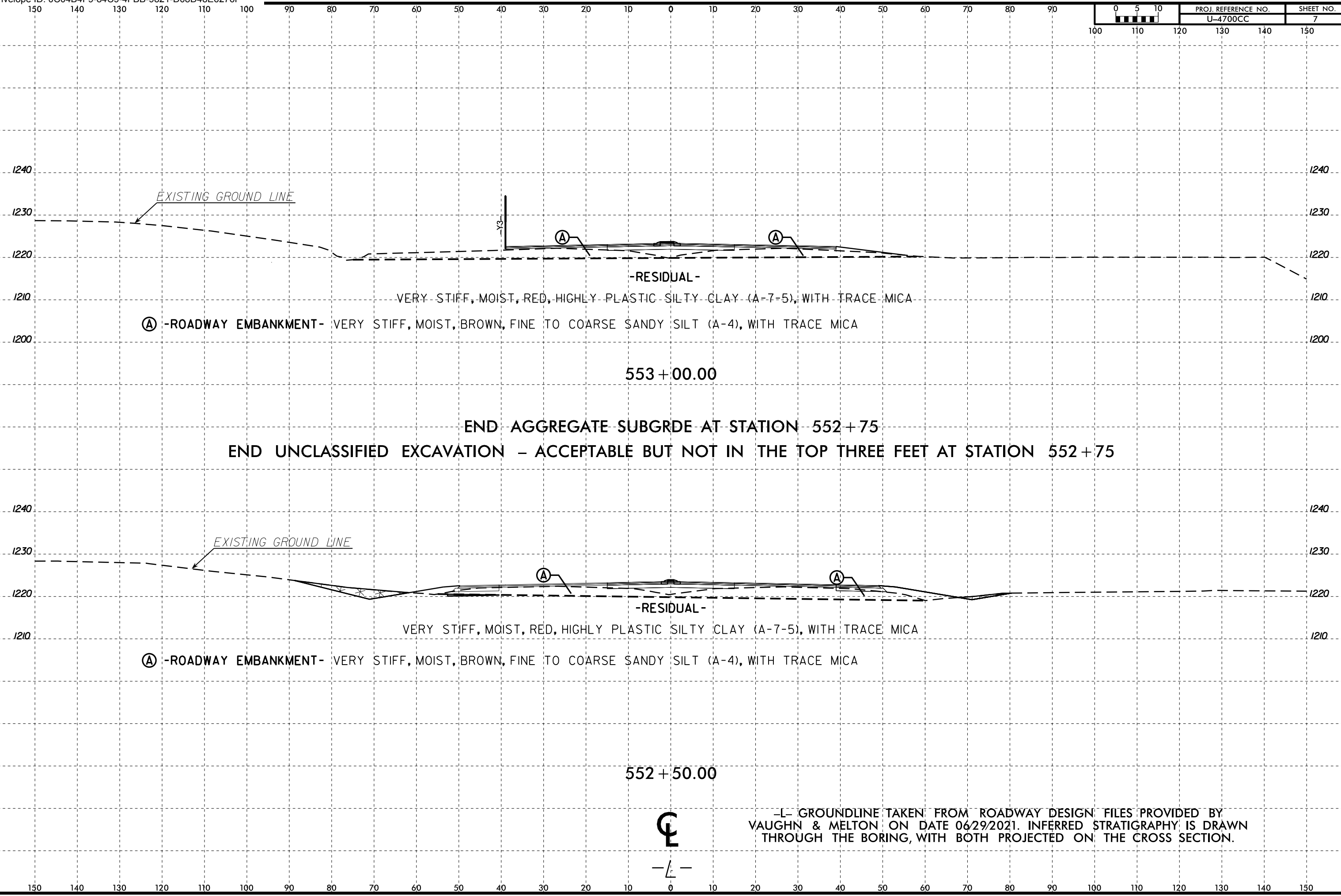


26-AUG-2021 17:08  
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US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR.L.dgn



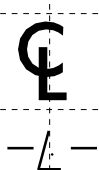
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26-AUG-2021 17:08  
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US 321 at Mission Road Intersection\CADD\GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_L.dgn



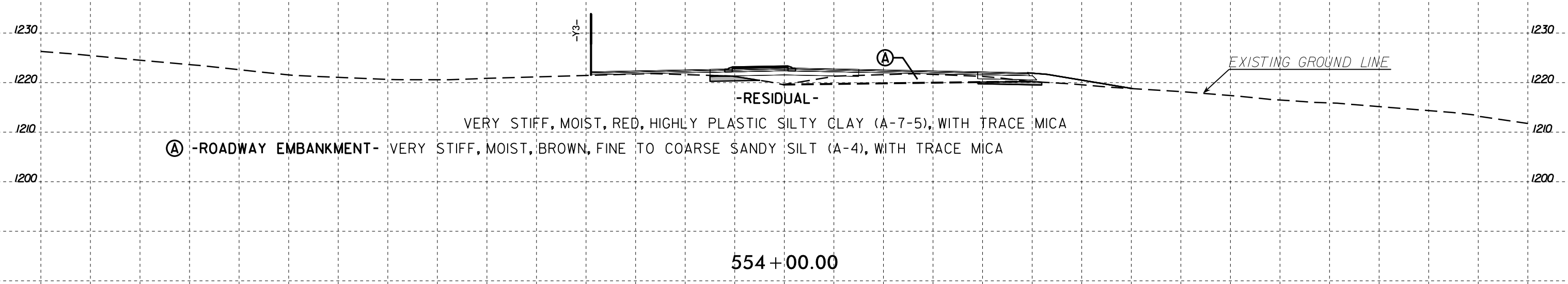
END AGGREGATE SUBGRDE AT STATION 552+75

END UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION 552+75

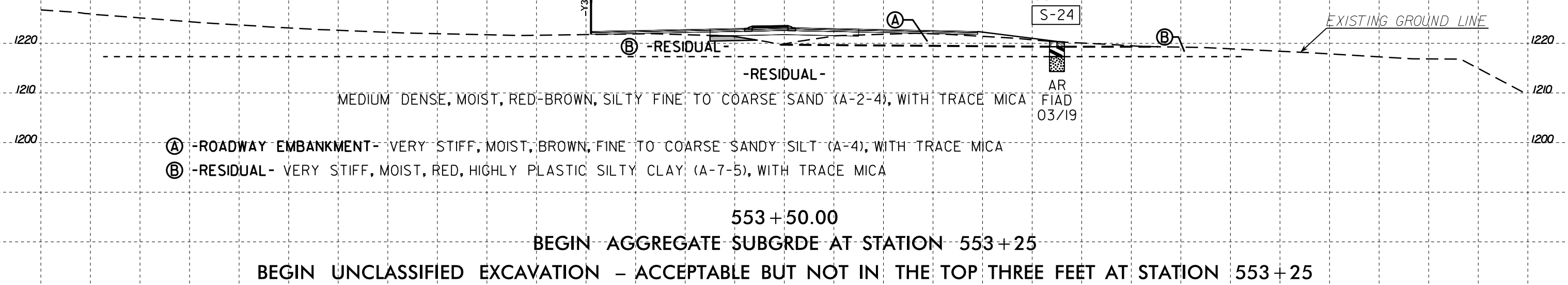


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

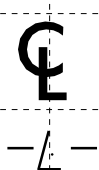
END AGGREGATE SUBGRDE AT STATION 554+25  
 END UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION 554+25



BEGIN AGGREGATE SUBGRDE AT STATION 553+25  
 BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION 553+25



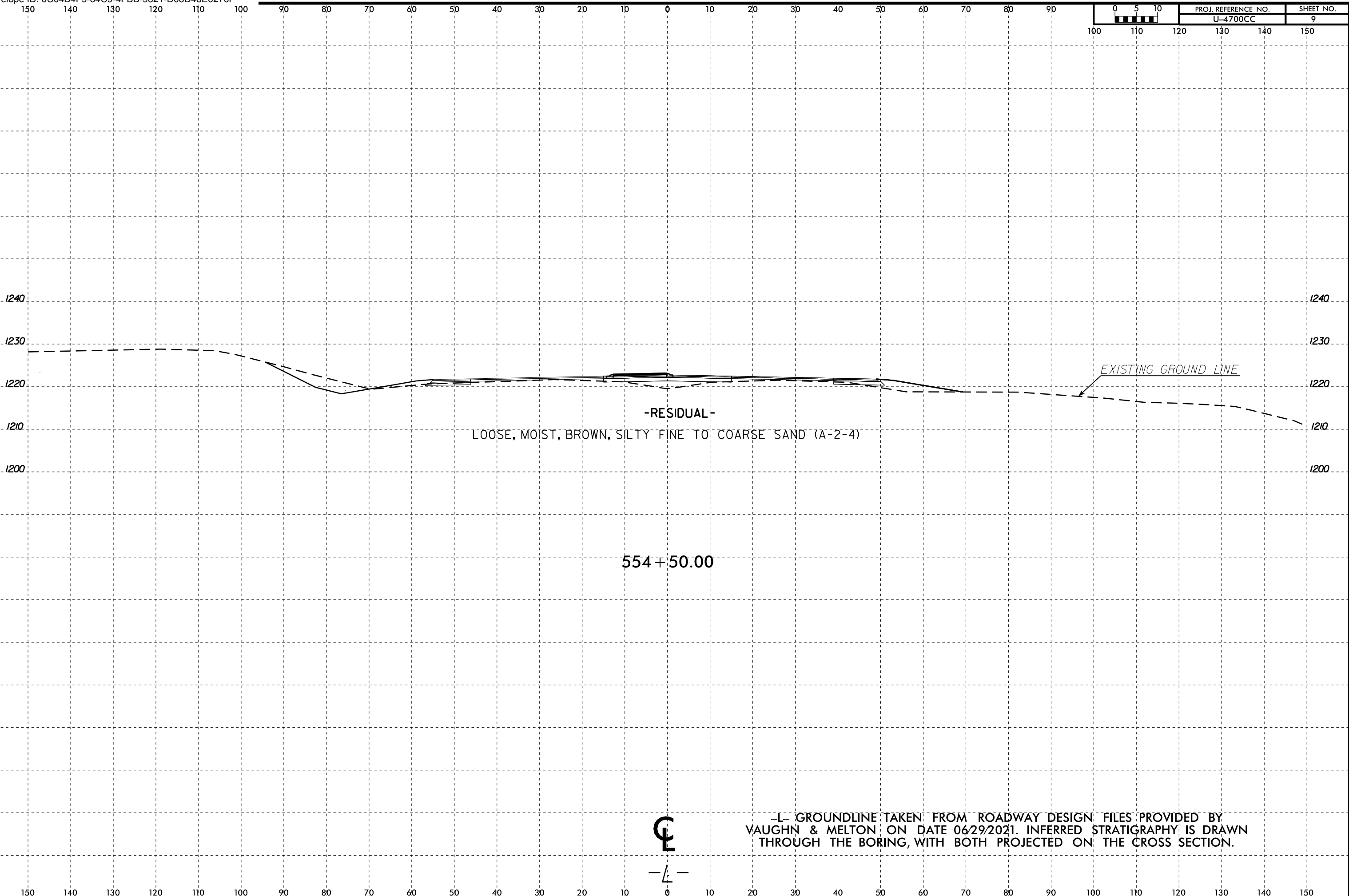
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.



26-AUG-2021 17:08  
 C:\Users\jgordon\OneDrive - ECS Corporate Services\08 Geo Projects\12000-12999\12400\12402 - U-4700CC %  
 US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR.L.dgn



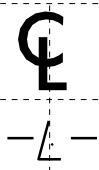
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US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR.L.dgn



-RESIDUAL-  
LOOSE, MOIST, BROWN, SILTY FINE TO COARSE SAND (A-2-4)

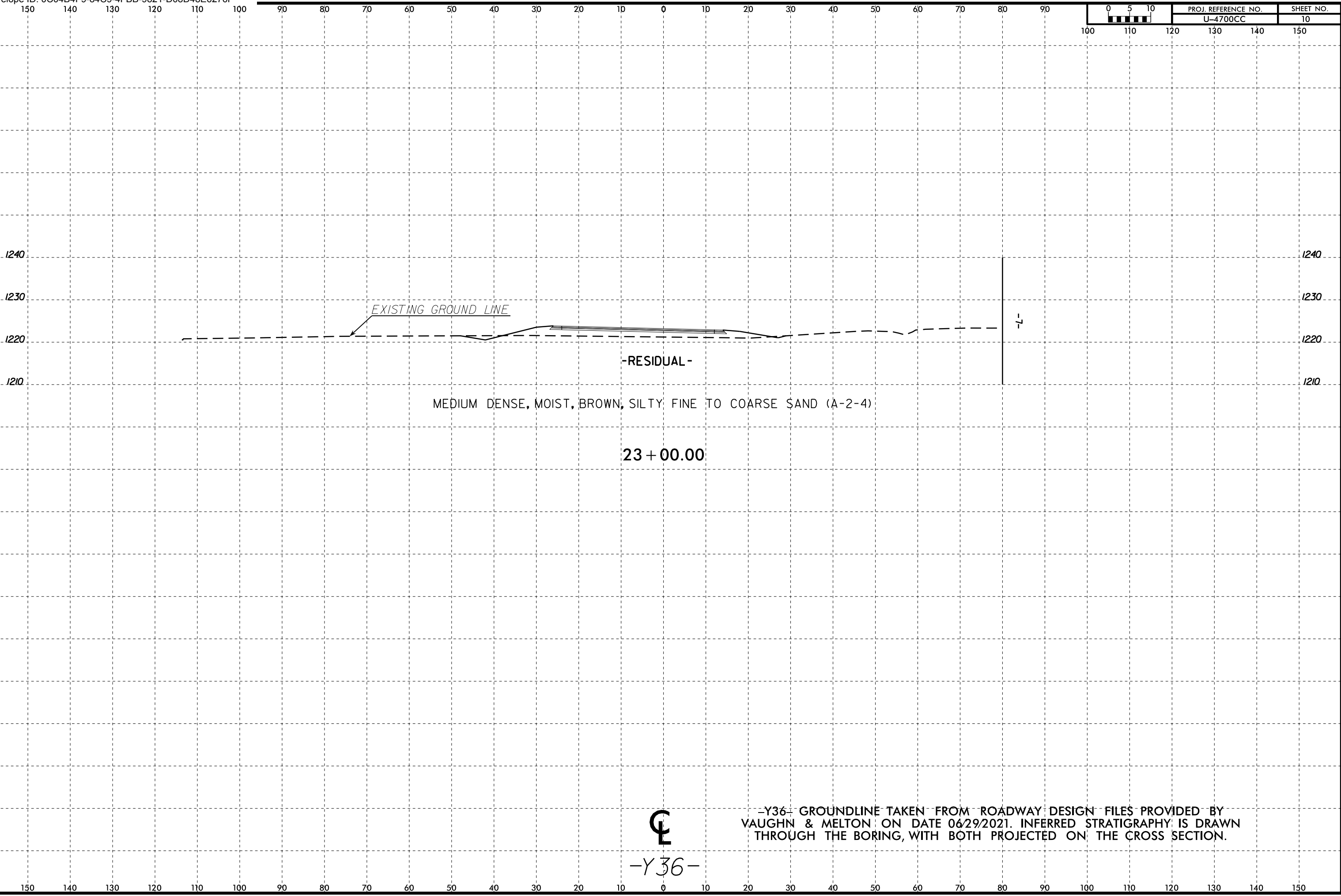
554 + 50.00

EXISTING GROUND LINE



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

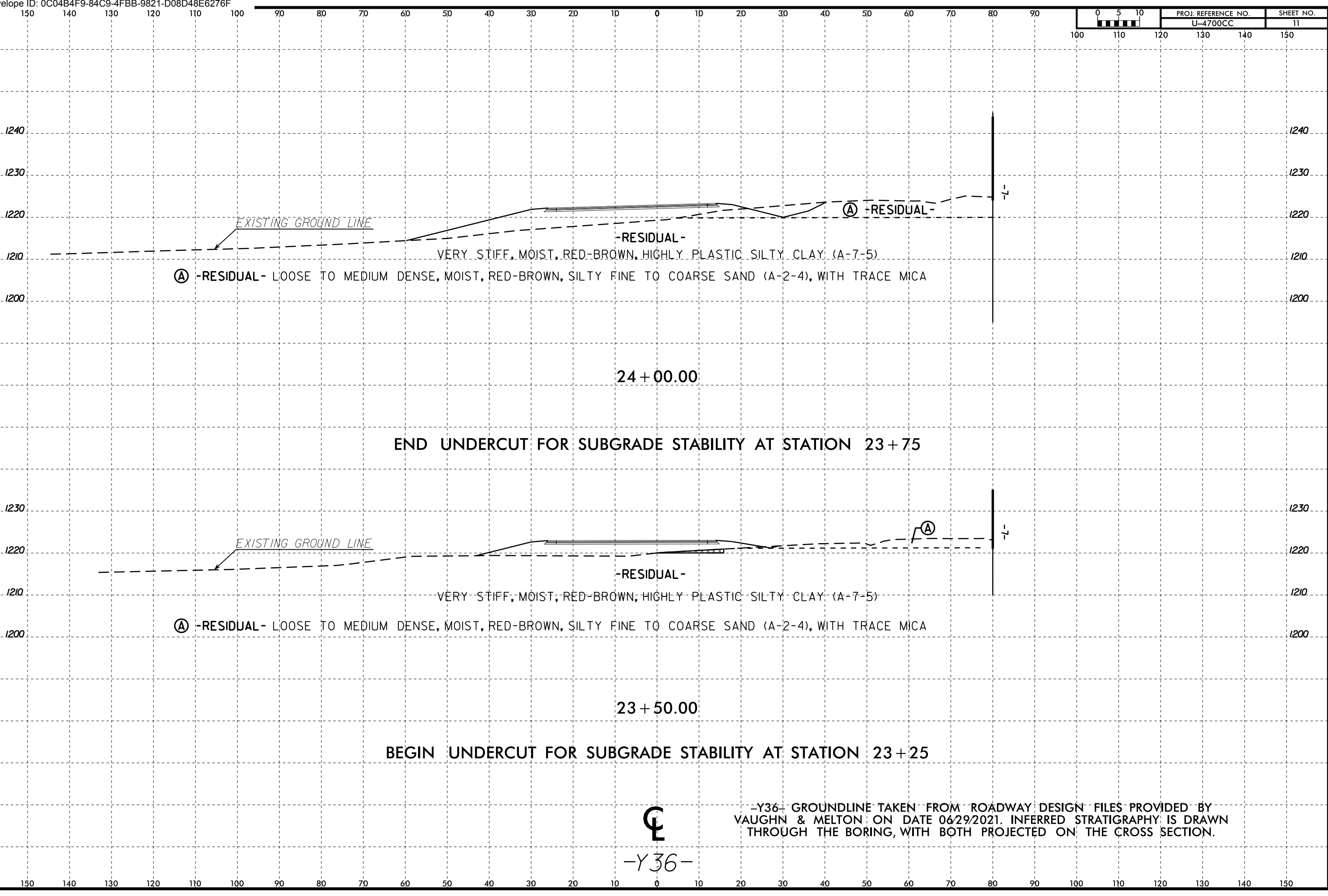
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-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

C  
-Y36-

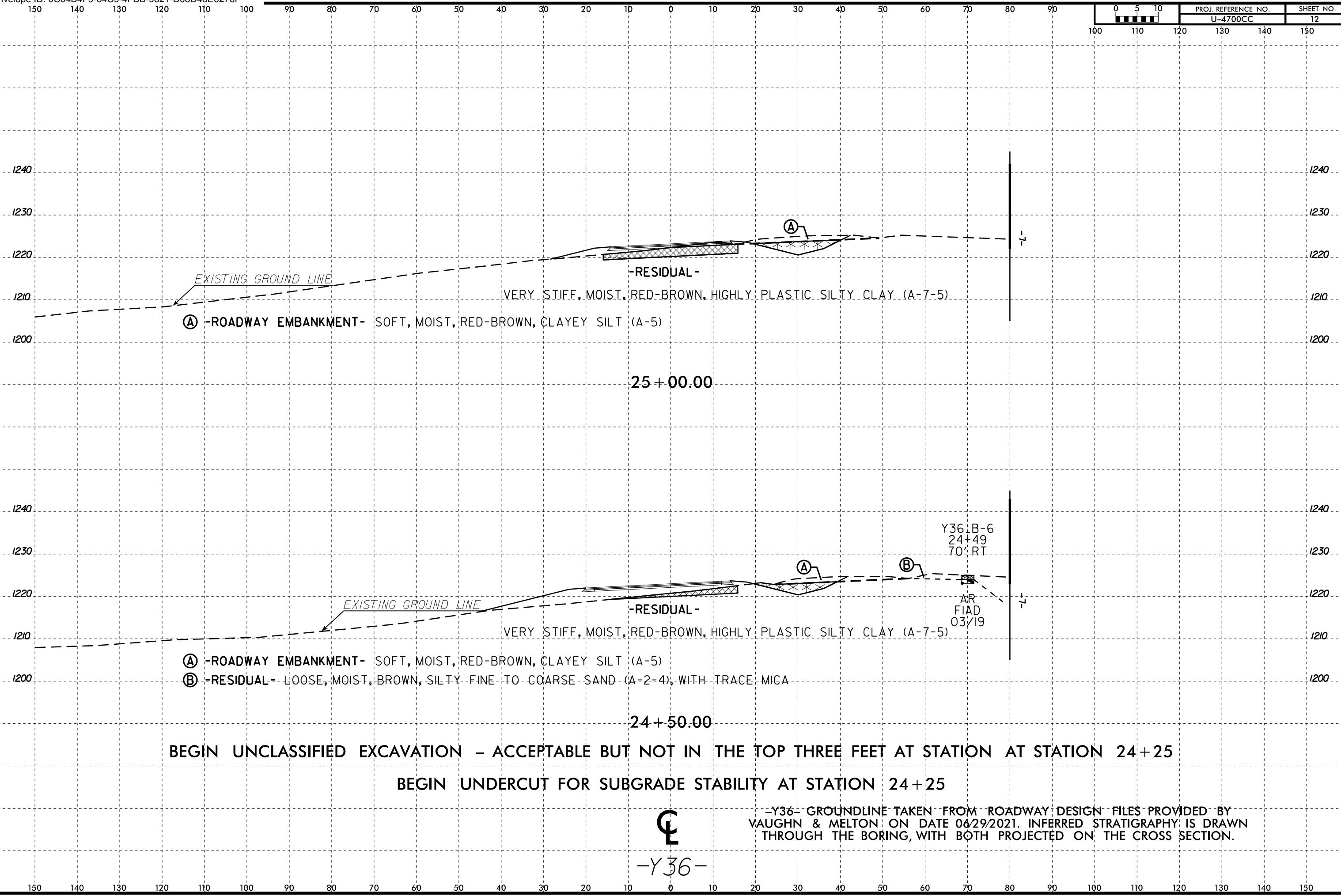
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US 321 at Mission Road Intersection\CADD\_GEO\TECH\ss\U4700CC.RDY\_GEO\_XSR\_Y.dgn



-Y36-

-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

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US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_Y.dgn



EXISTING GROUND LINE

① -ROADWAY EMBANKMENT- SOFT, MOIST, RED-BROWN, CLAYEY SILT (A-5)

-RESIDUAL-  
VERY STIFF, MOIST, RED-BROWN, HIGHLY PLASTIC SILTY CLAY (A-7-5)

25 + 00.00

EXISTING GROUND LINE

① -ROADWAY EMBANKMENT- SOFT, MOIST, RED-BROWN, CLAYEY SILT (A-5)

② -RESIDUAL- LOOSE, MOIST, BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA

-RESIDUAL-  
VERY STIFF, MOIST, RED-BROWN, HIGHLY PLASTIC SILTY CLAY (A-7-5)

24 + 50.00

Y36-B-6  
24+49  
70' RT

AR  
FIAD  
03/19

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION AT STATION 24+25

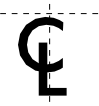
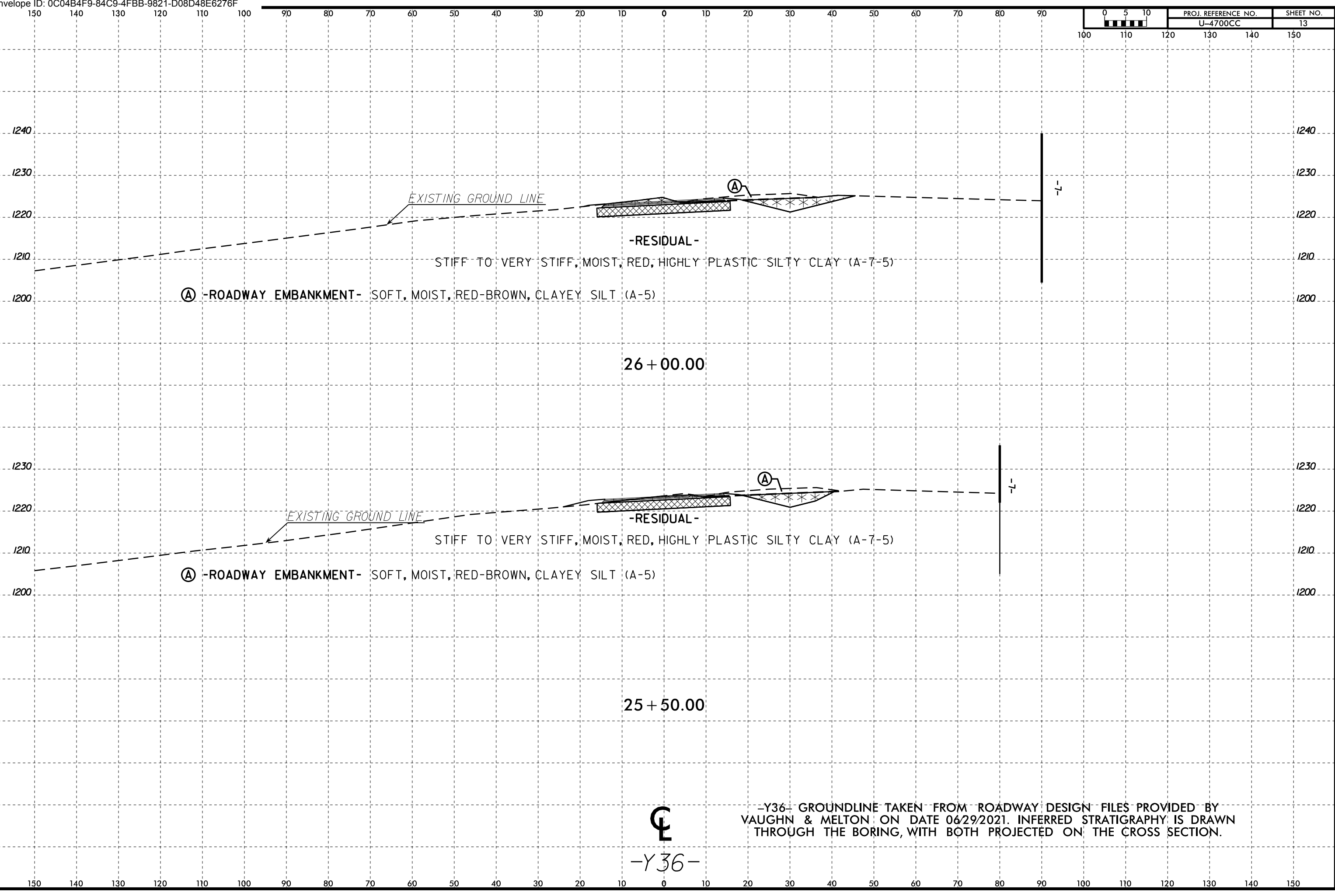
BEGIN UNDERCUT FOR SUBGRADE STABILITY AT STATION 24+25

-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

☑

-Y36-

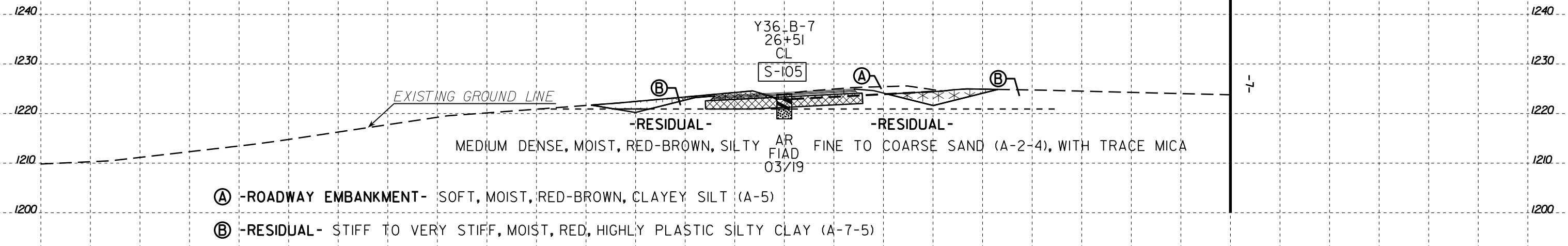
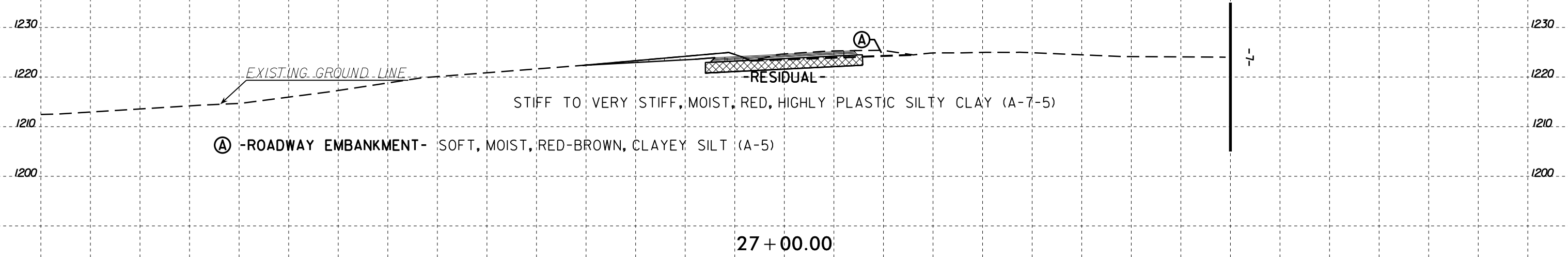
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-Y36-

-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

### END UNDERCUT FOR SUBGRADE STABILITY AT STATION 27+25

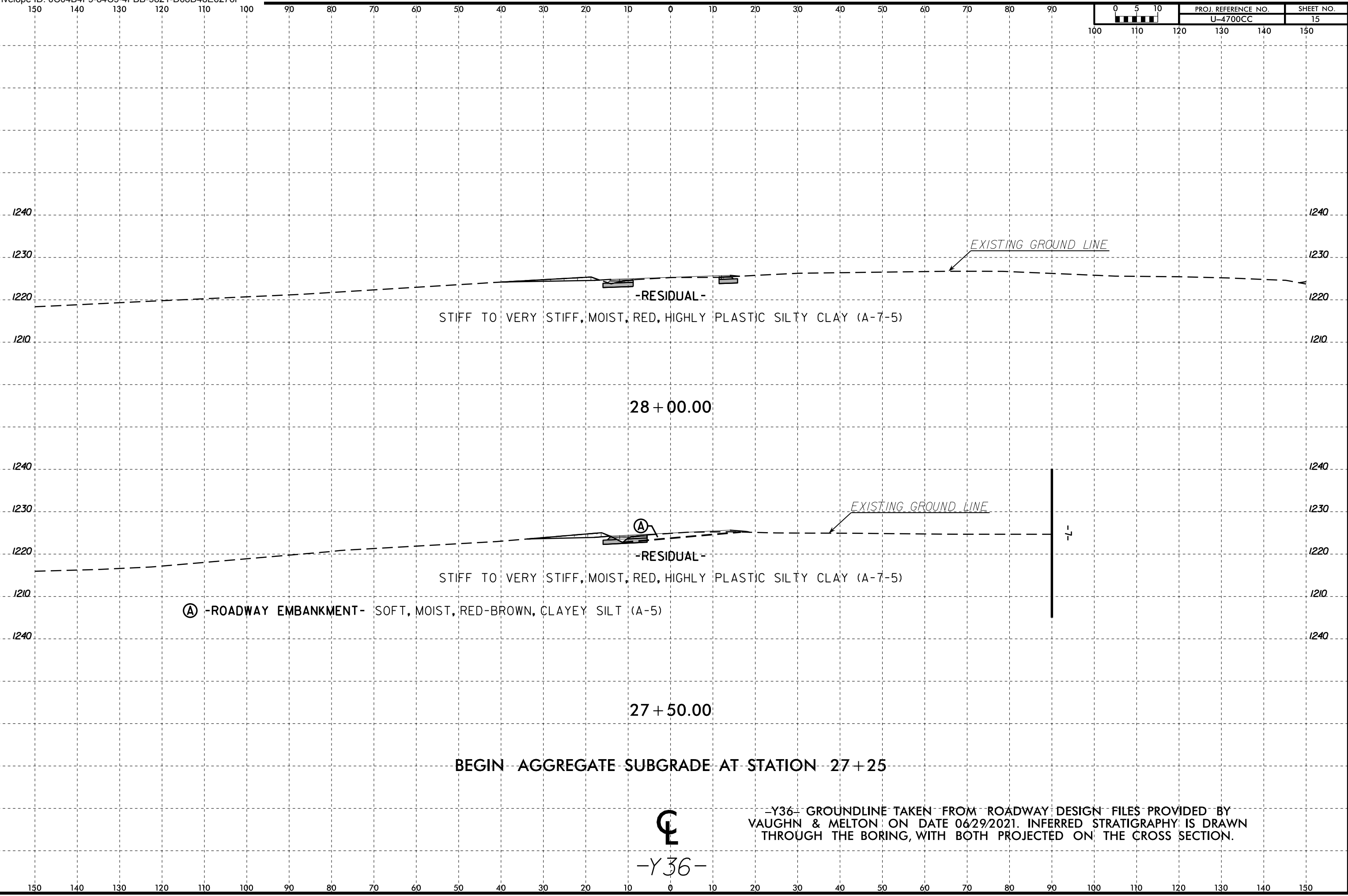


-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

Y  
-Y36-

26-AUG-2021 17:08  
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US 321 at Mission Road Intersection\CADD\_GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_Y.dgn



-RESIDUAL-  
STIFF TO VERY STIFF, MOIST, RED, HIGHLY PLASTIC SILTY CLAY (A-7-5)

28 + 00.00

-RESIDUAL-  
STIFF TO VERY STIFF, MOIST, RED, HIGHLY PLASTIC SILTY CLAY (A-7-5)

Ⓐ -ROADWAY EMBANKMENT- SOFT, MOIST, RED-BROWN, CLAYEY SILT (A-5)

27 + 50.00

BEGIN AGGREGATE SUBGRADE AT STATION 27 + 25

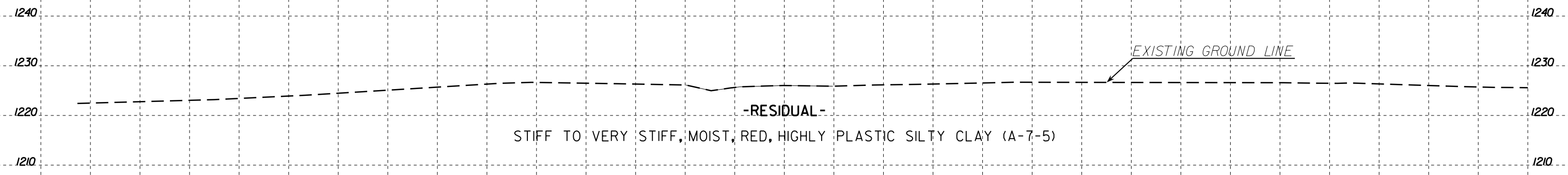
-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

Ⓒ  
-Y36-

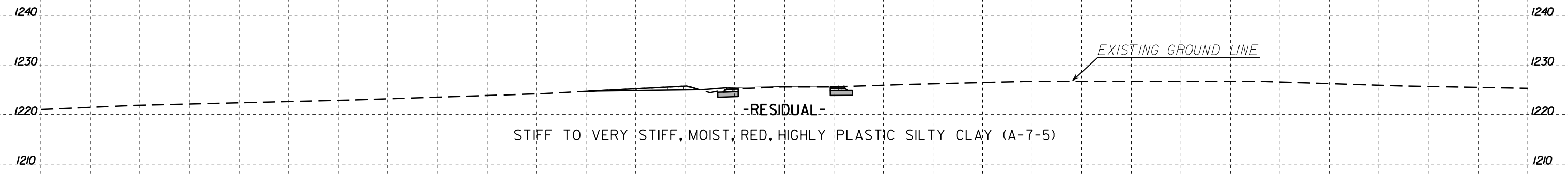
END -Y36- STA. 29+00.00

END AGGREGATE SUBGRADE AT STATION 29+00

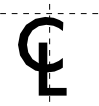
END UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION AT STATION 29+00



29+00.00



28+50.00



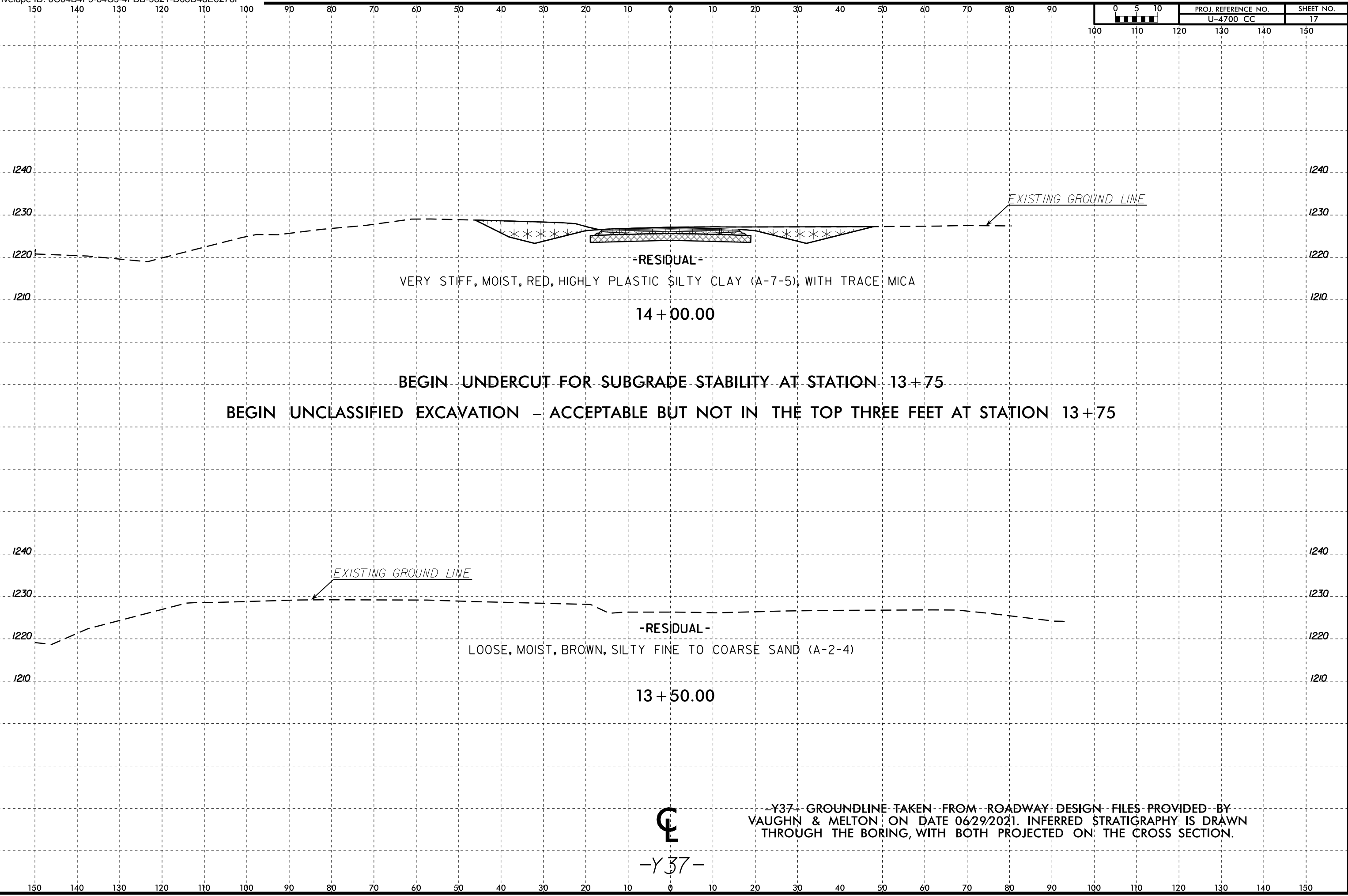
-Y36-

-Y36- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.


26-AUG-2021 17:08  
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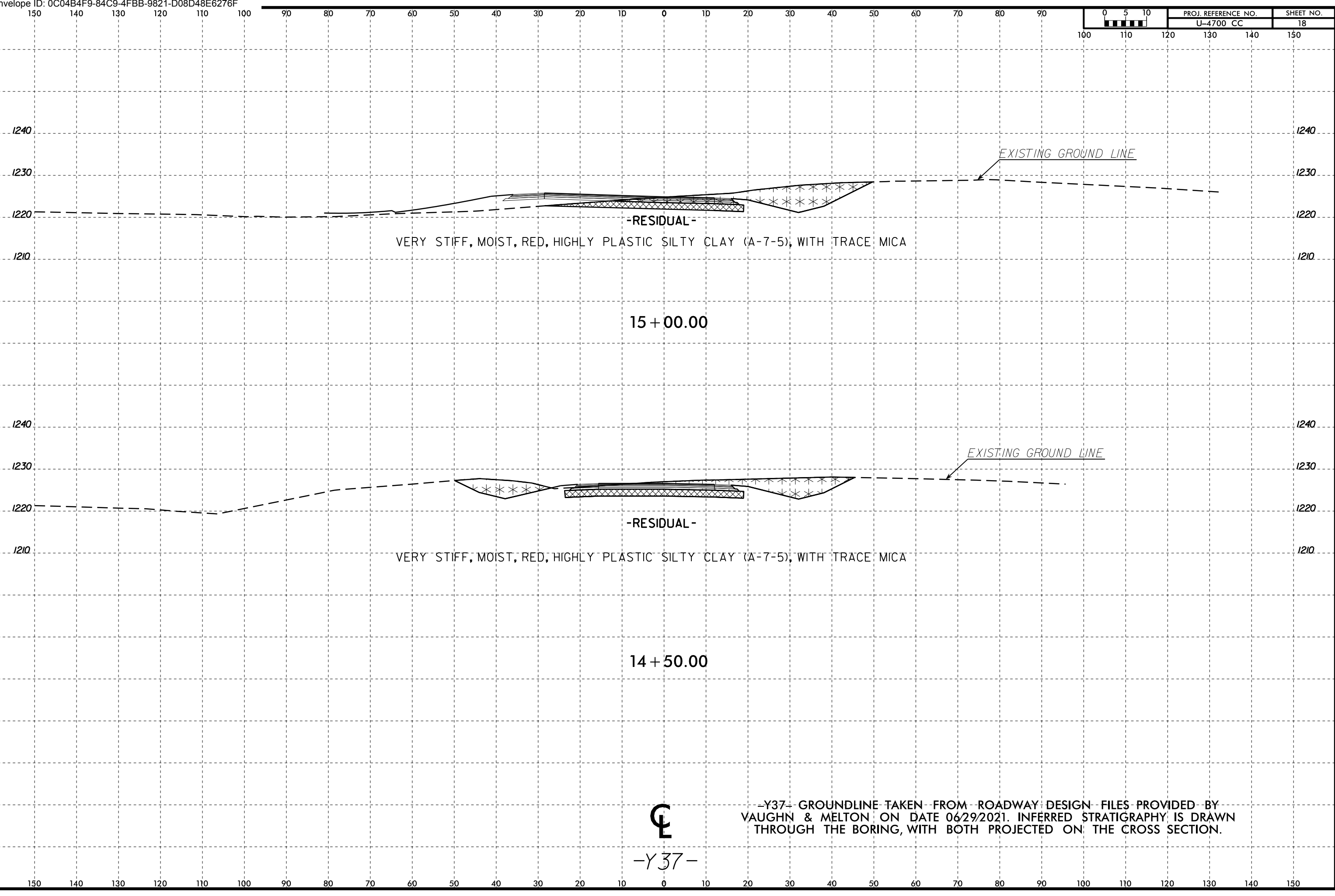
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-Y37- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

  
-Y37-

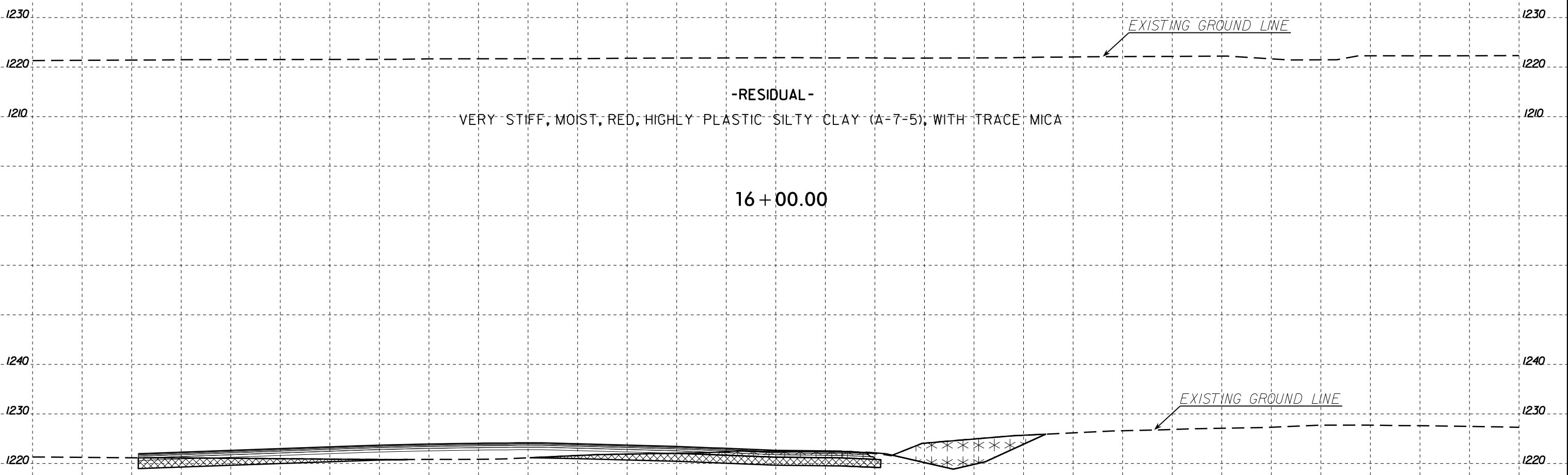
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 -Y37-

-Y37- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

END UNDERCUT FOR SUBGRADE STABILITY AT STATION 16 + 36  
 END UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT IN THE TOP THREE FEET AT STATION 16 + 36



-RESIDUAL-  
 VERY STIFF, MOIST, RED, HIGHLY PLASTIC SILTY CLAY (A-7-5), WITH TRACE MICA

16 + 00.00

-RESIDUAL-  
 VERY STIFF, MOIST, RED, HIGHLY PLASTIC SILTY CLAY (A-7-5), WITH TRACE MICA

15 + 50.00

-Y37- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY VAUGHN & MELTON ON DATE 06/29/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

-Y37-

26-AUG-2021 17:08  
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 US 321 at Mission Road Intersection\CADD\GEO\TECH\XSEC\U4700CC.RDY\_GEO\_XSR\_Y.dgn

**REFERENCE: U-4700CC**

**PROJECT: N/A**

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

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***SUBSURFACE INVESTIGATION***

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***APPENDIX A  
LABORATORY TEST RESULTS***

U-4700CC

21

## SOIL TEST RESULTS

BORING NO.	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		
L B-14	S-24	55' RT	553+50	1.0-2.0'	A-7-5(19)	57	28	19.3	11.7	9.0	60.1	95.3	82.6	68.4	22.4	-
Y36 B-7	S-105	CL	26+51	1.0-2.0'	A-7-5(24)	70	30	19.7	9.9	8.5	61.9	97.4	83.6	70.6	31.2	-

LAB TECHNICIAN: C. RUPERT

NCDOT CERTIFICATION NO. 112-01-1003