

**This electronic collection of documents is provided  
for the convenience of the user  
and is Not a Certified Document –**

**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
shall not be considered a certified document.**

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-5397	1	13

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	12+00 TO 19+25	4	5
-DRI-	10+00 TO 11+25	4	5
-DR2-	10+00 TO 10+80	4	5

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	12+00 TO 19+25	6 - 10
-DR2-	10+00 TO 10+80	11

**ROADWAY  
SUBSURFACE INVESTIGATION**

COUNTY RUTHERFORD  
PROJECT DESCRIPTION REPLACE BRIDGE NO. 51 OVER  
FLOYDS CREEK ON SR 2213

**INVENTORY**

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

R. TOOTHMAN

W. ALLEN

INVESTIGATED BY D. GOODNIGHT

DRAWN BY T. WELLS


CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER SE

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED DATE AUGUST 2015

REFERENCE: B-5397

PROJECT: 46112

<p>NC ENGINEERING F-1143</p>  <p>7DA5D2D0518F4B0...</p> <p>9/10/2015</p> <p>SIGNATURE _____ DATE _____</p>	<p>SIGNATURE _____ DATE _____</p>
---	-----------------------------------

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

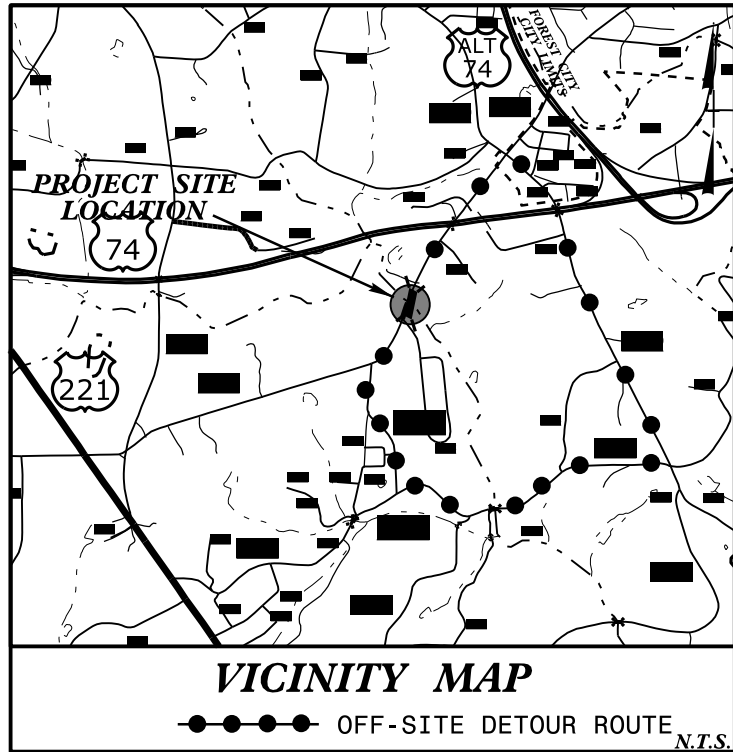
Table with multiple columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, PLASTICITY, COLOR, FRACTURE SPACING, BEDDING, INDURATION. Includes various charts, diagrams, and lists of symbols and terms.

25-AUG-2015 15:31 W:\share\GEO\TECHNICAL\Projects\Active Projects\2015\548.014A B-5397 Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECHN\PlanProf\B5397\_Rdy\_tsh.dgn twells AT 14206314

09/08/99

**TIP PROJECT: B-5397**

**CONTRACT: 46112**



25% Approved Prel. Plans  
05/18/15

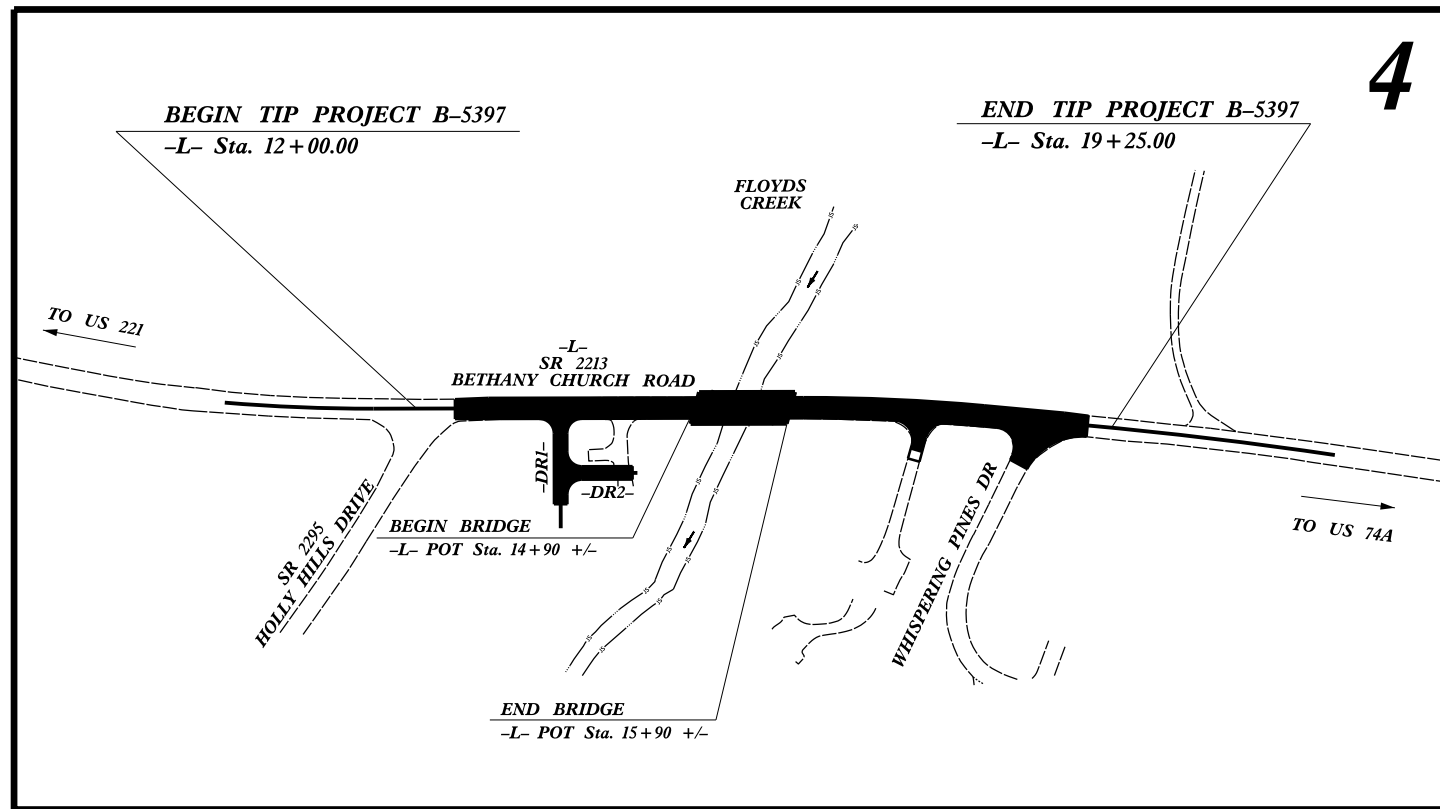
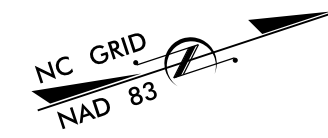
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**RUTHERFORD COUNTY**

**LOCATION: BRIDGE NO. 51 OVER FLOYDS CREEK  
ON SR 2213 (BETHANY CHURCH ROAD)**

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5397	3	13
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46112.1.1	BRZ-2213(2)	P.E.	



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

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION  
**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

<p><b>GRAPHIC SCALES</b></p> <p>50 25 0 50 100 PLANS</p> <p>50 25 0 50 100 PROFILE (HORIZONTAL)</p> <p>10 5 0 10 20 PROFILE (VERTICAL)</p>	<p><b>DESIGN DATA</b></p> <p>ADT 2017 = 5,000 ADT 2040 = 5,400 K = 10 % D = 55 % T = 6 % * V = 40 MPH * TTST = 1% DUAL 5% FUNC CLASS = LOCAL SUB-REGIONAL TIER</p>	<p><b>PROJECT LENGTH</b></p> <p>LENGTH ROADWAY TIP PROJECT B-5397 = 0.118 mi. LENGTH STRUCTURE TIP PROJECT B-5397 = 0.019 mi. TOTAL LENGTH TIP PROJECT B-5397 = 0.137 mi.</p>	<p>PLANS PREPARED BY: <b>CH ENGINEERING</b> 3220 GLEN ROYAL RD. RALEIGH, NC 27617 TEL: 919.788.0224 FAX: 919.788.0232 NC LICENSE #P-0189</p> <p>2012 STANDARD SPECIFICATIONS</p> <p>RIGHT OF WAY DATE: FEBRUARY 19, 2016</p> <p>LETTING DATE: FEBRUARY 21, 2017</p>	<p>PLANS PREPARED FOR: DIVISION OF HIGHWAYS 1000 Birch Ridge Dr. Raleigh, NC 27610</p> <p><b>BRIAN A. WILES, PE</b> PROJECT ENGINEER</p> <p><b>REKHA V. PATEL, PE</b> NCDOT CONTACT</p>	<p><b>HYDRAULICS ENGINEER</b></p> <p>SIGNATURE: _____ P.E.</p> <p><b>ROADWAY DESIGN ENGINEER</b></p> <p>SIGNATURE: _____ P.E.</p>	
--	--	---	---	---	---	--



August 26, 2015

STATE PROJECT: 46112.1.1 (B-5397)  
 COUNTY: Rutherford  
 DESCRIPTION: Replace Bridge No. 51 over Floyds Creek on SR 2213  
 SUBJECT: **Geotechnical Report - Inventory  
 Kleinfelder File No. 20151548.014A**

**Project Description**

This project consists of the reconstruction of 0.18 miles of Bethany Church Road (-L-) which is a two-lane roadway. Also proposed is the reconstruction of the drives (-DR1-) and (-DR2-) to the south of the bridge which are 100 feet and 75 feet in length, respectively.

The geotechnical investigation was conducted during July 2015. Auger probes and soil borings were performed using a Mobile B-57 drill rig. Representative soil samples were collected in the field for laboratory analysis by Kleinfelder Southeast, Inc.

The following alignments, totaling 0.18 miles, were investigated.

<u>LINE</u>	<u>STATIONS</u>
-L-	12+00 to 19+25
-DR1-	10+00 to 11+25
-DR2-	10+00 to 10+80

**Areas of Special Geotechnical Interest**

1) Artificial Fill: Artificial fill was encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-DR1-	10+50 to 11+00	LT to RT
-DR2-	10+00 to 10+75	LT to RT

**Physiography and Geology**

The project corridor is comprised primarily of residential properties. The general topography of the site consists of rolling hills with flat to moderate slopes along the existing roadway.

The project is located in the Piedmont Physiographic Province. Geologically, the project is located within the Inner Piedmont Belt. Soils are derived from the underlying metamorphic bedrock primarily consisting of biotite gneiss.

**Soil Properties**

Soils encountered during this investigation are separated into four categories based on origin. They consist of residual, roadway embankment, artificial fill, and alluvial soils.

Residual soils are derived from the weathering of underlying biotite gneiss rock. These majority of the residual soils encountered consist of moist, non plastic, loose to medium dense, tan-brown, micaceous, silty, coarse to fine sand (A-2-4), moist, non plastic, stiff, tan, red-tan, and tan-brown, micaceous, coarse to fine sandy silt (A-4), moist, moderately plastic, coarse to fine sandy clay (A-6). The plasticity index of the residual soils tested was 21.

Roadway Embankment soils are present along the existing roadway (-L-) on the project. These soils consist of moist, non plastic, medium dense to very loose, micaceous, silty, coarse to fine sand (A-2-4).

Artificial fill soils are present along the drives (-DR1-) and (-DR2-) on the project. These soils consist of moist, non plastic, loose to very loose, brown, silty, coarse to fine sands (A-2-4) and moist, highly plastic, medium stiff, tan-brown, micaceous, fine sandy, silty clay (A-7-5).

Alluvial soils are soils that have been transported and deposited by water; these soils are present along the existing roadway (-L-) as well as drives (-DR1-) and (-DR2-) to the depths explored. The alluvial soils encountered consist of wet, non-plastic, very loose, tan-brown to gray, silty, fine sand (A-2-4) and (A-3) with trace clay seams and wood fragments.



**Rock Properties**



Crystalline rock was encountered along the existing roadway (-L-) at an elevation of 876.3 feet (MSL).

**Groundwater**

Groundwater was not encountered to the depths explored along the existing roadway (-L-) and drives (-DR1-) and (-DR2-) of the project.

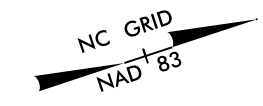
Prepared by,  
**KLEINFELDER SOUTHEAST, INC.**

   
 Thomas R. Wells, PE  
 Senior Professional

   
 Xavier C. Barrett, PE  
 Principal Professional

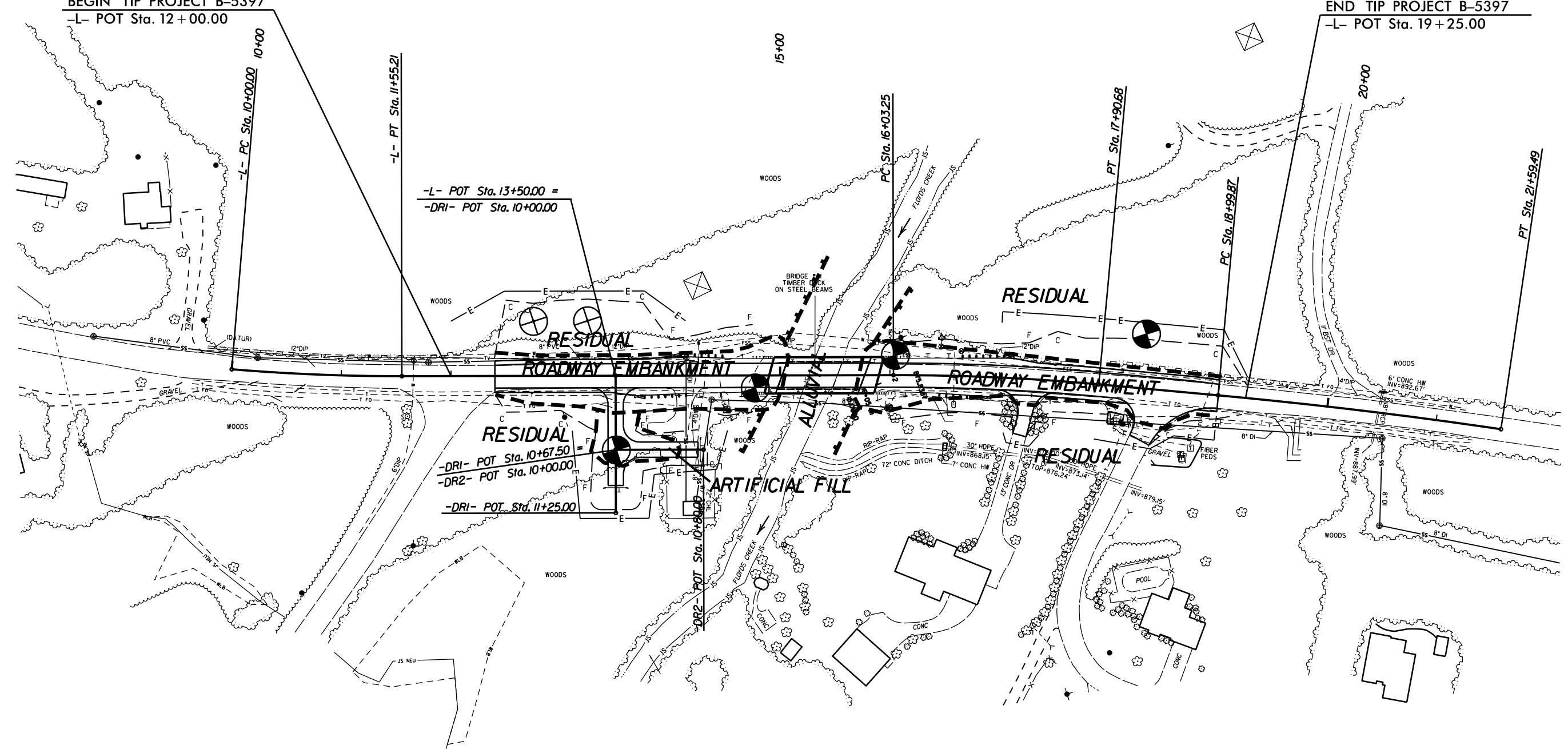
TRW/XCB:cas

PROJECT REFERENCE NO. <b>B-5397</b>	SHEET NO. <b>4</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	



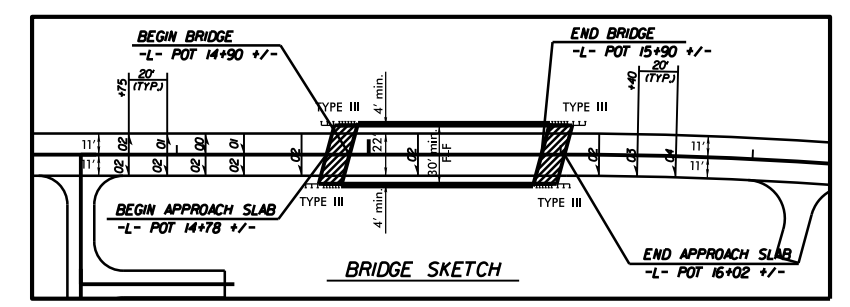
BEGIN TIP PROJECT B-5397  
 -L- POT Sta. 12+00.00

END TIP PROJECT B-5397  
 -L- POT Sta. 19+25.00



-L- POT Sta. 13+50.00 =  
 -DRI- POT Sta. 10+00.00

-DRI- POT Sta. 10+67.50  
 -DR2- POT Sta. 10+00.00  
 -DRI- POT Sta. 11+25.00



FOR PROFILES, SEE SHEET 5

5/14/99  
 26-AUC-2015 10:57  
 20151548:0144\_B-5397\_Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECH\PlanPr\of\_B5397\_GEO Inv\_04.dgn  
 15:48:0144\_B-5397\_Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECH\PlanPr\of\_B5397\_GEO Inv\_04.dgn

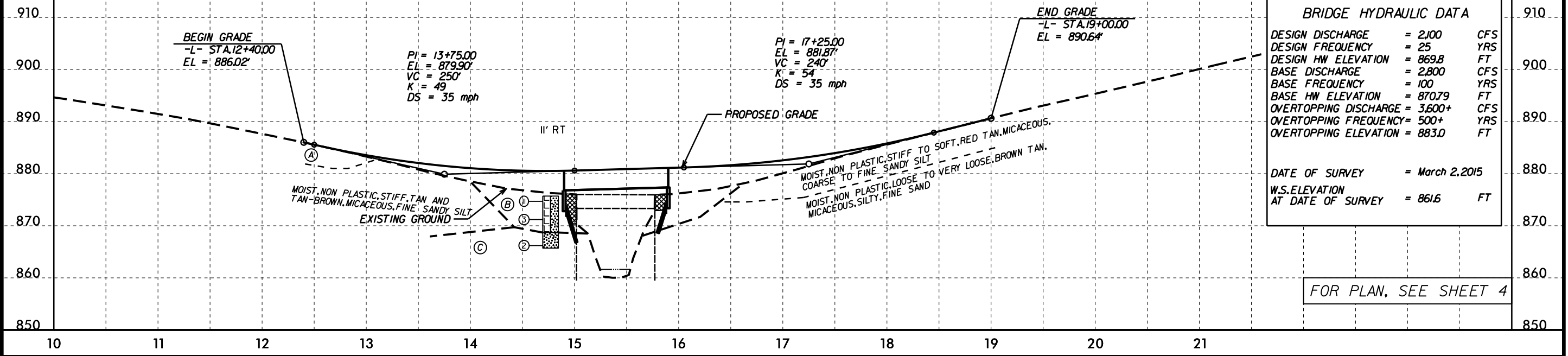
5/28/99

**CH ENGINEERING**  
 3220 GLEN ROYAL RD. RALEIGH, NC 27617  
 TELE 919.788.0224 FAX 919.788.0232  
 NC LICENSE #P0189

PROJECT REFERENCE NO. <b>B-5397</b>	SHEET NO. <b>5</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	

- (A) RESIDUAL: MOIST, NON PLASTIC, MEDIUM DENSE, TAN BROWN, SILTY, COARSE TO FINE SAND
- (B) ROADWAY EMBANKMENT: MOIST, NON PLASTIC, MEDIUM DENSE TO VERY LOOSE, BROWN, MICACEOUS, SILTY, COARSE TO FINE SAND
- (C) ALLUVIAL: WET, NON PLASTIC, VERY LOOSE, TAN-BROWN, SILTY, FINE SAND WITH TRACE CLAY SEEMS

BM 2 ELEV = 870.68'  
 N 578.733 E 1137.764  
 -L- STA 14+46 92' RIGHT  
 RR SPIKE IN BASE OF 12' SWEETGUM



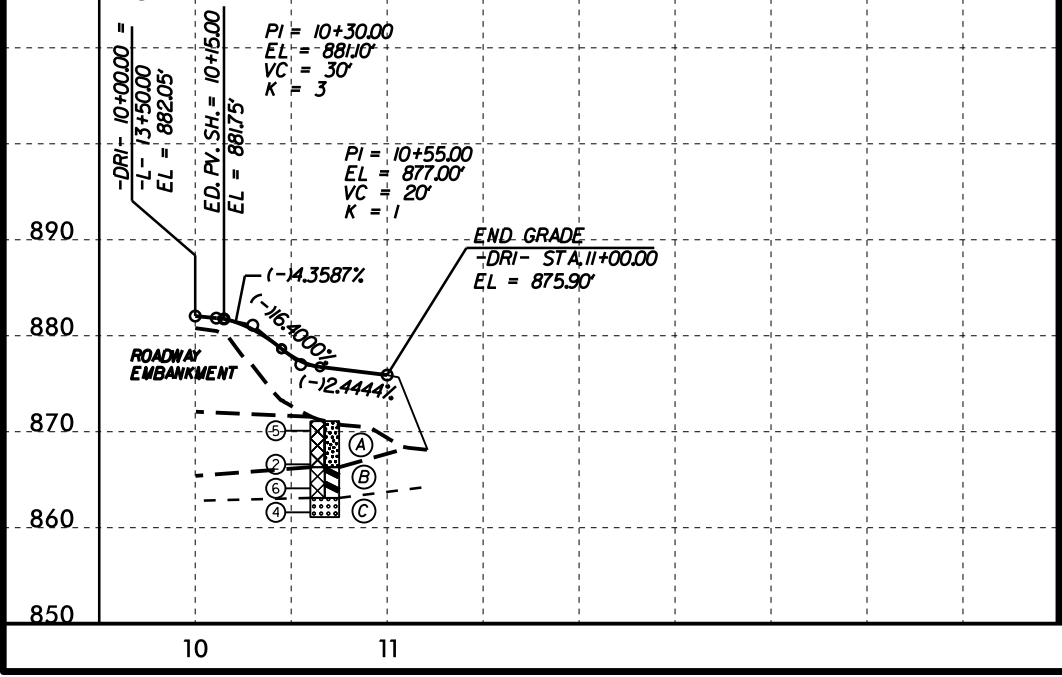
**BRIDGE HYDRAULIC DATA**

DESIGN DISCHARGE	= 2,100	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 869.8	FT
BASE DISCHARGE	= 2,800	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 870.79	FT
OVERTOPPING DISCHARGE	= 3,600+	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 883.0	FT
DATE OF SURVEY	= March 2, 2015	
W.S. ELEVATION AT DATE OF SURVEY	= 861.6 FT	

FOR PLAN, SEE SHEET 4

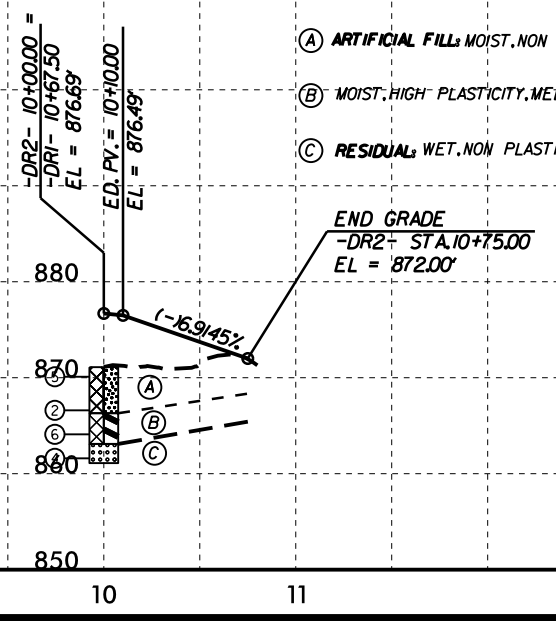
# -DR1-

- (A) ARTIFICIAL FILL: MOIST, NON PLASTIC, LOOSE TO VERY LOOSE, BROWN, SILTY, COARSE TO FINE SAND
- (B) MOIST, HIGH PLASTICITY, MEDIUM STIFF, TAN-BROWN, MICACEOUS, FINE SANDY, SILTY CLAY
- (C) RESIDUAL: WET, NON PLASTIC, VERY LOOSE, GRAY, COARSE TO FINE SAND WITH TRACE WOOD FRAGMENTS

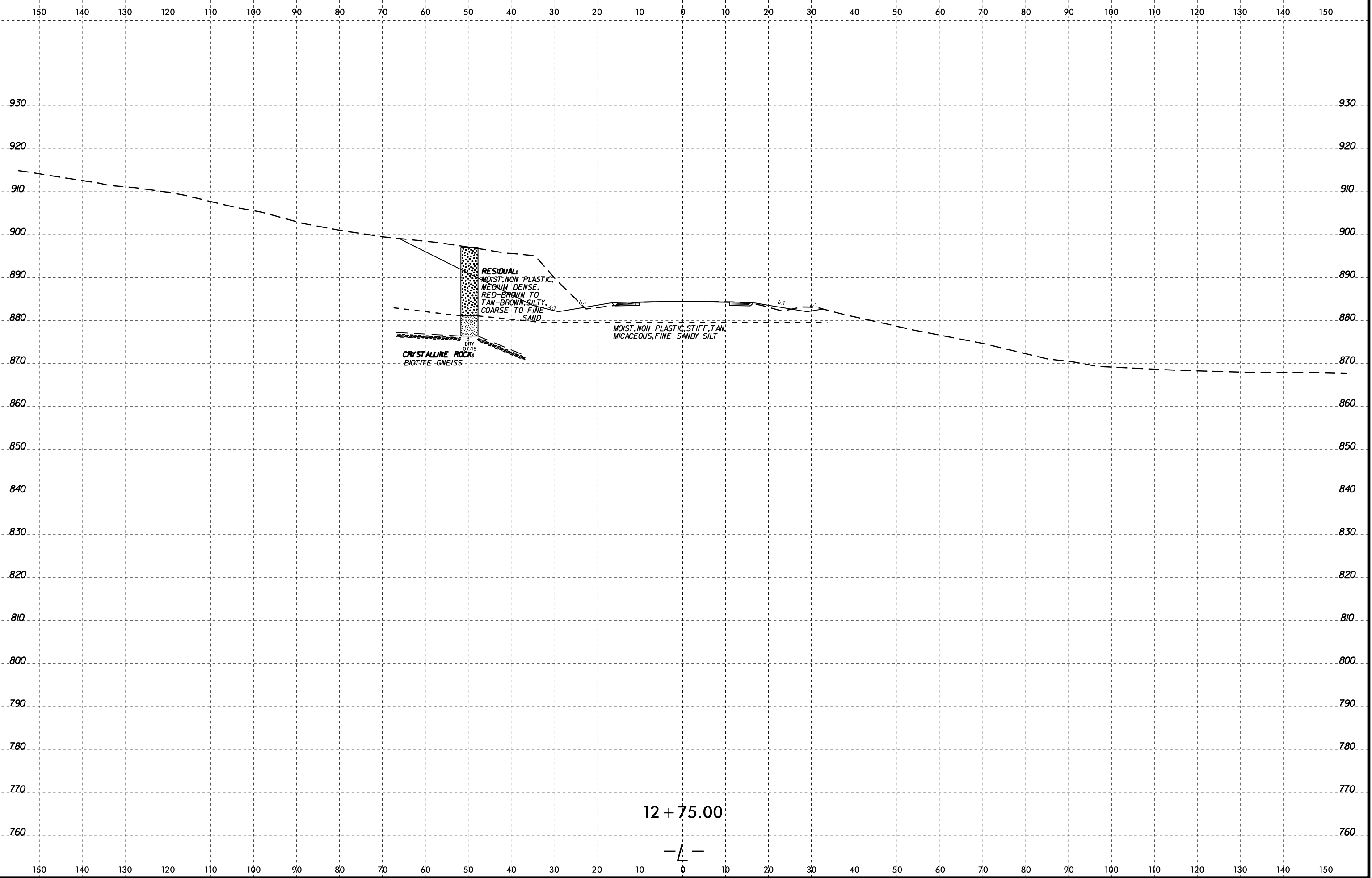


# -DR2-

- (A) ARTIFICIAL FILL: MOIST, NON PLASTIC, LOOSE TO VERY LOOSE, BROWN, SILTY, COARSE TO FINE SAND
- (B) MOIST, HIGH PLASTICITY, MEDIUM STIFF, TAN-BROWN, MICACEOUS, FINE SANDY, SILTY CLAY
- (C) RESIDUAL: WET, NON PLASTIC, VERY LOOSE, GRAY, COARSE TO FINE SAND WITH TRACE WOOD FRAGMENTS

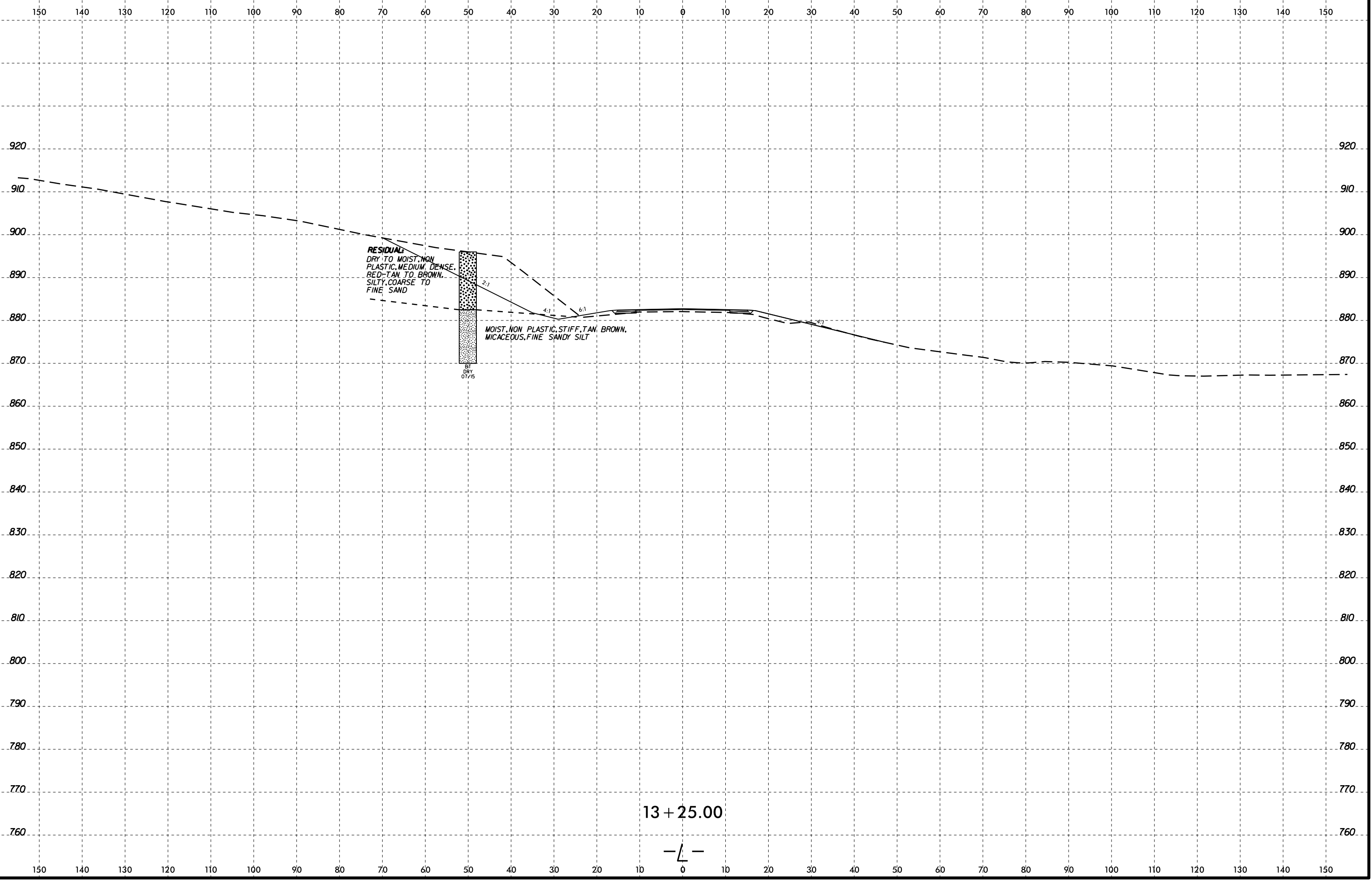


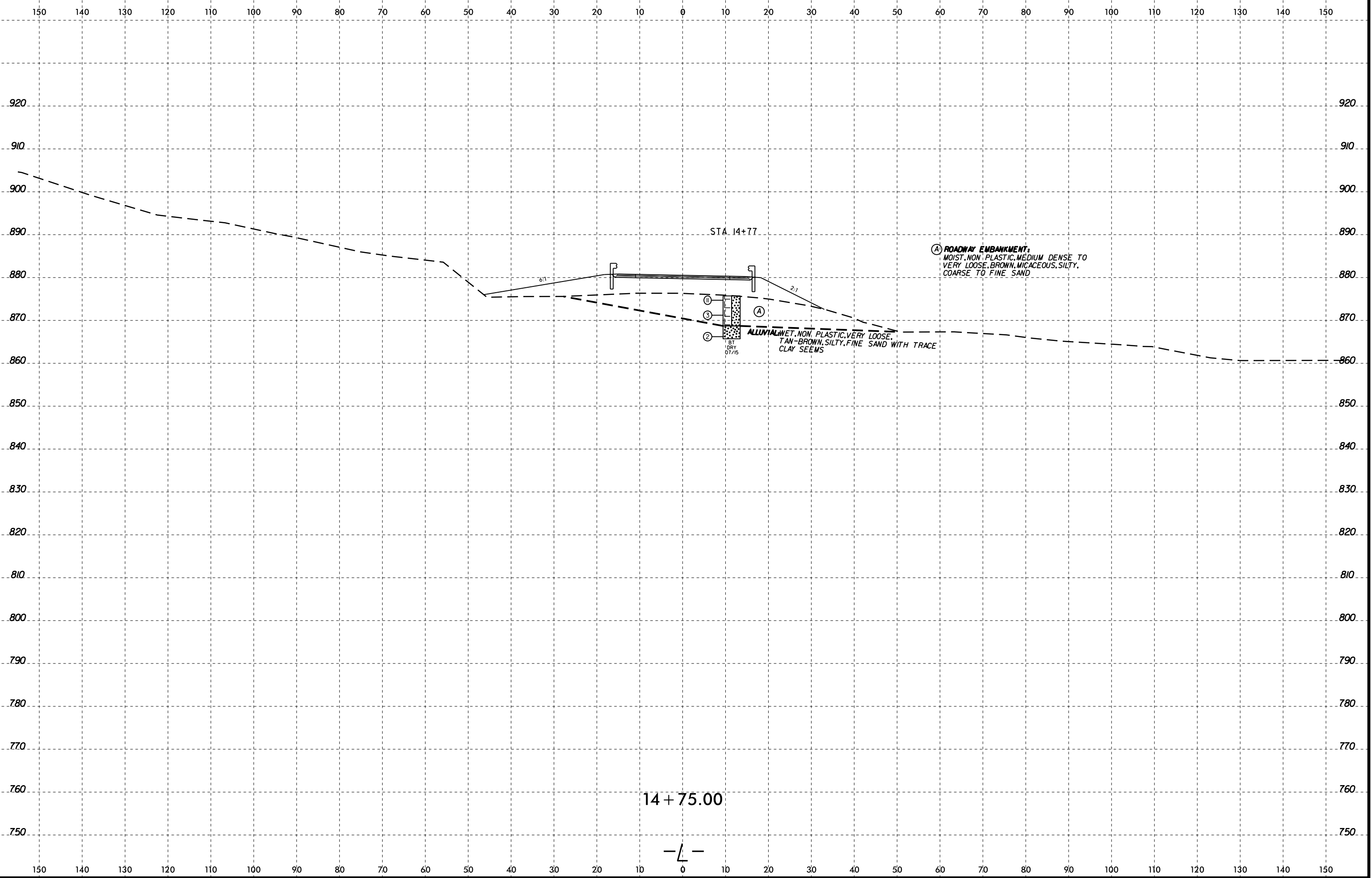
26-AUG-2015 13:12 W:\shore\GEO\TECHNICAL\Projects\Active Projects\201515148\014A B-5397 Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECHN\Plan\Prof\B5397\_GEO\_pf1\_05.dgn

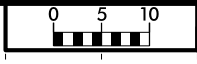




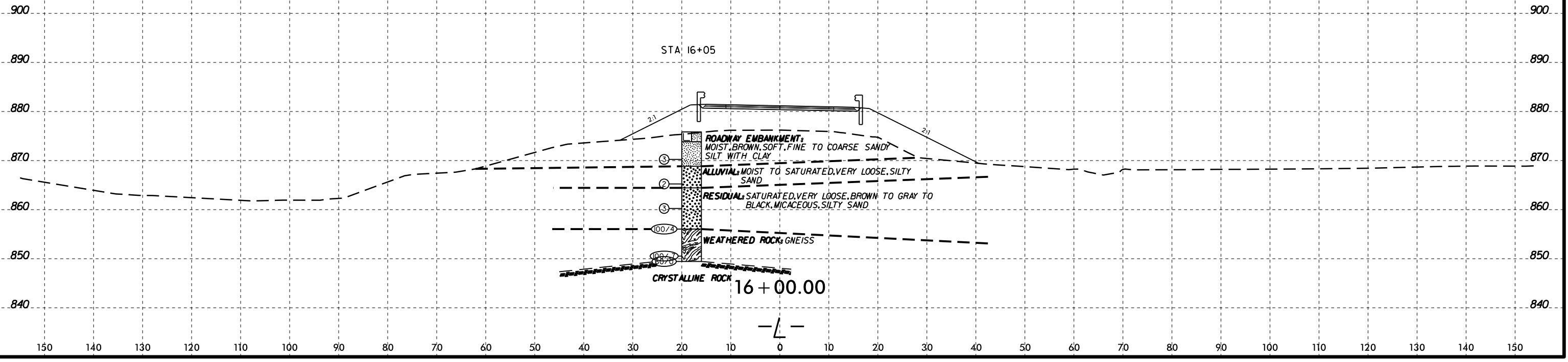
8/23/99  
26-AUG-2015 11:26  
W:\shore\GEO\TECHNICAL\Projects\Active Projects\2015\1548.014A B-5397 Roadway\B5397\_GEO.RDW\CADD\_GEO\TECH\isc\B5397\_GEO\_xst.L.dgn  
twells



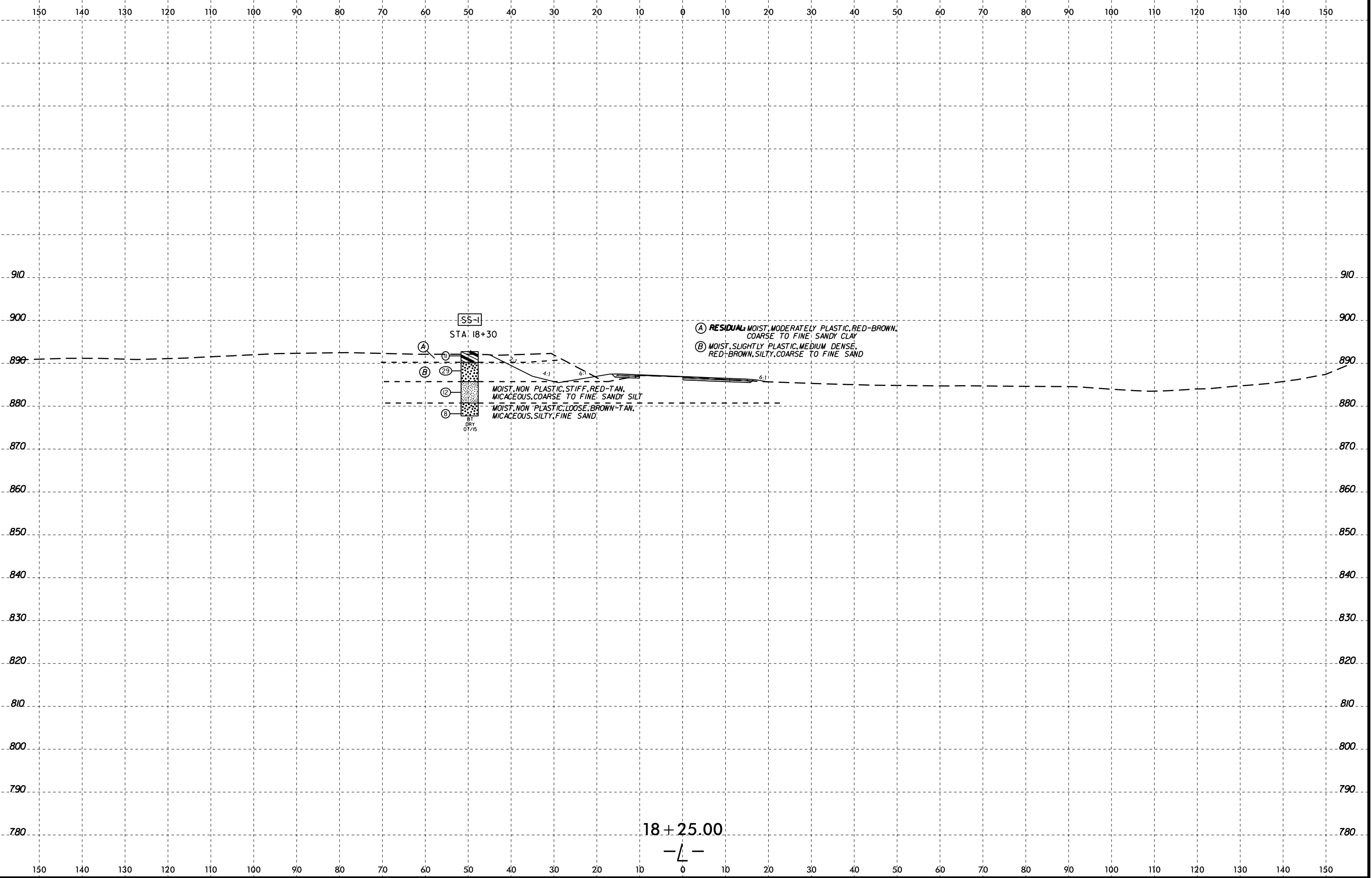


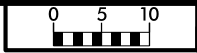


150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

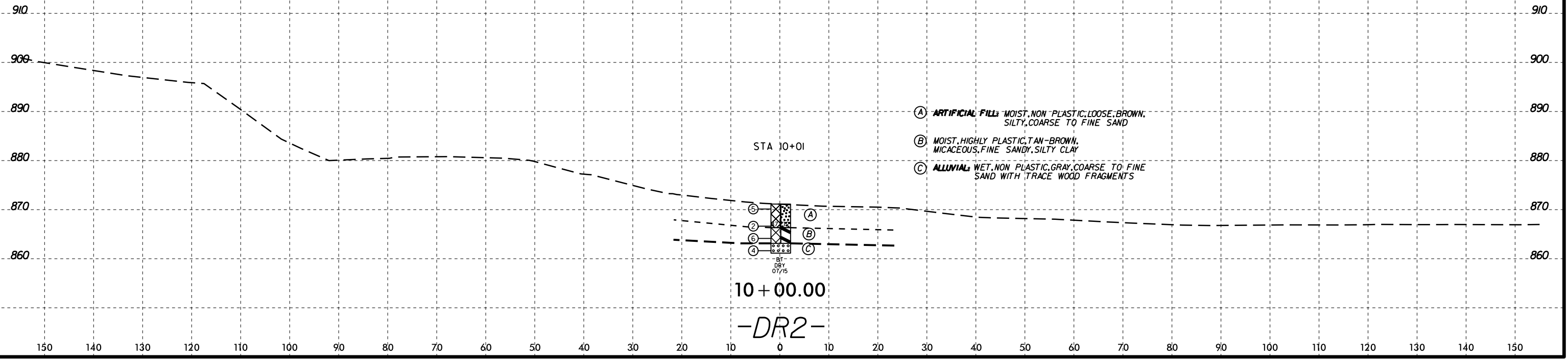


26-AUG-2005 12:49  
K:\shere\GEO\TECHNICAL\Projects\20151548\014A B-5397 Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECH\XSC\B5397\_GEO.XSI.L.dgn  
twells





150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



26-AUG-2016 13:03  
K:\sphere\GEO\TECHNICAL\Projects\Active Projects\20151548\014A B-5397 Roadway\B5397\_GEO\_RDWY\CADD\_GEO\TECH\XSC\B5397\_GEO.XSI\_DR2.dgn  
twells

**SUMMARY OF LABORATORY TEST DATA**

**PROJECT NO. 46112.1.1 (B-5397)**  
**COUNTY: RUTHERFORD**  
**REPLACE BRIDGE NO. 51 OVER FLOYDS CREEK ON SR 2213**

Sample No.	Boring Number	Station	Offset	Alignment	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	Atterberg Limits			Gradation Results							
									L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
SS-1	L_1825	18+30	50' LT	-L-	0.0-1.5	9.9	A-6(7)	11	37	16	21	98	87	50	52	22.6	29.4	10.0	38.0

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample

S = Grab Sample

NP -- Non Plastic

NA-- Non Applicable

Page: 1 of 1

Lab Technician: NCDOT Certification No.: 109-06-1003



Jonathon Creech