



May 27, 2015

WBS NUMBER: 44105.1.FD1
TIP NUMBER: W-5516
F.A. NUMBER: HSIP-1221(18)
COUNTY: Rowan
DESCRIPTION: Realignment of Old Beatty Ford Road from west of Bostian Rd. Intersection to Lentz Road

SUBJECT: Geotechnical Report – Design and Construction Recommendations

HDR | ICA Engineering, Inc. has completed the subsurface investigation for this project and submits the following recommendations.

I. SLOPE AND EMBANKMENT STABILITY

A. Slope Design

It is recommended that all fill embankment be constructed at a ratio of 2:1 (H:V) or flatter. It is recommended that all cut slopes be constructed at a ratio of 2:1 (H:V).

B. Undercut

A quantity of 150 cubic yards of shallow undercut is recommended for inclusion in the contract as a contingency item, to be used at the discretion of the Engineer.

C. Geotextile for Soil Stabilization

A quantity of 150 square yards of geotextile for soil stabilization is recommended for inclusion in the contract as a contingency item, to be used at the discretion of the Engineer.

II. SUBGRADE STABILITY

A. Undercut for Subgrade Stability

Soils were encountered consisting of highly plastic clays with plastic indices (PI) greater than 25. These soils could adversely impact the proposed pavement structure and should be undercut. These areas are shown by a double hatch symbol of the cross sections. The depth of undercut should be up to 3 feet or to suitable soil, whichever is less.

Table with 3 columns: LINE, STATION, OFFSET (FEET). Rows include station ranges like 73+50 to 74+00 and 134+00 to 139+00, and offsets like CL to 22 RT and 20 LT to 23 RT.

It is recommended that 1,600 cubic yards of undercut be included in the project contract for subgrade stability. The material may be used in embankment construction at the discretion of the Engineer. An additional quantity of 200 cubic yards of undercut is recommended for inclusion in the contract as a contingency item, to be used at the discretion of the Engineer.

B. Aggregate Subgrade

A quantity of 150 cubic yards of shallow undercut is recommended for inclusion in the contract as a contingency item, to be used at the discretion of the Engineer.

A quantity of 300 tons of Class IV material is recommended for inclusion in the contract as a contingency item, to be used at the discretion of the Engineer.

A quantity of 300 square yards of Geotextile for Soil Stabilization is recommended for inclusion in the contract item, to be used at the discretion of the Engineer.

C. Geotextile for Soil Stabilization

It is recommended that 1,600 square yards of geotextile be included in the project contract for subgrade stability at the following locations:

<u>LINE</u>	<u>STATION</u>	<u>OFFSET (FEET)</u>
-L-	73+50 to 74+00	CL to 22 RT
-L-	134+00 to 139+00	14 LT to 14 RT

A quantity of 200 square yards of geotextile for soil stabilization should be included in the project contract as a contingency item, to be used at the discretion of the Engineer.

III. BORROW SPECIFICATIONS

A. Borrow Criteria

Common borrow for embankment construction to subgrade shall meet Statewide criteria outlined in the Standard Specifications, Article 1018-2(A).

B. Select Granular Material

Select Granular Material for embankment construction on geotextile for soil stabilization shall meet the criteria outlined in Standard Specifications, Article 1016-3 Class II or III.

A quantity of 300 cubic yards of Select Granular Material should be included in the project contract as a contingency item, to be used at the discretion of the Engineer.

C. Shrinkage Factor

Recommend a 20 percent shrinkage factor be used for earthwork calculations.

IV. MISCELLANEOUS

A. Reduction of Unclassified Excavation – Clearing and Grubbing

Given the amount of excavation on this project, removal of topsoil, rootmats, stumps, shrubs, trees, and other ground cover is anticipated to be significant to include as a reduction in the excavation quantity. It is recommended that 12,140 cubic yards of excavation quantity be reduced in the project contract.

B. Reduction of Unclassified Excavation – Unsuitable Unclassified Excavation

Soils were encountered consisting of highly plastic clays with plastic indices (PI) greater than 35 and other characteristics unsuitable for construction (i.e. plastic limits equally moisture contents). It is recommended that 1,650 cubic yards of excavation quantity be reduced in the project contract.

C. Unclassified Excavation – Unsuitable Waste

Soils were encountered consisting of highly plastic clays with plastic indices (PI) greater than 35.

<u>LINE</u>	<u>STATION</u>	<u>OFFSET (FEET)</u>
-L-	72+00 to 74+00	70 LT to 70 RT
-L-	134+00 to 138+50	40 LT to 40 RT

D. Rock Blasting

Crystalline Rock (Felsic Metavolcanic Rock) is present within six feet of proposed grade at the following locations and may require blasting. It is recommended that 11,125 cubic yards be included in the project contract at the following locations:

<u>LINE</u>	<u>STATION</u>	<u>OFFSET (FEET)</u>
-L-	65+50 to 67+50	42 LT to 30 RT
-L-	73+00 to 77+50	47 LT to 42 RT
-L-	94+50 to 98+00	45 LT to 35 RT
-L-	103+00 to 105+00	34 LT to 32 RT

The crystalline rock encountered on this project is shown on cross-sections within the inventory report. Refer to Section 220 of the 2012 Standard Specifications for rock blasting.

E. Rock Slopes

Rocks cut slopes are anticipated at the following locations:

<u>LINE</u>	<u>STATION</u>	<u>OFFSET (FEET)</u>
-L-	65+00 to 67+50	42 LT to 30 RT
-L-	73+00 to 78+00	47 LT to 42 RT
-L-	94+00 to 98+00	45 LT to 35 RT
-L-	102+50 to 105+50	34 LT to 32 RT

Prepared by,



DocuSigned by:

Kenneth R. Bussey, Jr.

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6/8/2015

Kenneth R. Bussey, Jr., PE
Project Engineer



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

Summary of Quantities

WBS Number: 44105.1.FDCounty: RowanProject Engineer: Kenneth R. Bussey, Jr.TIP Number: W-5516Field Office: HDR | ICAProject Geologist: Mike GraggDescription: Old Beatty Ford Rd. from west of Bostian Rd. intersection to Lentz Rd.

Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units / %
0036000000-E	Undercut Excavation	225 - Roadway Excavation	I. B	Contingency	N/A	N/A	150	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	-L-	73+50.00	74+00.00	50	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	-L-	134+00.00	139+00.00	1,550	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	200	CY
Total Quantity of Undercut Excavation =							1,950	CY
0195000000-E	Select Granular Material	265 - Select Granular Material	III. B	Contingency	N/A	N/A	300	CY
Total Quantity of Select Granular Material =							300	CY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	150	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. B	Contingency	N/A	N/A	300	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	-L-	73+50.00	74+00.00	50	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	-L-	134+00.00	139+00.00	1,550	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	Contingency	N/A	N/A	200	SY
Total Quantity of Geotextile for Soil Stabilization =							2,250	SY
1099500000-E	Shallow Undercut	505 - Aggregate Subgrade	II. B	Contingency	N/A	N/A	150	CY
Total Quantity of Shallow Undercut =							150	CY
1099700000-E	Class IV Subgrade Stabilization	505 - Aggregate Subgrade	II. B	Contingency	N/A	N/A	300	TON
Total Quantity of Class IV Subgrade Stabilization =							300	TON
These Items Only Impact Earthwork Totals								
N/A	Loss Due to Clearing & Grubbing	200 - Clearing and Grubbing	IV. A	N/A	N/A	N/A	12,140	CY
N/A	Shrinkage Factor	235 - Embankments	III. C	N/A	N/A	N/A	20	%
N/A	Unclassified Excavation - Unsuitable Waste	225 - Roadway Excavation	IV. B	N/A	N/A	N/A	1,650	CY

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.	W-5516	1	12

CONTENTS

LINE	STATION	PROFILE
-L-	66+00.00 - 145+00.00	4 - 6

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	71+50.00 - 139+50.00	7 - 11

**ROADWAY
SUBSURFACE INVESTIGATION**

COUNTY Rowan
PROJECT DESCRIPTION Old Beatty Ford Road
West of Bostian Road Intersection to Lentz Road

RECOMMENDATIONS

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

Z. BRUCE

A. WILDER

B. MASSEY

INVESTIGATED BY M. GRAGG

DRAWN BY T. STIVERS

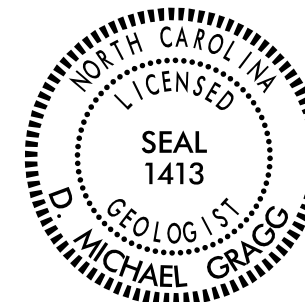
CHECKED BY K. BUSSEY

SUBMITTED BY HDR | ICA

DATE APRIL 2015

REFERENCE: W-5516

PROJECT: 44105



DocuSigned by:
D. Michael Gragg 6/8/2015
SIGNATURE DATE



DocuSigned by:
Kenneth R. Bussey, Jr. 6/8/2015
SIGNATURE DATE

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, SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, BENCH MARK, ELEVATION, FEET, NOTES.

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROW PLANS
rev. OCT. 22, 2014

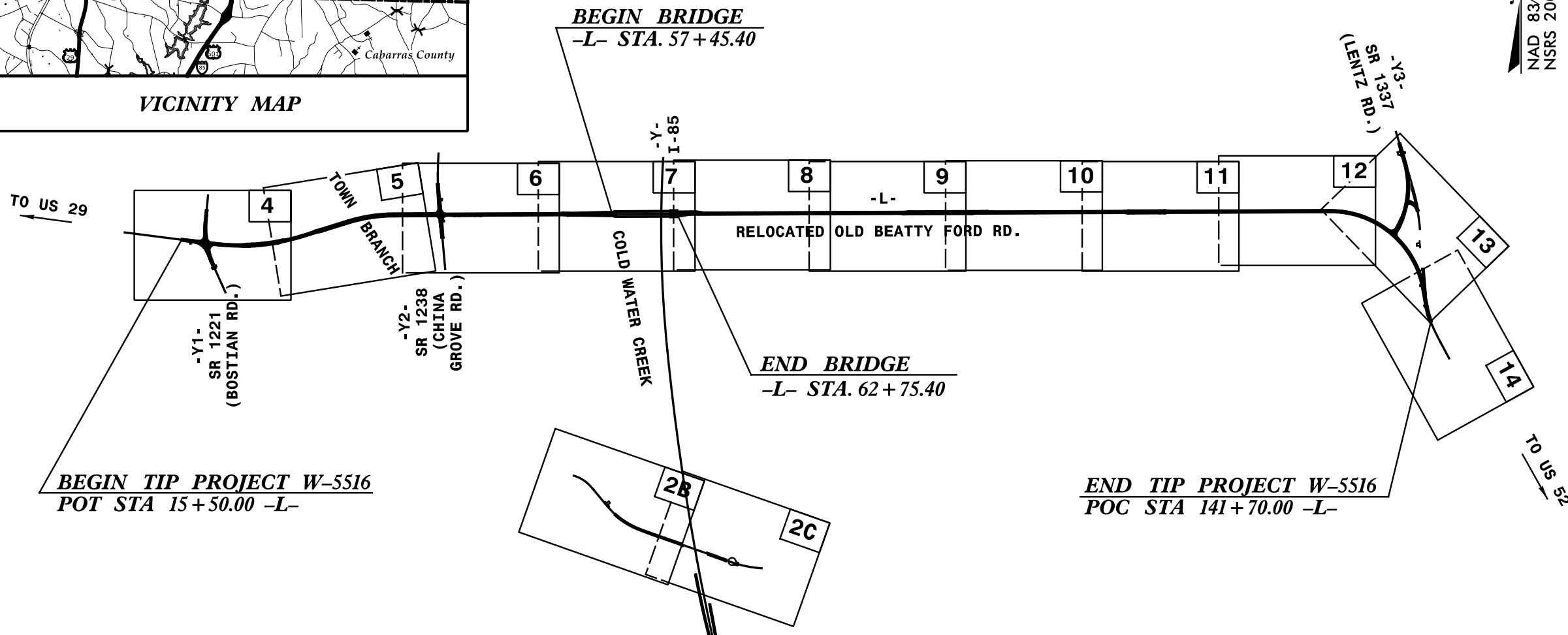
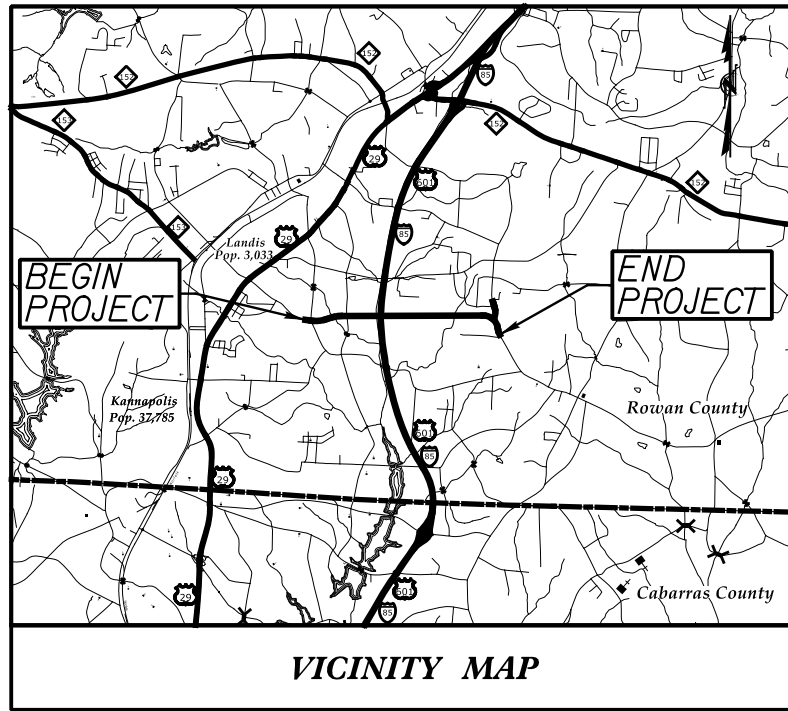
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-5516	3	12
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
44105.1.FD	HSIP-1221(18)	PE	

ROWAN COUNTY

LOCATION: OLD BEATTY FORD ROAD FROM WEST OF BOSTIAN ROAD INTERSECTION TO LENTZ ROAD

TYPE OF WORK: GRADING, PAVING, DRAINAGE, TRAFFIC CONTROL, SIGNING PAVEMENT MARKINGS AND STRUCTURES

TIP PROJECT: W-5516



NCDOT CONTACT: BRETT ABERNATHY, PE
DIVISION 9 PROJECT MANAGER

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

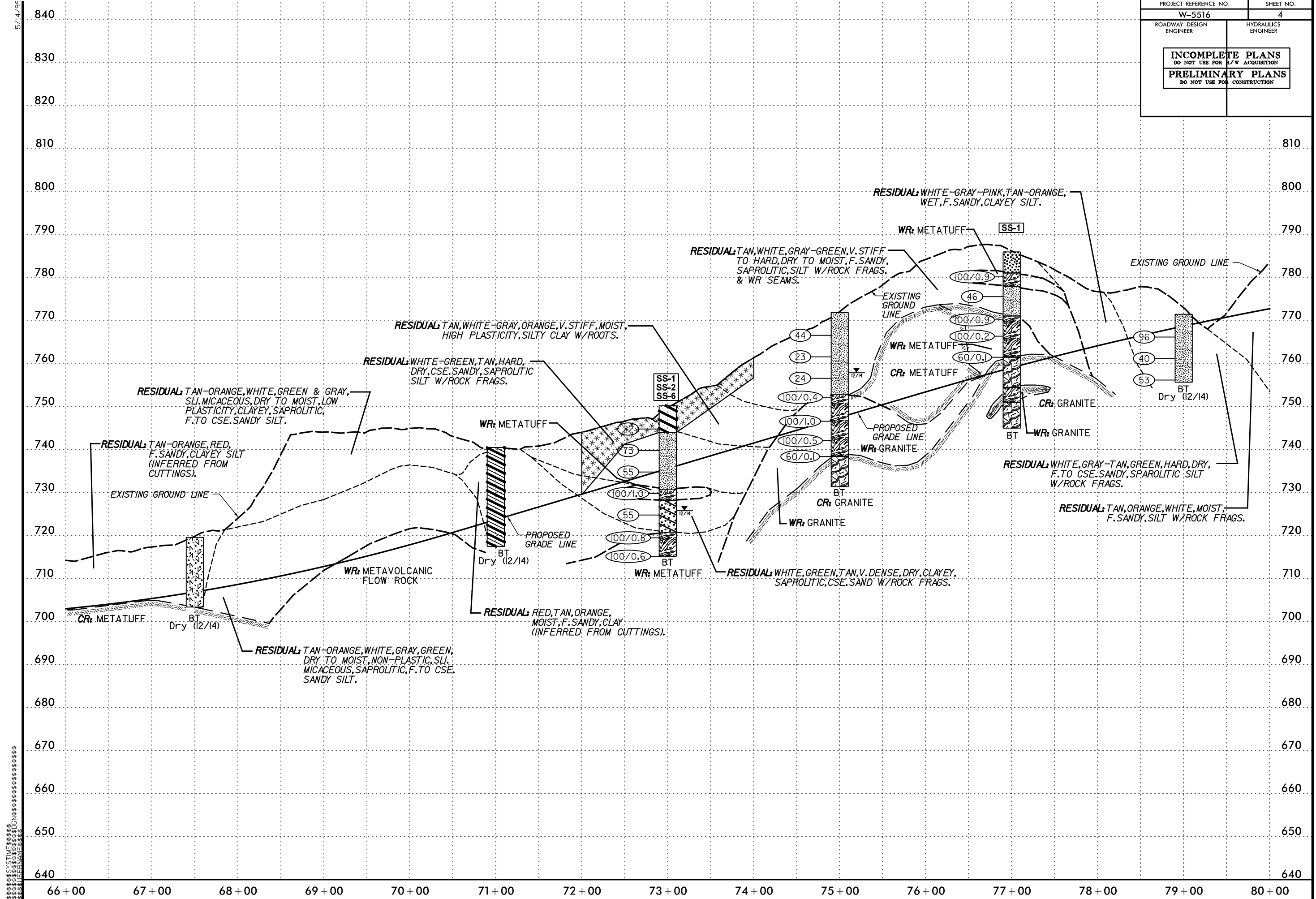
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

<p>GRAPHIC SCALES</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>DESIGN DATA</p> <p>ADT = ADT =</p> <p>DHV = % D = % T = % * V = 50 MPH * TTST = DUAL</p> <p>FUNC CLASS = COLLECTOR REGIONAL TIER</p>	<p>PROJECT LENGTH</p> <p>LENGTH ROADWAY TIP PROJECT W-5516 = 2.290 MILE LENGTH STRUCTURE TIP PROJECT W-5516 = 0.100 MILE TOTAL LENGTH TIP PROJECT W-5516 = 2.390 MILE</p>	<p>Prepared for the North Carolina Department of Transportation in the office of:</p> <p>HR ICA</p>	<p>HYDRAULICS ENGINEER</p> <p>SIGNATURE: _____ P.E.</p>	
			<p>2012 STANDARD SPECIFICATIONS</p> <p>RIGHT OF WAY DATE: SEPTEMBER 16, 2014</p> <p>LETTING DATE: SEPTEMBER 15, 2015</p>	<p>DAVID C. WALLER, PE PROJECT ENGINEER</p> <p>HENRY BARE PROJECT DESIGN ENGINEER</p>	

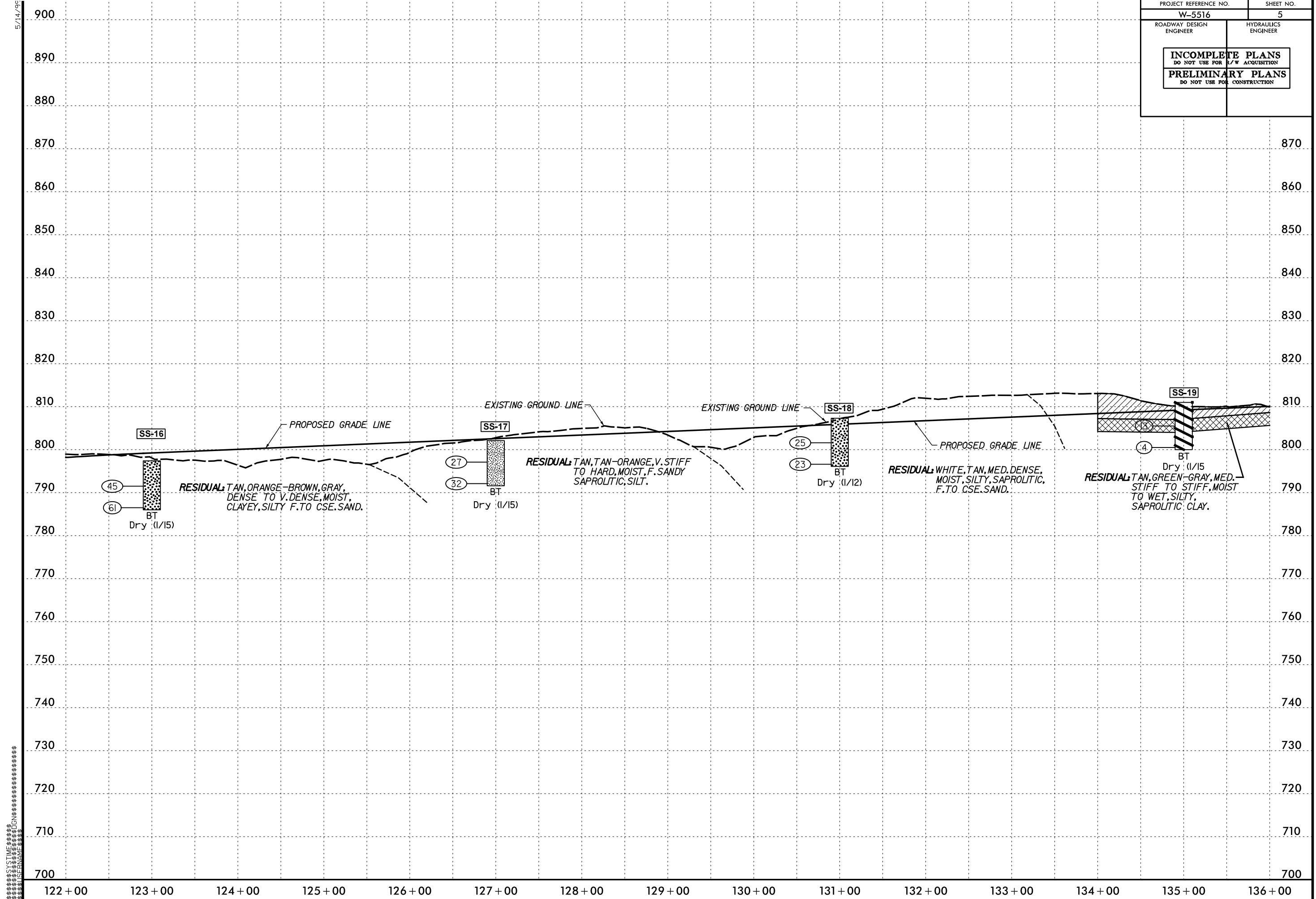
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PROJECT REFERENCE NO. W-5516	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



SYSTEMS
 DESIGN
 GROUP
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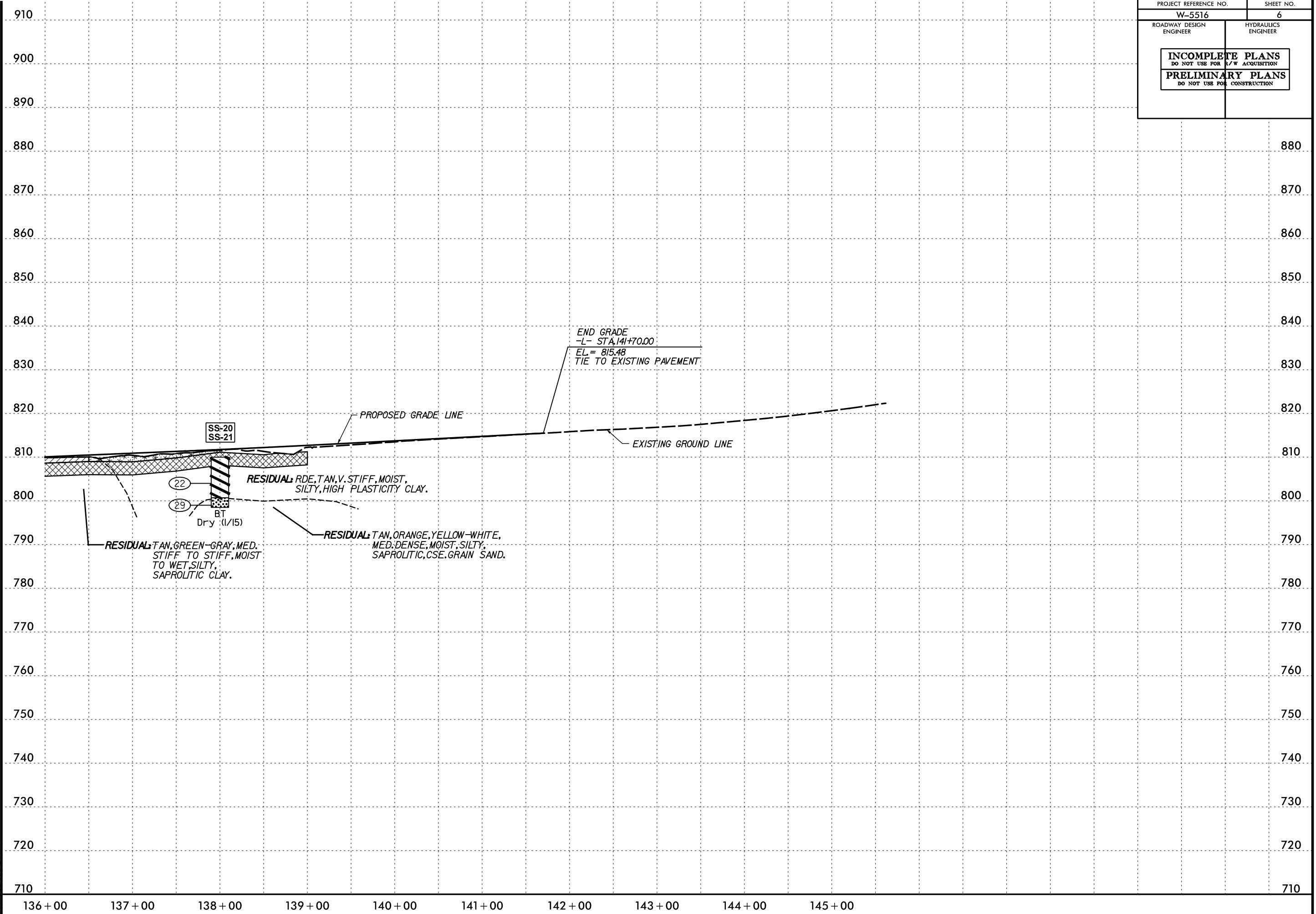
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W-5516		5	
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PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

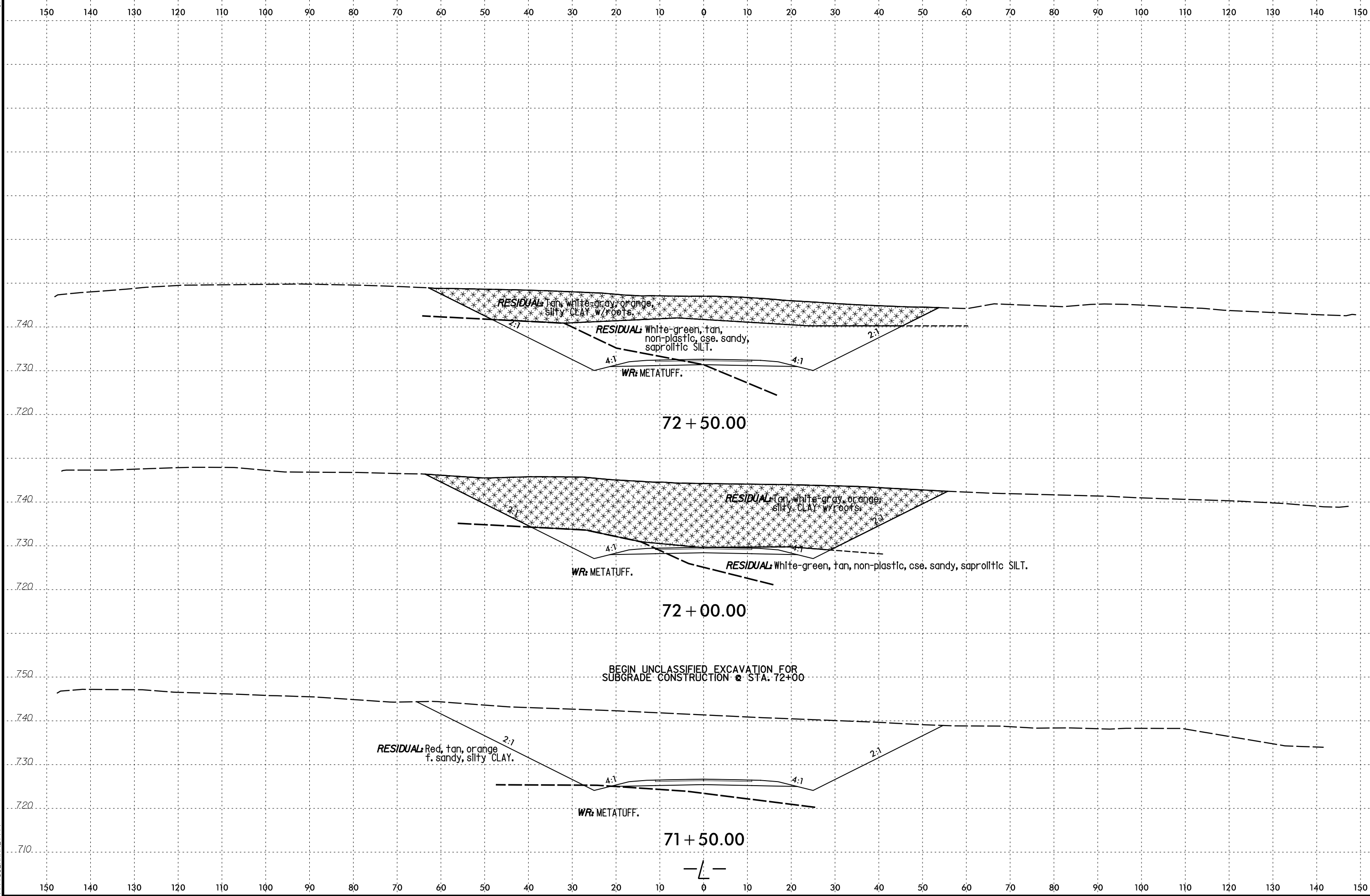


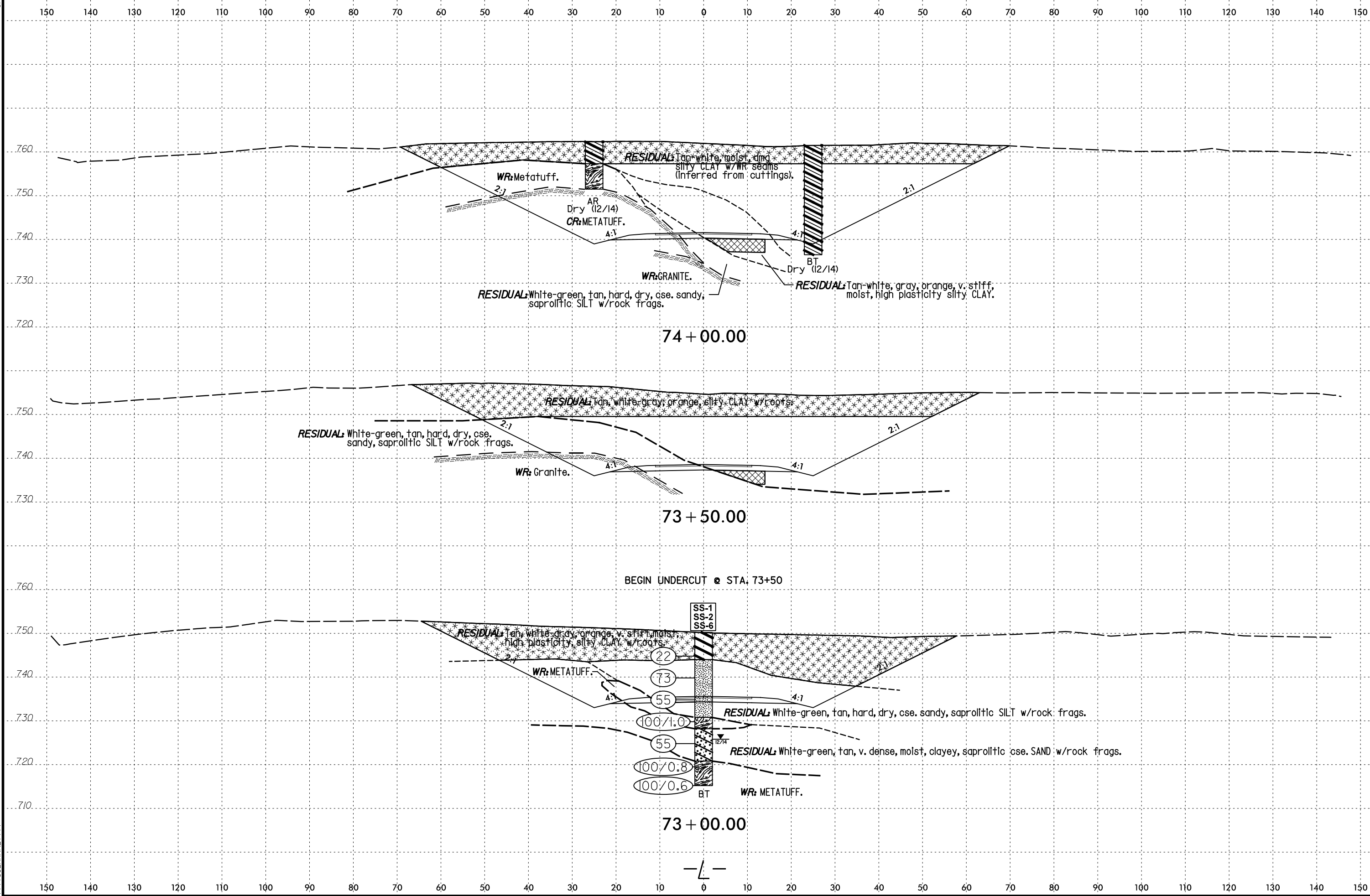
SYSTEMS DESIGN GROUP
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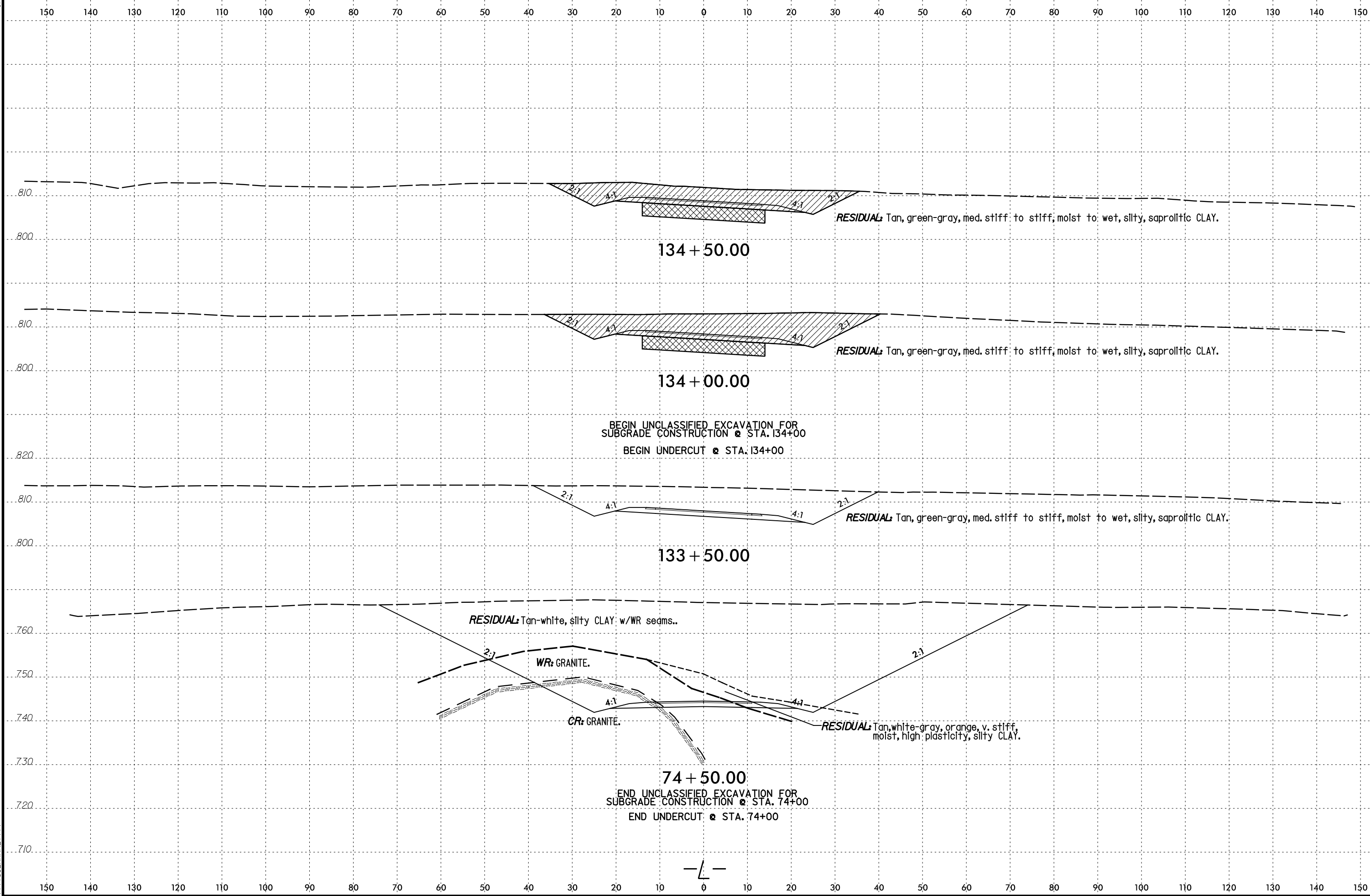
PROJECT REFERENCE NO.		SHEET NO.	
W-5516		6	
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PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

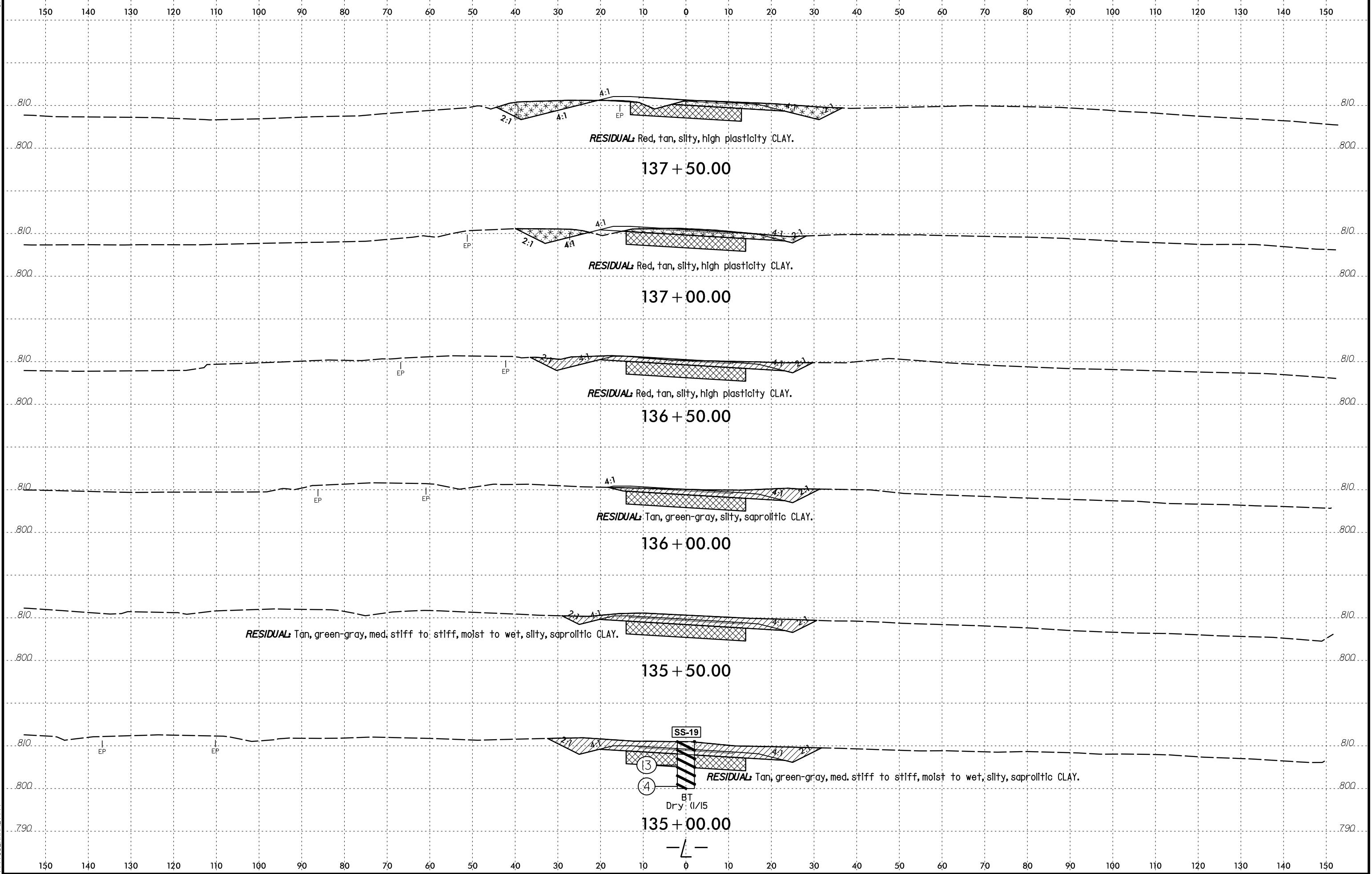


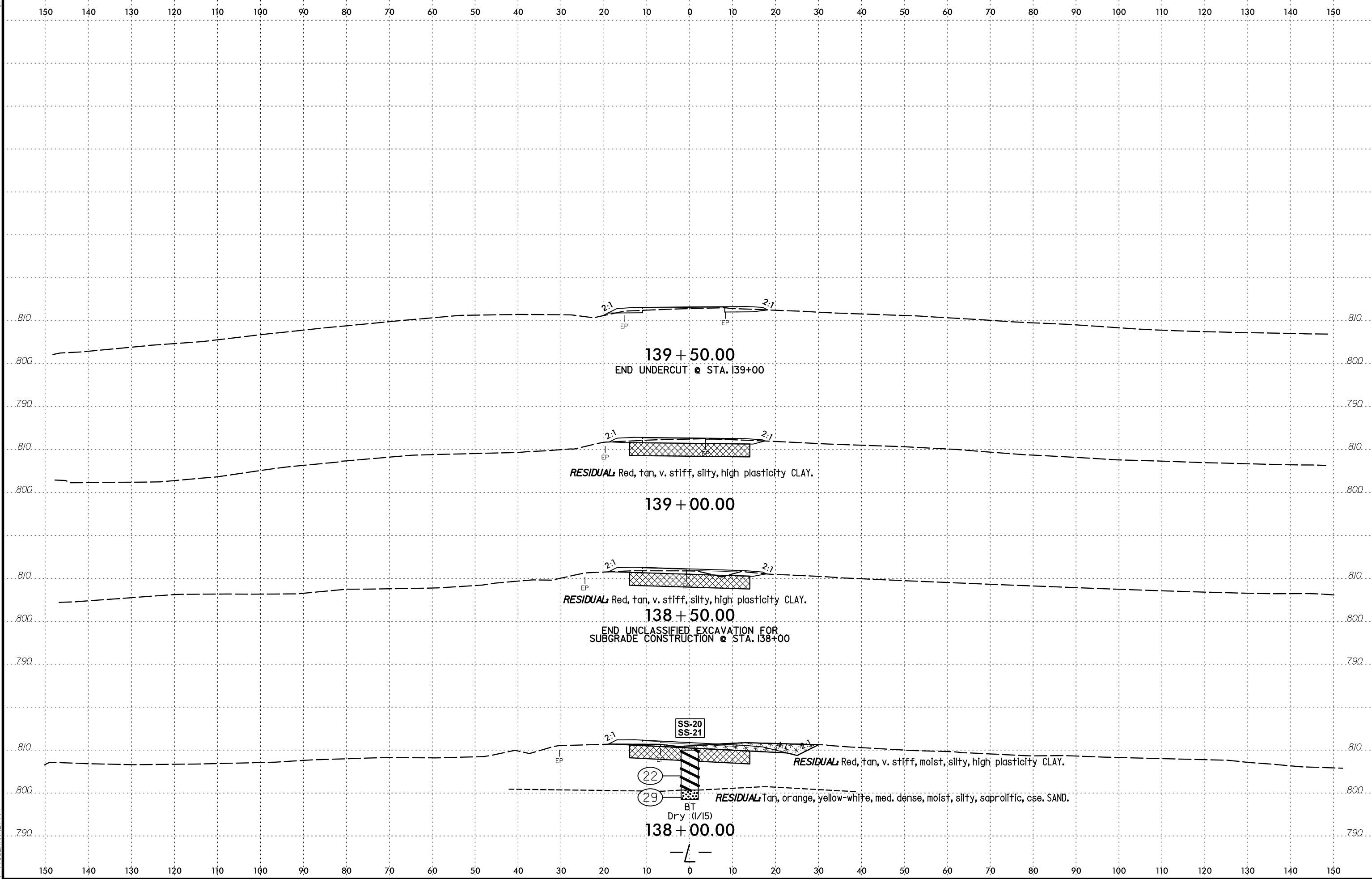




8/23/09
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 PLOT: 8/23/09 10:00 AM
 PLOTTER: HP DesignJet 500







139 + 50.00
END UNDERCUT @ STA. 139+00

RESIDUAL: Red, tan, v. stiff, silty, high plasticity CLAY.

139 + 00.00

RESIDUAL: Red, tan, v. stiff, silty, high plasticity CLAY.

138 + 50.00
END UNCLASSIFIED EXCAVATION FOR
SUBGRADE CONSTRUCTION @ STA. 138+00

RESIDUAL: Red, tan, v. stiff, moist, silty, high plasticity CLAY.

RESIDUAL: Tan, orange, yellow-white, med. dense, moist, silty, saprolitic, cse. SAND.

138 + 00.00

SS-20
SS-21

(22)

(29)

BT

Dry (1/15)

