

REFERENCE: U-5743

PROJECT: 50165

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.	U-5743	1	24

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	15+00.00 - 55+00.00	4,7	8,9
-Y1-	10+00.00 - 16+50.00	4,5	10
-Y2-	10+00.00 - 17+85.67	5	10
-Y5-	10+00.00 - 13+00.00	6	11
-Y6-	11+50.00 - 14+66.38	6	11

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	22+50.00 - 25+50.00	12,13
-L-	44+50.00 - 47+50.00	14,15
-L-	50+50.00 - 53+50.00	16,17
-Y5-	11+00.00 - 13+00.00	18,19

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY RESULTS	20,21

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY RANDOLPH
PROJECT DESCRIPTION NC 42 FROM SR 2237
(EAST SALISBURY STREET) TO NORTH OF
US 64 / NC 49 (DIXIE DRIVE) IN ASHEBORO

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:
- 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

TRIGON

WEIS, J.M.

INVESTIGATED BY FALCON ENG.

DRAWN BY HILL, M.J.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE APRIL 2019



DocuSigned by:
W. Scott Hunsberger 4/17/2019

5A469AC80FCD49E...
SIGNATURE DATE

**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 (AASHTO 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>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</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>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - 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. ARTESIAN - 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. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - 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. SLICKENISE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																												
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)																																																												
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<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>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>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																																																												
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CONTRACT:

TIP PROJECT: U-5743

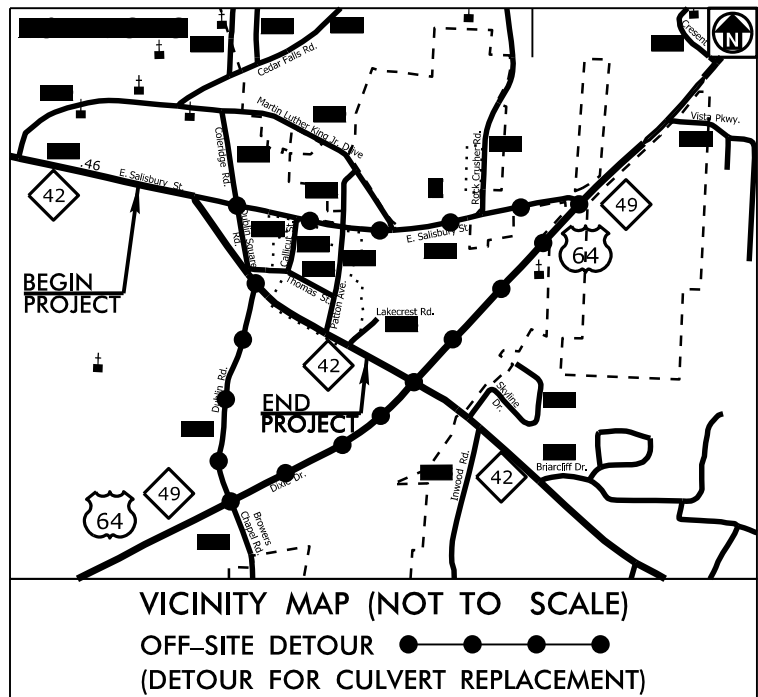
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RANDOLPH COUNTY

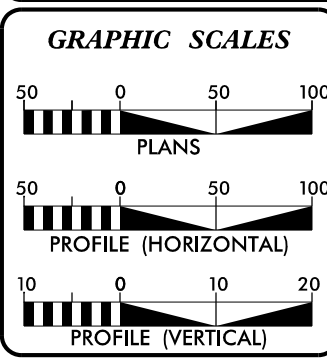
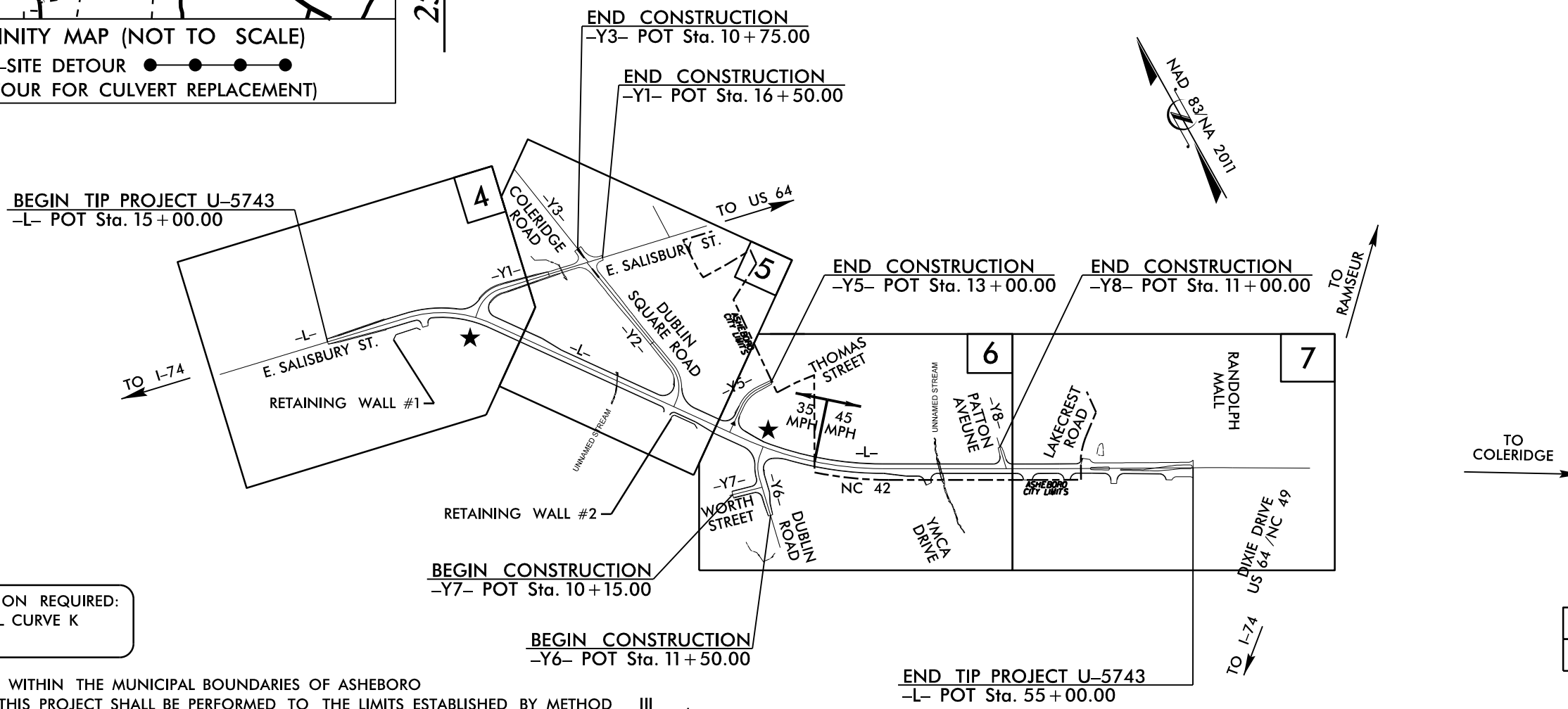
LOCATION: NC 42 FROM SR 2237 (EAST SALISBURY STREET) TO NORTH OF US 64 / NC 49 (DIXIE DRIVE) IN ASHEBORO

TYPE OF WORK: GRADING, PAVING, DRAINAGE, SIGNALS AND CULVERTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5743	3	24
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50165.1.1		P.E.	



25% PLANS



DESIGN DATA

ADT 2020 =	15,960
ADT 2040 =	18,600
K =	9 %
D =	60 %
T =	3 % *
V =	40 / 50 MPH
* TTST =	1% DUAL = 2%
FUNC CLASS =	URBAN PRINCIPAL ARTERIAL REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5743	=	0.777 MI
TOTAL LENGTH TIP PROJECT U-5743	=	0.777 MI

PLANS PREPARED FOR THE NCDOT BY:

M MOTT MACDONALD 2018 STANDARD SPECIFICATIONS	PO Box 700 Fuquay-Varina, NC 27526 (919) 552-2253 (919) 552-2254 (Fax) www.mottmac.com/america LICENSE NO. F-0669	HR HDR Engineering, Inc. of the Carolinas 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116
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RIGHT OF WAY DATE:
JUNE 21, 2019

LETTING DATE:
FEBRUARY 18, 2020

TIM JORDAN, PE
PROJECT ENGINEER

JAMES RICE, PE
HYDRAULICS PROJECT ENGINEER

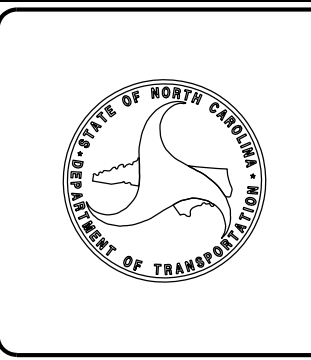
JEFFREY L. TEAGUE, PE
NCDOT CONTACT

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.





Roadway Subsurface Investigation Report - Inventory

**NC 42 From SR 2237 (East Salisbury Street) to
North of US 64 / NC 49 (Dixie Drive) in Asheboro
Randolph County, North Carolina
WBS: 50165.1.1 TIP: U-5743
Falcon Project No.: G18083.00**

Prepared for:
NCDOT Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, NC 27610

Submitted by:
Falcon Engineering, Inc.
1210 Trinity Road, Suite 110
Cary, North Carolina 27513
(919) 871-0800
www.falconengineers.com

April 16, 2019

WBS: 50165.1.1
TIP: U-5743
COUNTY: Randolph
DESCRIPTION: NC 42 From SR 2237 (East Salisbury Street) to North of US 64 / NC 49 (Dixie Drive) in Asheboro
SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of widening existing NC 42 from SR 2237 (East Salisbury Street) to north of US 64 / NC 69 (Dixie Drive) in Randolph County. The overall corridor is approximately 0.75 miles long and consists of existing two lane highway. The widened corridor will consist of a three lane highway with a center turn lane. Some reconfiguration/improvement of intersections and adjustments to varying lengths of numerous Y-lines is also planned. Two reinforced concrete box culverts are included in this project.

The investigation was conducted between February 4th and 19th, 2019 in general accordance with our Proposal to Provide Geotechnical Roadway Investigation and Design Services, dated December 21st, 2018.

A total of twenty-five (25) Standard Penetration Test (SPT) borings and twelve (12) hand auger borings were performed for the proposed roadway alignments. All mechanical borings were drilled using a CME 55 ATV mounted drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers, and SPT testing was performed with a recently calibrated and NCDOT approved automatic hammer. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, one (1) bulk sample was collected for standard Proctor compaction and California Bearing Ratio (CBR) testing.



Portions of the following alignments, totaling approximately 1.15 miles were investigated. Other minor driveways are included on the project but proposed improvements are not significant enough to warrant investigation.

<u>Alignment</u>	<u>Station (ft)</u>
-L- (NC 42)	15+00 to 55+00
-Y1- (E. Salisbury Street)	10+00 to 16+50
-Y2- (Dublin Square Road)	10+00 to 17+85.67
-Y5- (Thomas Street)	10+00 to 13+00
-Y6- (Leslieshire Drive)	11+50 to 14+66.38

AREAS OF SPECIAL GEOTECHNICAL INTEREST

A. The following locations contain highly plastic soils with plasticity indices (PI) greater than 25 within 3 feet of proposed subgrade elevations:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	24+00
-L-	46+00
-L-	52+00
-Y5-	12+49

B. The following location contains very soft to soft/very loose soils with an N-value less than 4 near the ground surface:

<u>Alignment</u>	<u>Station (ft)</u>
-Y2-	13+00

C. Alluvial soils were encountered at the following location:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	44+38

Isolated alluvial soils may exist elsewhere on the site between borings in proximity to natural waterways and/or constructed drainage features.

D. Shallow groundwater was encountered in the following areas:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	16+00
-L-	18+00
-L-	44+50

PHYSIOGRAPHY AND GEOLOGY

According to the *Geologic Map of North Carolina* (1985), the site is in the Carolina Slate Belt Physiographic Province of North Carolina. Specifically, rocks at the site are noted as Metamudstone and Meta-Argillite (**CZmd**) bedding plane and axial-planar cleavage common; interbedded with metamudstone, meta-conglomerate, and metavolcanic rock.

Existing site topography is typical of North Carolina's Piedmont Region. Existing roadway embankments on the site vary generally from 3 to 5 feet. Low areas and drainage ditches are present adjacent to the existing roadway that will require fill for the proposed widening. The site lies in east Asheboro and is currently a two lane highway. The existing corridor is populated with residential and commercial properties on either side of the corridor. A small stream flows southward across the mainline near station 43+75.

SOIL PROPERTIES

A variety of soils were encountered along the project, including artificial fill, roadway embankments, alluvial soils, residual soils, weathered rock, and crystalline rock.

Topsoil and rootmat were encountered in grassy, brushy, and wooded areas ranging in thickness from 0.2 to 0.5 feet, typically on the order of 0.3 feet, and consisting of sandy clay.

Artificial Fill soils were encountered at the ground surface beneath thin layers of topsoil associated with prior grading of private properties adjacent to the roadway. These consist of up to 9.5 feet of moist to wet, soft to very stiff, silty clay (A-7).

Roadway Embankment soils were encountered at the ground surface adjacent to existing roadways. These consist of up to 2 feet of moist, clayey silt (A-5).



Alluvial soils were encountered at the ground surface near the historic floodplains of natural waterways. These soils extended to depths of up to approximately 4.0 feet and consist of moist to saturated, silty clays (A-7).

Residual soils were encountered at the ground surface, or beneath artificial fill, roadway embankments or alluvial deposits. These soils consist of dry to moist, clean sands (A-1-b) and soft to very stiff, sandy clay and silt, clayey silt, and silty clays (A-4, A-5, A-6, A-7) and extend to depths of 3.0 feet to greater than 13.0 feet where borings were terminated in residual soils.

Weathered Rock (WR) is a very hard material with properties intermediate of soil and rock. WR is classified as having an N-value of greater than 100 blows per one foot. WR was encountered at depths of 3.0 feet to 19.8 feet and generally consists of tan and white metamudstone.

Crystalline Rock, in the form of metamudstone, was encountered beneath weathered rock or residual soils at various locations throughout the site at depths of 2.7 to 11.9. Crystalline Rock is classified as material that yields auger refusal or SPT refusal (blow count of 60/0.0 or 60/0.1 feet.)

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in many cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways were backfilled immediately after completion due to safety considerations. Where encountered, groundwater was measured in borings at depths of 0.5 feet to 5.6 feet, corresponding to elevations ranging from 836.2 ft to 753.3 ft.

Detailed groundwater measurements are included in the attached subsurface profiles and cross sections.

ADDITIONAL LABORATORY TESTING

The following bulk sample was obtained:

Sample	Location	Location	Test
BS-1	33+81, 21' LT, -L-	1.0 – 6.0	California Bearing Ratio, Standard Proctor

Classification test results for these samples are included in the subsurface profiles. Standard Proctor and California Bearing Ratio (CBR) data is attached in Appendix A.

CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

DOCUMENT NOT CONSIDERED FINAL UNTIL ALL SIGNATURES COMPLETED

Report Prepared By:

Report Reviewed By:

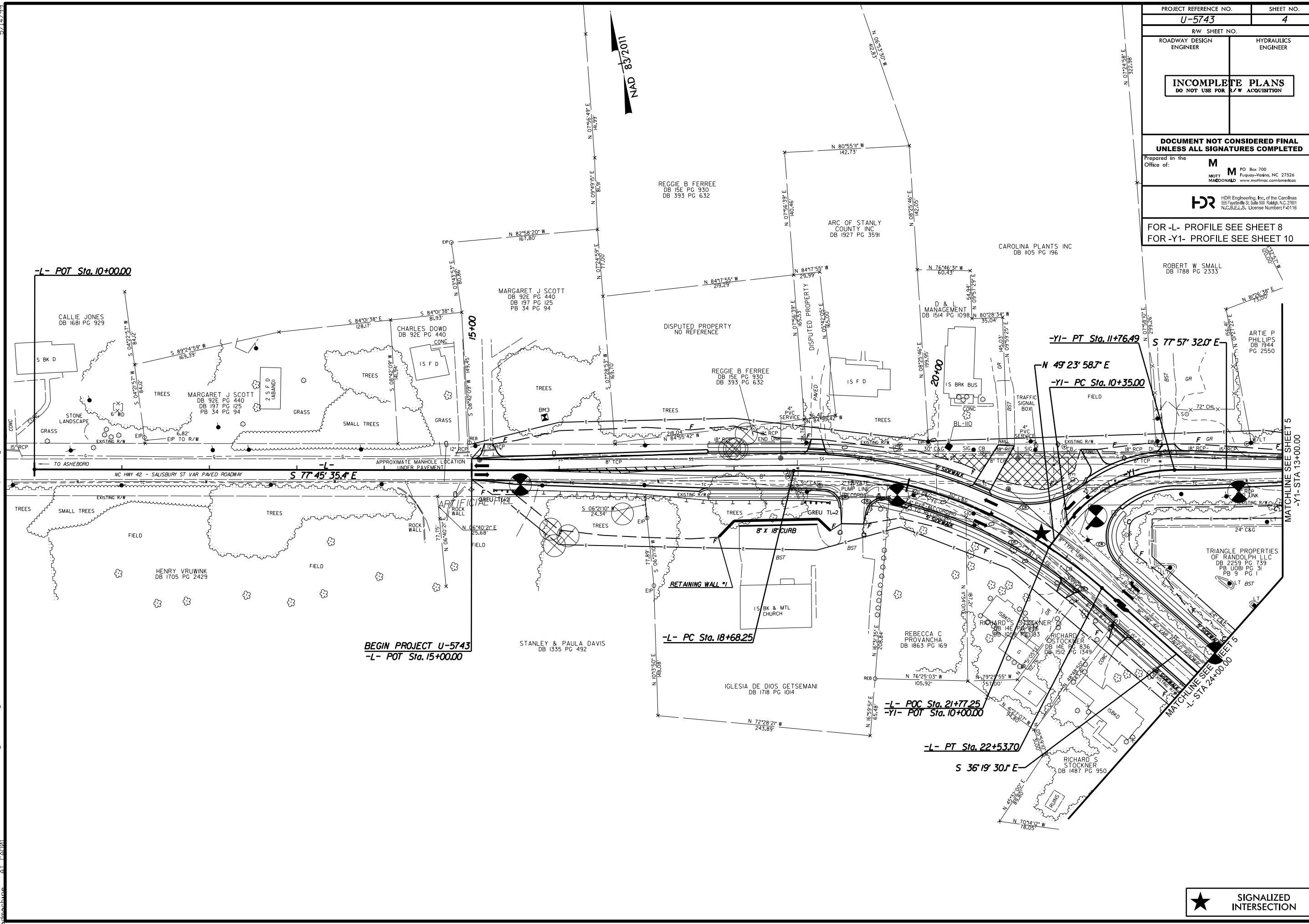
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W. Scott Hunsberger
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DocuSigned by:
Jeremy R Hamm
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W. Scott Hunsberger, PE
Geotechnical Engineer

Jeremy R. Hamm, PE
Geotechnical Engineering Manager

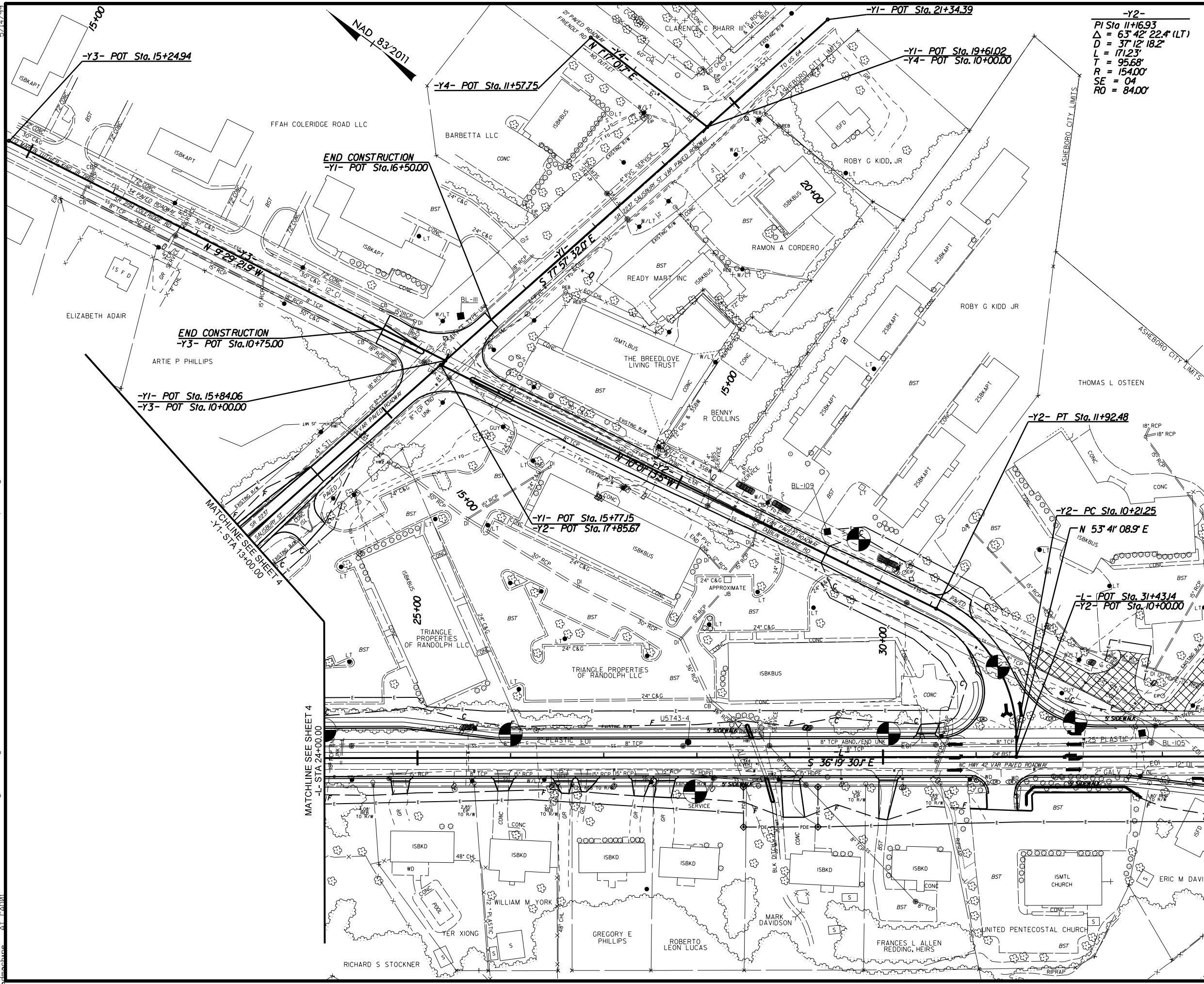
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PROJECT REFERENCE NO.	SHEET NO.
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	
M MOTT MAEDONAD PO Box 700 Fuquay-Varina, NC 27526 www.mottmac.com/mma/mo	
HR HDR Engineering, Inc. of the Carolinas 55 Fayetteville St., Suite 550, Raleigh, NC 27601 N.C.S.E.L.S. License Number: F-0116	
FOR -L- PROFILE SEE SHEET 8	
FOR -Y1- PROFILE SEE SHEET 10	



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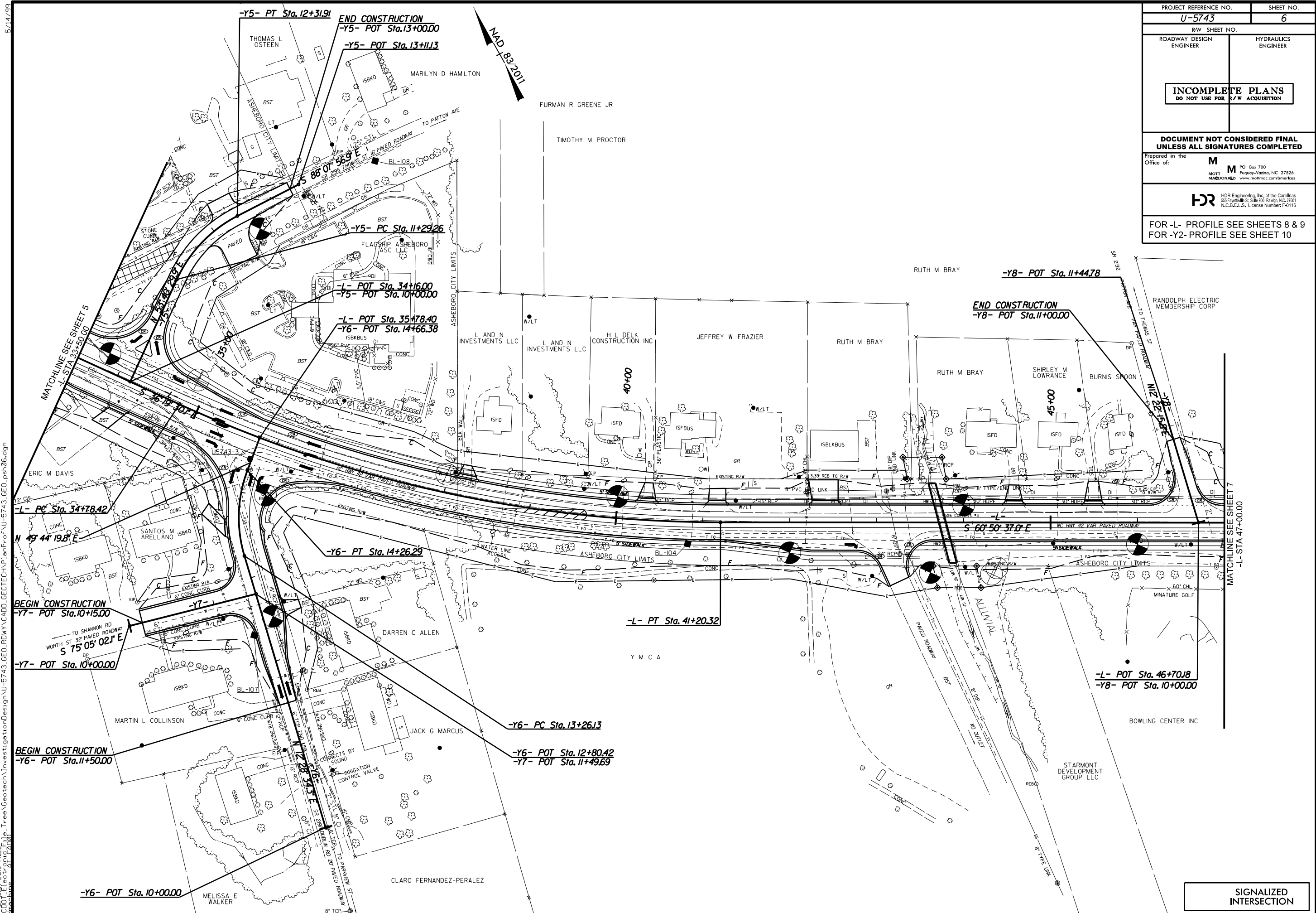
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	M
	M PO Box 700 Fuquay-Varano, NC 27526 MOTT MACDONALD www.mottmac.com/mackos
	HDR HDR Engineering, Inc. of the Carolinas 555 Fayetteville St., Suite 550 Raleigh, NC 27601 N.C.S.E.L.S. License Number: F-0116
FOR -L- PROFILE SEE SHEETS 8 & 9 FOR -Y2- PROFILE SEE SHEET 10	

-Y2-
 PI Sta 11+16.93
 $\Delta = 63^\circ 42' 22.4''$ (LT)
 $D = 37' 12'' 18.2''$
 $L = 171.23'$
 $T = 95.68'$
 $R = 154.00'$
 $SE = 04'$
 $RO = 84.00'$

MATCHLINE SEE SHEET 4
 -L- STA 24+00.00

MATCHLINE SEE SHEET 6
 -L- STA 33+50.00

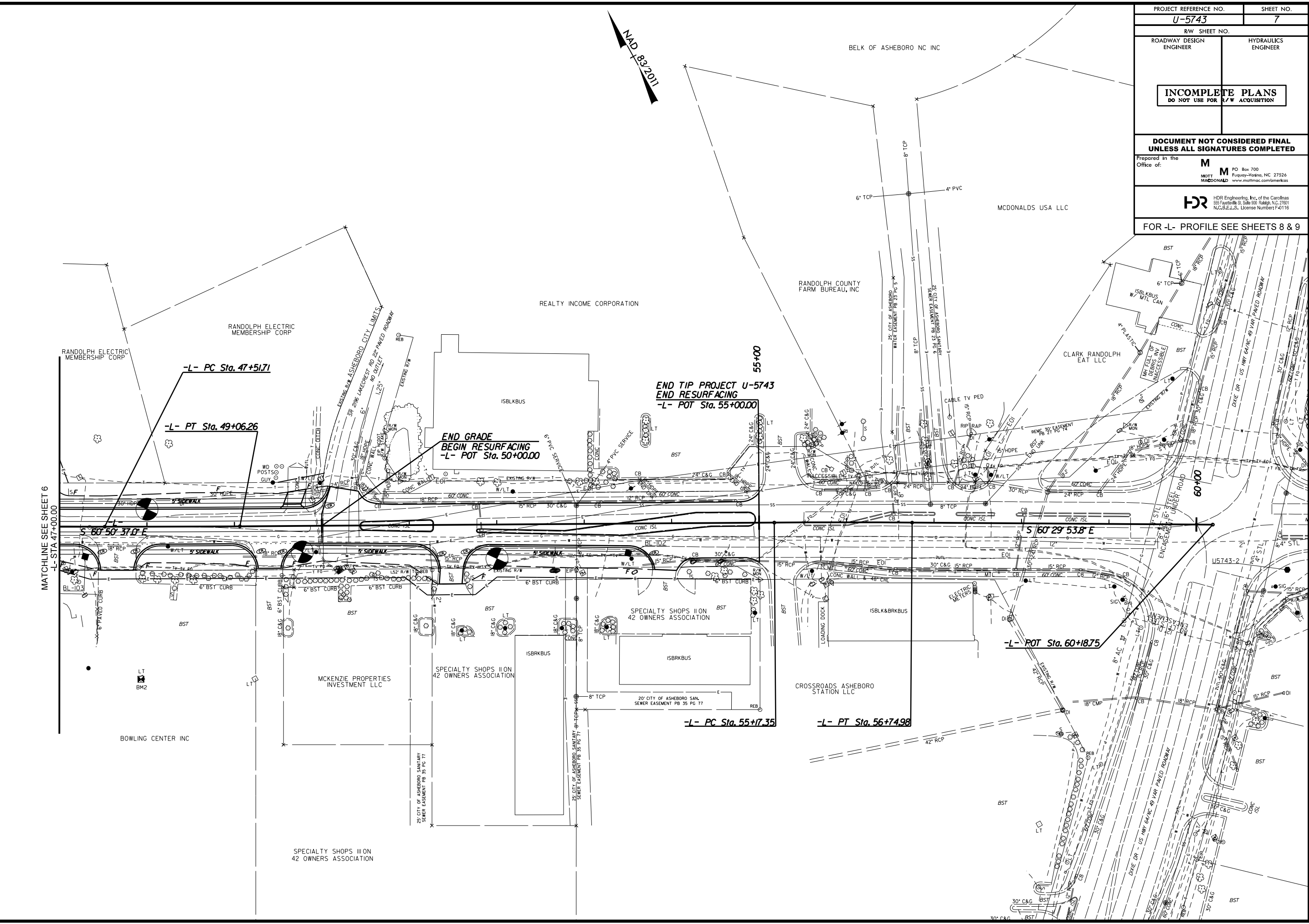
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R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	M MOTT MAGDONALD
	PO Box 700 Fuquay-Varina, NC 27526 www.mottmac.com/mmarks
	DR HDR Engineering, Inc. of the Carolinas 335 Fayetteville St., Suite 200 Raleigh, NC 27601 N.C.S.E.L.S. License Number: F-0116
FOR -L- PROFILE SEE SHEETS 8 & 9 FOR -Y2- PROFILE SEE SHEET 10	



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 MOTT MAGDONALD

SIGNALIZED INTERSECTION

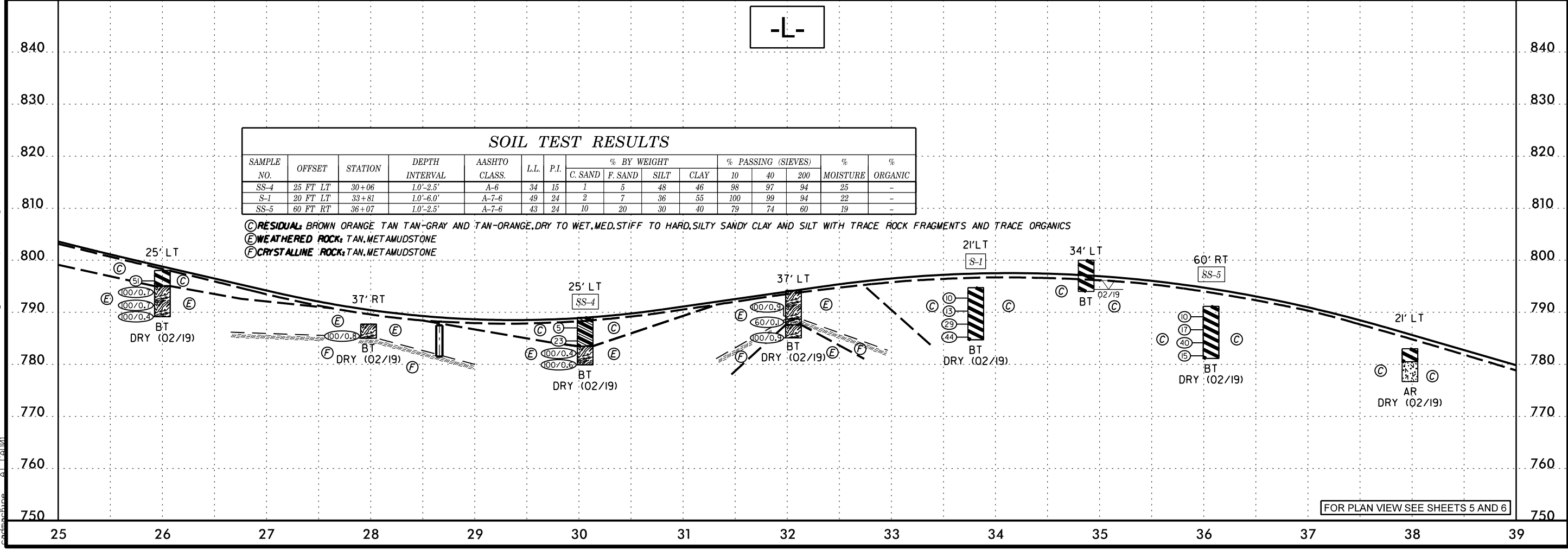
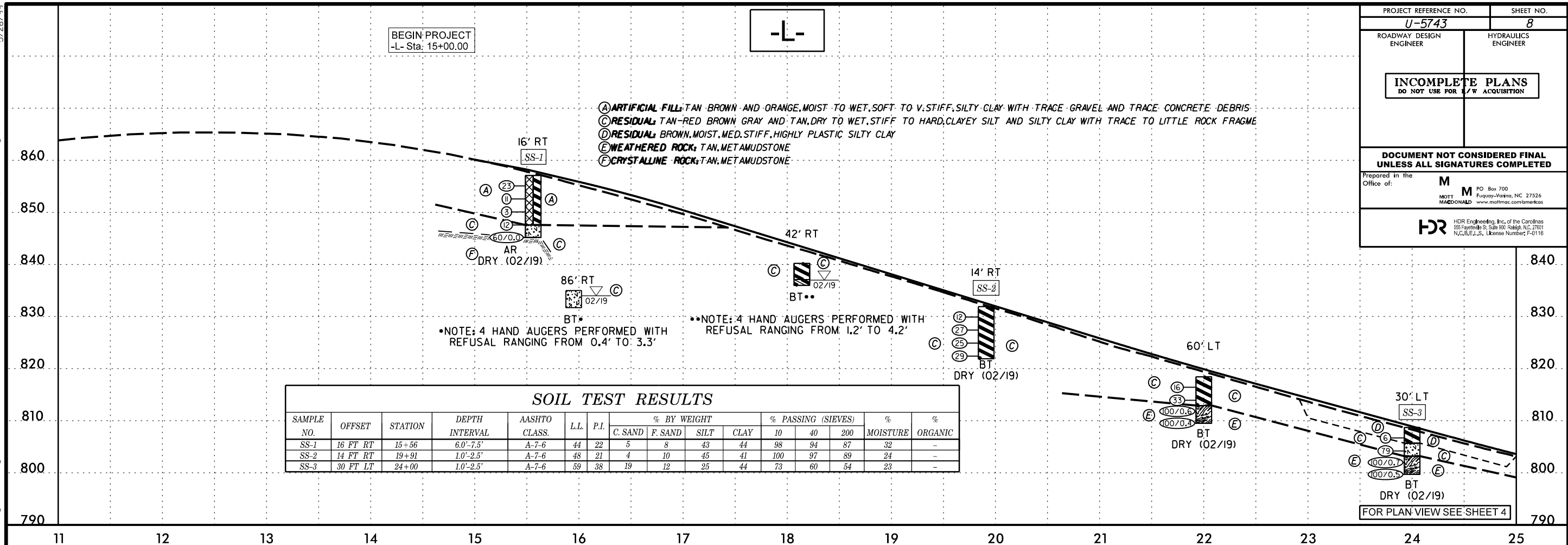
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PROJECT REFERENCE NO.	SHEET NO.
U-5743	7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	M
	PO Box 700 Fuquay-Varano, NC 27526 MOTT MADONAD www.mottmac.com/madonad
HR HDR Engineering, Inc. of the Carolinas 355 Fayetteville St., Suite 200 Raleigh, NC 27601 N.C.S.E.L.S. License Number: F-0116	
FOR -L- PROFILE SEE SHEETS 8 & 9	

5/28/99
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 39-APR-2018 08:37

PROJECT REFERENCE NO. U-5743	SHEET NO. 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR L/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of: M	
M PO Box 700 FAYETTEVILLE, NC 27526 MACDONALD www.mottmac.com/merkos	
HDR HDR Engineering, Inc. of the Carolinas 555 Fayetteville St. Suite 900 Raleigh, NC 27601 N.C.B.E.L.S. License Number: F-0116	



5/28/99
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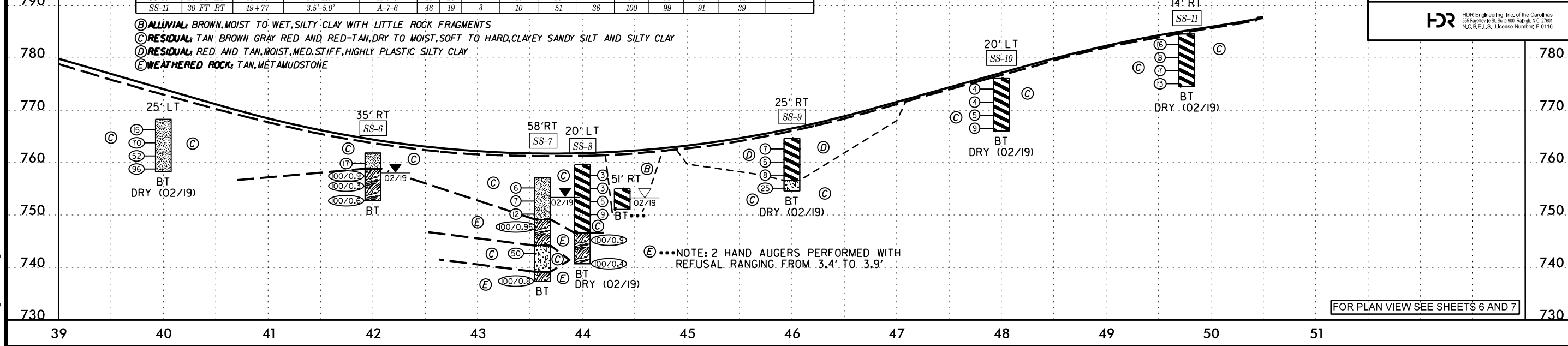
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SAG VERTICAL CURVE K
VERTICAL SSD**

-L-

PROJECT REFERENCE NO. U-5743	SHEET NO. 9
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INCOMPLETE PLANS DO NOT USE FOR L/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	M M PO Box 700 MOTT MACDONALD Fuquay-Varina, NC 27526 www.mottmac.com/america
HDR HDR Engineering, Inc. of the Carolinas 555 Fayetteville St. Suite 900 Raleigh, NC 27601 N.C.E.E.L.S. License Number: F-0116	

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-6	35 FT RT	42+00	1.0'-2.5'	A-4	34	9	22	25	38	15	100	86	60	16	-
SS-7	58 FT RT	43+62	1.0'-2.5'	A-4	31	10	7	10	57	26	96	92	84	23	-
SS-8	20 FT LT	44+00	3.5'-5.0'	A-7-6	49	20	4	9	47	40	94	91	85	39	-
SS-9	25 FT RT	46+00	6.0'-7.5'	A-7-6	51	33	4	8	39	49	90	87	82	22	-
SS-10	20 FT LT	48+00	1.0'-2.5'	A-7-6	48	20	15	18	29	38	85	76	60	31	-
SS-11	30 FT RT	49+77	3.5'-5.0'	A-7-6	46	19	3	10	51	36	100	99	91	39	-

- (B) ALLUVIAL BROWN, MOIST TO WET, SILTY CLAY WITH LITTLE ROCK FRAGMENTS
- (C) RESIDUAL TAN, BROWN GRAY RED AND RED-TAN, DRY TO MOIST, SOFT TO HARD, CLAYEY SANDY SILT AND SILTY CLAY
- (D) RESIDUAL RED AND TAN, MOIST, MED. STIFF, HIGHLY PLASTIC SILTY CLAY
- (E) WEATHERED ROCK TAN, METAMUDSTONE

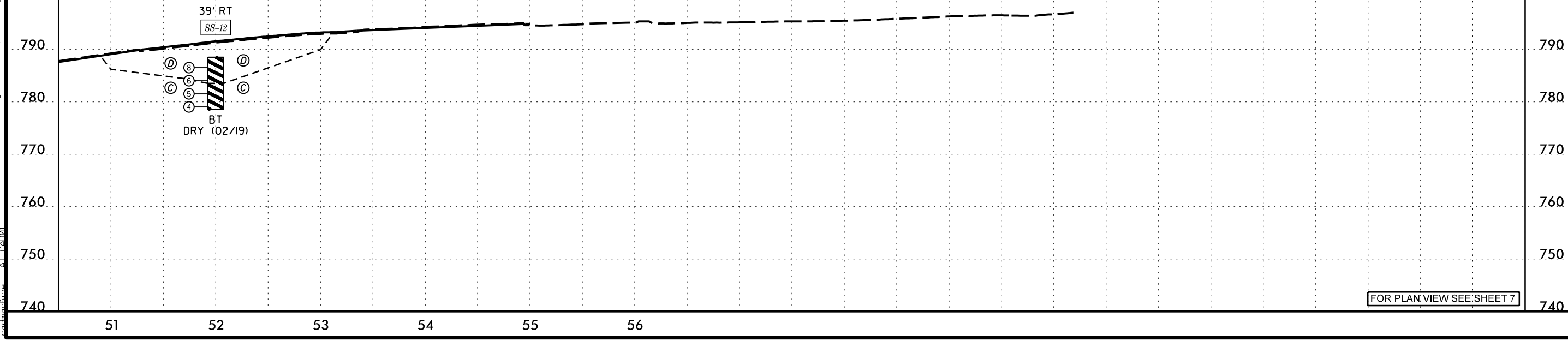


FOR PLAN VIEW SEE SHEETS 6 AND 7

-L-

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-12	39 FT RT	52+00	1.0'-2.5'	A-7-5	71	40	3	10	27	60	97	95	88	39	-

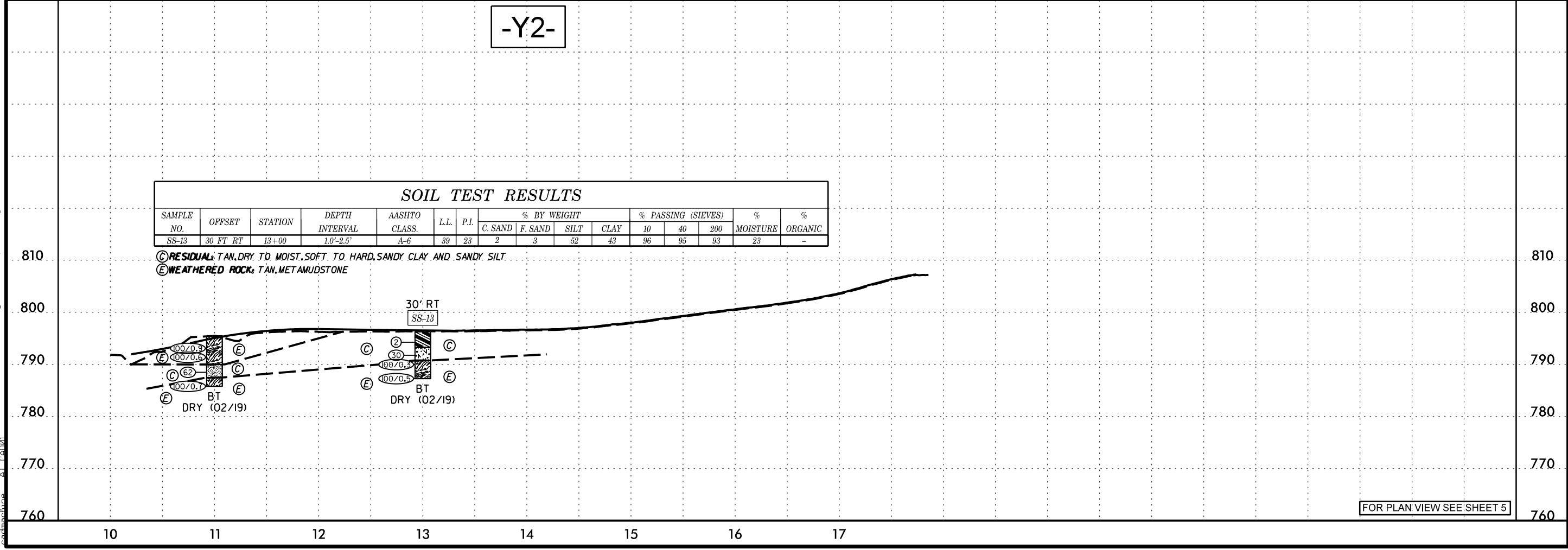
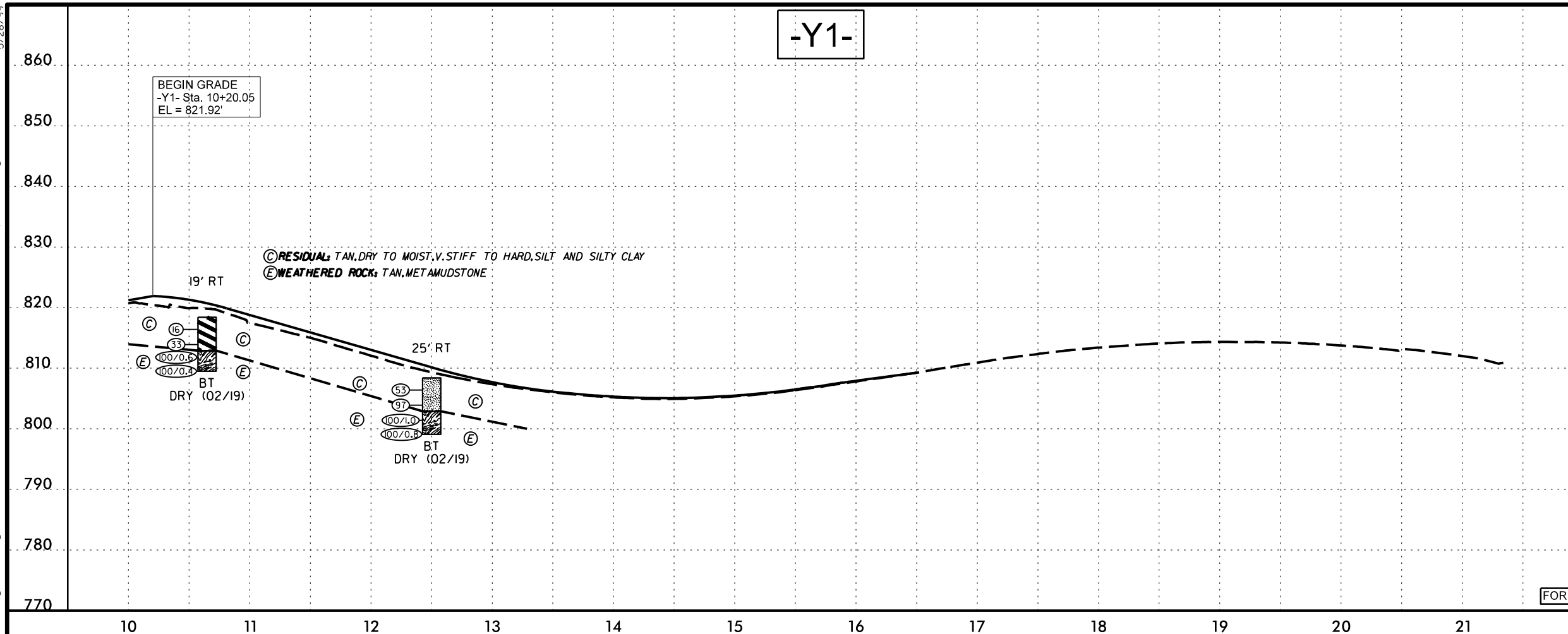
- (C) RESIDUAL RED, MOIST, MED. STIFF, SILTY CLAY
- (D) RESIDUAL RED, MOIST, MED. STIFF, HIGHLY PLASTIC SILTY CLAY



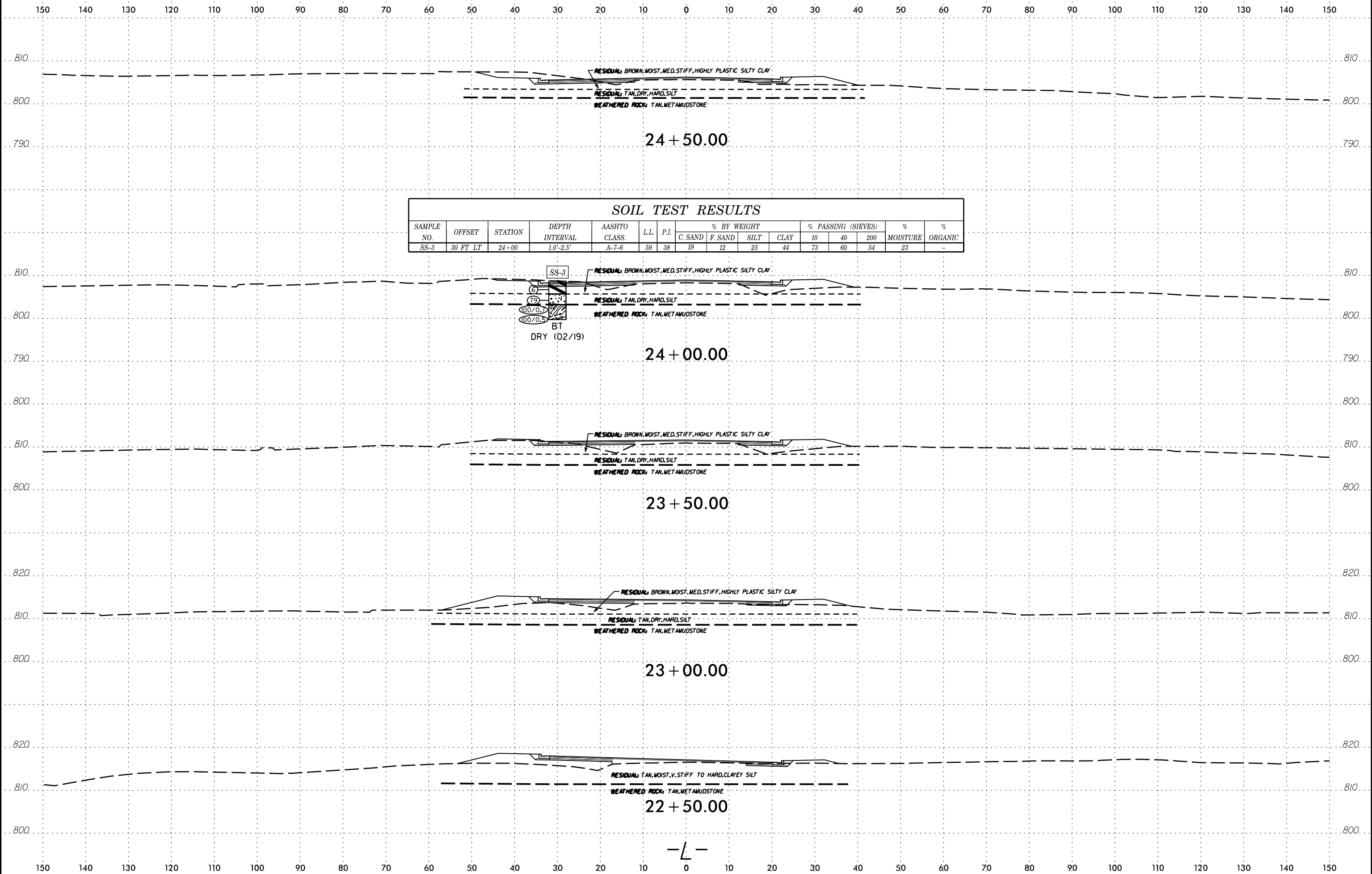
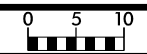
FOR PLAN VIEW SEE SHEET 7

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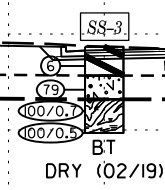
PROJECT REFERENCE NO. U-5743	SHEET NO. 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	M MOTT MACDONALD
	PO Box 700 Furqoy-Vasno, NC 27526 www.mottmac.com/merkos
HDR HDR Engineering, Inc. of the Carolinas 555 Fayetteville St. Suite 900 Raleigh, NC 27601 N.C.E.E.L.S. License Number: F-0116	

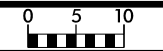


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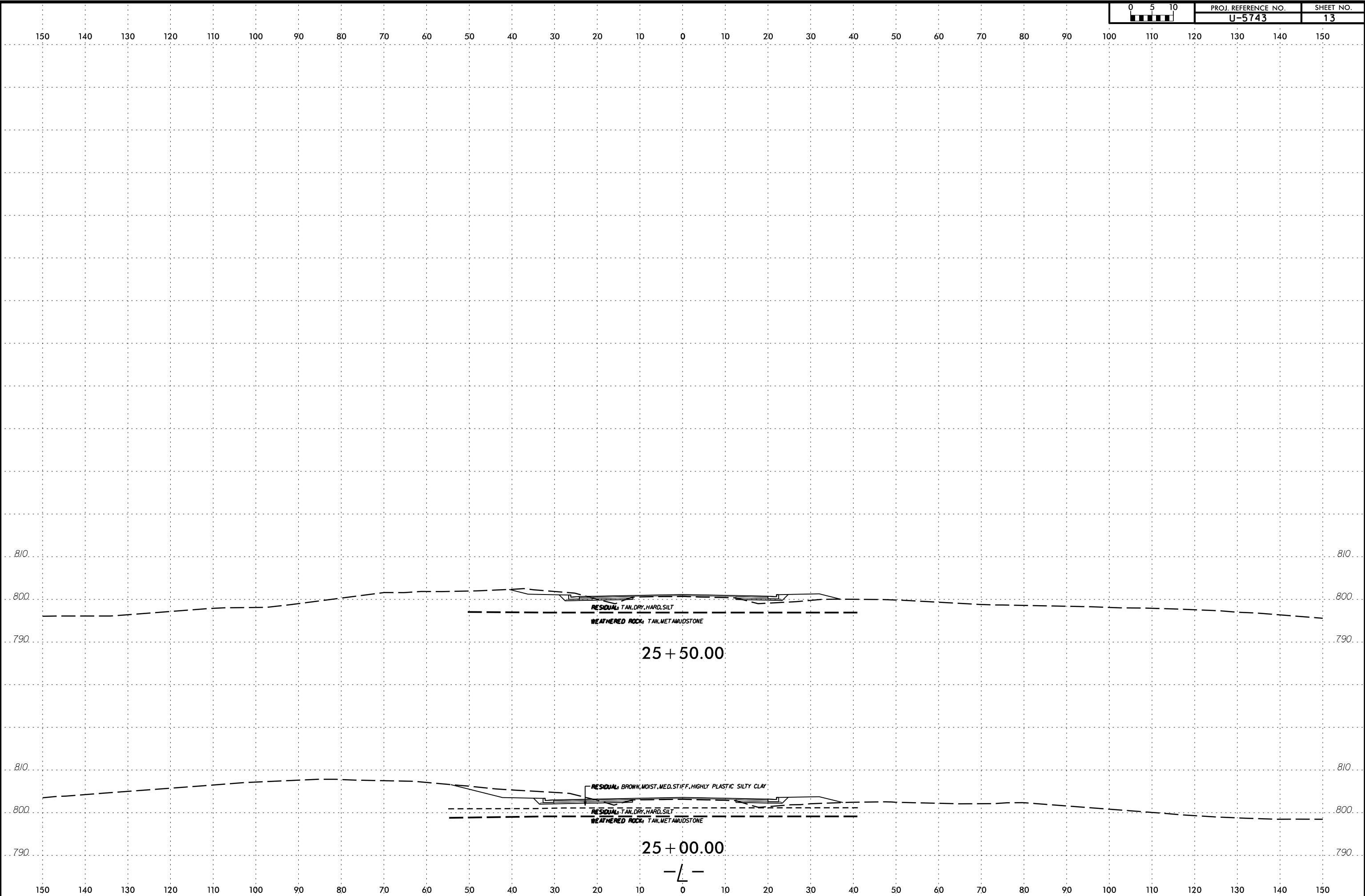


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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-3	30 FT LT	24+00	1.0'-2.5'	A-7-6	59	38	19	12	25	44	73	60	54	23	-



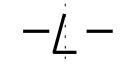


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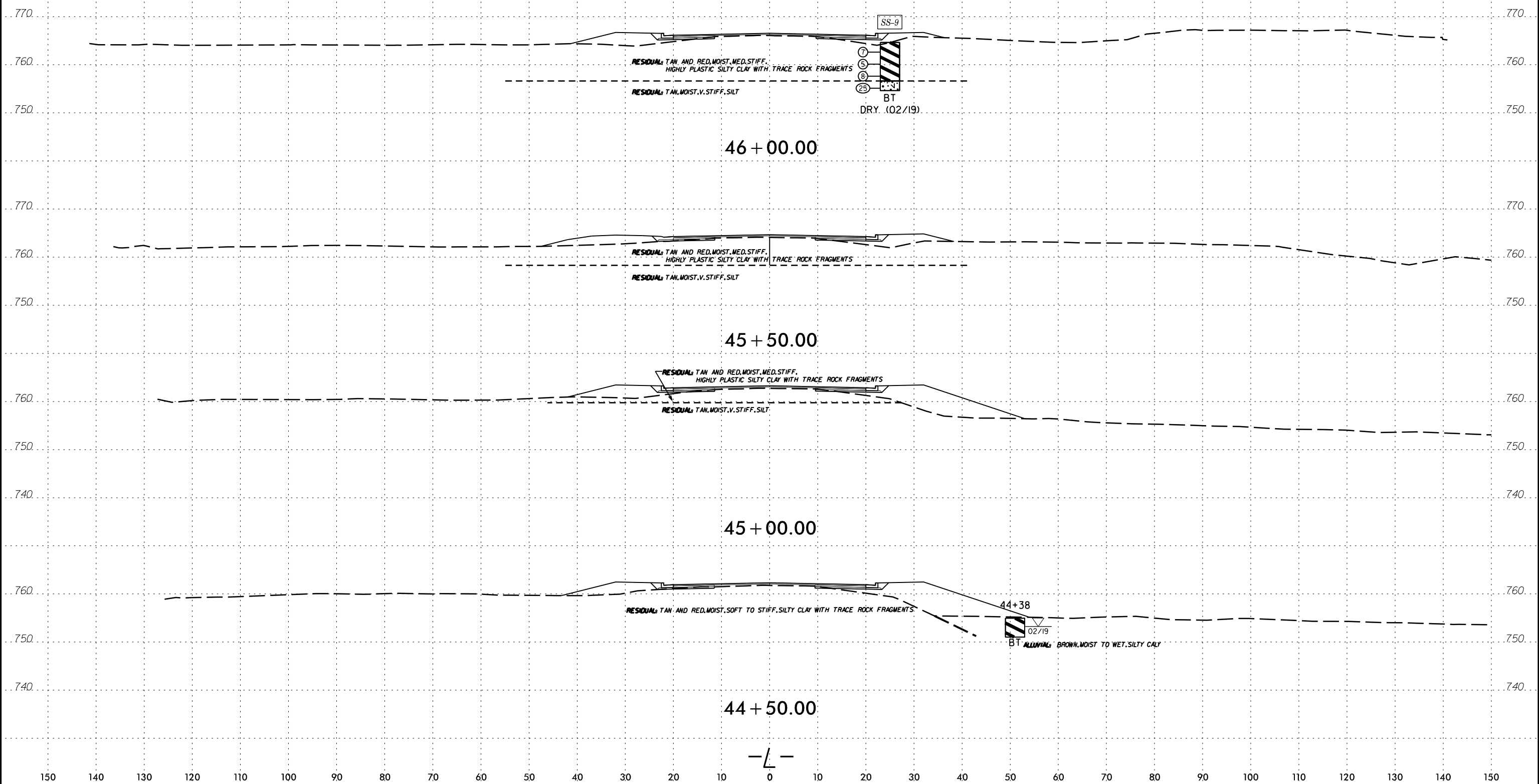


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25 + 00.00

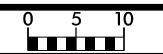


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-9	25 FT RT	46+00	6.0'-7.5'	A-7-6	51	33	4	8	39	49	90	87	82	22	-

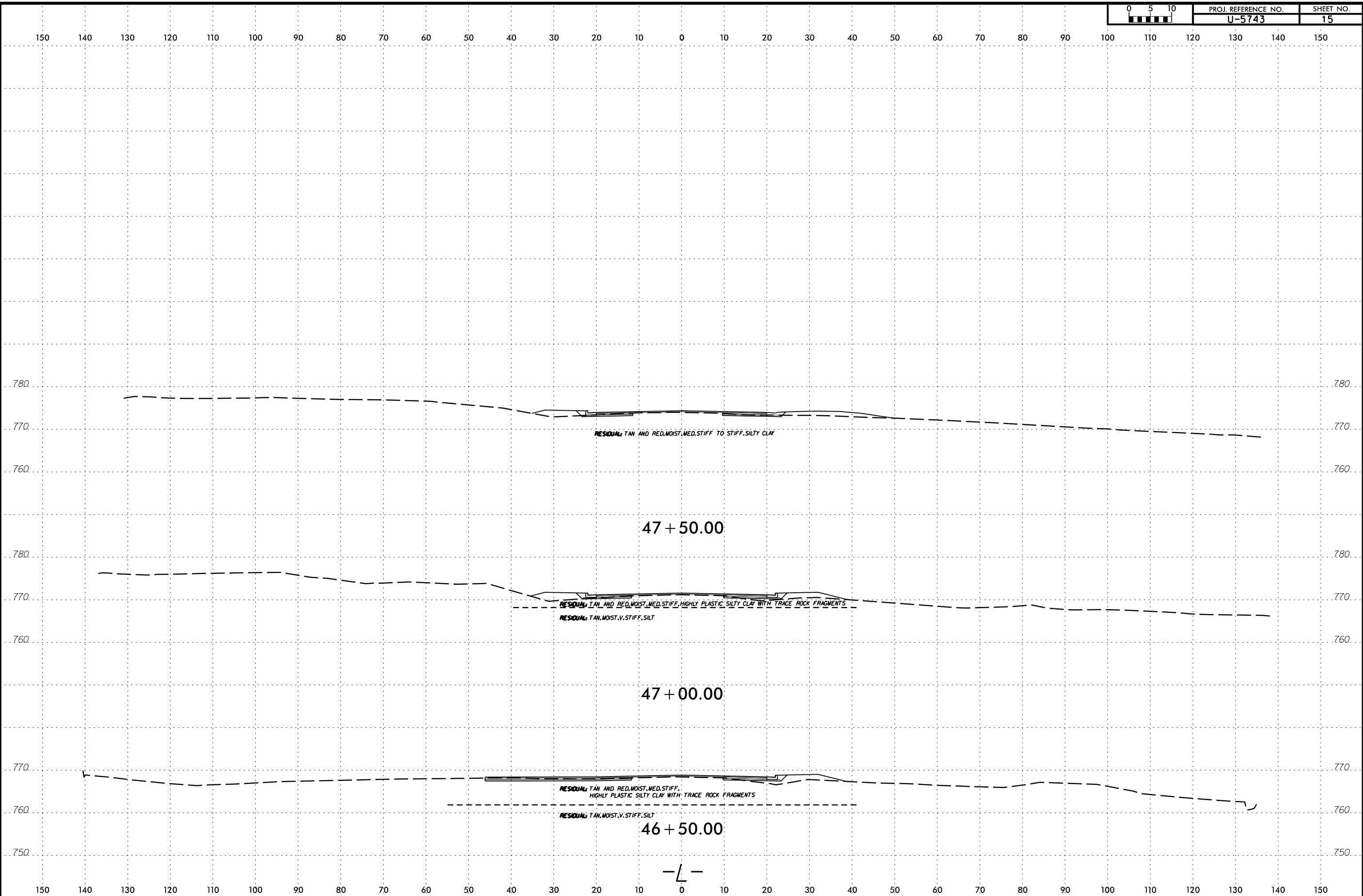


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cead.ctb



PROJ. REFERENCE NO.	SHEET NO.
U-5743	15



RESIDUAL TAN AND RED. MOIST. MED. STIFF TO STIFF, SILTY CLAY

47 + 50.00

RESIDUAL TAN AND RED. MOIST. MED. STIFF, HIGHLY PLASTIC SILTY CLAY WITH TRACE ROCK FRAGMENTS

RESIDUAL TAN, MOIST. V. STIFF, SILT

47 + 00.00

RESIDUAL TAN AND RED. MOIST. MED. STIFF, HIGHLY PLASTIC SILTY CLAY WITH TRACE ROCK FRAGMENTS

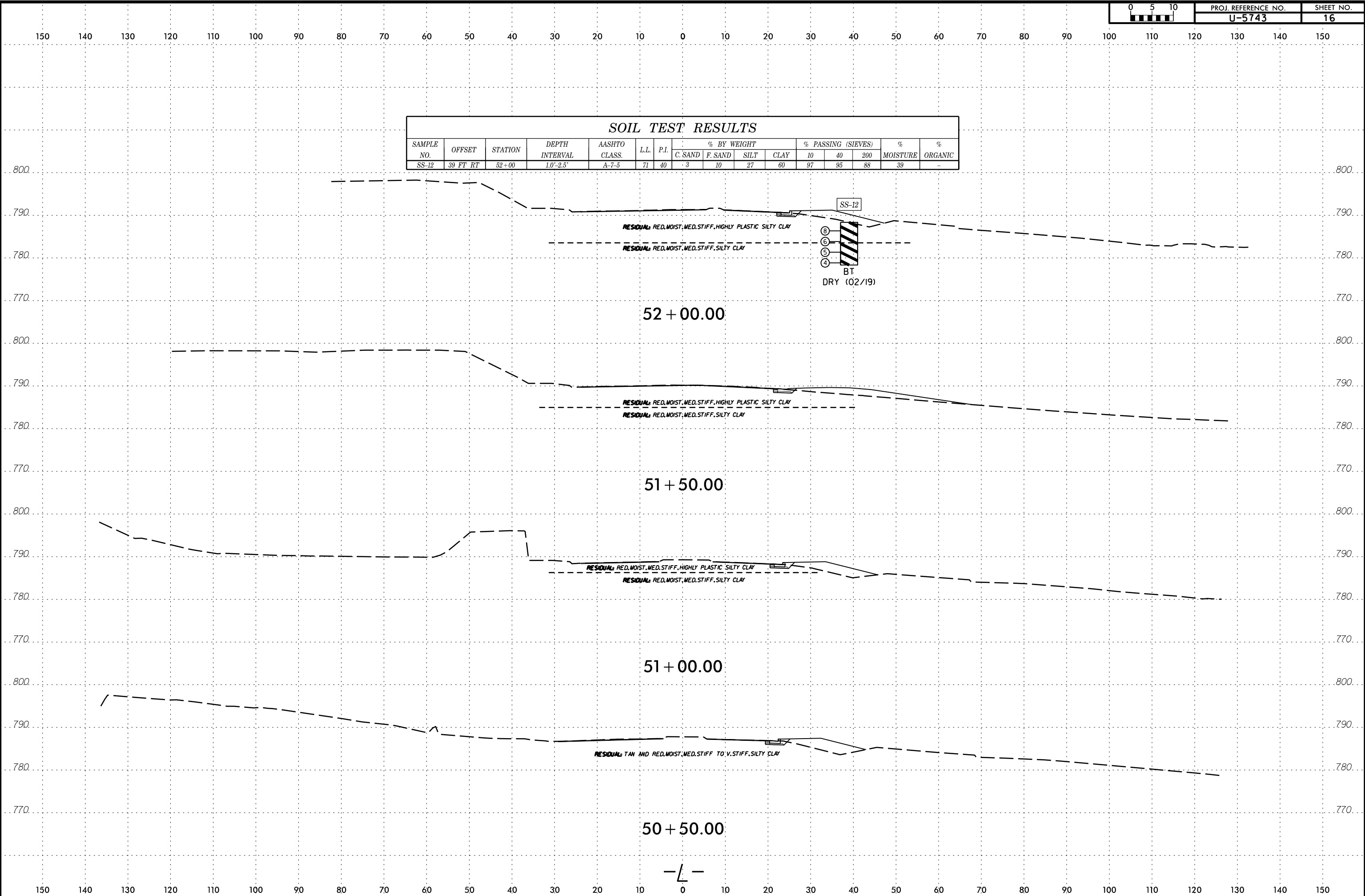
RESIDUAL TAN, MOIST. V. STIFF, SILT

46 + 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-12	39 FT RT	52+00	1.0'-2.5'	A-7-5	71	40	3	10	27	60	97	95	88	39	-	

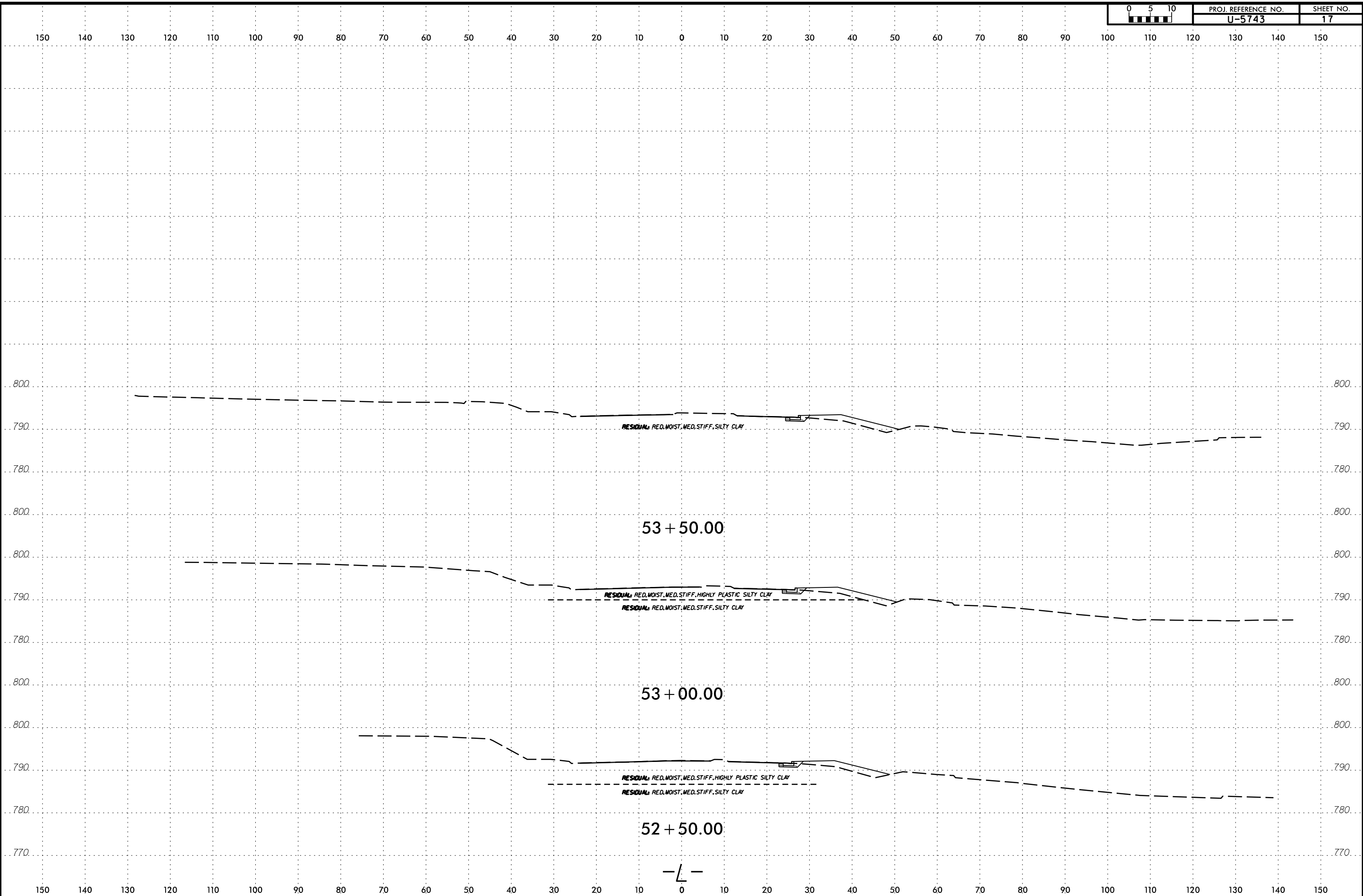


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cadd\cadd



PROJ. REFERENCE NO.	SHEET NO.
U-5743	17



RESIDUAL RED. MOIST. MED. STIFF. SILTY CLAY

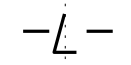
53 + 50.00

RESIDUAL RED. MOIST. MED. STIFF. HIGHLY PLASTIC SILTY CLAY
RESIDUAL RED. MOIST. MED. STIFF. SILTY CLAY

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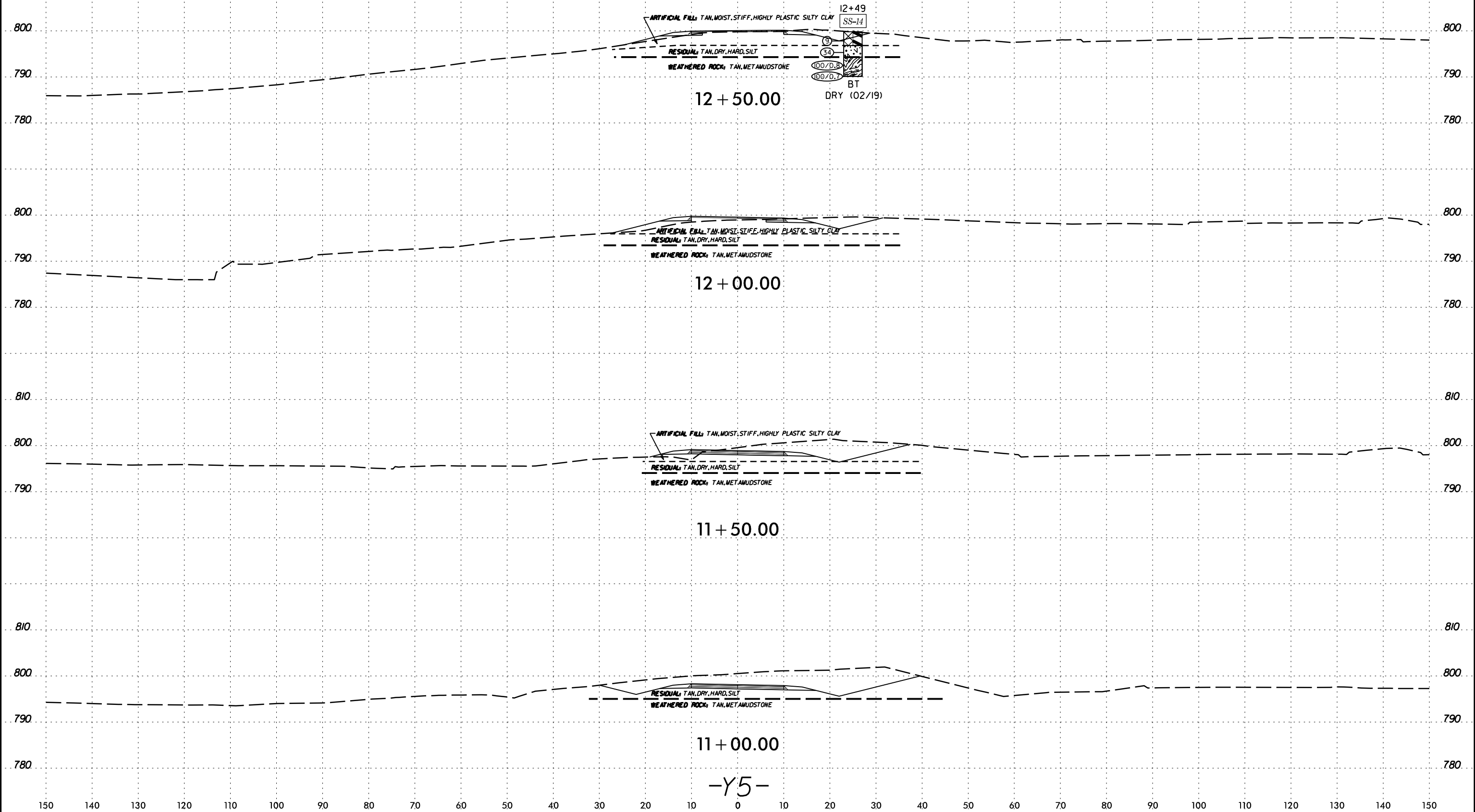
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52 + 50.00





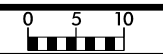
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-14	25 FT RT	12+49	1.0'-2.5'	A-7-6	68	42	0	8	31	61	100	100	96	30	-



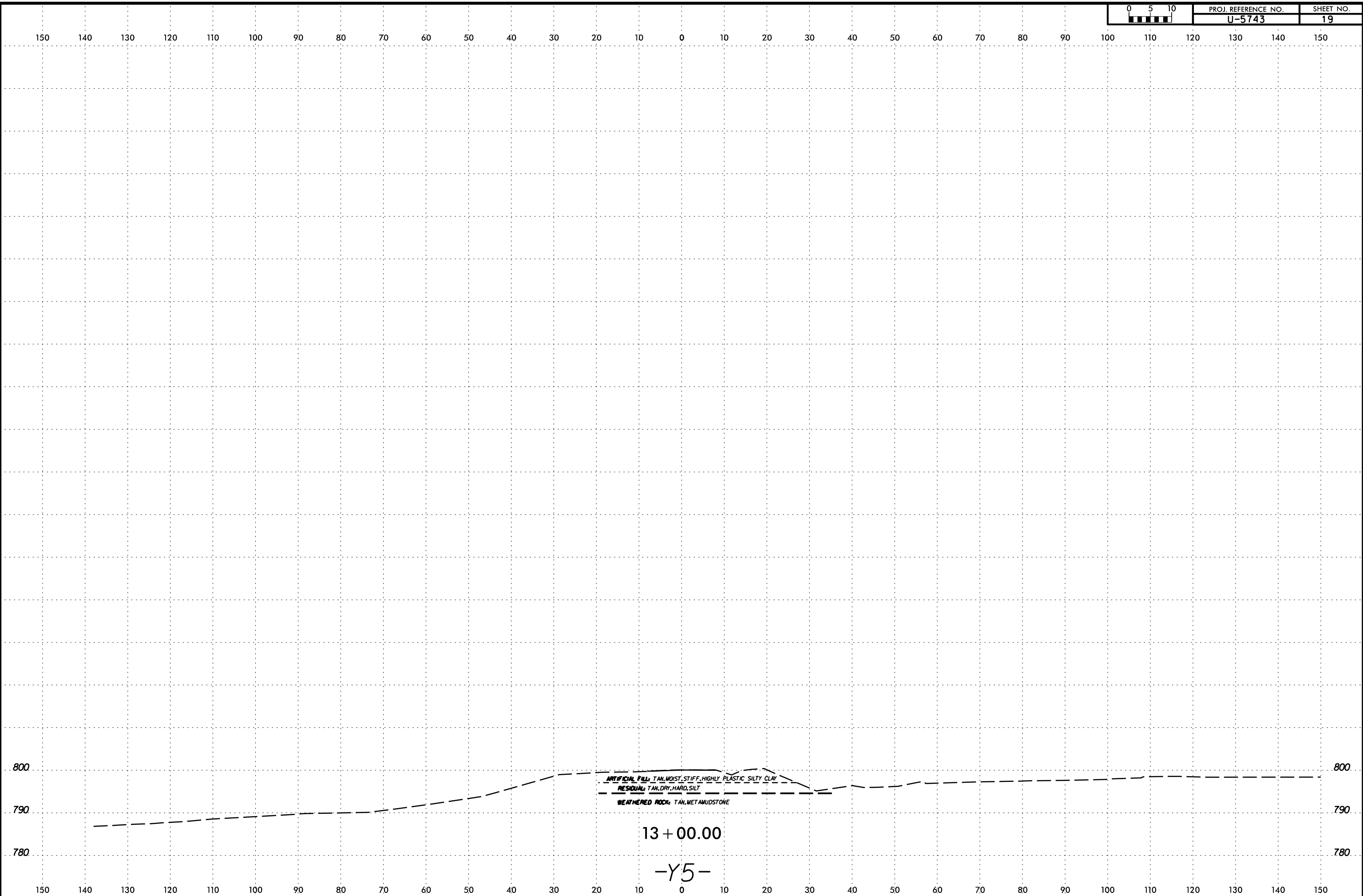
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6/23/16



PROJ. REFERENCE NO.	SHEET NO.
U-5743	19



ARTIFICIAL FILL, TAN, MOIST, STIFF, HIGHLY PLASTIC SILTY CLAY
RESIDUAL, TAN, DRY, HARD SILT
WEATHERED ROCK, TAN, METAMUDSTONE

13 + 00.00

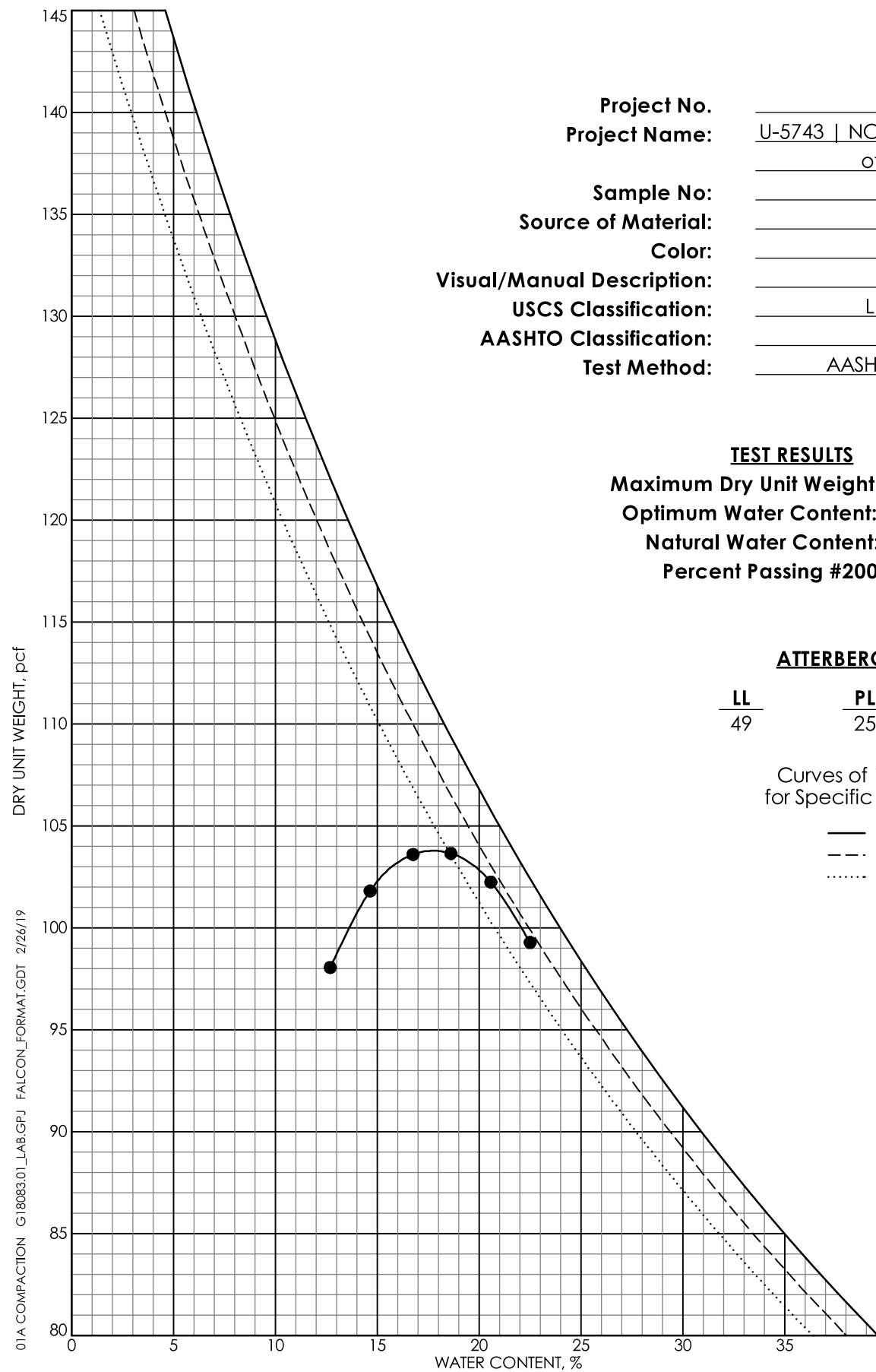
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
APPENDIX A
LABORATORY RESULTS

REFERENCE: U-5743

PROJECT: 50165

DS
WSH
INITIALS
4/17/2019
DATE



Project No: G18083.01
 Project Name: U-5743 | NC 42 from SR 2237 to North of US 64 / NC 49
 Sample No: BS-01
 Source of Material: L_3400
 Color: Tan
 Visual/Manual Description: Silty Clay
 USCS Classification: LEAN CLAY(CL)
 AASHTO Classification: A-7-6
 Test Method: AASHTO T-99 Method A

TEST RESULTS
 Maximum Dry Unit Weight: 103.8 PCF
 Optimum Water Content: 17.7 %
 Natural Water Content: 22.0 %
 Percent Passing #200: 93.6 %

ATTERBERG LIMITS

LL	PL	PI
49	25	24

Curves of 100% Saturation for Specific Gravity Equal to:
 — 2.6
 - - - 2.5
 2.4

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, Cary, NC 27513

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

PROJECT #: G18083.01 DATE: 2/25/2019
 PROJECT NAME: U-5743 | NC42 from SR 2237 to North of US 64 / NC 49
 BORING: L_3400 SAMPLE: BS-01 DEPTH: 1.0-6.0'

SOIL DESCRIPTION: Tan Silty Clay (A-7-6)

COMPACTION METHOD	AASHTO T99 A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	103.8 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	17.7%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	102.4 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	17.6%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.6%	SWELL	5.56%

