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REFERENCE: R-5752

PROJECT: 53088

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.	R-5752	1	52

**CAUTION NOTICE**

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

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

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

PERSONNEL

GEOSYNTEC

CAROLINA DRILLING

INVESTIGATED BY ROHIT WARRIER

DRAWN BY CHUCK TURLINGTON

CHECKED BY NJOROGE WAINAINA

SUBMITTED BY NJOROGE WAINAINA

DATE DECEMBER 2016

**CONTENTS**

LINE	STATION	PLAN	PROFILE
-L-	26+65 TO 148+24	4-10	11-12
-Y-	22+50 TO 39+50	5	13-14
-Y-	19+35 TO 22+50	8	13
-Y-	39+50 TO 41+76	8	14
-YRPA-	5+00 TO 25+19	5	15
-YRPB-	5+00 TO 20+60	5	16
-YRPC-	5+00 TO 27+58	5	17
-YRPD-	5+00 TO 20+92	5	18

**CROSS SECTIONS**

LINE	STATION	SHEET NO.
-Y-	35+50 TO 42+00	19-24
-YRPA-	14+00 TO 23+50	25-34
-YRPB-	10+50 TO 14+00	35-38
-YRPC-	14+50 TO 25+50	39-48
-YRPD-	18+50 TO 19+50	49-50

**APPENDICES**

APPENDIX	TITLE	SHEETS
B	BORELOG B-1	52

# ROADWAY SUBSURFACE INVESTIGATION

COUNTY ROBESON

PROJECT DESCRIPTION US 74 FROM SR 2220 TO SR 2225.

UPGRADE THE US 74/SR 2220 INTERSECTION TO AN

INTERCHANGE, AND UPGRADE THE US 74/SR 2225

INTERSECTION TO A DIRECTIONAL CROSSOVER

## INVENTORY



DocuSigned by:  
Njoroge Wainaina 1/12/2017

\_\_\_\_\_  
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

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 (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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with 4 columns: GENERAL CLASS., GRANULAR MATERIALS (<= 35% PASSING #200), SILT-CLAY MATERIALS (> 35% PASSING #200), and ORGANIC MATERIALS. Includes symbols for various soil types and moisture/consistency levels.

CONSISTENCY OR DENSENESS

Table mapping PRIMARY SOIL TYPE to COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE, and RANGE OF UNCONFINED COMPRESSIVE STRENGTH.

TEXTURE OR GRAIN SIZE

Table showing U.S. STD. SIEVE SIZE OPENING (MM) and GRAIN SIZE (MM) for different soil components like Boulder, Cobble, Gravel, etc.

SOIL MOISTURE - CORRELATION OF TERMS

Table relating SOIL MOISTURE SCALE (Atterberg Limits), FIELD MOISTURE DESCRIPTION, and GUIDE FOR FIELD MOISTURE DESCRIPTION.

PLASTICITY

Table showing PLASTICITY INDEX (PI) and DRY STRENGTH for different soil types like Non-Plastic, Slightly Plastic, etc.

COLOR

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL

Table showing percentages for ORGANIC MATERIAL, GRANULAR SOILS, SILT - CLAY SOILS, and OTHER MATERIAL.

GROUND WATER

- Water level symbols: inverted triangle for water level in bore hole, triangle for static water level, triangle with PW for perched water, and wavy line for spring or seep.

MISCELLANEOUS SYMBOLS

- Various symbols for roadway embankment, soil symbol, artificial fill, inferred soil boundary, inferred rock line, alluvial soil boundary, test boring, auger boring, monitoring well, piezometer installation, and slope indicator.

RECOMMENDATION SYMBOLS

- Symbols for undercuts (shallow and deep), unclassified excavation (unsuitable waste and acceptable rock), and unclassified excavation (acceptable but not to be used in embankment).

ABBREVIATIONS

- Alphabetical list of abbreviations for soil and rock testing methods and equipment, such as AR - Auger Refusal, BT - Boring Terminated, etc.

EQUIPMENT USED ON SUBJECT PROJECT

- Checklist of equipment used, including Drill Units (CME-45C, CME-55, etc.), Advancing Tools (Clay bits, augers, etc.), Hammer Type (Automatic, Manual), Core Size, Hand Tools (Post hole digger, etc.), and Auger bits.

ROCK DESCRIPTION

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:

- Weathered Rock (WR) symbol and description: Non-coastal plain material that would yield SPT N values > 100 blows per foot.
Crystalline Rock (CR) symbol and description: Fine to coarse grain igneous and metamorphic rock that would yield SPT refusal if tested.
Non-Crystalline Rock (INCR) symbol and description: Fine to coarse grain metamorphic and non-coastal plain sedimentary rock.

WEATHERING

- Rock weathering categories: Fresh, Very Slight (IV SLI), Slight (SLI), Moderate (MOD), Moderately Severe (MOD. SEV.), Severe (SEV), Very Severe (IV SEV.), Complete. Includes descriptions of joint staining, discoloration, and strength loss.

ROCK HARDNESS

- Rock hardness categories: Very Hard, Hard, Moderately Hard, Medium Hard, Soft, Very Soft. Includes descriptions of scratchability and blow requirements.

FRACTURE SPACING

Table mapping Fracture Spacing (Very Wide to Very Close) to Bedding Thickness (Very Thickly Bedded to Thinly Laminated).

INDURATION

- Induration categories: Friable, Moderately Indurated, Indurated, Extremely Indurated. Includes descriptions of friability, separation with steel probe, and sample break requirements.

TERMS AND DEFINITIONS

- Definitions for geological terms: Alluvium (Alluv.), Aquifer, Arenaceous, Argillaceous, Artesian, Calcareous (Calc.), Colluvium, Core Recovery (REC.), Dike, Dip, Dip Direction (Dip Azimuth), Fault, Fissile, Float, Flood Plain (FP), Formation (FM), Joint, Ledger, Lens, Mottled (MOT.), Perched Water, Residual (RES.) Soil, Rock Quality Designation (RQD), Saprolite (SAP.), Sill, Slickenside, Standard Penetration Test (SPT), Strata Core Recovery (SREC), Strata Rock Quality Designation (SROD), Topsoil (TS).

ELEVATION: \_\_\_\_\_ FEET

- NOTES: TIN FILE NAME 'r5752\_is.tbl.in' WITH FILE DATE 2/23/2016, WAS USED TO GENERATE BORING TOP ELEVATIONS, EXCEPT BORINGS B30-RR AND B-32 WERE SURVEYED UNDER SEPARATE PROJECT R-5752 BROG.
BT: BORING TERMINATION
FIAD: FILLED IN AFTER DRILLING
N/A: NOT APPLICABLE
WOH: WEIGHT OF HAMMER

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**ROBESON COUNTY**

LOCATION: US 74 FROM SR 2220 TO SR 2225.

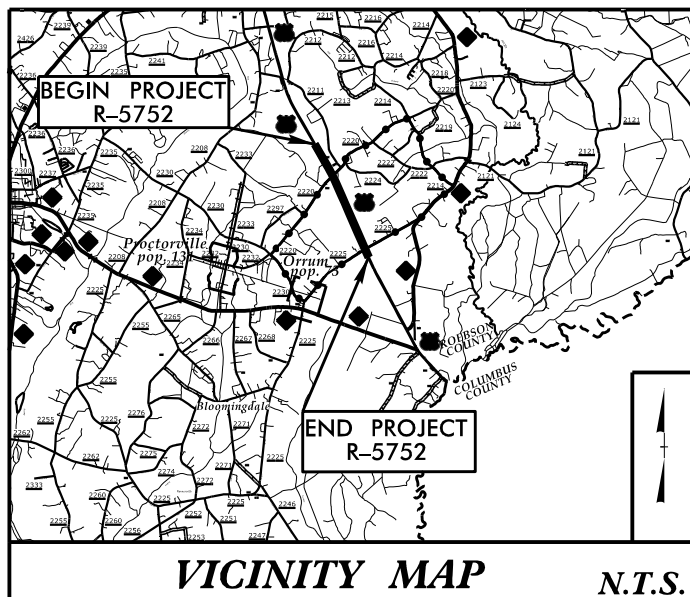
UPGRADE THE US 74/SR 2220 INTERSECTION TO AN INTERCHANGE, AND UPGRADE THE US 74/SR 2225 INTERSECTION TO A DIRECTIONAL CROSSOVER

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

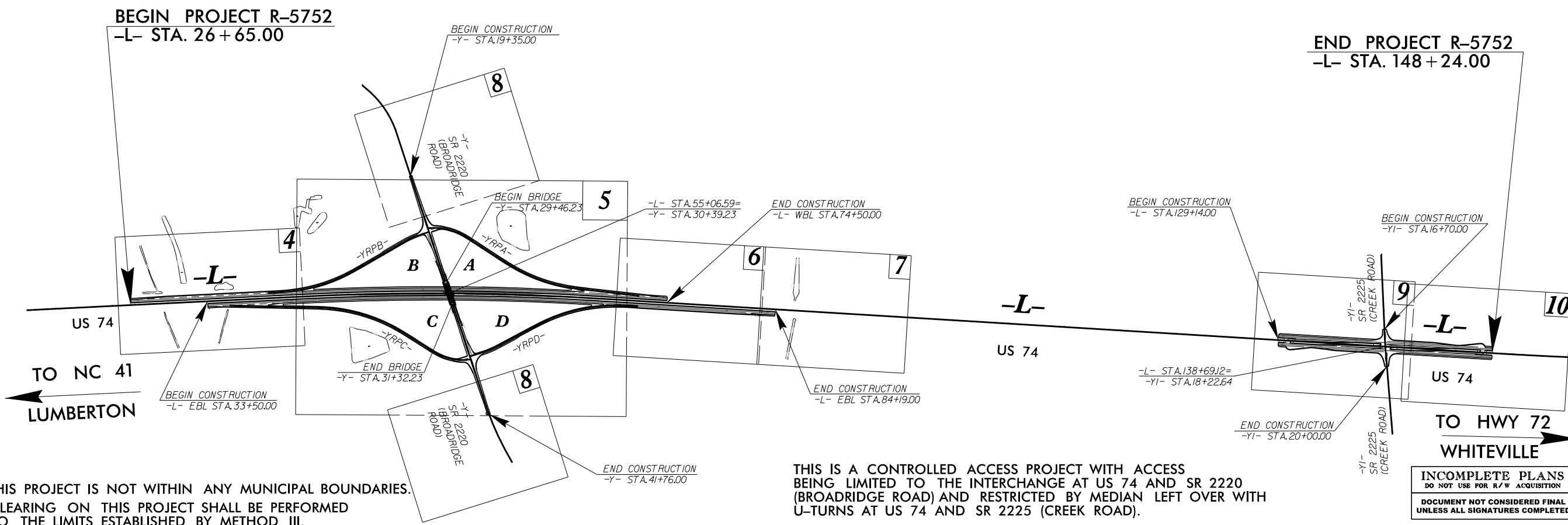
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5752	3	52
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
53088.1.FD1	HSIP-0074 (170)	P.E.	
53088.2.1	HSIP-0074 (170)	RW /UTIL	
53088.3.1	HSIP-0074 (170)	CONST.	

25% PRELIMINARY PLANS

TIP PROJECT: R-5752



OFF-SITE DETOUR ROUTE

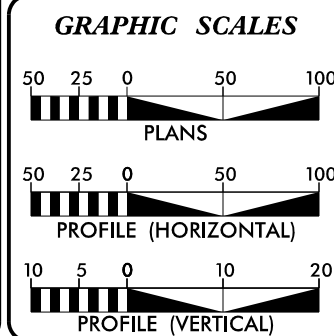


THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO THE INTERCHANGE AT US 74 AND SR 2220 (BROADRIDGE ROAD) AND RESTRICTED BY MEDIAN LEFT OVER WITH U-TURNS AT US 74 AND SR 2225 (CREEK ROAD).

INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION  
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UNLESS ALL SIGNATURES COMPLETED

CONTRACT:



**DESIGN DATA**

ADT 2018	=	10,100
ADT 2038	=	16,400
DHV	=	9 %
D	=	55 %
T	=	20 % *
V	=	75 MPH
* TTST = 17 DUAL 3		
FUNC CLASS = INTERSTATE STATEWIDE TIER		

**PROJECT LENGTH**

SECTION 1:	
LENGTH ROADWAY TIP PROJECT R-5752	= 1.090 MILES
SECTION 2:	
LENGTH ROADWAY TIP PROJECT R-5752	= 0.362 MILES
SECTION 1 & 2:	
LENGTH STRUCTURE TIP PROJECT R-5752	= 0.000 MILES
TOTAL LENGTH TIP PROJECT R-5752	= 1.452 MILES

Prepared In the Office of:  
**CDM Smith**  
CDM Smith Inc.  
5400 Glenwood Avenue  
Suite 400  
Raleigh, NC 27612-3228  
NC CDA No. F-0412

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:  
MARCH 2017

LETTING DATE:  
FEBRUARY 2018

DAVID J. CLODGO, P.E.  
PROJECT ENGINEER

CURTIS J. TILLMAN, P.E.  
PROJECT DESIGN ENGINEER

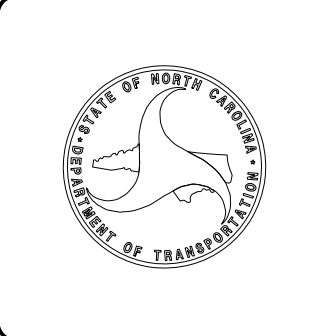
SEAN MATUSZEWSKI  
NCDOT CONTACT

**HYDRAULICS ENGINEER**

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

**ROADWAY DESIGN ENGINEER**

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



December 20, 2016

WBS NUMBER 53088.1.FD1  
TIP NUMBER R-5752  
COUNTY: Robeson  
DESCRIPTION: US 74 from SR 2220 to SR 2225. Upgrade the US 74/SR 2220 intersection to an interchange, and upgrade the US 74/SR 2225 intersection to a directional crossover.  
SUBJECT: Geotechnical Report – Inventory

Geosyntec Consultants has completed a subsurface investigation for this project and presents the following inventory.

**Project Description**

The project area lies northeast of the town of Proctorville along the existing US 74 beginning just west of Broadridge Road (Station 26+65) and extend eastward 2.3 miles to just east of Creek Road (Station 148+24). The proposed project consist of converting the at-grade intersection at Broadridge Road to an interchange and converting the at-grade intersection at Creek Road to a directional crossover. The roadway construction scope of work consist of construction of ramps, approach embankments along Broadridge Road and widening of US 74 around Creek Road.

The geotechnical investigation was conducted in July of 2016. Borings were advanced with an ATV mounted CME 45C drill machine equipped with an automatic hammer. Standard Penetration tests were performed in all borings. Representative soil samples were collected for visual classification in the field and for laboratory analysis by Falcon Engineering.

The following alignments, totaling 1.8 miles were investigated. This report includes subsurface profiles and selected cross sections of these alignments.

<u>Line</u>	<u>Station</u>
-L-	129+14 to 148+24
-Y-	19+35 to 41+76
-YRPA-	5+00 to 25+19

-YRPB-	5+00 to 20+60
-YRPC-	5+00 to 27+58
-YRPD-	5+00 to 20+92

**Physiography and Geology**

The project corridor is located within the Coastal Plain Physiographic Province. The topography along the project is relatively flat to gently sloping. The elevation in the majority of the project range from 115± to 130± feet except in the low lying areas where the elevation ranged for 103± to 109± feet. The low lying areas exhibit poor surface drainage with areas of standing water and swampy ground. Surface waters generally drain into the Lumber River.

Surficial soils in this area are generally derived from alluvial deposition and weathering of the Coastal Plain formation materials and primarily consist of fine sands, silty sands and clayey sands. The surficial soils are underlain by the Tertiary marine deposits of the Yorktown Formation. The Yorktown Formation deposits are underlain by Cretaceous marine deposits of the Black Creek Formation.

**Soil Properties**

Soils encountered on this project have been divided into four categories, 1) roadway embankment 2) alluvial soils, 3) Coastal Plain soils, and 4) artificial fill.

Roadway embankment soils are present along existing US 74 and Broadridge Road. They typically consist of black, brown, red, very loose to medium dense, moist, silty sands and clayey sands (A-2-4 and A-2-6) and stiff to very stiff, moist, sandy silt (A-4).

Alluvial soils were generally encountered in low lying areas on the eastern end of -YRPA- and -YRPD- alignments. These soils typically consist of black, gray, very loose to medium dense, moist to saturated, fine sands, silty sands and clayey sands (A-3, A-2-4 and A-2-6). The alluvial soils range in thickness from 3± to 5± feet.

Coastal Plain soils of the Yorktown and Black Creek Formations were encountered throughout the project site. The thickness of the Yorktown was approximately 20 ± feet and Black Creek Formation soils were encountered from depths of approximately 20± feet to the bottom of the

deepest borings (90 feet). Yorktown Formation soils consist of dark gray, gray, tan, red, brown, very loose to medium dense, moist to saturated, fine sands, silty sands and clayey sands (A-3, A-2-4 and A-2-6); and very soft to stiff, moist to saturated, sandy silts, sandy clays and silty clays (A-4, A-6, A-7-5 and A-7-6). Black Creek Formation soils consist of gray, tan, medium dense, wet to saturated, fine sands and clayey sands (A-3 and A-2-6); and dark gray, gray, very stiff to hard, wet, sandy and silty clays (A-6, A-7-5 and A-7-6).

Artificial fills were encountered along the -YRPA- alignment. Artificial fills consist of black, brown, very loose to medium dense, moist silty sands (A-2-4). There is a small localized area of artificial fill consisting of construction debris (broken up concrete pipes and rip rap) at Station 15+00±.

**Ground Water**

Ground water data was collected during the month of July 2016 during a time of above normal precipitation. The depths to ground water table ranges from 0 to 9 feet from the existing ground surface. Seasonal fluctuations in groundwater table should be expected.

Ponds: One pond was noted within the construction limit at the following location:

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-YRPA-	15+75 to 16+00	LT

Drainage Ditches: One drainage ditch (4 feet wide and 3 feet deep at Station 17+50) was noted within the construction limit at the following location:

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-YRPD-	15+00 to 19+80	LT

**Areas of Special Geotechnical Interest**

1) High Ground Water: Ground water was encountered within 6 feet of final grade at the following locations:

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-L-	139+00 to 141+00	LT and RT

-Y-	21+00 to 23+50	LT and RT
-Y-	37+75 to 40+00	LT and RT
-YRPB-	11+00 to 12+50	LT and RT
-YRPC-	8+00 to 14+75	LT and RT
-YRPC-	20+00 to 22+00	LT and RT

2) Artificial Fill: Areas of artificial fill were encountered at the following locations:

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-YRPA-	14+30 to 23+50	LT and RT

3) Soft Soils: The following areas were found to contain soft clay soils

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-Y-	37+75 to 41+00	LT and RT
-YRPB-	10+75 to 13+75	LT and RT

4) High Plastic Soils: Clay and Clayey Sandy soils with high plasticity (PI > 15) were encountered either within 3 feet of final grade or above final grade in cut areas at the following locations:

<u>Line</u>	<u>Station</u>	<u>Offsets</u>
-Y-	37+75 to 41+00	RT and LT
-YRPC-	14+75 to 25+00	LT and RT

Prepared by

Njoroge Wainaina  
Senior Consultant

**APPENDIX A**

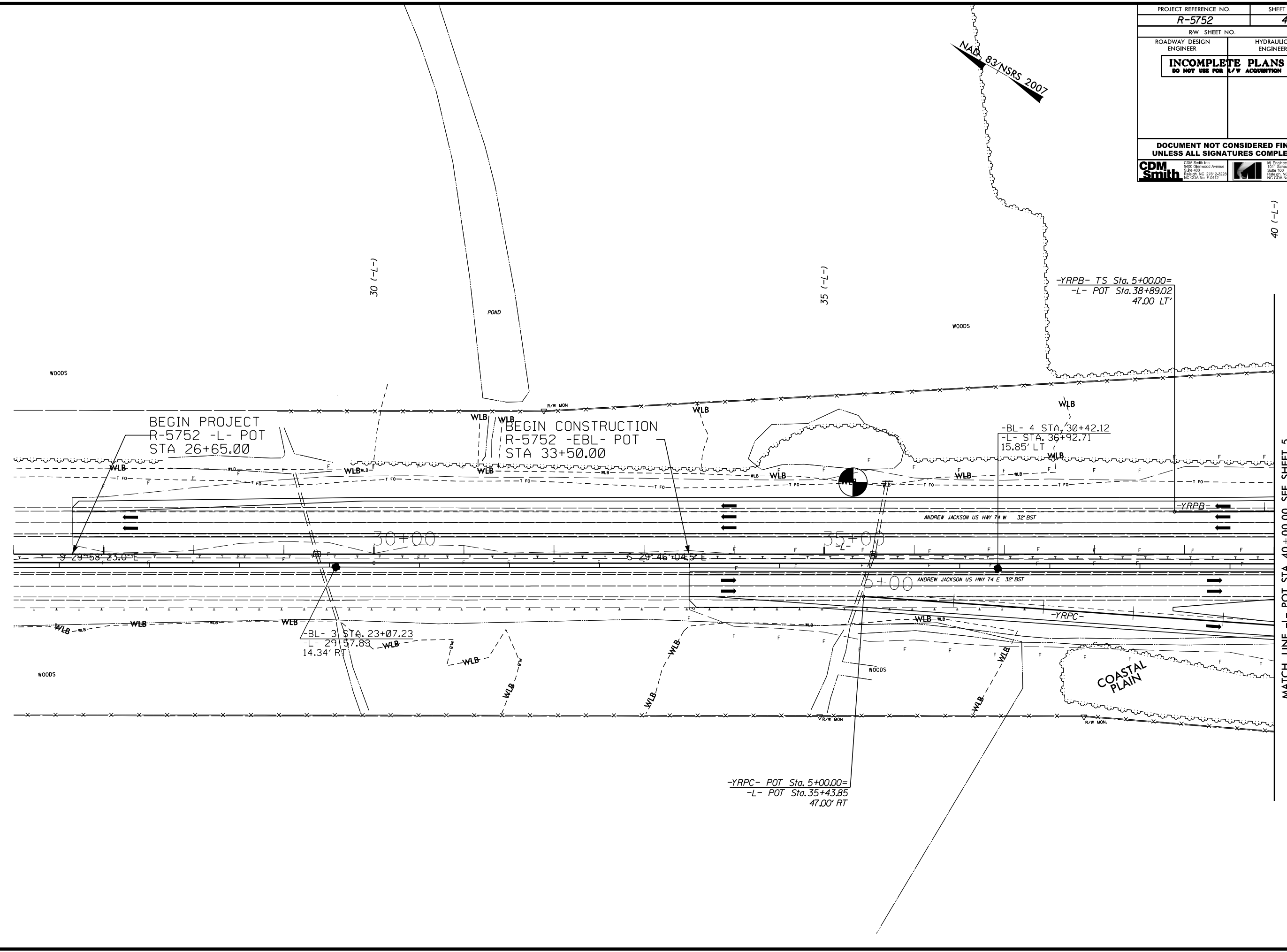
**Undisturbed and Bulk Samples**

Undisturbed Samples: Undisturbed thin wall Shelby tube samples were collected at the following locations along the -Y- alignment and submitted for testing.

<u>Sample No.</u>	<u>Station</u>	<u>Depth (ft)</u>	<u>Test</u>
ST-1	28+85, 35' RT	17.0-19.0	Consolidation, Triaxial CU
ST-2	31+30, 38' RT	18.0-20.0	Consolidation, Triaxial CU

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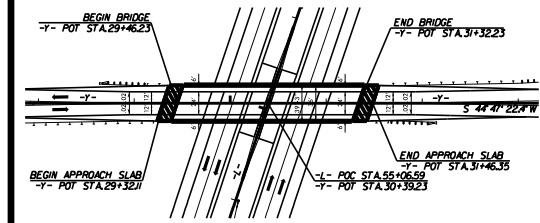
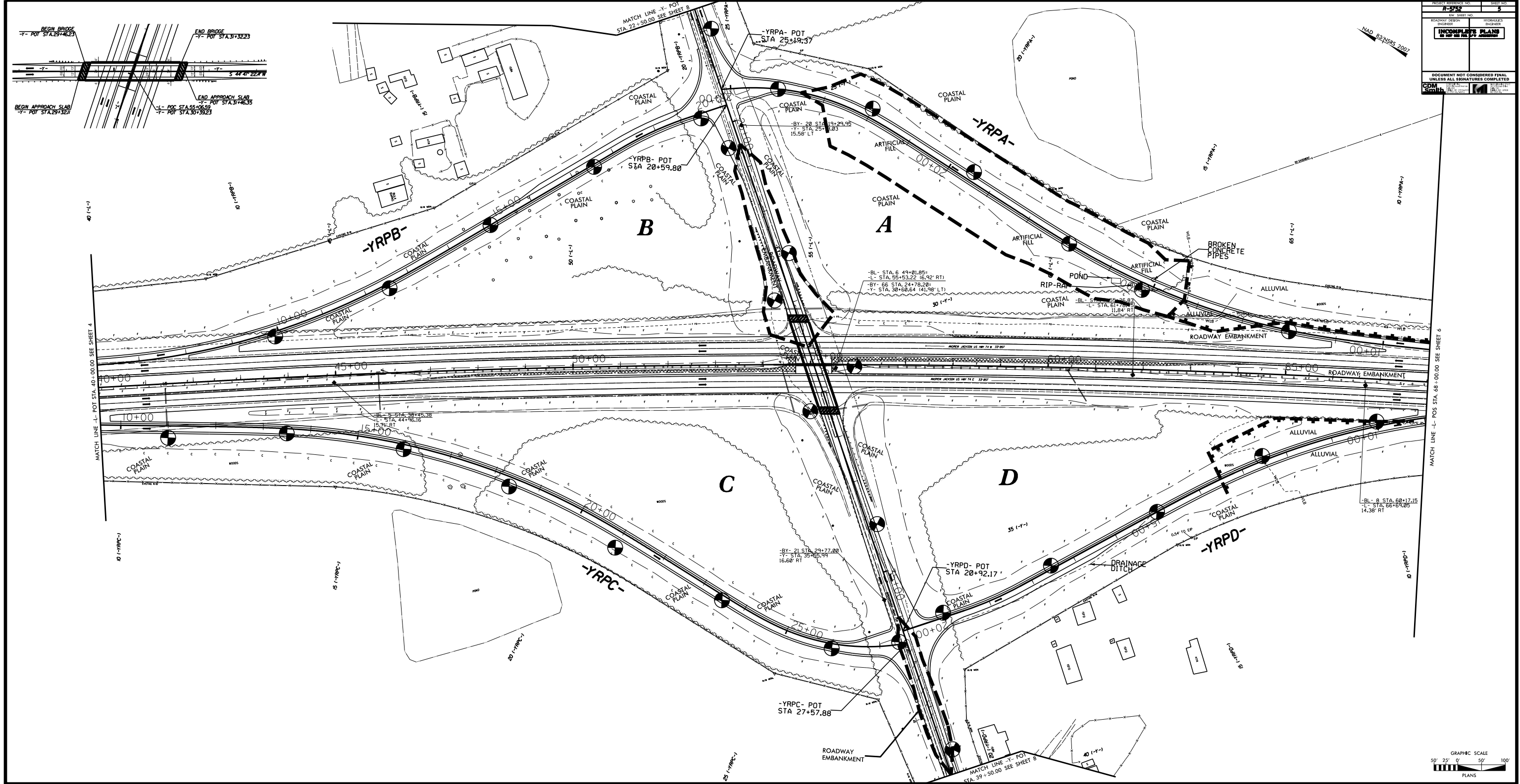
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R-5752	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
<b>CDM Smith</b> CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27612-3228 NC COA No. F-0472	<b>ME Engineering, PLLC</b> 3011 Spruce Drive Raleigh, NC 27606 NC COA No.



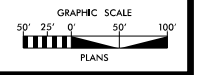
40 (-L-)

MATCH LINE -L- POT STA. 40+00.00 SEE SHEET 5





PROJECT NUMBER	2-152	SHEET NO.	5
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
<b>INCOMPLETE PLANS</b>			
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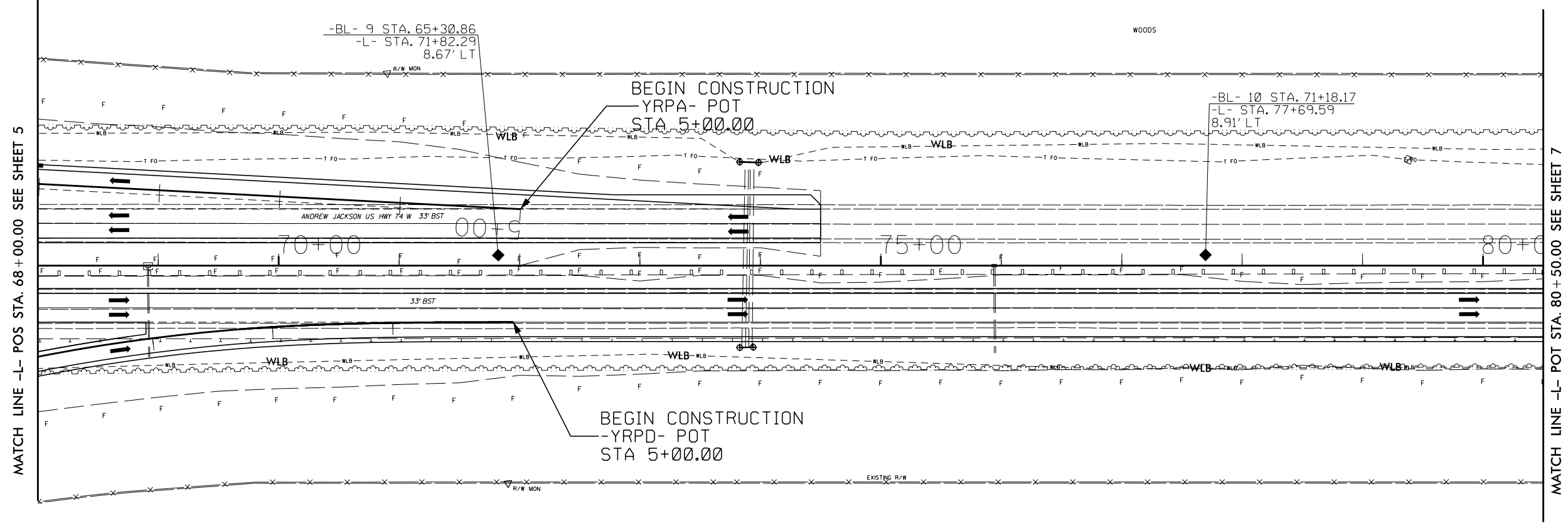
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
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<b>CDM Smith</b> Civil Engineering 5400 Glenwood Avenue Suite 400 Raleigh, NC 27606 NC COA No. F-0472	<b>ML Engineering, PLLC</b> 3011 Spruce Drive Suite 100 Raleigh, NC 27606 NC COA No.

NAD 83/NSRS 2007

70 (-L-)

75 (-L-)

80 (-L-)



MATCH LINE -L- POS STA. 68+00.00 SEE SHEET 5

MATCH LINE -L- POT STA. 80+50.00 SEE SHEET 7

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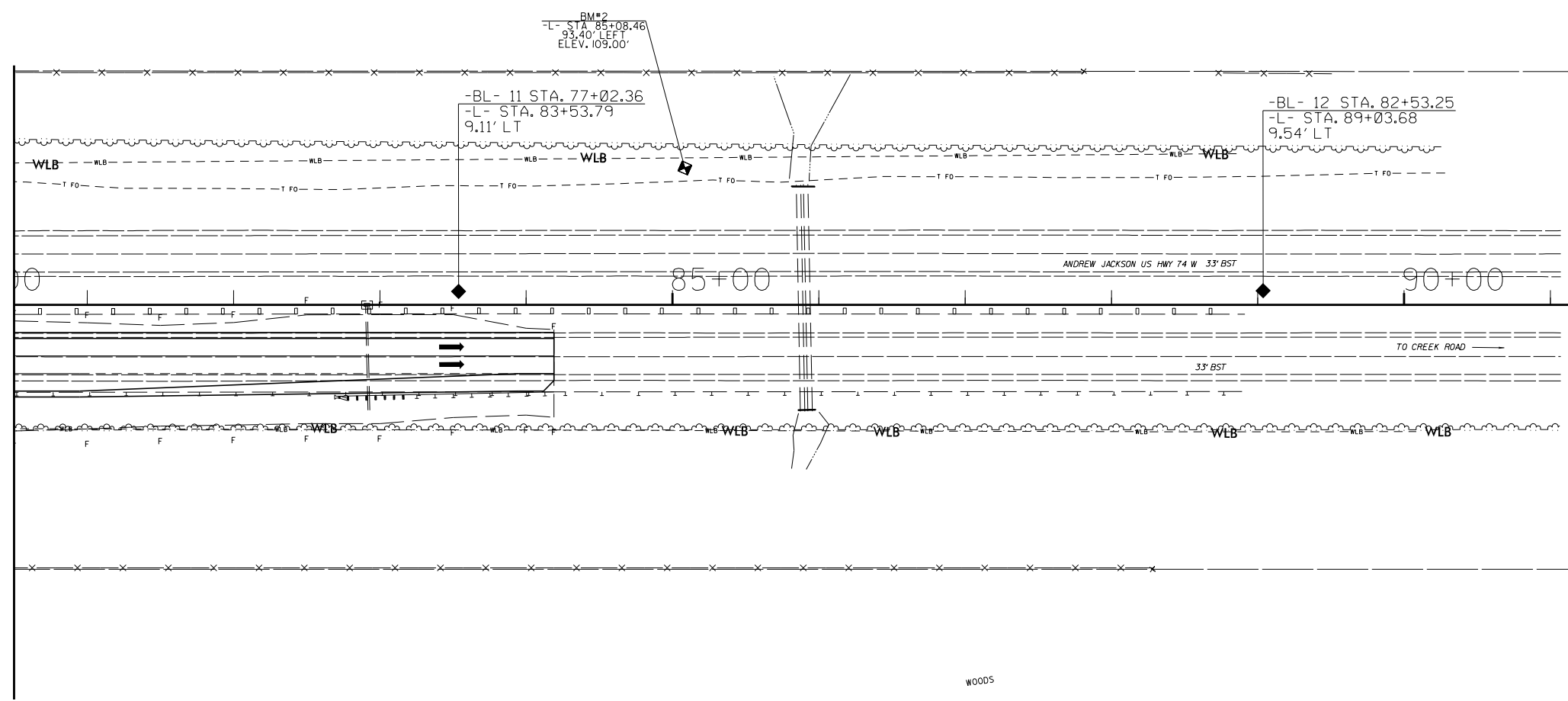
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
<b>CDM Smith</b> CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27606 NC COA No. 4-0472	<b>ME Engineering, PLLC</b> 1011 Glenwood Drive Suite 100 Raleigh, NC 27606 NC COA No.

NAD 83/NSRS 2007

85 (-L-)

90 (-L-)

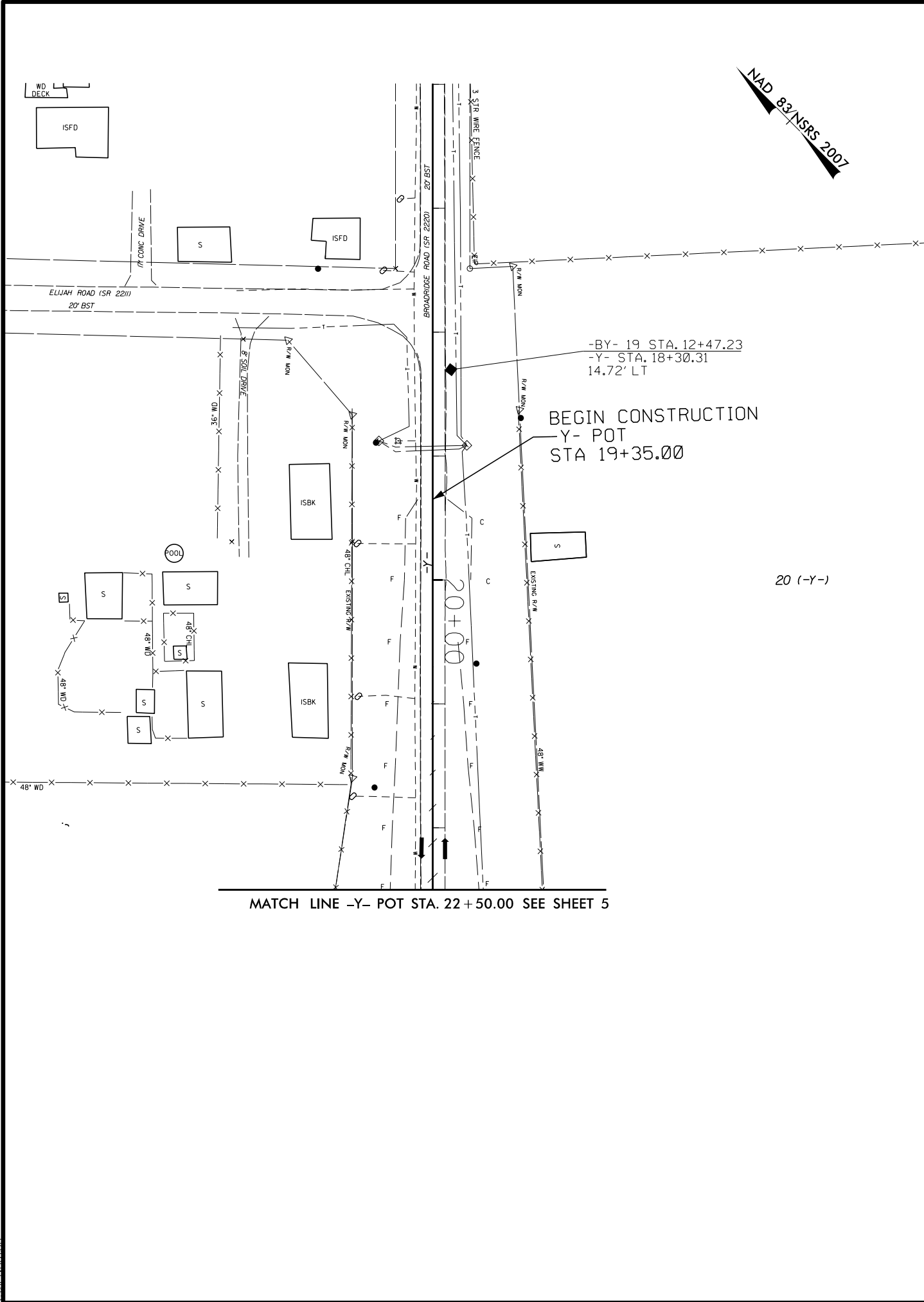
MATCH LINE -L- POT STA. 80 + 50.00 SEE SHEET 6



Y:\R-5752\_GEO\B06\modif\er\CA00D\_GEO\TECH\PlanPr\of\R5752\_GEO.mv.07.dgn

8/17/99

12/19/2016 M:\N\N\0001\1R-5752-RDWAY-R-5752.GEO.RDWAY\_modif\ter\CADD\_GEO\TECHN\1anPr\of\1R5752.GEO\_rnv\_08.dgn

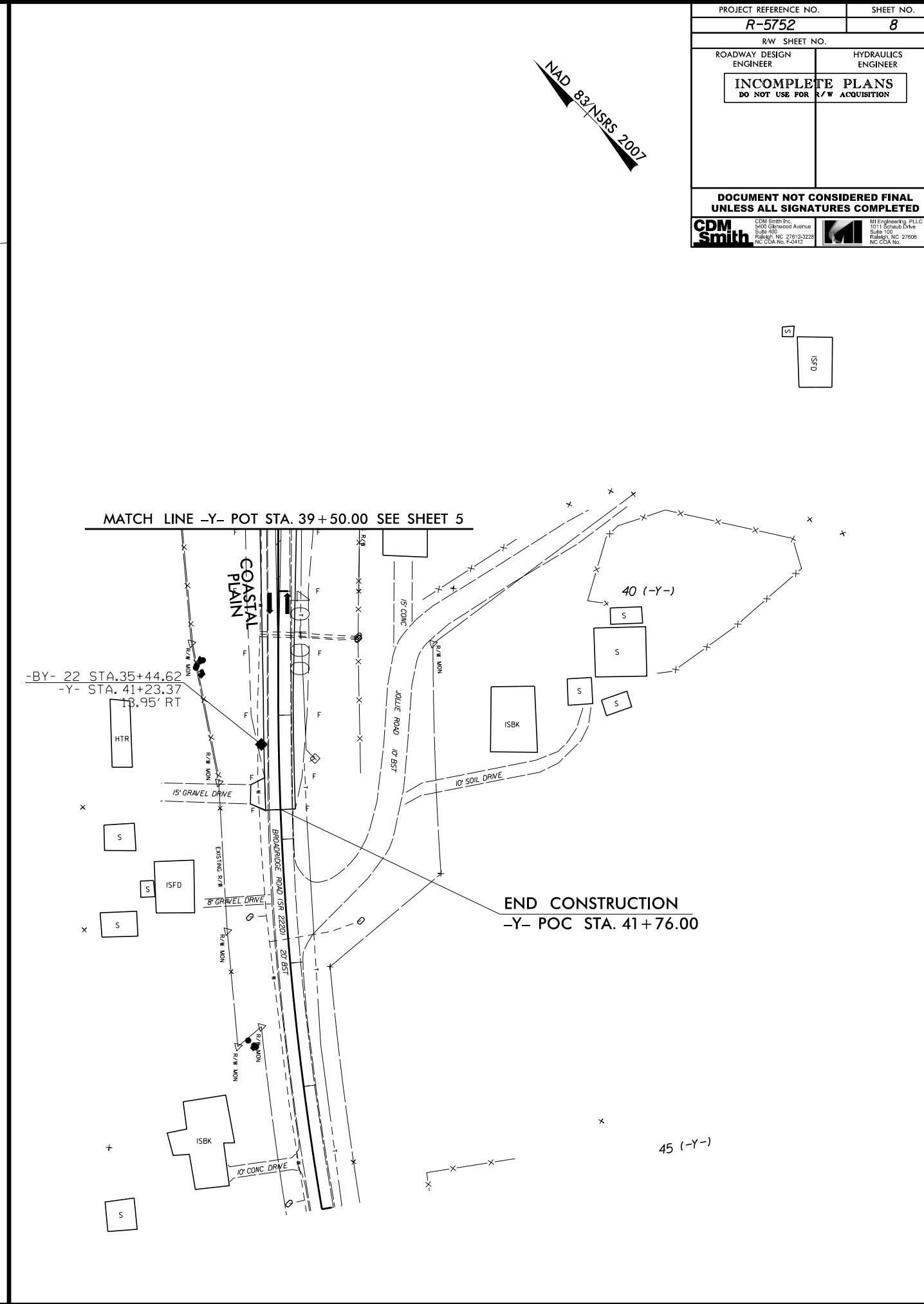


-BY- 19 STA. 12+47.23  
 -Y- STA. 18+30.31  
 14.72' LT

BEGIN CONSTRUCTION  
 Y- POT  
 STA 19+35.00

20 (-Y-)

MATCH LINE -Y- POT STA. 22+50.00 SEE SHEET 5



-BY- 22 STA. 35+44.62  
 -Y- STA. 41+23.37  
 18.95' RT

END CONSTRUCTION  
 -Y- POC STA. 41+76.00

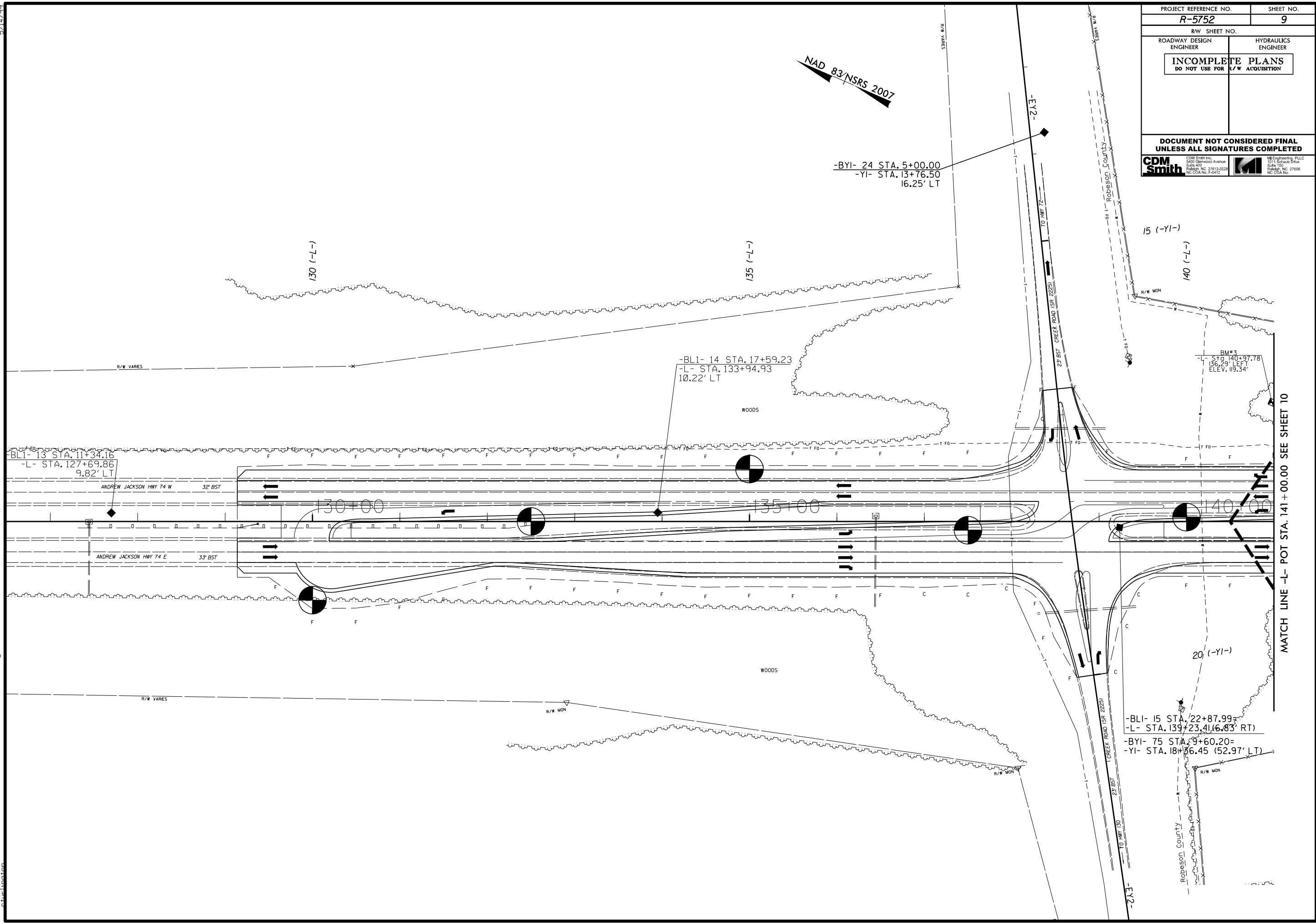
45 (-Y-)

PROJECT REFERENCE NO. <b>R-5752</b>	SHEET NO. <b>8</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
 CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27612-3228 NC CDA No. F-0417	 M1 Engineering, PLLC 1011 Schaub Drive Suite 100 Raleigh, NC 27608 NC CDA No.

5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-5752	9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
<b>CDM Smith</b> Civil & Environmental 4400 Glenwood Avenue Suite 400 Raleigh, NC 27606 NC COA No. F-42472	<b>M Engineering, PLLC</b> 3511 Spruce Drive Raleigh, NC 27606 NC COA No.

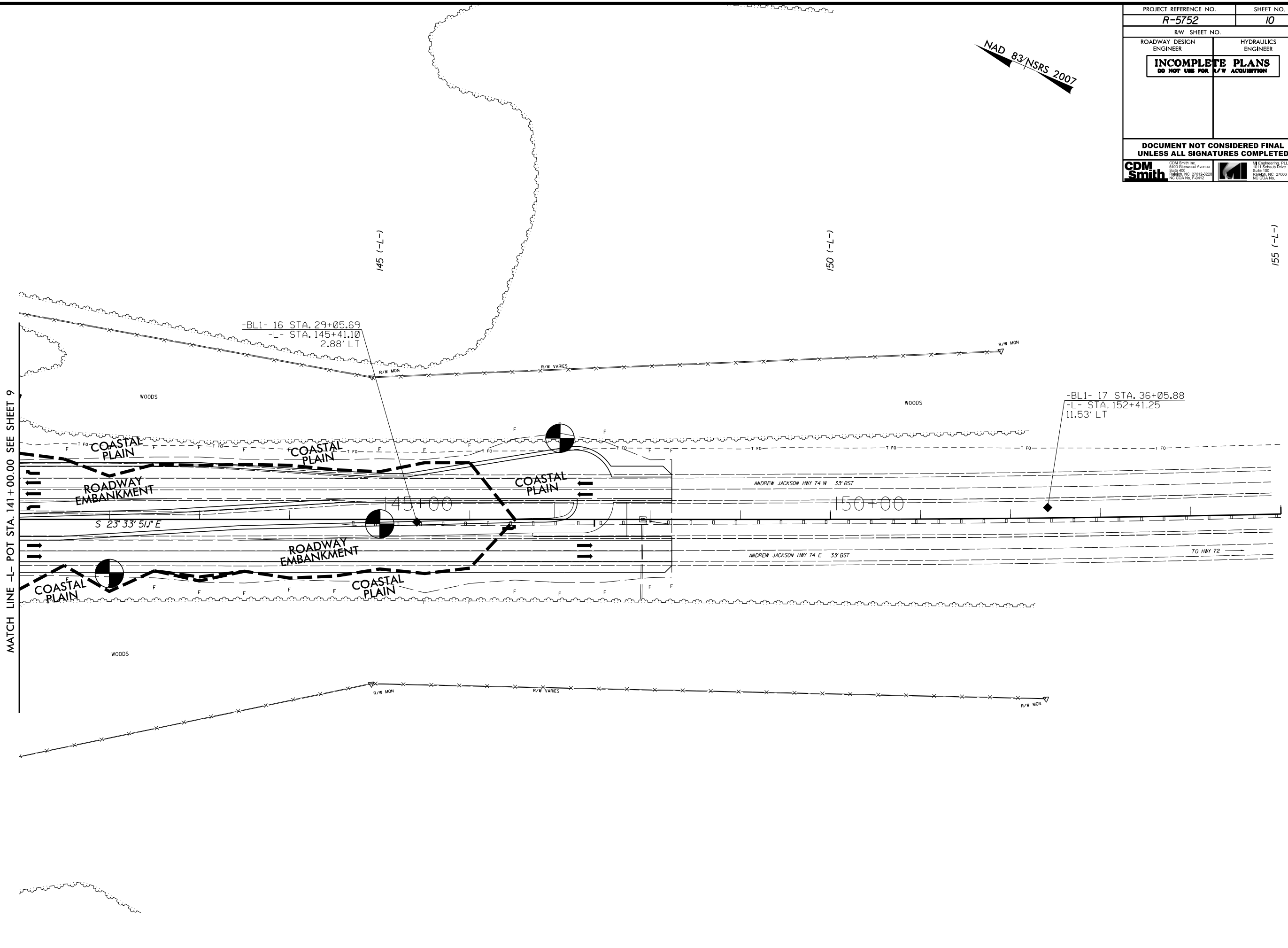


MATCH LINE -L- POT STA. 141+00.00 SEE SHEET 10

5/14/99

PROJECT REFERENCE NO. <b>R-5752</b>	SHEET NO. <b>10</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
<b>CDM Smith</b> CDM Smith Inc. 5400 Glenwood Avenue Suite 400 Raleigh, NC 27612-3228 NC CDA No. F-0412	<b>M Engineering, PLLC</b> 3011 Spruce Drive Suite 100 Raleigh, NC 27606 NC CDA No.

NAD 83/NSRS 2007

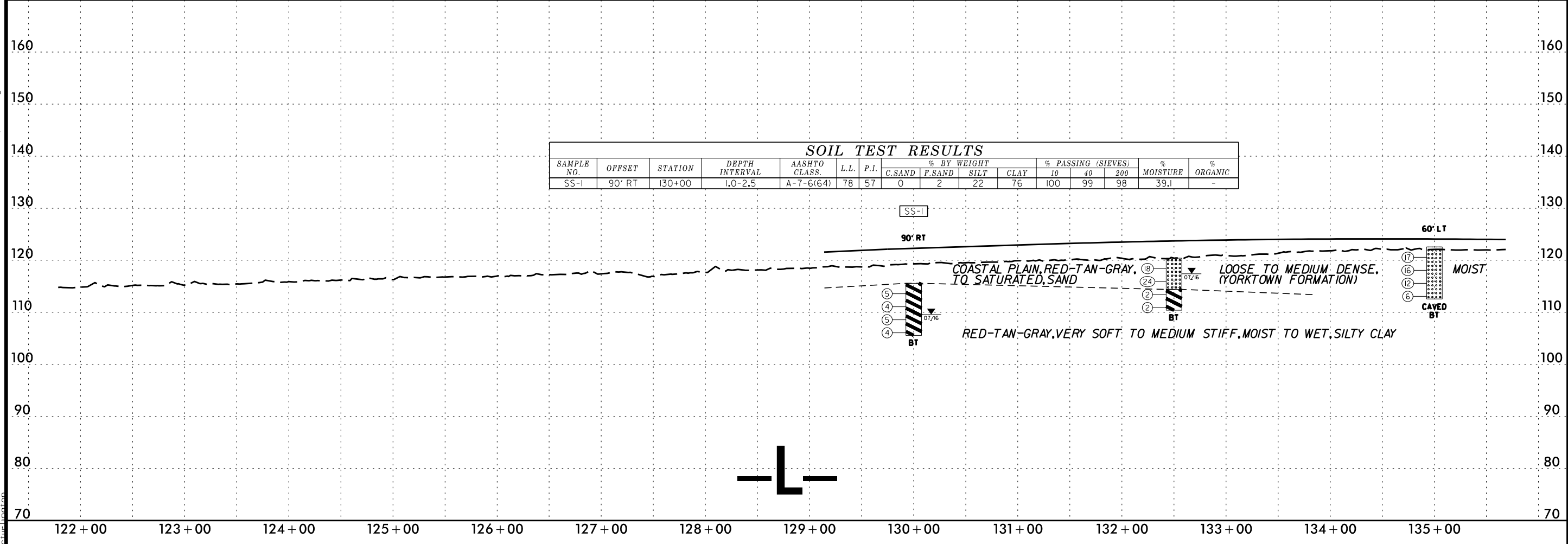


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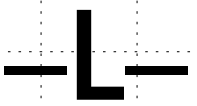
5/28/99

PROJECT REFERENCE NO. R-5752	SHEET NO. 11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	

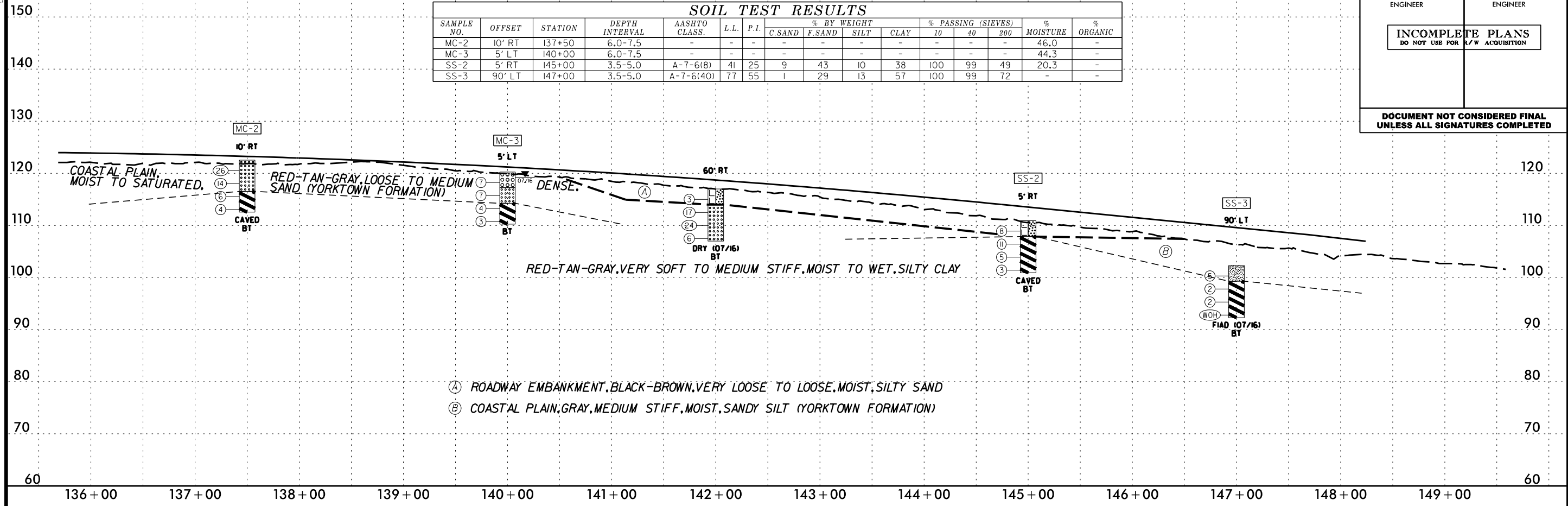
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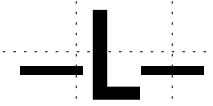
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	90' RT	130+00	1.0-2.5	A-7-6(64)	78	57	0	2	22	76	100	99	98	39.1	-



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		
MC-2	10' RT	137+50	6.0-7.5	-	-	-	-	-	-	-	-	-	46.0	-	
MC-3	5' LT	140+00	6.0-7.5	-	-	-	-	-	-	-	-	-	44.3	-	
SS-2	5' RT	145+00	3.5-5.0	A-7-6(8)	41	25	9	43	10	38	100	99	49	20.3	
SS-3	90' LT	147+00	3.5-5.0	A-7-6(40)	77	55	1	29	13	57	100	99	72	-	



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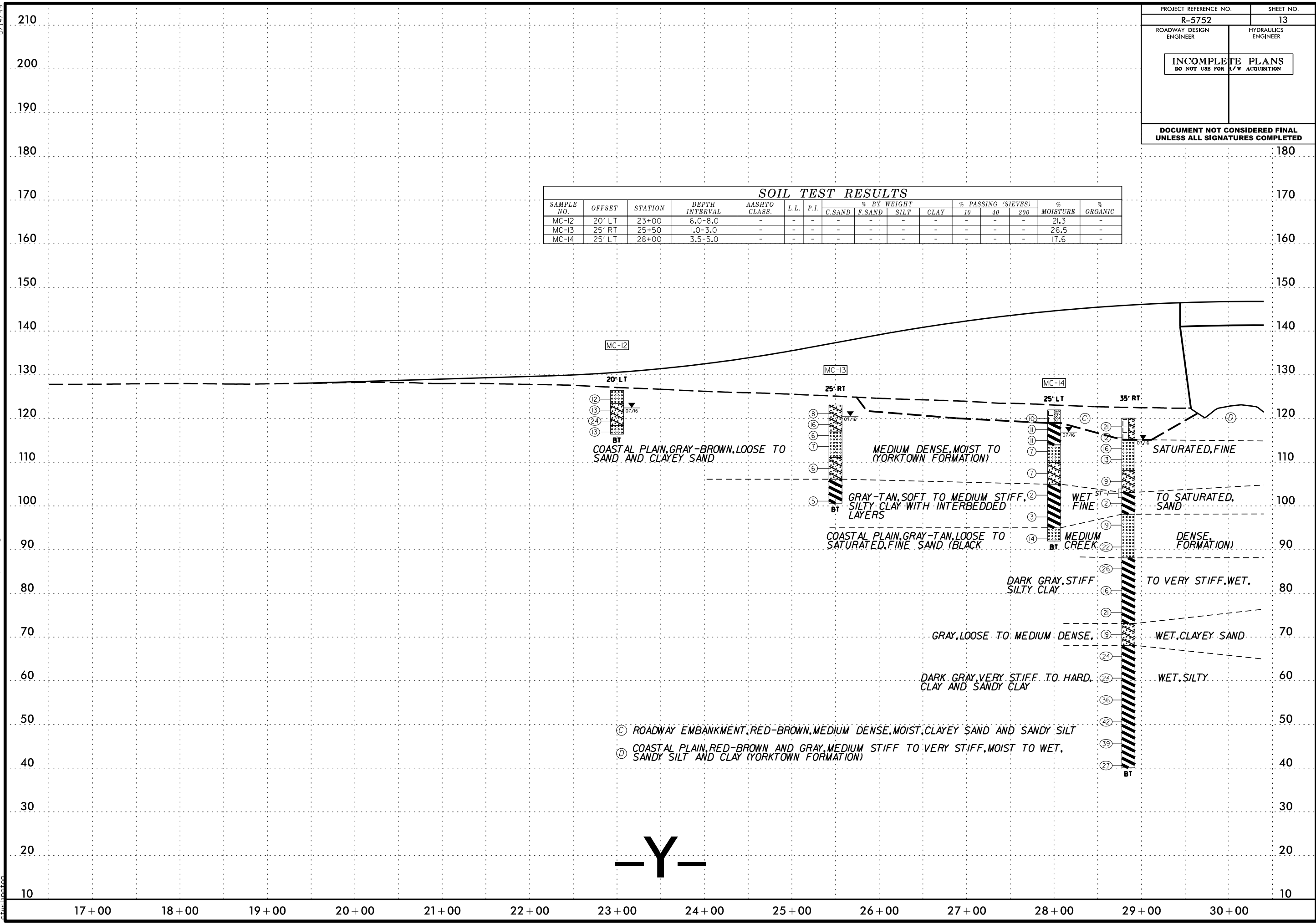




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PROJECT REFERENCE NO. <b>R-5752</b>	SHEET NO. <b>13</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	

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		
MC-12	20' LT	23+00	6.0-8.0	-	-	-	-	-	-	-	-	-	-	21.3	-
MC-13	25' RT	25+50	1.0-3.0	-	-	-	-	-	-	-	-	-	-	26.5	-
MC-14	25' LT	28+00	3.5-5.0	-	-	-	-	-	-	-	-	-	-	17.6	-

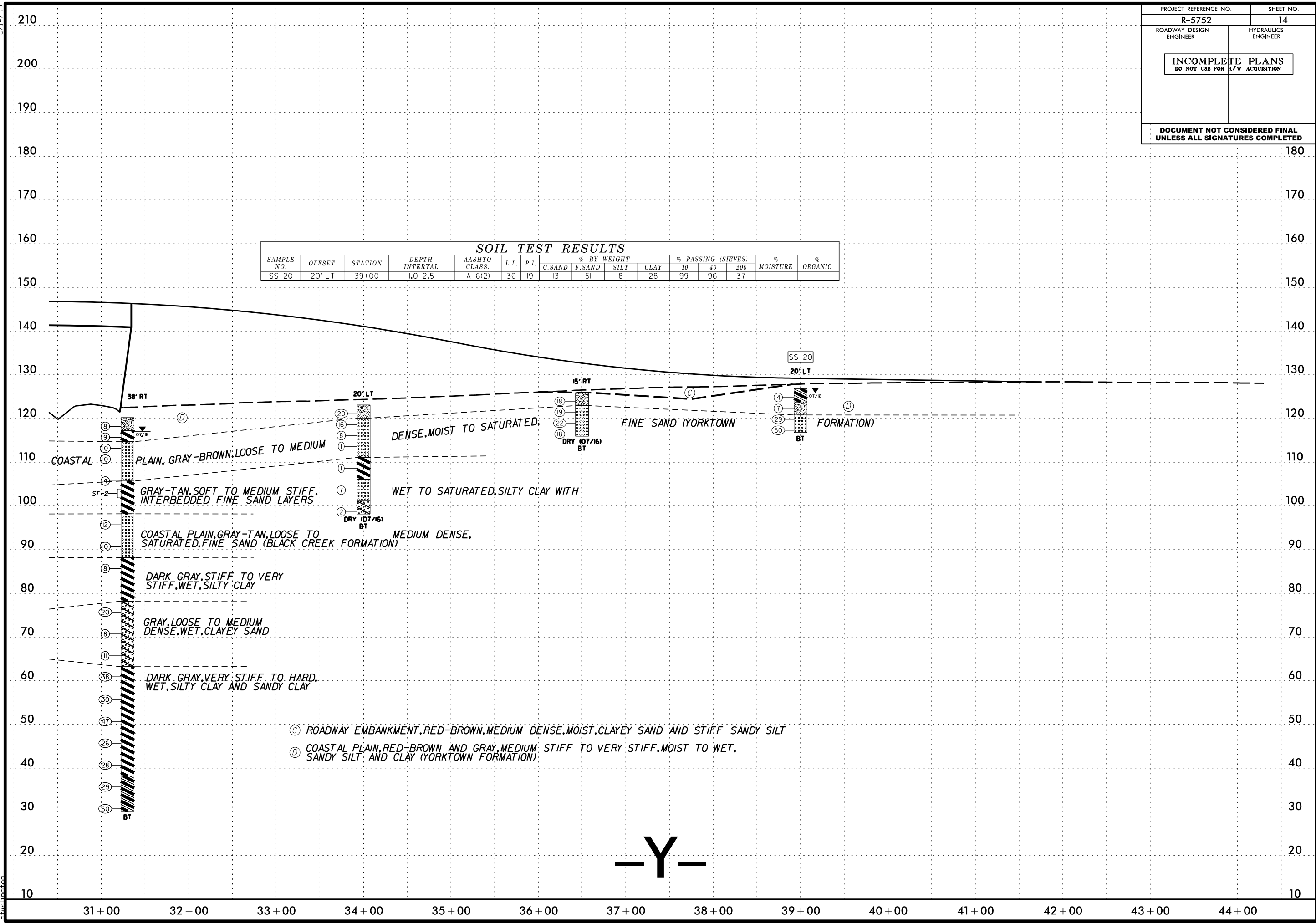


- Ⓒ ROADWAY EMBANKMENT, RED-BROWN, MEDIUM DENSE, MOIST, CLAYEY SAND AND SANDY SILT
- Ⓓ COASTAL PLAIN, RED-BROWN AND GRAY, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, SANDY SILT AND CLAY (YORKTOWN FORMATION)

-Y-

5/14/99  
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PROJECT REFERENCE NO.	SHEET NO.
R-5752	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> <b>UNLESS ALL SIGNATURES COMPLETED</b>	

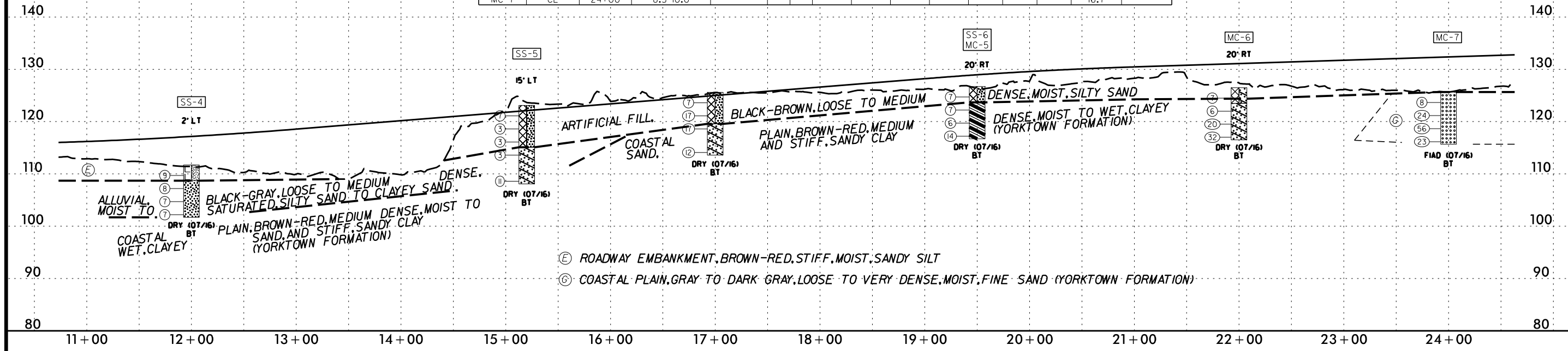


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-20	20' LT	39+00	L0-2.5	A-6(2)	36	19	13	51	8	28	99	96	37	-	-

- Ⓢ ROADWAY EMBANKMENT, RED-BROWN, MEDIUM DENSE, MOIST, CLAYEY SAND AND STIFF SANDY SILT
- Ⓣ COASTAL PLAIN, RED-BROWN AND GRAY, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, SANDY SILT AND CLAY (YORKTOWN FORMATION)

-Y-

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-4	2' LT	12+00	1.0-2.5	A-4(0)	28	4		
SS-5	15' LT	15+20	3.5-5.0	A-2-4(0)	15	4	21	51	11	17	99	93	29	-	-
SS-6	20' RT	19+50	1.0-2.5	A-2-4(0)	16	2	18	57	10	15	96	88	26	-	-
MC-5	20' RT	19+50	3.5-5.0	-	-	-	-	-	-	-	-	-	-	65.6	-
MC-6	20' RT	22+00	3.5-5.0	-	-	-	-	-	-	-	-	-	-	12.5	-
MC-7	CL	24+00	8.5-10.0	-	-	-	-	-	-	-	-	-	-	16.7	-

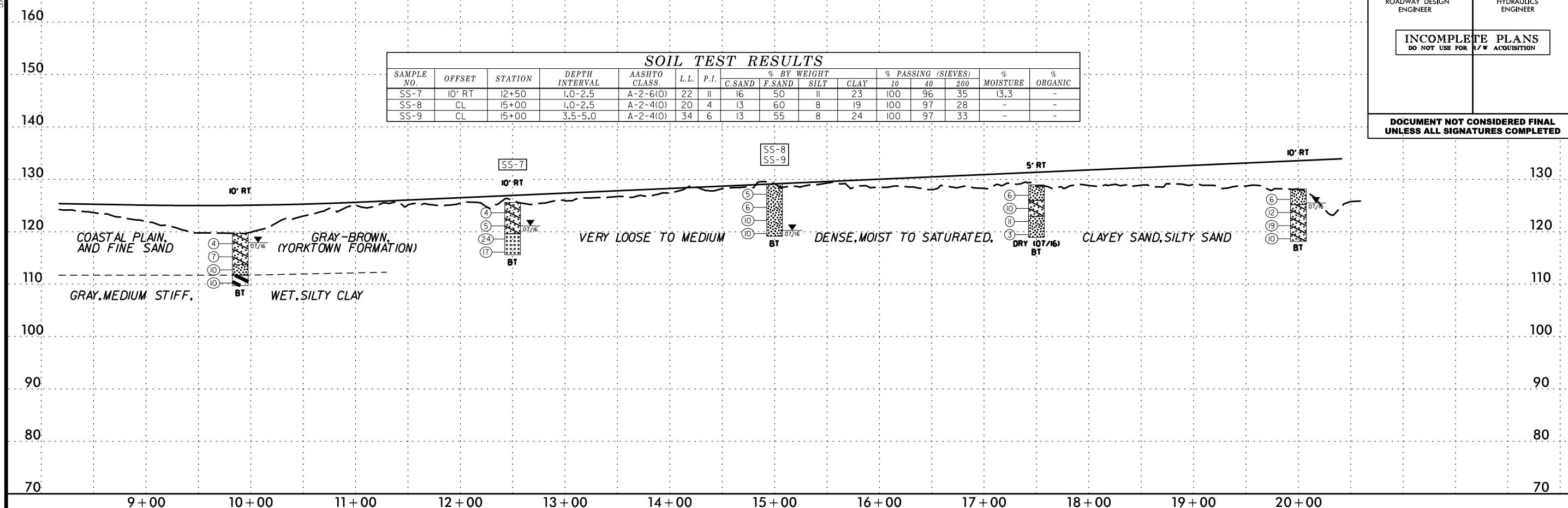


-YRPA-

5/28/99

PROJECT REFERENCE NO.		SHEET NO.	
R-5752		16	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION			
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED			

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-7	10' RT	12+50	1.0-2.5	A-2-6(O)	22	11	16	50	11	23	100	96	35	13.3	-
SS-8	CL	15+00	1.0-2.5	A-2-4(O)	20	4	13	60	8	19	100	97	28	-	-
SS-9	CL	15+00	3.5-5.0	A-2-4(O)	34	6	13	55	8	24	100	97	33	-	-



**-YRPB-**

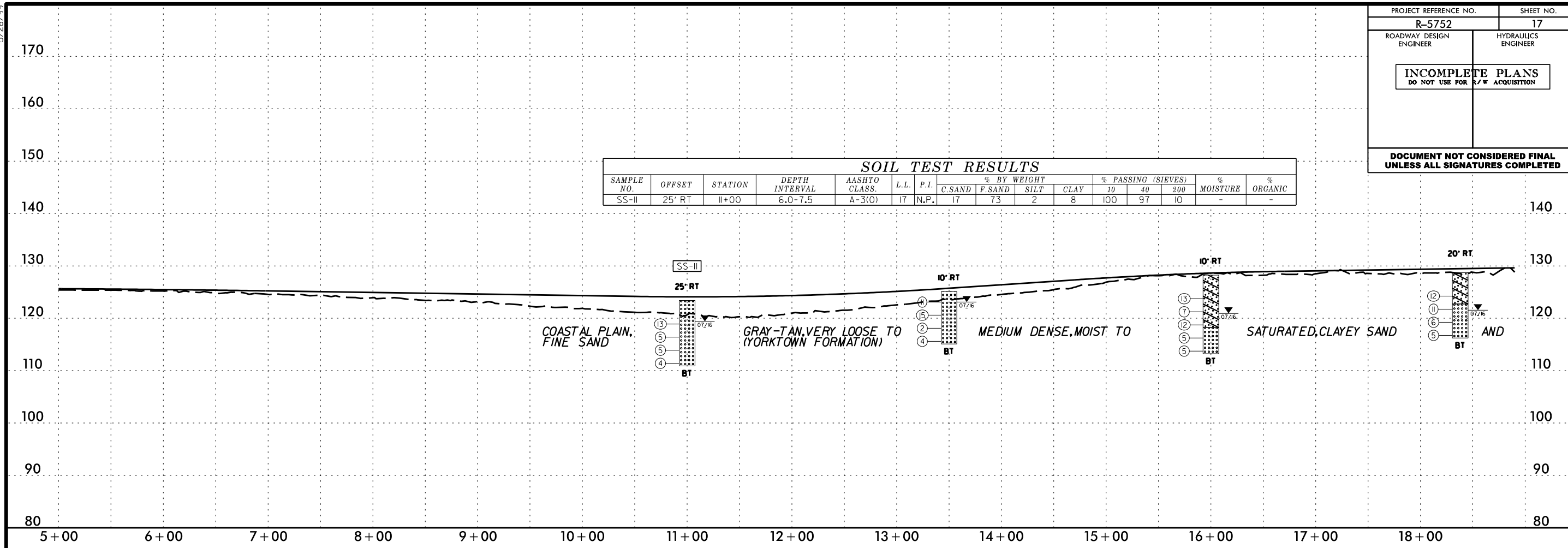
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5/28/99

PROJECT REFERENCE NO. <b>R-5752</b>	SHEET NO. <b>17</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	

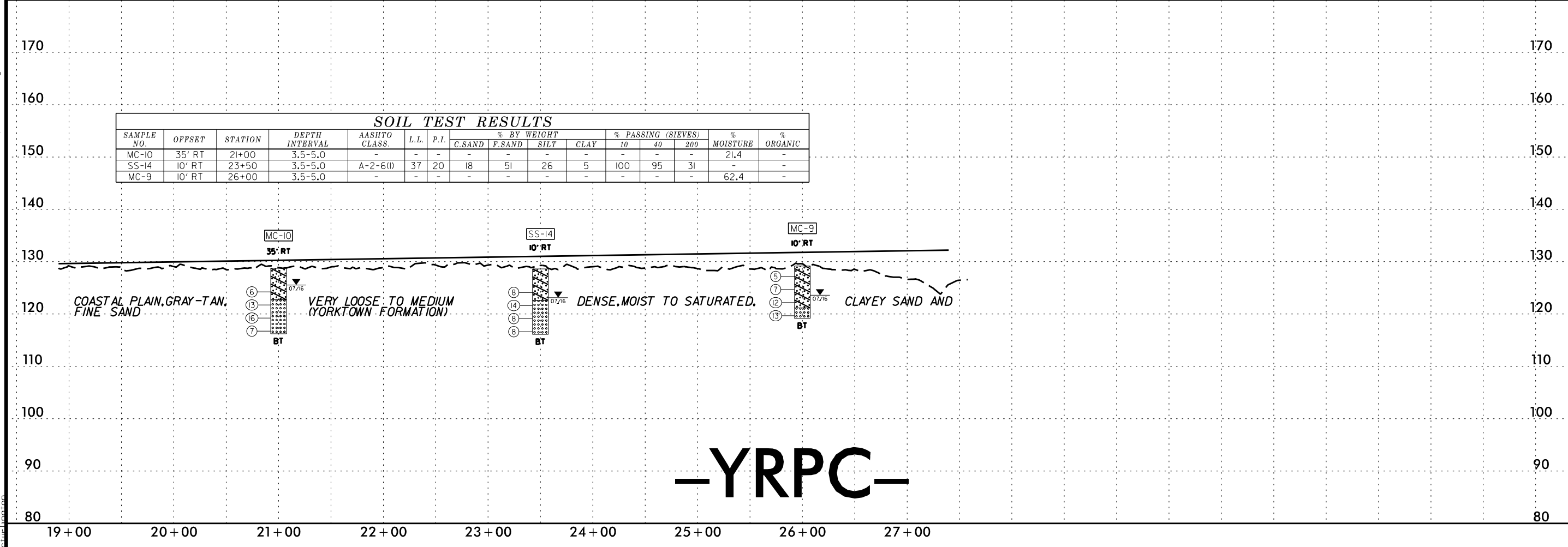
**SOIL TEST RESULTS**

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-11	25' RT	11+00	6.0-7.5	A-3(O)	17	N.P.	17	73	2	8	100	97	10	-	-



**SOIL TEST RESULTS**

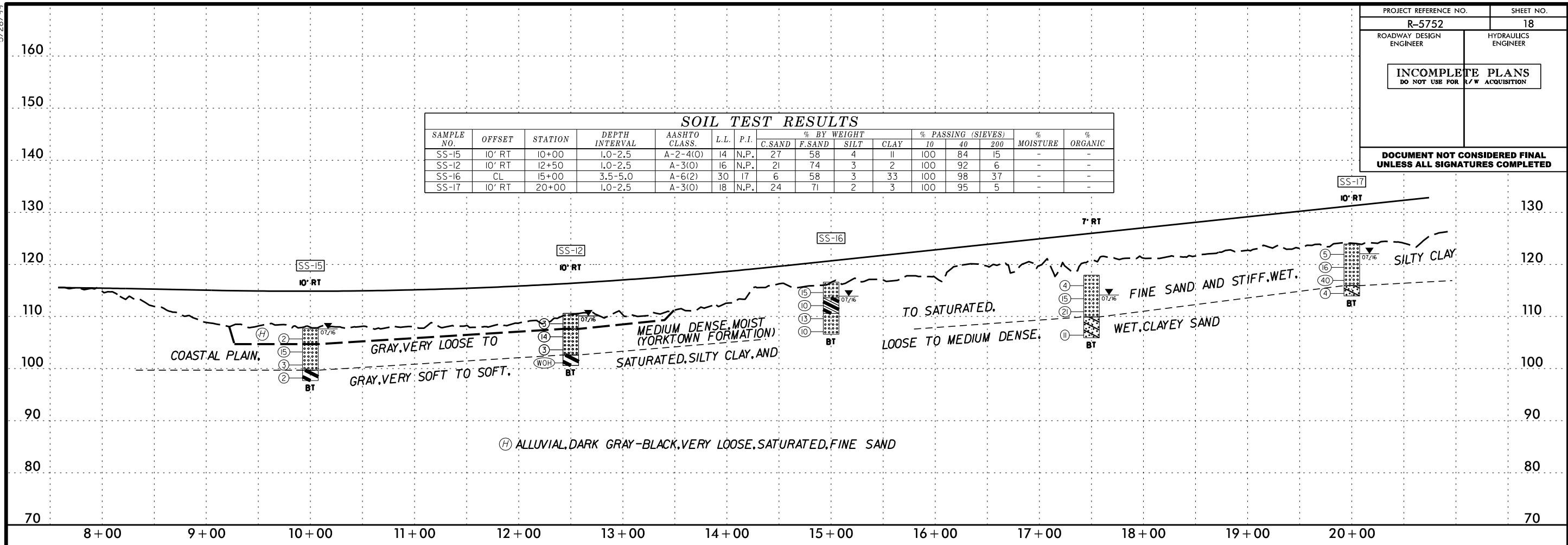
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
MC-10	35' RT	21+00	3.5-5.0	-	-	-	-	-	-	-	-	-	-	21.4	-
SS-14	10' RT	23+50	3.5-5.0	A-2-6(1)	37	20	18	51	26	5	100	95	31	-	-
MC-9	10' RT	26+00	3.5-5.0	-	-	-	-	-	-	-	-	-	62.4	-	



**-YRPC-**

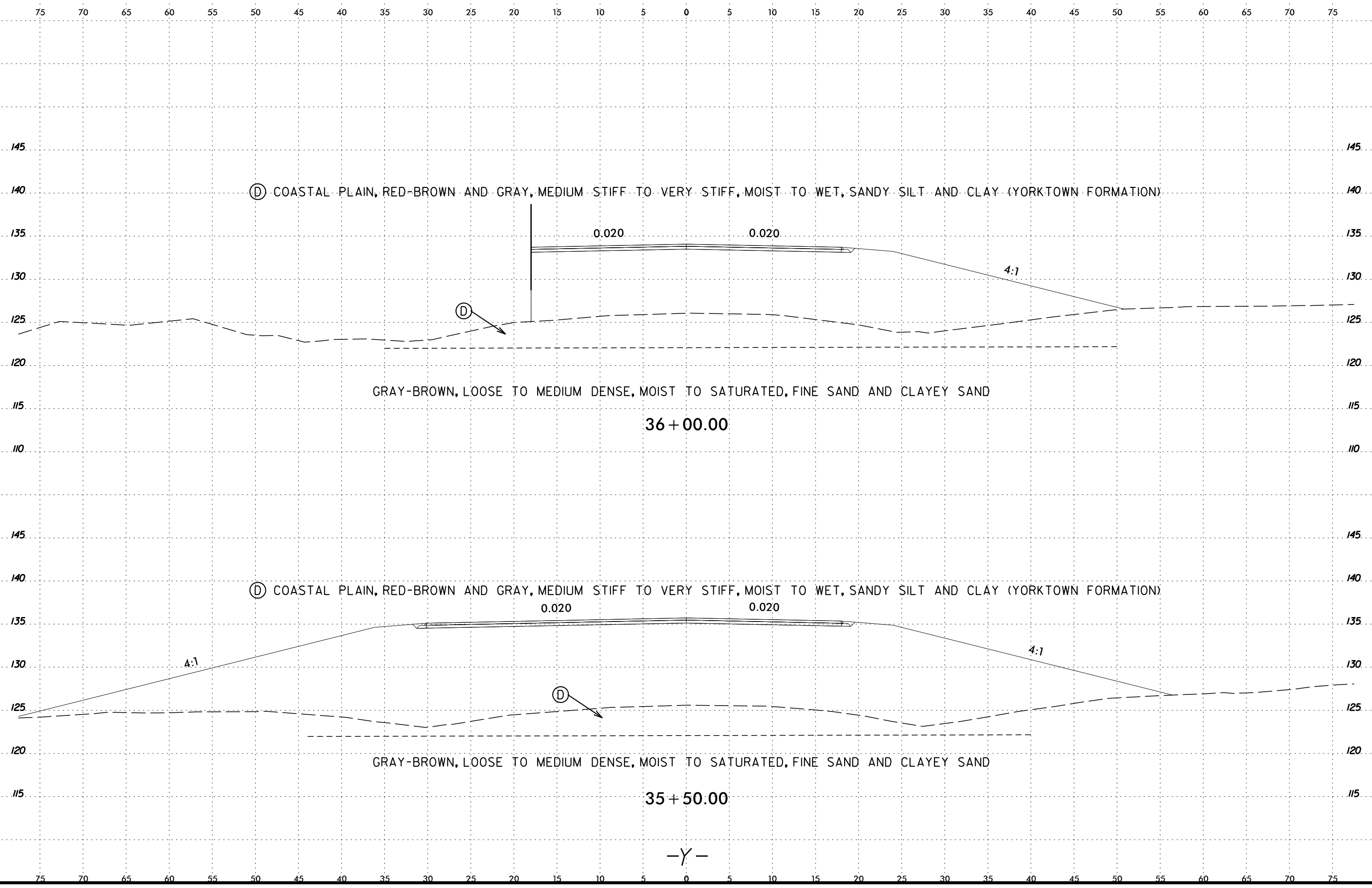
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-15	10' RT	10+00	1.0-2.5	A-2-4(0)	14	N.P.	27	58	4	11	100	84	15	-	-
SS-12	10' RT	12+50	1.0-2.5	A-3(0)	16	N.P.	21	74	3	2	100	92	6	-	-
SS-16	CL	15+00	3.5-5.0	A-6(2)	30	17	6	58	3	33	100	98	37	-	-
SS-17	10' RT	20+00	1.0-2.5	A-3(0)	18	N.P.	24	71	2	3	100	95	5	-	-

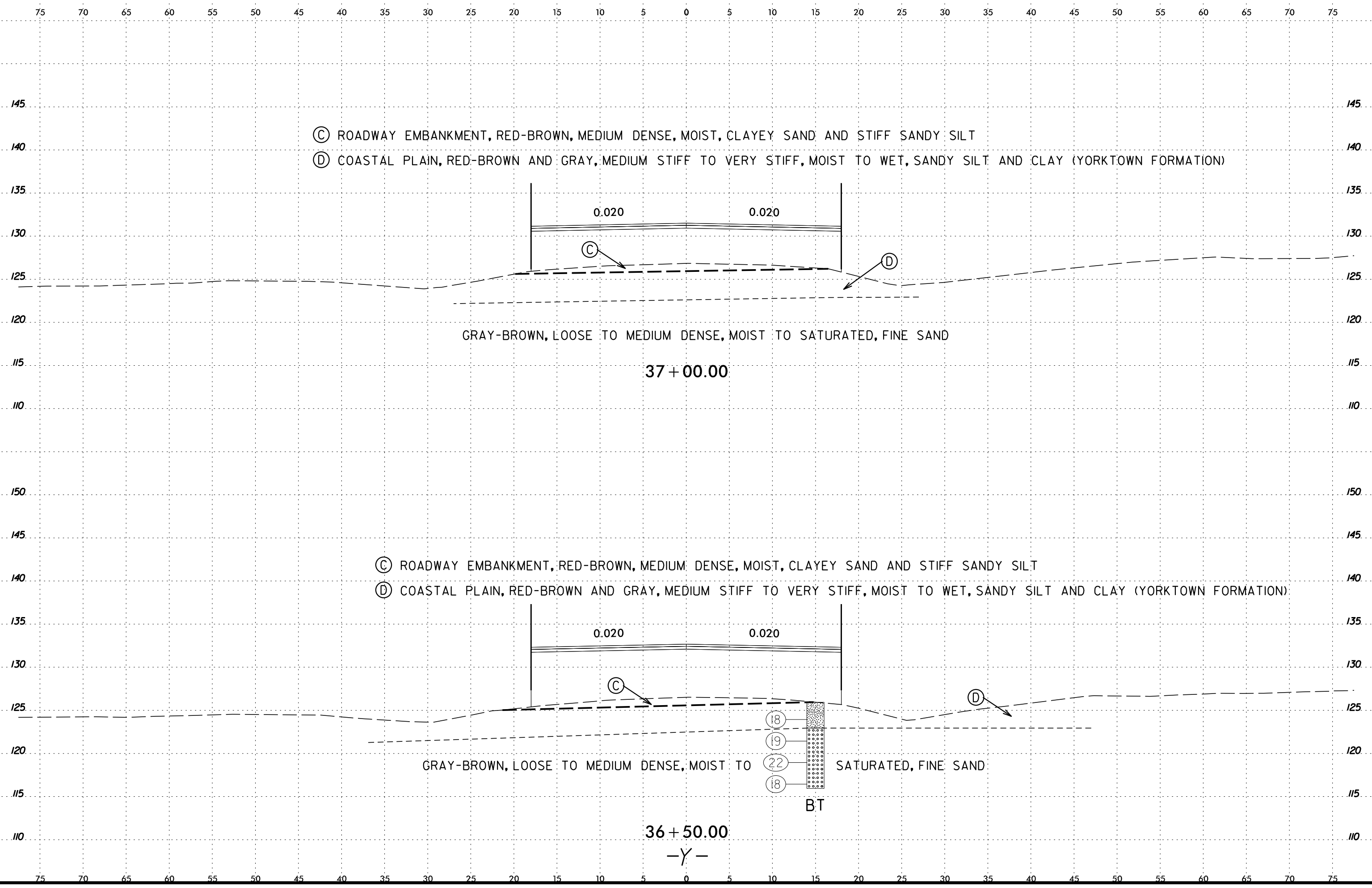


-YRPD-

6/23/16



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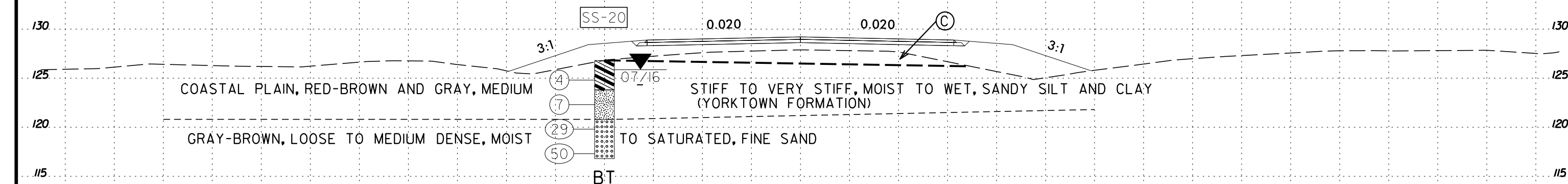




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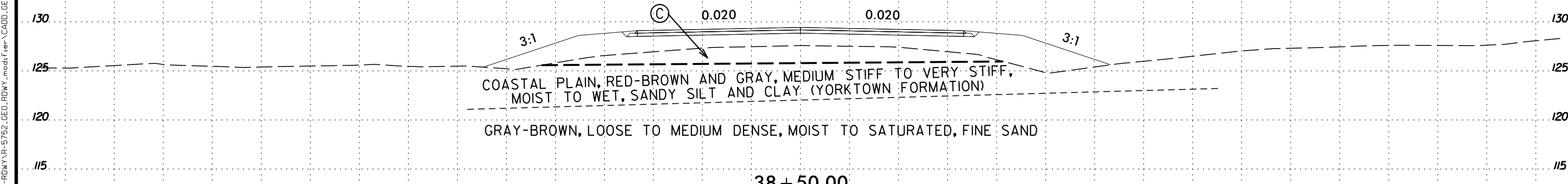
Ⓢ ROADWAY EMBANKMENT, RED-BROWN, MEDIUM DENSE, MOIST, CLAYEY SAND AND SANDY SILT

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-20	20' LT	39+00	1.0-2.5	A-6(2)	36	19	13	51	8	28	99	96	37	-	-



39 + 00.00

Ⓢ ROADWAY EMBANKMENT, RED-BROWN, MEDIUM DENSE, MOIST, CLAYEY SAND AND STIFF SANDY SILT

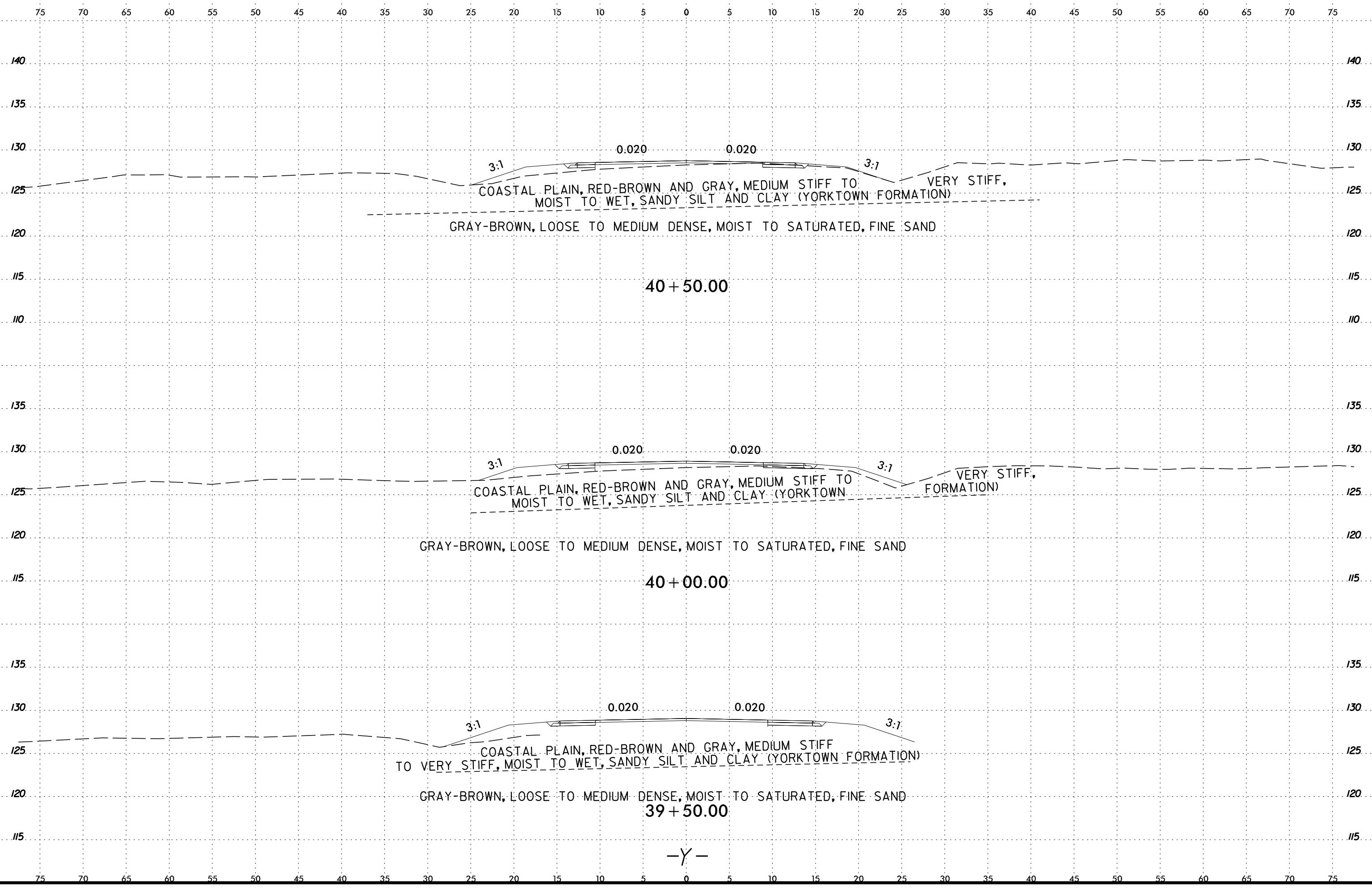


38 + 50.00

-Y-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

6/23/16



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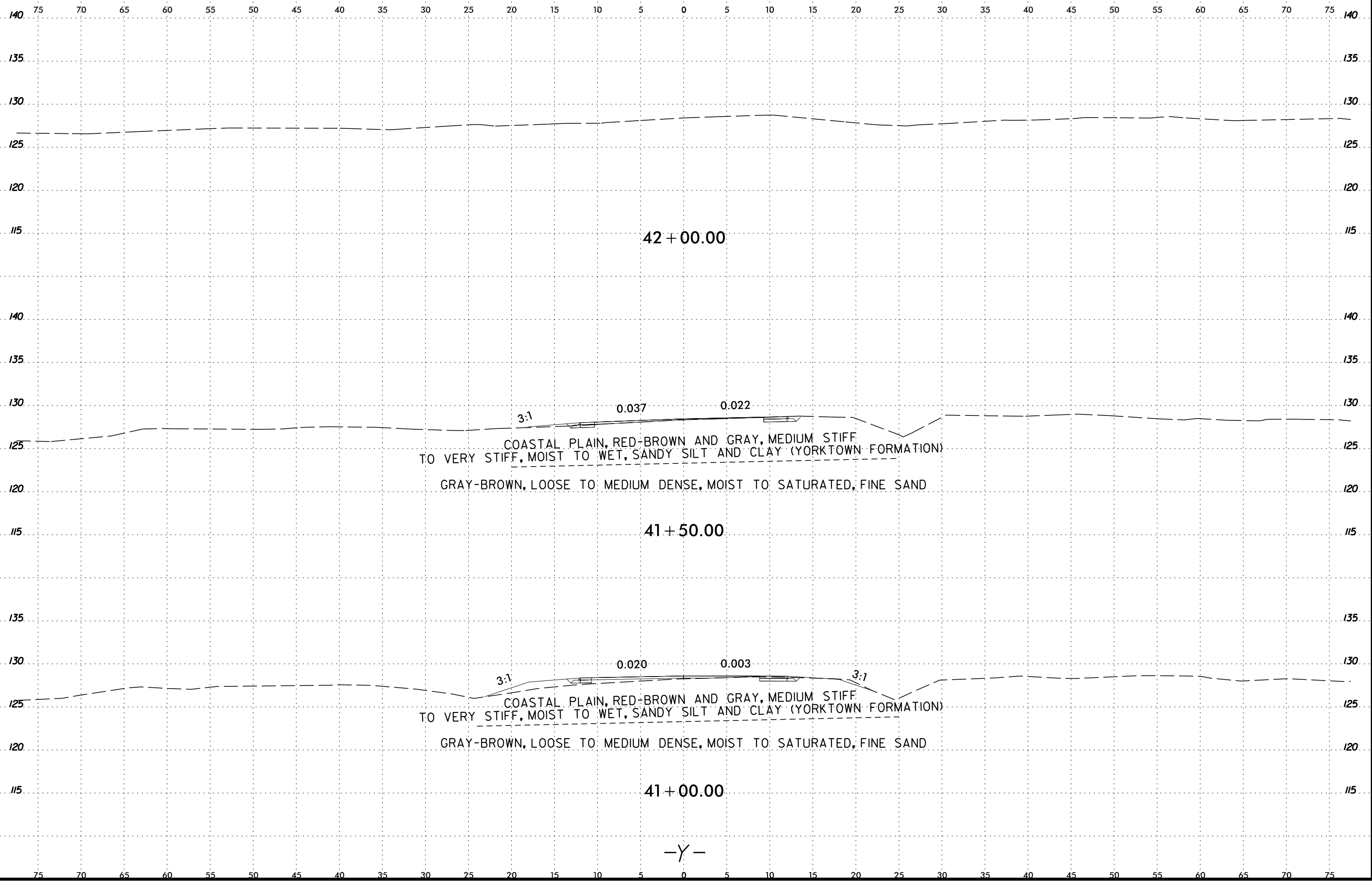
-Y-

6/23/16



PROJ. REFERENCE NO.  
R-5752

SHEET NO.  
24



42 + 00.00

3:1 0.037 0.022  
COASTAL PLAIN, RED-BROWN AND GRAY, MEDIUM STIFF  
TO VERY STIFF, MOIST TO WET, SANDY SILT AND CLAY (YORKTOWN FORMATION)  
GRAY-BROWN, LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, FINE SAND

41 + 50.00

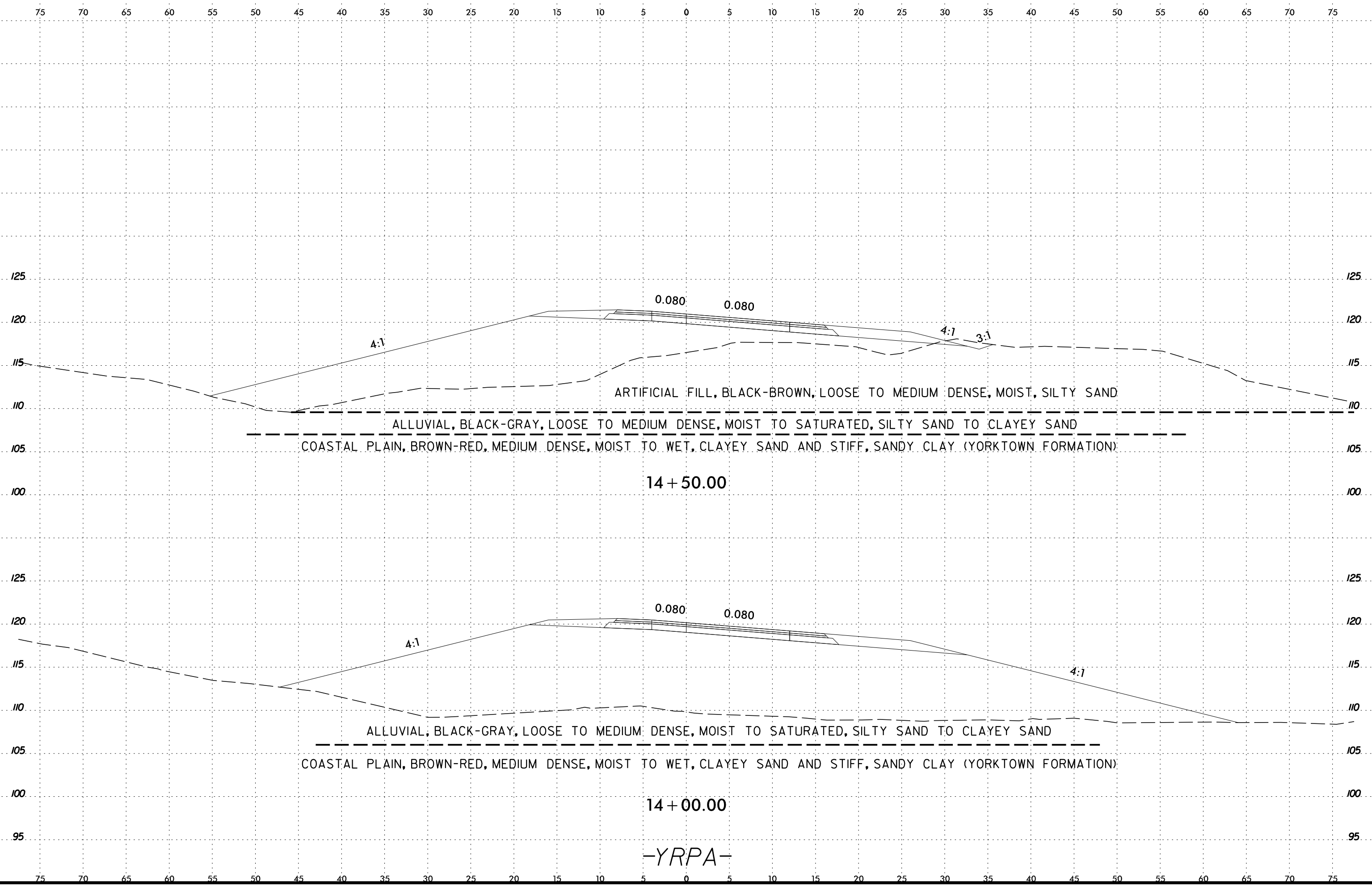
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COASTAL PLAIN, RED-BROWN AND GRAY, MEDIUM STIFF  
TO VERY STIFF, MOIST TO WET, SANDY SILT AND CLAY (YORKTOWN FORMATION)  
GRAY-BROWN, LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, FINE SAND

41 + 00.00

-Y-

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6/23/16

6/23/16



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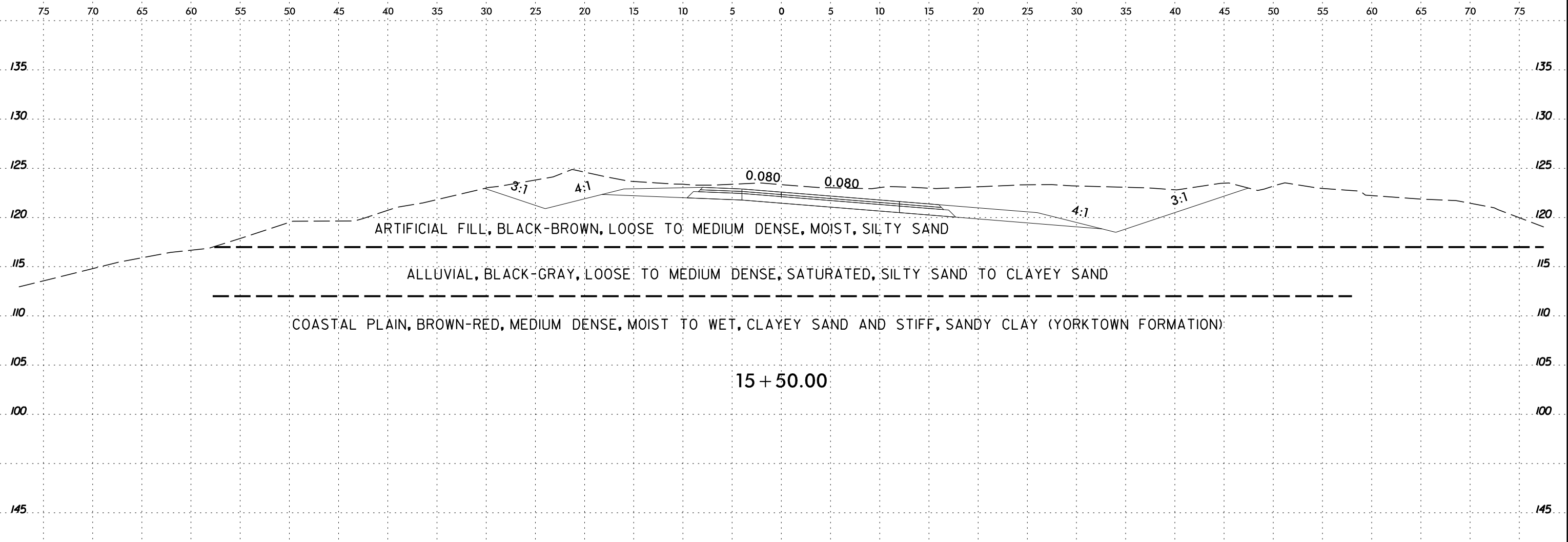
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6/23/16



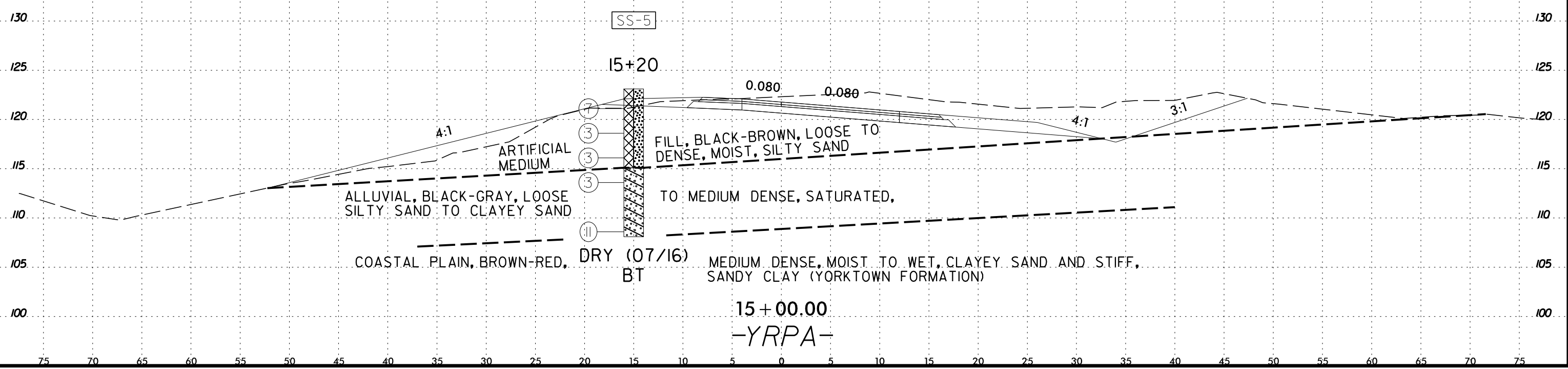
PROJ. REFERENCE NO.  
R-5752

SHEET NO.  
26



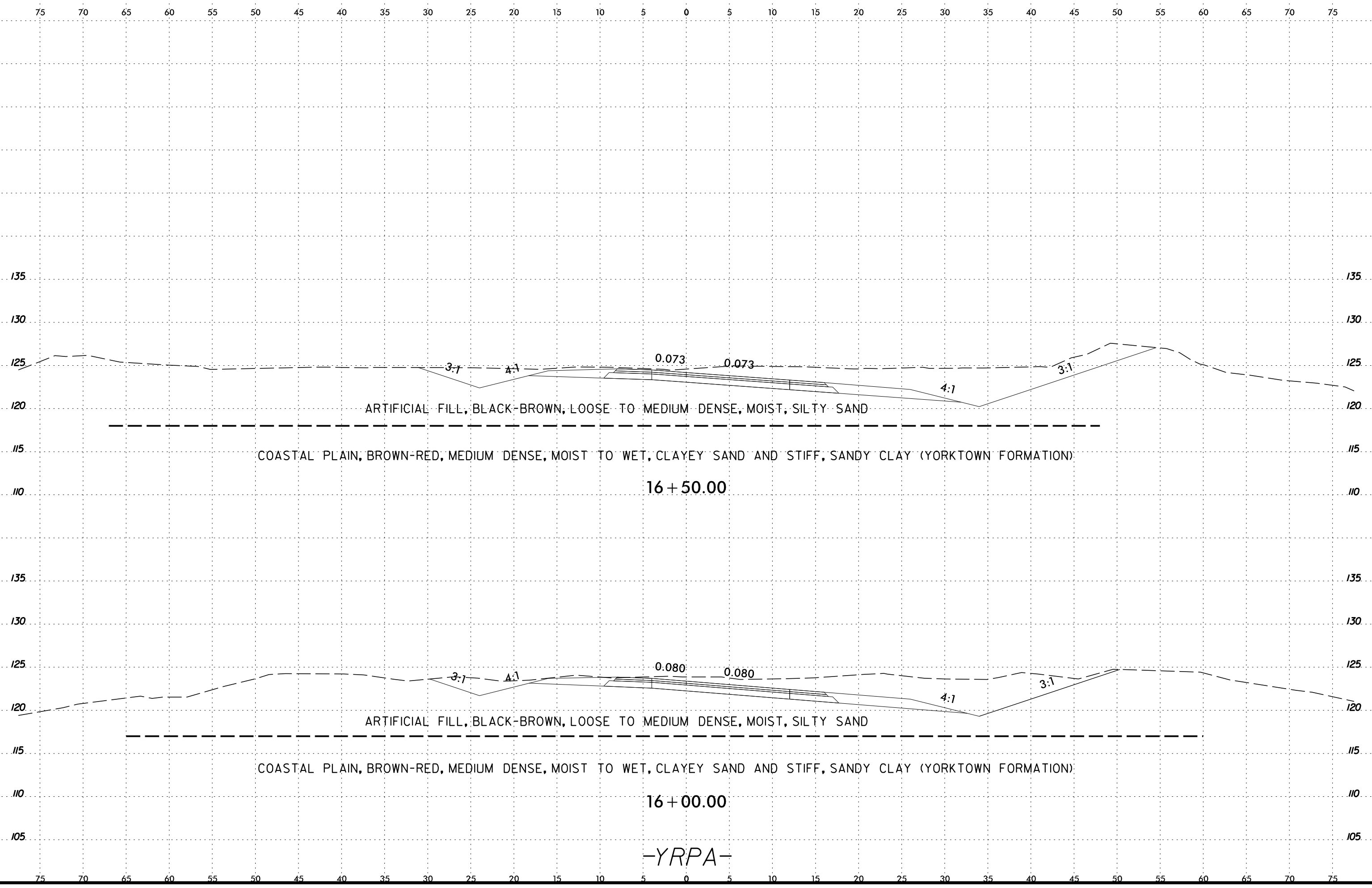
### SOIL TEST RESULTS

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-5	15' LT	15+20	3.5-5.0	A-2-4(0)	15	4	21	51	11	17	99	93	29	-	-



1/4/2017  
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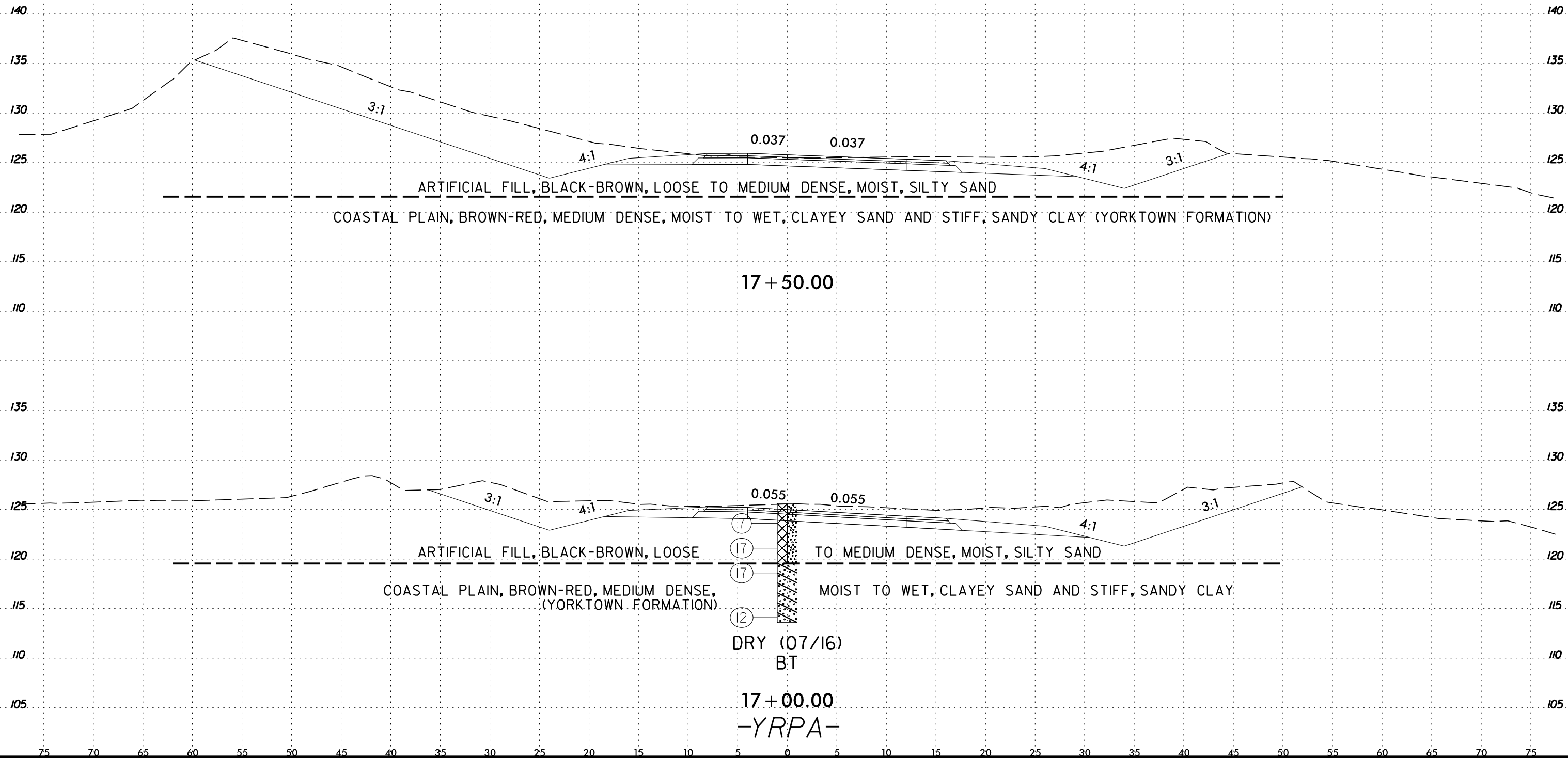
6/23/16



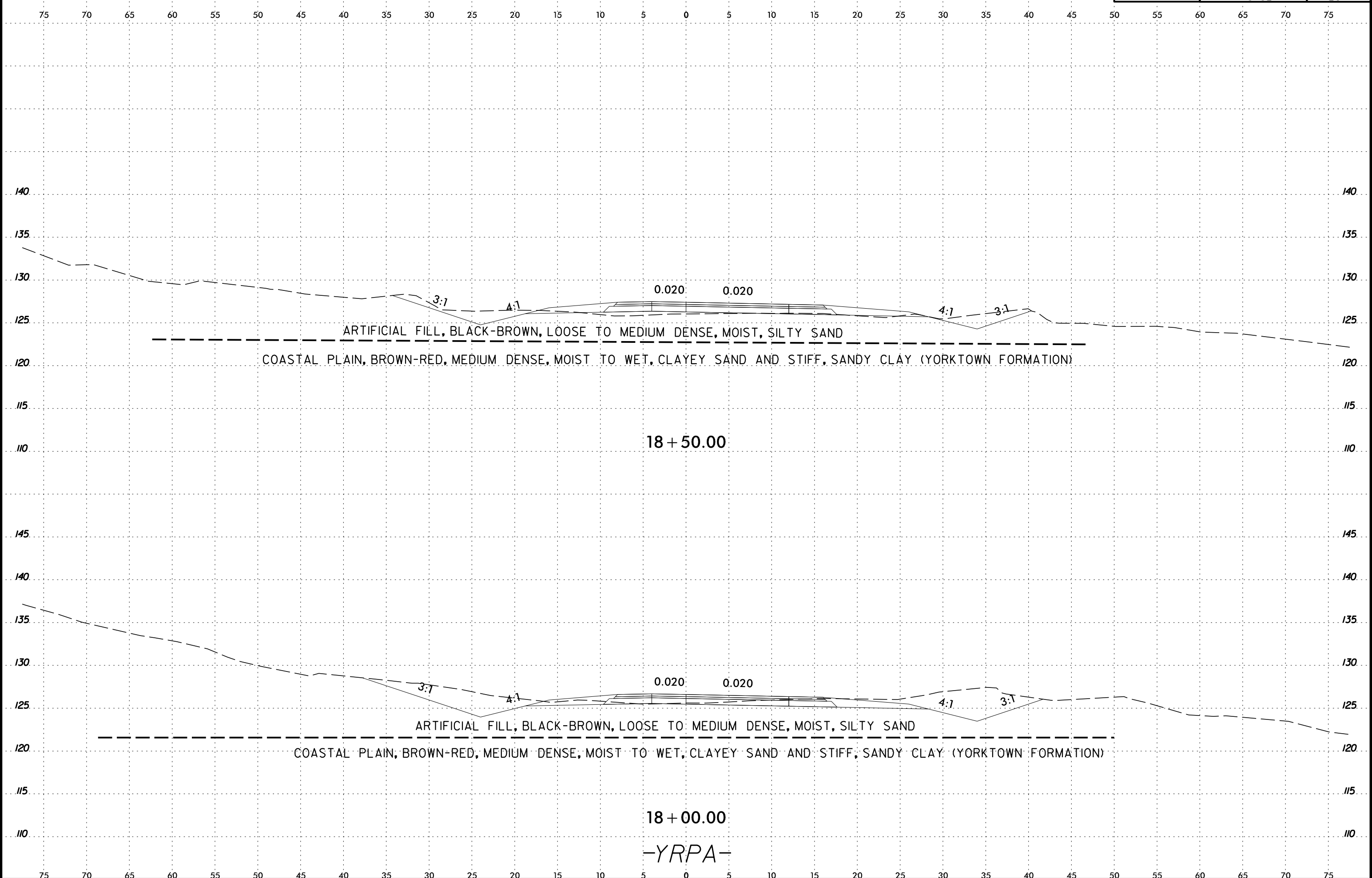
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-YRPA-

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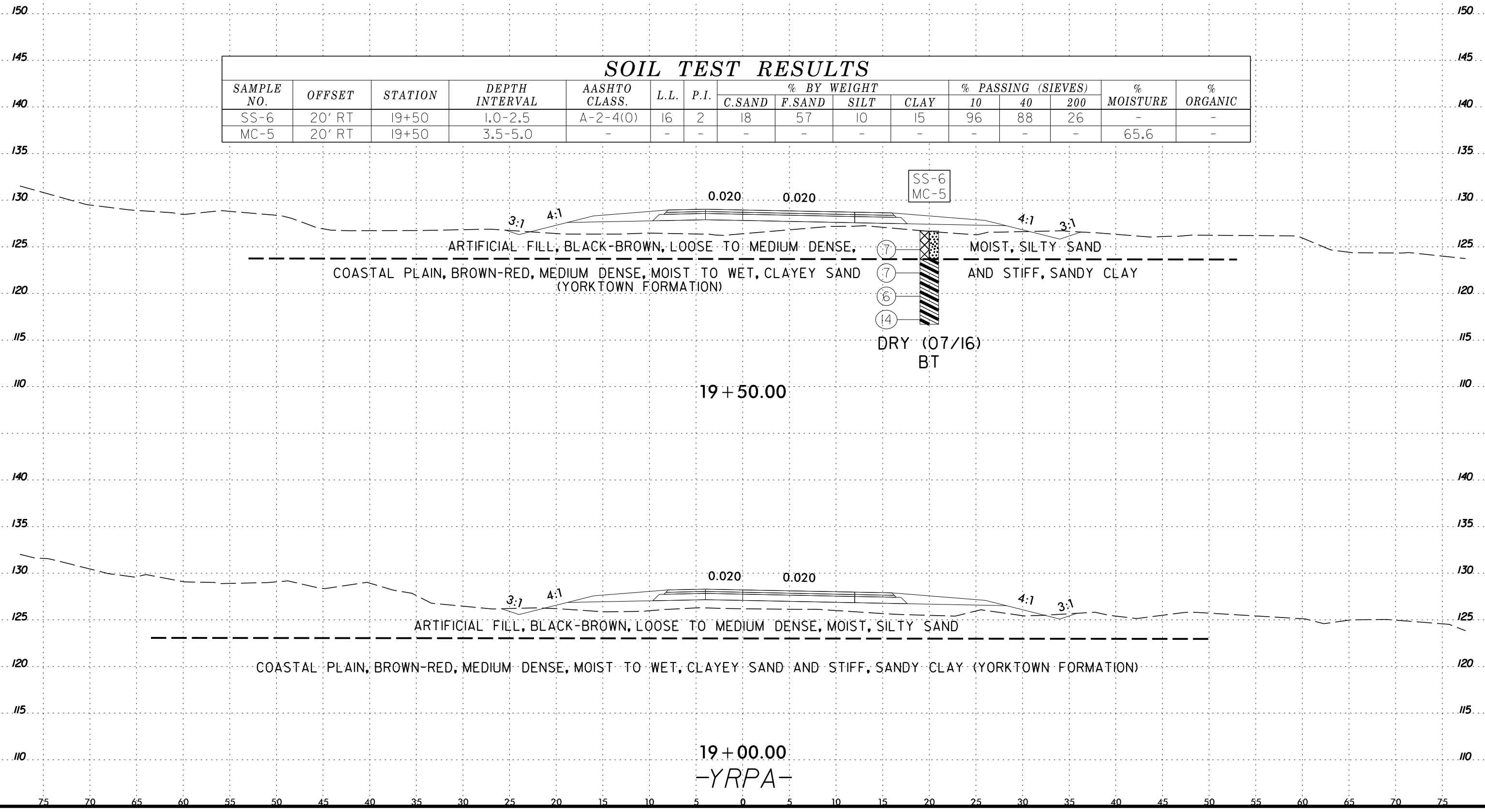


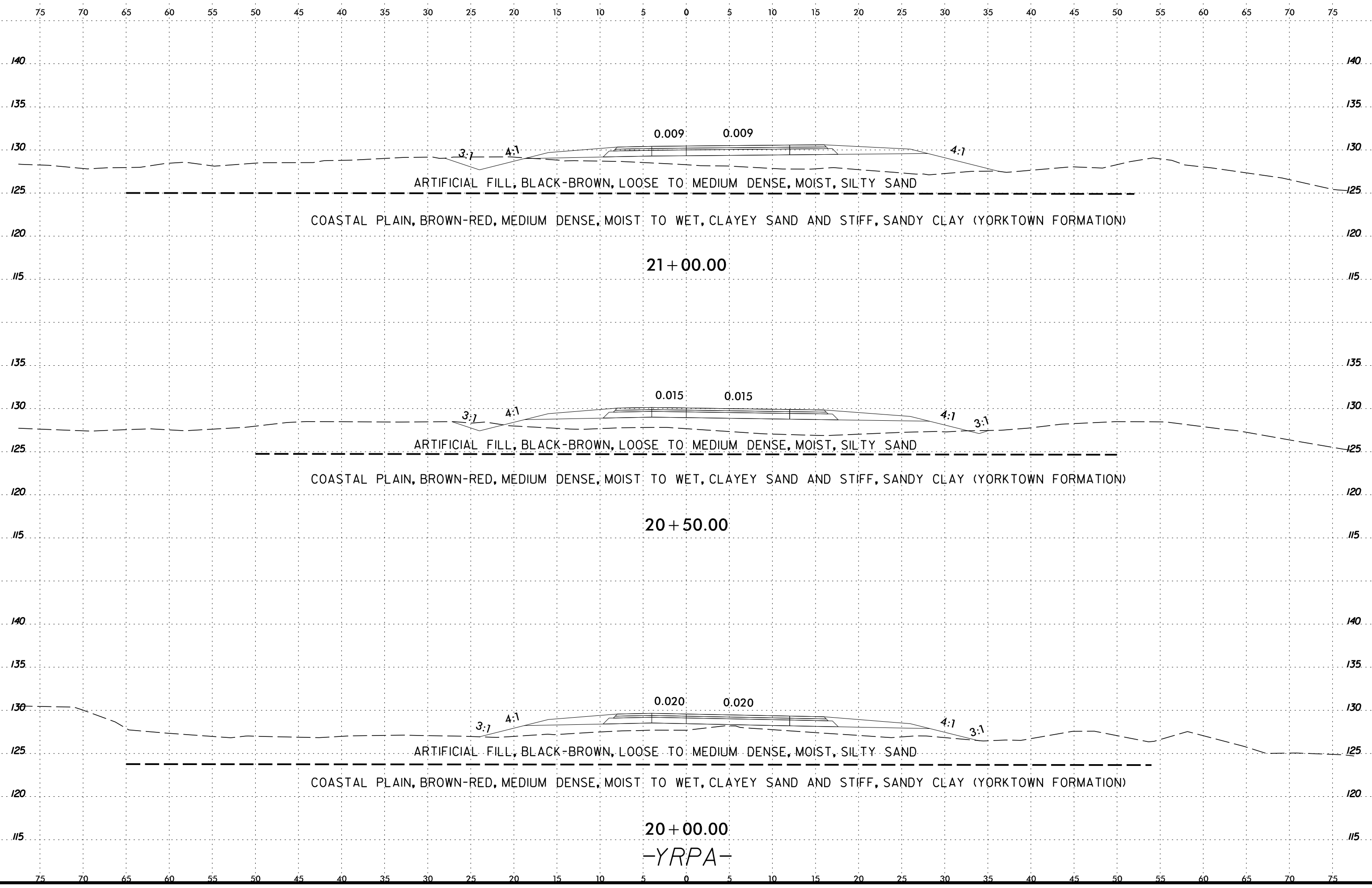


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### SOIL TEST RESULTS

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-6	20' RT	19+50	1.0-2.5	A-2-4(0)	16	2	18	57	10	15	96	88	26	-	-
MC-5	20' RT	19+50	3.5-5.0	-	-	-	-	-	-	-	-	-	-	65.6	-





75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

150 150

145 145

140 **SOIL TEST RESULTS** 140

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		
MC-6	20' RT	22+00	3.5-5.0	-	-	-	-	-	-	-	-	-	-	12.5	-

135 135

130 130

125 125

120 120

115 115

110 110

105 105

140 140

135 135

130 130

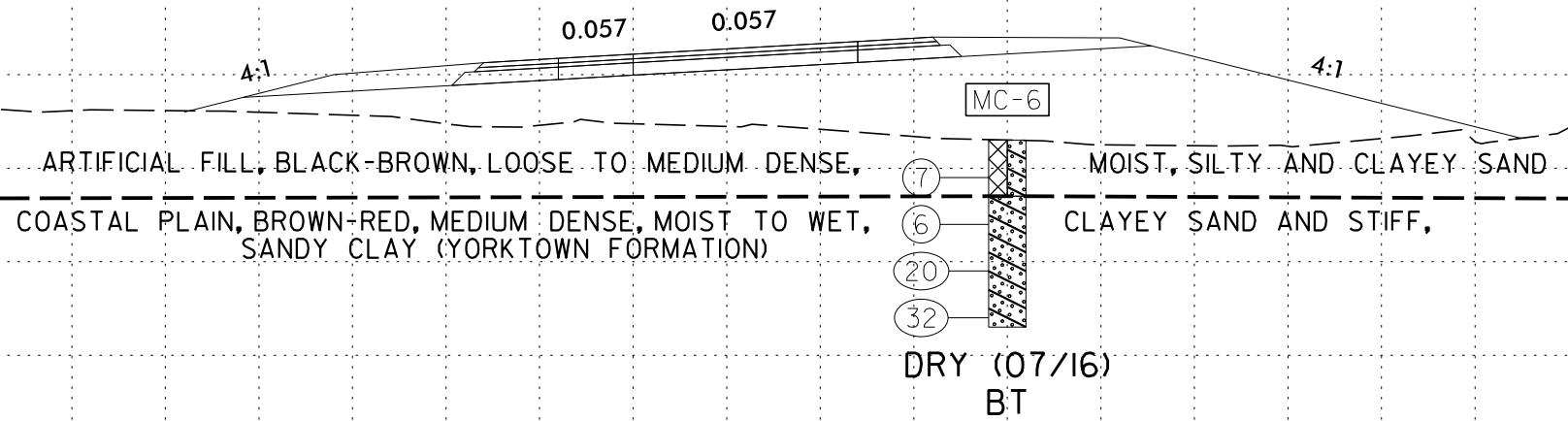
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120 120

115 115

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22 + 00.00

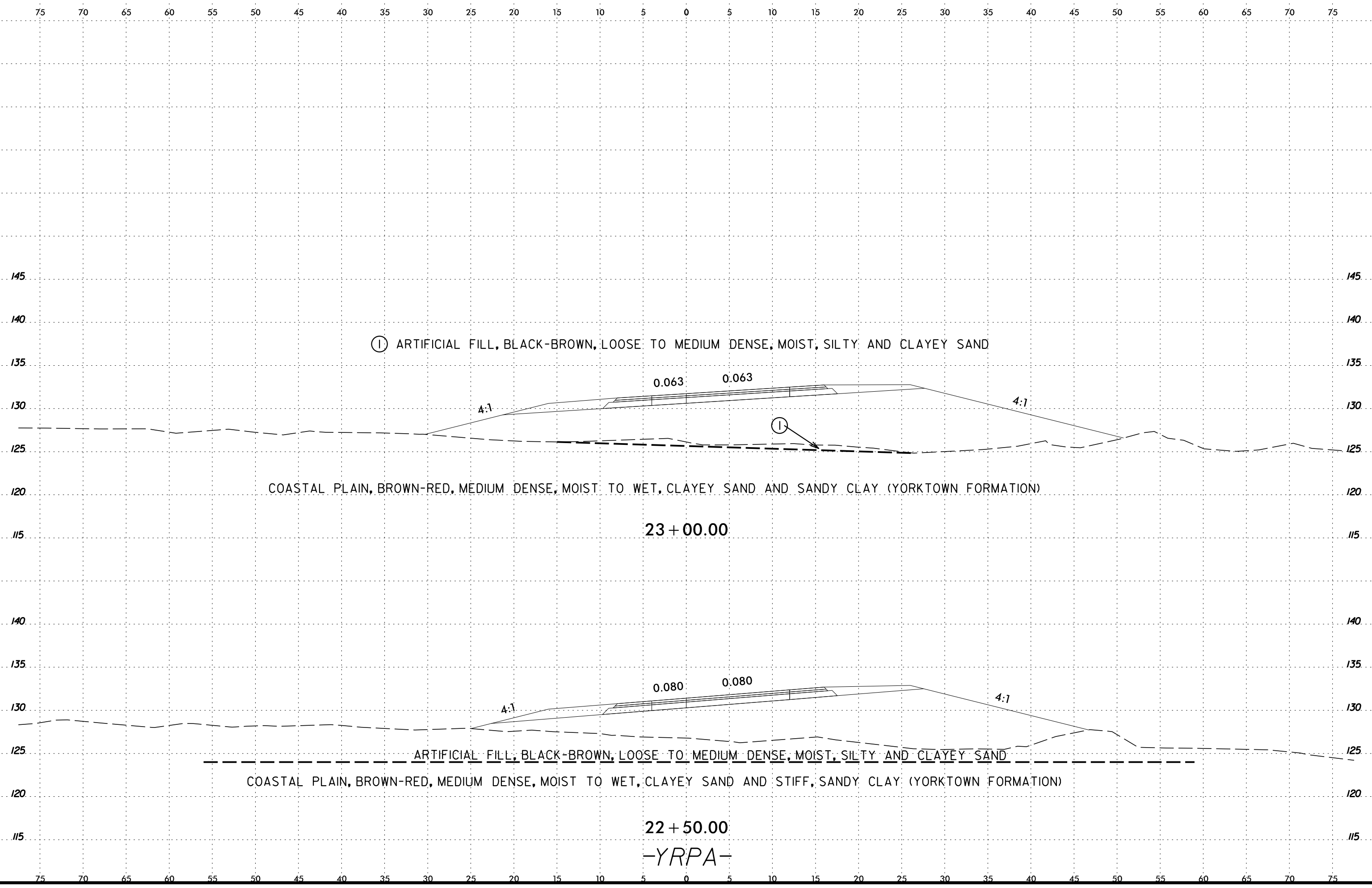
ARTIFICIAL FILL, BLACK-BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY AND CLAYEY SAND

COASTAL PLAIN, BROWN-RED, MEDIUM DENSE, MOIST TO WET, CLAYEY SAND AND STIFF, SANDY CLAY (YORKTOWN FORMATION)

21 + 50.00

-YRPA-

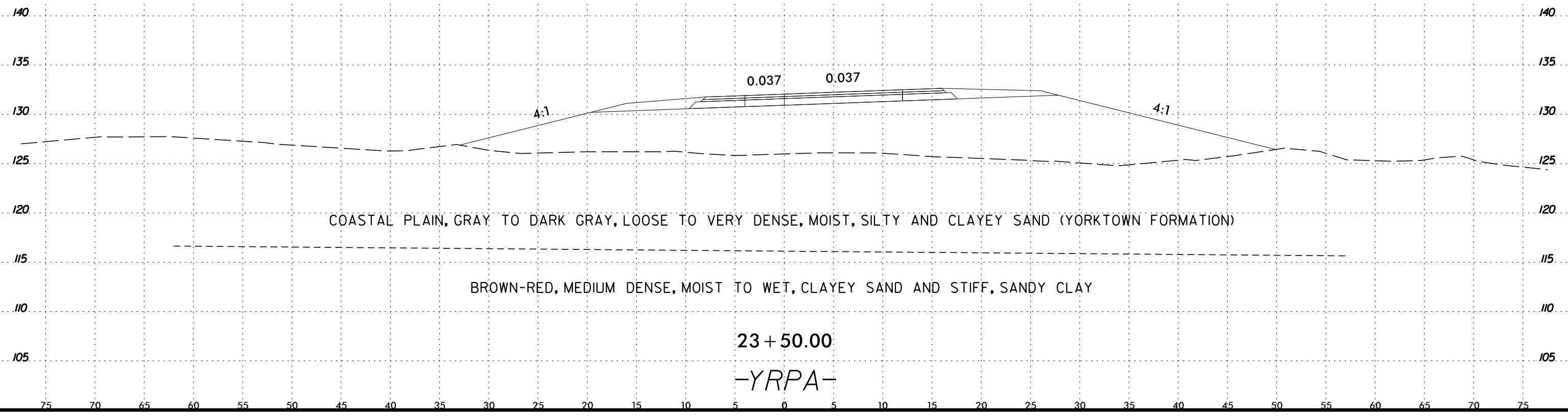
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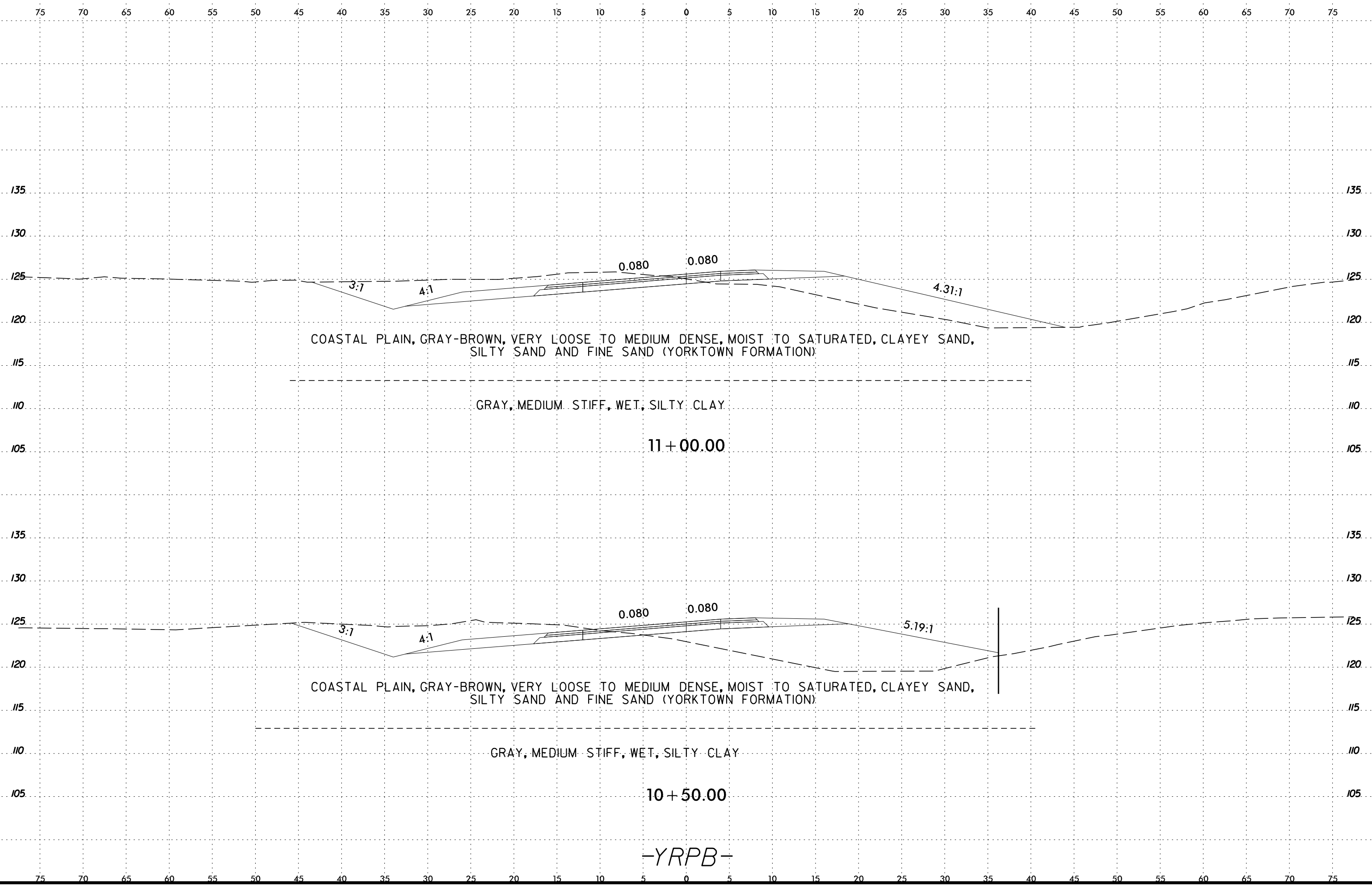
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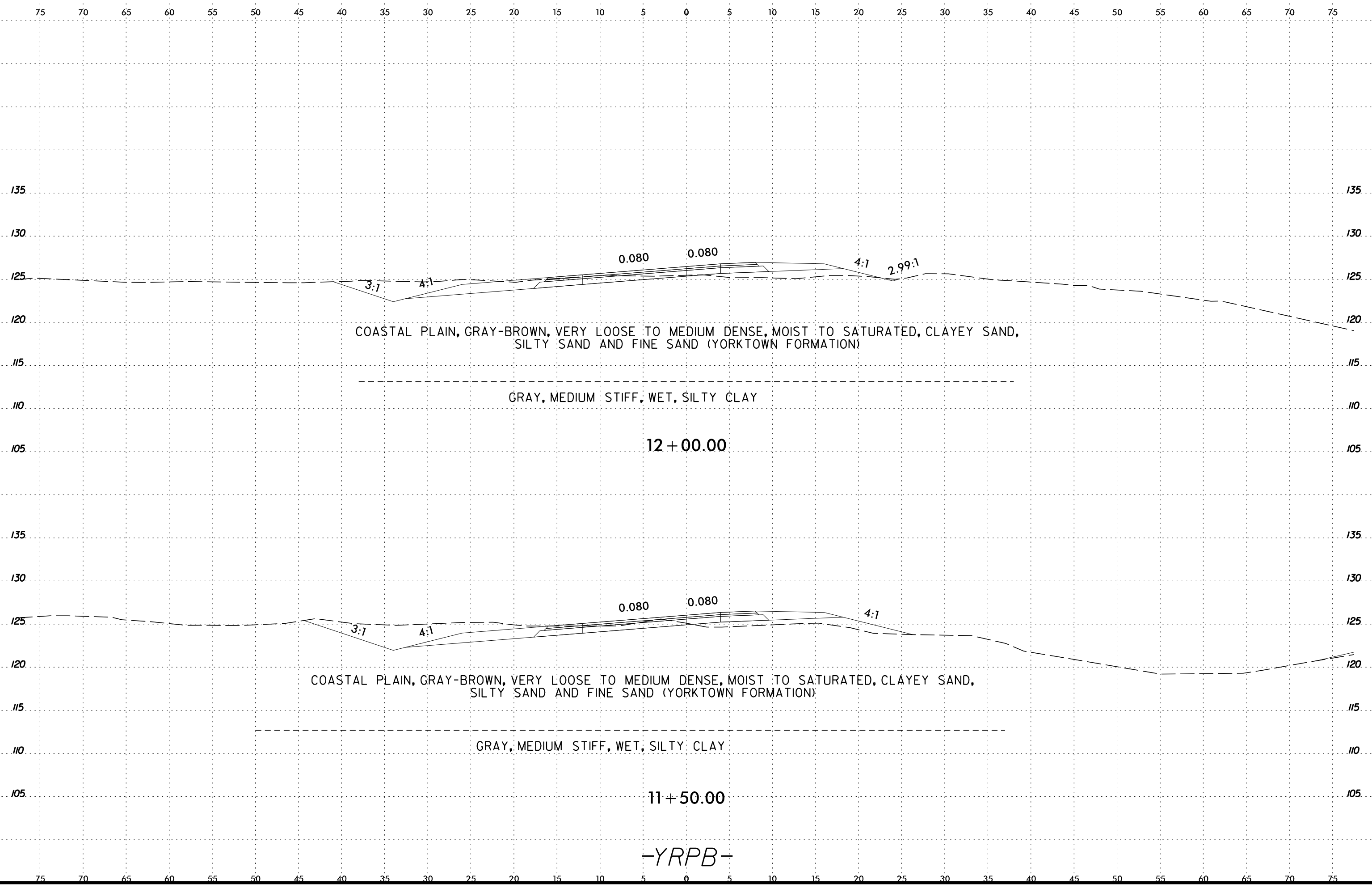
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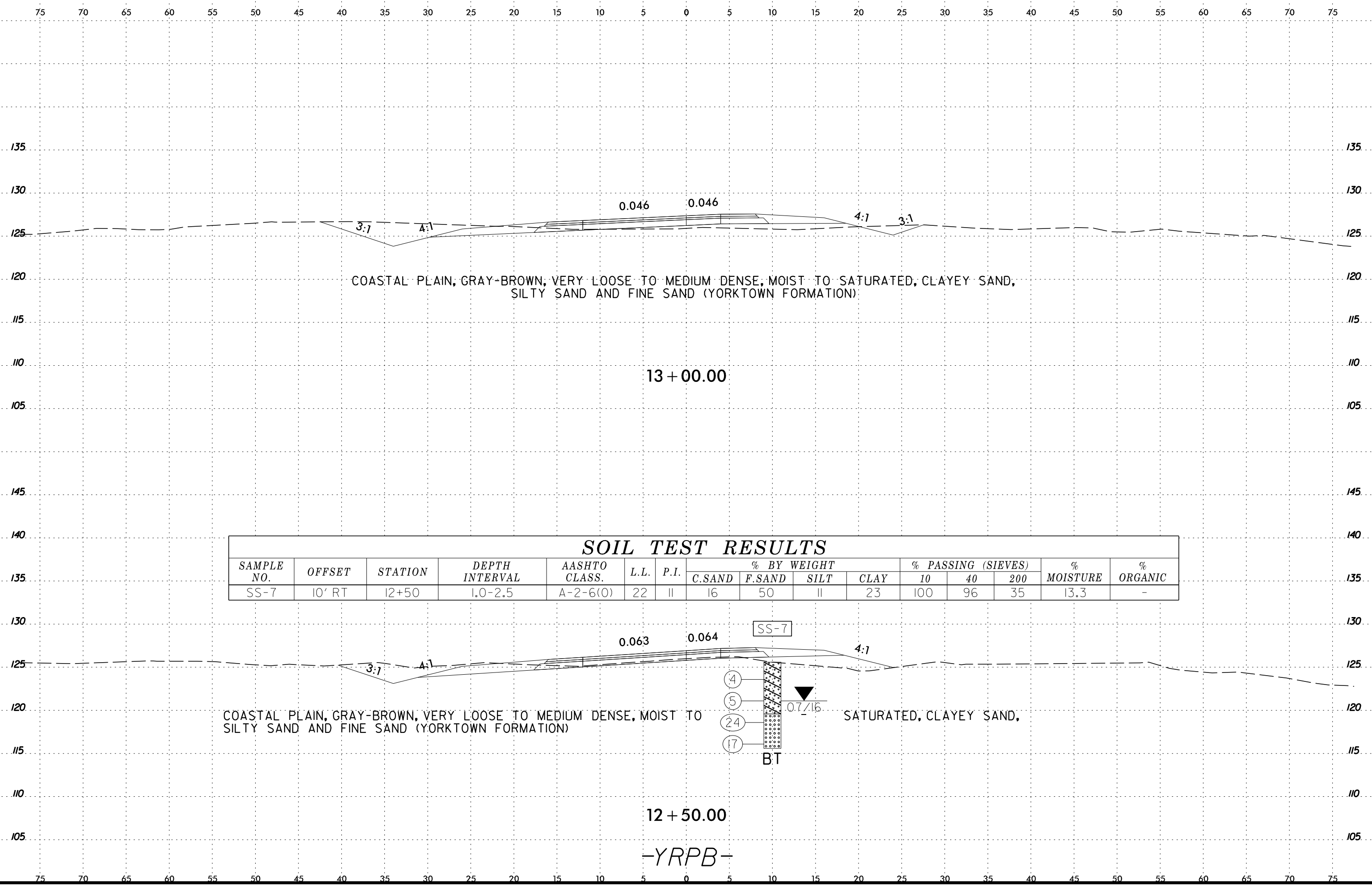
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-YRPB-





### SOIL TEST RESULTS

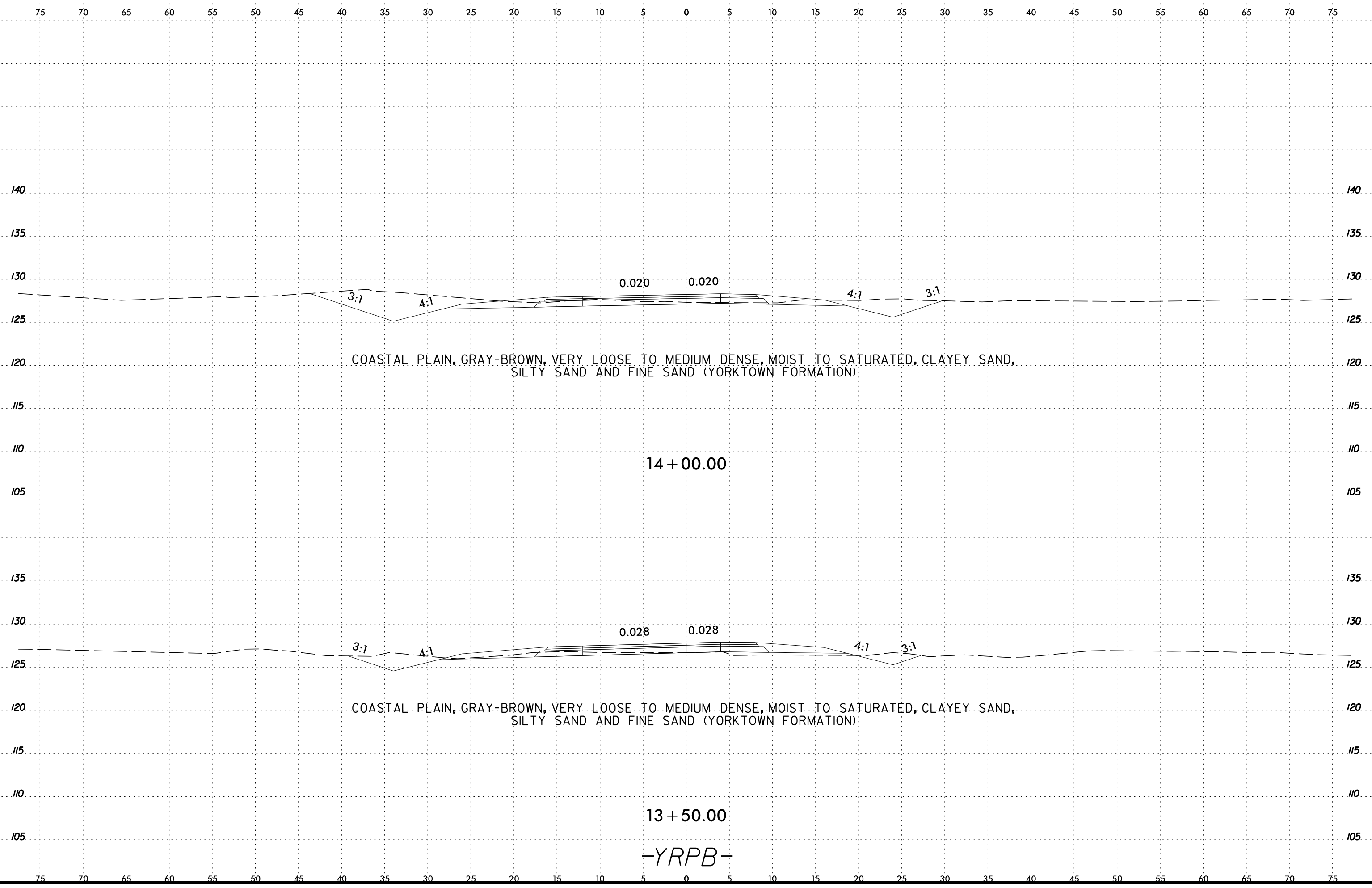
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	10' RT	12+50	1.0-2.5	A-2-6(0)	22	11	16	50	11	23	100	96	35	13.3	-

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12 + 50.00

-YRPB-

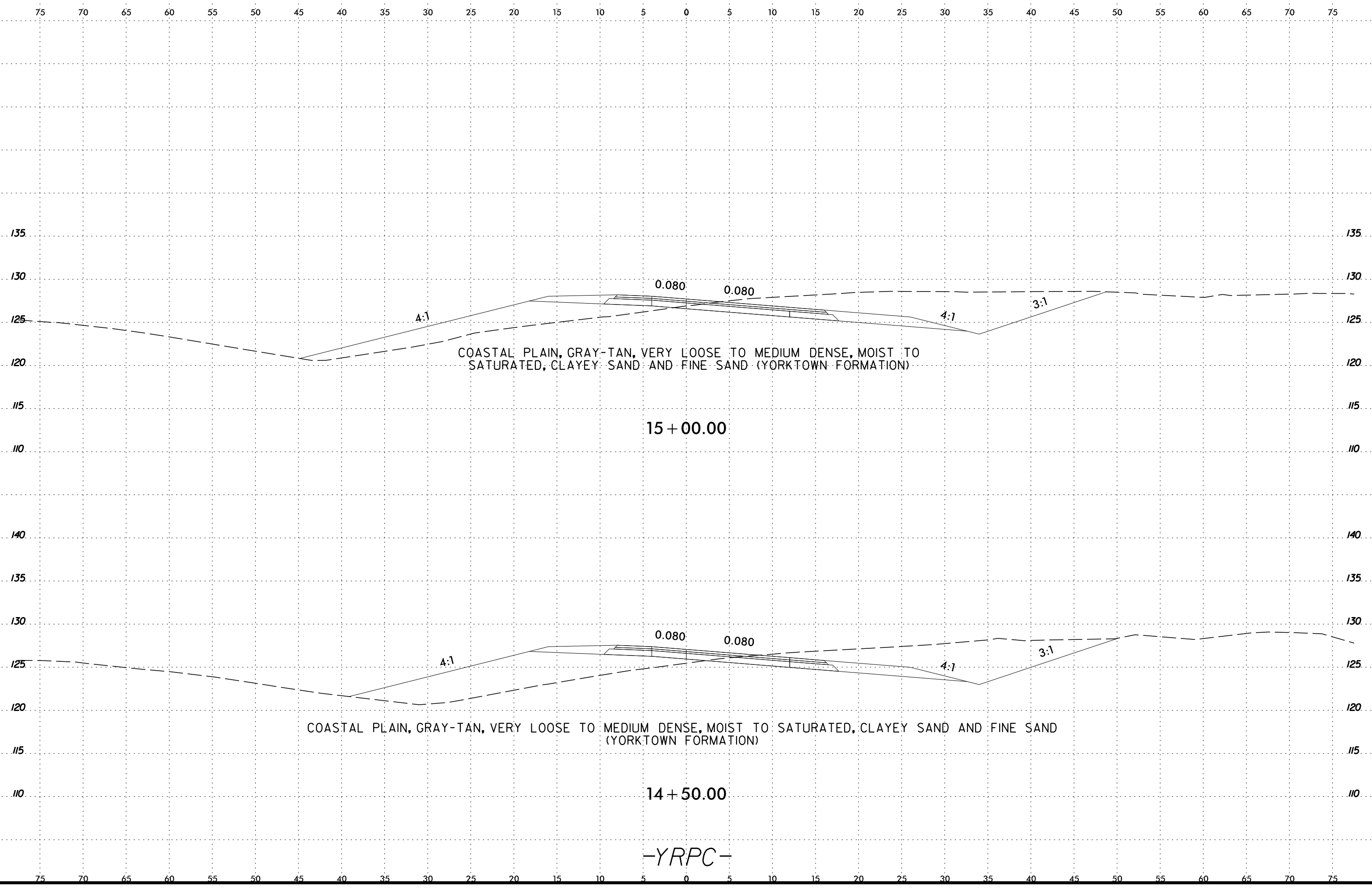
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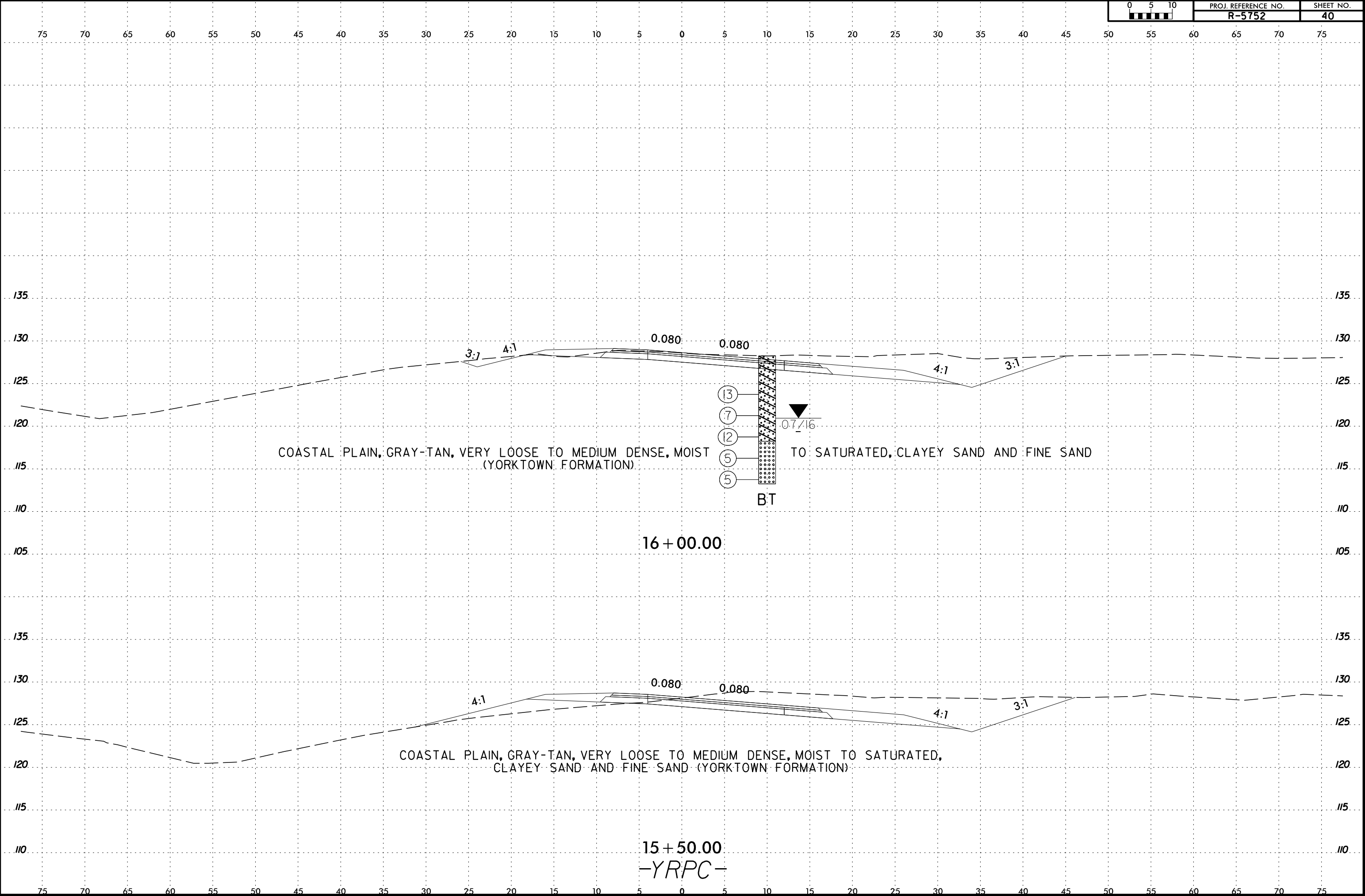
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-YRPB-

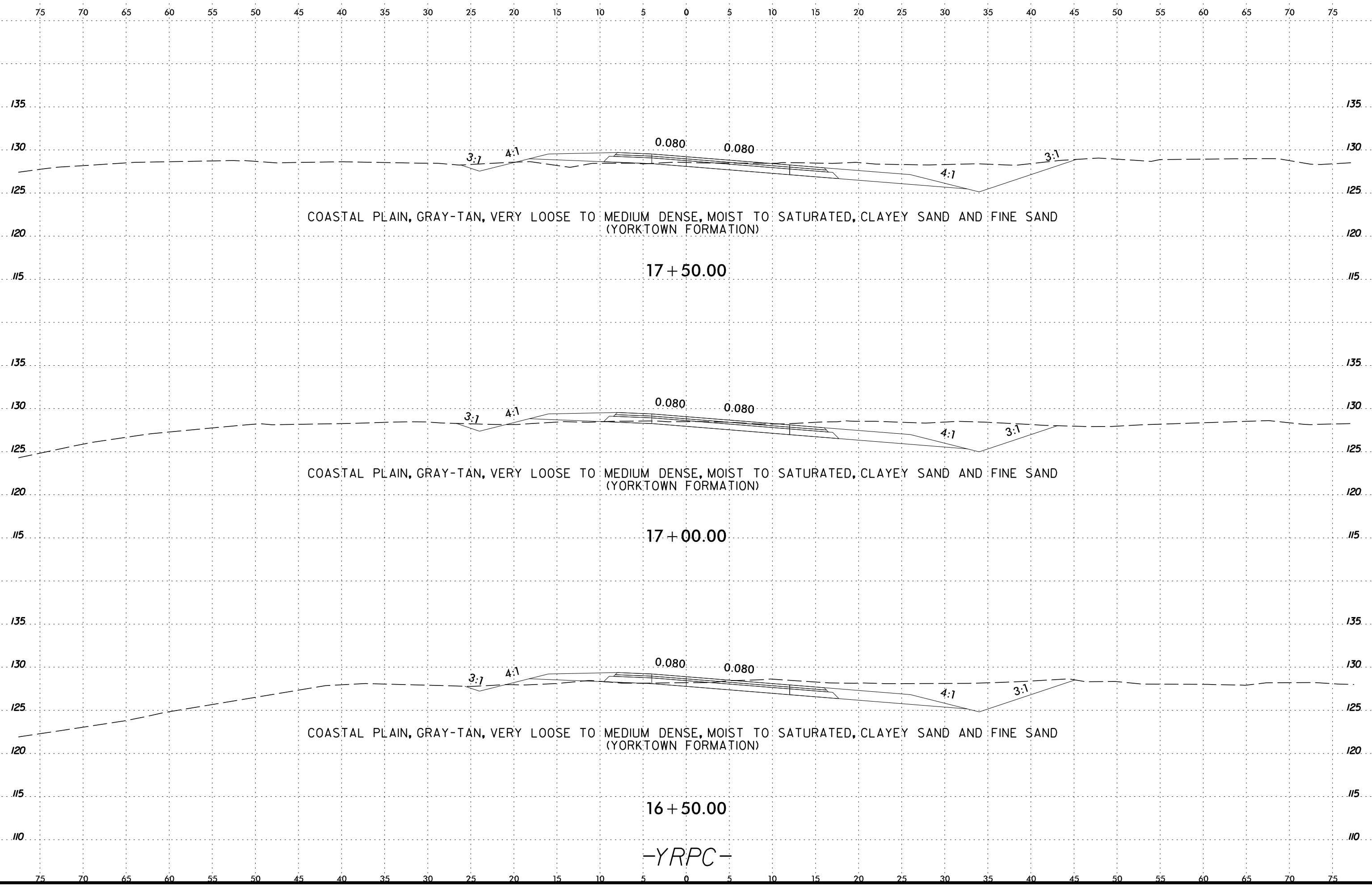
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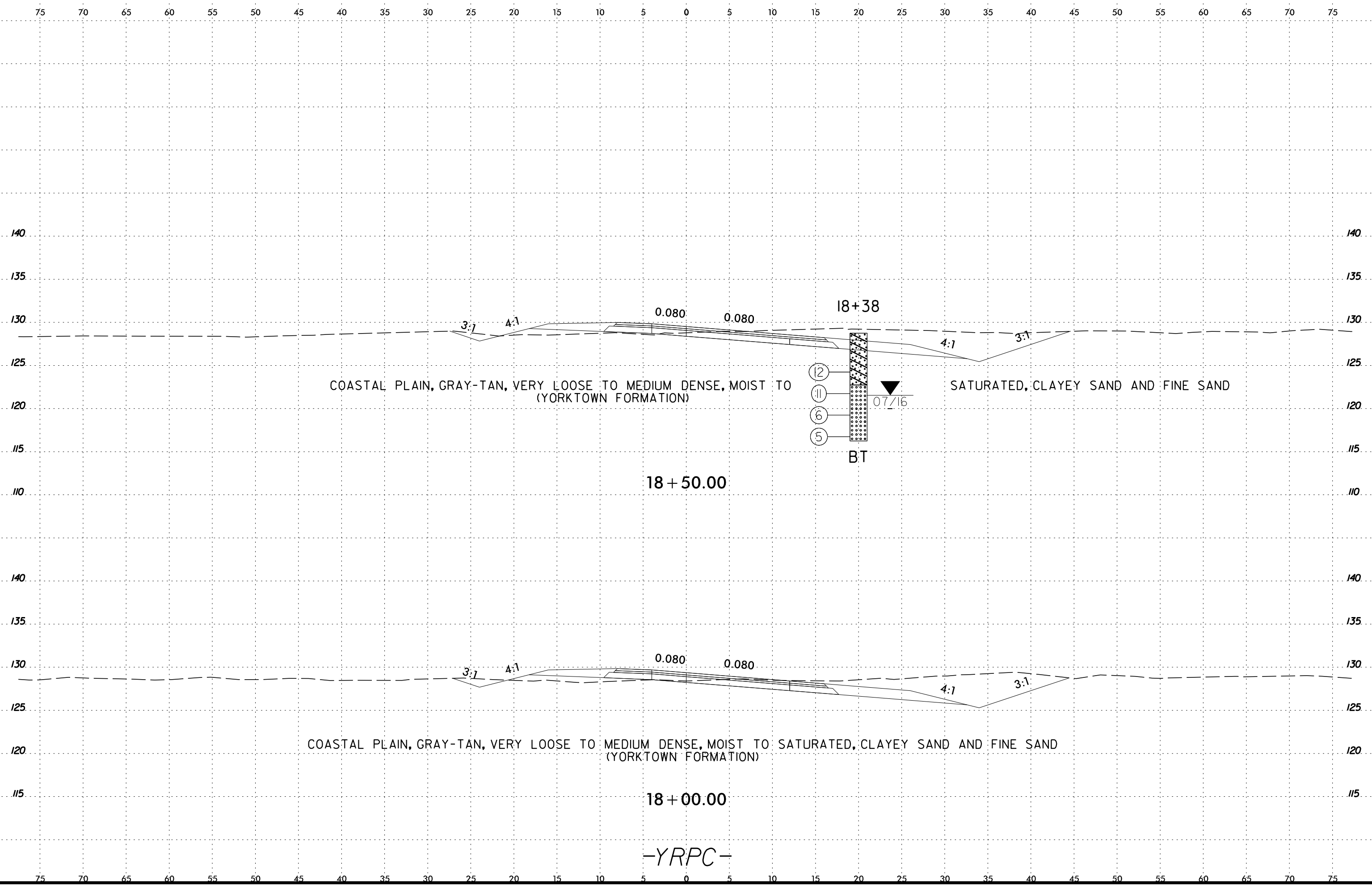


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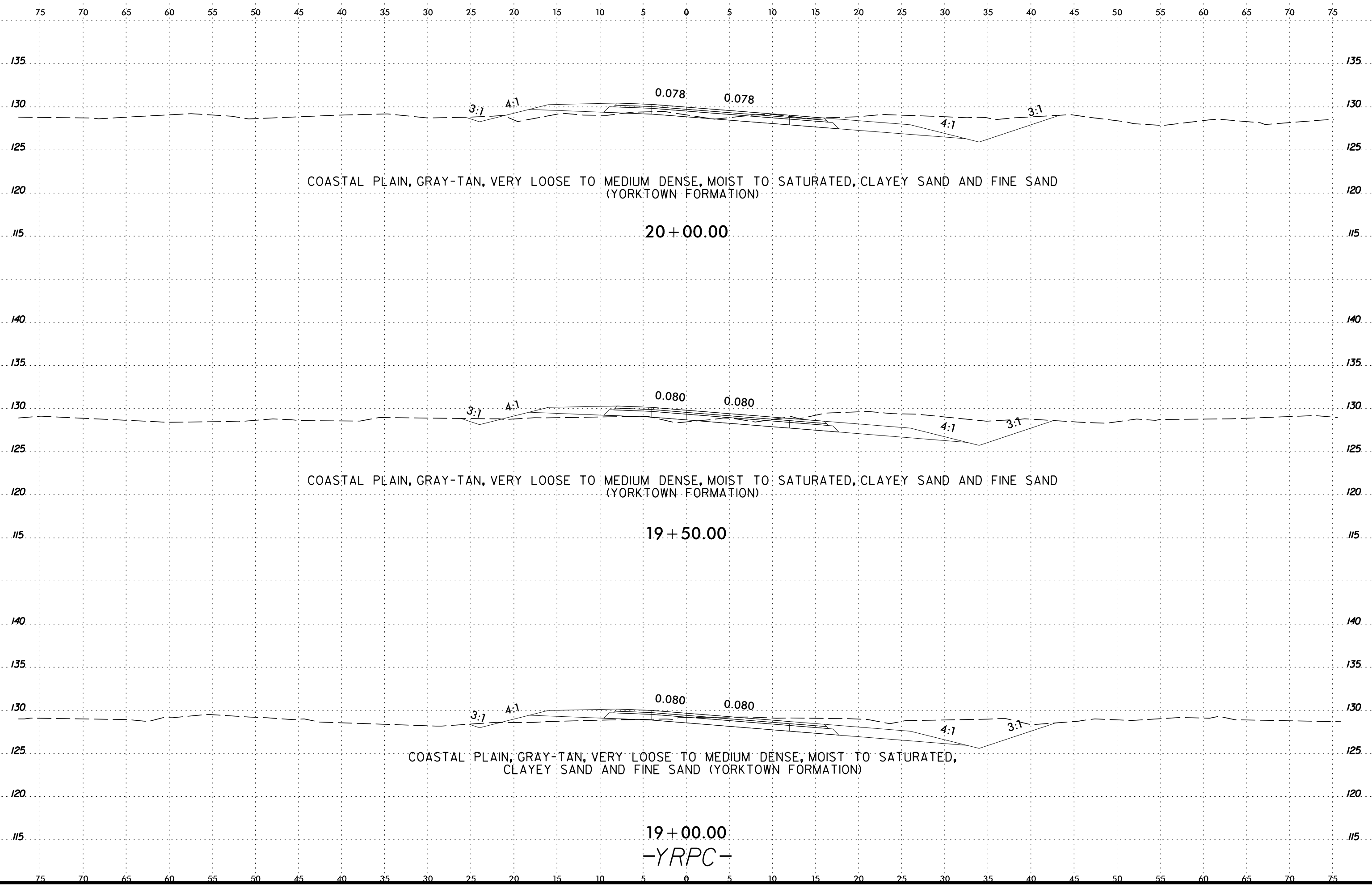
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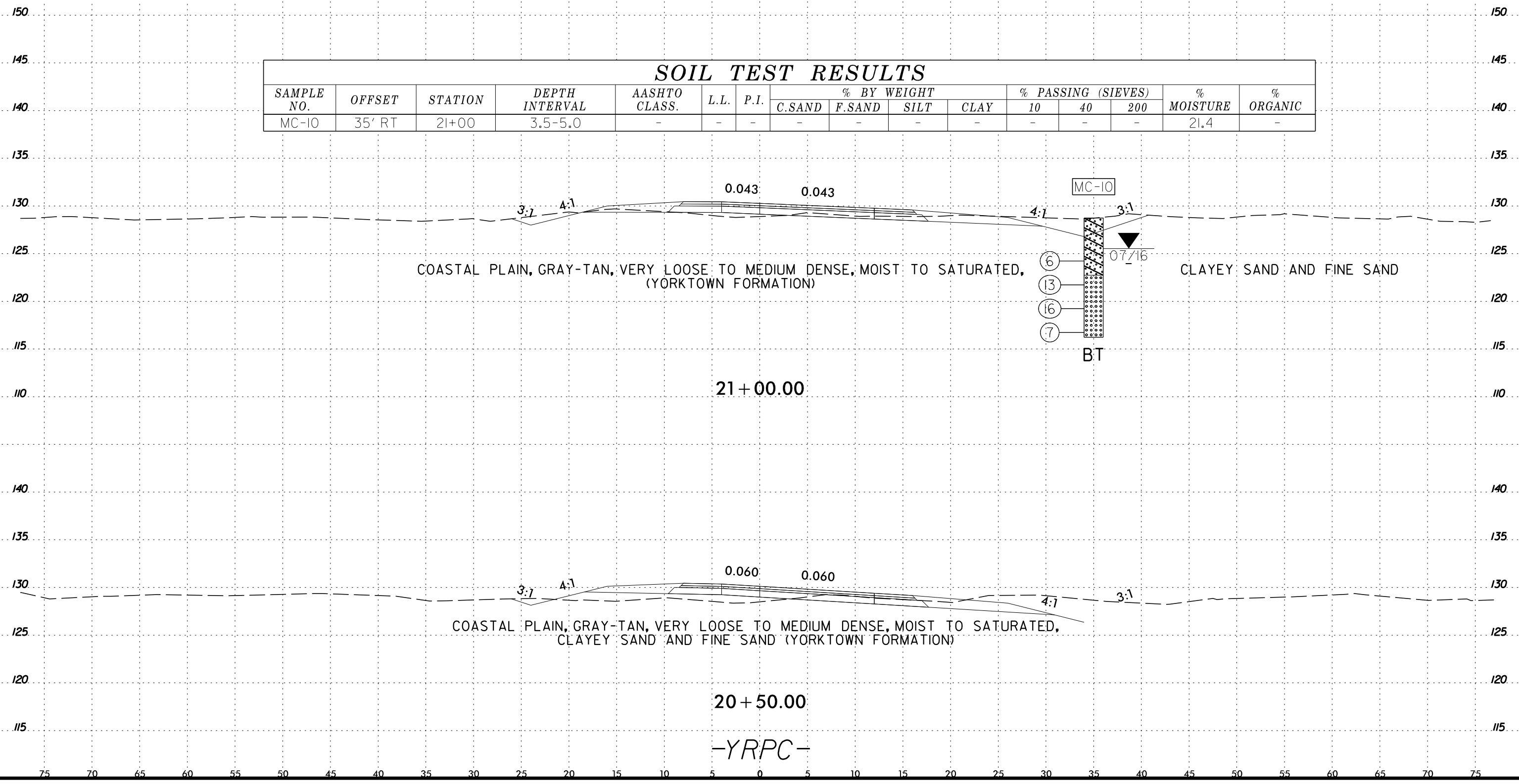


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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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		
MC-10	35' RT	21+00	3.5-5.0	-	-	-	-	-	-	-	-	-	-	21.4	-

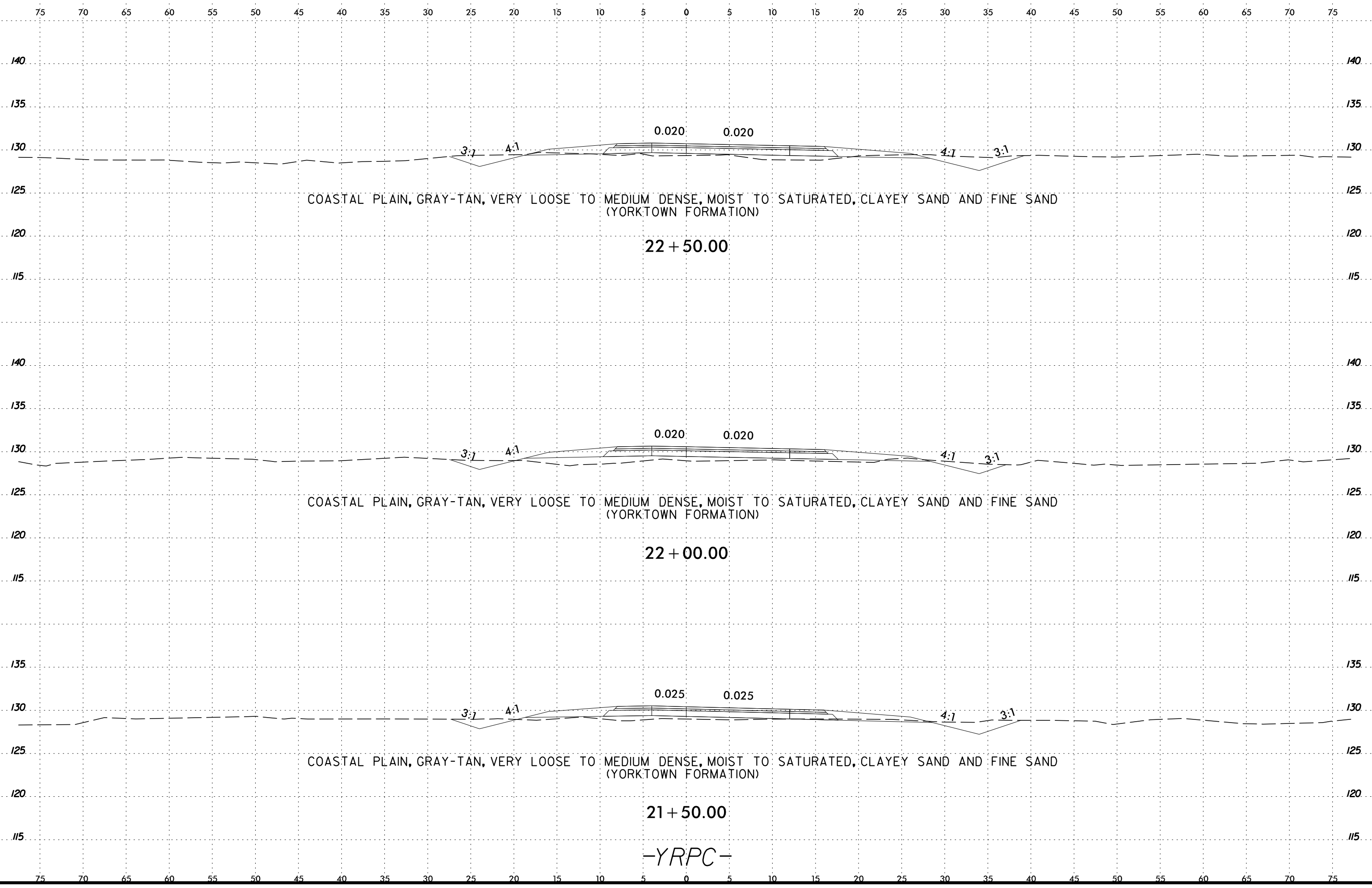


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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-5752	45



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155 155

150 150

145 145

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-14	10' RT	23+50	3.5-5.0	A-2-6(I)	37	20	18	51	26	5	100	95	31	-	-

140 140

135 135

130 130

125 125

120 120

115 115

110 110

140 140

135 135

130 130

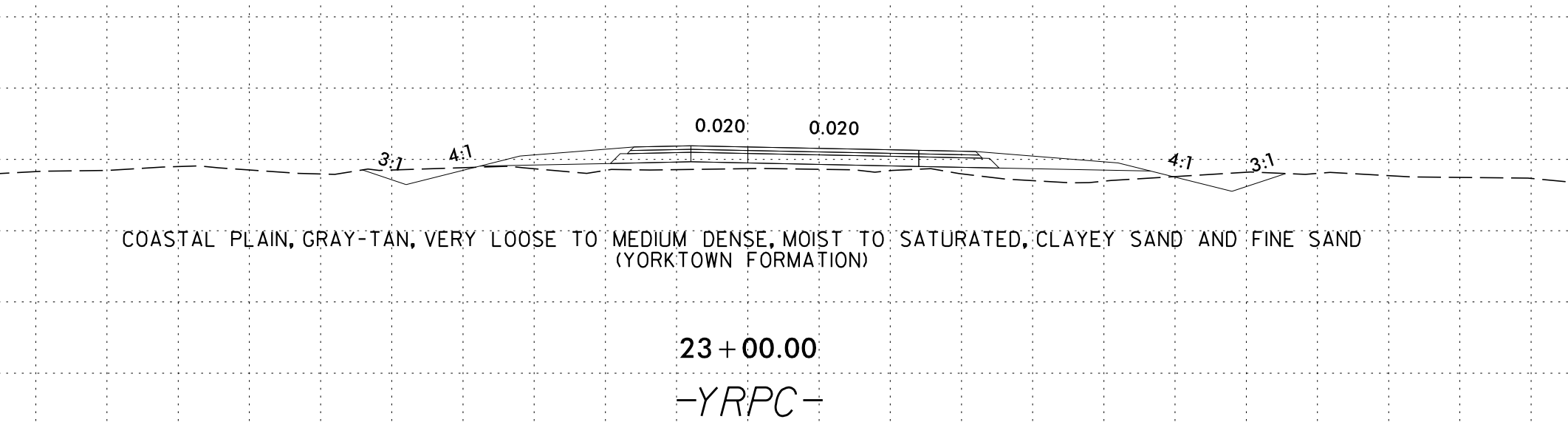
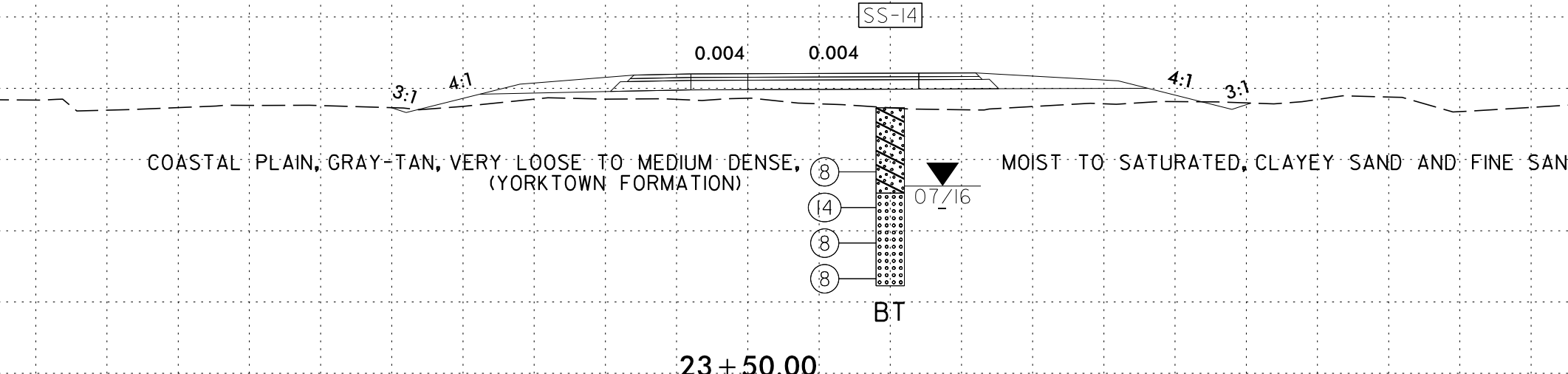
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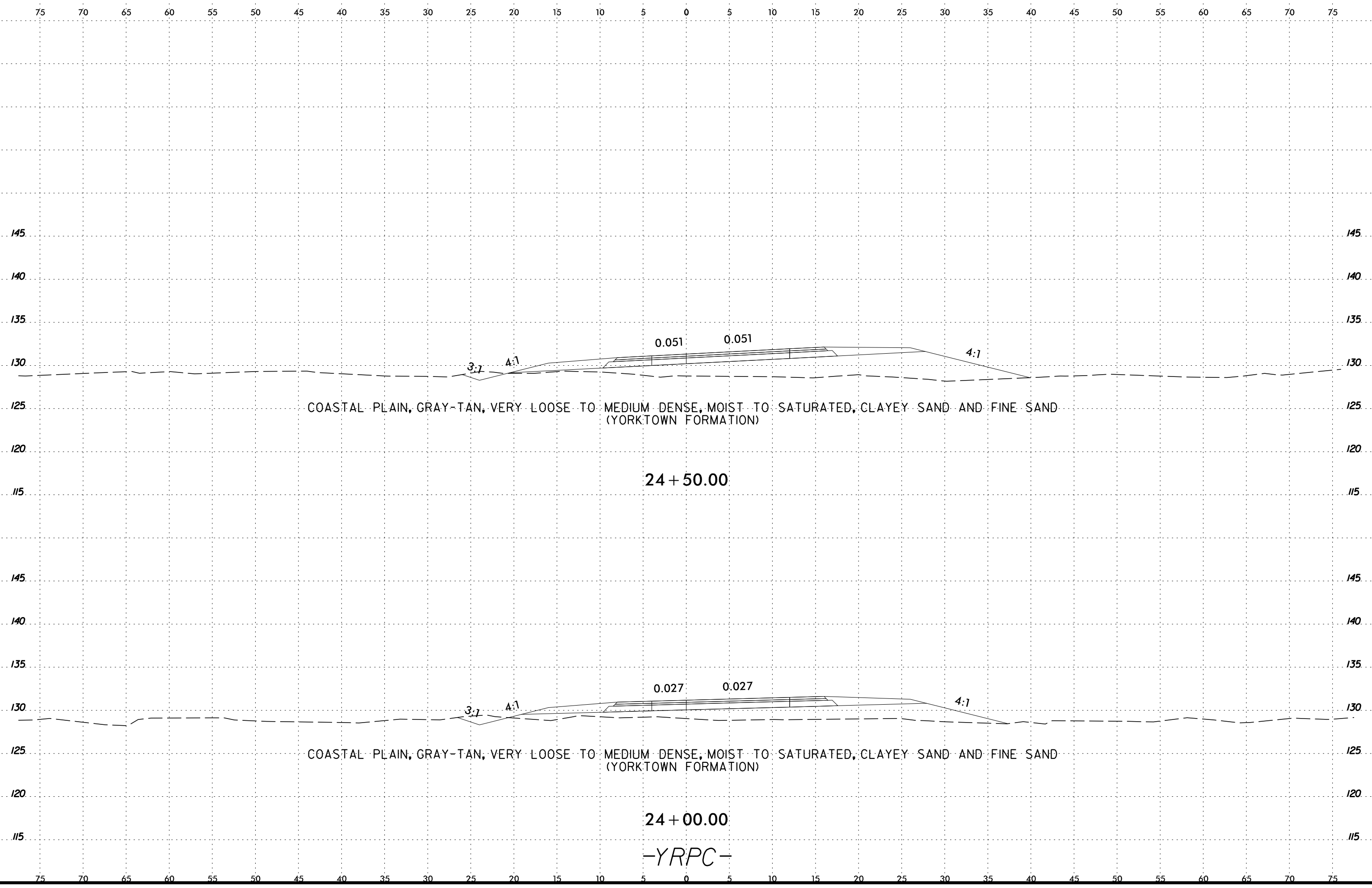
115 115

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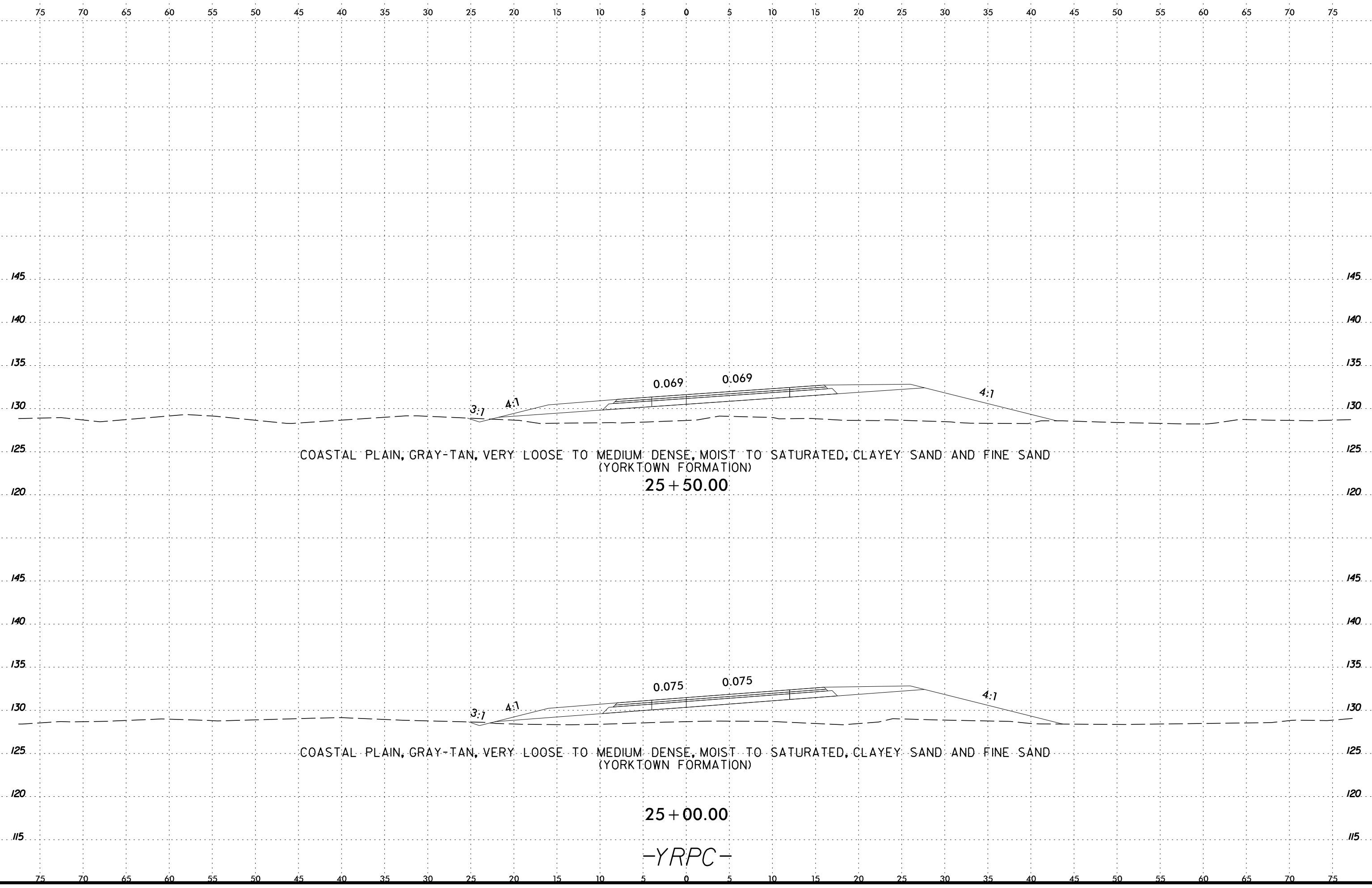


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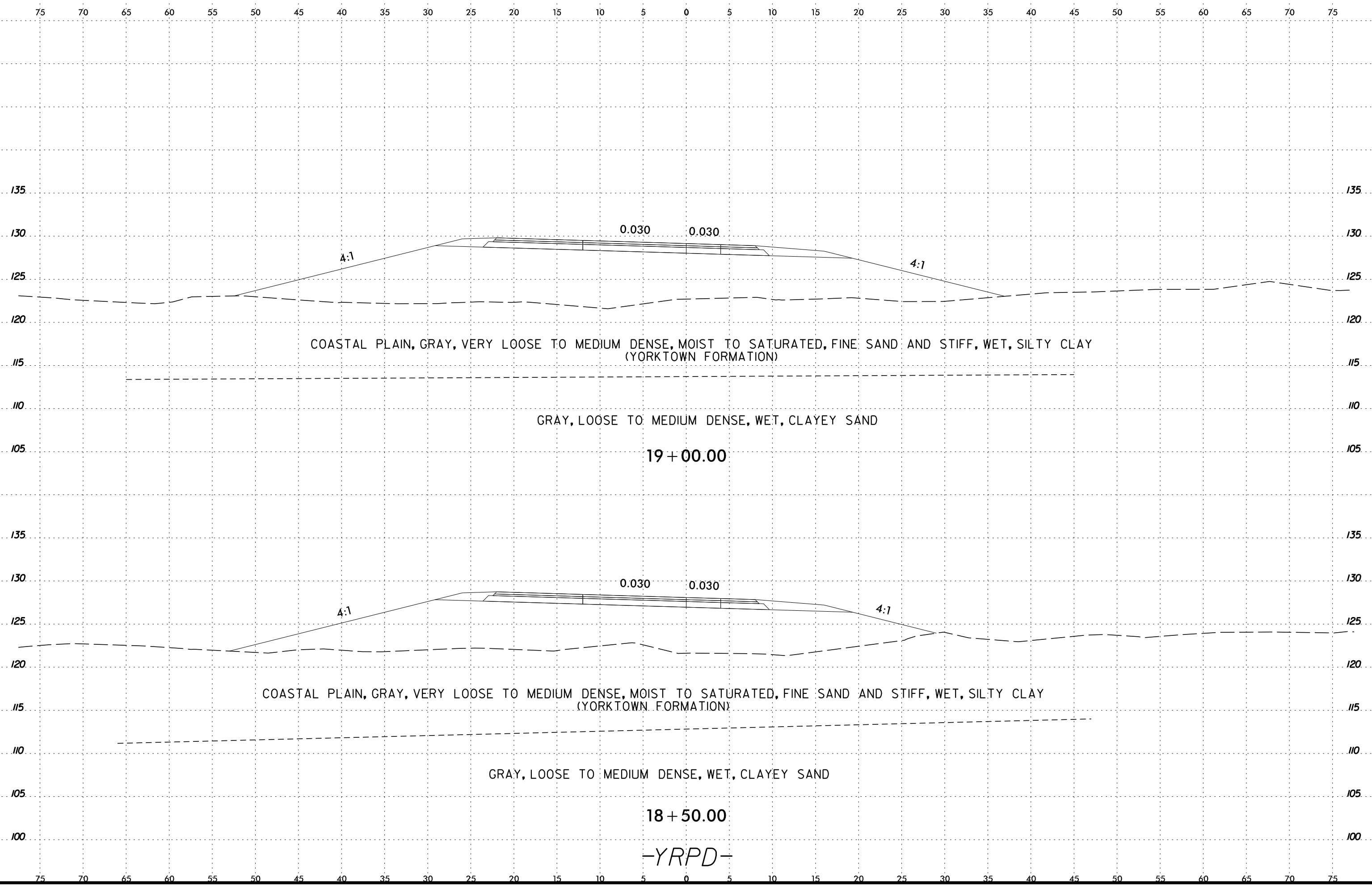


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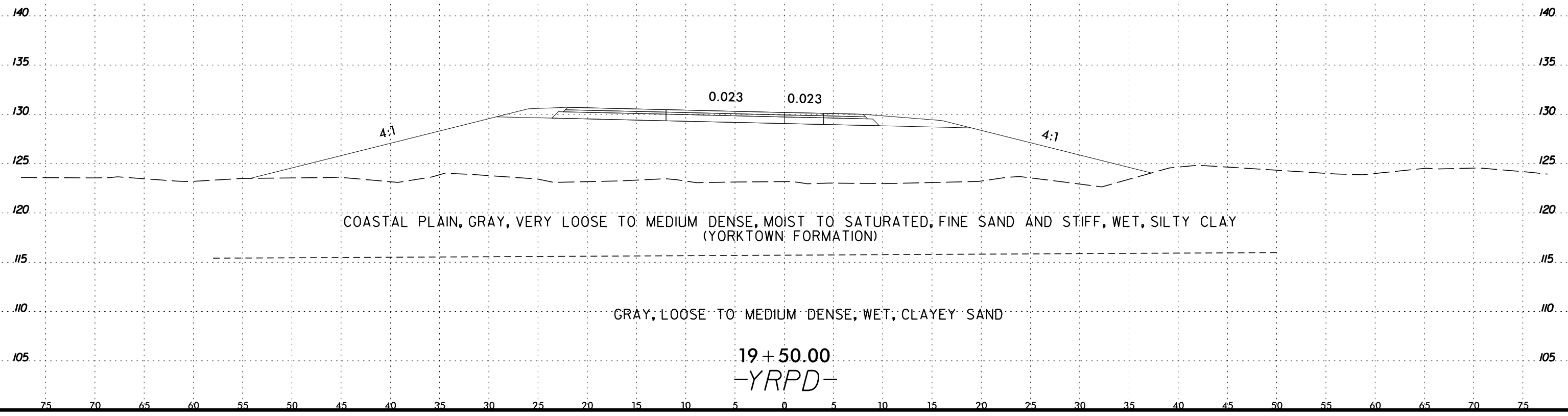
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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

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***SUBSURFACE INVESTIGATION***

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***APPENDIX B  
BORELOG***

***REFERENCE: R-5752***

***PROJECT: 53088***

# GEOTECHNICAL BORING REPORT BORE LOG

WBS 53088.1.FD1	TIP R-5752	COUNTY ROBESON	GEOLOGIST Rohit Warrier
SITE DESCRIPTION Upgrade US74/SR2220 intersection to an interchange and US74/SR2225 intersection to a directional crossover			GROUND WTR (ft)
BORING NO. B-1	STATION 35+32	OFFSET 80 ft LT	ALIGNMENT -L-
COLLAR ELEV. 121.5 ft	TOTAL DEPTH 10.0 ft	NORTHING 275,400	EASTING 1,999,352
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER J. ANDERSON	START DATE 07/22/16	COMP. DATE 07/22/16	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
125																
															121.5	GROUND SURFACE
120	120.5	1.0	2	4	1	5							M			ALLUVIAL BLACK, SILT
	118.0	3.5	2	1	2	3							M			
115	115.5	6.0	7	14	11	25							M		115.5	COASTAL PLAIN GRAY, SILTY SAND (YORKTOWN FORMATION)
	113.0	8.5	3	3	6	9							M		113.5	COASTAL PLAIN GRAY, SILTY CLAY
															111.5	Boring Terminated at Elevation 111.5 ft IN COASTAL PLAIN (SILTY CLAY)

NCDOT BORE DOUBLE R5752\_GEO\_RDWY\_BH.GPJ NC\_DOT.GDT 1/4/17