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REFERENCE: U-2519BA

PROJECT: 34817

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

CROSS SECTIONS

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1003 (CAMDEN ROAD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE ROAD)

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	201

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.

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PERSONNEL

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B. WORLEY, PG

A. GROSS

M. MOSELEY

M. MOSELEY

INVESTIGATED BY B. SMITH, PG & B. WORLEY, PG

DRAWN BY B. SMITH, PG & B. WORLEY, PG

CHECKED BY B. SMITH, PG & B. WORLEY, PG

SUBMITTED BY SUMMIT DESIGN AND ENGINEERING SERVICES, PLLC

DATE SEPTEMBER, 2017

Prepared in the Office of:

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NORTH CAROLINA LICENSED SEAL 2390 GEOLOGIST BRETT C. SMITH

DocuSigned by: Brett C. Smith 12/5/2017
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SIGNATURE DATE

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DocuSigned by: Bradley D. Worley 12/5/2017
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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	2

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MX	11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0	4 MX			8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

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

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-450
- [X] DIEDRICH D-50

ADVANCING TOOLS:
- [X] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 2.25" HOLLOW STEM AUGERS

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B _____
- [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

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)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

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 (RQD) - 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.

SLICKENSIDE - 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 (SRQD) - 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.

BENCH MARK:

ELEVATION: FEET

NOTES:

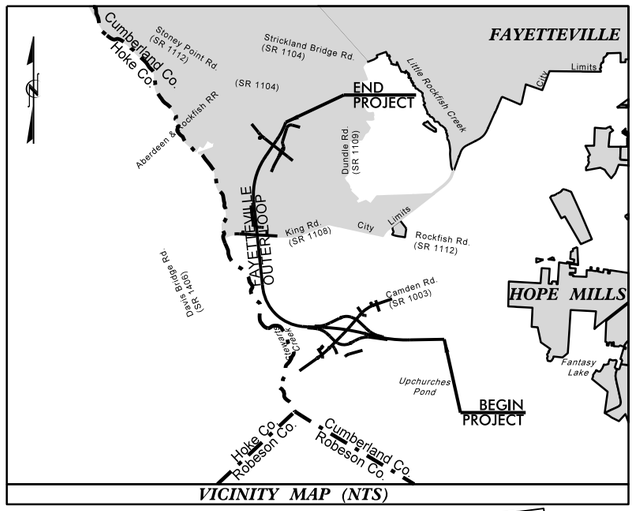
ELEVATIONS OBTAINED FROM u2519ba_ls_tin.tin (file dated 10/29/15)

DATE: 8-15-14

CONTRACT:

TIP PROJECT: U-2519BA

See Sheet 1-A For Index of Sheets



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CUMBERLAND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	3	201

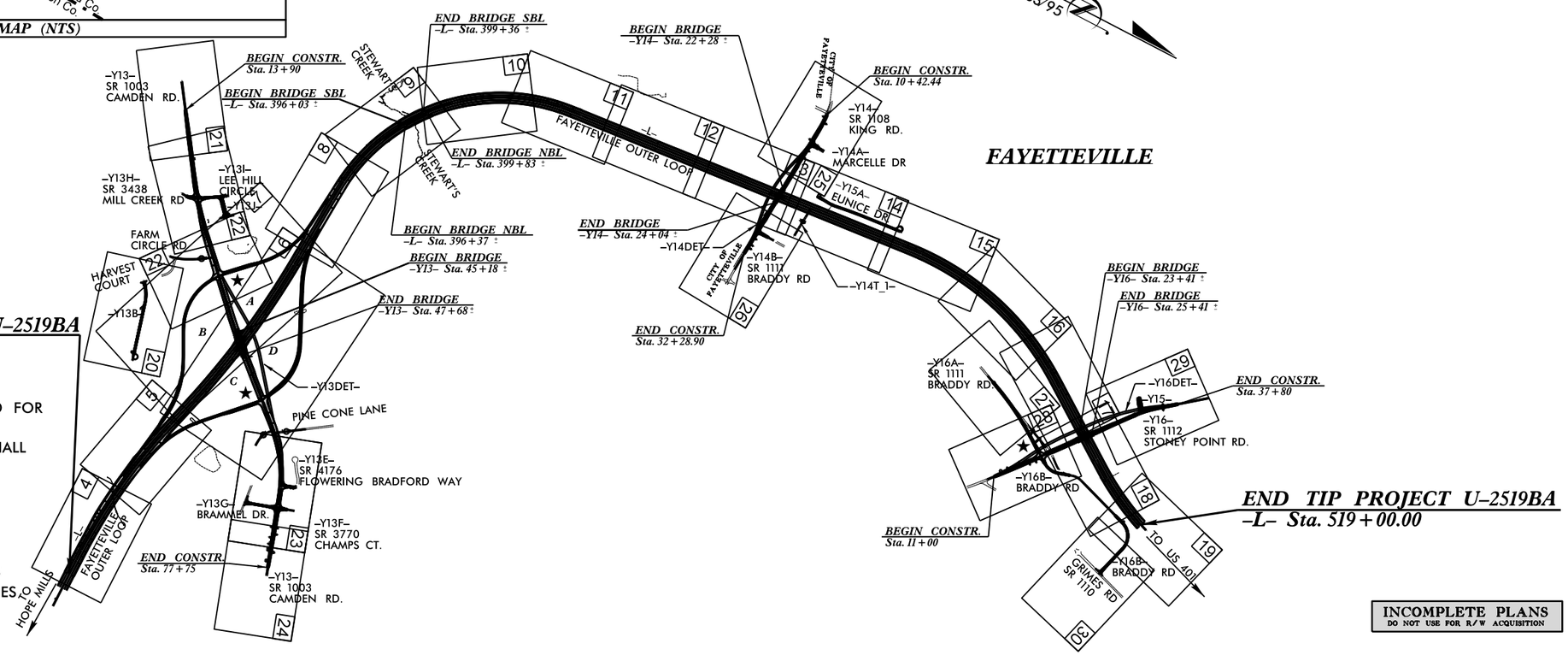
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34817.1.FR7	NHF-0100(24)	P.E.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCATION: *FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1003 (CAMDEN ROAD) TO SOUTH OF SR 1104 (STRICKLAND BRIDGE ROAD)*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, SIGNALS SIGNING, & STRUCTURES*

PRELIMINARY ROADWAY PLANS
DATE: 12/17/2015



BEGIN TIP PROJECT U-2519BA
–L– Sta. 320+00.00

NOTES:
1. DESIGN EXCEPTION IS REQUIRED FOR SUPER AND SIGHT DISTANCE.
2. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___.
3. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.
4. A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF FAYETTEVILLE.

★ PROPOSED TRAFFIC SIGNAL

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2018 = 27,300
ADT 2038 = 34,000
K = 8%
D = 55%
T = 12% *
V = 70 MPH

FUNC CLASS = INTERSTATE
* (TTST 4% + DUAL 8%)

PROJECT LENGTH (NB LANE)

LENGTH ROADWAY TIP PROJECT U-2519BA.....3.713 miles ±
LENGTH STRUCTURES TIP PROJECT U-2519BA.....0.056 miles ±
TOTAL LENGTH OF TIP PROJECT U-2519BA.....3.769 miles

PREPARED IN THE OFFICE OF:
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE, SUITE 350
RALEIGH, NORTH CAROLINA 27609
NC LICENSE NO. A-2112
FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS
RIGHT OF WAY DATE: SEPTEMBER 16, 2016
LETTING DATE: SEPTEMBER 18, 2018

B. KEITH SKINNER, PE
PROJECT ENGINEER RK&K, LLP

MICHAEL T. MERRITT, PE
PROJECT DESIGN ENGINEER RK&K, LLP

NCDOT CONTACT: REKHA PATEL, PE
PROJECT ENGINEER – ENGR. COORD.

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

SUMMIT
DESIGN AND ENGINEERING SERVICES
919.732.3883 SUMMIT-ENGINEER.COM
504 Meadowland Drive, Hillsborough, NC 27278

August 31, 2017

WBS Number: 34817.1.FR7
TIP Number: U-2519BA
ProjectID: 27774
County: Cumberland
Description: Fayetteville Outer Loop from south of SR 1003 (Camden Rd.) to south of SR 1104 (Strickland Bridge Rd.)

SUBJECT: Geotechnical Report - Inventory

Project Description

The proposed project consists of 3.769 miles of new alignment four-lane interstate associated with a future section of the Fayetteville Outer Loop. The project corridor begins south of Camden Road near Hope Mills, and ends south of Strickland Bridge Road within the city limits of Fayetteville. Numerous areas of embankment heights exceeding 20 feet and several cut sections exceeding 15 feet are proposed. One diamond interchange is proposed at the junction of the new interstate and Camden Road. Various roadway improvements designed to improve traffic flow in the area around the new interstate are proposed along Camden Road, King Road, Stoney Point Road, and other smaller secondary roads. Five structures are proposed within the project corridor. A dual structure bridge carrying the new alignment interstate over an unnamed tributary to Stewart's Creek, and 3 separate bridges carrying Camden Road, King Road, and Stoney Point Road over the proposed new interstate.

The geotechnical investigation was conducted from June 14, 2016 to October 4, 2016, with Summit Design and Engineering Services personnel and equipment. Borings were advanced using Diedrich (D) - 50, and Central Mine Equipment (CME) - 450 drill machines equipped with automatic hammers. Standard Penetration Tests were performed at all boring locations to provide subsurface information for roadbed and slope design/ construction. Representative soil samples were collected and submitted to Summit's soils laboratory for classification and moisture content testing. Organic samples were submitted to NCDOT for organic content testing. Bulk samples were subcontracted and submitted to Geotechnics for California Bearing Ratio (CBR) testing. All borings were left open for a minimum of 24 hours to collect groundwater data. All investigations and reporting were performed in accordance with the NCDOT Geotechnical Engineering Unit's 2016 "Geotechnical Investigation and Recommendations Manual."

The following alignments were investigated for this project:

Line	Station(±)
-L-	320+00 - 519+00
-Y13RPA-	10+00 - 28+57.05
-Y13RPB-	10+00 - 41+01.43
-Y13RPC-	10+00 - 28+80.21
-Y13RPD-	10+00 - 35+12.45
-Y13-	13+90 - 77+75
-Y13B-	10+10.06 - 20+38.91
-Y13E-	10+00 - 12+00
-Y13G-	10+08.14 - 14+32.27
-Y13I-	10+00 - 13+96.21
-Y14-	10+42.44 - 32+28.90
-Y15A-	10+00 - 22+34.96
-Y16-	11+00 - 37+80
-Y16A-	11+00 - 22+86.31
-Y16B-	10+18.07 - 33+10.12

Physiography and Geography

The project corridor is located in central-southeastern North Carolina in the Coastal Plain Physiographic Province. Topography in the region is characterized by flat land to gently rolling hills and valleys. The topography along the project corridor would be best described as gently rolling hills and valleys. Elevations range from approximately 134 feet above sea level in the floodplain of the unnamed tributary to Stewart's Creek, to approximately 221 feet above sea level along Stoney Point Road.

Geologically, the project corridor is located within the Cretaceous sedimentary deposits of the Inner Coastal Plain. These sediments were deposited largely in a deltaic system and range in age from 84 to 89 million years old. Two geologic formations within these deposits were encountered during the geotechnical investigation. The oldest of which, the Cape Fear Formation, consists of interbedded clays and sands. The clay beds are typically pale gray to dark gray with some mottled red to yellowish orange zones, and range from thin to thickly bedded. Some of the clay strata have lateral continuity and are indurated into mudstone in some areas. The sands in the Cape Fear range from thin to thickly bedded, and are either massive or poorly cross-bedded. They are poorly sorted ranging from fine to very coarse grained, commonly containing clay clasts. Overall, the sands of the Cape Fear generally contain quite a bit of clay, and in some areas are indurated into sandy mudstone and sandstone.

Overlying the Cape Fear is the Middendorf Formation. This formation consists of intercalated, lensing, thick bedded, light colored cross-bedded sands and laterally discontinuous clays. In some areas these strata are indurated into sandstone and mudstone. When the Cape Fear and Middendorf Formations are deeply weathered

and occur in close proximity, which is the case throughout the project corridor, it can be very difficult to distinguish between them. Significant effort was made in the graphics section of this report to determine the stratigraphic boundary between to two formations. Observed soil/rock characteristics, continuity/discontinuity of strata, Standard Penetration Test (SPT) data of strata, and topographic position were all used in identifying formations. In general, the stratigraphic contact between the two formations varies between 140 - 160 feet above sea level, with the Cape Fear Formation located below this contact.

An unnamed tributary to Stewart's Creek is the main natural body of flowing water located within the project corridor. Several areas of wetlands were encountered within the project corridor. Wetlands were typically encountered in low lying, flat areas with poor drainage and heavy vegetation.

Soils Properties

Coastal plain soils of the Cape Fear Formation were encountered along the entire project corridor at a general elevation at or below 140-160 feet above sea level. As previously described, these interbedded sands, clays, mudstones and sandstones were deposited in a largely deltaic environment during the Cretaceous period and have weathered in place since that time.

Laboratory analysis of the clay beds from within the Cape Fear Formation reveal that they predominately consist of mostly moderate to highly plastic, silty clays (A-7-5 & A-7-6). To a lesser extent, laboratory testing also revealed areas of sandy clay (A-6), and highly clayey, sandy silt (A-4) within the Cape Fear clay beds. The moisture content of the clay beds ranged from 11.8% to 29.0% with an average of 24.6%. Liquid limits were spread from a low of 22 to a high of 74 with an average value of 52. Plasticity Index (PI) values varied from 7 to 45 with an average of 23. Cape Fear Formation clay beds are typically acidic with pH values ranging from 2.4 to 4.5 with an average pH of 3.7. Cape Fear clays typically contain mica and disseminated wood fragments, and both were observed during the investigation and aided in Formational identification. The clay minerals present in the Cape Fear clay beds are typically a mixture of kaolinite and illite-smectite. Soil densities within the Cape Fear clay beds encountered were typically very stiff to hard. Occasionally some areas of medium stiff to stiff clays were encountered, but these areas were often close to or exposed at the surface. Cape Fear clay strata occur in mostly laterally continuous beds, and lengthy interpretations from boring to boring can be made with confidence.

Field observations of the Cape Fear Formation sands revealed mostly silty sands (A-2-4) with trace to some clay. Clayey sands (A-2-6 & A-2-7) were also encountered fairly frequently. To a lesser extent, fine to coarse sand (A-1-b), and fine sand (A-3) were believed to be encountered in some areas. Limited laboratory analysis of Cape Fear sands was performed, and only one sample was tested because of suspected high clay content and proximity to proposed grade. The lab tests revealed clayey sand (A-2-7) with a moisture content of 13.8%, liquid limit of 55, a PI of 28, and pH of 4.5. Cape Fear sands are believed to be principally feldspathic quartz sands. Soil densities within the Cape Fear sands varied greatly from loose to dense. Soil moisture content of these sands were typically found to be saturated, but when close to or at the surface and above the water table they were found to be occasionally moist to wet.

Less laboratory analysis was conducted on Cape Fear Formation soils, mainly due to the fact the formation is typically well below proposed roadway grade throughout the project corridor. The Cape Fear Formation is believed only to be at or near proposed grade along alignment -L- from approximately stations 363+00 - 416+00.

Coastal plain soils of the Middendorf Formation were encountered along the entire project corridor at a general elevation of at or above 140-160 feet above sea level, making this formation typically at or near proposed grade of all the roadway alignments. After deposition of the Cape Fear, the Middendorf was deposited in a deltaic environment during the Cretaceous period and has weathered in place in place since that time.

Laboratory analysis of the clay from within the Middendorf Formation revealed that they mostly consists of sandy clays (A-7-5, A-7-6, & A-6), with lesser but still significant amounts of silty clays (A-7-5 & A-7-6). To a much lesser extent, some of these clay rich areas consist of sandy silt (A-4) with some clay. Moisture contents varied from 11.7% to 37.7% with an average of 21.4%. Liquid limits ranged from 29 to 80 with an average value of 47. PI values varied from 10 to 42 with an average of 23. While not as acidic as the Cape Fear, the clay in the Middendorf had pH values that varied from 3.7 to 5.7 with an average pH of 4.9. Field observations of those clay samples not tested largely corresponded to the laboratory results. Clays from the Middendorf are consistently mottled in appearance which aided in Formational identification. The clay minerals present within the Middendorf are typically illite and kaolinite. Soil densities within the Middendorf clays typically ranged from soft to stiff with some areas of very stiff to hard. Clay strata within the Middendorf Formation are mostly discontinuous. The Middendorf clay seemed to occur more in lens form, meaning the clay areas thicken and thin in more than one direction and at random. Due to the laterally discontinuous nature of the Middendorf clay beds, interpretations across greater distances are more subject to error.

The Middendorf Formation predominately consists of sand within the project corridor. Laboratory analysis of the sands from within the Middendorf revealed that they mostly consist of silty sand (A-2-4) with trace to some clay, and clayey sand (A-2-6 & A-2-7). Moisture contents ranged from 6.5% to 25.0% with an average of 14.0%. Liquid limits were spread from a low of 16 to a high of 60 with an average value of 32. PI values varied from 0 (Non-Plastic) to 24 with an average value of 10. A range of pH values were measured from 4.5 to 6.4, with an average of 5.0. Field observations of Middendorf sand samples not tested largely corresponded to laboratory results. However, it is believed there are areas of fine to coarse sand (A-1-b) and fine sand (A-3) that were not lab tested. The Middendorf sand is predominately quartz. Soil densities within the Middendorf sands most commonly varied from very loose to medium dense. Occasionally, areas of dense sand were encountered.

The Middendorf Formation is believed to be at, near, or above proposed grade across almost the entire project corridor. The only exception is along -L- where the Cape Fear Formation is exposed at the surface, from approximately stations 373+00 - 377+50, 394+50 - 399+75, and 409+00 - 409+75. The majority of all excavated material will be from the Middendorf Formation.

Alluvial soils were encountered and/or observed in wetland areas in several locations within the project corridor, mainly along -L-, -Y13RPA-, -Y13RPB-, and -Y13RPC-. More specific information on the location of these alluvial soils can be found in the "Areas of Special Geotechnical Interest" section in this text report. Wetlands are typically present in low lying, flat, and poorly drained areas with near or at the surface groundwater fed by a spring or seep. Loose surficial coastal plain soils located in upland areas are transported to and deposited in these wetlands by surficial run-off during heavy rain events. Heavy vegetation thrives with a constant source of water for their root systems. This vegetation goes through repeated cycles of life, death, and decay in these soils. This in turn leads to a significant increase in organic content within the wetland soils. In

some extreme weather events, these areas may exhibit flowing surface water which also can lead to additional sediment deposition.

Field observations of these alluvial soils revealed wet to saturated, fine to coarse sands and silty sands with organic contents ranging from little to highly organic (A-1 to MUCK). Limited laboratory analysis revealed fine to coarse sand with little to moderate amounts of organic matter (A-1). The percentage of organic material varied from 3.8% to 6.0%. Liquid limits ranged from 38 to 57 with an average of 48, and PI values were 0 or Non-Plastic. Moisture content and pH were not measured with these samples. When encountered during drilling, these alluvial soils were typically never more than 3-4 feet thick and commonly with very loose soil densities.

Alluvial wetland soils throughout the project corridor were drilled and sampled on a limited basis due to access and cost constraints.

Roadway embankment soils from the existing construction of Camden Road, King Road, Braddy Road, and Stoney Point Road were encountered or observed within the project corridor. Roadway embankment soils were rarely encountered during the geotechnical investigation. This was mainly due to the fact that these areas contained buried utilities, and were unable to be drilled or sampled. When they were encountered during drilling these soils were typically observed as moist, loose, clayey sands (A-2-6/A-2-7) and silty sands (A-2-4). Usually about 1-3 feet in thickness, but occasionally some areas were observed to have as much as 3-4 feet of existing roadway embankment fill. No laboratory testing was performed on these soils.

Engineered artificial fill was encountered at one location within the project corridor, -Y13RPD- from approximately station 18+90 - 19+25. This fill was believed to be associated with a driveway. Field observations of this fill indicated that it was composed of a moist, medium dense, silty sand (A-2-4) with trace gravel and clay, and only about 3 feet thick. No laboratory testing was performed on this fill.

Rock Properties

In many areas within the project corridor, sand and/or clay strata are indurated to the point of being considered mudstone, sandy mudstone, or sandstone. This especially occurs at depth within the Cape Fear Formation, but also occurs occasionally within the Middendorf. This “Coastal Plain Sedimentary Rock” has an N-Value of greater than 100. At no point during the geotechnical investigation was rock encountered within 6 feet of proposed grade and is not expected to be a factor during roadway construction. However, it will likely be a factor with respect to pile driving at the bridge locations.

Ground Water

Groundwater was encountered across the entire project corridor. Within the project corridor, ground water was encountered anywhere from approximately 140 to 209 feet above sea level with an average elevation of 170 feet above sea level. A shallow unconfined aquifer was encountered along mostly the entire project corridor; anywhere a significant amount of surficial sand occurs. Water within this aquifer varied with levels typically being influenced by surface topography, also known as topographically-driven flow. Significant fluctuations in groundwater levels within this aquifer are possible due to seasonal change or climatic variation. Confined aquifers were encountered underneath the surficial aquifer and throughout the project corridor. In some areas, especially within the Middendorf Formation where the confining clay layers are more discontinuous, these aquifers would be better described as semi-confined. These deeper semi-confined and confined aquifers are much less impacted by season changes or climatic variations than the surficial aquifer. In areas within the confined aquifers where the groundwater is under sufficient pressure, artesian conditions are present. A flowing artesian aquifer is present underneath the proposed dual structure over an unnamed tributary to Stewart’s Creek. This aquifer is not anticipated to impact the construction of the roadway, but will likely be an issue during bridge construction. Non-flowing artesian aquifers were encountered along alignment -L- at approximately the following stations: 329+00, 357+00, 369+00, 445+00, 496+00, 502+00, and 514+00. Only at station 357+00 will an artesian aquifer impact construction. Perched water was encountered along alignment -L- at approximately the following stations: 329+00, 366+00, and 381+00.

Several springs and/or seeps were identified at approximately the following locations during this investigation: -L- 380+41, 105’RT; -L- 380+37, 54’LT; and -L- 442+44, 3’LT. Further details about areas of high groundwater can be found in the “Areas of Special Geotechnical Interest” section of this text report.

A visual reconnaissance for residential water wells was conducted throughout the project corridor. This was used in conjunction with the final survey file to attempt to identify water wells within the proposed construction limits of the project. Properly abandoned wells are not included in the following list. Some water well locations are well hidden, and it is possible that some wells were missed or misidentified by the final survey and/or visual reconnaissance. The following residential water wells were identified within the construction limits at the following locations:

Alignment:	Station:	Offset:	Alignment:	Station:	Offset:
-L-	353+61	47’RT	-Y13-	36+26	95’RT
-L-	362+49	28’RT	-Y13-	59+46	67’RT
-L-	362+90	149’RT	-Y13-	63+76	63’RT
-L-	362+94	315’RT	-Y13-	66+04	50’RT
-L-	363+76	57’LT	-Y13-	66+52	80’RT
-L-	365+55	74’LT	-Y13-	71+06	61’LT
-L-	445+37	204’RT	-Y13-	71+53	58’LT
-L-	450+25	184’RT	-Y13RPA-	25+76	38’RT
-L-	454+10	194’RT	-Y13RPA-	27+58	30’LT
-L-	454+39	54’LT	-Y13RPC-	27+49	37’RT
-L-	455+85	85’RT	-Y13RPD-	23+62	30’RT
-L-	458+70	112’RT	-Y14-	14+53	41’LT
-Y13-	36+26	95’RT	-Y14-	16+37	42’LT
-Y14-	19+36	81’LT	-Y14-	29+97	45’LT
-Y14-	30+93	47’LT			

Two dug-out irrigation ponds were identified within the construction limits of the project. One at -Y13RPC- 19+52, and the other at -Y13RPD- 21+75. King’s Pond intersects with the project’s construction limits from -L- 440+40 to 442+87.

Areas of Special Geotechnical Interest

Plastic Soils - Moderate to highly plastic clays (A-7-5, A-7-6, & A-6) of Coastal Plain origin were encountered throughout the project corridor. Isolated areas of highly plastic, clayey sands (A-2-7) were also encountered. More detailed information on these soils can be found in the “Soil Properties” section of this text report. The following locations listed below show areas where moderate to highly plastic clays are located within 3 feet of proposed subgrade:

Alignment:	Begin Station - End Station:	Alignment:	Begin Station - End Station:
-L-	340+75 - 342+75	-Y13-	19+75 - 20+25
-L-	352+65 - 358+46	-Y13-	34+00 - 35+75
-L-	359+00 - 361+00	-Y13-	41+00 - 41+75
-L-	362+50 - 394+50	-Y14-	20+00 - 24+50
-L-	409+00 - 415+25	-Y14-	29+00 - 32+00
-L-	428+75 - 431+25	-Y16-	11+00 - 15+25
-L-	431+75 - 434+25	-Y16-	20+75 - 27+25
-L-	444+50 - 448+75	-Y16-	32+00 - 37+50
-L-	449+25 - 450+25	-Y13RPA-	10+00 - 24+75
-L-	453+25 - 463+75	-Y13RPC-	13+50 - 15+75
-L-	472+25 - 488+25	-Y13RPD-	10+00 - 14+50
-L-	491+75 - 500+25	-Y13RPD-	17+50 - 20+75
-L-	503+75 - 519+00	-Y15A-	12+25 - 14+75
-Y16B-	25+50 - 28+75		
-L-	340+50 - 342+50	-L-	353+00 - 372+25
-L-	380+50 - 393+75	-L-	402+75 - 406+25
-L-	415+25 - 419+25	-L-	431+50 - 440+25
-L-	443+50 - 455+75	-L-	493+25 - 497+50
-L-	500+50 - 505+75	-Y13-	14+00 - 31+50
-Y13-	57+50 - 77+00	-Y13RPA-	10+00 - 11+25
-Y13RPC-	14+00 - 15+00	-Y13RPD-	32+50 - 35+12
-Y13B-	15+00 - 18+50	-Y13G-	10+25 - 13+00

Alluvial Soils - Wet to saturated, very loose, little to moderate and highly organic alluvial sands (A-1, MUCK) were encountered along the project corridor. More detailed information on alluvial soils can be found in the “Soil Properties” section of this text report. The following locations listed below show areas where alluvial soils were encountered and/or observed:

Alignment:	Begin Station - End Station	Alignment:	Begin Station - End Station:
-L-	328+25 - 334+25	-L-	344+25 - 349+75
-L-	440+75 - 443+25	-L-	397+00 - 399+00
-Y13RPA-	18+25 - 21+35	-Y13RPB-	20+10 - 22+40
-Y13RPC-	17+40 - 18+25		

Acidic Soils - Acidic soils occur throughout the project corridor within the Cape Fear and Middendorf Coastal Plain Formations. For more information on this, please refer to the “Soil Properties” section of this text report. Special consideration will need to be taken in all areas of cut along the project corridor. The excavation and exposure of acidic soils can result in the dewatering of acidic groundwater and acidic run-off from precipitation. Acidic groundwater discharge should be mitigated to prevent environmental damages to downstream surface waters and to prevent erosion control hazards resulting from the loss of vegetation on land. Cut slopes with acidic groundwater will not properly vegetate. The following is a list highlighting the major locations where soils with a pH of 5 or lower were encountered in proposed cut sections:

High Groundwater - For more details on groundwater encountered throughout the project corridor, please refer to the “Groundwater” section of this text report. Groundwater was encountered within 6 feet of or above proposed grade at the following locations:

Alignment:	Begin Station - End Station:	Alignment:	Begin Station - End Station:
-L-	351+00 - 370+50	-L-	380+00 - 391+50
-L-	395+00 - 401+00	-L-	444+00 - 453+50
-L-	500+50 - 503+50	-Y13RPA-	24+50 - 27+50
-Y13RPA-	10+00 - 11+25	-Y13-	54+50 - 64+50
-Y13RPB-	25+00 - 39+50	-Y14-	10+50 - 13+00
-Y13-	67+00 - 77+50		

Appendix A

Bulk Samples - CBR

S#3
369+00
100’LT
2.0 - 23.0 feet

S#1
387+00
100’RT
0.0 - 18.0 feet

S#4
448+00
100’RT
0.0 - 25.0 feet

Results from CBR testing can be found on the following page.

References

The Geology of the Carolinas, J. Wright Horton, Jr., and Victor A. Zullo

Respectfully Submitted,
Brett Smith, PG
Project Geologist
Summit Design and Engineering Services, PLLC

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	4
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

REVISIONS

8/17/99

30-AUG-2017 15:22
S:\Users\kesmith\Documents\SUMMIT PROJECTS\NCDOT\Completed Projects\2016\U-2519BA - Fayetteville Outer Loop\U2519BA_GEO_RDWY_InventoryREVISED_Summit\CADD_GEOTECH\PlanProf\U2519BA_GEO_inv_004.dgn
$$$$USERNAME$$$$

LOIS BRYANT DB 4910 PG 72
FRANKLIN ABRAMSKY DB 2580 PG 826
DAVID MEADOWS DB 5230 PG 329
KENNETH BYERS DB 2397 PG 455
FREDDIE MCLEAN DB 7406 PG 247
CYNTHIA F CHANCELLOR DB 7667 PG 139
DAVID FOSTER DB 5852 PG 511
NETTIE HAWKINS DB 2393 PG 157
JOHN GERVAIS DB 3858 PG 778
DB 3858 PG 780
JOSH JENKINS DB 6871 PG 740
MELINDA SMITH DB 4644 PG 402 PB 92 PG 181
JERRY ANDERSON DB 4582 PG 26 PB 92 PG 181
FREDDIE MCLEAN DB 7706 PG 107 PB 92 PG 181
MITCHELL JOHNSON DB 4080 PG 457
JOHN LOWERY DB 3176 PG 231
J.B. BROWN DB 2685 PG 650
PEGGY LANE DB 4044 PG 499
BARBARA JOHNSON DB 7258 PG 706
BARBARA JOHNSON DB 3574 PG 94
JOSEPH BROWN DB 7258 PG 706

SR 3647 MARK AVE
SR 3646 PINE CREST DR
SR 3795 BRYTON ST

NAD 83/95

COASTAL PLAIN
ALLUVIAL
PROPOSED GUARDRAIL
PROPOSED CABLE GUIDERAIL
300' TAPER
600' ACCELERATION LANE
FUTURE TIP U-2519AB 320+00
325+00
330+00
333+00 SEE SHEET 5
MATCHLINE -L- STA. 333+00
S 89°38'03" W
BL-1
BL-2
BL-5I (U-2519A)
CHORD
BEGIN TIP PROJECT U-2519BA
-L- Sta. 320+00.00
-L- TS Sta. 322+14.22
-L- SC Sta. 323+64.22
BM#180
BL- STA 4+99
226 RIGHT
ELEV 174.74'

-L-

PIs Sta 323+14.22
θs = 0° 33' 44.9"
Ls = 150.00'
LT = 100.00'
ST = 50.00'

PI Sta 333+35.86
Δ = 14° 29' 45.0" (RT)
D = 0° 44' 59.8"
L = 1,932.92'
T = 971.65'
R = 7,640.00'
SE = 0.03

FOR -L- PROFILE SEE SHT. 31

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	5
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

-L-	-Y13RPB-		-Y13RPC-	
PI Sta 333+35.86	PIs Sta 343+47.13	PIs Sta 20+27.34	PI Sta 23+91.05	PIs Sta 12+92.53	PI Sta 16+27.81	PIs Sta 19+59.12
Δ = 14° 29' 45.0" (RT)	Θs = 0° 33' 44.9"	Θs = 6° 36' 39.8"	Δ = 22° 56' 46.9" (LT)	Θs = 6° 00' 36.2"	Δ = 18° 41' 42.6" (RT)	Θs = 6° 00' 36.2"
D = 0° 44' 59.8"	Ls = 150.00'	Ls = 300.00'	D = 4° 24' 26.5"	Ls = 300.00'	D = 4° 00' 24.1"	Ls = 300.00'
L = 1,932.92'	LT = 100.00'	LT = 200.14'	L = 520.64'	LT = 200.12'	L = 466.60'	LT = 200.12'
T = 971.65'	ST = 50.00'	ST = 100.13'	T = 263.85'	ST = 100.10'	T = 235.39'	ST = 100.10'
R = 7,640.00'			R = 1,300.00'		R = 1,430.00'	
SE = 0.03			SE = 0.08			

ALLUVIAL
PEGGY LANE
DB 4044 PG 499
-L- POC Sta. 335+00.00 =
-Y13RPB- POT Sta. 10+00.00 (59' LT)
-Y13RPB- TS Sta. 18+27.20
-Y13RPB- SC Sta. 21+27.20
ROBERT MANGUM
NO DEED INFO
CHORD
COASTAL PLAIN
600' ACCELERATION LANE
PROPOSED GUARDRAIL
PROPOSED CABLE GUIDERAIL
GRAU 350
BL-3
N 81° 17' 07.5" W
N 76° 54' 37.9" W
N 74° 44' 41.8" W
-L- ST Sta. 344+47.13
-Y13RPC-
-L- CS Sta. 342+97.13
-Y13RPC- TS Sta. 10+92.42
-Y13RPC- SC Sta. 13+92.42
-Y13RPC- CS Sta. 18+59.01
CAROLYN RATLEY
DB 2848 PG 239
PB 87 PG 122
CAROLYN TEDDER
DB 9358 PG 567
PB 87 PG 122
DANIEL JACKSON
DB 9227 PG 437
-L- POC Sta. 337+50.00 =
-Y13RPC- POT Sta. 10+00.00 (59' RT)
Δ = 2° 30' 00"
MATCHLINE -L- STA. 323+00 SEE SHEET 4
MATCHLINE -L- STA. 22+00 -Y13RPB- SEE SHEET 7
MATCHLINE -L- STA. 347+00 SEE SHEETS 6
MATCHLINE -Y13RPC- STA. 19+50 SEE SHEET 6

FOR -L- PROFILE SEE SHT. 31
FOR -Y13RPB- PROFILE SEE SHT. 42
FOR -Y13RPC- PROFILE SEE SHT. 43

PLANS PREPARED BY :

RK&K
RUMMEL, KLEPPER & KAHL, LLP
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RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

REVISIONS
8/17/99

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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	6

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
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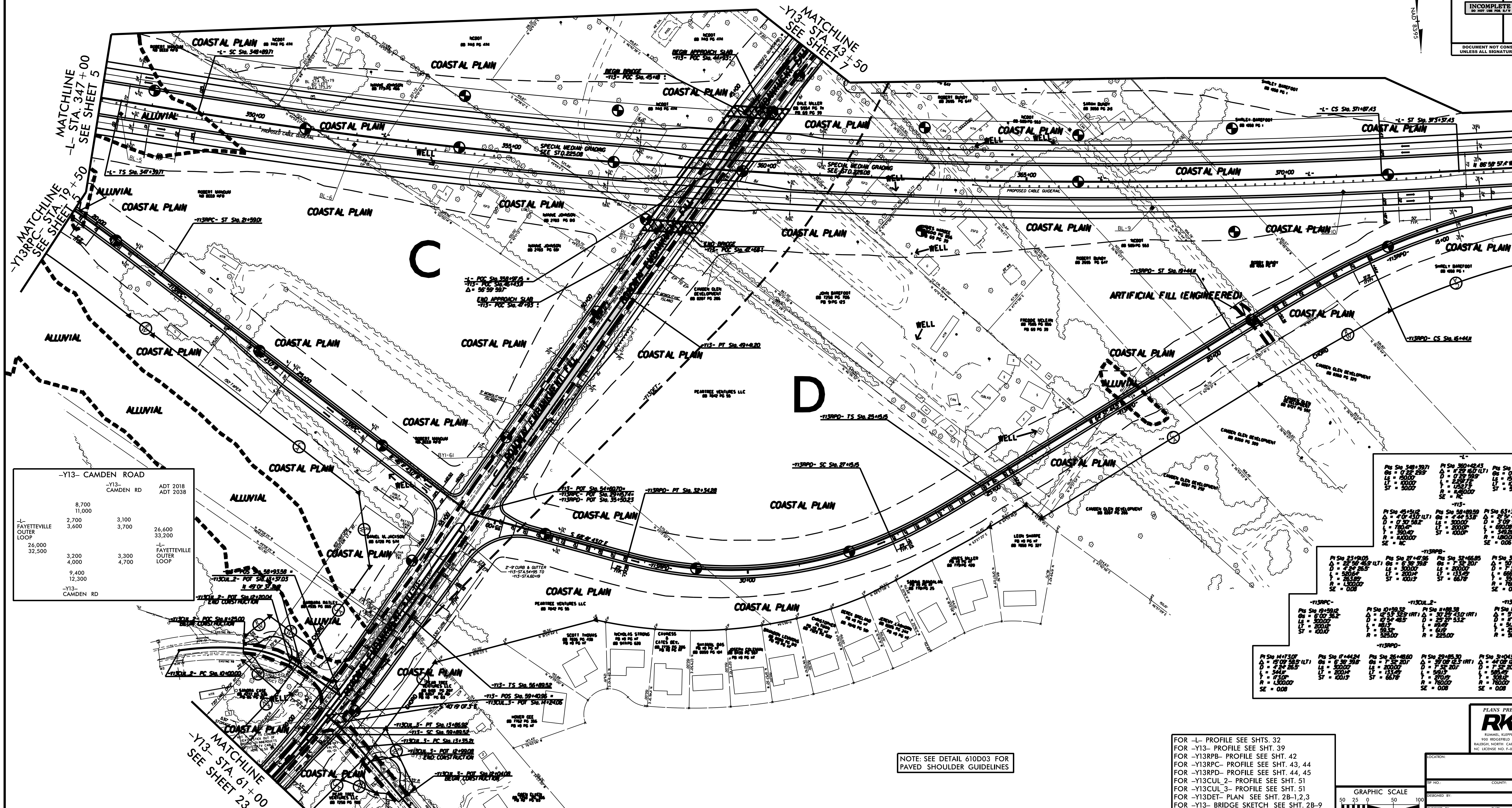

-Y13- CAMDEN ROAD			
		-Y13- CAMDEN RD	ADT 2018 / ADT 2038
	8,700 / 11,000		
-L- FAYETTEVILLE OUTER LOOP	2,700 / 3,600	3,100 / 3,700	26,600 / 33,200
26,000 / 32,500			-L- FAYETTEVILLE OUTER LOOP
	3,200 / 4,000	3,300 / 4,700	
	9,400 / 12,300		
	-Y13- CAMDEN RD		

-L-

PIs Sta 348+39.71	PI Sta 360+42.43	PIs Sta 372+37.43
θs = 0°22'29.9"	Δ = 11°29'16.0" (LT)	θs = 0°22'29.9"
Ls = 150.00'	D = 0°29'59.9"	Ls = 150.00'
LT = 100.00'	L = 2,297.72'	LT = 100.00'
ST = 50.00'	T = 1,152.73'	ST = 50.00'
	R = 11,460.00'	
	SE = RC	

-Y13-

PI Sta 45+51.12	PIs Sta 58+89.59	PI Sta 63+38.80
Δ = 4°01'43.0" (LT)	θs = 4°44'53.8"	Δ = 21°51'40.22" (RT)
D = 0°30'58.2"	Ls = 300.00'	D = 3°09'55.8"
L = 780.47'	LT = 200.07'	L = 690.06'
T = 390.40'	ST = 100.07'	T = 349.28'
R = 11,100.00'		R = 1,810.00'
SE = NC		SE = 0.06

-Y13RPB-

PI Sta 23+91.05	PIs Sta 27+47.96	PIs Sta 32+66.85	PI Sta 36+89.79
Δ = 22°56'46.9" (LT)	θs = 6°36'39.8"	θs = 7°32'20.1"	Δ = 50°14'53.8" (RT)
D = 4°24'26.5"	Ls = 300.00'	Ls = 200.00'	D = 7°32'20.1"
L = 520.64'	LT = 200.14'	LT = 133.45'	L = 666.52'
T = 263.85'	ST = 100.13'	ST = 66.78'	T = 356.40'
R = 1,300.00'			R = 760.00'
SE = 0.08			SE = 0.08

-Y13RPC-

PIs Sta 19+59.12
θs = 6°00'36.2"
Ls = 300.00'
LT = 200.12'
ST = 100.10'

-Y13CUL_2-

PI Sta 10+59.32	PI Sta 11+88.38
Δ = 12°53'32.9" (RT)	Δ = 30°25'43.0" (RT)
D = 10°54'48.5"	D = 25°27'53.2"
L = 118.13'	L = 119.49'
T = 59.32'	T = 61.19'
R = 525.00'	R = 225.00'

-Y13CUL_3-

PI Sta 13+61.09
Δ = 5°55'51.1" (LT)
D = 11°27'33.0"
L = 51.71'
T = 25.88'
R = 500.00'

-Y13RPD-

PI Sta 14+73.07	PIs Sta 17+44.24	PIs Sta 26+48.60	PI Sta 29+85.30	PI Sta 31+04.59
Δ = 15°09'38.5" (LT)	θs = 6°36'39.8"	θs = 7°32'20.1"	Δ = 39°08'12.5" (RT)	Δ = 44°08'12.5" (RT)
D = 4°24'26.5"	Ls = 300.00'	Ls = 200.00'	D = 7°32'20.1"	D = 7°32'20.1"
L = 344.11'	LT = 200.14'	LT = 133.45'	L = 519.13'	L = 585.45'
T = 173.07'	ST = 100.13'	ST = 66.78'	T = 270.15'	T = 308.12'
R = 1,300.00'			R = 760.00'	R = 760.00'
SE = 0.08			SE = 0.08	SE = 0.08

NOTE: SEE DETAIL 610D03 FOR PAVED SHOULDER GUIDELINES

FOR -L- PROFILE SEE SHTS. 32
FOR -Y13- PROFILE SEE SHT. 39
FOR -Y13RPB- PROFILE SEE SHT. 42
FOR -Y13RPC- PROFILE SEE SHT. 43, 44
FOR -Y13RPD- PROFILE SEE SHT. 44, 45
FOR -Y13CUL_2- PROFILE SEE SHT. 51
FOR -Y13CUL_3- PROFILE SEE SHT. 51
FOR -Y13DET- PLAN SEE SHT. 2B-1,2,3
FOR -Y13- BRIDGE SKETCH SEE SHT. 2B-9
FOR INTERSECTION DESIGNS SEE SHT. 2B-10

GRAPHIC SCALE
50 25 0 50 100
PLANS

PLANS PREPARED BY :
RK&K
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LOCATION:

TIP NO.: COUNTY:

DESIGNED BY:

CHECKED BY: DATE:

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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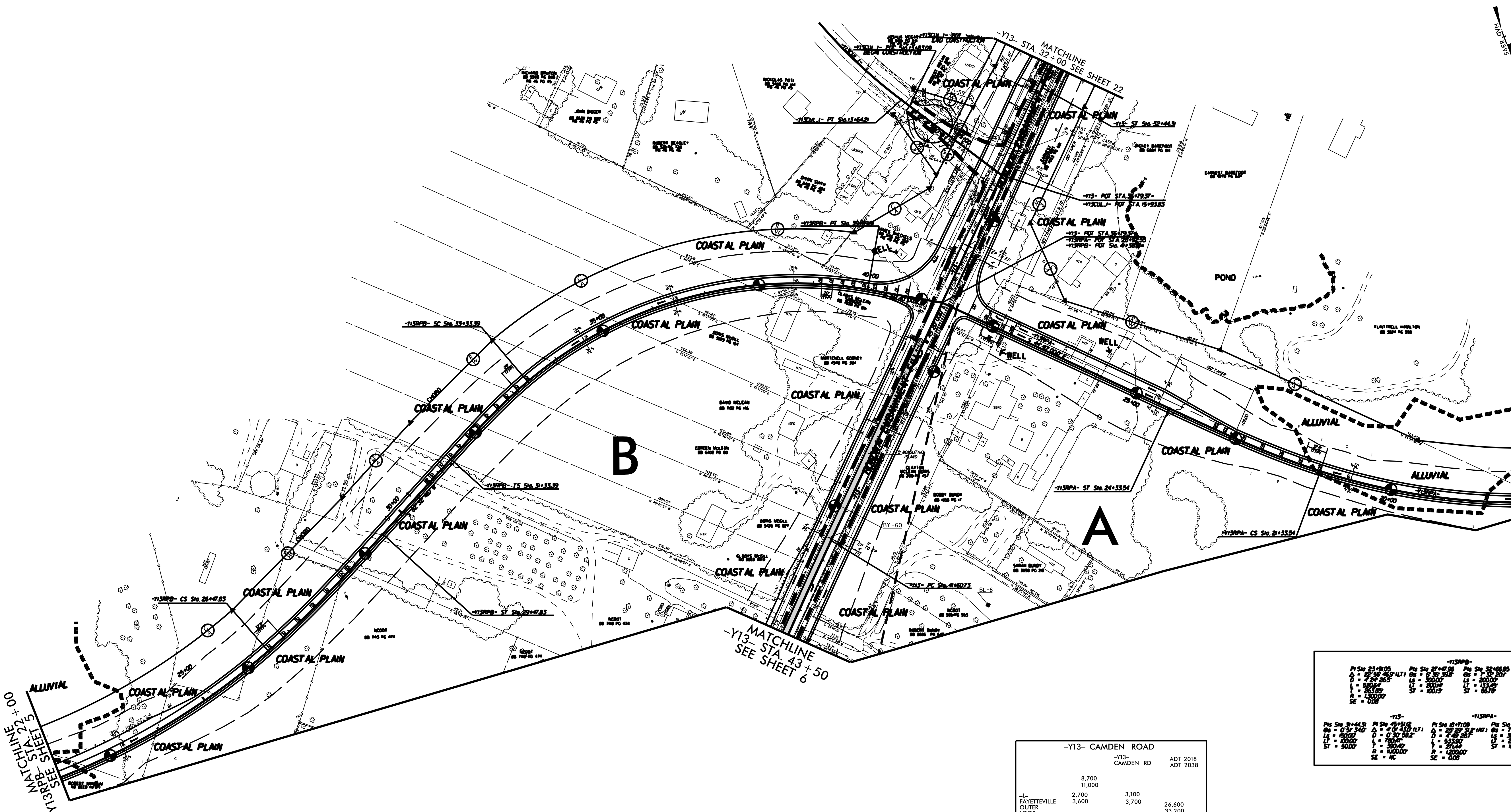

-Y13RPB-

PI Sta 23+91.05
Δ = 22°56'46.9" (LT)
D = 4°24'26.5"
L = 520.64'
T = 263.85'
R = 1,300.00'
SE = 0.08

PIs Sta 27+47.96
θs = 6°36'39.8"
Ls = 300.00'
LT = 200.14'
ST = 100.15'

PIs Sta 32+66.85
θs = 7°32'20.1"
Ls = 200.00'
LT = 133.45'
ST = 66.78'

PI Sta 36+89.79
Δ = 50°14'53.8" (RT)
D = 7°32'20.1"
L = 666.52'
T = 356.40'
R = 760.00'
SE = 0.08

-Y13-

PIs Sta 31+44.51
θs = 0°51'34.0"
Ls = 150.00'
LT = 100.00'
ST = 50.00'

PI Sta 45+51.12
Δ = 4°01'43.0" (LT)
D = 0°30'58.2"
L = 780.47'
T = 390.40'
R = 11,100.00'
SE = NC

-Y13RPA-

PI Sta 18+71.09
Δ = 25°29'31.2" (RT)
D = 4°46'28.1"
L = 533.90'
T = 271.44'
R = 1,200.00'
SE = 0.08

PIs Sta 22+33.69
θs = 7°09'43.1"
Ls = 300.00'
LT = 200.18'
ST = 100.15'

-Y13CUL_1-

PI Sta 11+84.37
Δ = 21°51'58.6" (LT)
D = 6°01'52.1"
L = 364.21'
T = 184.37'
R = 950.00'

-Y13- CAMDEN ROAD

-Y13- CAMDEN RD
ADT 2018
ADT 2038

8,700
11,000

-L- FAYETTEVILLE OUTER LOOP
2,700
3,600
3,100
3,700
26,600
33,200
26,000
32,500
-L- FAYETTEVILLE OUTER LOOP
3,200
4,000
3,300
4,700
9,400
12,300
-Y13- CAMDEN RD

FOR -Y13- PROFILE SEE SHT. 39
FOR -Y13RPA- PROFILE SEE SHT. 41
FOR -Y13RPB- PROFILE SEE SHT. 42, 43
FOR -Y13CUL_1- PROFILE SEE SHT. 51
FOR -Y13DET- PLAN SEE SHT. 2B-2
FOR INTERSECTION DESIGN SEE SHT. 2B-11

GRAPHIC SCALE
50 25 0 50 100
PLANS

PLANS PREPARED BY :
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900 RIDGEFIELD DRIVE SUITE 350
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LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/2/99
30-AUG-2017 15:22
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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	8
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

NAD 83/95

-L-
Pls Sta 383+98.25
Θs = 3° 22' 13.2"
Ls = 300.00'
LT = 200.04'
ST = 100.03'

Pl Sta 404+50.03
Δ = 7° 4' 51.7" (RT)
D = 2° 14' 48.8"
L = 3,331.81'
T = 1,951.81'
R = 2,550.00'
SE = 0.06 *
* DESIGN EXCEPTION REQUIRED

-Y13RPA-
Pl Sta 18+71.09
Δ = 25° 29' 31.2" (RT)
D = 4° 46' 28.7"
L = 533.90'
T = 271.44'
R = 1,200.00'
SE = 0.08

-Y13RPD-
Pl Sta 14+73.07
Δ = 15° 09' 58.5" (LT)
D = 4° 24' 26.5"
L = 344.11'
T = 173.07'
R = 1,300.00'

-Y13RPD-
Pls Sta 12+00.14
Θs = 6° 36' 39.8"
Ls = 300.00'
LT = 200.14'
ST = 100.13'

-Y13RPA-
Pls Sta 14+99.80
Θs = 1° 09' 43.1"
Ls = 300.00'
LT = 200.16'
ST = 100.15'

ALLUVIAL

ALLUVIAL

CAMDEN GLEN DEVELOPMENT LLC
DB 8722 PG 485
PB 20 PG 34

CAMDEN GLEN DEVELOPMENT LLC
DB 7868 PG 571
PB 73 PG 84

MATCHLINE -Y13RPA- STA. 17+50
SEE SHEET 7

-Y13RPA- SC Sta. 15+99.64

-Y13RPA- TS Sta. 12+99.64

-L- POT Sta. 381+98.22 =
-Y13RPA- POT Sta. 10+00.00 (59' LT)
Δ = 2° 30' 00"

CHORD

CHORD

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

SEEP

S 84° 28' 57.4" E

-Y13RPA-

300' TAPER

50' (TYP)

175'

MATCHLINE -L- STA. 374+50
SEE SHEET 6

375+00 N 86° 58' 57.4" W

380+00 -L- N 86° 58' 57.4" W

385+00

PROPOSED CABLE GUIDERAIL

BL-11

BL-12

BL-13

SPRING

BM#182
STA 62+97
90 RIGHT
ELEV 176.25'

-Y13RPD-

50' TYP.

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

600' ACCELERATION LANE

300' TAPER

CHORD

-L- POT Sta. 377+83.10=
-Y13RPD- ST Sta. 10+00.00 (59'RT)

-L- TS Sta. 381+98.22

-L- SC Sta. 384+98.22

-Y13RPD- SC Sta. 13+00.00

N 03°00'39" E
858.69'

MATCHLINE -L- STA. 388+00 SEE SHEET 9

CAMDEN GLEN DEVELOPMENT LLC
DB 8722 PG 485
PB 20 PG 34

CAMDEN GLEN DEVELOPMENT LLC
DB 7868 PG 571
PB 73 PG 84

FOR -L- PROFILE SEE SHT. 32, 33
FOR -Y13RPA- PROFILE SEE SHT. 41
FOR -Y13RPD- PROFILE SEE SHT. 44

PLANS PREPARED BY :
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REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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NOTE: SEE CROSS SECTIONS AND ROADWAY STD.DRAWINGS NO. 560.02 SHT. 1 OF 3 FOR SPECIAL MEDIAN GRADING. -L- STA. 392+00 TO STA. 394+00.

NAD 83/95

ALLUVIAL

ALLUVIAL

ALLUVIAL

ALLUVIAL

CAMDEN GLEN DEVELOPMENT LLC
DB 7868 PG 571
PB 73 PG 84

JOHNNY BEASLEY
DB 3757 PG 316
PB 73 PG 84

BEGIN BRIDGE
-L- POC Sta. 396+03 ± SBL

BEGIN APPROACH SLAB
-L- POC Sta. 395+79 ± SBL

END BRIDGE
-L- POC Sta. 399+36 ± SBL

END APPROACH SLAB
-L- POC Sta. 399+61 ± SBL

STEWART'S CREEK

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

PROPOSED GUARDRAIL

PROPOSED CABLE GUIDERAIL

PROPOSED GUARDRAIL

GRAU 350 TL-3

PROPOSED GUARDRAIL

PROPOSED GUARDRAIL

BEGIN APPROACH SLAB
-L- POC Sta. 396+12 ± NBL

BEGIN BRIDGE
-L- POC Sta. 396+37 ± NBL

CAT-1

TYPE-III

TYPE-III

TYPE-III

TYPE-III

TYPE-III

TYPE-III

390+00

395+00

400+00

BL-14

BL-15

BL-16

MATCHLINE -L- STA. 388+00 SEE SHEET 8

MATCHLINE -L- STA. 401+00 SEE SHEET 10

CAMDEN GLEN DEVELOPMENT LLC
DB 7868 PG 571
PB 73 PG 84

JOHNNY BEASLEY
DB 3757 PG 316
PB 73 PG 84

UNKNOWN

END BRIDGE
-L- POC Sta. 399+83 ± NBL

END APPROACH SLAB
-L- POC Sta. 400+08 ± NBL

STEPHEN BRANCALASSO
DB 4854 PG 399
PB 89 PG 96

-L-
PI Sta 404+50.03
Δ = 74° 51' 43.7" (RT)
D = 2° 14' 48.8"
L = 3,331.81'
T = 1,951.81'
R = 2,550.00'
SE = 0.06 *
*DESIGN EXCEPTION REQUIRED

FOR -L- PROFILE SEE SHT 33
FOR BRIDGE SKETCH SEE SHT 2B-9

PLANS PREPARED BY :
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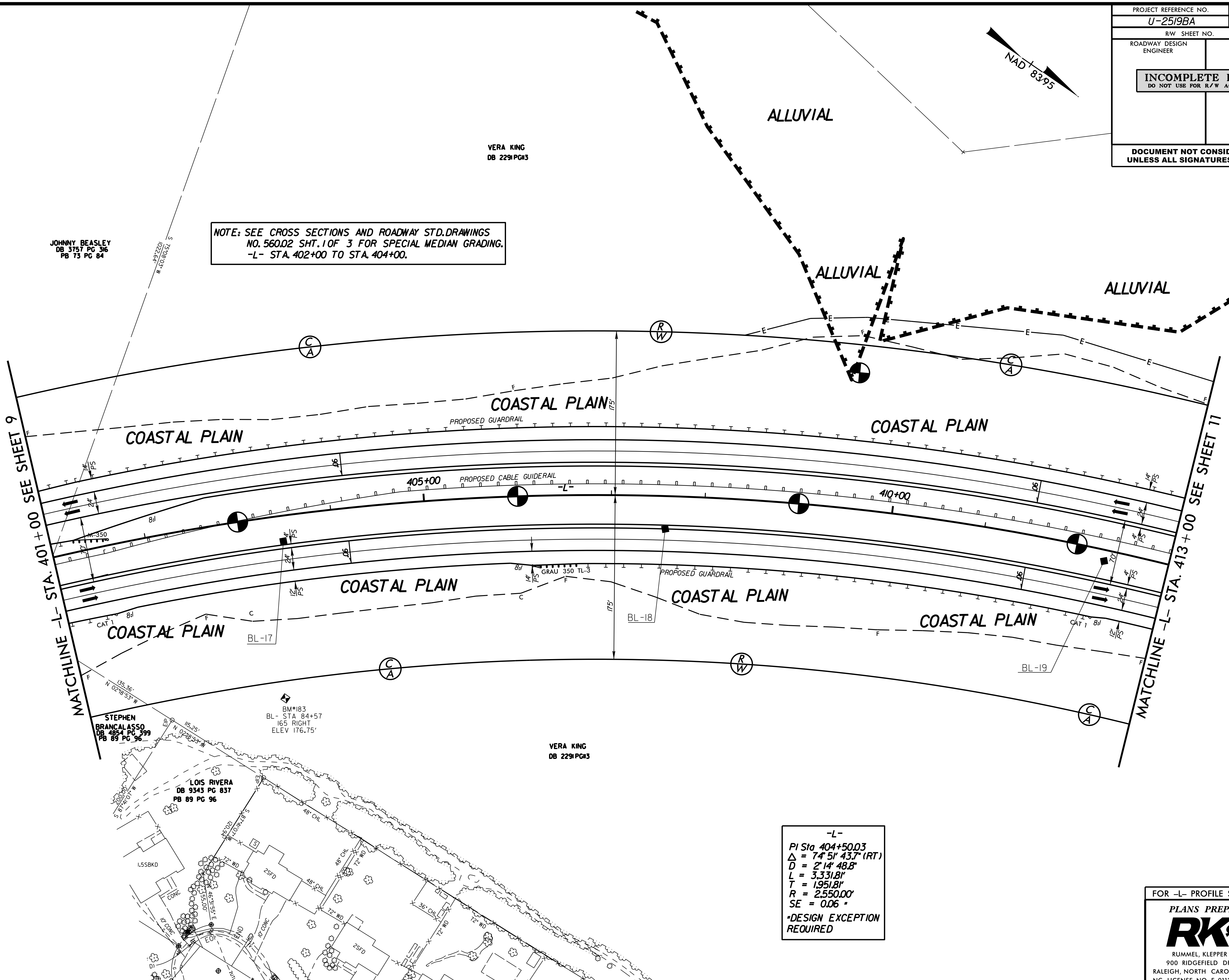
PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NOTE: SEE CROSS SECTIONS AND ROADWAY STD.DRAWINGS NO. 560.02 SHT. 1 OF 3 FOR SPECIAL MEDIAN GRADING. -L- STA. 402+00 TO STA. 404+00.



-L-
PI Sta 404+50.03
△ = 74° 51' 43.7" (RT)
D = 2° 14' 48.8"
L = 3,331.81'
T = 1,951.81'
R = 2,550.00'
SE = 0.06 *
*DESIGN EXCEPTION REQUIRED

FOR -L- PROFILE SEE SHTS. 33, 34

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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	11
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

NAD 83/95

817.77'
N 41°45'25" W

N 14°43'03" E
454.08'

209.88'
N 15°46'57" W

ALLUVIAL

ALLUVIAL

ALLUVIAL

VERA KING
DB 2291 PG83

CHORD

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

COASTAL PLAIN

PROPOSED GUARDRAIL

PROPOSED CABLE GUIDERAIL

GRAU 350 TL-3

50' (TYP)

175'

BL-20

BL-21

415+00

420+00

425+00

N 5° 22' 47.3" W

-L-

-L- CS Sta. 418+30.02

-L- ST Sta. 421+30.02

MATCHLINE -L- STA. 413+00 SEE SHEET 10

MATCHLINE -L- STA. 426+00 SEE SHEET 12

VERA KING
DB 2291 PG83

-L-

PI Sta 404+50.03	PIs Sta 419+30.05
Δ = 74° 51' 43.7" (RT)	Θs = 3° 22' 13.2"
D = 2° 14' 48.8"	Ls = 300.00'
L = 3,331.81'	LT = 200.04'
T = 1,951.81'	ST = 100.03'
R = 2,550.00'	
SE = 0.06 *	

*DESIGN EXCEPTION REQUIRED

FOR -L- PROFILE SEE SHT. 34

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
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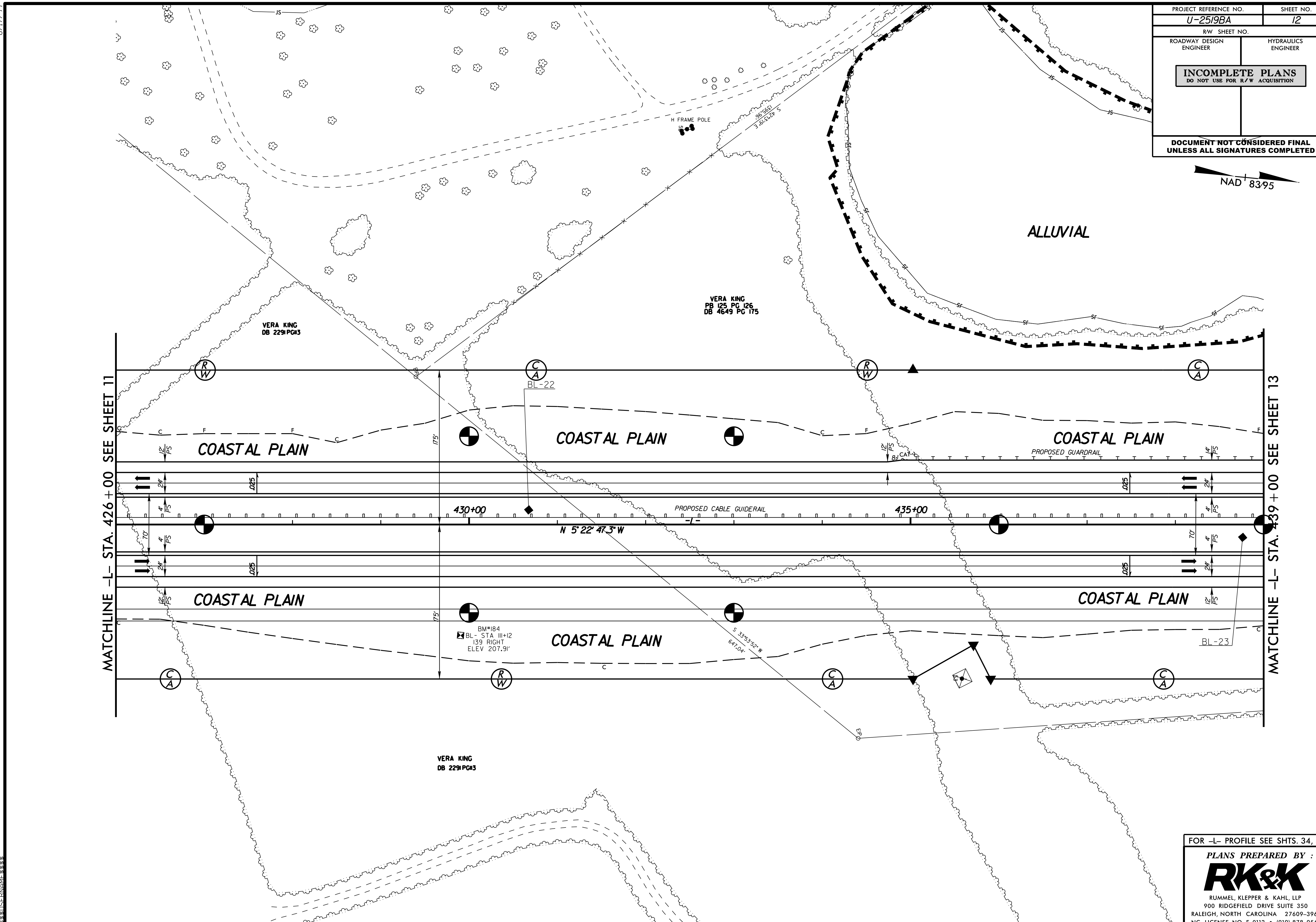
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	12
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



FOR -L- PROFILE SEE SHTS. 34, 35

PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	13
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

-Y14-
PI Sta 20+46.87
Δ = 0°15'15.0" (LT)
D = 0°17'11.3"
L = 88.72'
T = 44.36'
R = 20,000.00'
SE = NC

NAD 83/95

MATCHLINE -Y14- STA. 19+00 SEE SHEET 25

-Y14- PC Sta. 20+02.51

S 86°03'55.5" E

NCDOT
DB 7696 PG 678

ROADWAY EMBANKMENT FILL

ALLUVIAL

COASTAL PLAIN

PROPOSED GUARDRAIL

PROPOSED CABLE GUIDERAIL

SEEP

WELL

ISBKD

ABANDON

EXISTING RW

-Y14- PT

NCDOT
DB 7103 PG 581
PB 27 PG 27

VERA KING
PB 125 PG 126
DB 4649 PG 175

-Y14DET-

BEGIN APPROACH SLAB
-Y14- PT Sta. 22+03±

BESL BRIDGE
-Y14- PT Sta. 22+28±

BYG
BL

NCDOT
DB 7103 PG 581
PB 27 PG 27

SPECIAL MEDIAN GRADING
SEE STD.225.08

NCDOT
DB 7037 PG 485
PB 27 PG 27

END BRIDGE
-Y14- PT Sta. 24+04±

END APPROACH SLAB
-Y14- PT Sta. 24+29±

BL-25

-L- POT Sta. 450+12.29 =
-Y14- POT Sta. 23+16.56
Δ = 80°56'23.0"

CHADWICK MARTIN
DB 5459 PG 317
PB 27 PG 27

LUCRETIA GILBERT
DB 8022 PG 430
PB 125 PG 126

NCDOT
DB 9526 PG 847
PB 71 PG 98

ARTIFICIAL FILL (ENGINEERED)

MATCHLINE -L- STA. 439+00 SEE SHEET 12

MATCHLINE -L- STA. 452+00 SEE SHEET 14

MATCHLINE -Y14- STA. 27+00 SEE SHEET 26

NOTE: SEE DETAIL 610D03 FOR PAVED SHOULDER GUIDELINES

FOR -L- PROFILE SEE SHT. 35
FOR -Y14- PROFILE SEE SHT. 47
FOR -Y14DET- PROFILE SEE SHT. 2B-4, 2B-5
FOR -Y14- BRIDGE SKETCH SEE SHT. 2B-9

PLANS PREPARED BY :
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RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	14
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

-Y15A-	
PI Sta 12+14.10	PI Sta 15+35.77
Δ = 12° 35' 25.9" (LT)	Δ = 3° 10' 38.8" (RT)
D = 10° 03' 06.8"	D = 0° 59' 59.7"
L = 125.26'	L = 317.77'
T = 62.88'	T = 158.92'
R = 570.00'	R = 5,730.00'
SE = 0.04	SE = NC

-Y14T_1-	
PI Sta 11+40.20	PI Sta 12+76.49
Δ = 1° 34' 52.5" (RT)	Δ = 0° 59' 39.8" (LT)
D = 3° 49' 11.0"	D = 3° 49' 11.0"
L = 41.40'	L = 26.03'
T = 20.70'	T = 13.02'
R = 1,500.00'	R = 1,500.00'

NAD 83/95

MATCHLINE -L- STA. 452+00 SEE SHEET 13

MATCHLINE -L- STA. 466+00 SEE SHEET 15

MATCHLINE -Y15A- STA. 21+00 SEE SHEET 15

-Y15A- PC Sta. 11+51.22

-Y15A- PT Sta. 12+76.48

-Y15A- PC Sta. 13+76.85

-Y15A- PT Sta. 16+94.61

BEGIN CONSTRUCTION -Y15A- POT Sta. 10+00.00

-L- POT Sta. 454+72.53= -Y14T_1- POT Sta. 14+26.17

-Y14T_1- PT Sta. 12+89.50

-Y14T_1- PC Sta. 11+19.50

-Y14T_1- PT Sta. 11+60.89

-Y14T_1- POC Sta. 12+39.60 END CONSTRUCTION

-Y14T_1- POC Sta. 11+84.60 BEGIN CONSTRUCTION

-Y14T_1- POT Sta. 10+00.00

COASTAL PLAIN

JAMES MCGARVEY PB 93 PG 26 DB 5358 PG 165

SHELBY STEWART DB 7107 PG 759 PB 94 PG 145

MELISSA MCBRIDE DB 9442 PG 278 PB 27 PG 27

GEORGE MOORE DB 4717 PG 605 PB 94 PG 145

JACQUELYN JONES DB 6297 PG 233-232 DB 3573 PG 131-140

ALEXANDER PATE DB 3573 PG 142

NCDOT DB 7103 PG 581 PB 27 PG 27

DAVID MALDONADO DB 5340 PG 388 PB 27 PG 27

ANDREW MCMILLIAN DB 4719 PG 405 PB 27 PG 27

ANDREW MCMILLIAN DB 4719 PG 403 PB 27 PG 27

RONALD FISHER DB 6010 PG 210 PB 27 PG 27

RONALD FISHER DB 27 PG 27 DB 5890 PG 599

ARNOLD MYERS PB 27 PG 27 DB 2781 PG 486

MATTHEW HARDIN DB 9075 PG 647 PB 27 PG 27

LARRY CUMMINGS DB 4736 PG 112 PB 27 PG 27

JACQUELYN JONES DB 6293 PG 230 PB 82 PG 143

JACQUELYN JONES DB 6293 PG 242 PB 82 PG 143

JACQUELYN JONES DB 6297 PG 234 DB 6293 PG 241 PB 82 PG 143

MARK BOAHN DB 4178 PG 563 PB 82 PG 143

TRACE INVESTMENTS LLC DB 8763 PG 770 PB 129 PG 173

JOHN LYONS DB 9203 PG 437 PB 131 PG 126

MICHAEL GREEN DB 9281 PG 151 PB 131 PG 126

LANCE MENDYKA DB 9280 PG 875 PB 131 PG 126

DAVID RIDLEY DB 2574 PG 202

LINDA MCMILLAN DB 3599 PG 158 PB 73 PG 52

BL-26 BL-27 BL-28

WELL

PROPOSED CABLE GUIDERAIL

CATHODIC PROTECTION TEST POINT

FOR -L- PROFILE SEE SHTS. 35, 36
FOR -Y15A- PROFILE SEE SHT. 48
FOR -Y14T 1- PROFILE SEE SHT. 51

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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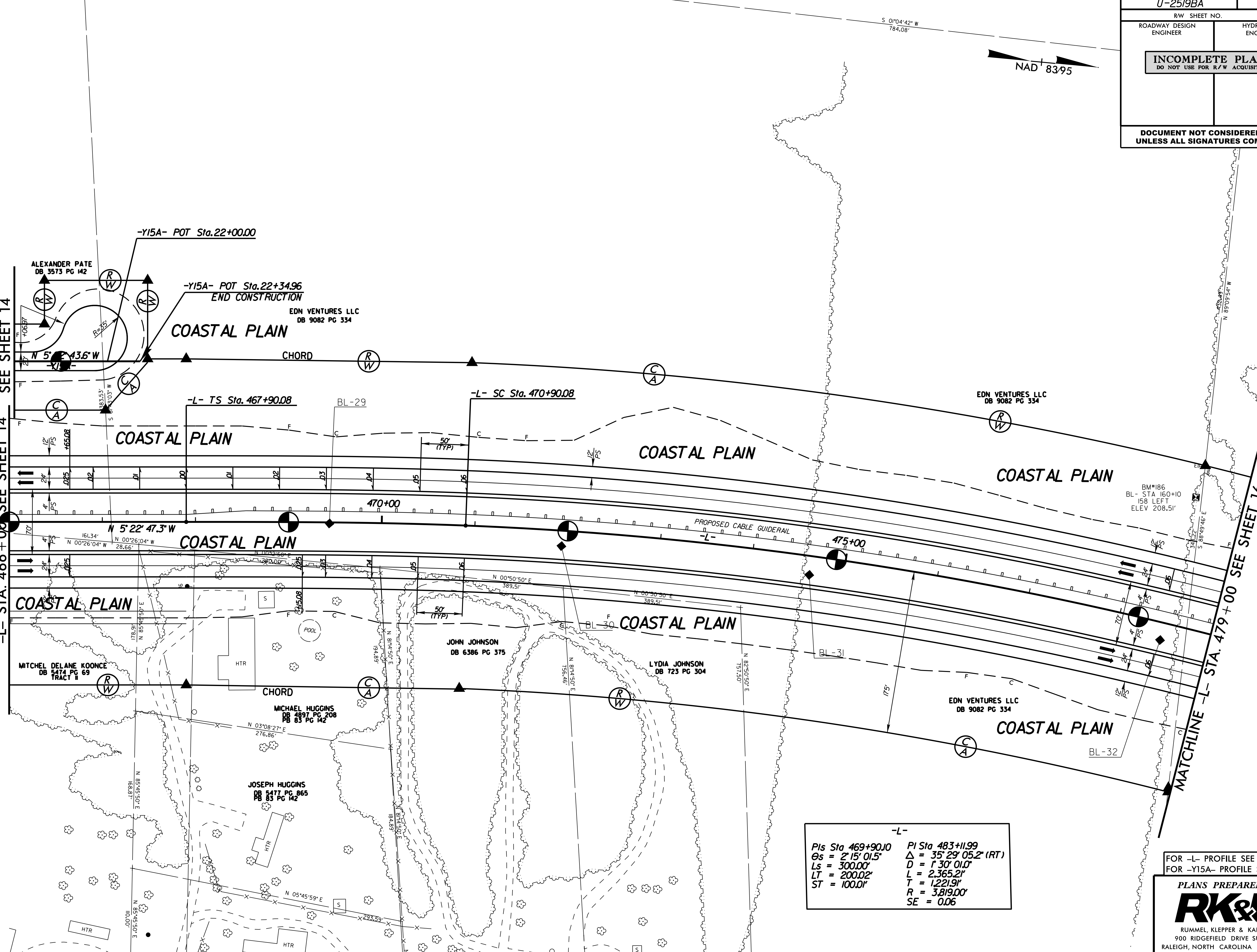

-L-

PIs Sta 469+90.10	PI Sta 483+11.99
Θs = 2° 15' 01.5"	Δ = 35° 29' 05.2" (RT)
Ls = 300.00'	D = 1° 30' 01.0"
LT = 200.02'	L = 2,365.21'
ST = 100.01'	T = 1,221.91'
	R = 3,819.00'
	SE = 0.06

FOR -L- PROFILE SEE SHT. 36
FOR -Y15A- PROFILE SEE SHT. 48

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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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-L-
PI Sta 483+11.99
Δ = 35° 29' 05.2" (RT)
D = 1° 30' 01.0"
L = 2,365.21'
T = 1,221.91'
R = 3,819.00'
SE = 0.06

NAD 83/95

FLOYD PROPERTIES AND DEVELOPMENT, INC
DB 8794 PG 246
PB 134 PG 177

NANCY NEWTON
DB 2477 PG 761

DAYNE CRUMPLER
DB 5247 PG 639

MARCUS FRANCO
DB 9276 PG 373
PB 129 PG 169

CHRISTOPHER GALE
DB 8935 PG 236
PB 129 PG 55

EDWIN MONTOYA
DB 8923 PG 009
PB 129 PG 55

TROY CARAWAY
DB 8992 PG 47
PB 129 PG 55

TYRONE BETHUNE
DB 8929 PG 479
PB 129 PG 55

MONICA MCRAE
DB 8423 PG 279
PB 126 PG 178

MONICA MCRAE
DB 8423 PG 279
PB 126 PG 178

KELLY AUGUSTIN
DB 8503 PG 387
PB 126 PG 108

COASTAL PLAIN

MATCHLINE -L- STA. 479+00 SEE SHEET 15

MATCHLINE -L- STA. 491+00 SEE SHEET 17

480+00 485+00 490+00

PROPOSED CABLE GUIDERAIL -L-

BL-33 BL-34

20' ACCESS EASEMENT

FOR -L- PROFILE SEE SHTS. 36, 37

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	17

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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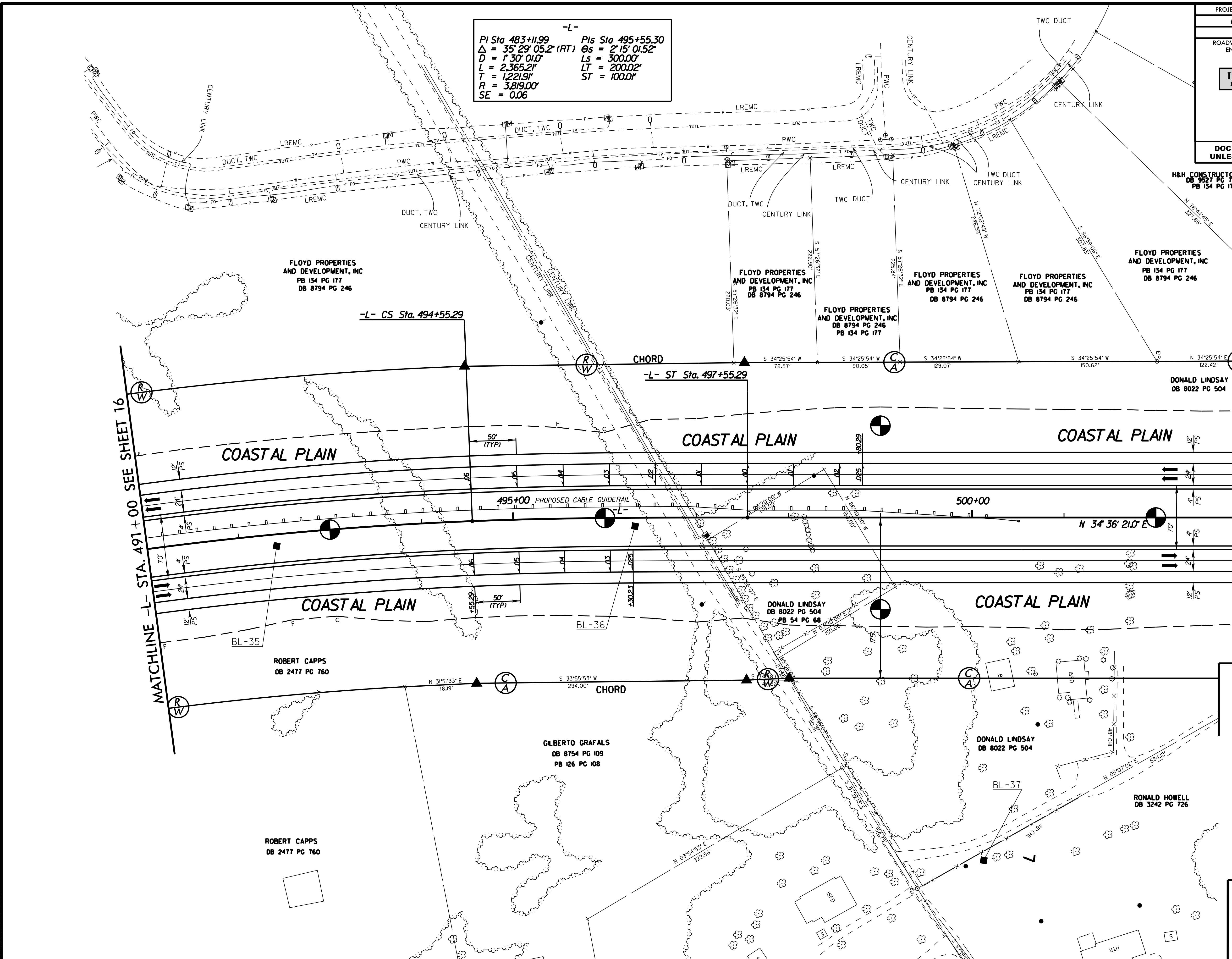

FOR -L- PROFILE SEE SHT. 37

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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NAD 83/95

MATCHLINE -Y16- STA. 28+00 SEE SHEET 29

MATCHLINE -L- STA. 503+00 SEE SHEET 17

MATCHLINE -L- STA. 516+00 SEE SHEET 19

MATCHLINE -Y16- STA. 21+00 SEE SHEET 28

MATCHLINE -Y16B- STA. 14+00 SEE SHEET 28

MATCHLINE -Y16B- STA. 23+00 SEE SHEET 19

-Y16DET-

-Y16B-

-L-

BL-39

BL-40

BL-38

BY8

END APPROACH SLAB
-Y16- STA. 25+66 ±

END BRIDGE
-Y16- STA. 25+41 ±

-L- POT STA. 504+87.42=
-Y16- POT STA. 24+41.38
Δ = 94° 14' 20.5"

-L- SC Sta. 511+25.53

-L- TS Sta. 508+25.53

-Y16B- PT Sta. 16+70.34

BEGIN BRIDGE
-Y16- STA. 23+41 ±

BEGIN APPROACH SLAB
-Y16- STA. 23+16 ±

-Y16B- PC Sta. 15+31.14

END CONSTRUCTION
-Y16B- POT Sta. 15+00.00

CHORD

PROPOSED CABLE GUIDERAIL

PROPOSED GUARDRAIL

ROADWAY EMBANKMENT FILL

425' UNIFORM TRANSITION

COASTAL PLAIN

SPECIAL MEDIAN GRADING SEE STD. 225.08

DONALD LINDSAY
DB 8022 PG 504

DONALD CARMICHAEL LINDSAY
DB 7611 PG 679
PB 49 PG 41
PB 82 PG 103
PB 121 PG 89

NCDOT
formerly DONALD CARMICHAEL LINDSAY
DB 8953 PG 145

WILLIAM PAUL
DB 7783 PG 752

RICHARD THORNTON
PB 82 PG 103
DB 4741 PG 146

CHAD VUYOVICH
PB 82 PG 103
DB 6328 PG 727

KIMBERLY RAMSEY
PB 82 PG 103
DB 7821 PG 769

KENNETH BRADY
PB 82 PG 103
DB 5229 PG 718

ALEXANDER SPENCE
PB 82 PG 103
DB 9207 PG 736

GILLIS DEVEOPMENT CORPORATION, INC.
DB 3372 PG 452
PB 82 PG 103

DAVID LOCKLEAR
PB 82 PG 103
DB 8524 PG 785

WILLIAM MAIDEN
DB 8095 PG 780
PB 82 PG 103

RENATE KONSTANTELLIS
DB 6184 PG 556
PB 82 PG 103

RUBEN VEGA
PB 82 PG 103
DB 5491 PG 06

JMORGAN CHASE BANK
DB 9402 PG 372
PB 82 PG 103

CHARLES WENTZELL
DB 8856 PG 175
PB 82 PG 103

JESSE DIDOMENICO
PB 82 PG 103
DB 8205 PG 623

JAVAD JAVADIAN
PB 82 PG 103
DB 8386 PG 252

NOTES: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

SEE DETAIL 610D03 FOR PAVED SHOULDER GUIDELINES

-L-		-Y16B-	
PIs Sta 510+25.55	PI Sta 523+30.69	PI Sta 16+03.05	
θs = 2° 14' 59.40"	Δ = 35° 01' 11.1" (LT)	Δ = 35° 26' 48.9" (RT)	
Ls = 300.00'	D = 1° 29' 59.6"	D = 25° 27' 53.2"	
LT = 200.02'	L = 2,334.82'	L = 139.20'	
ST = 100.01'	T = 1,205.17'	T = 71.91'	
	R = 3,820.00'	R = 225.00'	
	SE = 0.06	SE = EXIST	

FOR -L- PROFILE SEE SHT. 37, 38
FOR -Y16- PROFILE SEE SHT. 48, 49
FOR -Y16B- PROFILE SEES SHTS. 50
FOR -Y16DET- PLAN SEE SHTS. 2B-6 & 2B-7
FOR -Y16- BRIDGE SKETCH SEE SHT. 2B-9

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8/17/99

-L-	-Y16B-
PI Sta 523+30.69	PI Sta 27+13.33
Δ = 35° 01' 11.1" (LT)	Δ = 87° 39' 17.1" (RT)
D = 1° 29' 59.6"	D = 22° 55' 05.9"
L = 2,334.82'	L = 382.47'
T = 1,205.17'	T = 239.97'
R = 3,820.00'	R = 250.00'
SE = 0.06	SE = 0.04

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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END TIP PROJECT U-2519BA
BEGIN TIP PROJECT U-2519BB
-L- Sta. 519+00.00

DONALD CARMICHAEL LINDSAY
DB 761 PG 679
PB 49 PG 41
PB 82 PG 103
PB 121 PG 89

NCDOT
formerly DONALD CARMICHAEL LINDSAY
DB 8953 PG 145

MARVIN LINDSAY
DB 4049 PG 189

N 72°48'48" W
659.00'

S 72°25'07" E
908.80'

BL-41

BL-42

EIP

S 18°13'55" W
300.67'

S 18°37'11" W
229.34'

N 74°14'46" W
365.49'

N 74°14'46" W
173.06'

MATCHLINE -L- STA. 516+00
SEE SHEET 18

COASTAL PLAIN

300' TAPER

12' PS

24'

4' PS

PROPOSED CABLE GUIDERAIL

N 18°02'49" E
100.00'

N 18°02'49" E
201.03'

-L-

520+00

COASTAL PLAIN

PROPOSED GUARDRAIL

GILLIS DEVEOPMENT CORPORATION, INC.
DB 3372 PG 452
PB 82 PG 103

GILLIS DEVEOPMENT CORPORATION, INC.
DB 3372 PG 452
PB 82 PG 103

S 17°46'44" E
166.06'

N 74°14'46" W
216.46'

MATCHLINE -Y16B- STA. 23+00
SEE SHEET 18

20' TAPER TO EXIST.

EXIST.

N 08°47'0" E

25+00

ROADWAY EMBANKMENT FILL

-Y16B-

NCDOT
formerly GERTRUDE GODWIN
DB 9667 PG 262

GILLIS DEVEOPMENT CORPORATION, INC.
DB 3372 PG 452
PB 82 PG 103

COASTAL PLAIN

COASTAL PLAIN

BEGIN CONSTRUCTION
-Y16B- POT Sta. 23+30.00

-Y16B- PC Sta. 24+73.36

N 18°09'10" E
420.23'

S 74°14'46" E
164.03'

+32.49

-Y16B- PT Sta. 28+55.82

S 74° 11' 55.9" E

COASTAL PLAIN

MATCHLINE -Y16B- STA. 29+00
SEE SHEET 30

W.M. LINDSAY
DB 2722 PG 504
PB 108 PG 94

MARVIN LINDSAY
DB 4049 PG 189

RADIUS 3994.72'
CHORD S 14°56'24" W
CHORD DISTANCE 300.11'

RADIUS 3994.72'
CHORD N 9°41'57" E
CHORD DISTANCE 428.36'

N 74°36'36" W
333.09'

S 74°36'36" E
348.00'

FLYOD PROPERTIES
DB 8017 PG 233

FLYOD PROPERTIES
DB 8017 PG 229

FOR -L- PROFILE SEE SHT. 38
FOR -Y16B- PROFILE SEE SHT. 50

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$$$$ICENAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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NAD 83'95

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BY2-65

BEGIN CONSTRUCTION
-Y13B- POT Sta.10+10.06

-Y13B- POT Sta. 10+00.00

-Y13B- PT Sta. 13+01.75

-Y13B- PC Sta. 10+33.09

END CONSTRUCTION
-Y13B- POT Sta.20+82.2

-Y13B- POT Sta. 21+00.00

BY2-66

COASTAL PLAIN

HERMAN CRAWFORD
DB 4319 PG 854
PB 45 PG 45

RICHARD BRUTON
DB 5508 PG 608
PB 45 PG 45

GLADYS MCLEAN SIMMONS
DB 7828 PG 891

MARTENELL GOONEY
DB 4940 PG 304

DORIS McGILL
DB 3829 PG 154

DAVID MCLEAN
DB 7132 PG 146

COREEN McLEAN
DB 6402 PG 80

NCDOT
DB 7413 PG 474

KIMBERLY SIECINSKI
DB 7799 PG 533
PB 59 PG 135

AQUA NORTH CAROLINA
DB 7302 PG 579
PB 59 PG 135

DORIS MCGILL
DB 9426 PG 827

GLADYS McGILL
NO DEED INFO

DELMAR MUNRO
DB 4850 PG 646
PB 59 PG 135

WALTER BARSNICA
DB 6140 PG 408
PB 73 PG 58

JOSHUA PARTON
DB 8894 PG 146
PB 59 PG 135

ERNEST CARTER
DB 4671 PG 293
PB 73 PG 58

-Y13B-
PI Sta 11+70.26
Δ = 28° 30' 19.8" (RT)
D = 10° 36' 37.2"
L = 268.66'
T = 137.17'
R = 540.00'
SE = 0.04

FOR -Y13B- PROFILE SEE SHT. 45

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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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NAD 83-95

-Y13- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y13- POT Sta.13+90.00

N 03°00'30" E
337.48'

S 40°11'43" W
104.34'

150.07'
N 30°16'45" W

BYI-56

BYI-57

10+00

TO ROCKFISH ROAD

CAMDEN ROAD (SR 1003) 27' BST

50' TAPER
TO EXIST.

CAMDEN GLEN DEVELOPMENT LLC
DB 8722 PG 485
PB 20 PG 34
PB 126 PG 68

COASTAL PLAIN

COASTAL PLAIN

15+00

-Y13- N 55°11' 36.5" E

ROADWAY EMBANKMENT FILL

COASTAL PLAIN

COASTAL PLAIN

360' UNIFORM TRANSITION LT & RT

150' TAPER

KENNETH BROWN
DB 9027 PG 48
PB 127 PG 168

189.88'
N 34°56'31" W

191.95'
S 29°26'58" E

WILLIAM UHRIG
DB 8686 PG 346
PB 127 PG 168

222.20'
S 14°10'01" E

WILLIAM SPALDING
DB 8886 PG 625
PB 127 PG 168

S 01°08'57" W
165.46'

S 01°08'57" W
60.00'

S 01°08'57" W
30.15'

EMILY LOGAN
DB 9022 PG 624
PB 127 PG 168

S 73°11'05" E
225.57'

S 67°13'35" E
227.17'

VERNON HOLMES
DB 9241PG 638
PB 127 PG 168

EIP

MATCHLINE -Y13- STA. 19+00
SEE SHEET 22

FOR -Y13- PROFILE SEE SHT. 38

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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–Y13– CAMDEN ROAD						
			–Y13I– LEE HILL CIRCLE		ADT 2018 ADT 2038	
		100 100				
					TO FOL	
–Y13– CAMDEN RD	100 100		100 100		8,700 1,100	
	9,800 12,400				–Y13– CAMDEN RD	
		1,600 2,100		500 600		
				2,100 2,600		
			–Y13H– SR 3438 MILL CREEK RD			

–Y13–			–Y13H–
PIs Sta 23+34.10	PI Sta 27+39.80	PIs Sta 31+44.31	PI Sta 11+18.08
Θs = 0° 51' 34.0"	Δ = 8° 08' 18.2" (LT)	Θs = 0° 51' 34.0"	Δ = 24° 07' 43.8" (LT)
Ls = 150.00'	D = 1° 08' 45.3"	Ls = 150.00'	D = 22° 55' 05.9"
LT = 100.00'	L = 710.21'	LT = 100.00'	L = 105.28'
ST = 50.00'	T = 355.70'	ST = 50.00'	T = 53.43'
	R = 5,000.00'		R = 250.00'
	SE = 0.03		SE = SEE PLANS

MATCHLINE –Y13– STA. 19+00 SEE SHEET 21

MATCHLINE –Y13– STA. 32+00 SEE SHEET 7

–Y13– TS Sta. 22+34.10

–Y13– SC Sta. 23+84.10

165' UNIFORM TRANSITION LT. & RT.

END CONSTRUCTION –Y13I– POT Sta. 13+96.21

–Y13J– POT Sta. 10+00.00= –Y13I– POT Sta. 13+06.23

–Y13J– N 48° 14' 02.9" E

–Y13I– N 32° 52' 01.2" W

–Y13T_1– POT Sta. 11+99.03

–Y13T_1– POC Sta. 11+08.87 END CONSTRUCTION

–Y13J– POT Sta. 12+84.88= –Y13T_1– POT Sta. 10+74.72

–Y13T_1– POC Sta. 10+38.83 BEGIN CONSTRUCTION

N 39° 46' 33.0" W

–Y13T_1– POT Sta. 10+00.00

–Y13– CS Sta. 30+94.31

–Y13– POC Sta. 25+99.04= –Y13H– POT Sta. 12+26.67= –Y13I– POT Sta. 10+00.00

–Y13H– PT Sta. 11+69.93

–Y13H– PC Sta. 10+64.65

–Y13H– POC Sta. 10+70 END CONSTRUCTION

–Y13H– POT Sta. 10+00.00

720' LANE DROP LT.

150' TAPER RT.

150' TAPER RT.

150' LEFT TURN TAPER

530' STORAGE

5' MONOLITHIC ISLAND WELL #42 AQUA AMERICA WATER (AATUR)

AT&T (FO) 73' OF 5" HDPE CASING W/ 93' OF SPARE I/I INNERDUCT

NAD 1983

COASTAL PLAIN

ROADWAY EMBANKMENT FILL

CAMDEN GLEN DEVELOPMENT LLC
DB 8722 PG 485
PB 20 PG 34
PB 126 PG 68

DB 3375 PG 340
ERNEST BAREFOOT

WHISPERING PINES FREE WILL BAPTIST CHURCH
DB 2217 PG 609

EARNEST BAREFOOT
DB 9278 PG 534

ROCKY BAREFOOT
DB 6664 PG 84

LUTHER PORTER
DB 318 PG 399

EARNEST BAREFOOT
DB 7053 PG 681

DAVID WOODS
DB 9268 PG 327
PB 127 PG 168

TIMOTHY BRIDGES
DB 7732 PG 101
PB 45 PG 45

AQUA NC
DB 7302 PG 579
PB 45 PG 45

CHRISTOPHER OSTAPIEJ
DB 8751 PG 590
PB 45 PG 45

STACY CARVER
DB 8866 PG 86
PB 45 PG 45

ROBERT ROTAN
DB 2895 PG 845
PB 45 PG 45

KENNETH FISHER
DB 5088-710
PB 45 PG 45

EDGAR MANESS
DB 3144 PG 101
PB 45 PG 45

JANE O'BRYAN
DB 8581 PG 202
PB 45 PG 45

CHRISTOPHER AULTMAN
DB 8258 PG 167
PB 45 PG 45

GEORGE HOGAN
DB 8205 PG 2
PB 45 PG 45

KENNETH WRIGHT
DB 7309 PG 691
PB 45 PG 45

ROBERT KALLMEYER
DB 7676 PG 237
PB 45 PG 45

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR –Y13– PROFILE SEE SHTS. 38, 39
FOR –Y13H– PROFILE SEE SHT. 46
FOR –Y13I– PROFILE SEE SHT. 46
FOR –Y13J– PROFILE SEE SHT. 46
FOR –Y13T_1– PROFILE SEE SHT. 51
FOR INTERSECTION DESIGN SEE SHT. 2B-12

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$$$$ICENAME $$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	23
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

-Y13-
PI Sta 63+38.80
Δ = 21° 50' 40.2" (RT)
D = 3° 09' 55.8"
L = 690.08'
T = 349.28'
R = 1,810.00'
SE = 0.06
PIs Sta 67+62.97
θs = 3° 57' 24.8"
Ls = 250.00'
LT = 166.71'
ST = 83.37'

NAD 83/95

-Y13E- POT Sta. 12+20.75
END CONSTRUCTION
-Y13E- POT Sta. 12+00.00

END CONSTRUCTION
-Y13F- POT Sta. 11+35.00
-Y13F- POT Sta. 12+31.64
-Y13F- POT Sta. 10+00.00=
-Y13- POT Sta. 69+61.21

-Y13E- POT Sta. 10+00.00=
-Y13- POT Sta. 66+56.27

-Y13- CS Sta. 66+79.60

-Y13- ST Sta. 69+29.60

-Y13G- POT Sta. 14+53.02=
-Y13- POT Sta. 69+61.26

BEGIN CONSTRUCTION
-Y13G- POT Sta. 10+08.14
-Y13G- POT Sta. 10+00.00

-Y13- SEE SHEET 6 STA. 61+00

MATCHLINE -Y13- STA. 74+00 SEE SHEET 24

-Y13- CAMDEN ROAD

	-13E- SR 4176 FLOWERING BRADFORD WAY	-Y13F- SR 3770 CHAMPS CT.	ADT 2018 ADT 2038
	1,700 2,200	100 100	
TO FOL	900 1,300	700 1,000	100 100
-Y13-	9,400 12,300	9,200 12,000	9,200 12,000
		100 100	100 100
		-Y13G- BRAMMEL DRIVE	100 100

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR -Y13- PROFILE SEE SHT. 40
FOR -Y13E- PROFILE SEE SHT. 46
FOR -Y13F- PROFILE SEE SHT. 46
FOR -Y13G- PROFILE SEE SHT. 46
FOR -Y13DET- PLAN SEE SHTS. 2B-1-2B-3
FOR INTERSECTION DESIGN SEE SHT. 2B-13

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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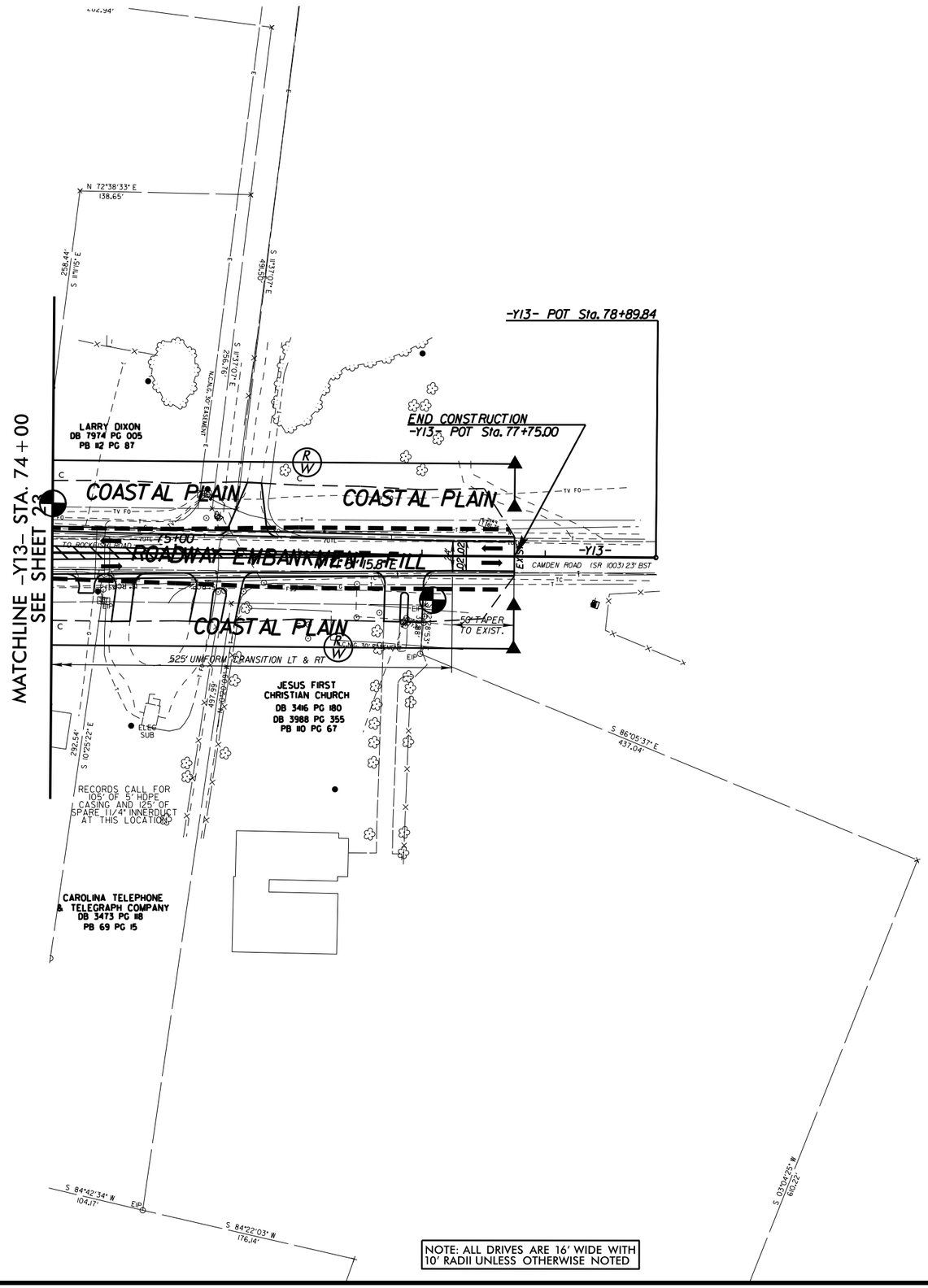
NAD 83/95



FOR -Y13- PROFILE SEE SHT. 40

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	25

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

-Y14- KING ROAD		ADT 2018 ADT 2038
-Y14A- MARCELLE DR		TO FOL
100 100	100 200	
-Y14- SR 1108 KING RD		4,500 6,800
4,500 6,800		-Y14- SR 1108 KING RD

NAD 83/95

MATCHLINE -Y14- STA. 19+00 SEE SHEET 13

-Y14- POT Sta. 10+00.00

-Y14A- POT Sta. 12+07.59

END CONSTRUCTION
-Y14A- POT Sta. 11+25.00

-Y14- PC Sta. 10+24.12

BEGIN CONSTRUCTION
-Y14- POC Sta. 10+42.44

-Y14- PT Sta. 12+83.06

-Y14- POT Sta. 14+88.70 =
-Y14A- POT Sta. 10+00.00

-Y14-
PI Sta 11+53.77
Δ = 7° 25' 04.8" (RT)
D = 2° 51' 53.2"
L = 258.94'
T = 129.65'
R = 2,000.00'
SE = SEE PLANS

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR -Y14- PROFILE SEE SHT. 47
FOR -Y14A- PROFILE SEE SHT. 47
FOR -Y14DET- PLAN SEE SHTS. 2B-4-2B-5

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	26
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

NAD 83/95

–Y14– KING ROAD			
	–Y14B– SR 1111 BRADDY ROAD	ADT 2018 3,300	ADT 2038 5,000
TO FOL			
	1,600 2,500	1,600 2,500	
–Y14– SR 1108 KING RD			4,500 6,800
	4,500 6,800		–Y14– SR 1108 KING RD

–Y14– STA. 27+00 SEE SHEET 13

MATCHLINE –Y14– STA. 27+00 SEE SHEET 13

–Y14B– POT Sta. 12+55.12

–Y14– POT Sta. 34+82.88

END CONSTRUCTION –Y14B– Sta. 11+70.00

–Y14DET–

–Y14– POT Sta. 28+79.17 = –Y14B– POT Sta. 10+00.00

END CONSTRUCTION –Y14– POT Sta. 32+28.90

ARNOLD MYERS
DB 2781 PG 486
PB 27 PG 27

EHAB SHAKIR
DB 8788 PG 301
PB 102 PG 39

MILTON GILBERT
DB 5423 PG 362
PB 102 PG 39

JAMES BAKER
PB 20 PG 31
DB 8001 PG 82

ALBERT JARMAN
PB 96 PG 138
DB 4818 PG 845

DEBORAH ANDERS
DB 9442 PG 750

TRACE HOMES INC
DB 9283 PG 211
PB 134 PG 14

ROBERT SWAIN JR
DB 4591 PG 265
PB 58 PG 109

ANTHONY LUBRANO
DB 3292 PG 817

CARL HASKINS JR.
DB 8730 PG 396

JOEY WALKER
DB 7400 PG 63

VERA KING
DB 2291 PG 113

COASTAL PLAIN

ROADWAY EMBANKMENT FILL

WELL

ISBKD

ISFD

2SFD

2SDF

ISDF

POOL

EXISTING RW

SR 1108 KING RD 21' BST

TO DUNDLE RD

100' TURN LANE

100' STORAGE

300' UNIFORM TAPER

115' TAPER

50' TAPER TO EXIST.

S 86°19'10.3" E

S 86°12'14" E 153.46'

S 86°12'51" E 155.26'

S 86°11'38" E 107.19'

N 86°11'38" W 106.09'

S 86°35'55" E 97.85'

S 86°35'55" E 149.96'

S 86°24'02" E 104.20'

S 86°54'31" E 150.06'

S 02°22'58" E 198.80'

S 02°23'06" W 198.35'

S 01°46'29" W 199.99'

S 01°53'09" W 199.80'

S 03°05'29" W 200.08'

S 03°05'29" W 10.25'

S 00°29'55" W 400.11'

N 04°07'51" E 240.00'

N 04°07'51" E 30.00'

N 05°03'59" E 76.60'

N 87°01'12" E 230.48'

S 17°18'51" E 474.15'

N 58°24'41" E 90.40'

N 60°42'59" E 97.11'

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR –Y14– PROFILE SEE SHT. 47
FOR –Y14B– PROFILE SEE SHT. 47
FOR –Y14DET– PLAN SEE SHTS. 2B–4–2B–5

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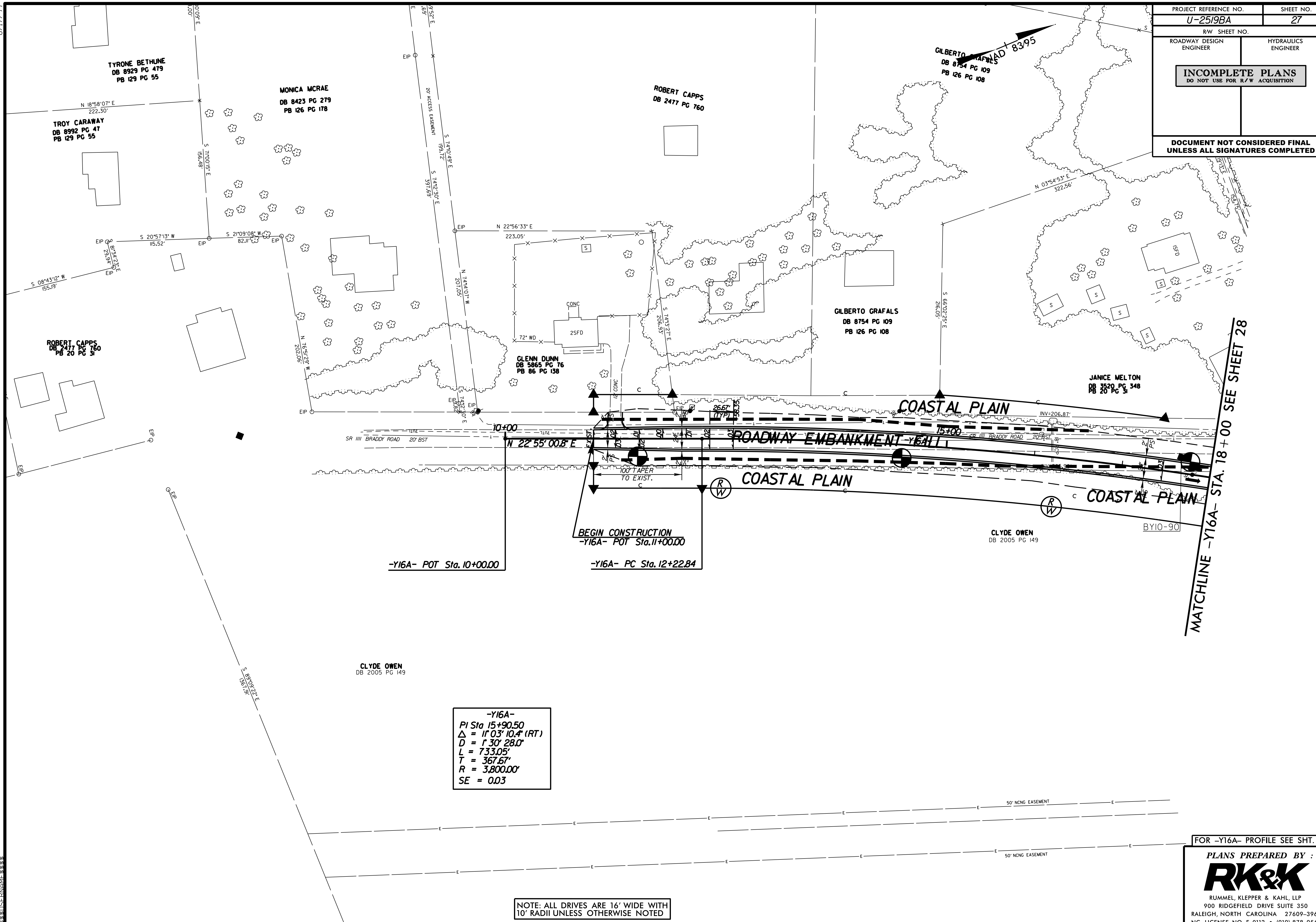

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y16A-
PI Sta 15+90.50
Δ = 11° 03' 10.4" (RT)
D = 1° 30' 28.0"
L = 733.05'
T = 367.67'
R = 3,800.00'
SE = 0.03

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR -Y16A- PROFILE SEE SHT. 49

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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$$$$USERNAME$$$$

MATCHLINE -Y16A- STA. 18+00 SEE SHEET 27

-Y16A- PT Sta. 19+55.89

-Y16- PT Sta. 13+67.51

-Y16- PC Sta. 12+85.47

BEGIN CONSTRUCTION
-Y16- POT Sta. 11+00.00

-Y16- POT Sta. 10+00.00

-Y16- POT Sta. 17+91.10=
-Y16A- POT Sta. 23+04.38=
-Y16B- POT Sta. 10+00.00

-Y16B- PT Sta. 13+40.48

-Y16B- PC Sta. 11+16.77

-Y16DET-

MATCHLINE -Y16- STA. 21+00 SEE SHEET 18

MATCHLINE -Y16B- STA. 14+00 SEE SHEET 18

CLYDE OWEN
DB 2009 PG 149

HASAN HATTO
DB 3440 PG 837
PB 49 PG 41

JODY ERICKSON
DB 5371 PG 475
PB 90 PG 148

EDWARD TIGHE
DB 4459 PG 19
PB 90 PG 148

WILLIAM PAUL
DB 7738 PG 447

BARBARA JACKSON
DB 2917 PG 125

RONALD HOWELL
DB 3242 PG 726

WILLIAM PAUL
DB 7783 PG 752

CORA CASTRO
DB 4716 PG 180
PB 75 PG 50

SAMUEL MITCHELL
DB 4643 PG 793
PB 75 PG 50

DENNIS CAMPBELL
DB 4346 PG 271
PB 75 PG 50
PB 80 PG 100

ALA HITO
DB 9425 PG 791
PB 80 PG 100

ALFONSO SANCHEZ
DB 3146 PG 58
PB 131 PG 22

JOHN DELGADO
PB 82 PG 103
DB 8326 PG 294

ERIC OUELLHORST
DB 9129 PG 819
PB 131 PG 22

KEALII MORRIS
DB 9570 PG 555
PB 131 PG 22

NCDOT
PB 131 PG 22

COASTAL PLAIN

ROADWAY EMBANKMENT FILL

NAD 83/95

N 33°58'11.2" E

N 50°41'06.3" W

N 51°09'18.5" W

TO DUNDLE RD

STONEY POINT RD

SR 1110 GRIMES RD

41' OF 16" STEEL CASING

46' OF 16" STEEL CASING

BY8-84

BY8-83

BY10

-Y16- STONEY POINT ROAD

	-Y16A- SR 1111 BRADDY ROAD	3,300 5,000	ADT 2018 ADT 2038
-Y16- SR 1112 STONEY POINT RD	500 1,000	2,800 4,000	TO FOL 12,500 17,200
10,300 14,200	100 100	100 100	-Y16- SR 1112 STONEY POINT RD
	-Y16B- SR 1111 BRADDY ROAD	100 200	

-Y16-	-Y16A-	-Y16B-
PI Sta 13+26.49	PI Sta 15+90.50	PI Sta 12+36.74
Δ = 0° 28' 12.2" (LT)	Δ = 11° 03' 10.4" (RT)	Δ = 51° 16' 13.1" (LT)
D = 0° 34' 22.6"	D = 1° 30' 28.0"	D = 22° 55' 05.9"
L = 82.04'	L = 733.05'	L = 223.71'
T = 41.02'	T = 367.67'	T = 119.97'
R = 10,000.00'	R = 3,800.00'	R = 250.00'
SE = NC	SE = 0.03	SE = 0.04

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

PAVEMENT REMOVAL

FOR -Y16- PROFILE SEE SHT. 48
FOR -Y16A- PROFILE SEE SHT. 49
FOR -Y16B- PROFILE SEE SHT. 50
FOR -Y16DET- PLAN,
SEE SHTS. 2B-6-2B-7
FOR INTERSECTION DESIGN SEE SHT. 2B-14

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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NAD 1983

MATCHLINE -Y16- STA. 28+00 SEE SHEET 18

-Y16DET-
360' LANE SHIFT

COASTAL PLAIN

ROADWAY EMBANKMENT FILL

-Y16- POT Sta. 42+00.00

-Y15- POT Sta. 10+00.00
BEGIN CONSTRUCTION

-Y15- PC Sta. 10+14.21

-Y15- PT Sta. 11+16.08

-Y16- SC Sta. 32+70.52

-Y16- TS Sta. 30+70.52

-Y16- CS Sta. 33+83.77

-Y16- ST Sta. 35+83.77

-Y15- POT Sta. 12+06.34 =
-Y16- POC Sta. 32+75.81

END CONSTRUCTION
-Y16- POT Sta. 37+80.00

N 38° 30' 57" W

SR 1112
STONEY POINT RD

24' BST

-Y16-			-Y15-
PIs Sta 32+03.89	PI Sta 33+27.18	PIs Sta 34+50.47	PI Sta 10+65.18
θs = 4° 02' 05.7"	Δ = 4° 34' 10.0" (RT)	θs = 4° 02' 05.7"	Δ = 4° 51' 50.7" (LT)
Ls = 200.00'	D = 4° 02' 05.7"	Ls = 200.00'	D = 4° 46' 28.7"
LT = 133.37'	L = 113.25'	LT = 133.37'	L = 101.87'
ST = 66.70'	T = 56.65'	ST = 66.70'	T = 50.97'
	R = 1,420.00'		R = 1,200.00'
	SE = 0.06		

NOTE: ALL DRIVES ARE 16' WIDE WITH 10' RADII UNLESS OTHERWISE NOTED

FOR -Y15- PROFILE SEE SHT. 50
FOR -Y16- PROFILE SEE SHT. 49
FOR -Y16DET- PLAN SEE SHTS. 2B-6-2B-7

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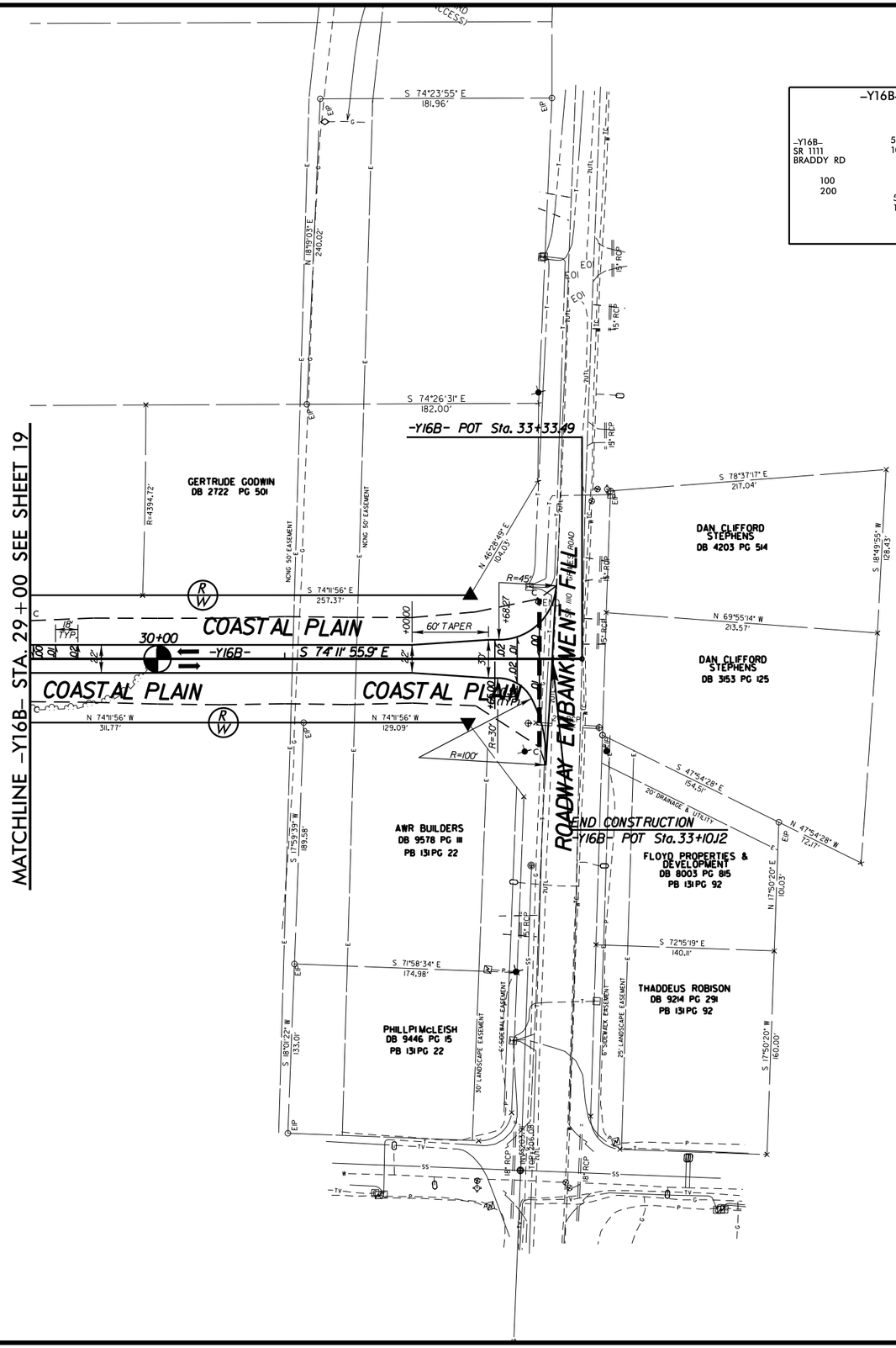
PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83 95

–Y16B– BRADDY ROAD				
			1,800	ADT 2018
			2,700	ADT 2038
		GRIMES ROAD		
–Y16B– SR 1111 BRADDY RD	50			
	100			
100				
200				
	50			
	100			



FOR –Y16B– PROFILE SEE SHT. 50

PLANS PREPARED BY :

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$$$$ICENAME$$$$
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-111	CL	329+00	4.0' - 5.5'	A-2-7	53	24	4.7	67.7	5.1	6.3	21.0	98	46	27	10.7	N/A
SS-114	CL	331+00	2.8' - 4.3'	A-2-4	23	7	5.0	64.9	17.8	3.7	13.6	92	46	17	14.3	N/A
S-2	CL	333+00	0.0' - 4.0'	A-1-b	57	NP	4.9	85.0	9.3	3.7	2.0	98	30	6	N/A	6.0

BEGIN GRADE TIP PORJECT U-2519BA
-L- STA. 320+00.00
ELEV. = 189.72'

25'
3:1
(-)0.6000%
PROPOSED GRADE
EXISTING GROUND
(-)0.6000%

L-320
L-323
L-326
SS-111
L-329
SS-114
L-331
S-2
L-333

COASTAL PLAIN (MIDDENDORF FM.): brown, tan-brown, orange-brown, gray, and red, moist to saturated, looose to medium dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FM.): mottled gray, blue-gray, orange-brown, and red, moist to wet,

COASTAL PLAIN (MIDDENDORF FM.): light gray, light tan-brown, and orange-brown, saturated, very loose to loose, silty SAND (A-2-4), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FM.): light gray to dark gray and black, moist, hard, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FM.): brown, tan-brown, and orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b)

medium stiff to stiff, silty CLAY (A-7) and sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FM.): brown, tan-brown, orange-brown, and gray, moist to saturated, very loose to medium dense, silty SAND (A-2-4),

COASTAL PLAIN (MIDDENDORF FM.): mottled gray, blue-gray, orange-brown, and red, moist to wet, medium stiff to stiff, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FM.): white, pink, and orange-brown, saturated,

COASTAL PLAIN (CAPE FEAR FM.): light gray to dark gray, and

fine to coarse SAND (A-1-b), and clayey SAND (A-2-7)

very loose to loose, silty SAND (A-2-4)

orange-brown, moist to wet,

very stiff to hard

COASTAL PLAIN (MIDDENDORF FM.): light gray and light orange-brown, saturated, very loose to medium dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b)

silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FM.): light gray and light orange-brown, saturated, loose to medium dense, silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FM.): (Mudstone) 100/0.3

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FM.): (Mudstone) 100/0.9

COASTAL PLAIN (CAPE FEAR FM.): gray, wet, very stiff to hard, sandy CLAY (A-6)

(A) **ALLUVIAL:** black, saturated, very loose, moderately organic, fine to coarse SAND (A-1)

•Notes: Vertical Exaggeration = 5:1

280	270	260	250	240	230	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80

320+00 321+00 322+00 323+00 324+00 325+00 326+00 327+00 328+00 329+00 330+00 331+00 332+00 333+00

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5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

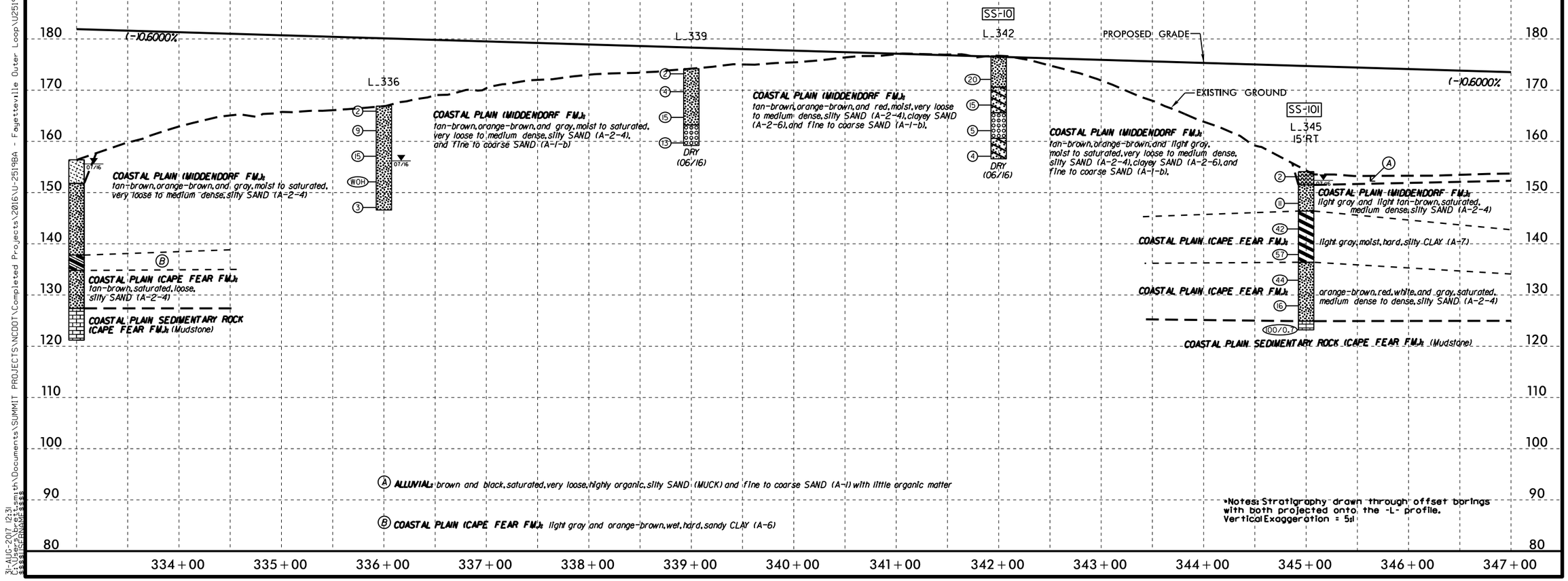
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-10	CL	342+00	8.6' - 10.1'	A-2-6	36	14	5.0	53.2	17.9	3.1	25.8	100	75	30	15.1	N/A
SS-101	15'RT	345+00	5.2' - 6.7'	A-2-4	19	4	4.7	61.8	21.8	0.8	15.6	95	57	17	16.4	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

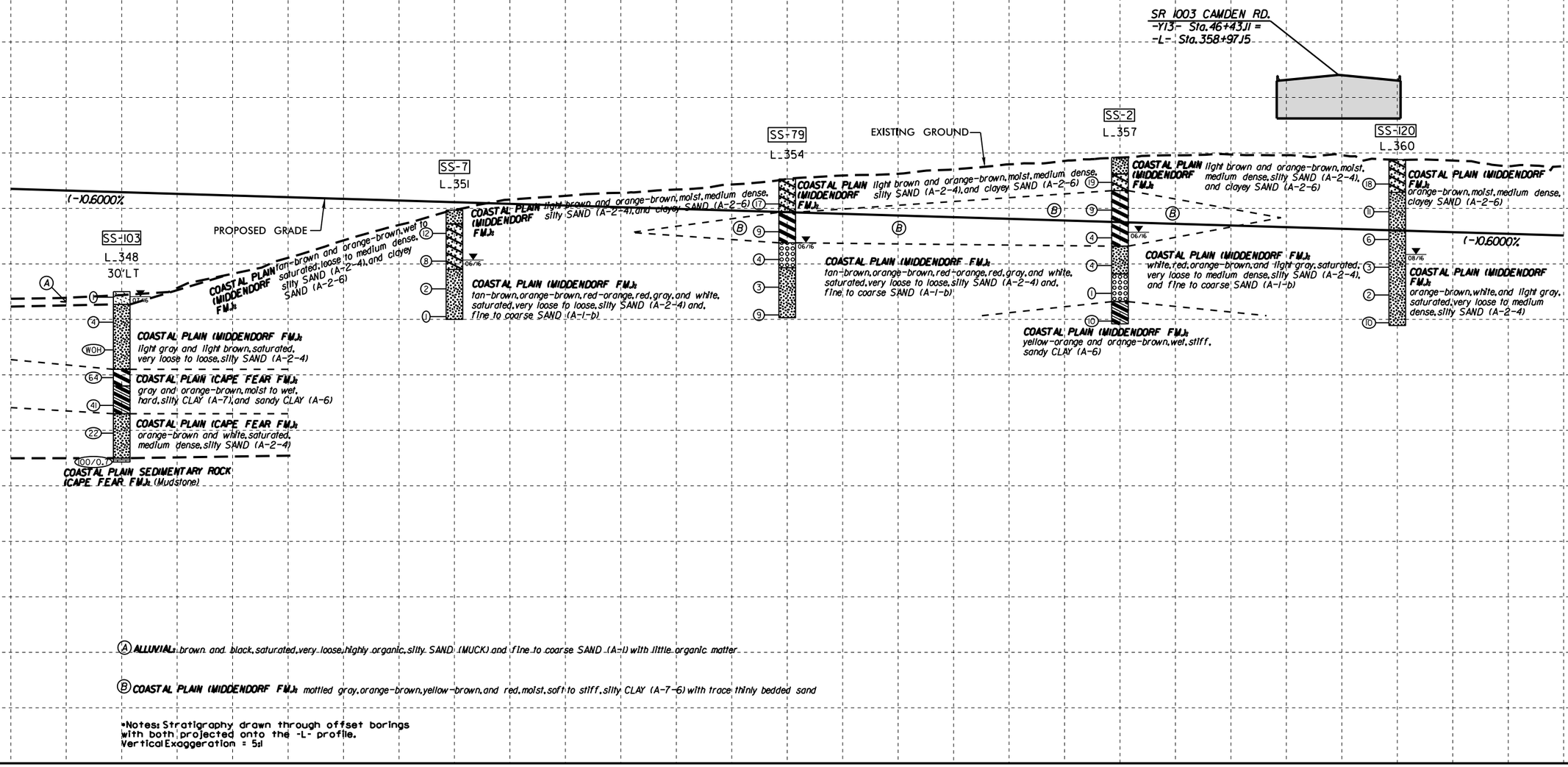
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-103	30'LT	348+00	0.0' - 1.5'	A-1-b	38	NP	N/A	79.8	12.9	3.3	4.0	95	39	8	N/A	3.8
SS-7	CL	351+00	8.2' - 9.7'	A-2-6	38	17	5.3	74.9	6.4	3.4	15.3	96	35	19	17.5	N/A
SS-79	CL	354+00	8.5' - 10.0'	A-7-6	46	22	4.6	21.9	7.1	23.6	47.3	99	83	73	29.1	N/A
SS-2	CL	357+00	8.5' - 10.0'	A-7-6	47	25	4.9	1.8	10.6	27.2	60.4	100	99	95	19.6	N/A
SS-120	CL	360+00	18.4' - 19.9'	A-2-4	19	1	4.8	56.8	25.7	2.8	14.6	100	95	18	25.0	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-143	100'LT	363+00	18.5' – 20.0'	A-4	32	10	2.4	4.4	34.1	20.8	40.7	97	94	76	37.4	N/A
SS-15	CL	366+00	13.3' – 14.8'	A-7-6	55	26	3.9	1.1	4.6	25.5	68.8	100	99	97	27.7	N/A
SS-116	100'RT	369+00	3.5' – 5.0'	A-7-6	49	20	4.2	1.6	1.3	31.6	65.6	100	99	98	25.2	N/A
SS-138	CL	375+00	3.6' – 5.1'	A-4	22	7	3.5	38.4	19.6	4.8	37.3	100	86	45	11.8	N/A

-L- Sta. 361+35.63= -Y13DET - Sta. 21+51.54

SS-143
L_363LT
100'LT

PI = 364+00.00
EL = 163.32'
VC = 210'
K = 525

SS-15
L_366

EXISTING GROUND

SS-116
L_369RT
100'RT

PI = 371+50.00
EL = 155.82'
VC = 330'
K = 206

L_372

LP STA. 371+91.25
ELEV.= 156.44

PROPOSED GRADE

SS-138
L_375

(-)0.6000%

(-)1.0000%

(+)0.6000%

(=)1.0000%

COASTAL PLAIN (MIDDENDORF FM.): light tan-brown, orange-brown, white, and gray, moist to saturated, loose to medium dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FM.): light to dark gray, moist to wet, soft to hard, highly clayey, sandy SILT (A-4), and moderate to highly plastic, silty CLAY (A-7-6) with trace thinly bedded, saturated, fine sand

COASTAL PLAIN (MIDDENDORF FM.): light brown-gray and light tan-brown, moist to saturated, loose, silty SAND (A-2-4), and fine SAND (A-3)

COASTAL PLAIN (CAPE FEAR FM.): light to dark gray, moist to wet, soft to hard, highly clayey, sandy SILT (A-4), and moderate to highly plastic, silty CLAY (A-7-6) with trace thinly bedded, saturated, fine sand

COASTAL PLAIN (CAPE FEAR FM.): light to dark gray, moist to wet, soft to hard, highly clayey, sandy SILT (A-4), and moderate to highly plastic, silty CLAY (A-7-6) with trace thinly bedded, saturated, fine sand

COASTAL PLAIN (CAPE FEAR FM.): gray and orange-brown, saturated, medium dense, silty SAND (A-2-4), and fine SAND (A-3)

COASTAL PLAIN (CAPE FEAR FM.): (Sandstone)

Ⓐ **COASTAL PLAIN (MIDDENDORF FM.):** light brown-gray and light tan-brown, moist to saturated, loose, silty SAND (A-2-4), and fine SAND (A-3)

Ⓑ **COASTAL PLAIN (CAPE FEAR FM.):** light to dark gray, moist to wet, soft to hard, highly clayey, sandy SILT (A-4), and moderate to highly plastic, silty CLAY (A-7-6) with trace thinly bedded, saturated, fine sand

•Notes: Stratigraphy drawn through offset borings with both projected onto the -L- profile.
Vertical Exaggeration = 5:1

362+00 363+00 364+00 365+00 366+00 367+00 368+00 369+00 370+00 371+00 372+00 373+00 374+00 375+00

260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

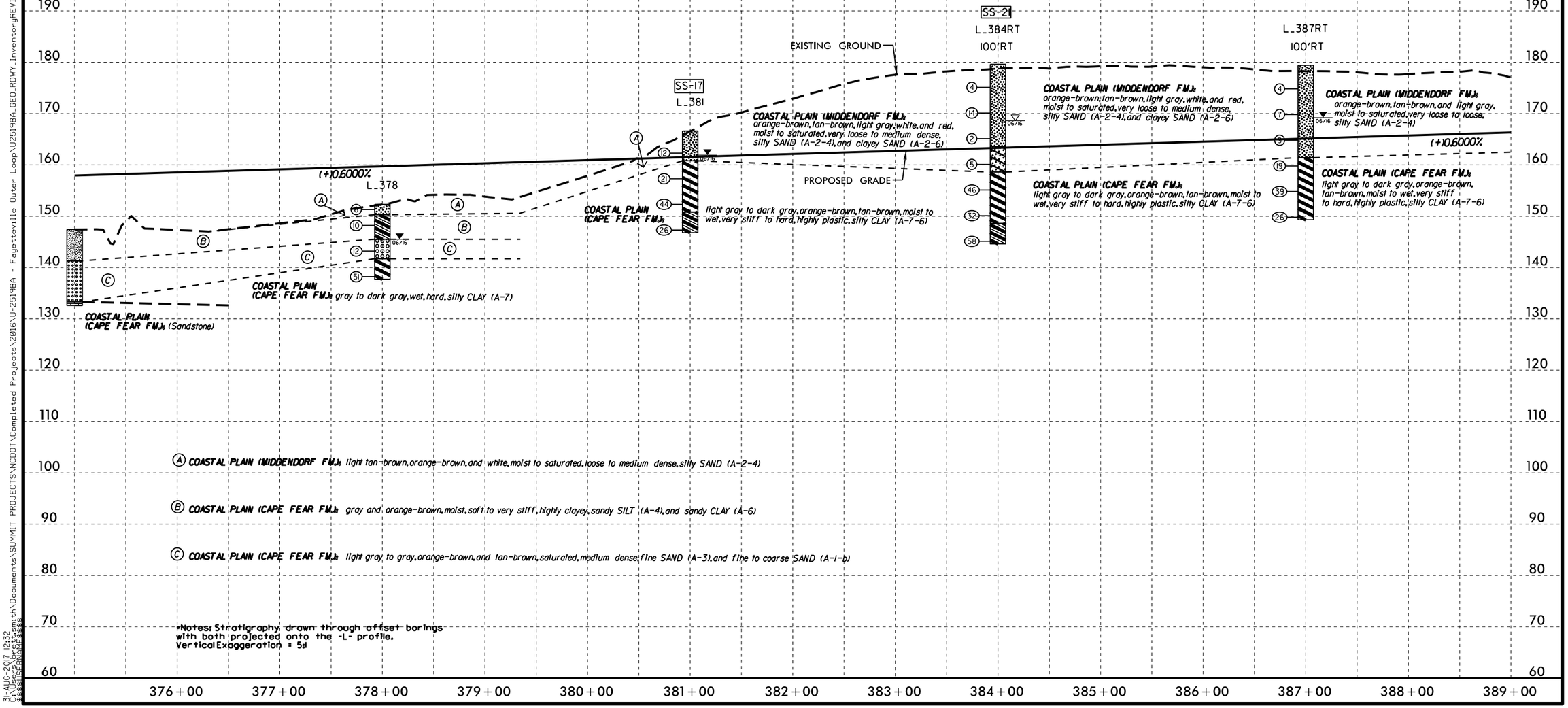
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-17	CL	381+00	8.3' - 9.8'	A-7-6	74	45	3.9	0.3	0.5	15.8	83.4	100	100	100	22.3	N/A
SS-21	100'RT	384+00	23.5' - 25.0'	A-7-6	62	33	3.9	0.5	0.9	19.2	79.4	100	100	99	19.5	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-25	CL	390+00	13.6' - 15.1'	A-7-5	67	37	4.4	3.0	1.4	17.3	78.4	100	97	96	29.0	N/A

BEGIN BRIDGE -L- Sta. 396+37 ± NBL

END BRIDGE -L- Sta. 399+83 ± NBL

PROPOSED GRADE

EXISTING GROUND

ALLUVIAL

SS-25 L-390

L-393

L-396LT 71'LT ARTESIAN

L-397RT 71'RT ARTESIAN

L-399LT 71'LT ARTESIAN

L-400RT 71'RT

L-403 (+)0.6000%

COASTAL PLAIN (MIDDENDORF FM.): orange-brown, wet, very loose silty SAND (A-2-4) (+)0.6000%

COASTAL PLAIN (CAPE FEAR FM.): light gray to dark gray, black, yellow-brown, and red, moist to wet, soft to hard, highly plastic, silty CLAY (A-7-6)

DRY (06/16)

COASTAL PLAIN (MIDDENDORF FM.): orange-brown, light tan-brown, and red, moist to wet, very loose to loose, silty SAND (A-2-4), and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FM.): mottled gray, yellow-brown, and red, wet, soft, f. sandy CLAY (A-6)

06/16

COASTAL PLAIN (CAPE FEAR FM.): orange-brown and red, saturated, medium dense, fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FM.): light gray to dark gray, black, yellow-brown, and red, moist to wet, soft to hard, highly plastic, silty CLAY (A-7-6)

COASTAL PLAIN (MIDDENDORF FM.): tan-brown and orange-brown, moist, very loose to medium dense, fine SAND (A-3), and clayey SAND (A-2-7)

COASTAL PLAIN (CAPE FEAR FM.): gray, orange-brown, red, and yellow-brown, moist to wet, stiff to very stiff, sandy CLAY (A-6); and silty CLAY (A-7)

08/16

DRY (08/16)

(A) **COASTAL PLAIN (CAPE FEAR FM.):** gray, orange-brown, tan-brown, black, and red, moist to saturated, loose to dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b), and clayey SAND (A-2-6)

(B) **COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FM.):** (Mudstone & Sandstone)

(C) **COASTAL PLAIN (CAPE FEAR FM.):** gray to dark gray, moist to wet, hard, silty CLAY (A-7), and sandy CLAY (A-6)

(D) **COASTAL PLAIN (CAPE FEAR FM.):** light gray to gray, saturated, loose to dense, silty SAND (A-2-4), and fine to coarse SAND (A-1-b), and clayey SAND (A-2-6)

(E) **COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FM.):** (Mudstone & Sandy Mudstone)

(F) **COASTAL PLAIN (CAPE FEAR FM.):** gray, dark gray, and yellow-brown, moist to wet, stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

(G) **COASTAL PLAIN (CAPE FEAR FM.):** light gray, saturated, medium dense, silty SAND (A-2-4)

•Notes: Stratigraphy drawn through offset borings with both projected onto the -L- profile.
Vertical Exaggeration = 5:1

390+00 391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00 401+00 402+00 403+00

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

5/14/99

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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	37
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

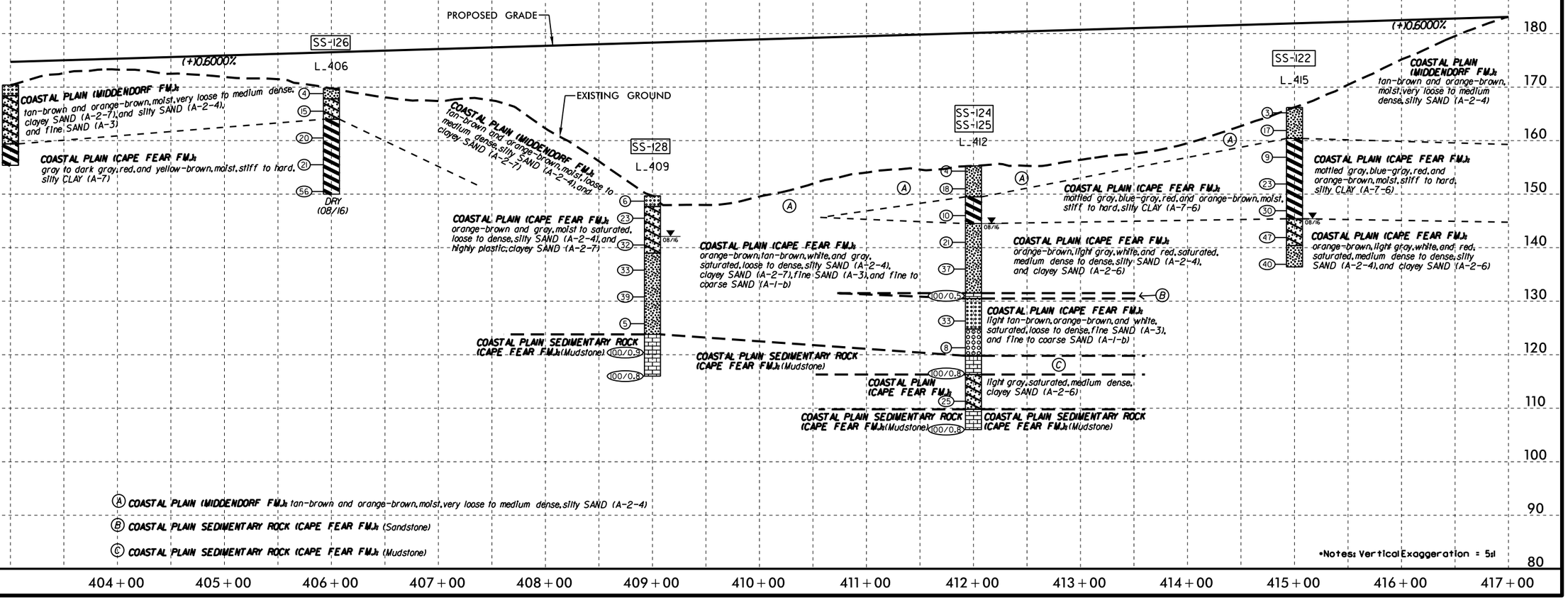
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-126	CL	406+00	3.3' - 4.8'	A-2-7	47	14	4.9	70.2	5.0	4.1	20.6	98	42	25	8.5	N/A
SS-128	CL	409+00	3.2' - 4.7'	A-2-7	55	28	4.5	55.5	10.1	3.2	31.2	97	52	34	13.8	N/A
SS-124	CL	412+00	3.3' - 4.8'	A-2-4	29	9	4.9	45.5	31.8	6.5	16.3	94	68	23	7.8	N/A
SS-125	CL	412+00	8.3' - 9.8'	A-7-6	50	23	4.2	1.4	1.6	30.4	66.6	100	99	97	27.5	N/A
SS-122	CL	415+00	3.3' - 4.8'	A-2-4	16	0	4.7	32.4	42.1	6.5	19.0	98	79	28	6.5	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

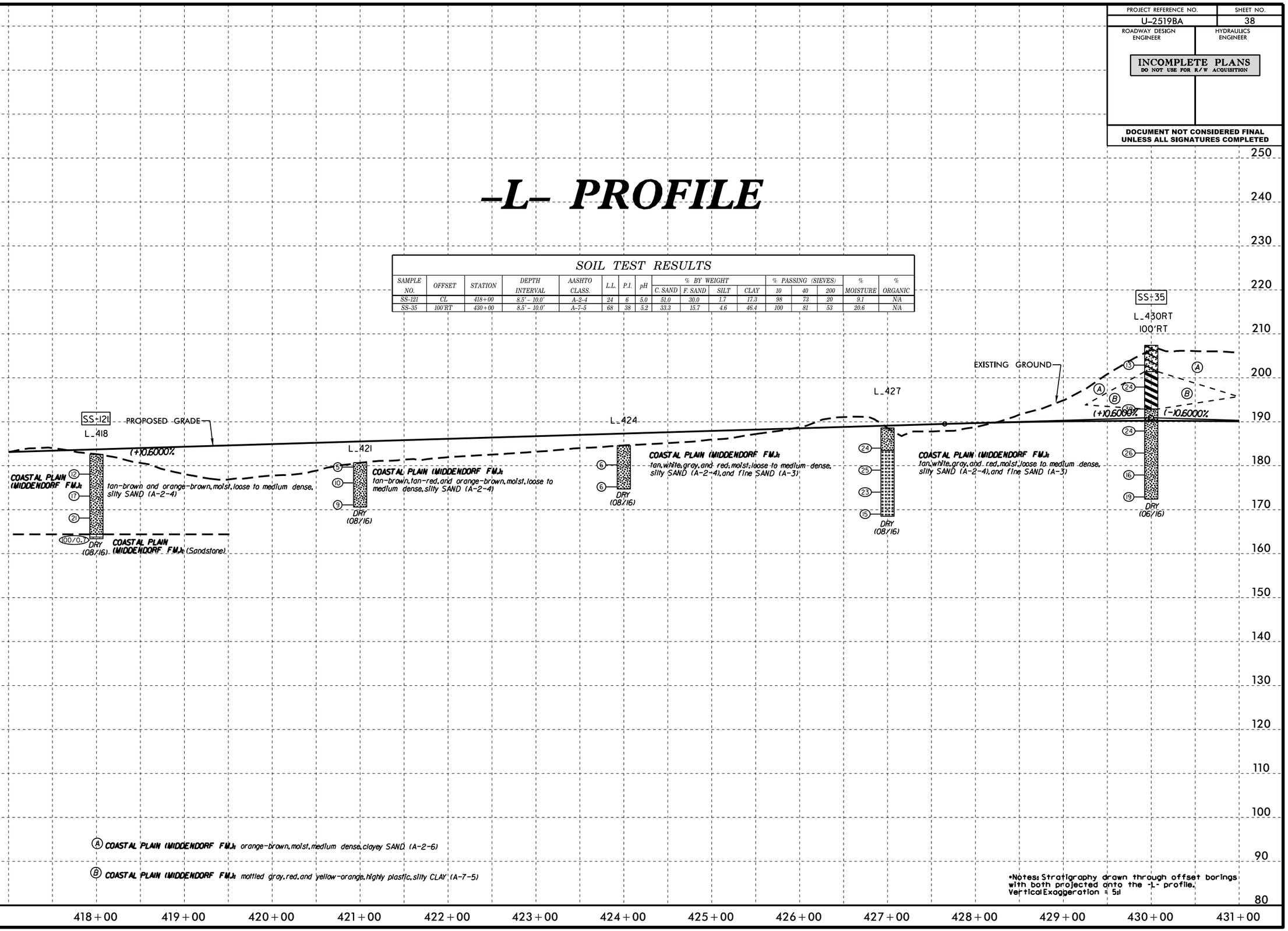
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-121	CL	418+00	8.5' - 10.0'	A-2-4	24	6	5.0	51.0	30.0	1.7	17.3	98	73	20	9.1	N/A
SS-35	100'RT	430+00	8.5' - 10.0'	A-7-5	68	38	5.2	33.3	15.7	4.6	46.4	100	81	53	20.6	N/A



*Notes: Stratigraphy drawn through offset borings with both projected onto the -L- profile.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

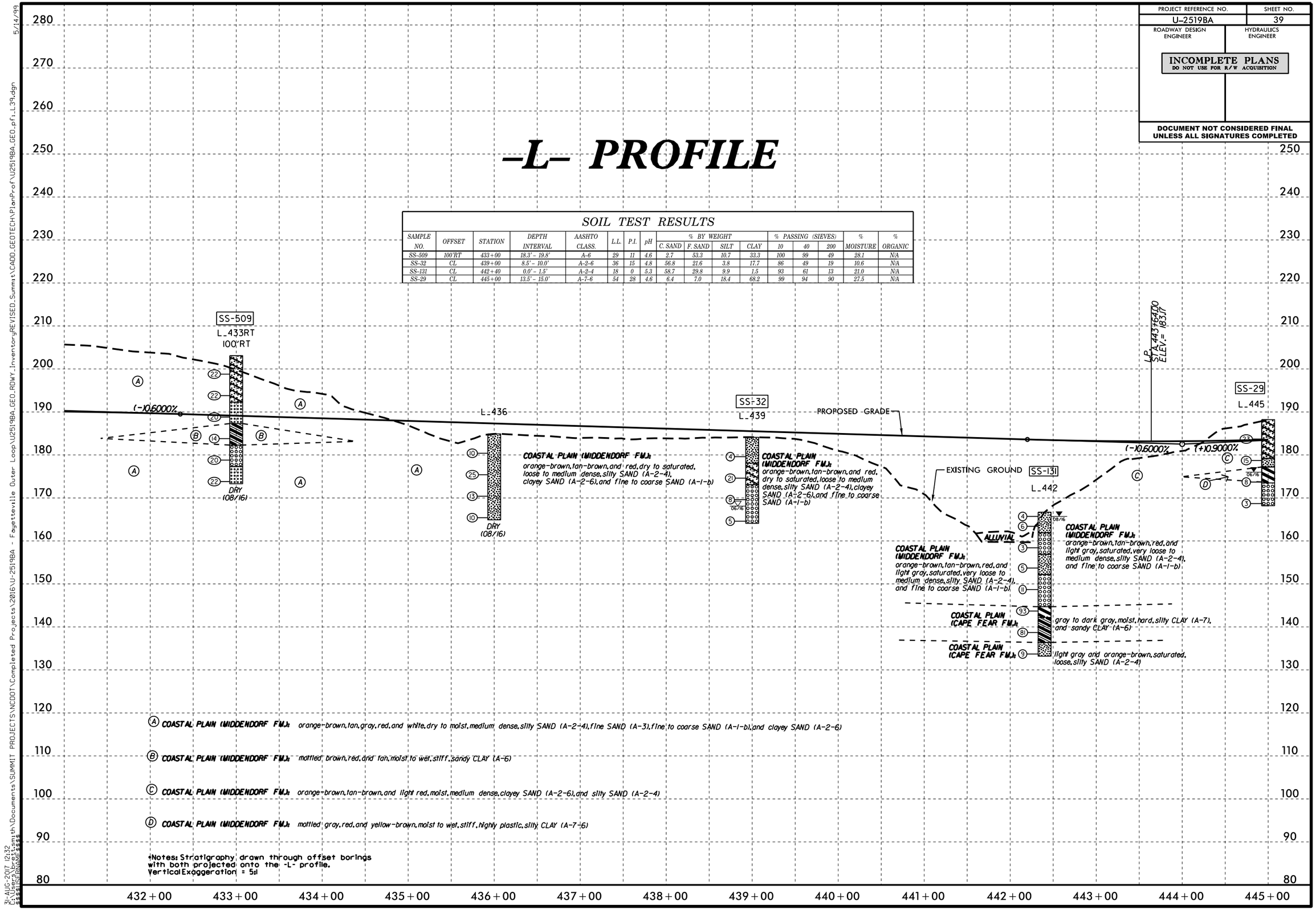
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-509	100'RT	433+00	18.3' - 19.8'	A-6	29	11	4.6	2.7	53.3	10.7	33.3	100	99	49	28.1	N/A
SS-32	CL	439+00	8.5' - 10.0'	A-2-6	36	15	4.8	56.8	21.6	3.8	17.7	86	49	19	10.6	N/A
SS-131	CL	442+40	0.0' - 1.5'	A-2-4	18	0	5.3	58.7	29.8	9.9	1.5	93	61	13	21.0	N/A
SS-29	CL	445+00	13.5' - 15.0'	A-7-6	54	28	4.6	6.4	7.0	18.4	68.2	99	94	90	27.5	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	40
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

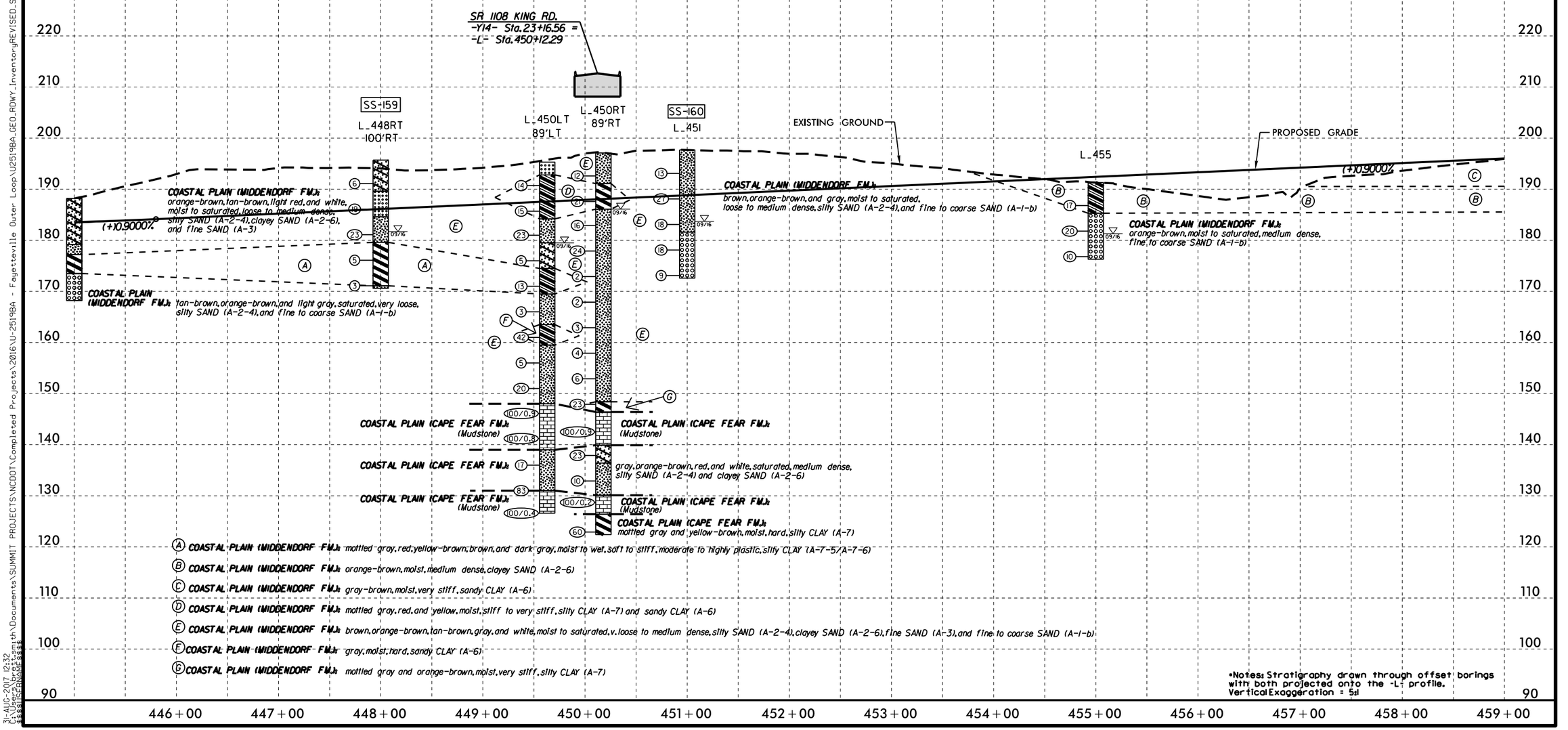
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-159	100'RT	448+00	18.6' - 20.1'	A-7-5	56	25	3.7	2.6	6.7	15.4	75.2	97	96	90	37.7	N/A
SS-160	CL	451+00	13.6' - 15.1'	A-2-4	23	5	4.8	32.4	41.9	0.9	24.9	100	78	31	19.3	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	41
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

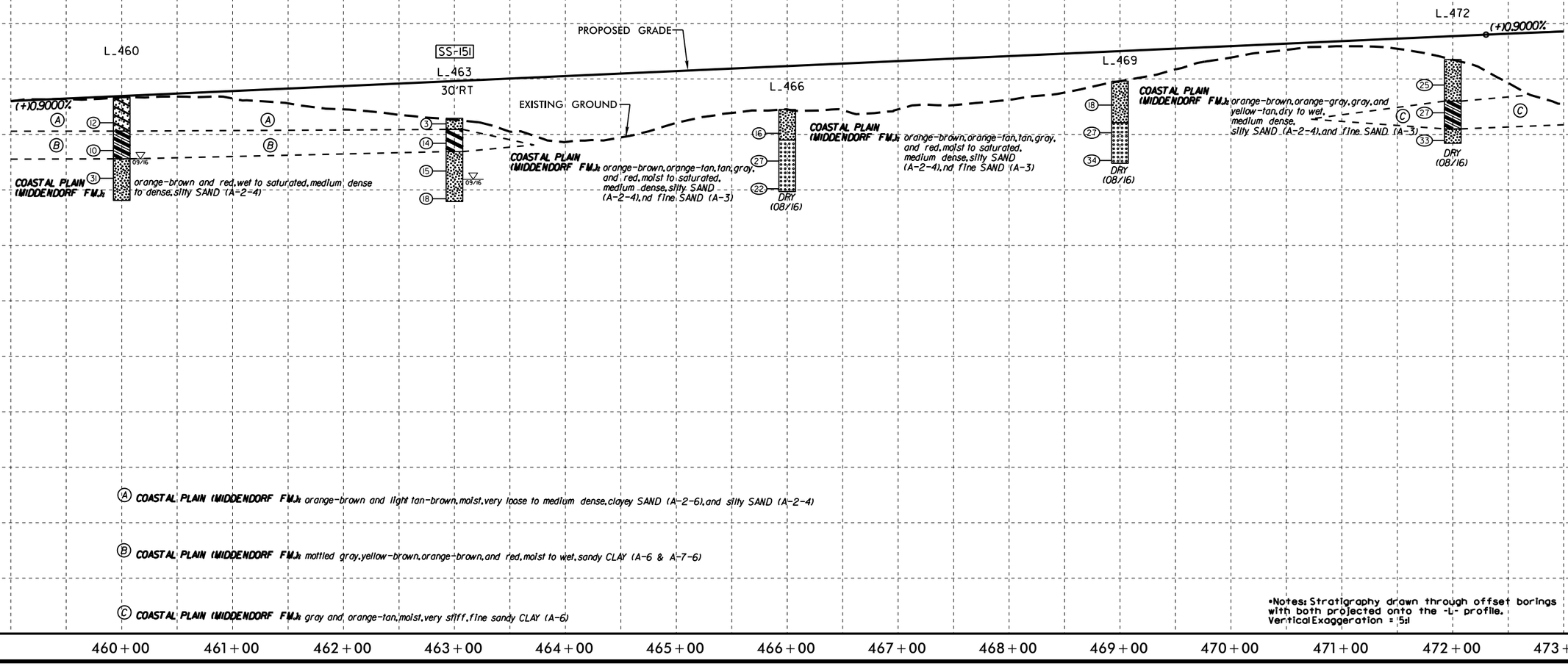
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-151	30'RT	463+00	3.5' - 5.0'	A-7-6	47	23	4.7	19.8	28.2	6.8	45.1	100	91	56	25.6	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	42
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

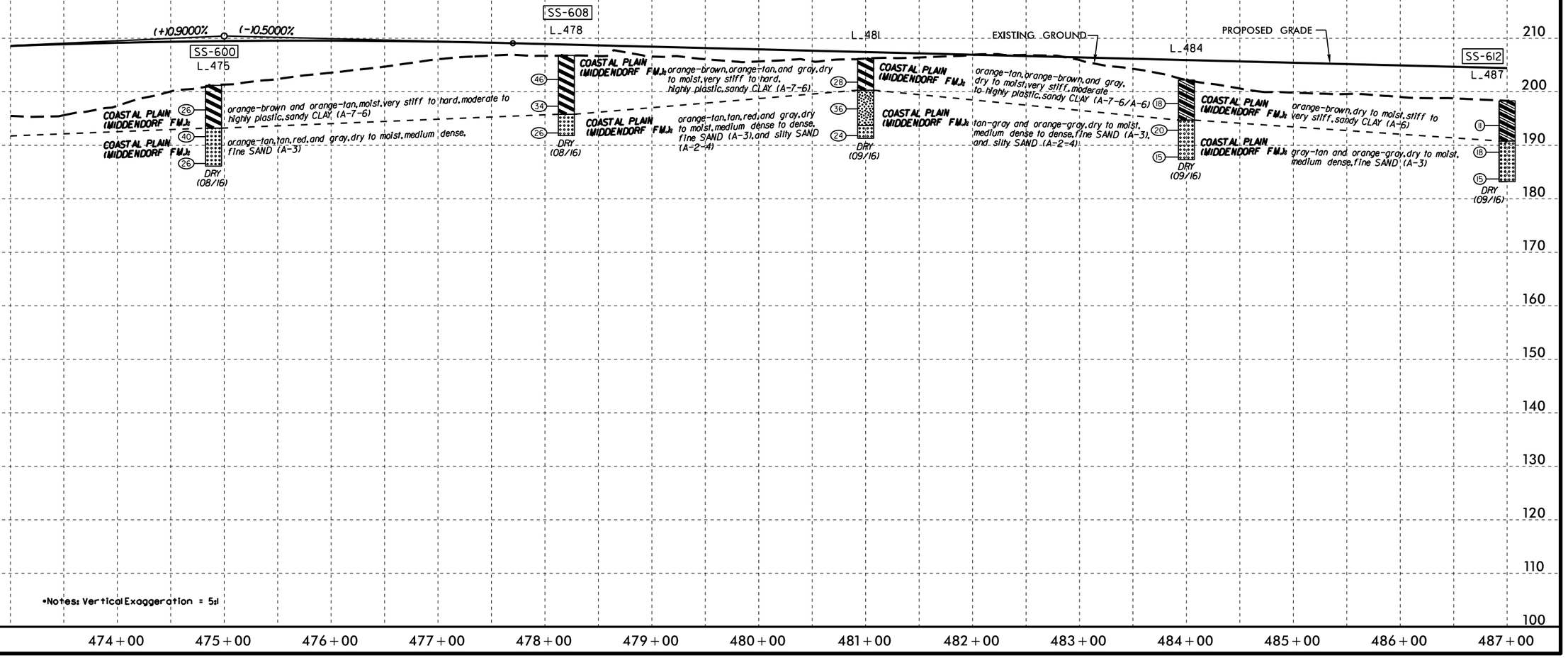
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-600	CL	474+90	3.6' - 5.1'	A-7-6	43	24	5.0	20.2	35.9	0.6	43.3	100	89	50	14.5	N/A
SS-608	CL	478+20	3.5' - 5.0'	A-7-6	56	36	5.0	43.2	16.6	0.9	39.3	99	70	42	13.1	N/A
SS-612	CL	487+00	3.6' - 5.1'	A-6	36	12	5.2	30.1	36.7	1.5	31.7	100	83	38	17.9	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-37	CL	496+00	3.5' - 5.0'	A-7-6	50	22	4.8	32.8	22.1	5.1	39.9	100	82	48	22.0	N/A
SS-38	CL	496+00	8.5' - 10.0'	A-7-6	49	32	4.8	40.7	22.9	4.9	31.5	100	76	40	11.7	N/A
SS-619	100'LT	499+00	3.5' - 5.0'	A-2-6	37	14	5.3	42.2	25.1	1.4	31.3	100	73	35	10.9	N/A
SS-620	100'LT	499+00	8.5' - 10.0'	A-7-6	51	27	5.2	31.4	20.6	3.5	44.4	100	82	51	22.0	N/A

LP STA.489+35.80 ELEV.= 203.53

PI = 490+00.00
EL = 202.92'
VC = 360'
K = 232

PROPOSED GRADE

(-)0.5000% (+)1.0544% EXISTING GROUND

SS-37 SS-38 L-496

SS-619 SS-620 L-499LT 100'LT

L-489 L-490 L-493

COASTAL PLAIN (MIDDENDORF FM.): orange-gray, moist to saturated, very loose to medium dense, silty SAND (A-2-4), and fine SAND (A-3)

COASTAL PLAIN (MIDDENDORF FM.): tan-gray and orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4), fine to coarse SAND (A-1-b), and fine SAND (A-3)

COASTAL PLAIN (MIDDENDORF FM.): mottled gray, orange-brown, and red; moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6/A-6)

COASTAL PLAIN (MIDDENDORF FM.): orange-tan, orange-brown, white, and red; wet to saturated, very loose to medium dense, silty SAND (A-2-4), and fine SAND (A-3)

COASTAL PLAIN (MIDDENDORF FM.): mottled gray, orange-brown, and red; moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6/A-6)

COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray; moist, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FM.): mottled gray, orange-brown, and red; moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6/A-6)

DRY (09/16)

Ⓐ **COASTAL PLAIN (MIDDENDORF FM.):** orange-brown, moist, stiff, sandy CLAY (A-6)

•Notes: Stratigraphy drawn through offset borings with both projected onto the -L- profile.
Vertical Exaggeration = 5:1

488+00 489+00 490+00 491+00 492+00 493+00 494+00 495+00 496+00 497+00 498+00 499+00 500+00 501+00

310 300 290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	44
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-41	CL	502+00	8.4' - 9.9'	A-2-4	28	8	5.1	44.0	28.5	6.0	21.5	100	81	31	16.5	N/A
SS-42	CL	502+00	13.4' - 14.9'	A-2-7	41	21	4.7	41.9	25.1	5.5	27.5	98	76	35	17.3	N/A
SS-147	CL	511+00	3.5' - 5.0'	A-6	31	11	5.3	36.9	26.4	5.5	31.2	100	79	40	14.3	N/A
SS-145	CL	514+00	3.7' - 5.2'	A-7-6	41	23	5.3	35.3	19.8	13.4	41.5	100	85	59	20.2	N/A

SR 1112 STONEY POINT RD.
-Y16- Sta.24+41.38 =
-L- Sta.504+87.12

-L- Sta.503+62.07=
-Y16DET- Sta.24+40.37

SS-41
SS-42
L_502

ROADWAY EMBANKMENT FILL

L_505LT
99'LT

PROPOSED GRADE

PI = 511+60.00
EL = 225.70'
VC = 560'
K = 385

(+)1.0544%

(-)0.3997%

HP
STA.512+86.07
ELEV.= 224.89

L_508

SS-147
L_511

SS-145
L_514

EXISTING GROUND

COASTAL PLAIN (MIDDENDORF FM.): tan-brown,light orange-brown,gray,red,and yellow-brown, moist to saturated,loose to medium dense, silty SAND (A-2-4),and clayey SAND (A-2-7)

COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray,moist to wet, medium stiff to very stiff,sandy CLAY (A-7-6/A-6)

COASTAL PLAIN (MIDDENDORF FM.): tan-brown,light orange-brown,gray,red,and yellow-brown, moist to saturated,v.loose to medium dense, silty SAND (A-2-4),and clayey SAND (A-2-7)

COASTAL PLAIN (MIDDENDORF FM.): gray to dark gray,moist to wet,hard, sandy clay (A-6) and silty CLAY (A-7)

COASTAL PLAIN (MIDDENDORF FM.): gray,saturated,dense to very dense, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FM.): (Sandstone)

COASTAL PLAIN (CAPE FEAR FM.): gray,saturated,medium dense to dense, clayey SAND (A-2-6)

DRY (09/16)

COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray,moist to wet, medium stiff to very stiff,andy CLAY (A-7-6/A-6)

COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray,moist to wet, medium stiff to very stiff,andy CLAY (A-7-6/A-6)

COASTAL PLAIN (MIDDENDORF FM.): tan-brown,saturated,medium dense, silty SAND (A-2-4)

(A) COASTAL PLAIN (MIDDENDORF FM.): brown,moist,very loose,silty SAND (A-2-4) and clayey SAND (A-2-7)

(B) COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray,moist to wet,medium stiff to very stiff,sandy CLAY (A-7-6/A-6)

•Notes: Vertical Exaggeration = 5:1

320 310 300 290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120

502+00 503+00 504+00 505+00 506+00 507+00 508+00 509+00 510+00 511+00 512+00 513+00 514+00 515+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	45
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- PROFILE

END GRADE TIP PROJECT U-2519BA
BEGIN PROJECT U-2519BB
-L- STA 519+00.00
ELEV. = 222.74'

PROPOSED GRADE

(-10.3997%

25'

3:1

EXISTING GROUND

L_517

L_519

COASTAL PLAIN (MIDDENDORF FM.): gray and orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4), fine to coarse SAND (A-1-b), and clayey SAND (A-2-7)

17 / 16 / 5 / 3 — 09/16

COASTAL PLAIN (MIDDENDORF FM.): gray and orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4), fine to coarse SAND (A-1-b), clayey SAND (A-2-7), and fine SAND (A-3)

15 / A / 14 / 19 / 13 / 10 — 09/16

(A) **COASTAL PLAIN (MIDDENDORF FM.):** gray, moist, stiff, sandy CLAY (A-6)

320 310 300 290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120

516+00 517+00 518+00 519+00 520+00 521+00 522+00 523+00 524+00 525+00 526+00 527+00 528+00 529+00

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	46
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPA- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-136	CL	23+00	3.5' - 5.0'	A-7-6	80	42	5.1	1.4	1.0	3.5	94.1	100	99	98	29.9	N/A
SS-17	63'LT	10+96	8.3' - 9.8'	A-7-6	74	45	3.9	0.3	0.5	15.8	83.4	100	100	100	22.3	N/A

Ⓐ **COASTAL PLAIN (MIDDENDORF FM.):** orange-brown and white, moist to saturated, medium dense, silty SAND (A-2-4)

BEGIN GRADE
-Y13RPA- STA. 10+00.00
ELEV. = 162.11'

SS-17
Y13RPA_11
63'LT

SS-136
Y13RPA_23

(-)4.6000%
(-)0.7000%
(-)0.7000%
(-)1.4000%
PROPOSED GRADE
(-)1.4000%
(+)2.9885%
EXISTING GROUND

Y13RPA_14
Y13RPA_17
Y13RPA_20

COASTAL PLAIN (CAPE FEAR FM.): light gray to gray, tan-brown and orange-brown, moist, very stiff to hard, moderate to highly plastic, silty CLAY (A-7-6), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FM.): gray and orange-brown, wet, very soft to hard, sandy CLAY (A-6), and silty CLAY (A-7) with little fine sand

COASTAL PLAIN (CAPE FEAR FM.): gray, saturated, medium dense to very dense, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FM.): gray, moist, hard, sandy CLAY (A-6), and silty CLAY (A-7) with little fine sand

COASTAL PLAIN (CAPE FEAR FM.): gray to dark gray, moist,

COASTAL PLAIN (CAPE FEAR FM.): gray, saturated, medium dense to dense, silty SAND (A-2-4), and clayey SAND (A-2-6)

ALLUVIAL: medium stiff to stiff, silty CLAY (A-7) with little fine sand

COASTAL PLAIN (MIDDENDORF FM.): gray to dark gray, moist, stiff to very stiff, highly plastic, silty CLAY (A-7-6)

DRY (08/16)

•Notes: Alluvium shown was determined to be present through review of the wetlands survey file (u2519_neu_wet_english_nad83_0706). A clear determination of the presence of alluvial soils could not be made in sampling boring Y13RPA_20. Stratigraphy drawn through offset borings with both projected onto the -Y13RPA- profile.
Vertical Exaggeration = 5:1

260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPA- PROFILE

END GRADE
-Y13RPA- STA. 28+57.05=
-Y13- STA. 36+79.37 35.5' RT.
ELEV. = 181.51'

Y13RPA_25 | EXISTING GROUND | PROPOSED GRADE | Y13RPA_28 | (-)12.00% | (+)2.9885%

17 / 7 / A 10 / 5 — 08/16

COASTAL PLAIN (MIDDENDORF FM.): orange-brown, light tan-brown, and red, clayey SAND (A-2-6), fine SAND (A-3).

10 / 15 / 3 — 08/16

moist to saturated, very loose to medium dense, and silty SAND (A-2-4) with little clay

A COASTAL PLAIN (MIDDENDORF FM.): gray to dark gray, red, and yellow-brown, moist, stiff to very stiff, highly plastic, silty CLAY (A-7-6)

Vertical Exaggeration = 5:1

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

24+00 25+00 26+00 27+00 28+00

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$$$$LEVEL$$$$
$$$$SERVICE$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	48
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPB- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-99	CL	20+00	3.7' - 5.2'	A-2-4	22	1	5.2	48.3	28.7	0.2	22.8	100	82	24	17.8	N/A

BEGIN GRADE
-Y13RPB- STA. 10+00.00
ELEV. = 181.44'

PROPOSED GRADE

(-)10.5500%

(-)10.4000%

Y13RPB_14
70'RT

(-)10.4000%

Y13RPB_17

(-)12.5000%

(-)12.5000%

(+)0.9602%

Y13RPB_23

Y13RPB_11
60'RT

COASTAL PLAIN (MIDDENDORF FM.) tan-brown to orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FM.) tan-brown to orange-brown, moist, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, and fine to coarse SAND (A-1-b)

DRY (06/16)

DRY (07/16)

COASTAL PLAIN (MIDDENDORF FM.) tan-brown, light gray, and orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to some clay

SS-99

Y13RPB_20

EXISTING GROUND

COASTAL PLAIN (MIDDENDORF FM.) tan-brown, light gray, and orange-brown, moist to saturated, very loose to loose, silty SAND (A-2-4) with trace to some clay

COASTAL PLAIN (CAPE FEAR FM.) light gray to gray, moist, hard, silty CLAY (A-7)

COASTAL PLAIN (CAPE FEAR FM.) orange-brown, saturated, dense, silty SAND (A-2-4) with little clay

(A) **ALLUVIAL:** black and brown, wet to saturated, very loose, highly organic, silty SAND (MUCK) with little clay, and fine to coarse SAND (A-1) with little organic matter

•Notes: Alluvium determined to be present through review of the wetlands survey file (u2519_neu_wet_english_nad83_0706), not through any actual subsurface investigation. Depth and type of alluvial material estimated based on lab results and field observations in other areas in such material.
Stratigraphy drawn through offset borings with both projected onto the -Y13RPB- profile.
Vertical Exaggeration = 5:1

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	49
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPB- PROFILE

EXISTING GROUND

PROPOSED GRADE

Y13RPB_26

Y13RPB_29

Y13RPB_32

Y13RPB_35

Y13RPB_38

(+)0.9602%

COASTAL PLAIN (MIDDENDORF FM.)
orange-brown to light tan-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay

COASTAL PLAIN (MIDDENDORF FM.)
orange-brown to light tan-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, and fine SAND (A-3)

COASTAL PLAIN (MIDDENDORF FM.)
gray, red, and yellow-brown, moist, medium stiff, silty CLAY (A-7)

•Notes: Vertical Exaggeration = 5:1

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	50
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPB- PROFILE

END GRADE
-Y13RPB- STA. 41+01.43=
-Y13- STA. 36+88.88 35.5'LT
ELEV. = 181.54'

EXISTING GROUND

PROPOSED GRADE — Y13RPB_41

(+)0.9602%

(-)12.00%

COASTAL PLAIN (MIDDENDORF FM.)
tan-brown and orange-brown, moist to saturated, loose to medium dense, silty SAND (A-2-4) with little clay, fine SAND (A-3), and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FM.)
gray, red, and yellow-brown, moist, medium stiff, silty CLAY (A-7)

6
12
14
DRY
(08/16)

•Notes: Vertical Exaggeration = 5:1

280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80

38+00 39+00 40+00 41+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	51
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPC- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-100	CL	14+50	4.0' - 5.5'	A-7-6	55	28	4.6	7.2	10.7	21.6	60.5	99	95	86	17.7	N/A

BEGIN GRADE -Y13RPC- STA.10+00.00 ELEV. = 178.50'

Y13RPC_11 64' LT

(-)0.7000%

(-)1.2000%

SS-100

Y13RPC_14

(-)1.2000%

(-)1.8000%

PROPOSED GRADE

(-)1.8000%

(+)1.0180%

Y13RPC_20

Y13RPC_24

Y13RPC_17

EXISTING GROUND

IRRIGATION POND

COASTAL PLAIN (MIDDENDORF FM.) tan-brown to orange-brown, gray and red, moist to wet, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, and fine to coarse SAND (A-1-b)
DRY (06/16)

COASTAL PLAIN (MIDDENDORF FM.) light orange-brown to brown, moist to wet, medium dense, silty SAND (A-2-4) with trace to little clay
DRY (07/16)

COASTAL PLAIN (MIDDENDORF FM.) light gray, saturated, medium dense, silty SAND (A-2-4) with little clay

COASTAL PLAIN (CAPE FEAR FM.) light brown to light gray, moist, very stiff to hard, silty CLAY (A-7)

COASTAL PLAIN (CAPE FEAR FM.) orange-brown, brown, and white, saturated, dense, silty SAND (A-2-4) with little clay, and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FM.) orange-brown to tan-brown, moist to wet, loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)
DRY (07/16)

COASTAL PLAIN (MIDDENDORF FM.) dark gray, wet, stiff, silty CLAY (A-7) with little fine sand.
DRY (06/16)

(A) **COASTAL PLAIN (MIDDENDORF FM.)** mottled gray, orange-brown, and red, moist, very stiff, highly plastic, silty CLAY (A-7-6)

(B) **ALLUVIAL:** black, very loose, highly organic, silty SAND (MUCK)

•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y13RPC- profile.
Vertical Exaggeration = 5:1

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

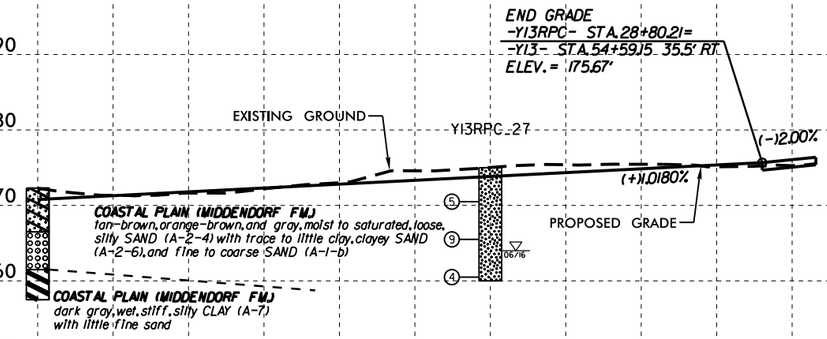
10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	52
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPC- PROFILE



*Notes: Vertical Exaggeration = 5:1

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

24+00 25+00 26+00 27+00 28+00 29+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	53
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

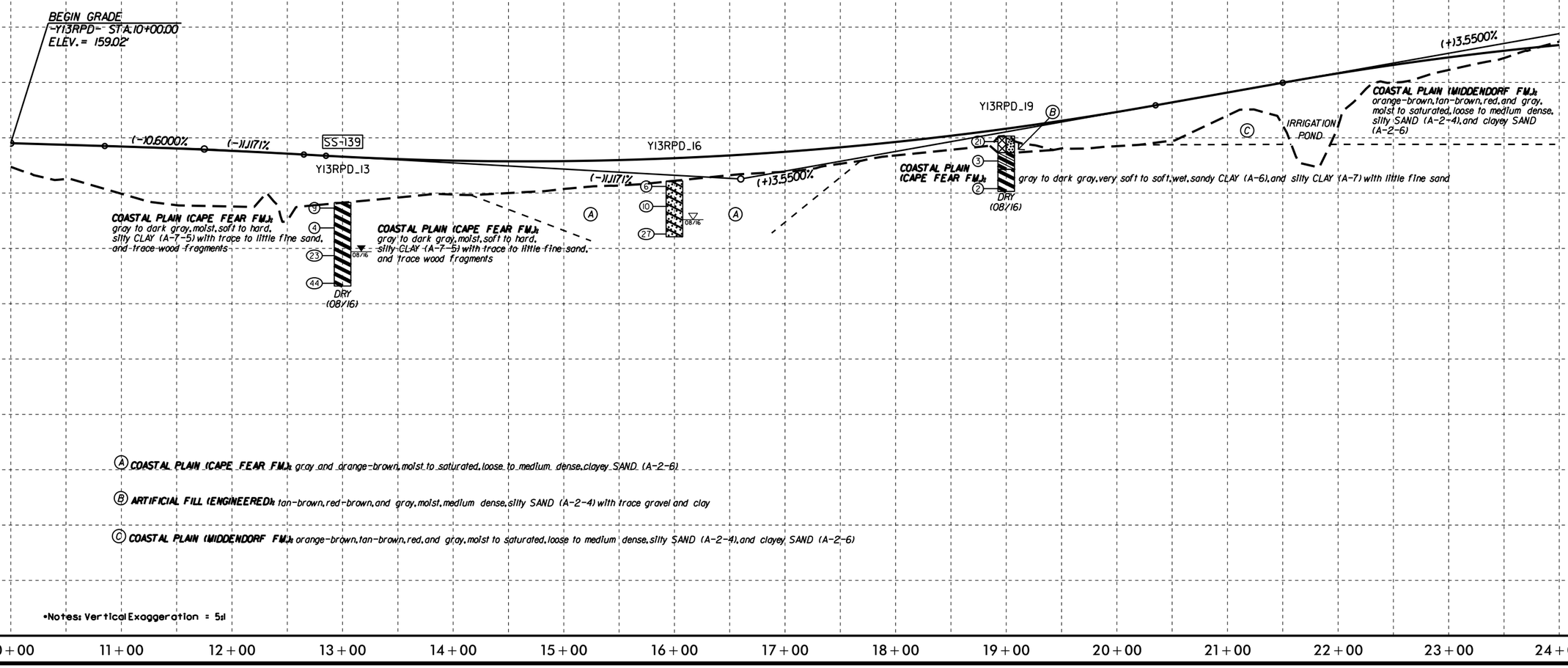
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPD- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-139	CL	13+00	3.6' - 5.1'	A-7-5	56	24	3.9	3.9	3.1	23.3	69.7	100	98	95	25.1	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	54
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

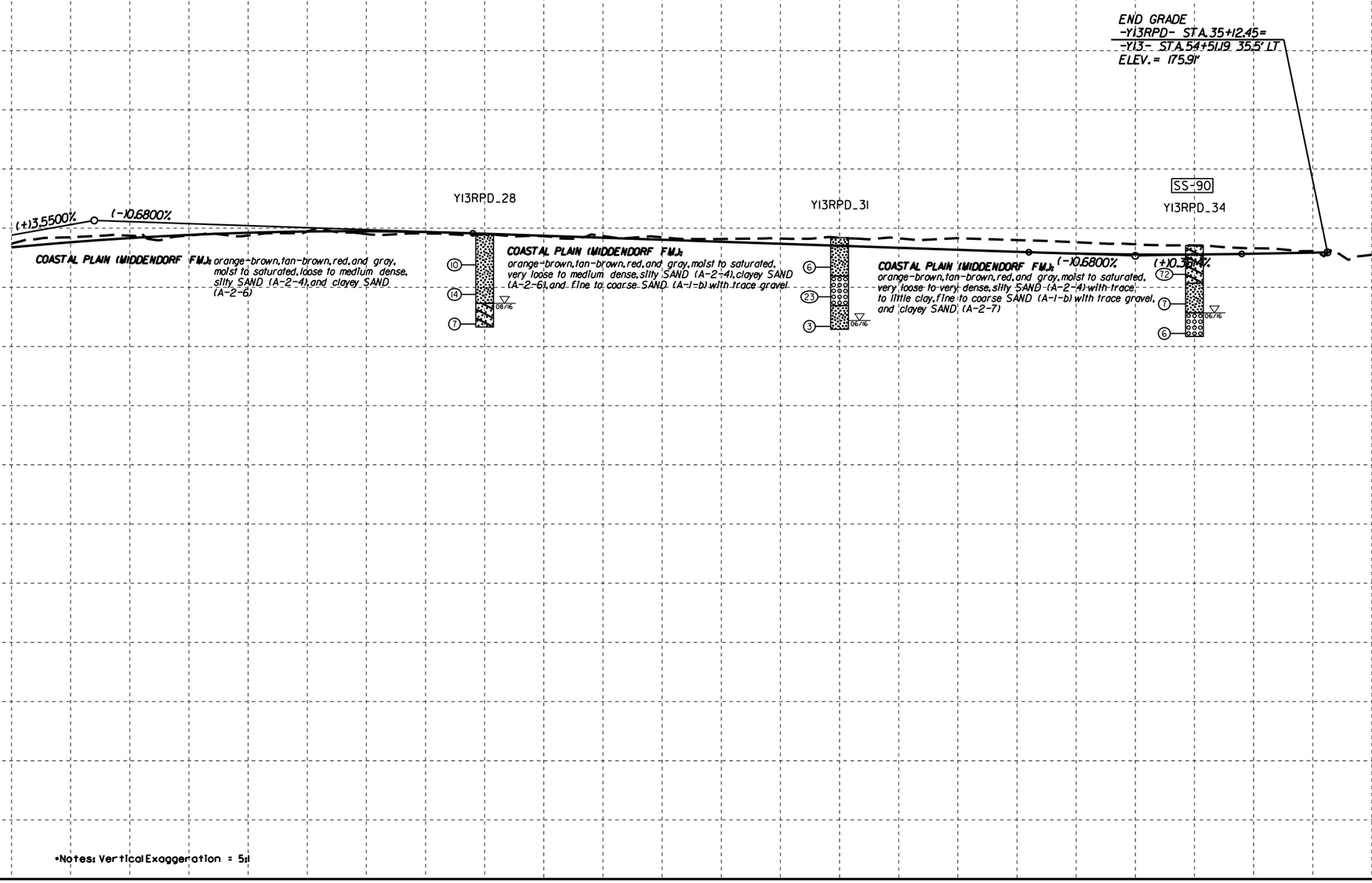
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13RPD- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-90	CL	34+00	3.9' - 5.4'	A-2-7	42	13	4.8	54.8	14.6	1.7	28.9	94	60	30	10.2	N/A



*Notes: Vertical Exaggeration = 5x

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	55
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

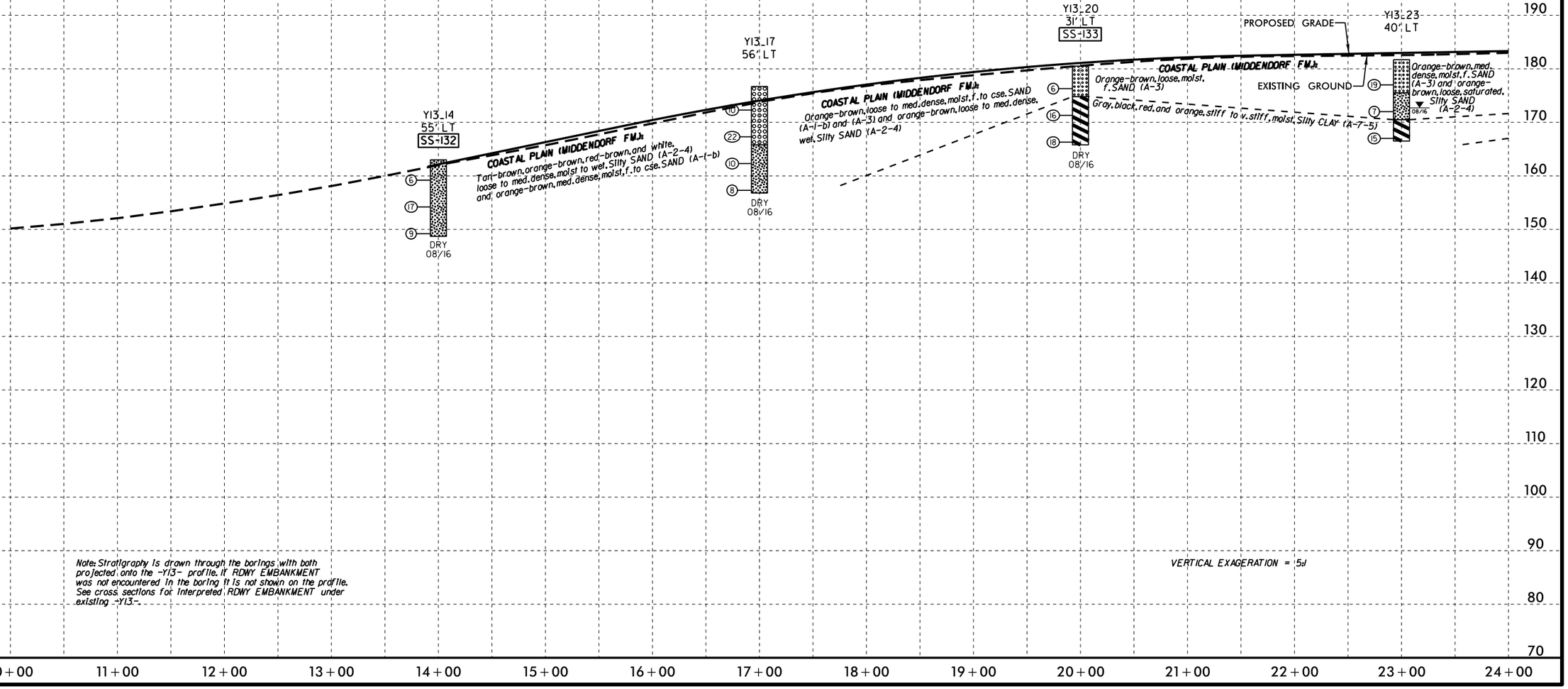
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-132	55' LT	-Y13- 14+00	7.8-9.3	A-2-4	33	10	4.7	53.8	20.0	0	26.3	99	73	27	N/A	N/A
SS-133	31' LT	-Y13- 20+00	8.2-9.7	A-7-5	58	25	4.6	1.7	6.8	18.6	72.9	100	99	94	25.4	N/A



Note: Stratigraphy is drawn through the borings with both projected onto the -Y13- profile. If RDWY EMBANKMENT was not encountered in the boring it is not shown on the profile. See cross sections for interpreted RDWY EMBANKMENT under existing -Y13-.

VERTICAL EXAGERATION = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	56
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13- PROFILE

Y13_26
40' LT

Y13_29
30' LT

Y13_32
42' LT

Y13_35
23' LT

Y13_38
40' LT

PROPOSED GRADE

EXISTING GROUND

COASTAL PLAIN (MIDDENDORF FM.)
Tan-brown, loose, moist, f. SAND (A-3)
Brown-gray, stiff, moist, Sandy CLAY (A-6)
Orange-brown, v. loose, sat., Silty SAND (A-2-4)
7
8
3
08/16

COASTAL PLAIN (MIDDENDORF FM.)
Orange-brown to tan-brown, loose to med. dense, moist, dense, moist to wet, f. to cse. SAND

13
13
9
08/16

COASTAL PLAIN (MIDDENDORF FM.)
Silty SAND (A-2-4) w/ little clay and orange-brown, med. SAND (A-1-b) and (A-3)

12
12
6
DRY
08/16

COASTAL PLAIN (MIDDENDORF FM.)
Gray to tan-brown, loose to m. dense, moist, f. SAND (A-3) and gray and orange-brown, m. dense, moist to sat., Silty SAND (A-2-4)
Gray, yellow-brown, and red, med. to v. stiff, moist, Silty CLAY (A-7) and tan and orange-brown, stiff, dry, Sandy CLAY (A-6)

4
15
20
DRY
08/16

COASTAL PLAIN (MIDDENDORF FM.)
Tan-brown, loose, moist, f. SAND (A-3) and tan and gray, med. dense, dry to wet, Silty SAND (A-2-4)

12
14
11
DRY
08/16

Note: Stratigraphy is drawn through the borings with both projected onto the -Y13- profile. If -RDWY- EMBANKMENT was not encountered in the boring it is not shown on the profile. See cross sections for interpreted RDWY EMBANKMENT under existing -Y13-.

VERTICAL EXAGERATION = 5:1

280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	57
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

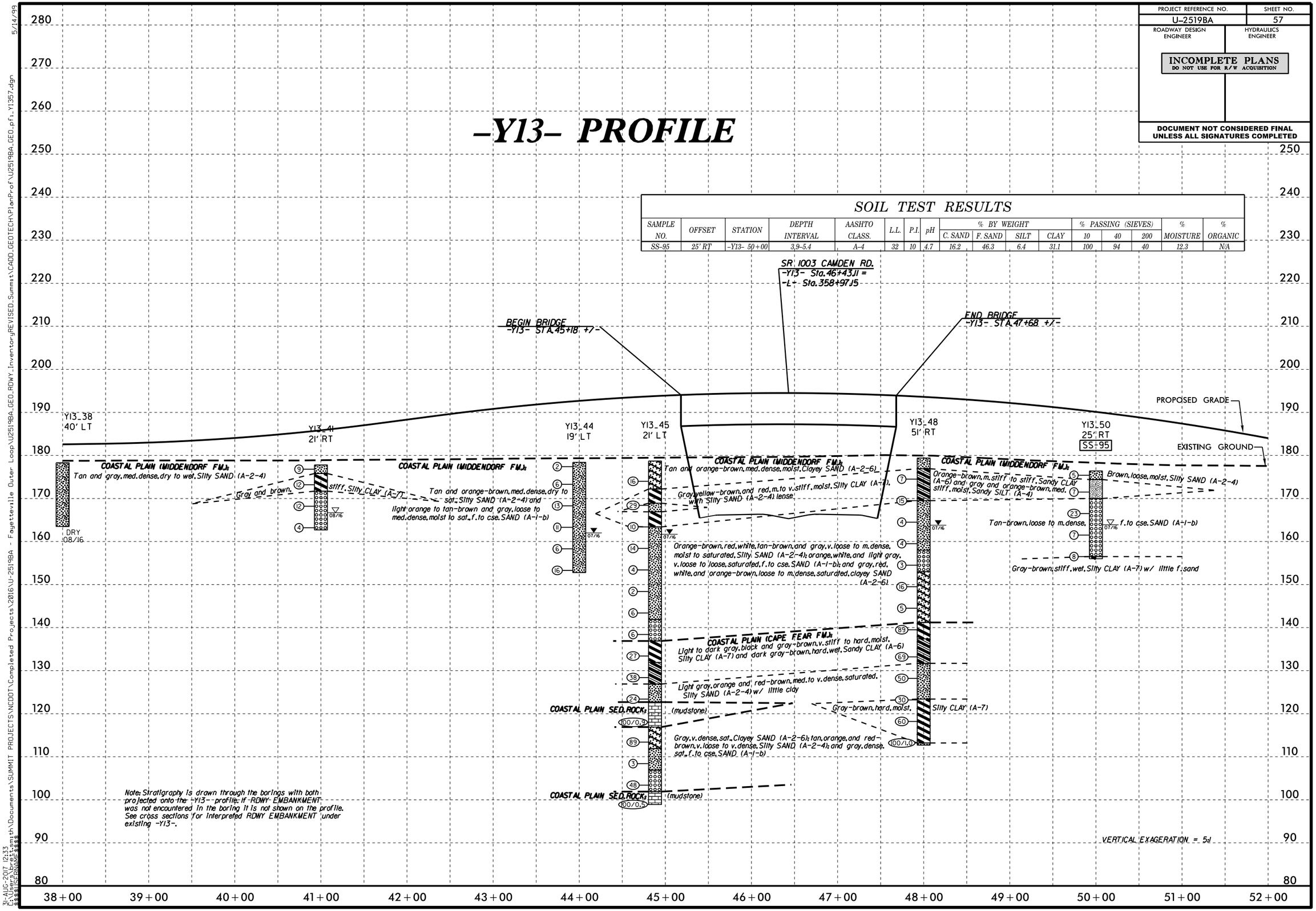
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-95	25' RT	-Y13- 50+00	3.9-5.4	A-4	32	10	4.7	16.2	46.3	6.4	31.1	100	94	40	12.3	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	58
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

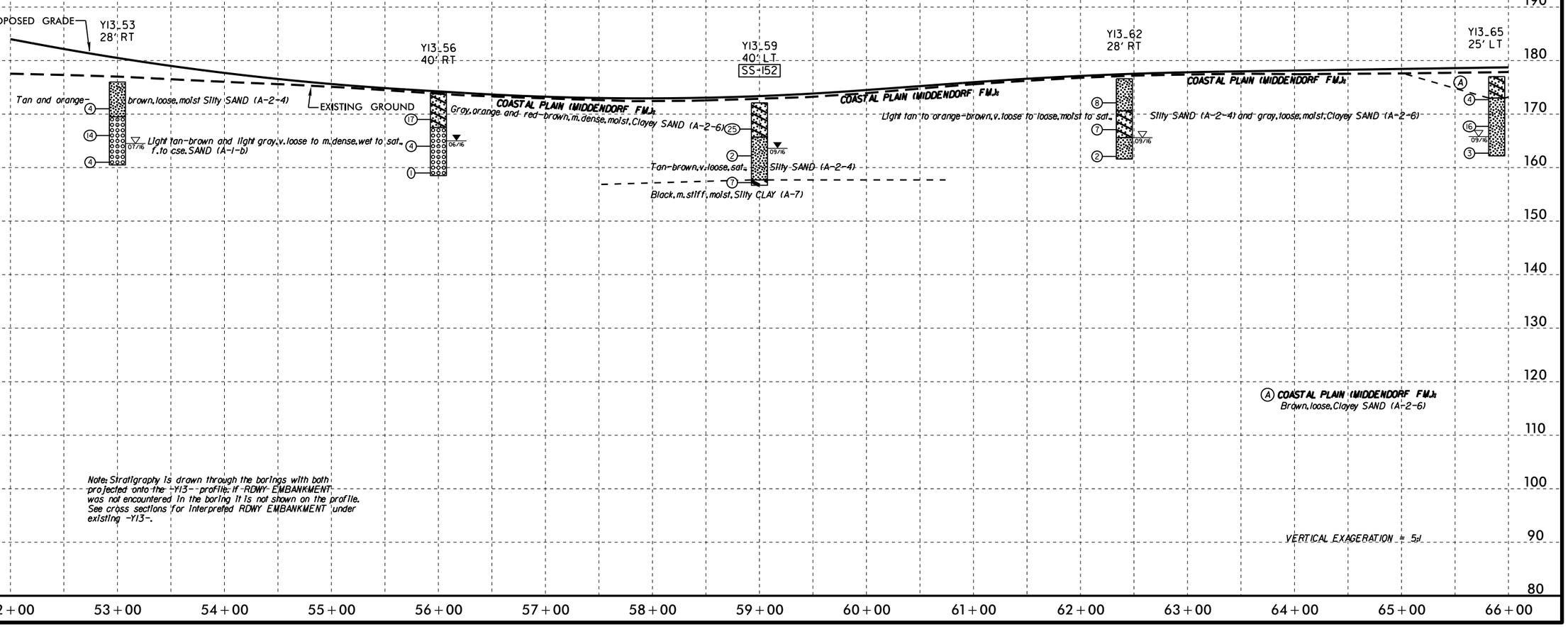
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-152	40' LT	-Y13- 59+00	3.9-5.4	A-2-7	60	19	4.8	68.8	5.8	0.1	25.4	99	46	26	14.9	N/A

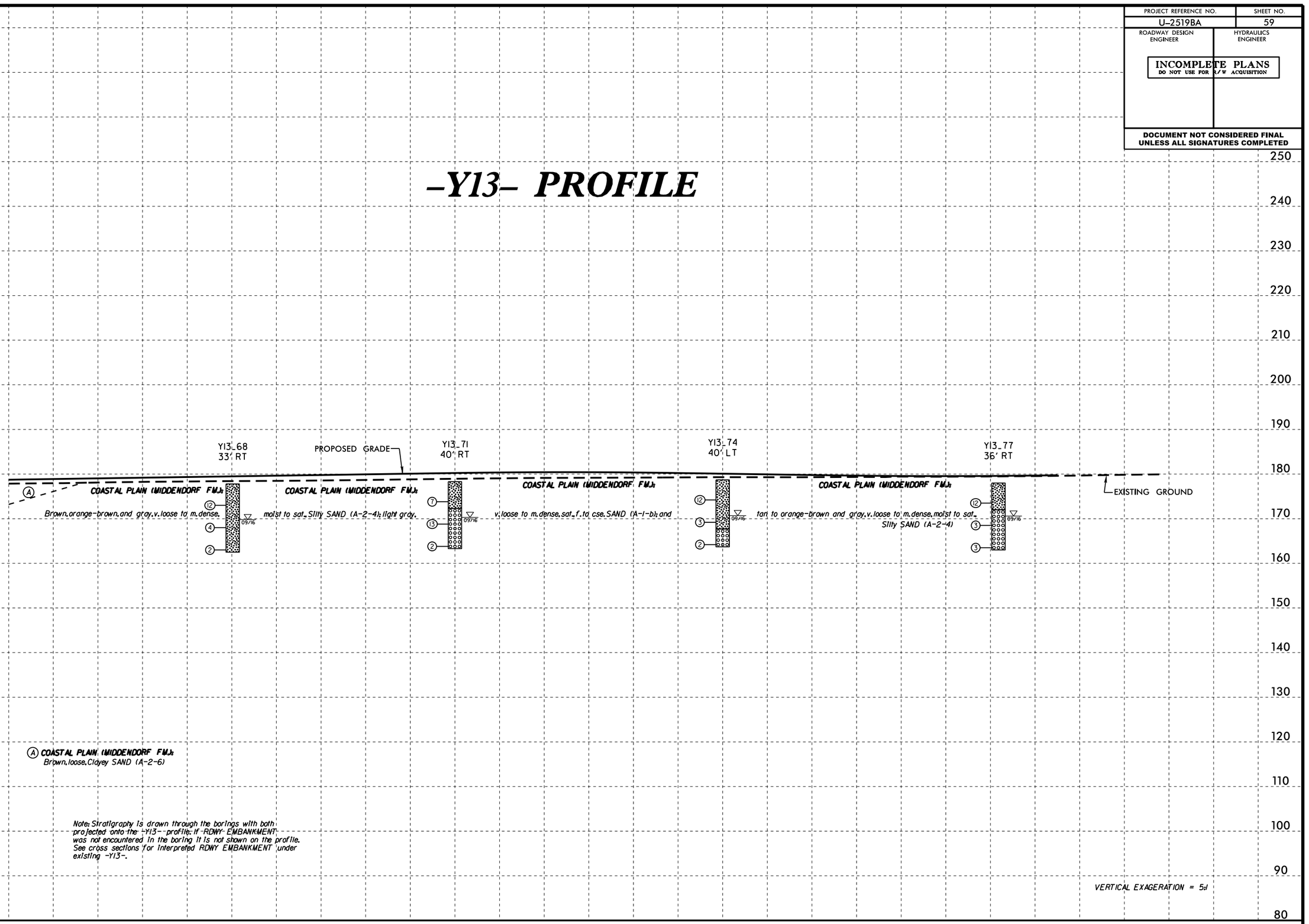


PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	59
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y13– PROFILE



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	60
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

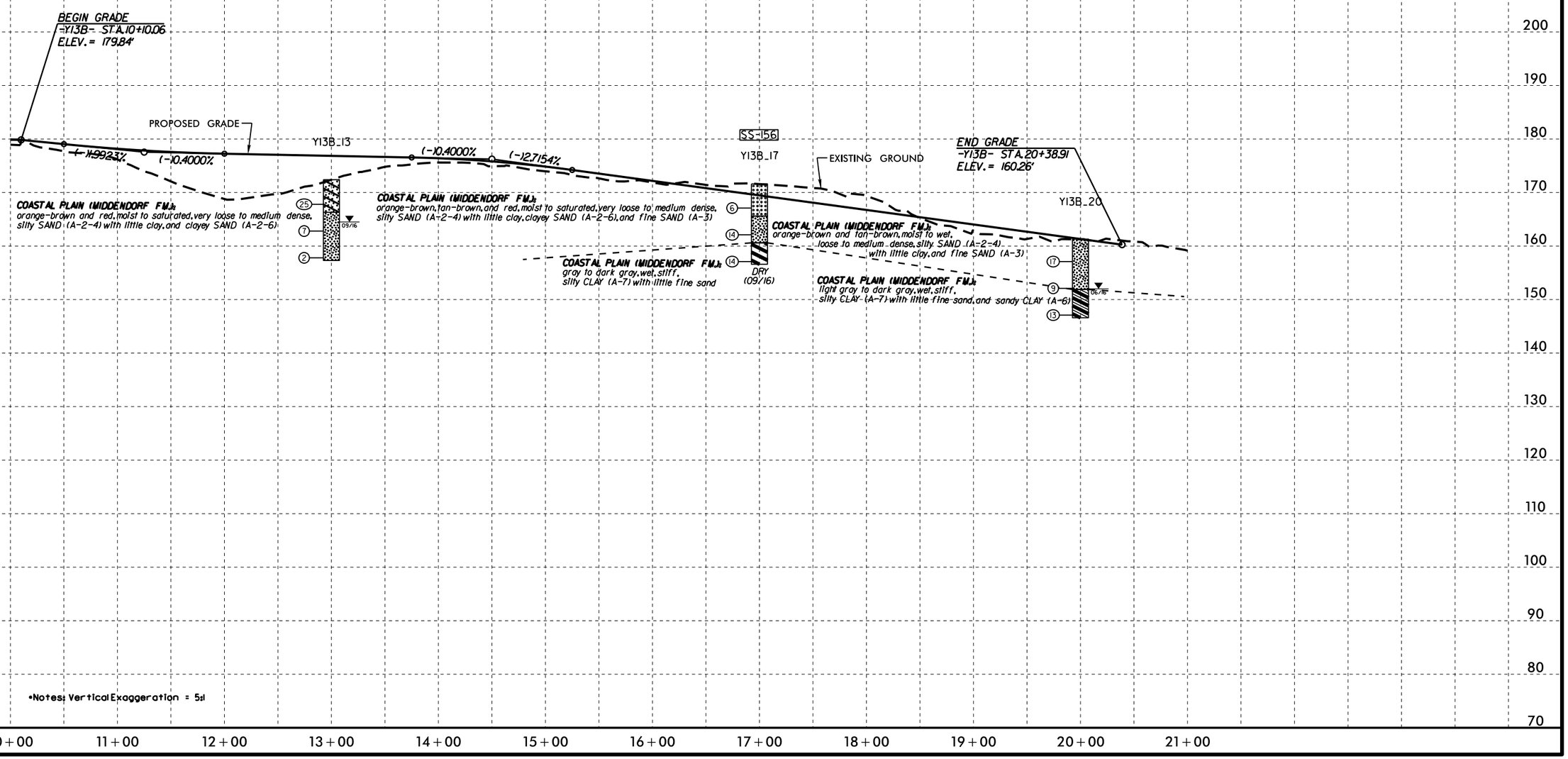
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13B- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-156	CL	17+00	8.5' - 10.0'	A-2-4	38	8	4.5	64.7	14.2	0.1	20.9	98	51	22	11.7	N/A



*Notes: Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	61
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

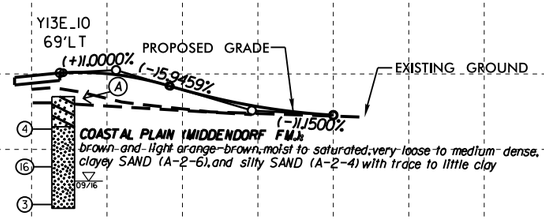
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13E- PROFILE

270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70

(A) **ROADWAY EMBANKMENT FILL:** brown, moist, loose, clayey SAND (A-2-6)



•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y13E- profile.
Vertical Exaggeration = 5H

10+00 11+00 12+00

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	62
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

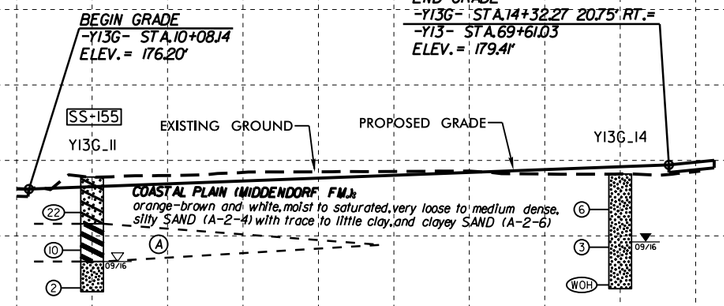
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y13G- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-155	CL	10+50	8.7' - 10.2'	A-7-5	46	15	3.8	0.9	7.8	27.5	63.8	100	99	95	27.6	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	63
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y13I– PROFILE

280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80

10+00 11+00 12+00 13+00 14+00

Y13I-10
21'LT

PROPOSED GRADE

EXISTING GROUND

(7) COASTAL PLAIN (MIDDENDORF FM.): tan-brown, moist, loose, fine SAND (A-3)

(8) COASTAL PLAIN (MIDDENDORF FM.): orange-brown and red, saturated, very loose, silty SAND (A-2-4) with little clay

08/16

(3) COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray, moist, stiff, sandy CLAY (A-6)

(A) COASTAL PLAIN (MIDDENDORF FM.): orange-brown and gray, moist, stiff, sandy CLAY (A-6)

•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y13I- profile.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	64
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

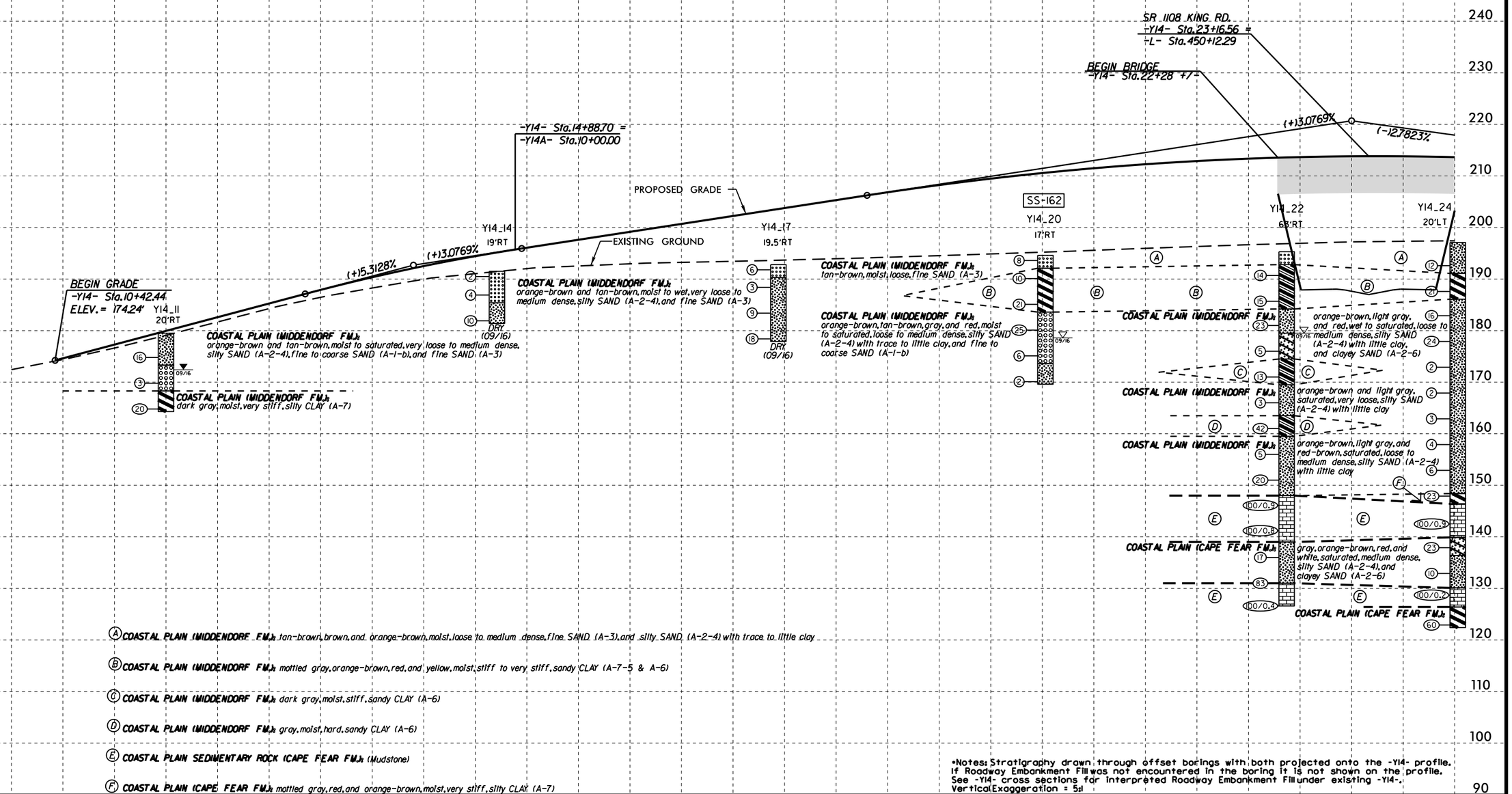
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y14– PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-162	17'RT	20+03	3.5' - 5.0'	A-7-5	45	19	5.0	34.5	24.9	4.5	36.1	98	79	44	17.9	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	65
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

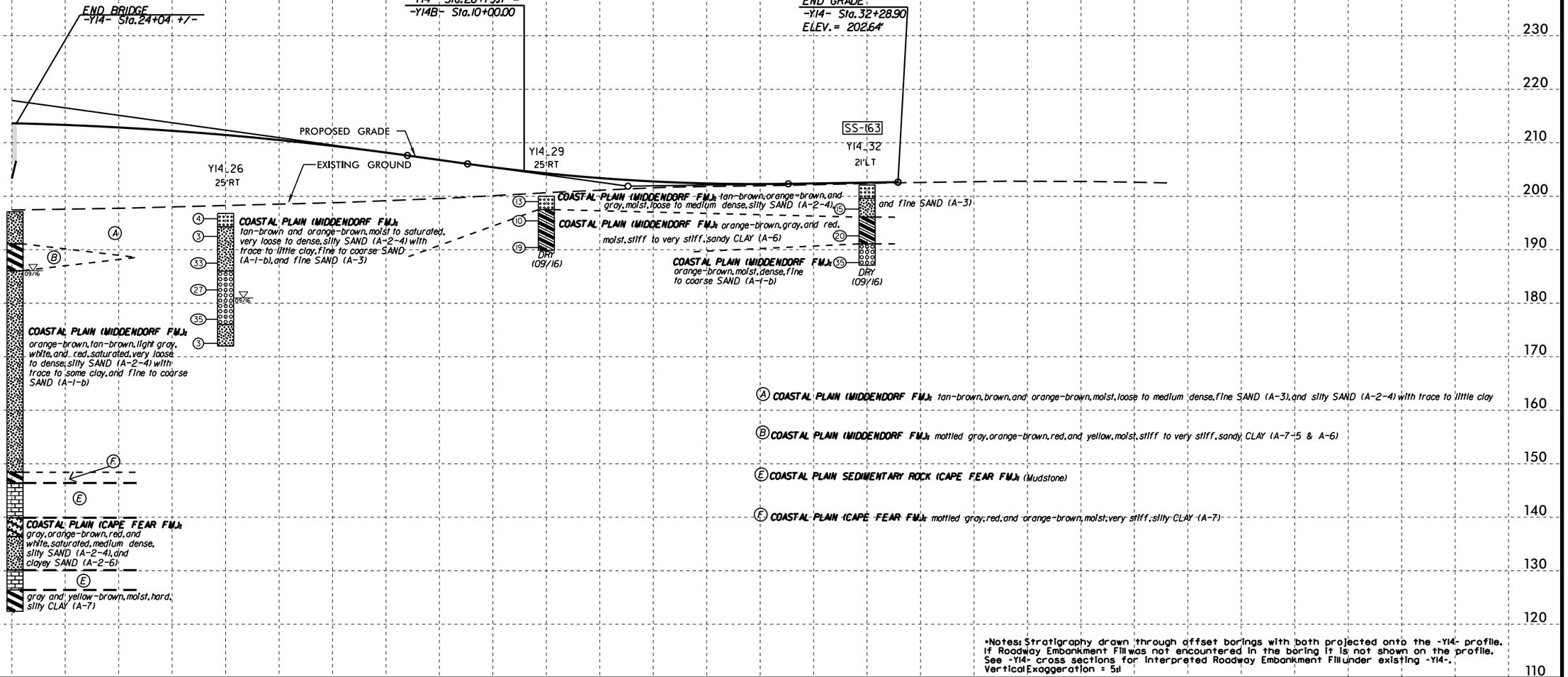
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y14- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-163	21'LT	32+00	3.5' - 5.0'	A-2-4	22	3	5.2	45.5	34.3	1.4	18.8	100	81	22	13.7	N/A



•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y14- profile. If Roadway Embankment Fill was not encountered in the boring it is not shown on the profile. See -Y14- cross sections for interpreted Roadway Embankment Fill under existing -Y14-.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	66
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

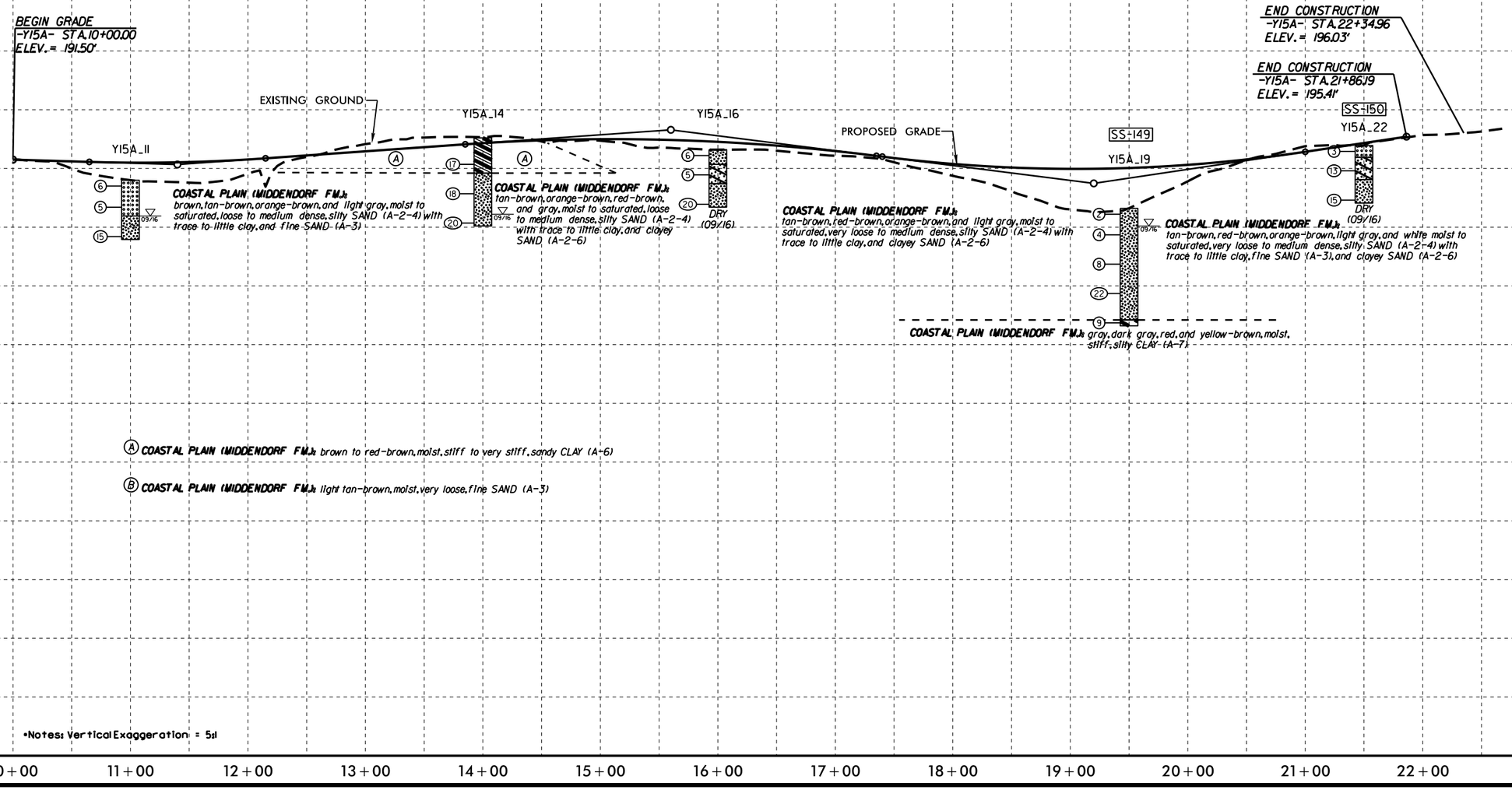
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y15A- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-149	CL	19+50	3.5' - 5.0'	A-2-4	21	2	5.8	49.5	36.6	0.0	14.0	100	71	15	17.9	N/A
SS-150	CL	21+50	3.3' - 4.8'	A-2-6	34	11	6.4	26.2	46.3	0.1	27.4	100	85	29	9.9	N/A



PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	67
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

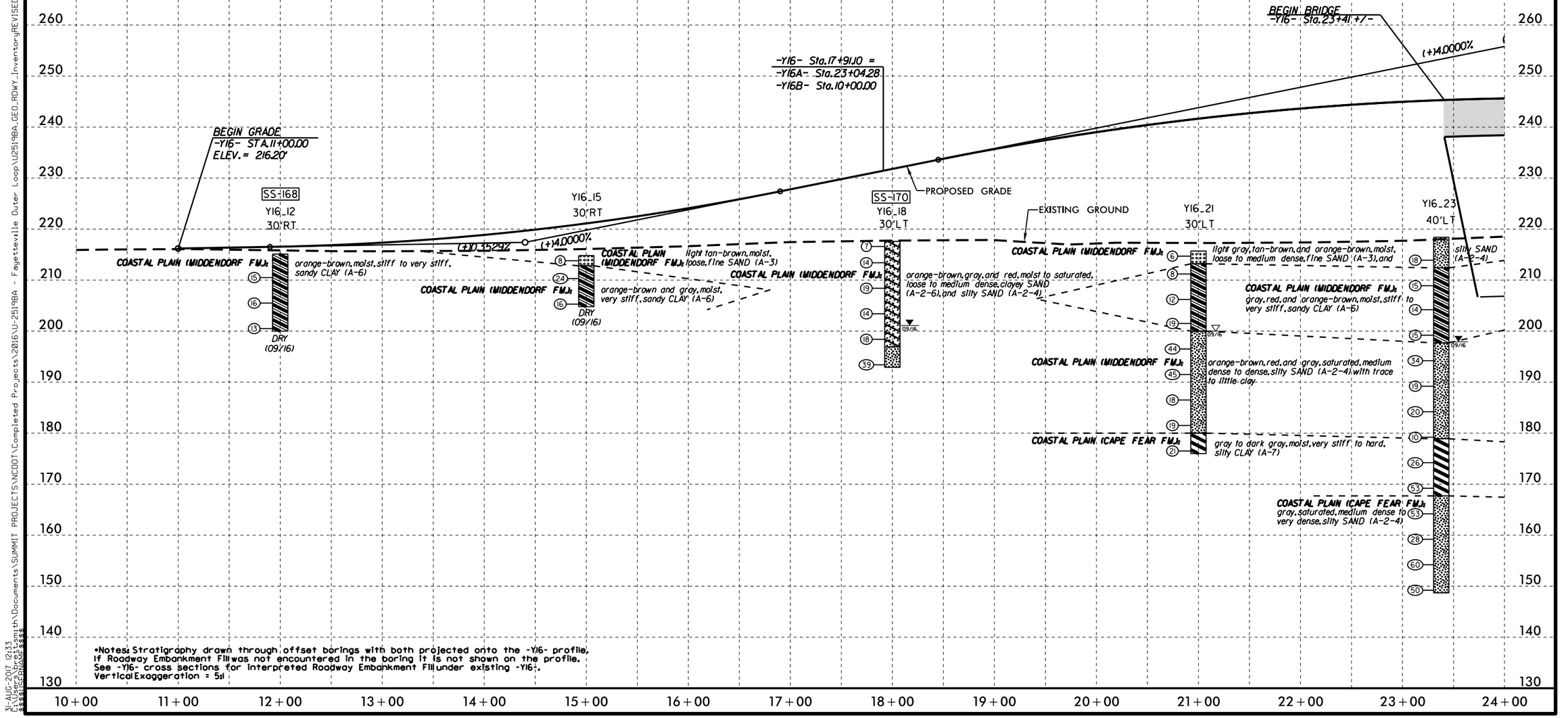
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y16- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			%	%
								C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-168	30'RT	12+00	3.6' - 5.1'	A-6	40	15	5.7	35.7	26.3	6.4	31.7	100	80	42	12.4	N/A
SS-170	30'LT	18+00	3.2' - 4.7'	A-2-6	36	13	5.3	40.6	31.6	0.0	27.9	100	80	31	15.0	N/A



•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y16- profile. If Roadway Embankment Fill was not encountered in the boring it is not shown on the profile. See -Y16- cross sections for interpreted Roadway Embankment Fill under existing -Y16-.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	68
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y16- PROFILE

SR 1112 STONEY POINT RD.
-Y16- Sta.24+41.38 =
-L- Sta.504+87.12

END BRIDGE
-Y16- Sta.25+41 +/-

+14.0000% (-14.0000%

PROPOSED GRADE

EXISTING GROUND

END GRADE
-Y16- STA.37+80.00
ELEV. = 217.39'

Y16_25
38'RT

Y16_28
30'LT

Y16_31
30'RT

Y16_34
30'RT

Y16_37
30'RT

COASTAL PLAIN (MIDDENDORF FM.): gray, orange-brown, and red, moist, stiff to very stiff, sandy CLAY (A-6).

COASTAL PLAIN (MIDDENDORF FM.): gray, red, and orange-brown, saturated, very loose to medium dense, clayey SAND (A-2-6), and silty SAND (A-2-4) with trace to little clay

COASTAL PLAIN (CAPE FEAR FM.): gray to dark gray, moist to wet, very stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FM.): gray, saturated, dense to very dense, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FM.): gray, saturated, medium dense to dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FM.): brown and gray, moist to wet, loose, fine SAND (A-3), silty SAND (A-2-4) with little clay, and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FM.): gray, orange-brown, and red, moist, stiff to very stiff, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FM.): red, light gray, and orange-brown, saturated, medium dense, silty SAND (A-2-4)

DRY (10/16)

•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y16- profile. If Roadway Embankment Fill was not encountered in the boring it is not shown on the profile. See -Y16- cross sections for interpreted Roadway Embankment Fill under existing -Y16-.
Vertical Exaggeration = 5:1

Ⓐ COASTAL PLAIN (MIDDENDORF FM.): tan-brown and orange-brown, moist, loose to medium dense, fine SAND (A-3), and silty SAND (A-2-4) with trace to little clay

Ⓑ COASTAL PLAIN (MIDDENDORF FM.): gray, orange-brown, and red, moist to wet, stiff, sandy CLAY (A-6)

Ⓒ COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FM.): (Sandstone)

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	69
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

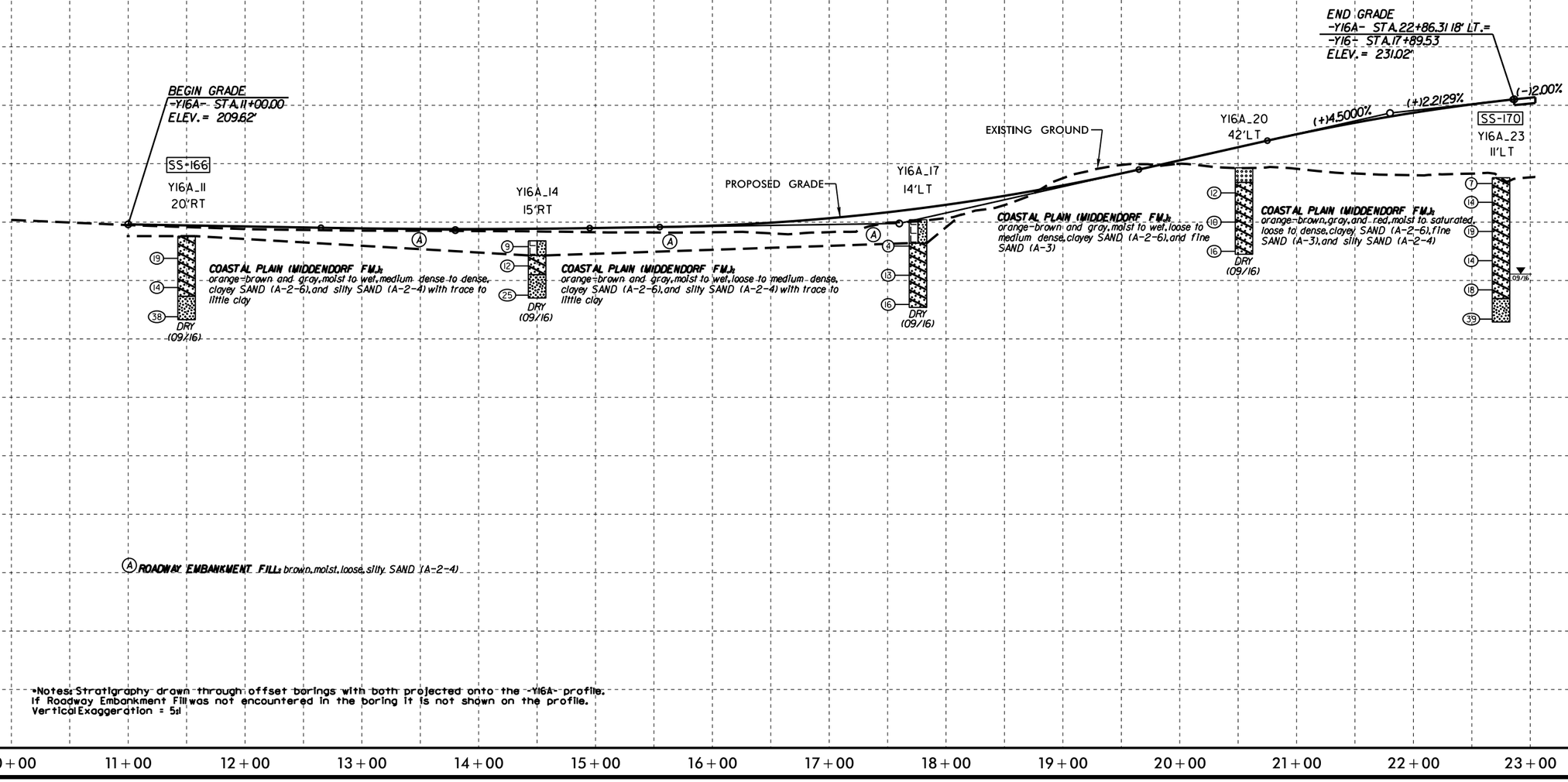
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y16A- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-166	20'RT	11+50	7.8' - 9.3'	A-2-6	31	12	5.1	42.2	29.7	4.4	23.7	100	77	33	17.5	N/A
SS-170	11'LT	22+75	3.2' - 4.7'	A-2-6	36	13	5.3	40.6	31.6	0.0	27.9	100	80	31	15.0	N/A



*Notes: Stratigraphy drawn through offset borings with both projected onto the -Y16A- profile.
If Roadway Embankment Fill was not encountered in the boring it is not shown on the profile.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	70
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

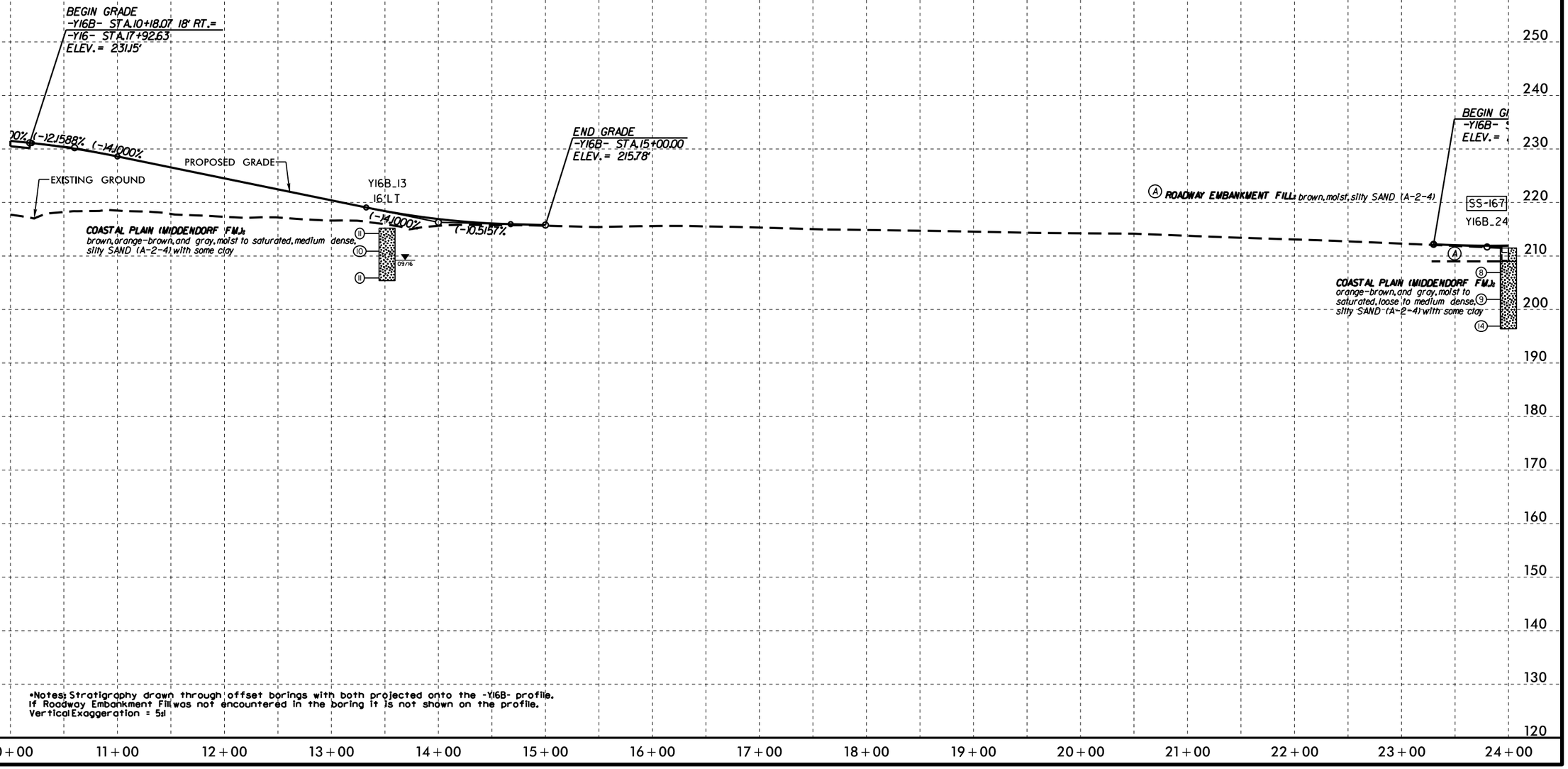
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y16B- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-167	CL	24+00	3.6' - 5.1'	A-2-4	24	6	5.4	44.0	29.7	2.8	23.5	100	78	29	12.7	N/A



•Notes: Stratigraphy drawn through offset borings with both projected onto the -Y16B- profile.
If Roadway Embankment Fill was not encountered in the boring it is not shown on the profile.
Vertical Exaggeration = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	71
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

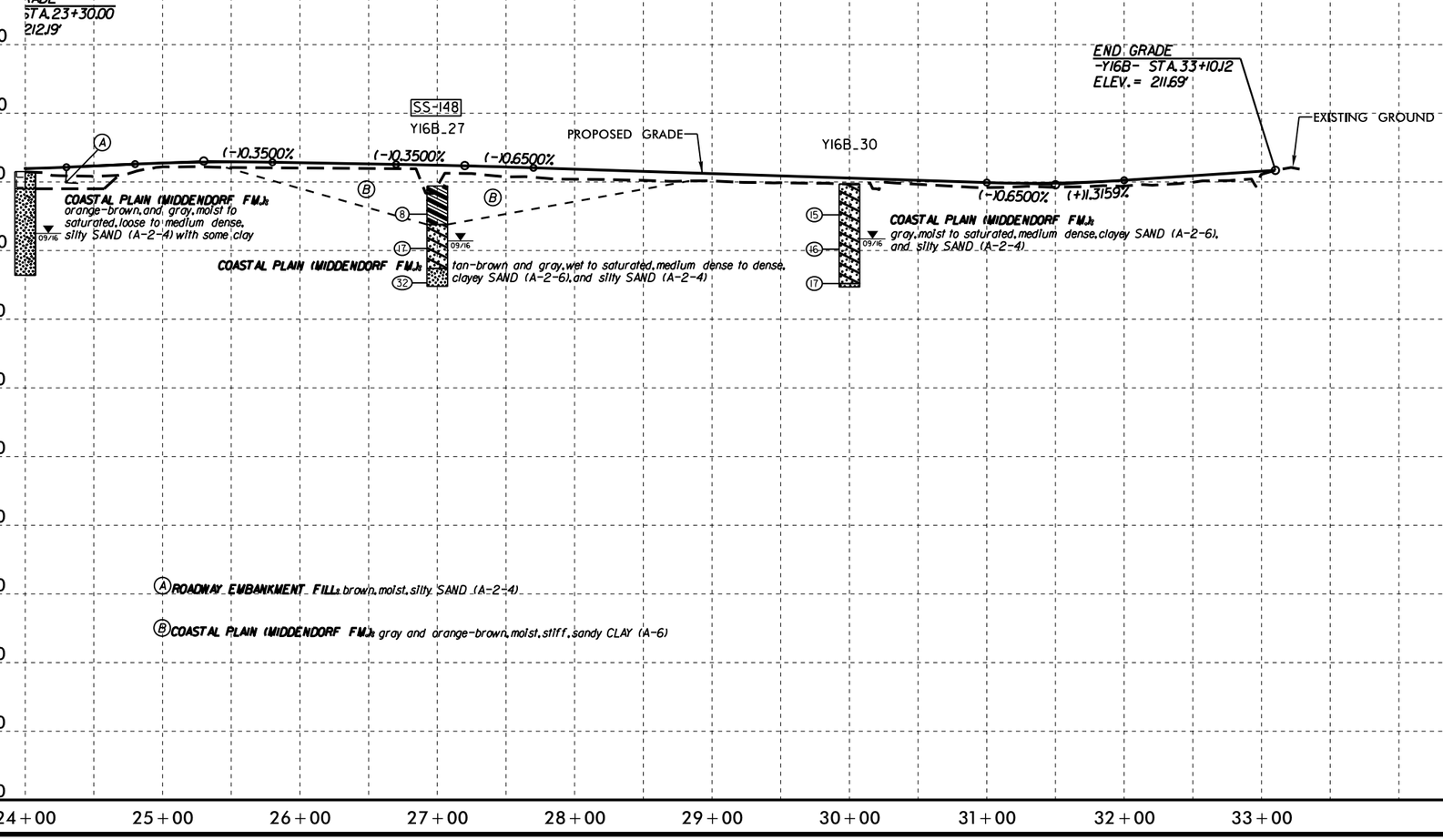
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

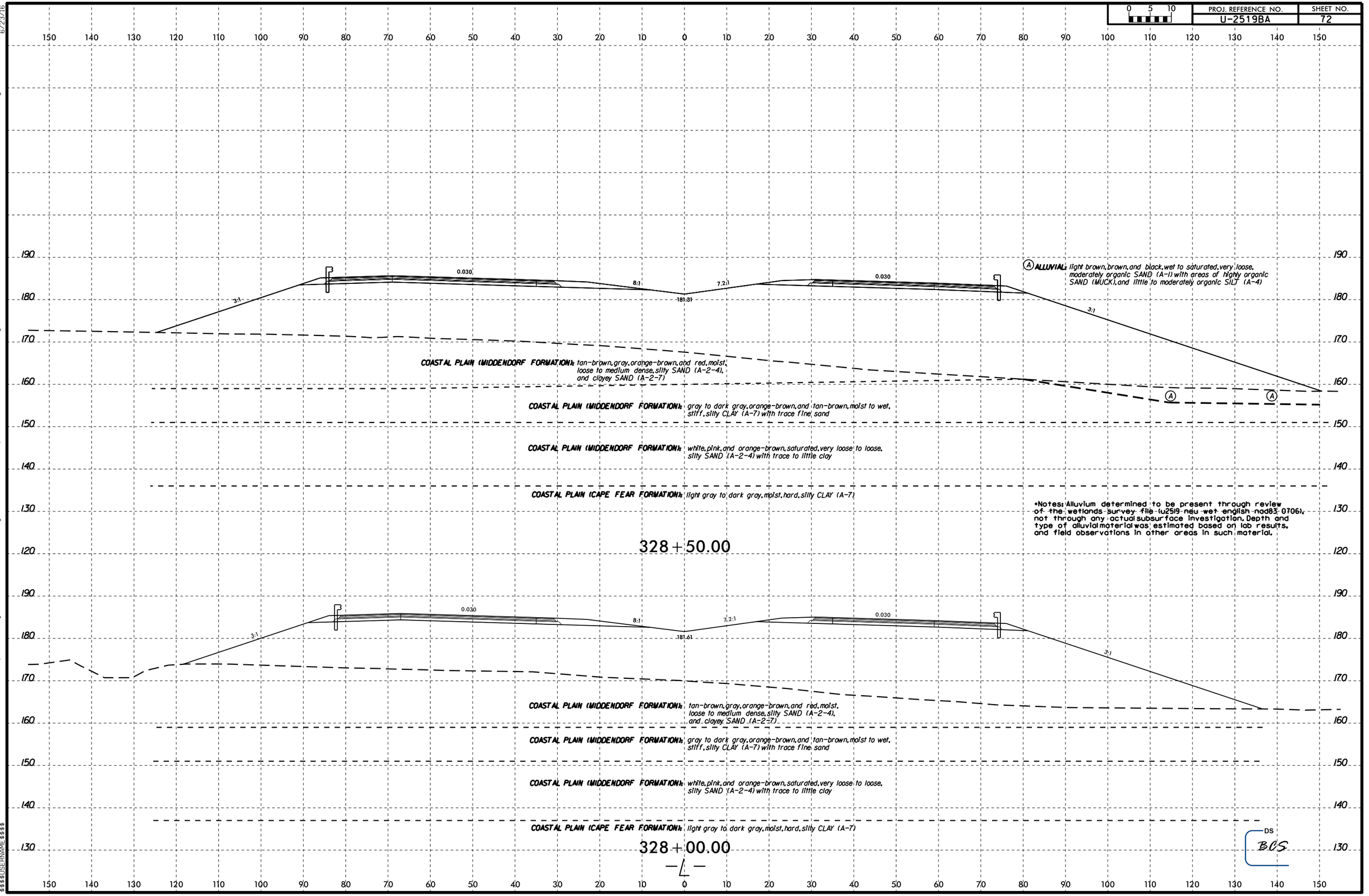
-Y16B- PROFILE

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-148	CL	27+00	3.1' - 4.6'	A-6	35	15	5.6	30.0	16.5	8.8	44.7	100	82	56	19.3	N/A

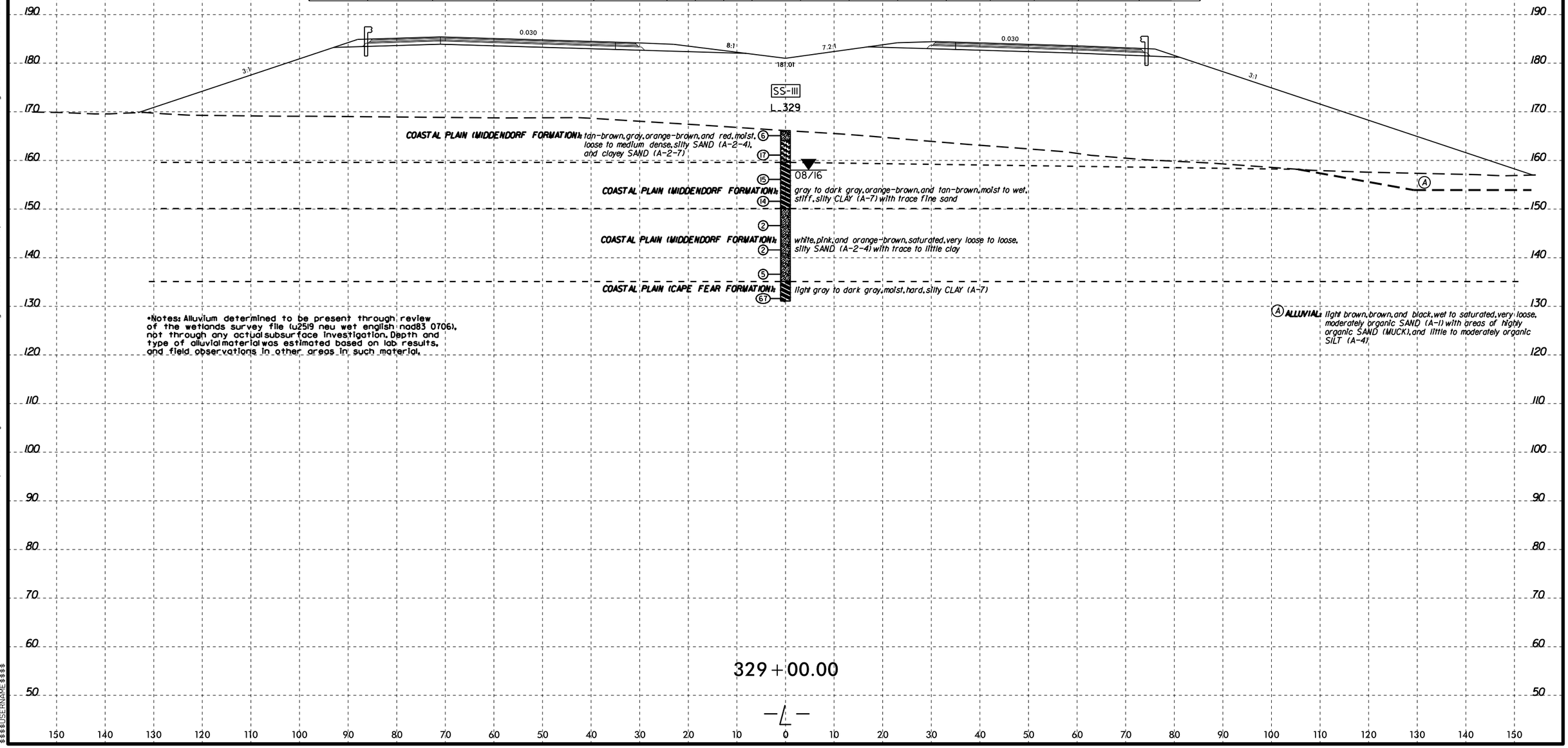


*Notes: Vertical Exaggeration = 5:1



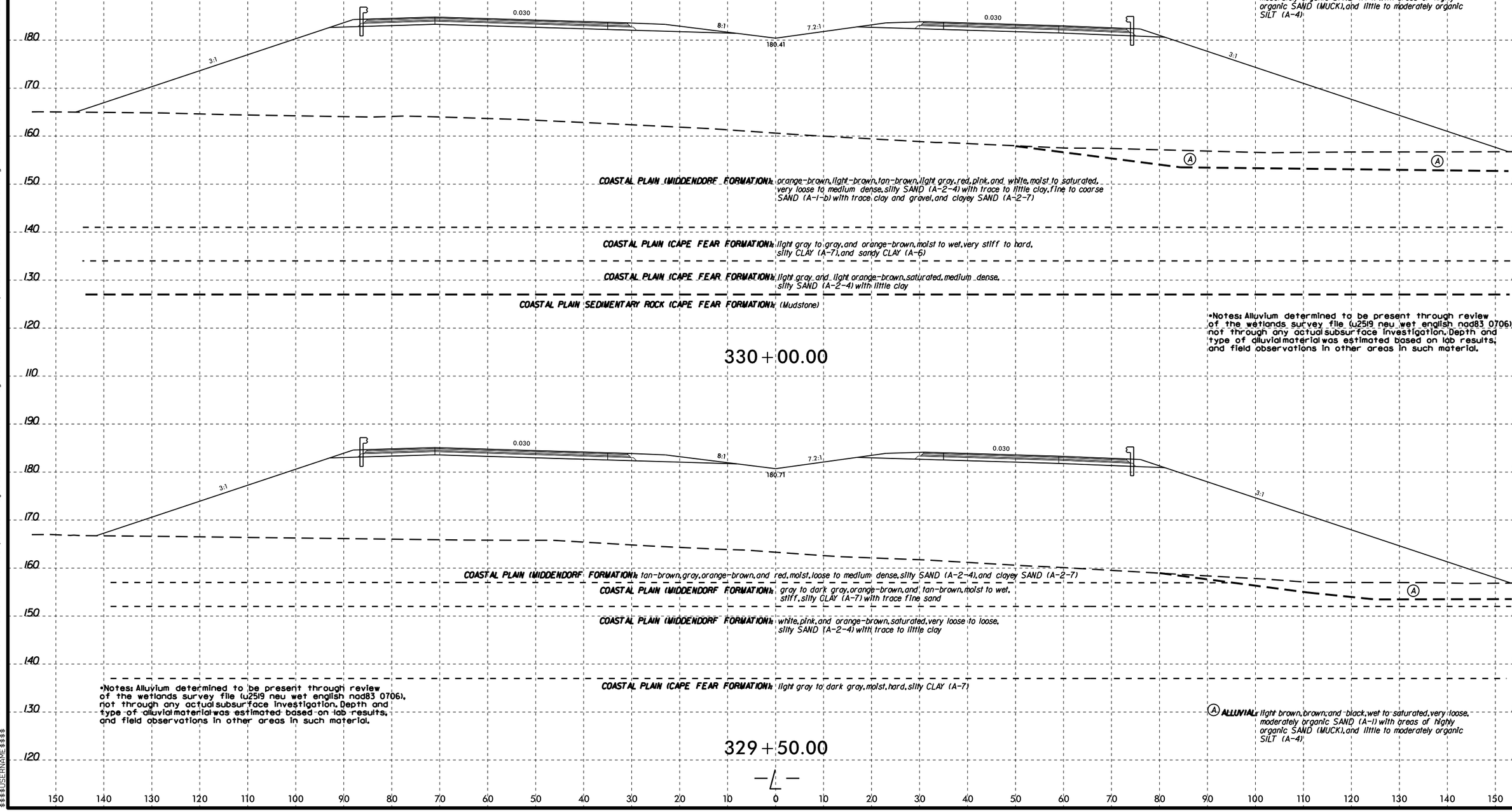
SOIL TEST RESULTS

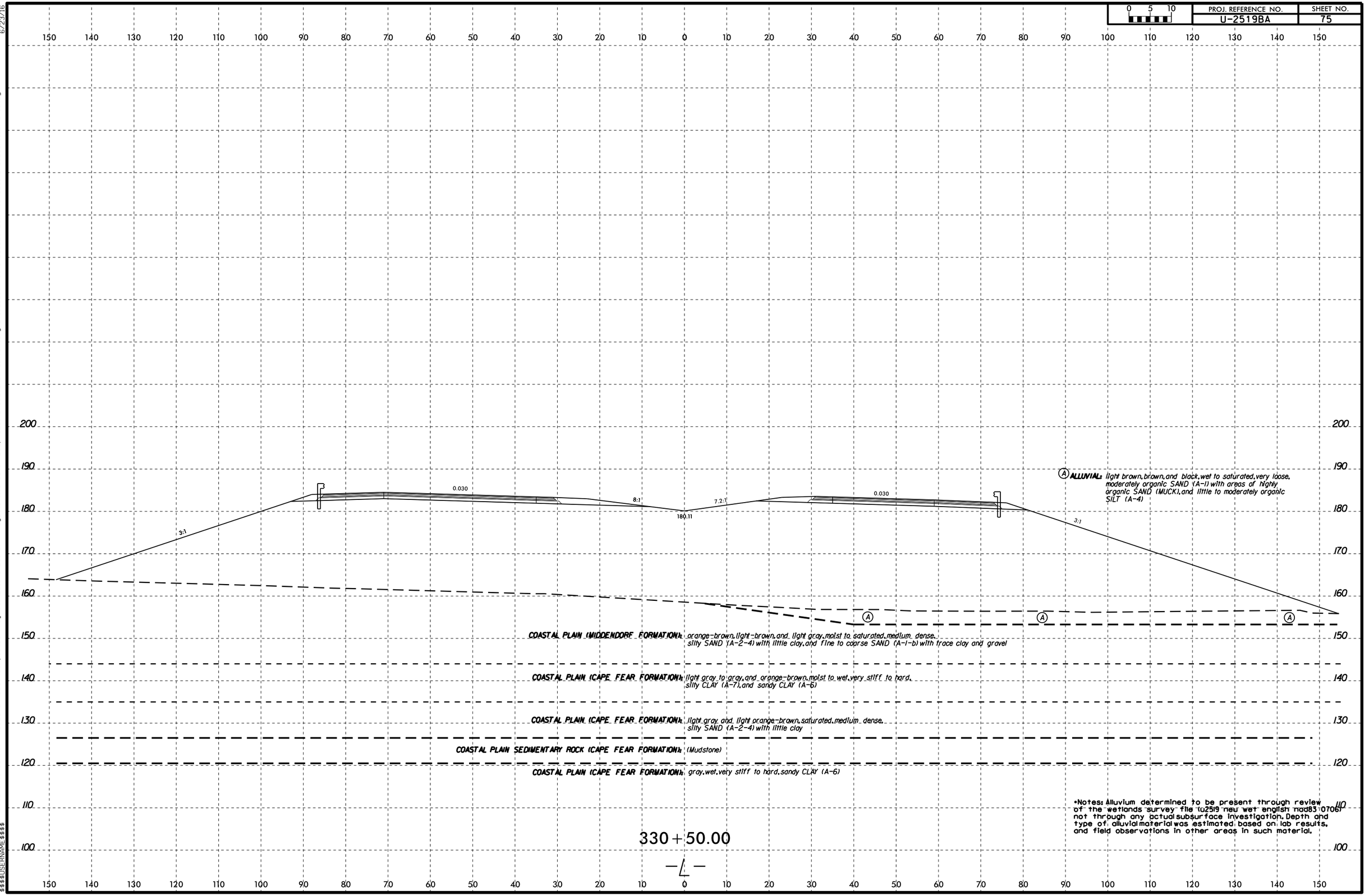
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-111	CL	329+00	4.0' - 5.5'	A-2-7	53	24	4.7	67.7	5.1	6.3	21.0	98	46	27	10.7	N/A



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

200 190 180 170 160 150 140 130 120 110





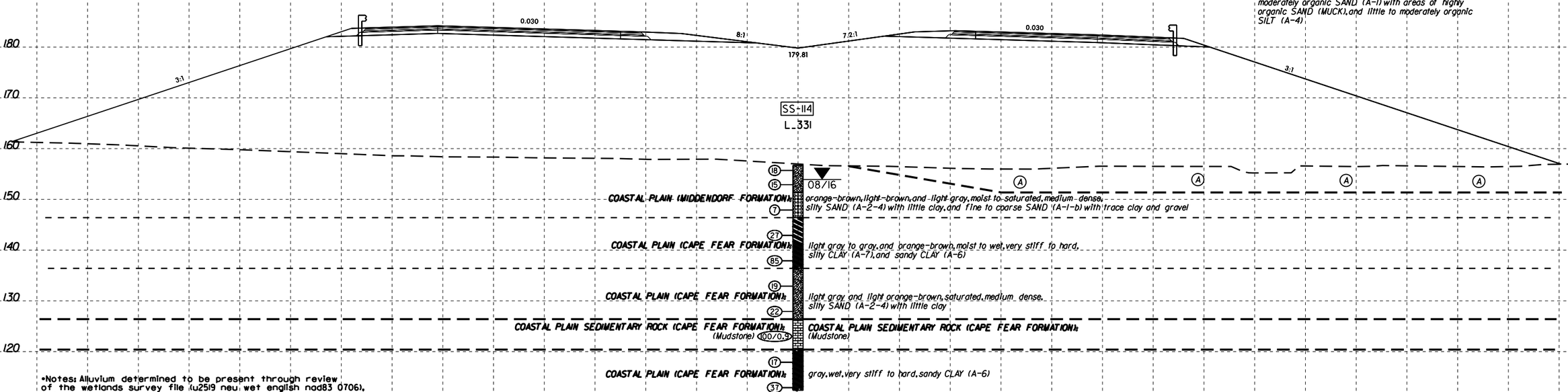
330+50.00

—L—

•Notes: Alluvium determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 07061) not through any actual subsurface investigation. Depth and type of alluvial material was estimated based on lab results, and field observations in other areas in such material.

SOIL TEST RESULTS

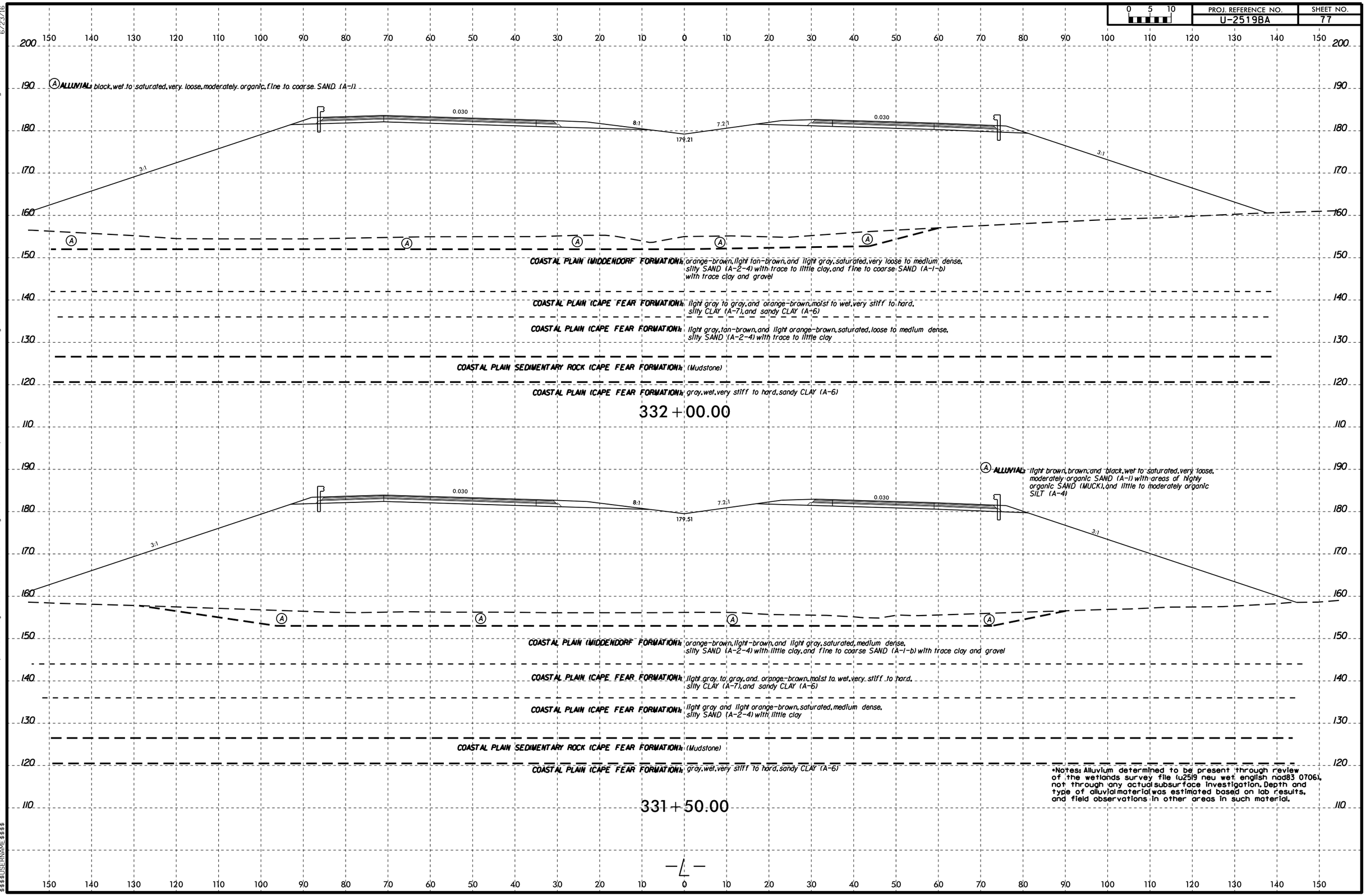
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-114	CL	331+00	2.8' - 4.3'	A-2-4	23	7	5.0	64.9	17.8	3.7	13.6	92	46	17	14.3	N/A

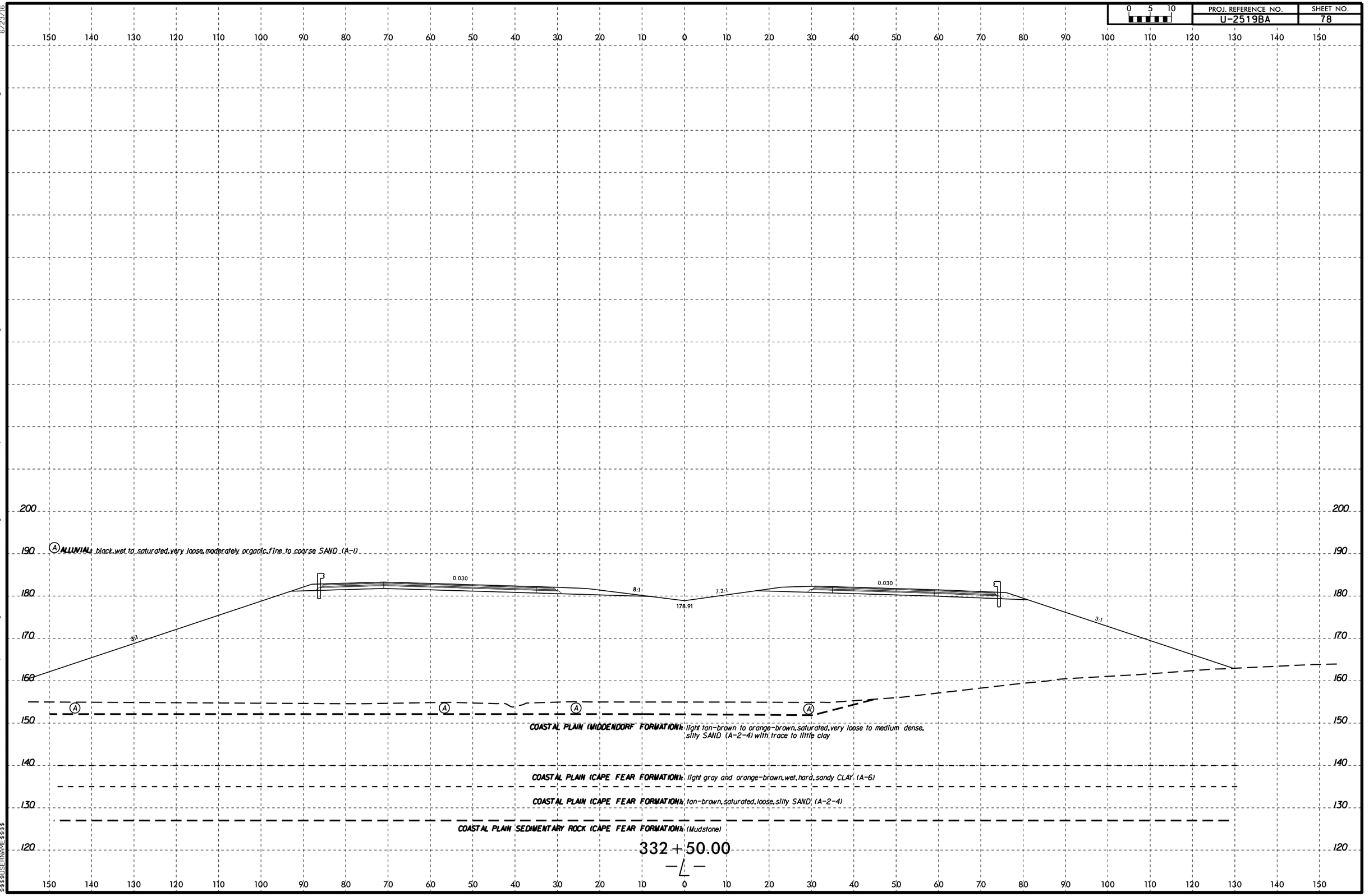


*Notes: Alluvium determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706), not through any actual subsurface investigation. Depth and type of alluvial material was estimated based on lab results, and field observations in other areas in such material.

331+00.00

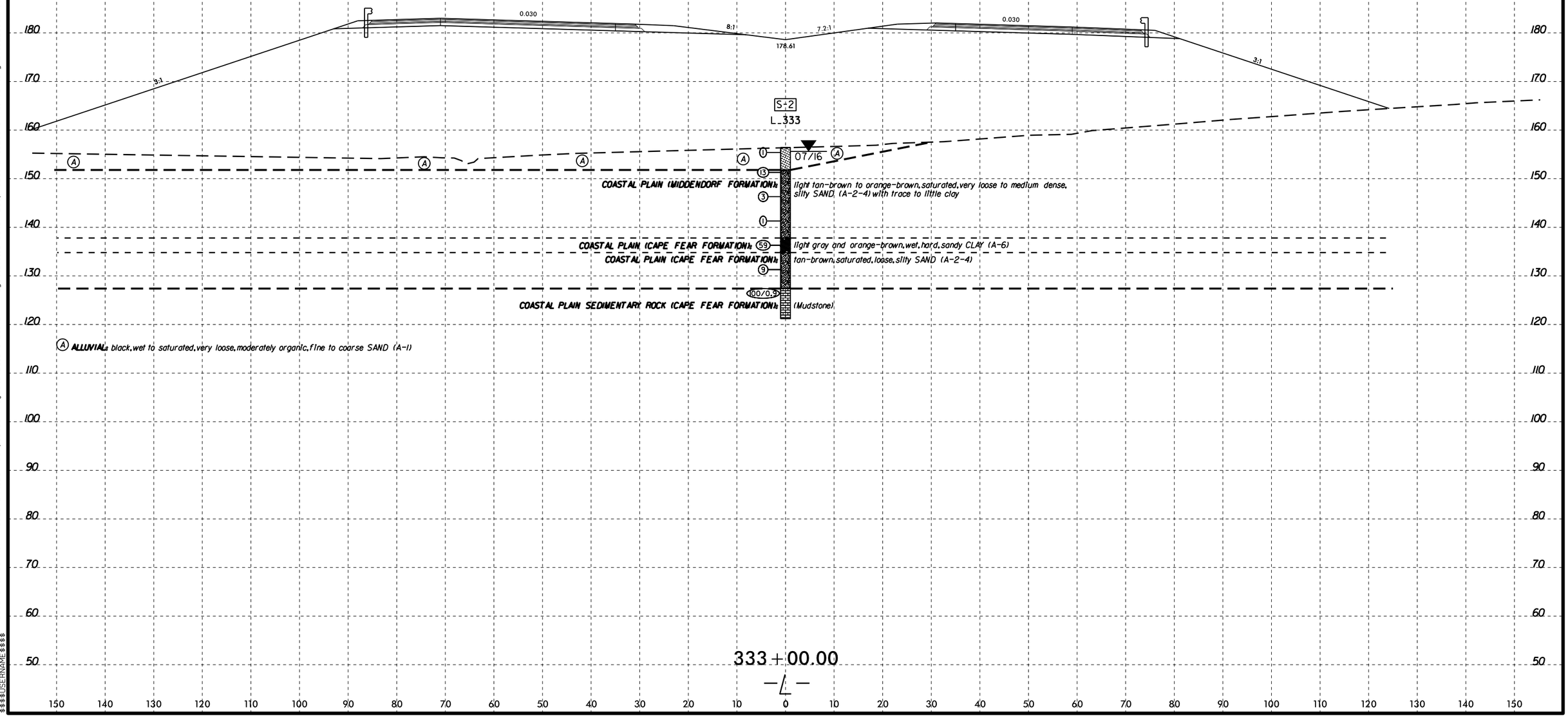
—L—





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		
S-2	CL	333+00	0.0' - 4.0'	A-1-b	57	NP	85.0	9.3	3.7	2.0	98	30	6	N/A	6.0



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

190 180 170 160 150 140 130 120

Ⓐ **ALLUVIAL:** black, wet to saturated, very loose, moderately organic, fine to coarse SAND (A-1)

0.030 8:1 7.2:1 0.030 3:1 3:1

178.01

COASTAL PLAIN (MIDDENDORF FORMATION): light tan-brown to orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay

COASTAL PLAIN (CAPE FEAR FORMATION): light gray and orange-brown, wet, hard, sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): tan-brown, saturated, loose, silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

334+00.00

Ⓐ **ALLUVIAL:** black, wet to saturated, very loose, moderately organic, fine to coarse SAND (A-1)

0.030 8:1 7.2:1 0.030 3:1 3:1

178.31

COASTAL PLAIN (MIDDENDORF FORMATION): light tan-brown to orange-brown, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay

COASTAL PLAIN (CAPE FEAR FORMATION): light gray and orange-brown, wet, hard, sandy CLAY (A-6)

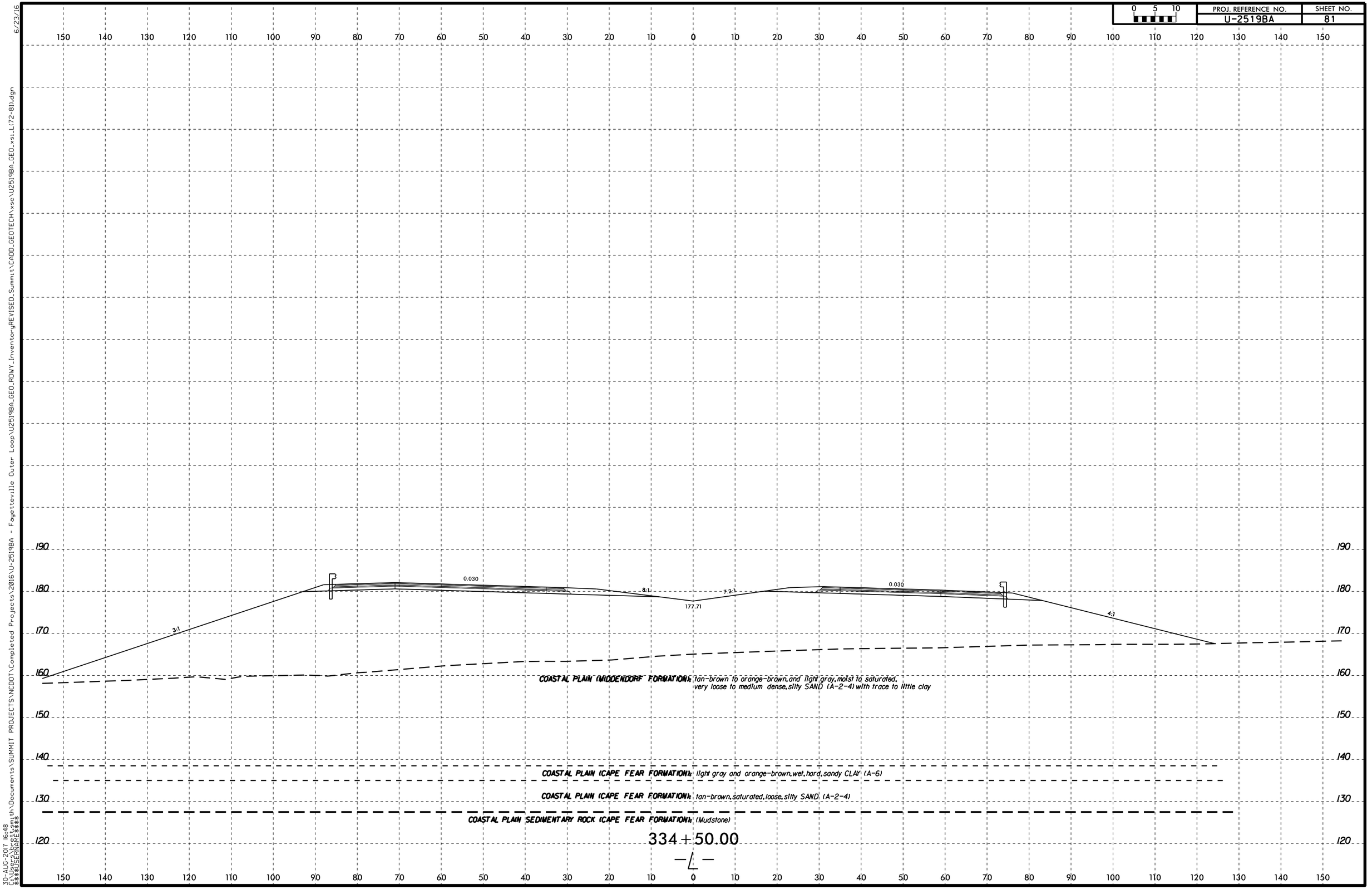
COASTAL PLAIN (CAPE FEAR FORMATION): tan-brown, saturated, loose, silty SAND (A-2-4)

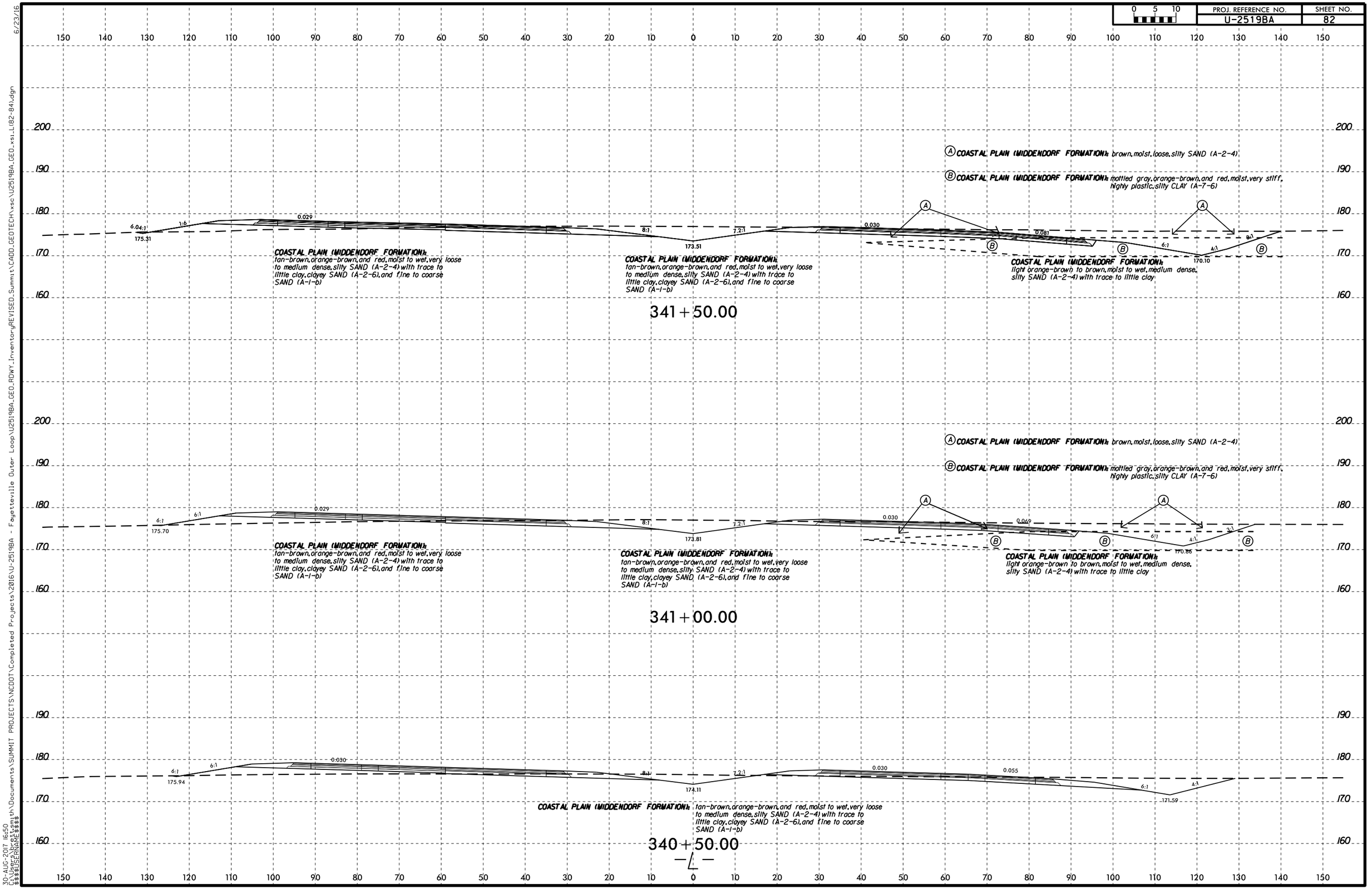
COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

333+50.00

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

190 180 170 160 150 140 130 120





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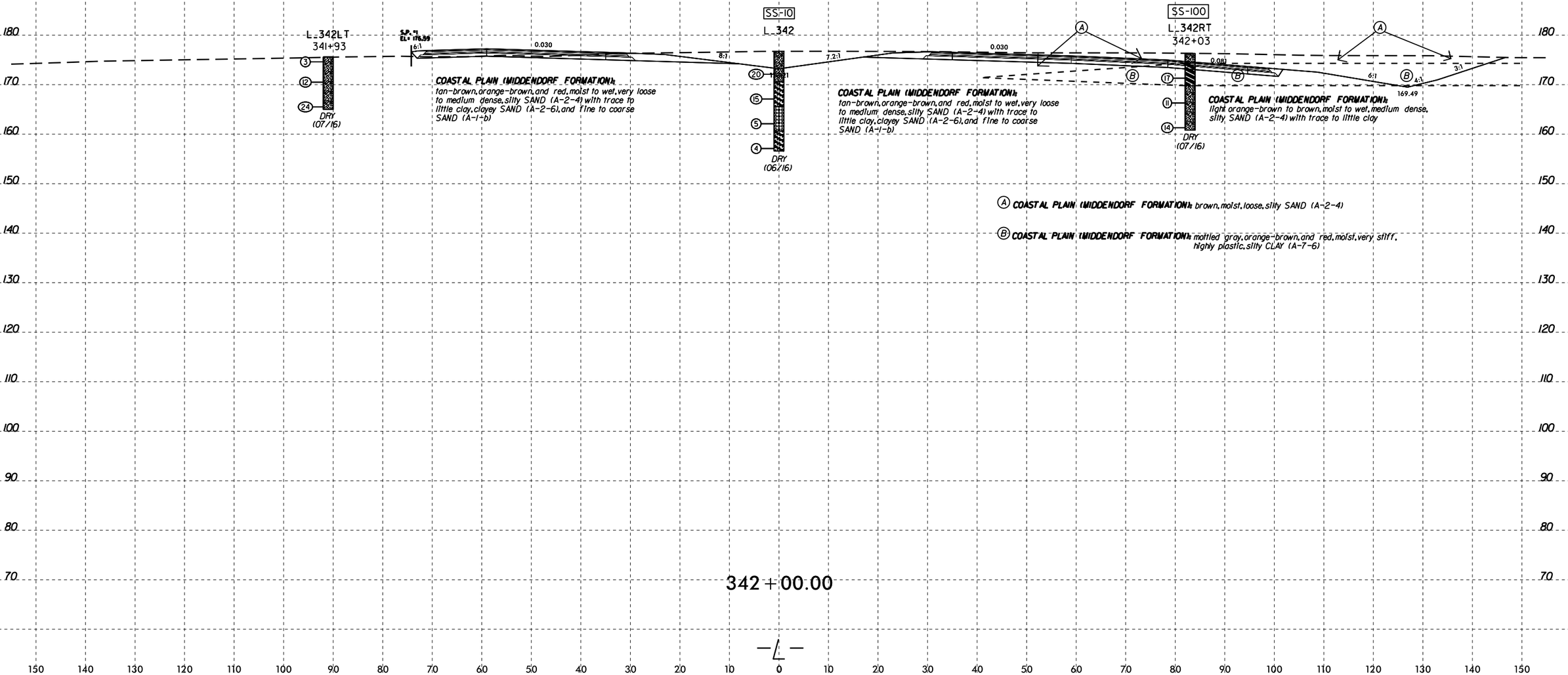
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	CL	342+00	8.6' – 10.1'	A-2-6	36	14	5.0	53.2	17.9	3.1	25.8	100	75	30	15.1	N/A
SS-100	83'RT	342+03	4.0' – 5.5'	A-7-6	55	28	4.6	7.2	10.7	21.6	60.5	99	95	86	17.7	N/A



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

190
180
170
160

S.P. #3
EL= 175.05
6:1 6:1
0.029
8:1
7:22:1
0.029
0.081
6:1
4:1
3:1
172.61
168.16

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown, orange-brown, and red, moist to wet, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown, orange-brown, and red, moist to wet, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FORMATION): light orange-brown to brown, moist to wet, medium dense, silty SAND (A-2-4) with trace to little clay

343+00.00

200
190
180
170
160

S.P. #2
EL= 175.82
6:1 6:1
0.030
8:1
7.2:1
0.030
0.081
6:1
4:1
3:1
172.91
168.86

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown, orange-brown, and red, moist to wet, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown, orange-brown, and red, moist to wet, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (MIDDENDORF FORMATION): light orange-brown to brown, moist to wet, medium dense, silty SAND (A-2-4) with trace to little clay

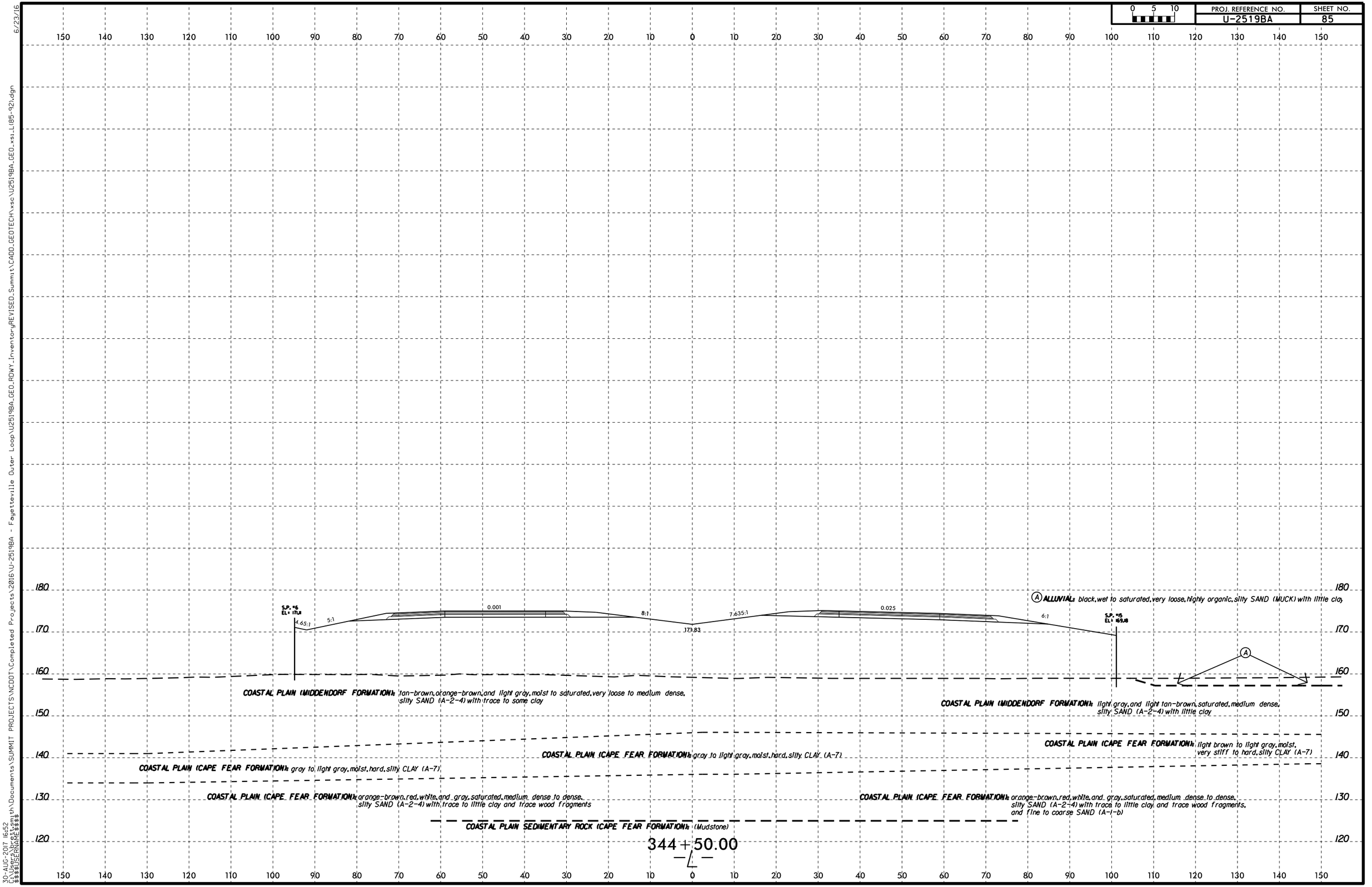
(A) **COASTAL PLAIN (MIDDENDORF FORMATION):** brown, moist, loose, silty SAND (A-2-4)

(B) **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray, orange-brown, and red, moist, very stiff, highly plastic, silty CLAY (A-7-6)

342+50.00

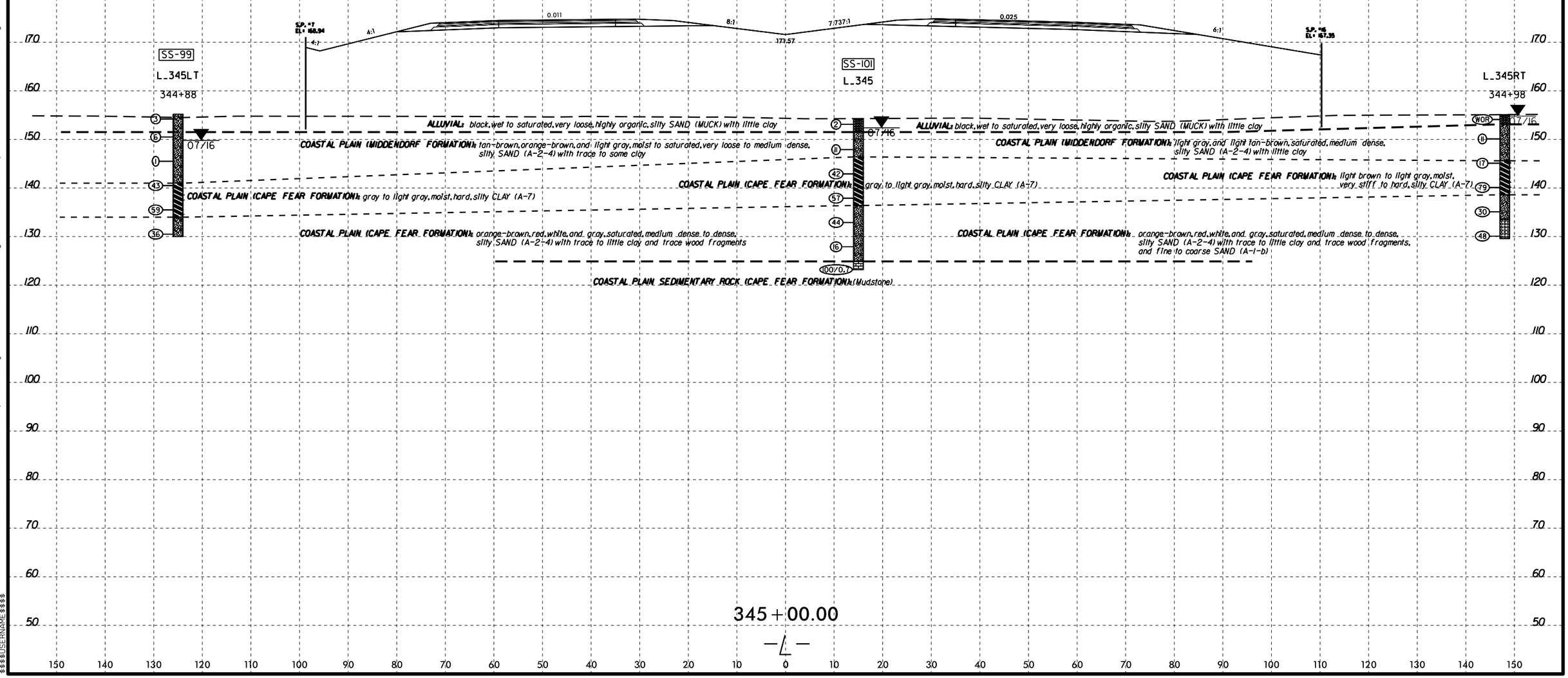
—L—

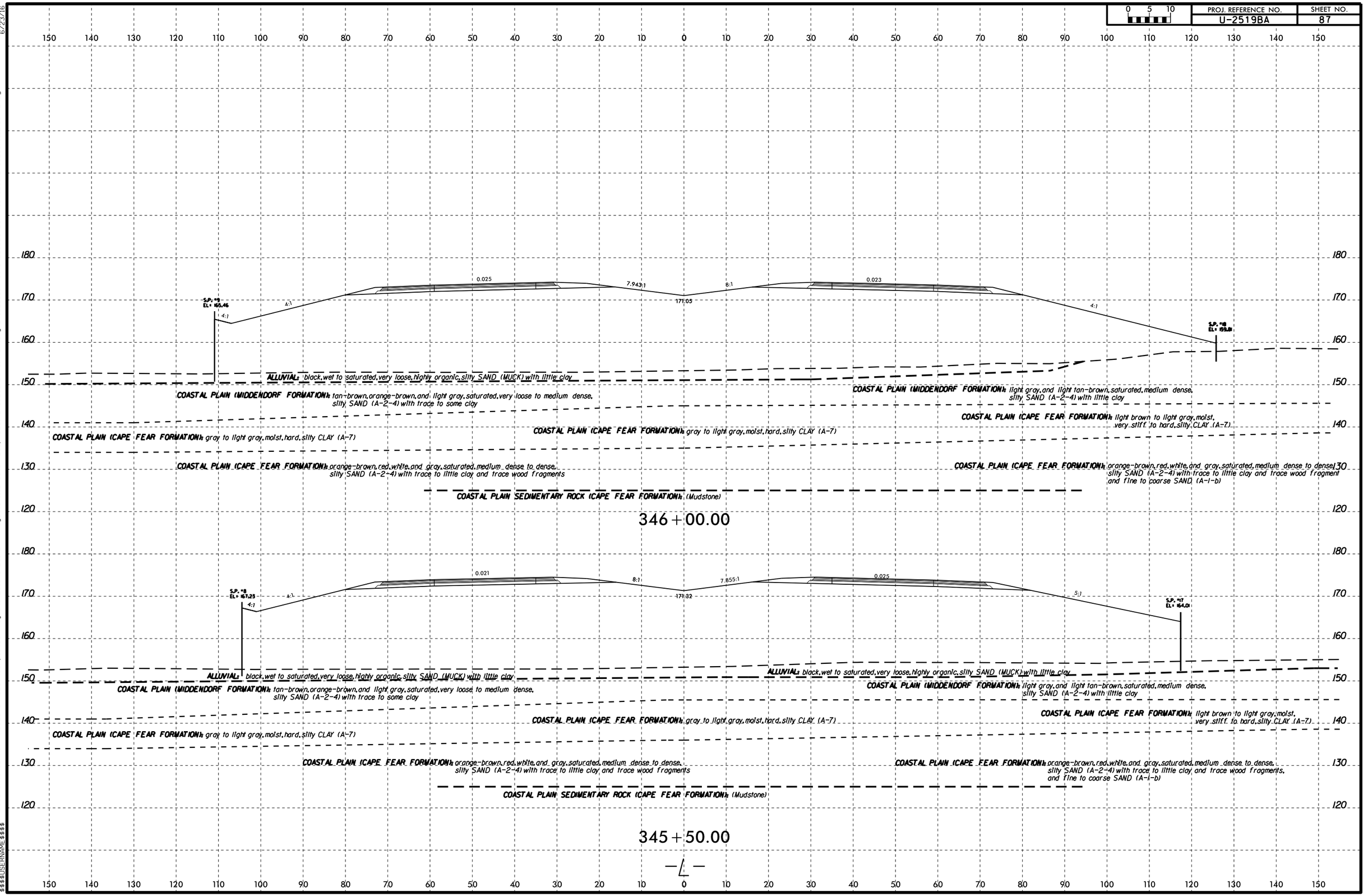
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

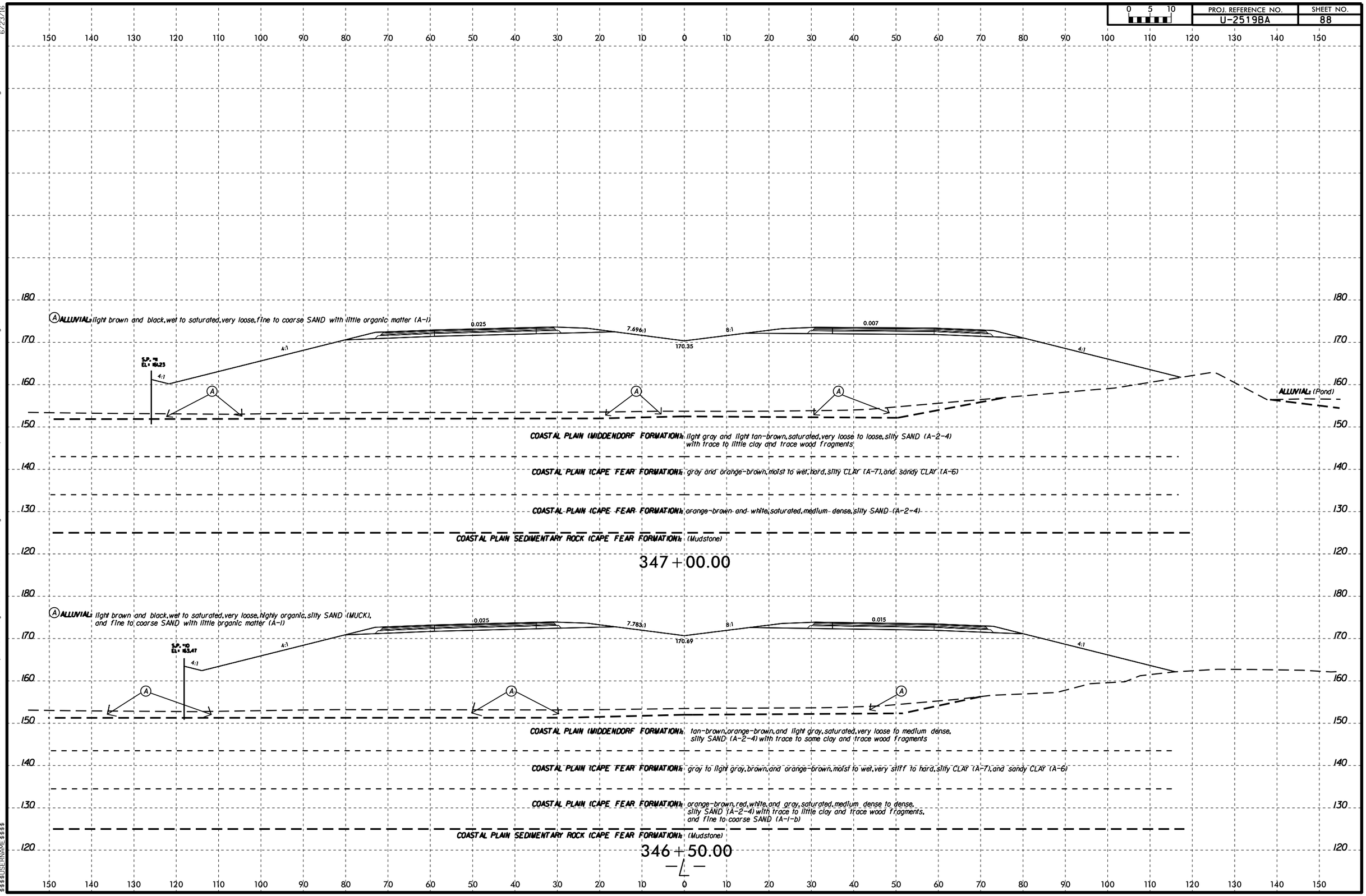


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-99	125'LT	344+88	3.7' - 5.2'	A-2-4	22	1	5.2	48.3	28.7	0.2	22.8	100	82	24	17.8	N/A
SS-101	15'RT	345+00	5.2' - 6.7'	A-2-4	19	4	4.7	61.8	21.8	0.8	15.6	95	57	17	16.4	N/A







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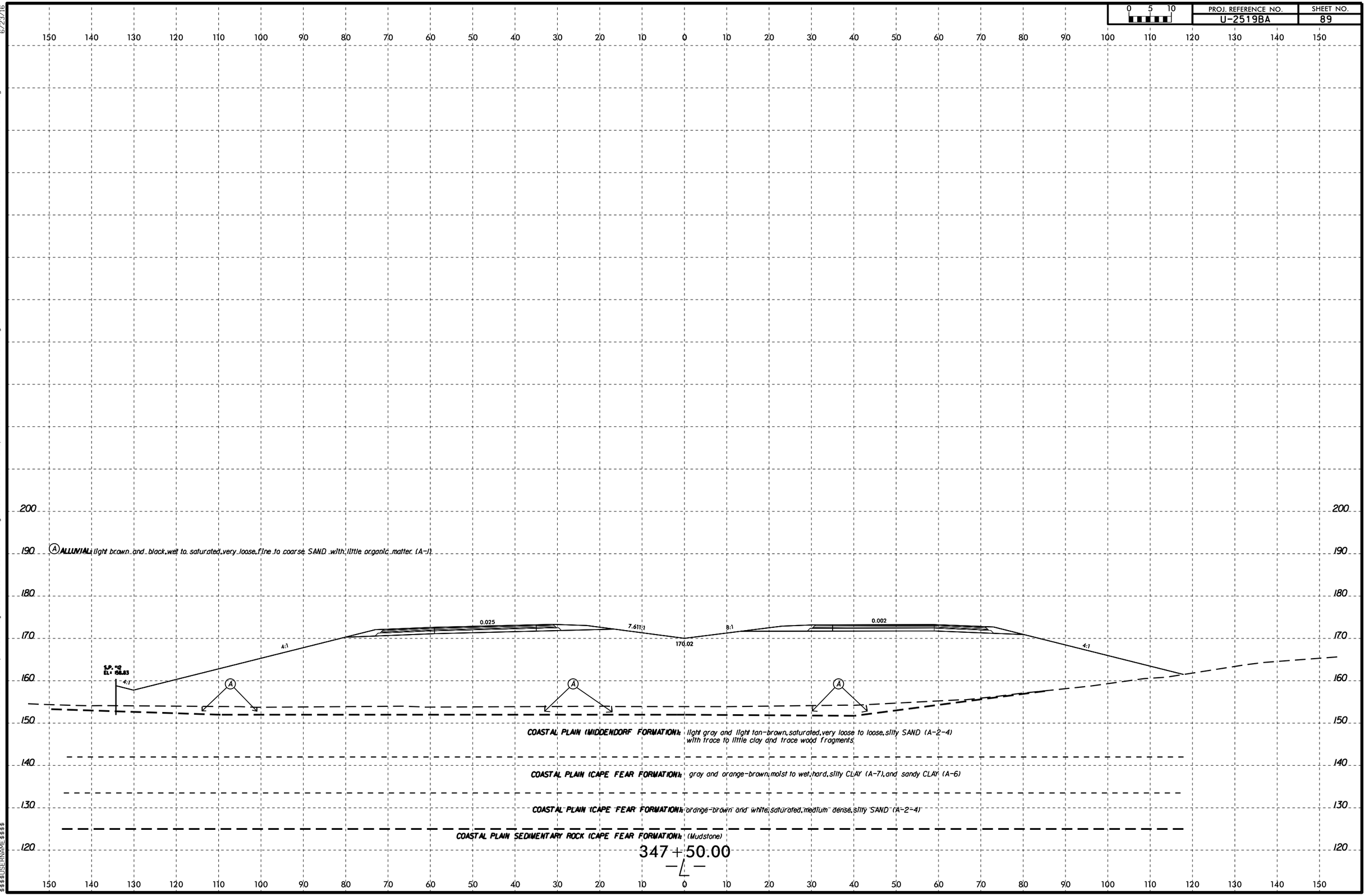

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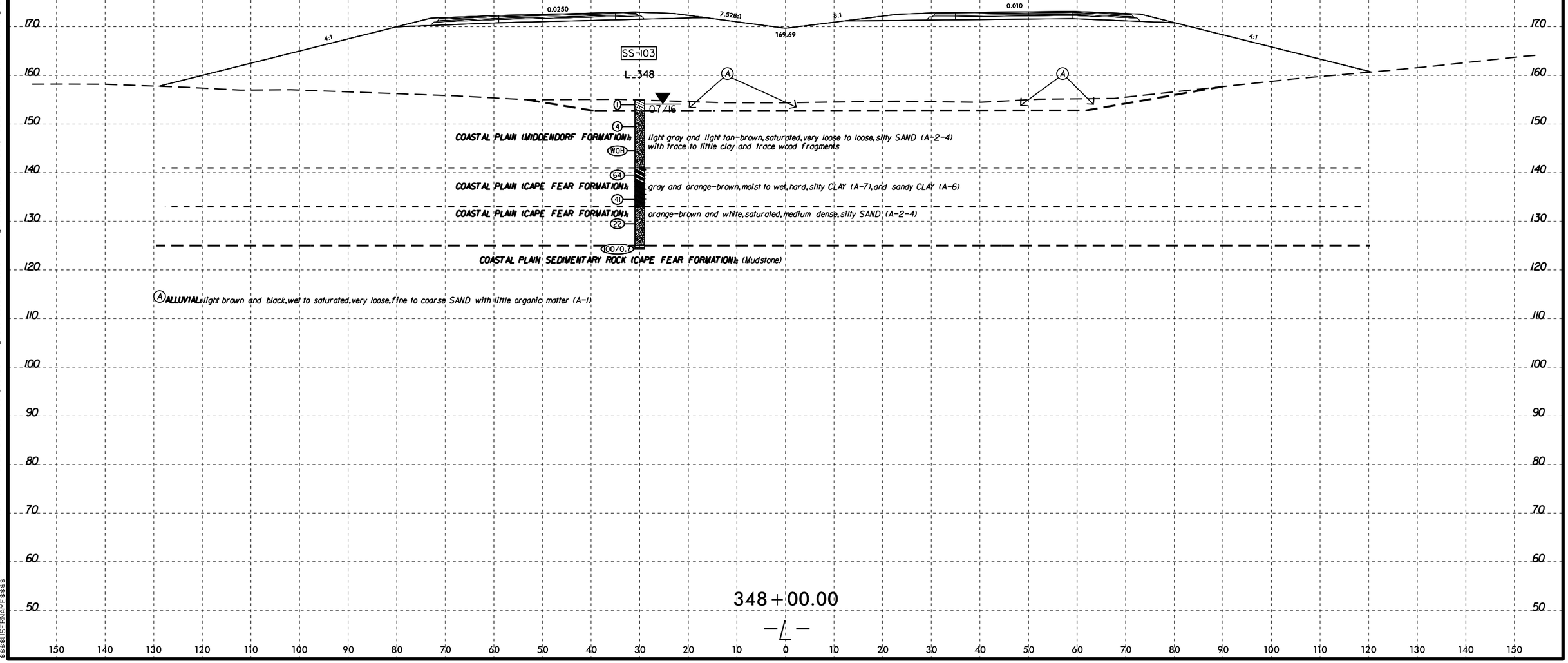
SOIL TEST RESULTS

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-103	30'LT	348+00	0.0' - 1.5'	A-1-b	38	NP	79.8	12.9	3.3	4.0	95	39	8	N/A	3.8



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

190 180 170 160 150 140 130 120

Ⓐ **ALLUVIAL:** light brown and black,wet to saturated,very loose,fine to coarse SAND with little organic matter (A-1)

4:1 | 0.025 | 7.38:1 | 169.03 | 8:1 | 0.025 | 4:1

COASTAL PLAIN (MIDDENDORF FORMATION): light gray and light tan-brown,saturated,very loose to loose,silty SAND (A-2-4) with trace to little clay and trace wood fragments

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown,moist to wet,hard,silty CLAY (A-7),and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): orange-brown and white,saturated,medium dense,silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

349+00.00

Ⓐ **ALLUVIAL:** light brown and black,wet to saturated,very loose,fine to coarse SAND with little organic matter (A-1)

4:1 | 0.025 | 7.447:1 | 169.35 | 8:1 | 0.018 | 4:1

COASTAL PLAIN (MIDDENDORF FORMATION): light gray and light tan-brown,saturated,very loose to loose,silty SAND (A-2-4) with trace to little clay and trace wood fragments

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown,moist to wet,hard,silty CLAY (A-7),and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): orange-brown and white,saturated,medium dense,silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

348+50.00

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

6/23/16

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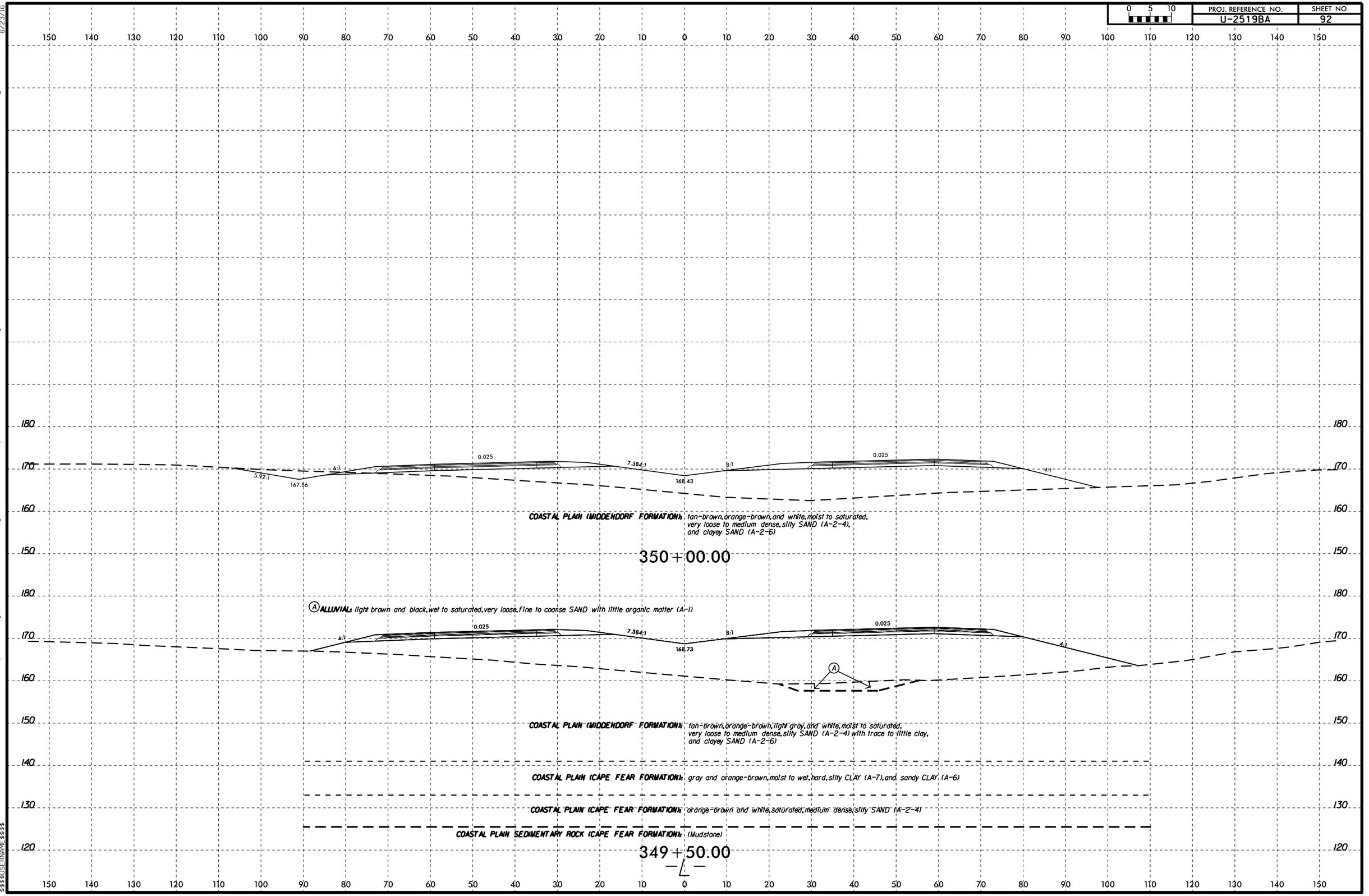

0 5 10

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

200 190 180 170 160 150

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,orange-brown,and red,moist to wet,medium stiff to stiff,silty CLAY (A-7-6) with thinly bedded sand

4:1 6:1 0.025 7.384:1 8:1 0.025 6:1 4:1

165.46 166.33 166.72

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,moist,medium dense to dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, saturated,very loose to loose,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

353+50.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,orange-brown,and red,moist to wet,medium stiff to stiff,silty CLAY (A-7-6) with thinly bedded sand

4:1 6:1 0.025 7.384:1 8:1 0.025 6:1 4:1

165.78 166.63 167.02

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,moist,medium dense to dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, saturated,very loose to loose,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

353+00.00

4:1 6:1 0.025 7.384:1 8:1 0.025 6:1 4:1

166.06 166.93 167.32

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, moist to saturated,very loose to dense,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

352+50.00

6/23/16

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

190 180 170 160 150

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,orange-brown,and red,moist to wet,medium stiff to stiff,silty CLAY (A-7-6) with thinly bedded sand

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,moist,medium dense to dense, clayey SAND (A-2-6)

4:1 6:1 0.025 0.06 0.06 0.025 6:1 4:1

164.86 167.03 166.12

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, saturated,very loose to loose,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

354+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-79	CL	354+00	8.5' - 10.0'	A-7-6	46	22	4.6	21.9	7.1	23.6	47.3	99	83	73	29.1	N/A

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,orange-brown,and red,moist to wet,medium stiff to stiff,silty CLAY (A-7-6) with thinly bedded sand

SS-79

L_354LT L_354

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,moist,medium dense to dense, clayey SAND (A-2-6)

4:1 6:1 0.025 7.38 4:1 8:1 6:1 4:1

34 7 6 4 3 17 9 4 3 9

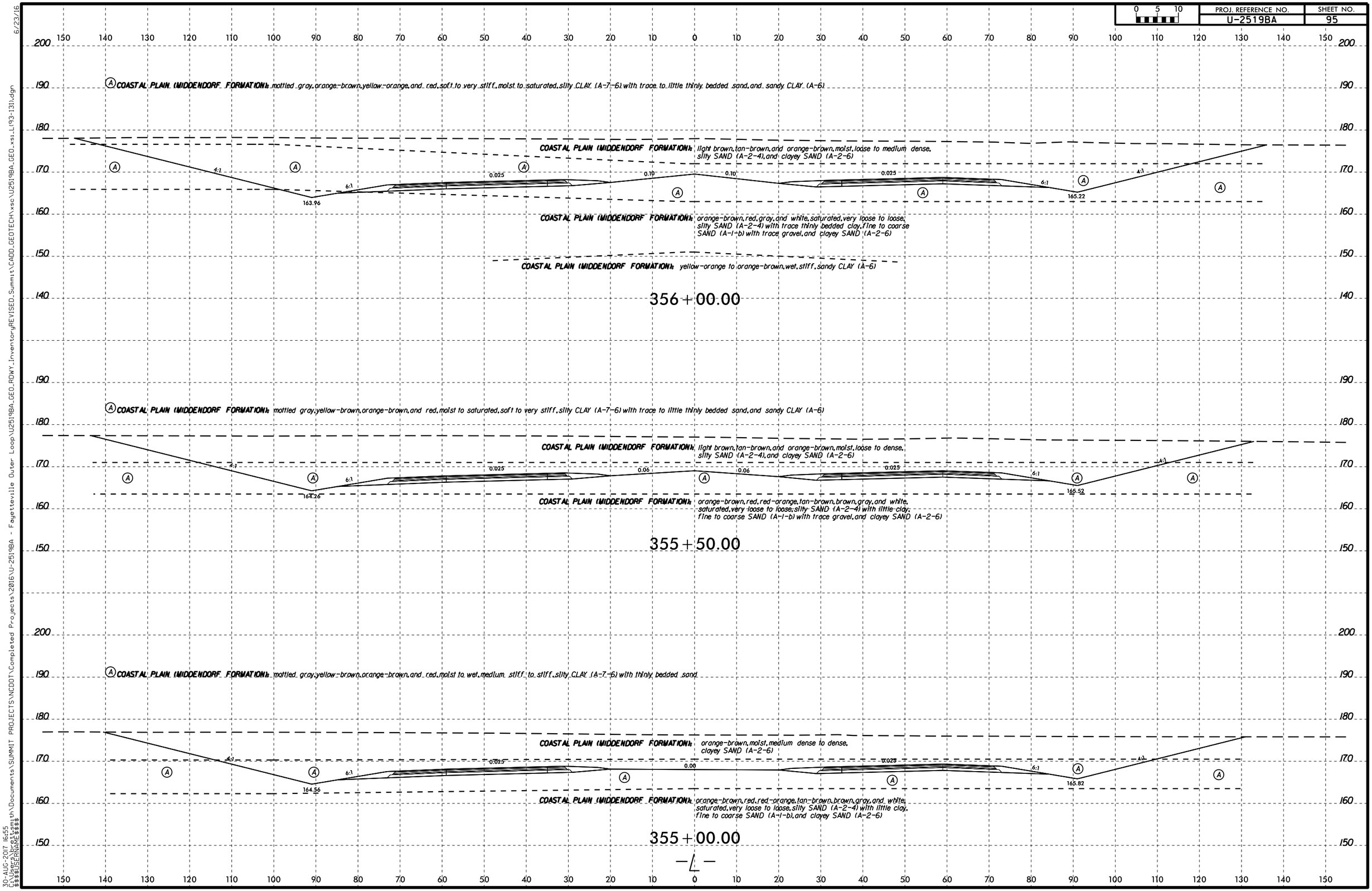
165.16 06/16 06/16 166.42

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, saturated,very loose to loose,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,red-orange,tan-brown,brown,gray,and white, saturated,very loose to loose,silty SAND (A-2-4) with little clay, fine to coarse SAND (A-1-b),and clayey SAND (A-2-6)

354+00.00

—L—



0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	96

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

200
190
180
170
160
150
140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *mottled gray,orange-brown,yellow-orange,and red,soft to very stiff,moist to saturated,silty CLAY (A-7-6) with trace to little thinly bedded sand,and sandy CLAY (A-6)*

COASTAL PLAIN (MIDDENDORF FORMATION): *light brown,tan-brown,and orange-brown,moist,loose to medium dense, silty SAND (A-2-4),and clayey SAND (A-2-6)*

4:1
6:1
163.66
0.025
0.14
0.14
0.025
6:1
4:1
164.92

COASTAL PLAIN (MIDDENDORF FORMATION): *orange-brown,red,gray,and white,saturated,very loose to loose, silty SAND (A-2-4) with trace thinly bedded clay,fine to coarse SAND (A-1-b) with trace gravel,and clayey SAND (A-2-6)*

COASTAL PLAIN (MIDDENDORF FORMATION): *yellow-orange to orange-brown,wet,stiff,sandy CLAY (A-6)*

356+50.00

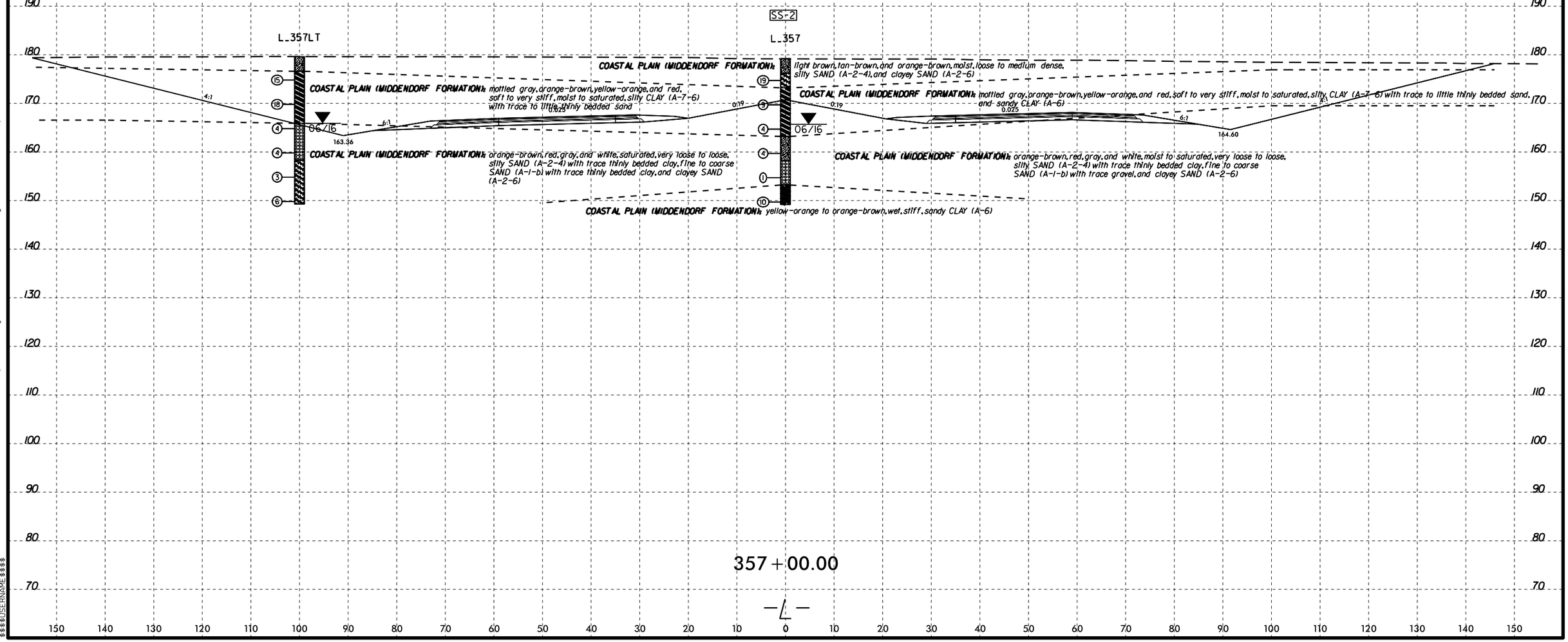
—L—

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

200
190
180
170
160
150
140

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	CL	357+00	8.5' - 10.0'	A-7-6	47	25	4.9	1.8	10.6	27.2	60.4	100	99	95	19.6	N/A



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

200 190 180 170 160 150 140 130 120 110 100 90 80 70

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,orange-brown,yellow-orange,and red,soft to very stiff,moist to saturated,silty CLAY (A-7-6) with trace to little thinly bedded sand,and sandy CLAY (A-6)

Ⓑ **COASTAL PLAIN (MIDDENDORF FORMATION):** yellow-orange to orange-brown,wet,stiff,sandy CLAY (A-6)

L_358RT
357+71

4:1

163.06

6:1

0.025

0.23

0.23

0.025

6:1

164.09

4:1

07/16

COASTAL PLAIN (MIDDENDORF FORMATION): light brown,tan-brown,and orange-brown,moist,loose to medium dense, silty SAND (A-2-4),and clayey SAND (A-2-6)

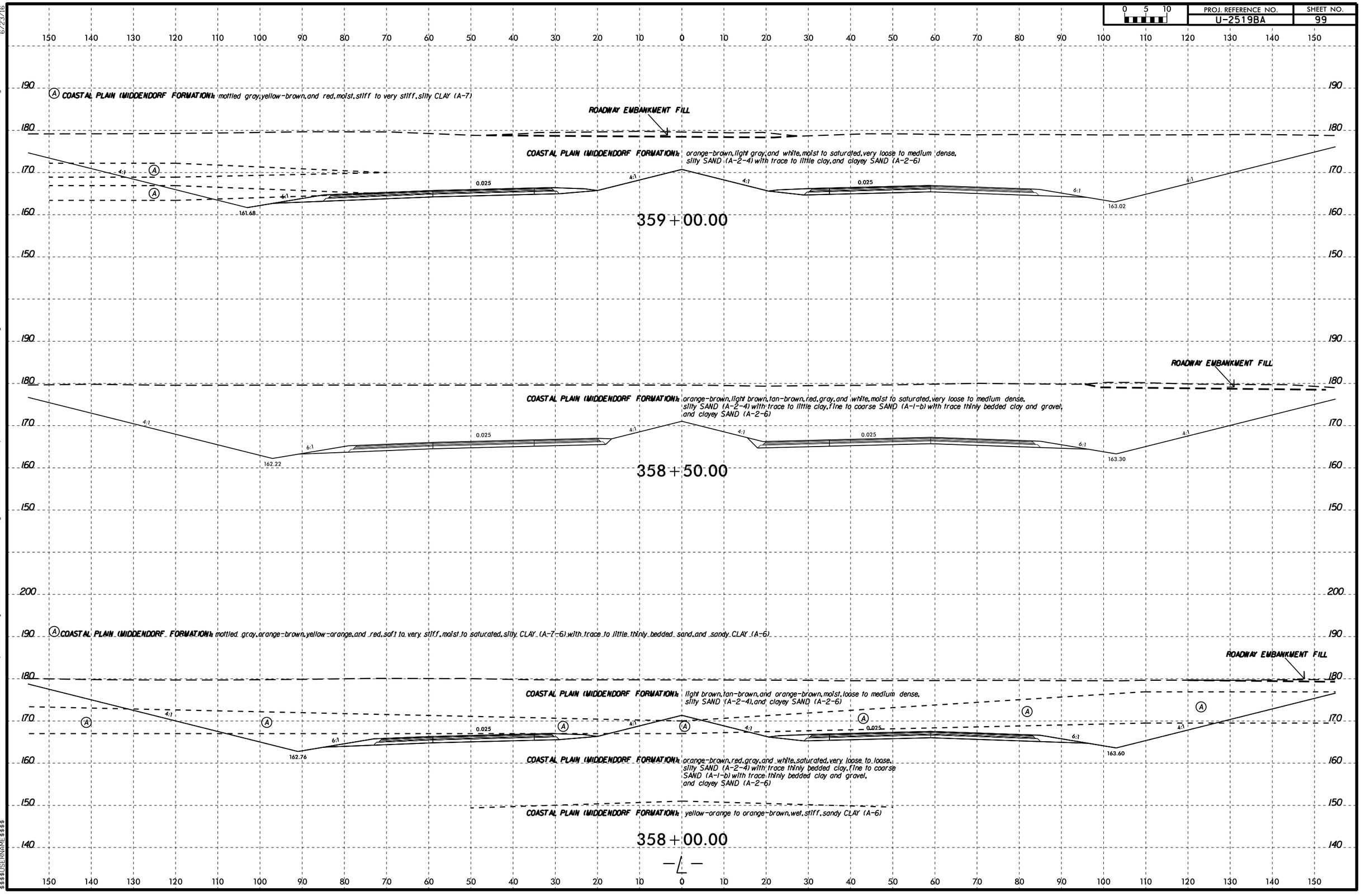
COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,gray,and white,saturated,very loose to loose, silty SAND (A-2-4) with trace thinly bedded clay,fine to coarse SAND (A-1-b) with trace thinly bedded clay and gravel, and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red,gray,and white,moist to saturated,very loose to loose, silty SAND (A-2-4) with trace thinly bedded clay,fine to coarse SAND (A-1-b) with trace thinly bedded clay and gravel, and clayey SAND (A-2-6)

7		
15		
4		
4		
3		
16		
5		
89	**COASTAL PLAIN (CAPE FEAR FORMATION):**	gray-brown,moist to wet,hard,silty CLAY (A-7) with little sand,and sandy CLAY (A-6)
69	**COASTAL PLAIN (CAPE FEAR FORMATION):**	light gray and orange-brown,saturated,very dense, silty SAND (A-2-4) with little clay
50		
30	**COASTAL PLAIN (CAPE FEAR FORMATION):**	mottled gray,yellow,and red,moist,hard, silty CLAY (A-7)
60		
100/1.0	**COASTAL PLAIN (CAPE FEAR FORMATION):**	light gray,saturated,very dense,silty SAND (A-2-4)

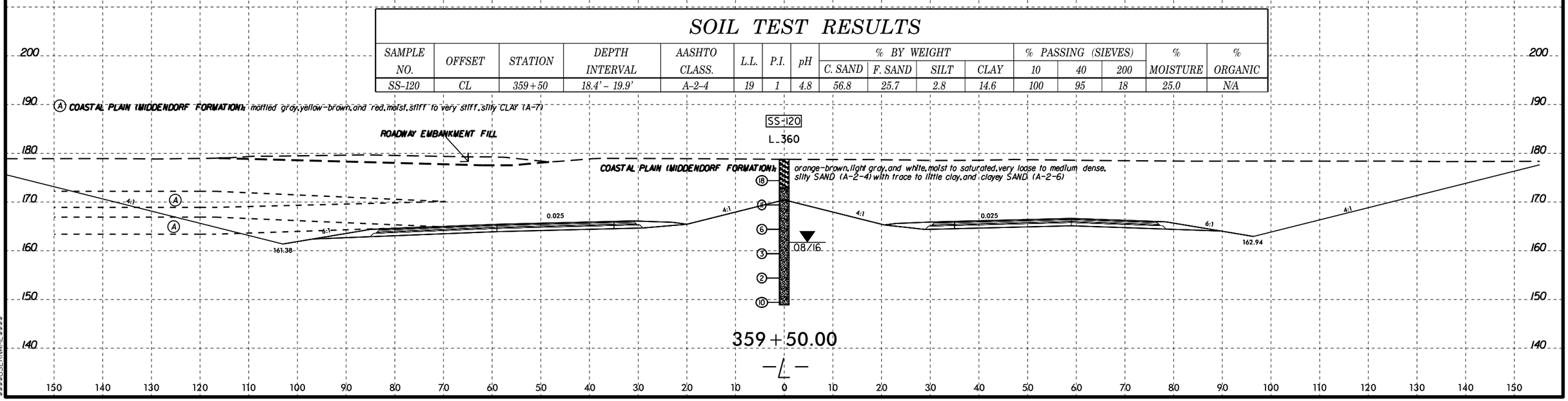
357+50.00

—L—



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-120	CL	359+50	18.4' - 19.9'	A-2-4	19	1	4.8	56.8	25.7	2.8	14.6	100	95	18	25.0	N/A



Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,and red,moist,stiff to very stiff,silty CLAY (A-7)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,light gray,and white,moist to saturated,very loose to medium dense, silty SAND (A-2-4) with trace to little clay,and clayey SAND (A-2-6)

4:1 Ⓐ Ⓐ 6:1 0.025 0.23 0.23 0.025 6:1 4:1

161.00 162.52

360+50.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,yellow-brown,and red,moist,stiff to very stiff,silty CLAY (A-7)

ROADWAY EMBANKMENT FILL

L 360LT
360+01

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,light gray,and white,moist to saturated,very loose to medium dense, silty SAND (A-2-4) with trace to little clay,and clayey SAND (A-2-6)

4:1 Ⓐ Ⓐ 6:1 0.025 4:1 4:1 0.025 6:1 4:1

161.08 162.82

07/16

16 29 10 14

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,brown,white,and red,saturated,very loose to medium dense, silty SAND (A-2-4) with trace to little clay

4 2 6 6

COASTAL PLAIN (CAPE FEAR FORMATION): light to dark gray and black,moist to wet,very stiff to hard,silty CLAY (A-7), and sandy CLAY (A-6) with little wood fragments

27 38

COASTAL PLAIN (CAPE FEAR FORMATION): orange-brown and red-brown,saturated,medium dense,silty SAND (A-2-4) with little clay

24

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandy Mudstone)

100/0.9

COASTAL PLAIN (CAPE FEAR FORMATION): gray,tan-brown,orange-brown,and red-brown,saturated,very loose to very dense, silty SAND (A-2-4) with little clay,clayey SAND (A-2-6),and fine to coarse SAND (A-1-b) with trace gravel

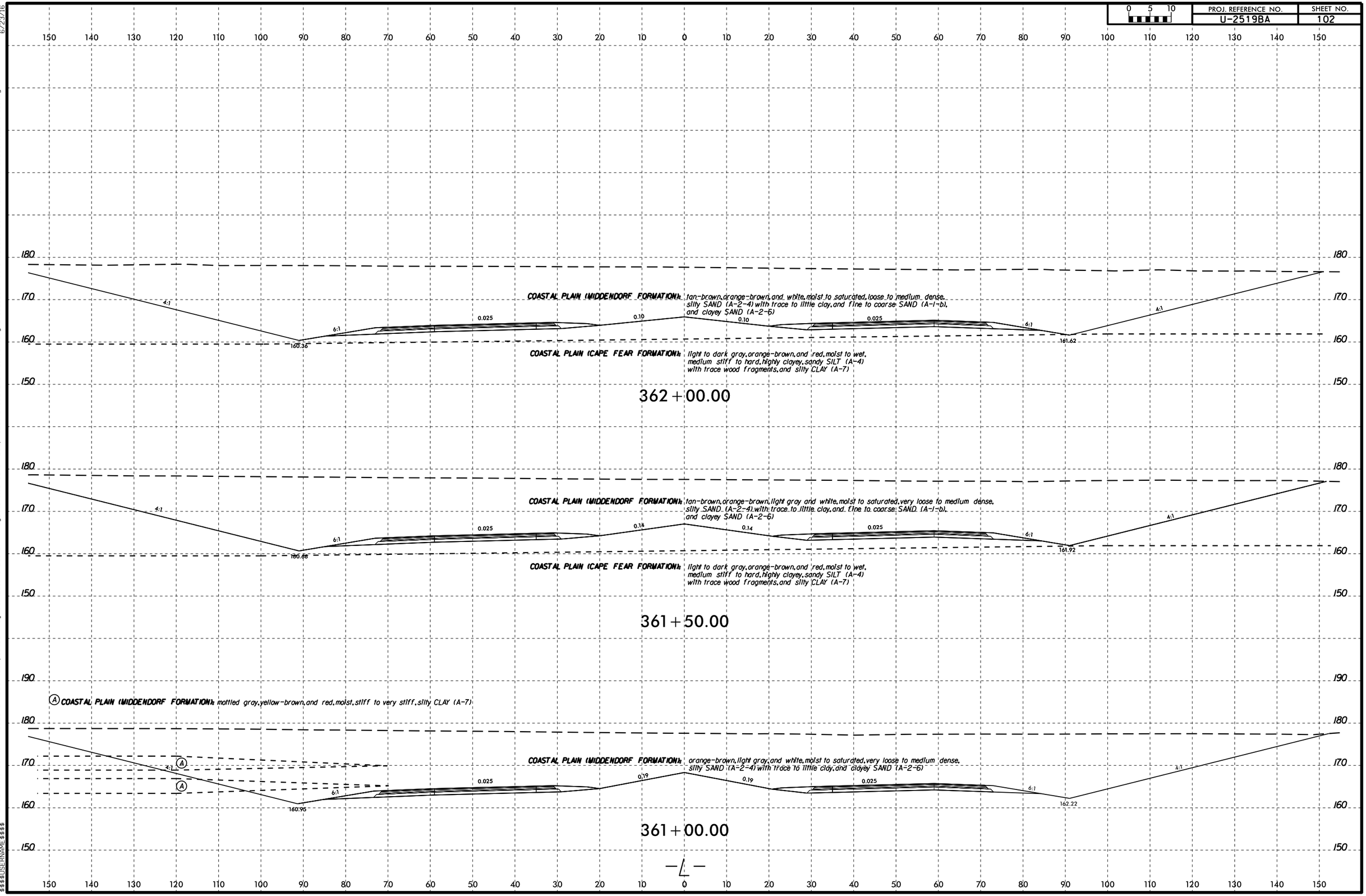
89 3 48

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandy Mudstone)

100/0.5

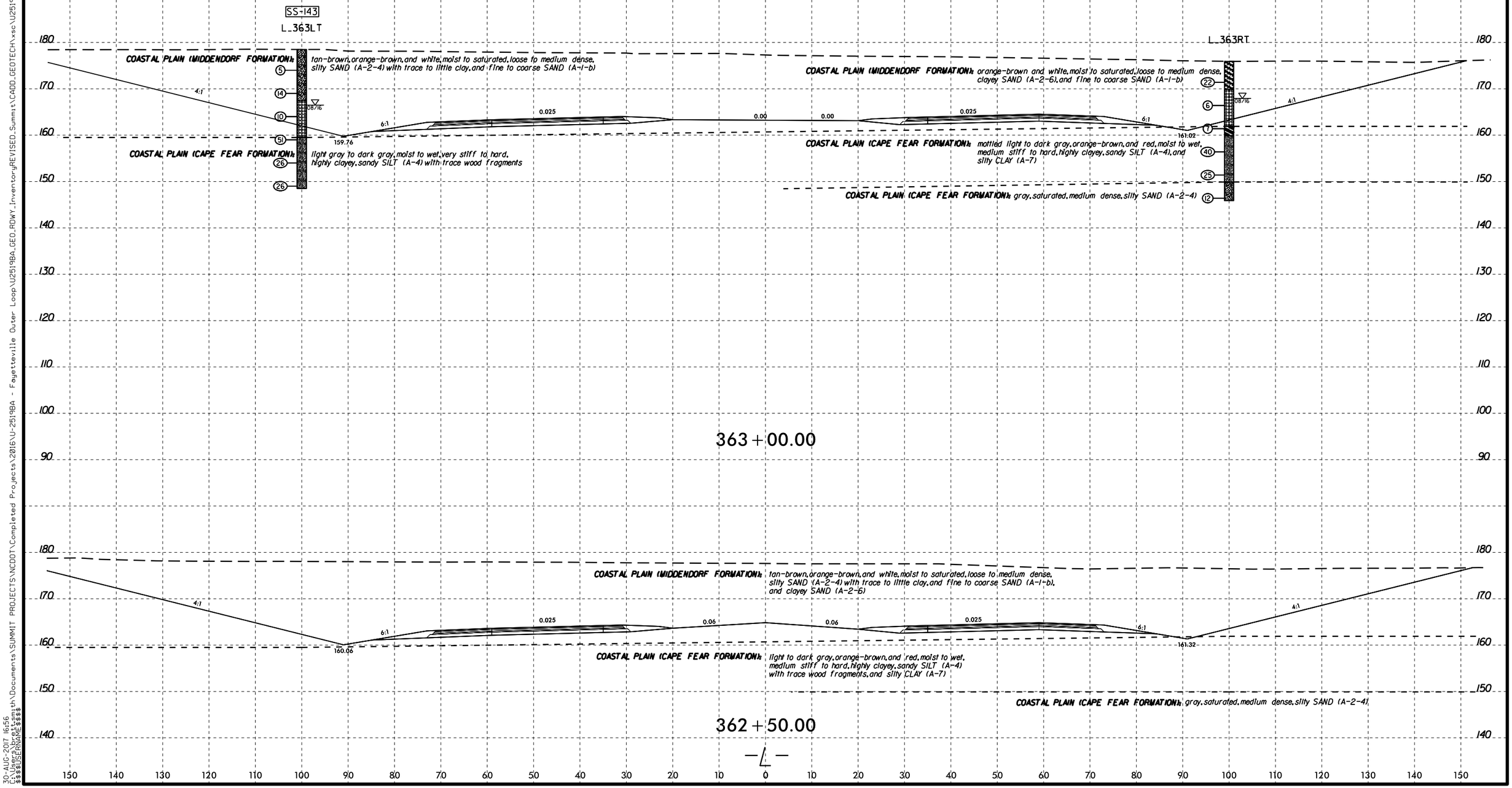
360+00.00

—℄—



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-143	100'LT	363+00	18.5' - 20.0'	A-4	32	10	2.4	4.4	34.1	20.8	40.7	97	94	76	37.4	N/A



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

180 170 160 150 140

4:1 6:1 0.025 7.38:1 8:1 0.025 6:1 4:1

158.86 159.50 160.12

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown,orange-brown,gray and white,moist to saturated,very loose to medium dense, silty SAND (A-2-4) with trace to little clay,and fine to coarse SAND (A-1-b), and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light to dark gray,orange-brown,and red,moist to wet, medium stiff to hard,highly clayey,sandy SILT (A-4) with trace wood fragments,and moderate to highly plastic, silty CLAY (A-7-5/A-7-6)

364+50.00

180 170 160 150 140

4:1 6:1 0.025 7.38:1 8:1 0.025 6:1 4:1

159.16 159.92 160.42

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown,orange-brown,and white,moist to saturated,loose to medium dense, silty SAND (A-2-4) with trace to little clay,and fine to coarse SAND (A-1-b), and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light to dark gray,orange-brown,and red,moist to wet, medium stiff to hard,highly clayey,sandy SILT (A-4) with trace wood fragments,and silty CLAY (A-7)

COASTAL PLAIN (CAPE FEAR FORMATION): gray,saturated,medium dense,silty SAND (A-2-4)

364+00.00

180 170 160 150 140

4:1 6:1 0.025 0.06 0.06 0.025 6:1 4:1

159.46 160.30 160.72

COASTAL PLAIN (MIDDENDORF FORMATION): tan-brown,orange-brown,and white,moist to saturated,loose to medium dense, silty SAND (A-2-4) with trace to little clay,and fine to coarse SAND (A-1-b), and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light to dark gray,orange-brown,and red,moist to wet, medium stiff to hard,highly clayey,sandy SILT (A-4) with trace wood fragments,and silty CLAY (A-7)

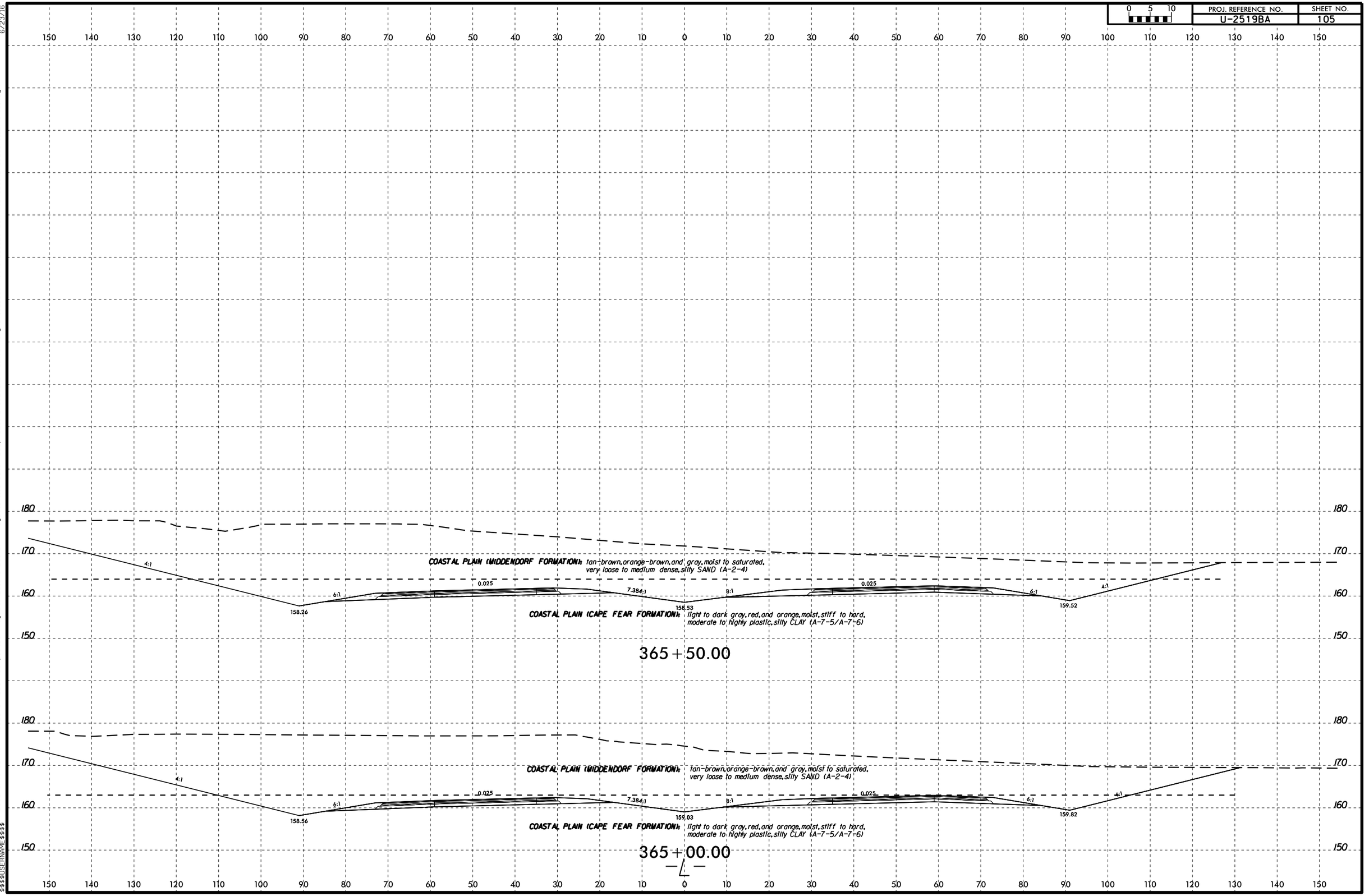
COASTAL PLAIN (CAPE FEAR FORMATION): gray,saturated,medium dense,silty SAND (A-2-4)

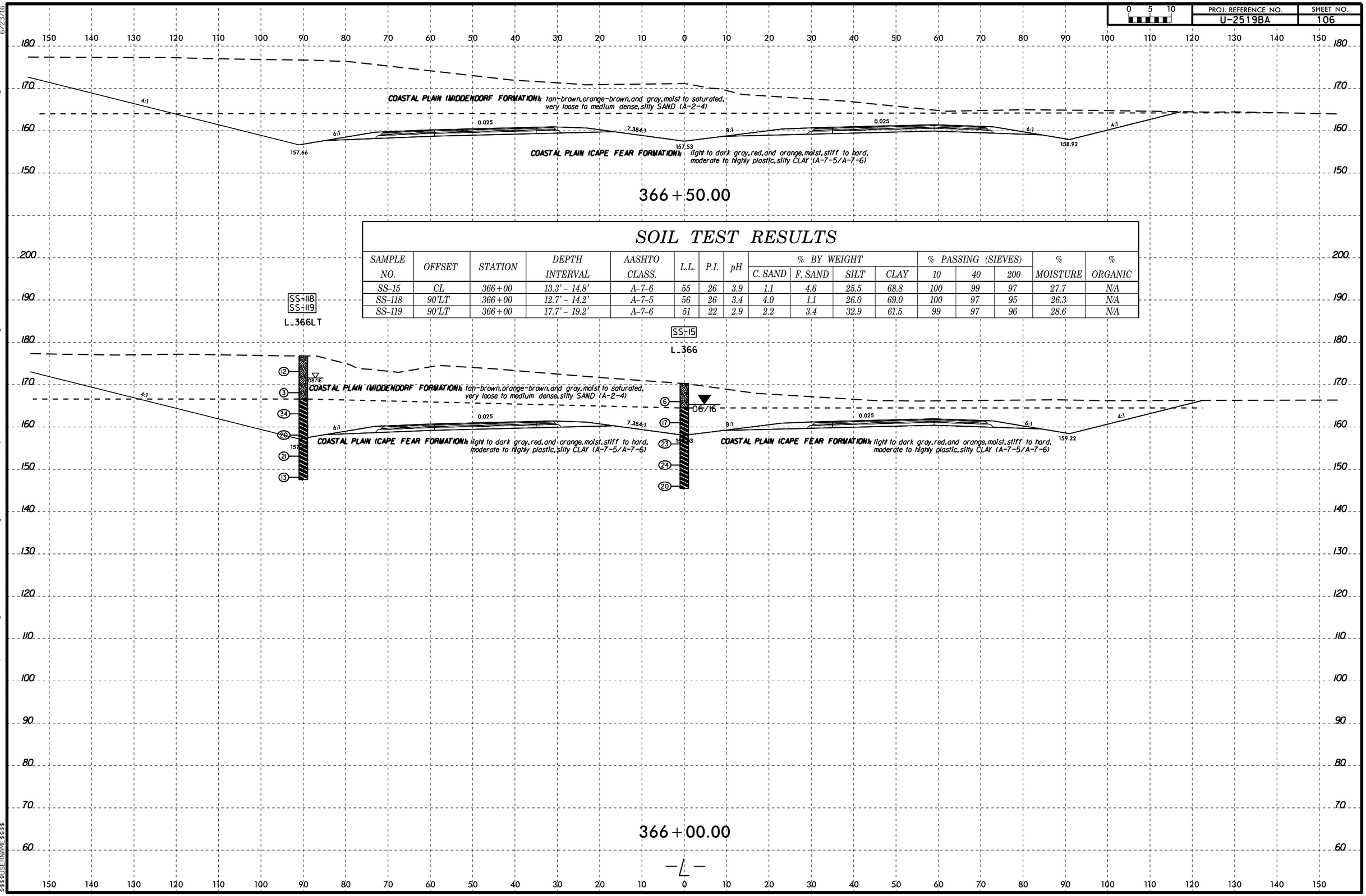
363+50.00

—L—

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

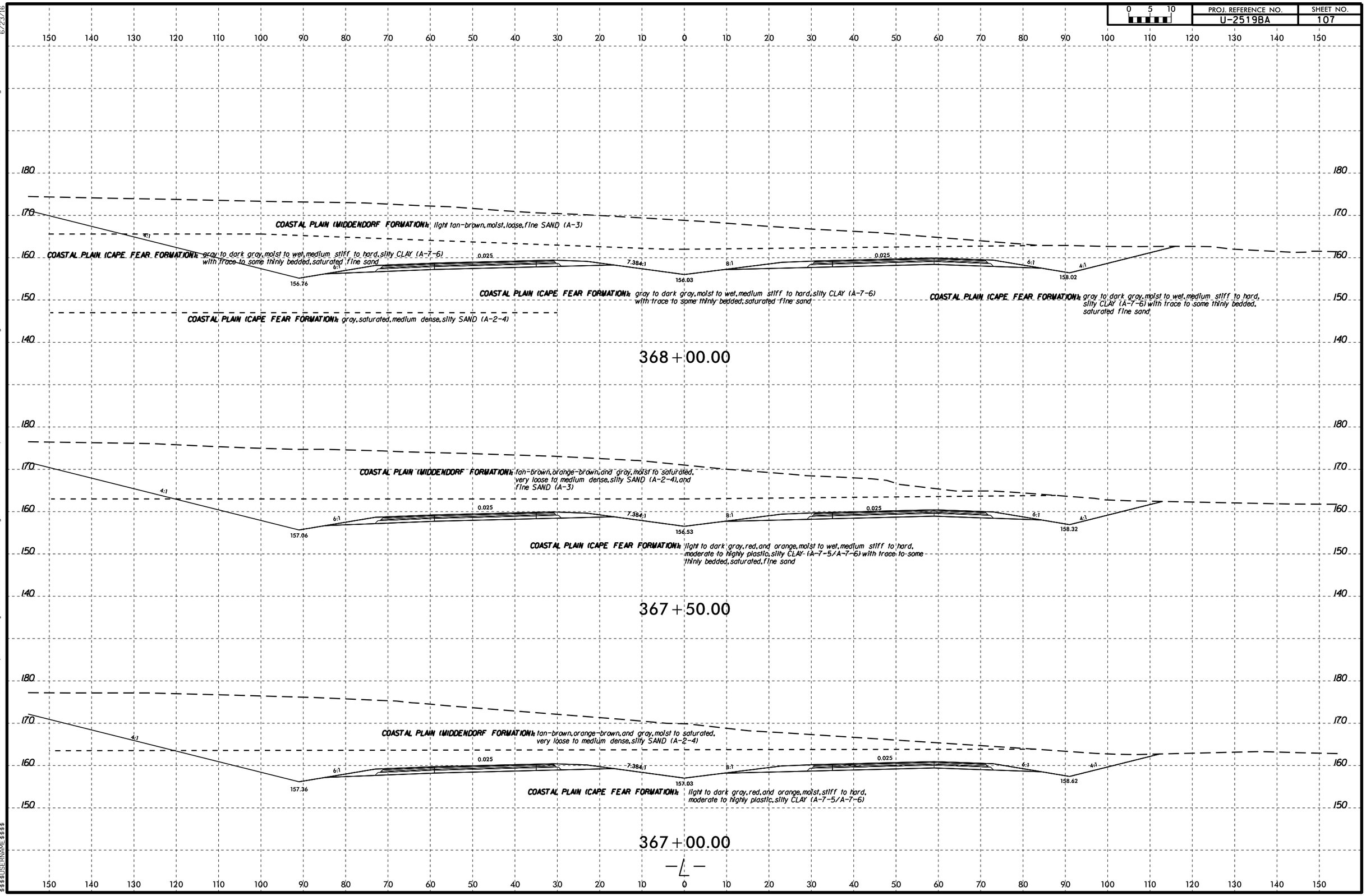
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	105

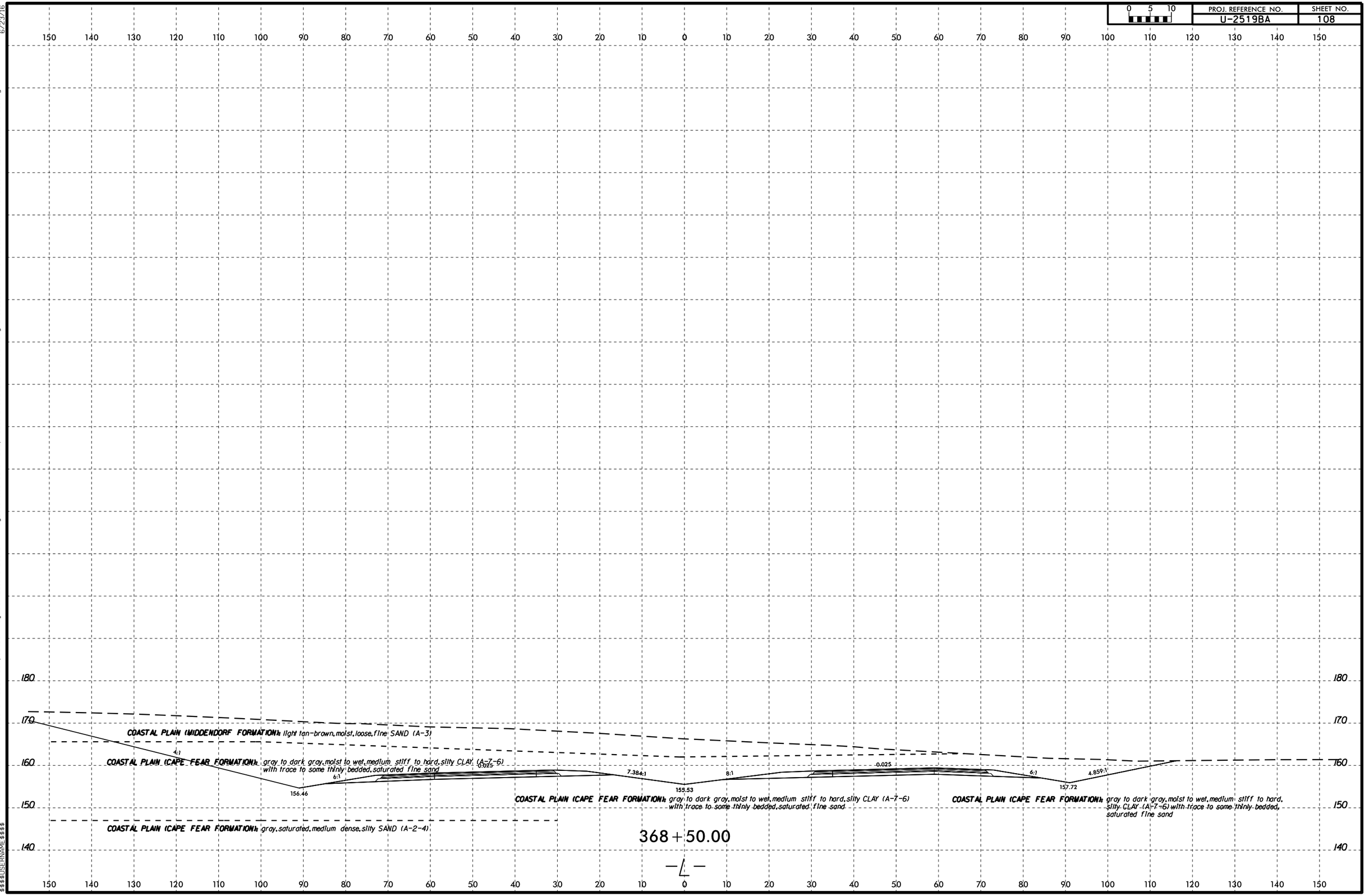




SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-15	CL	366+00	13.3' – 14.8'	A-7-6	55	26	3.9	1.1	4.6	25.5	68.8	100	99	97	27.7	N/A
SS-118	90'LT	366+00	12.7' – 14.2'	A-7-5	56	26	3.4	4.0	1.1	26.0	69.0	100	97	95	26.3	N/A
SS-119	90'LT	366+00	17.7' – 19.2'	A-7-6	51	22	2.9	2.2	3.4	32.9	61.5	99	97	96	28.6	N/A





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-142	100'LT	369+00	13.1' - 14.6'	A-7-6	53	26	3.5	0.4	2.9	23.8	72.9	100	99	98	25.4	N/A
SS-116	100'RT	369+00	3.5' - 5.0'	A-7-6	49	20	4.2	1.6	1.3	31.6	65.6	100	99	98	25.2	N/A

SS-142
L_369LT

SS-116
L_369RT

(16) (13) (15) (32) 08/16 (27)

(5) 08/16 (18) (15)

6:1 0.025 7.38 4:1 8:1 155.03 6:1 0.025 6:1 157.42 6:1 156.16

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

(A) **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

369+00.00

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

170 160 150 140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

4:1 6:1 155.26 0.025 7.38 4:1 153.63 8:1 0.025 6:1 6:1

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

370+50.00

180 170 160 150 140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

8:1 155.56 0.025 7.38 4:1 154.03 8:1 0.025 6:1 6:1 156.82

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense, silty SAND (A-2-4)

370+00.00

190 180 170 160 150 140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

4:1 155.86 0.025 7.38 4:1 154.53 8:1 0.025 6:1 6:1 157.12

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, medium stiff to hard, silty CLAY (A-7-6) with trace to some thinly bedded, saturated fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense, silty SAND (A-2-4)

369+50.00

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

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

170
160
150
140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *light tan-brown, moist, loose, fine SAND (A-3)*

6:1 5.99:1 154.66 0.025 7.38:1 8:1 153.19 0.025 6:1

COASTAL PLAIN (CAPE FEAR FORMATION): *gray, moist, stiff, silty CLAY (A-7)*

COASTAL PLAIN (CAPE FEAR FORMATION): *gray and orange-brown, saturated, medium dense, silty SAND (A-2-4) with little clay*

COASTAL PLAIN (CAPE FEAR FORMATION): *gray and orange-brown, moist to saturated, loose to medium dense, clayey SAND (A-2-6)*

371+50.00

170
160
150
140

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *light tan-brown, moist, loose, fine SAND (A-3)*

6:1 5.99:1 154.96 0.025 7.38:1 8:1 153.35 0.025 6:1 6:1

COASTAL PLAIN (CAPE FEAR FORMATION): *gray, moist, stiff, silty CLAY (A-7)*

COASTAL PLAIN (CAPE FEAR FORMATION): *gray and orange-brown, saturated, medium dense, silty SAND (A-2-4) with little clay*

COASTAL PLAIN (CAPE FEAR FORMATION): *gray and orange-brown, moist to saturated, loose to medium dense, clayey SAND (A-2-6)*

371+00.00

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

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

170 160 150 140 130 120 110 100 90 80 70 60 50

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

6:1 | 0.025 | 7.48:1 | 8:1 | 0.015 | 6:1 | 6:1

S.P. #25 EL= 164.33

154.27

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist, stiff, silty CLAY (A-7)

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, saturated, medium dense, silty SAND (A-2-4) with little clay

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist to saturated, loose to medium dense, clayey SAND (A-2-6)

372+50.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, loose, fine SAND (A-3)

L-372

6:1 | 0.025 | 7.40:1 | 8:1 | 0.023 | 6:1

5.99:1

154.36

S.P. #24 EL= 155.33

L-372RT
371+93

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist, stiff, silty CLAY (A-7)

8 14 10 27

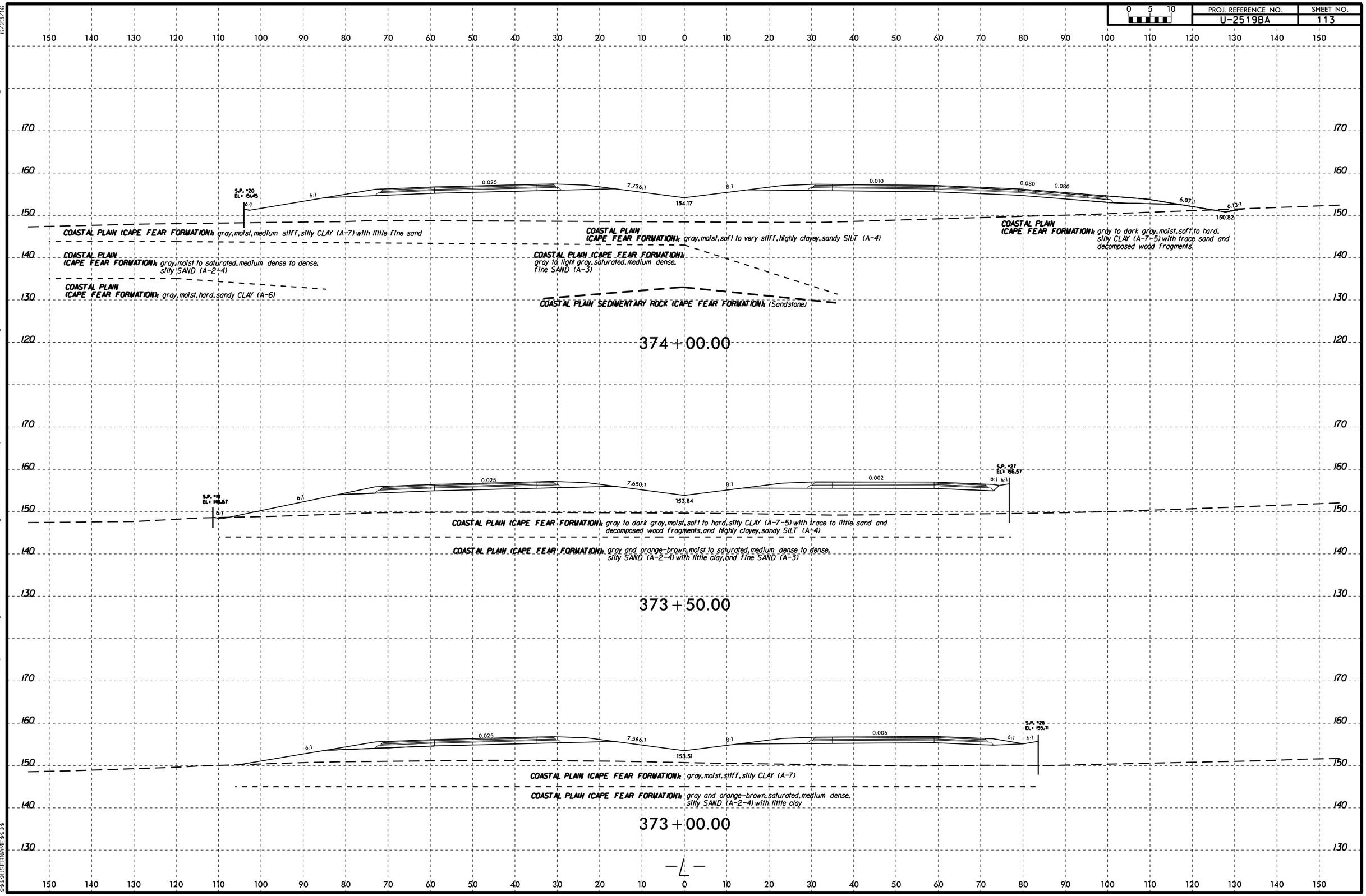
08/16 06/16

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, saturated, medium dense, silty SAND (A-2-4) with little clay

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist to saturated, loose to medium dense, clayey SAND (A-2-6)

372+00.00

—L—



6/23/16

30-AUG-2017 16:56
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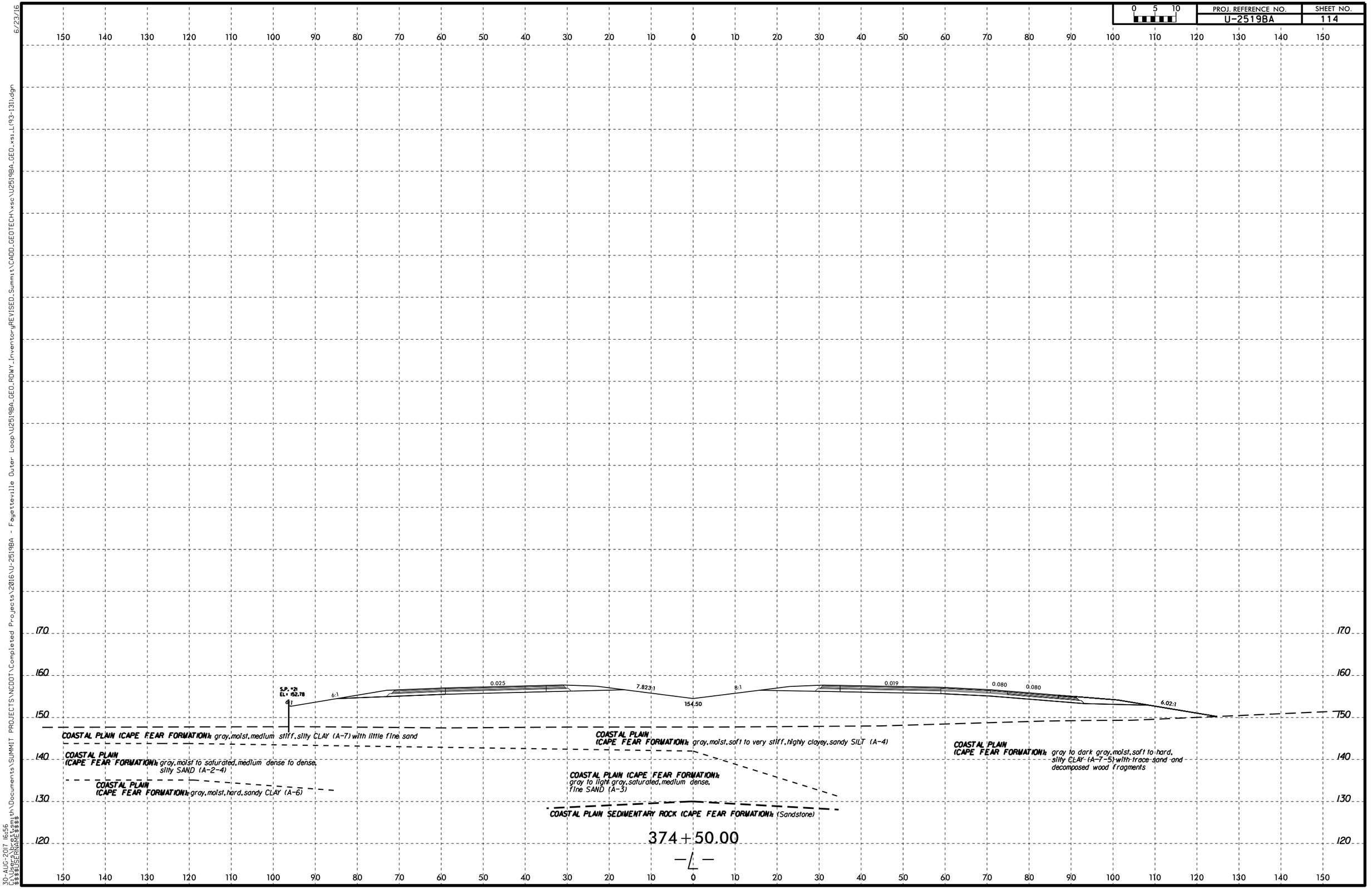
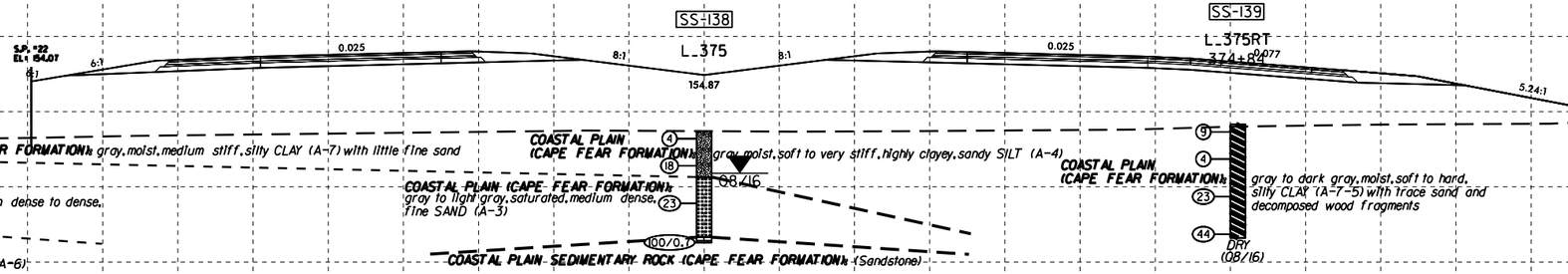


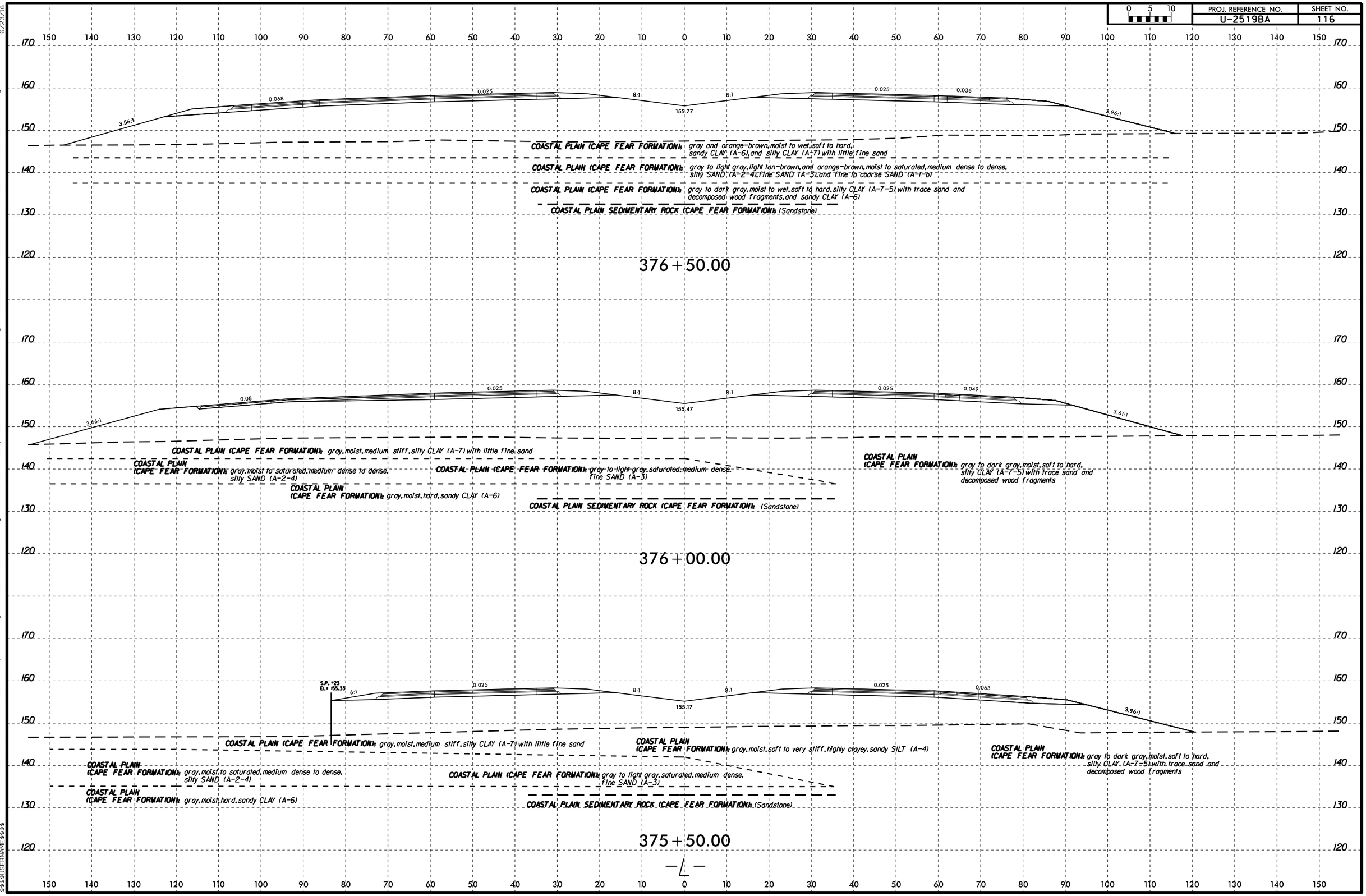
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-138	CL	375+00	3.6' - 5.1'	A-4	22	7	3.5	38.4	19.6	4.8	37.3	100	86	45	11.8	N/A
SS-139	71'RT	374+84	3.6' - 5.1'	A-7-5	56	24	3.9	3.9	3.1	23.3	69.7	100	98	95	25.1	N/A



375+00.00

—L—



6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	117

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

170 160 150 140 130

0.04 -0.025 8:1 8:1 0.025 -0.025 6:1 5.99:1 3.25:1

156.37 154.62

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist to wet, soft to hard, sandy CLAY (A-6), and silty CLAY (A-7) with little fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, very dense, silty SAND (A-2-4)

COASTAL PLAIN (MIDDENDORF FORMATION): light tan-brown, dry, loose, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light tan-brown, and orange-brown, saturated, medium dense, fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, wet, hard, silty CLAY (A-7)

377+50.00

170 160 150 140 130

0.054 0.025 8:1 8:1 0.025 -0.025 6:1 3.29:1

156.07

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, dry, loose, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist to wet, soft to hard, sandy CLAY (A-6), and silty CLAY (A-7) with little fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, very dense, silty SAND (A-2-4)

COASTAL PLAIN (CAPE FEAR FORMATION): gray and orange-brown, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light tan-brown, and orange-brown, saturated, medium dense, fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, wet, hard, silty CLAY (A-7)

377+00.00

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

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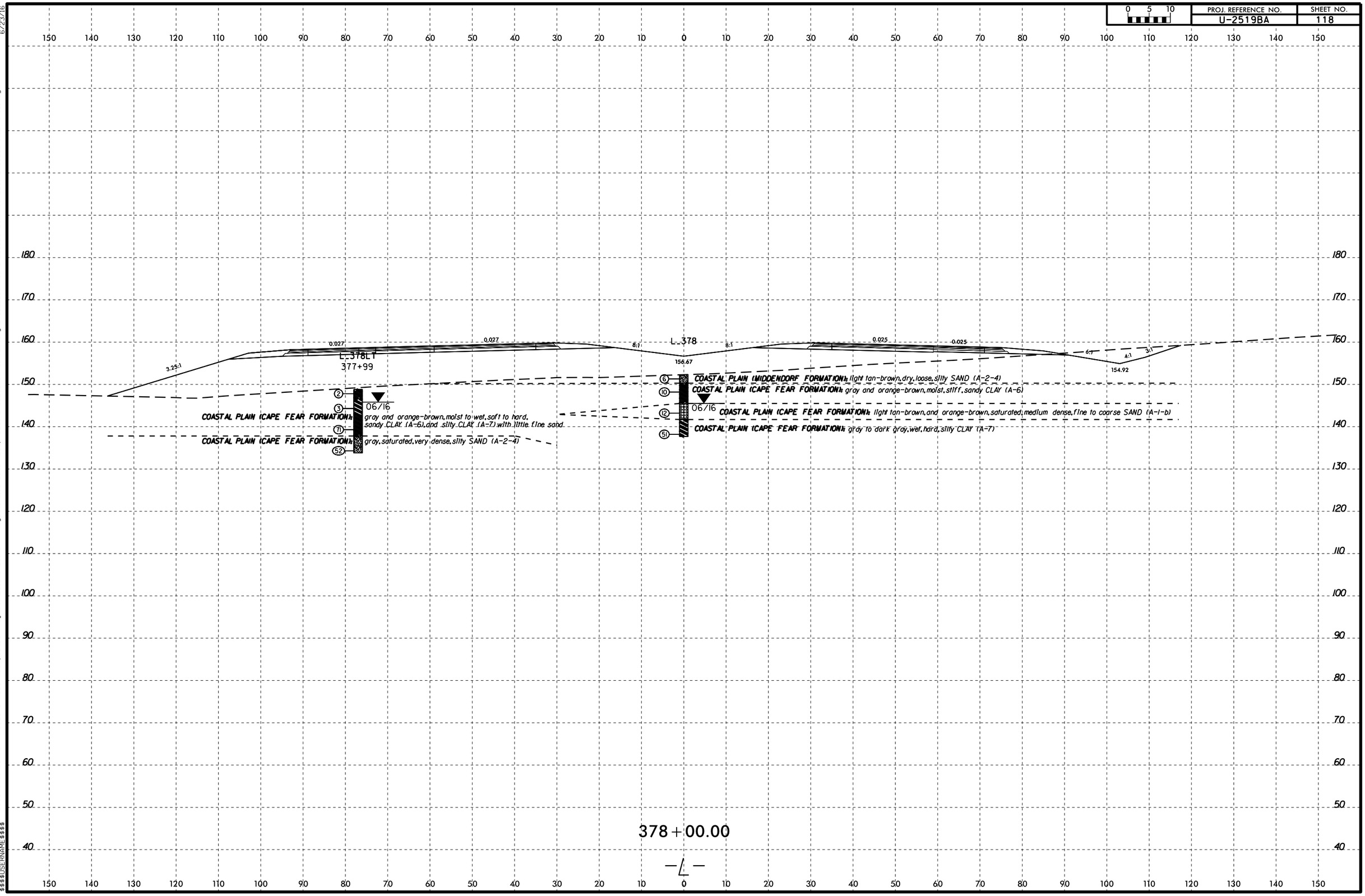

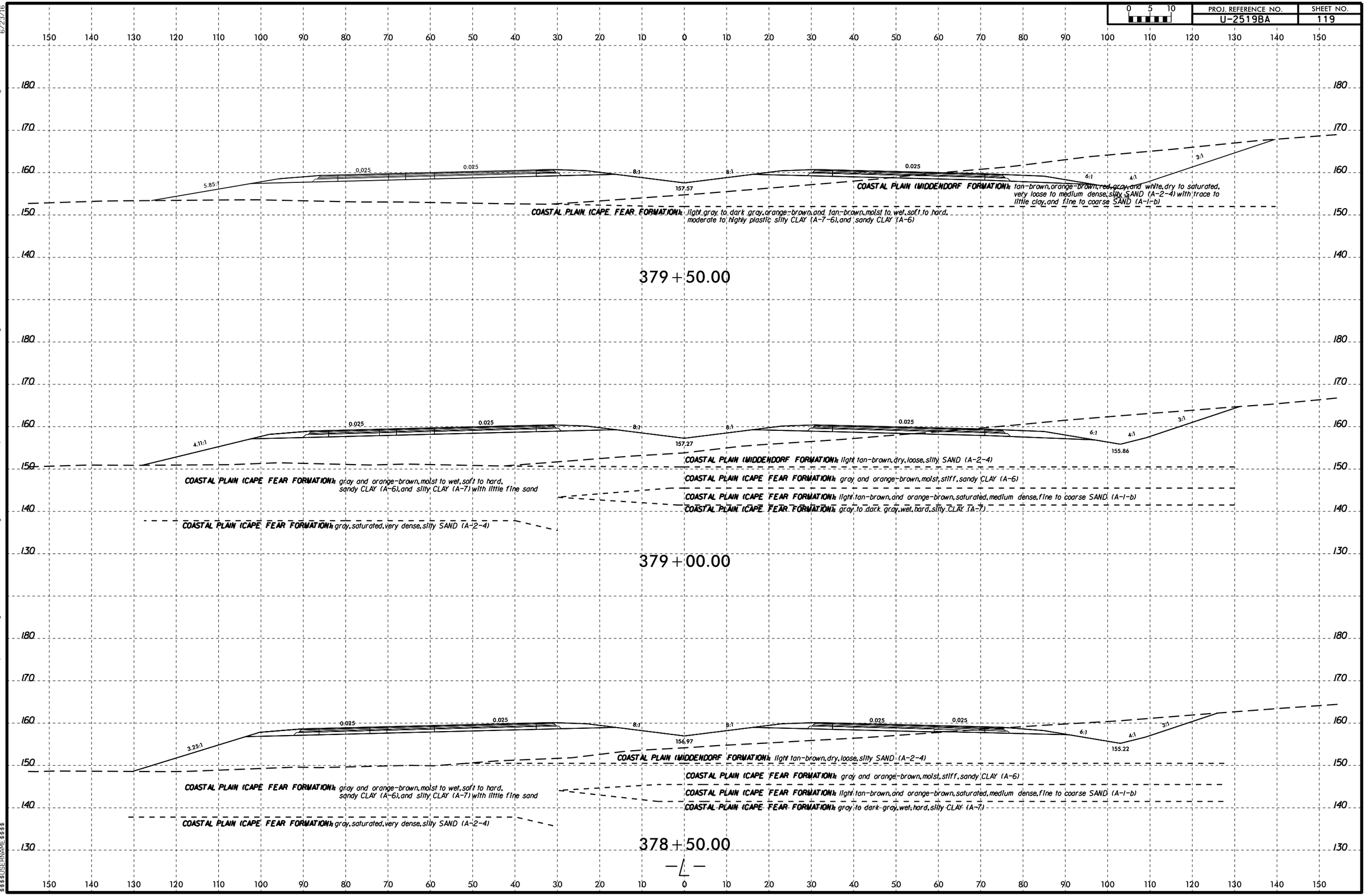

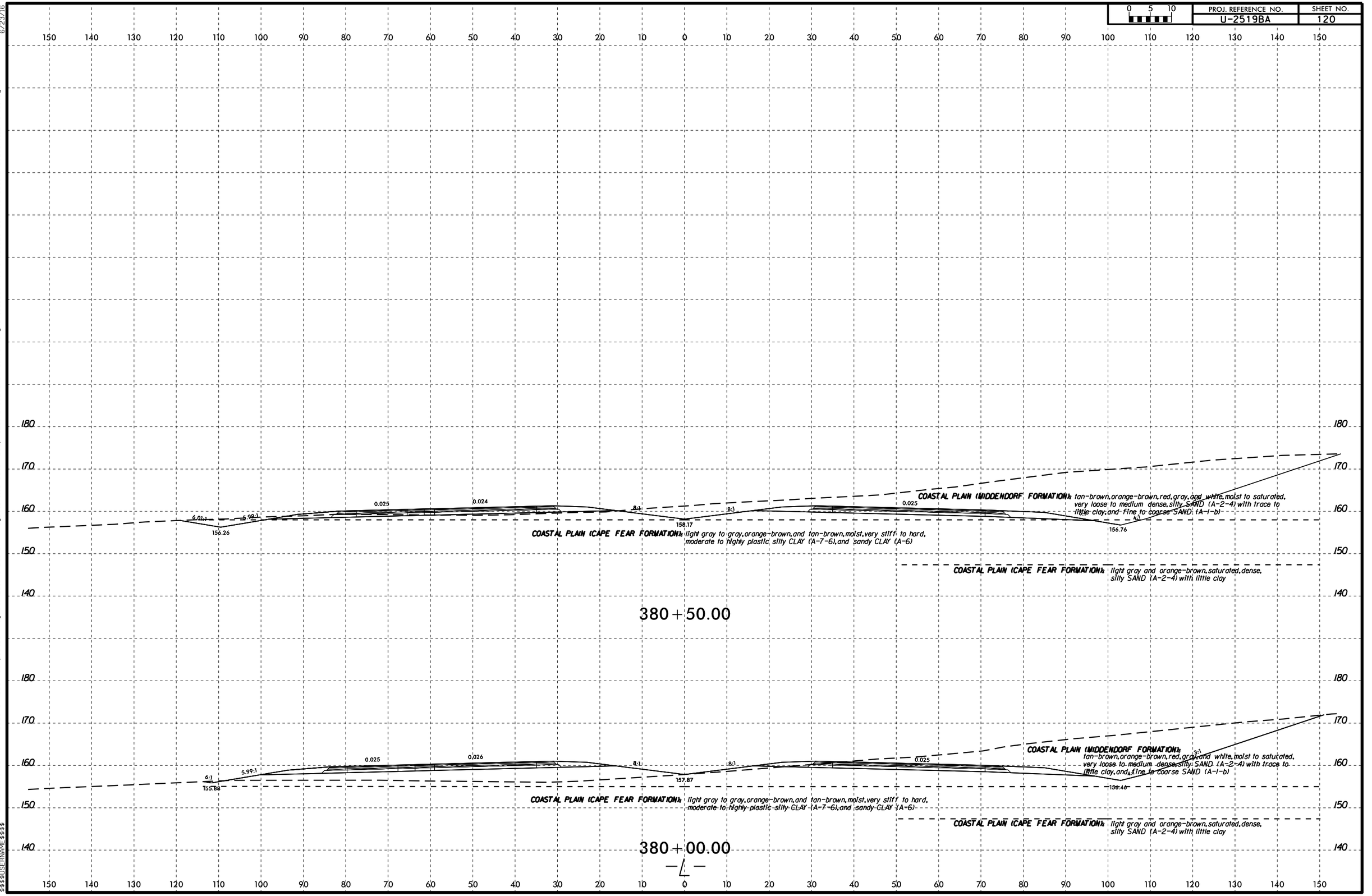

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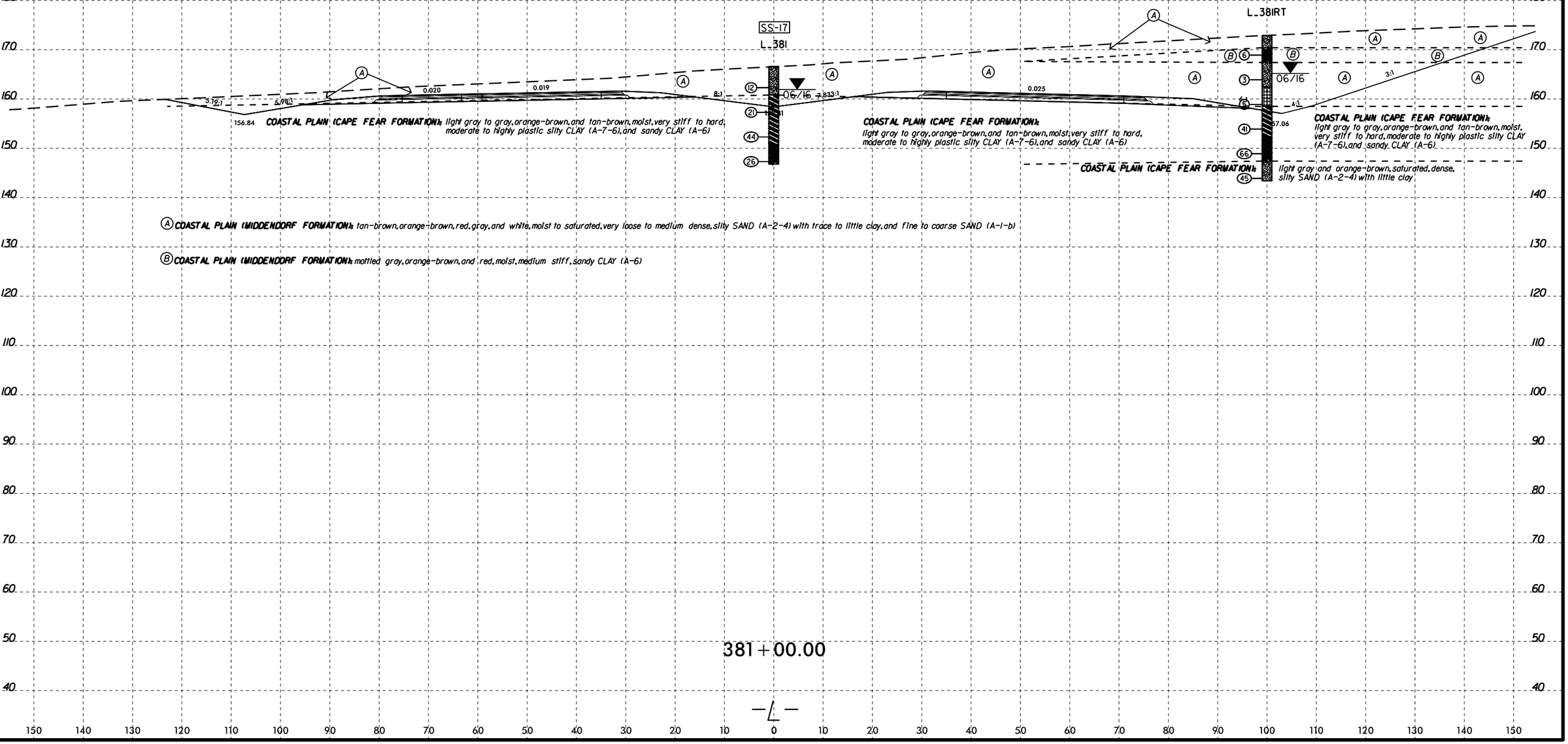
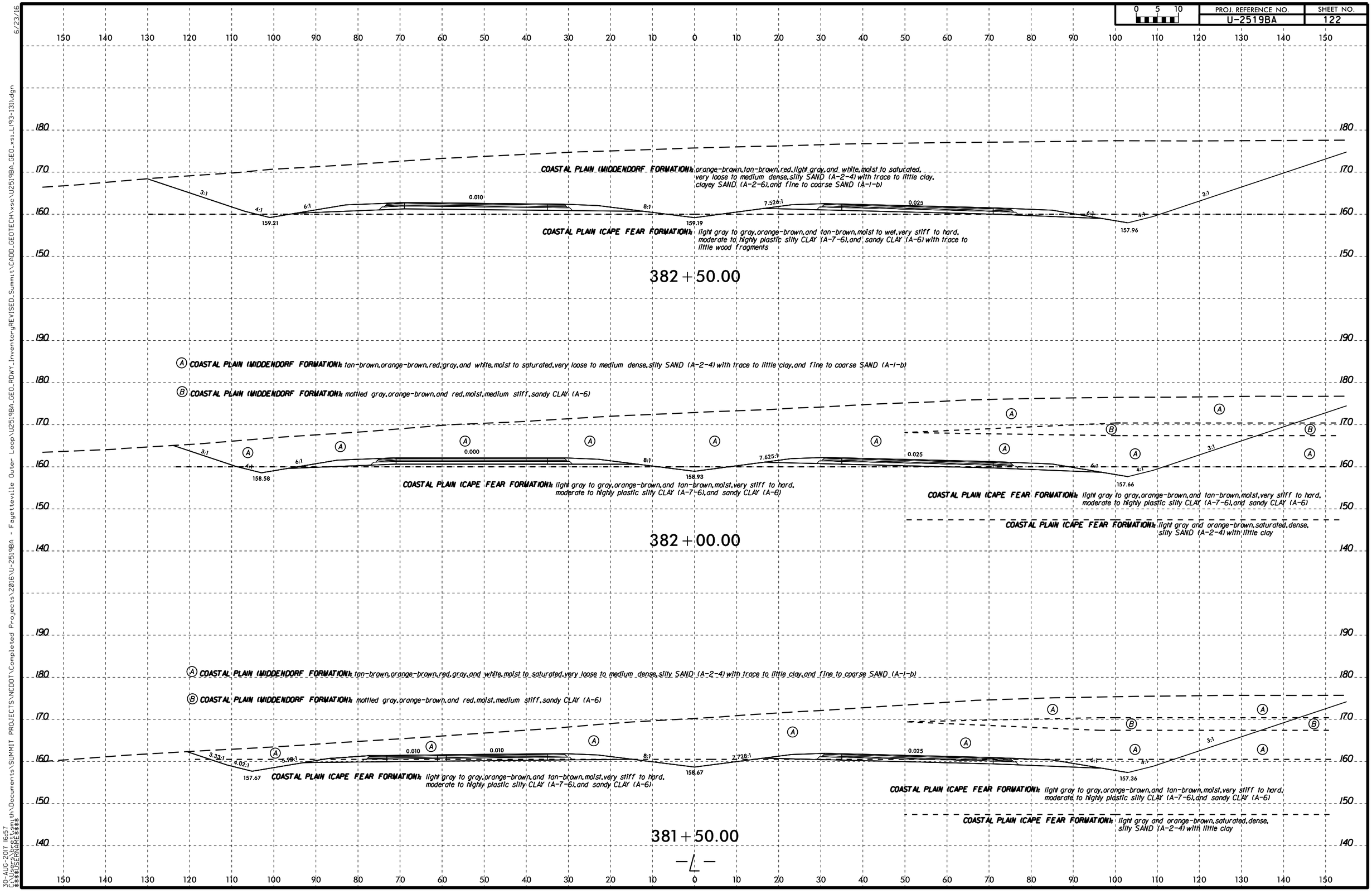
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-17	CL	381+00	8.3' - 9.8'	A-7-6	74	45	3.9	0.3	0.5	15.8	83.4	100	100	100	22.3	N/A





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

190 180 170 160 150 140

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, highly plastic, silty CLAY (A-7-6), and sandy CLAY (A-6) with little wood fragements

3:1 4:1 6:1 0.030 8:1 7.186:1 0.030 6:1 4:1 3:1

159.43 159.71 158.37

383+50.00

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

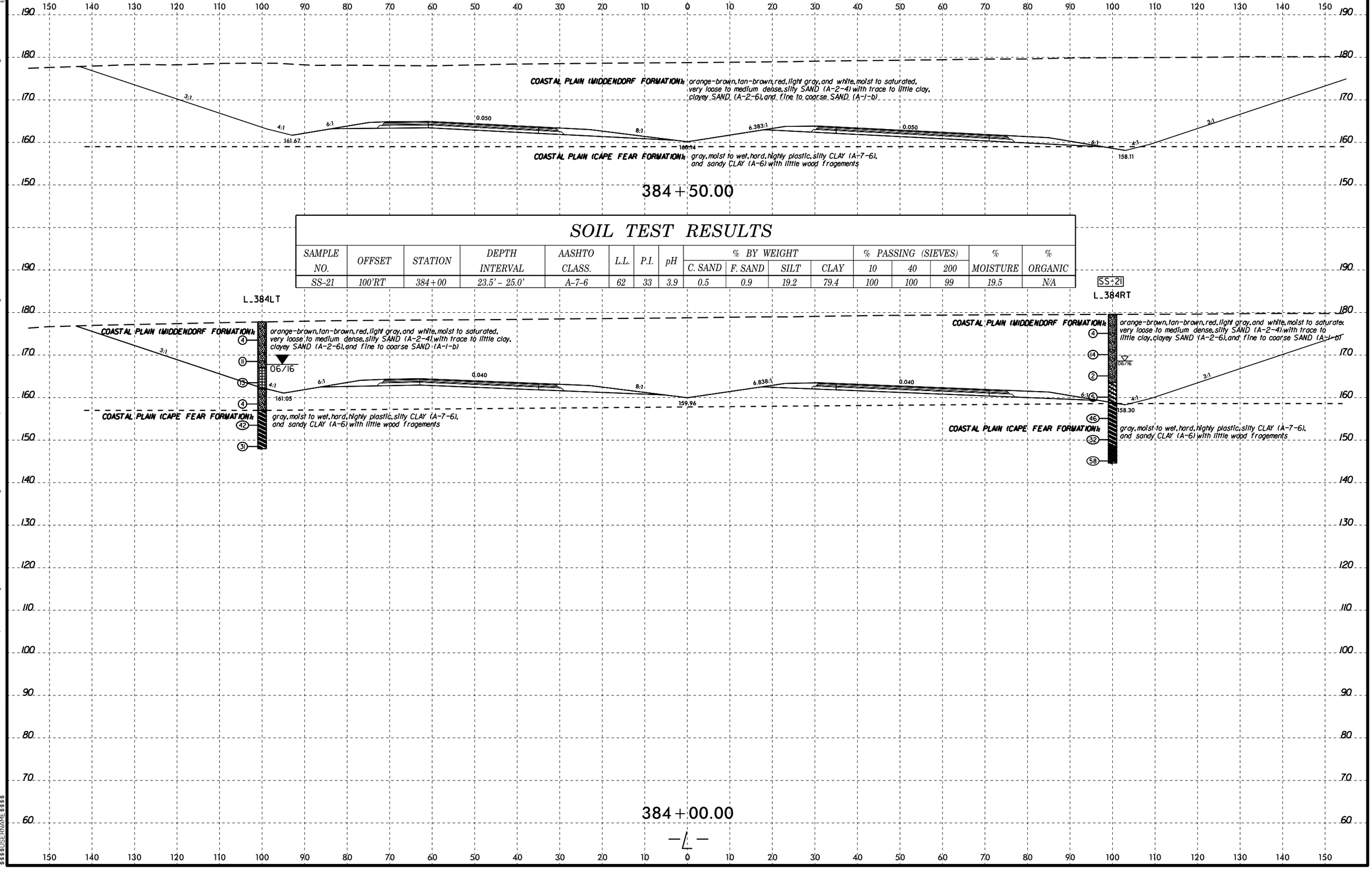
COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, highly plastic, silty CLAY (A-7-6), and sandy CLAY (A-6) with little wood fragements

3:1 4:1 6:1 0.020 8:1 7.428:1 0.025 6:1 4:1 3:1

159.81 159.45 158.26

383+00.00

—L—



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-21	100'RT	384+00	23.5' - 25.0'	A-7-6	62	33	3.9	0.5	0.9	19.2	79.4	100	100	99	19.5	N/A

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

190 180 170 160 150

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, red-orange, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with little clay, and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist, very stiff to hard, silty CLAY (A-7)

3:1 4:1 6:1 0.060 8:1 6:1 0.060 6:1 4:1 3:1

162.88 160.93 158.88

386+00.00

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, red-orange, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist to wet, very stiff to hard, highly plastic, silty CLAY (A-7-6), and sandy CLAY (A-6) with little wood fragements

3:1 4:1 6:1 0.060 8:1 6:1 0.060 6:1 4:1 3:1

162.58 160.63 158.46

385+50.00

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, highly plastic, silty CLAY (A-7-6), and sandy CLAY (A-6) with little wood fragements

3:1 4:1 6:1 0.060 8:1 6:1 0.060 6:1 4:1 3:1

162.28 160.33 158.04

385+00.00

L_387LT

L_387RT

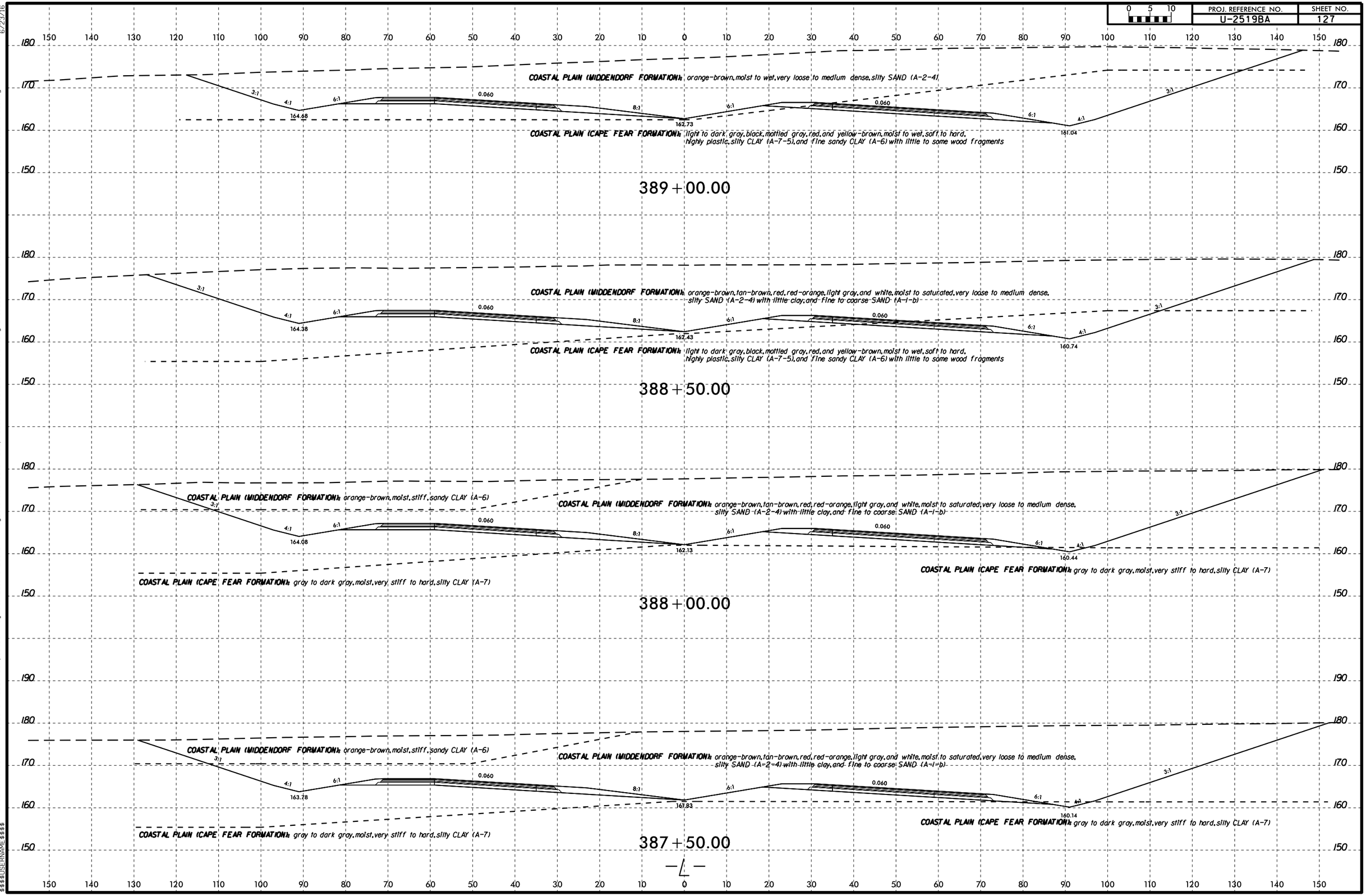
COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist, stiff, sandy CLAY (A-6)

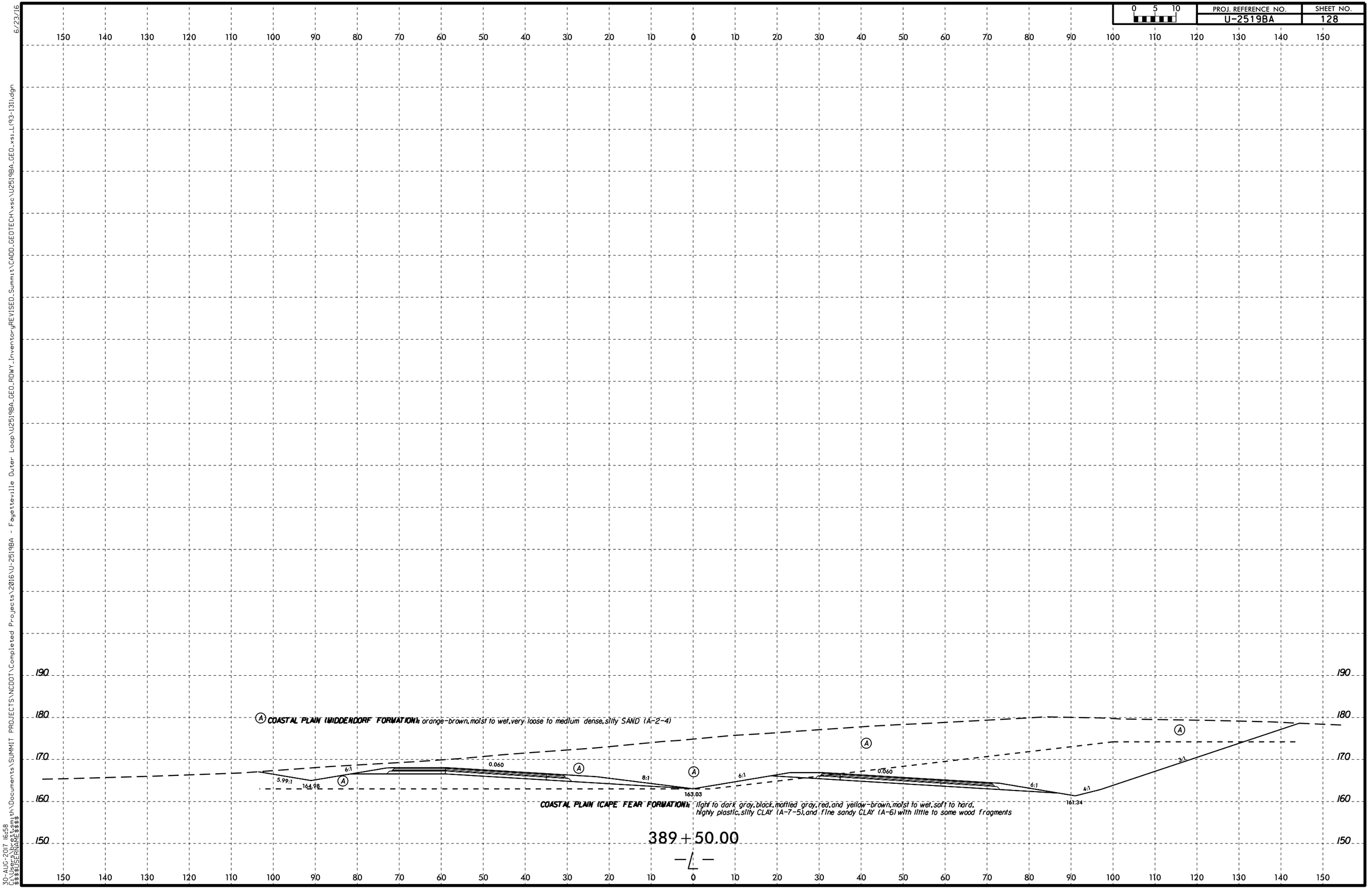
COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, tan-brown, red, red-orange, light gray, and white, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with little clay, and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist, very stiff to hard, silty CLAY (A-7)

387+00.00

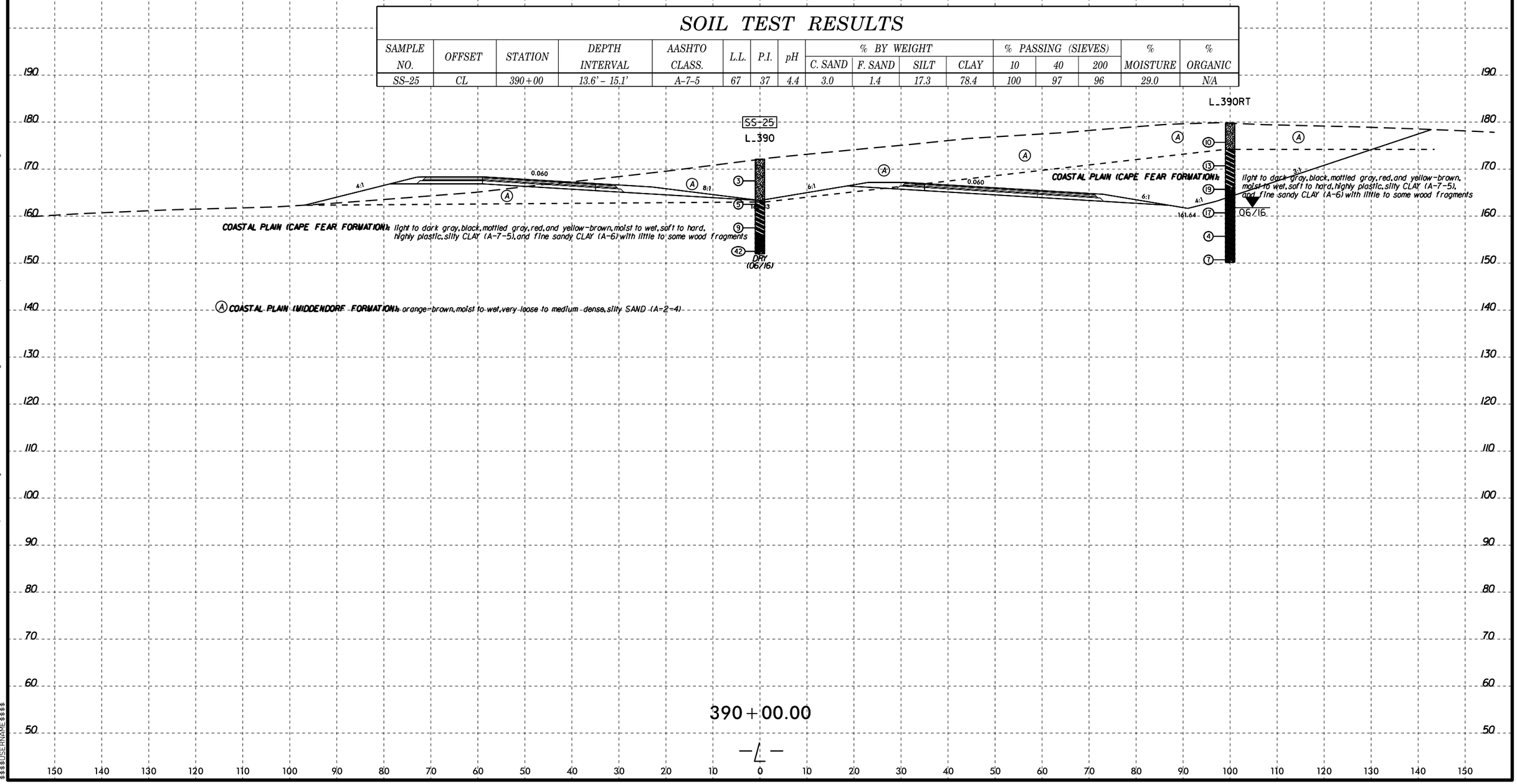
386+50.00

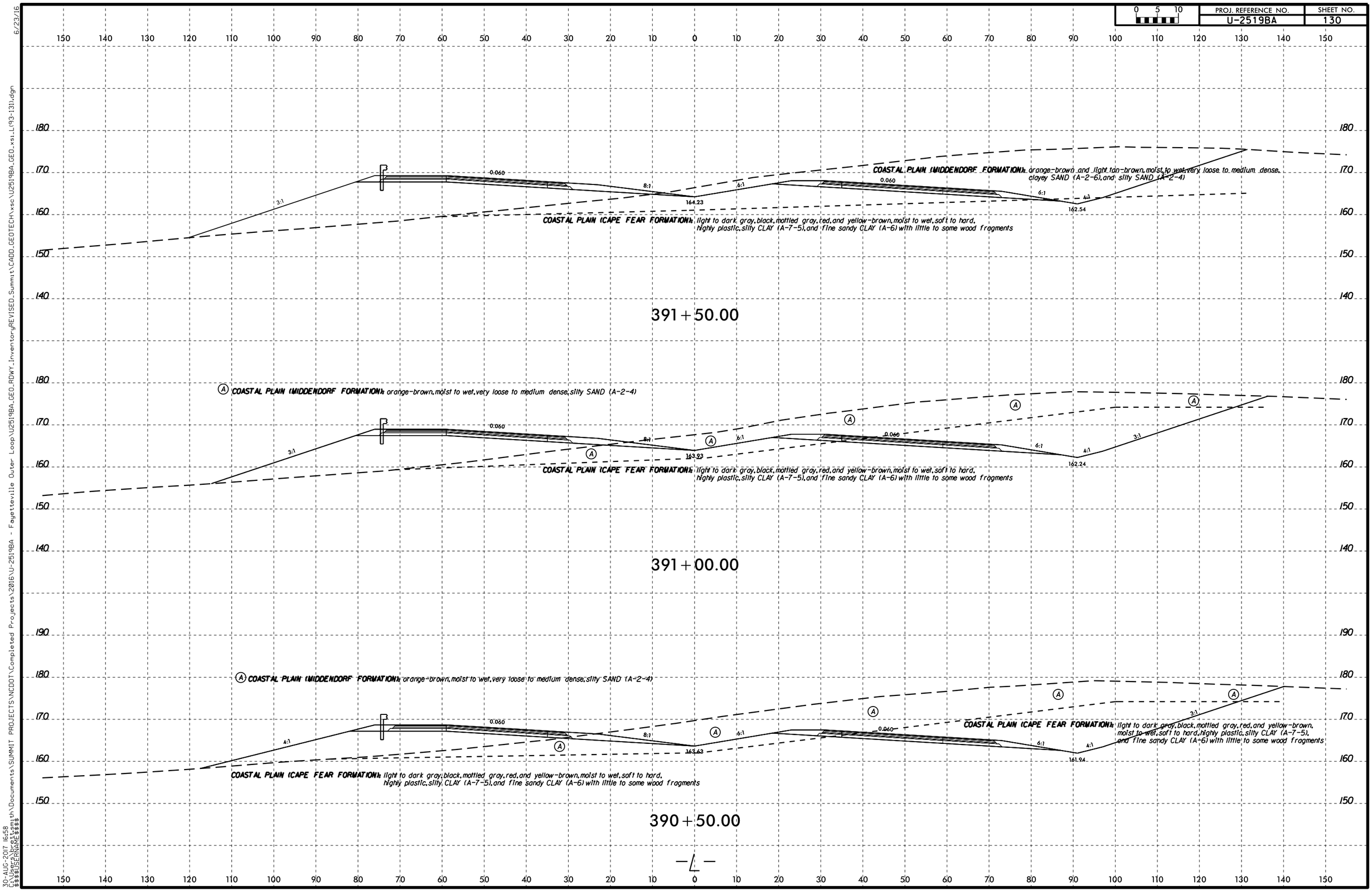




SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-25	CL	390+00	13.6' - 15.1'	A-7-5	67	37	4.4	3.0	1.4	17.3	78.4	100	97	96	29.0	N/A





0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	131

Ⓐ **COASTAL PLAIN (CAPE FEAR FORMATION):** orange-brown and red, saturated, medium dense, fine to coarse SAND (A-1-b)

0.060 8:1 6:1 3:1

164.53 **COASTAL PLAIN (MIDDENDORF FORMATION):** orange-brown and light tan-brown, moist, loose, clayey SAND (A-2-6), and silty SAND (A-2-4)

0.060 6:1 4:1 3:1

162.84

COASTAL PLAIN (CAPE FEAR FORMATION): mottled gray, yellow-brown, and red, wet, soft, sandy CLAY (A-6)

Ⓐ

COASTAL PLAIN (CAPE FEAR FORMATION): dark gray, dry, hard, silty CLAY (A-7)

392+00.00

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6/23/16

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

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20

3:1

0.060

13.303:1

167.98

10:1

0.060

3:1

L_396LT
395+86

ARTESIAN

L_397RT
396+56

ARTESIAN

COASTAL PLAIN (CAPE FEAR FORMATION):
gray, orange-brown, tan-brown, and red, moist to saturated, loose to medium dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

4 20 5 64 36 17 33 21 22 14 68 19

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, moist to wet, hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
light gray to gray, saturated, medium dense to dense, silty SAND (A-2-4), clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, mottled yellow-brown, moist to wet, stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray, orange-brown, tan-brown, and red, moist to saturated, loose to medium dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, moist to wet, hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
light gray to gray, saturated, medium dense to dense, silty SAND (A-2-4), clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, mottled yellow-brown, moist to wet, stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

11 20 16 100/0.6 46 30 65 20 18 11 100/0.1 42

COASTAL PLAIN (CAPE FEAR FORMATION):
gray, orange-brown, tan-brown, and red, moist to saturated, loose to medium dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, moist to wet, hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light gray, saturated, dense, clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, moist to wet, hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION):
light gray to gray, saturated, medium dense to dense, silty SAND (A-2-4), clayey SAND (A-2-6), and fine to coarse SAND (A-1-b)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandy Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION):
gray to dark gray, mottled yellow-brown, moist to wet, stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

396+00.00

—L—

0 5 10

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

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40

L_399LT
399+14

L_400RT
400+09

400+00.00
—L—

3:1

0.060

17.24:1

170.86

10:1

0.060

3:1

ARTESIAN

08/16

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown, moist, loose to medium dense, fine SAND (A-3)

COASTAL PLAIN (CAPE FEAR FORMATION): (23) gray and orange-brown, moist to wet, very stiff, sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, orange-brown, red, tan-brown, and black, wet to saturated, loose to dense, silty SAND (A-2-4) with little clay, trace gravel and wood fragments, and fine to coarse SAND (A-1-b) with trace gravel — (17), (38), (11)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone) — 100/0.5

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, silty CLAY (A-7) with trace fine sand, and sandy CLAY (A-6) — (87), (41)

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, saturated, loose to dense, silty SAND (A-2-4) with trace to little clay and trace wood fragments, and clayey SAND (A-2-6) — (22), (16), (7), (10)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone) — 100/0.7

COASTAL PLAIN (CAPE FEAR FORMATION): light gray, saturated, medium dense, silty SAND (A-2-4) — (29)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone) — 100/0.5

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, orange-brown, red, tan-brown, and black, wet to saturated, loose to dense, silty SAND (A-2-4) with little clay, trace gravel and wood fragments, and fine to coarse SAND (A-1-b) with trace gravel — (48), (24), (8)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone) — 100/0.2

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandstone) — 100/0.2

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, silty CLAY (A-7) with trace fine sand, and sandy CLAY (A-6) — (36), (69)

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, saturated, loose to dense, silty SAND (A-2-4) with trace to little clay and trace wood fragments, and clayey SAND (A-2-6) — (15), (27), (17)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone) — 100/0.8

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, orange-brown, red, tan-brown, and black, wet to saturated, loose to dense, silty SAND (A-2-4) with little clay, trace gravel and wood fragments, and fine to coarse SAND (A-1-b) with trace gravel

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist to wet, hard, silty CLAY (A-7) with trace fine sand, and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): light gray to gray, saturated, loose to dense, silty SAND (A-2-4) with trace to little clay and trace wood fragments, and clayey SAND (A-2-6)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

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

210 200 190 180 170

COASTAL PLAIN (MIDDENDORF FORMATION): tan, brown, white-gray, pink, and red, moist, medium dense to very dense, silty SAND (A-2-4), fine SAND (A-3), and clayey SAND (A-2-6)

3.20:1 4:1 6:1 0.025 8:1 186.03 187.13 8:1 0.025 6:1 4:1 186.03 3:1

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, red, and yellow-orange, moist, very stiff, highly plastic, sandy CLAY (A-7-5)

COASTAL PLAIN (MIDDENDORF FORMATION): white, light pink, and orange-brown, moist to wet, medium dense to dense, silty SAND (A-2-4)

429+50.00

COASTAL PLAIN (MIDDENDORF FORMATION): tan, brown, white-gray, pink, and red, moist, medium dense to very dense, silty SAND (A-2-4), fine SAND (A-3), and clayey SAND (A-2-6)

4.93:1 6:1 0.025 8:1 185.93 187.04 8:1 0.025 6:1 4:1 185.93 3:1

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** orange-brown, moist, medium dense, clayey SAND (A-2-6)

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray, red, and yellow-orange, moist, very stiff, highly plastic, sandy CLAY (A-7-5)

COASTAL PLAIN (MIDDENDORF FORMATION): white, light pink, and orange-brown, moist to wet, medium dense to dense, silty SAND (A-2-4)

429+00.00

COASTAL PLAIN (MIDDENDORF FORMATION): tan, brown, orange-brown, white, gray, pink, and red, moist to wet, medium dense to very dense, silty SAND (A-2-4), fine SAND (A-3), and clayey SAND (A-2-6)

5.99:1 6:1 0.025 8:1 185.77 186.88 8:1 0.025 6:1 4:1 185.55

COASTAL PLAIN (MIDDENDORF FORMATION): tan, brown, orange-brown, white, gray, pink, and red, moist to wet, medium dense to very dense, silty SAND (A-2-4), fine SAND (A-3), and clayey SAND (A-2-6)

428+50.00

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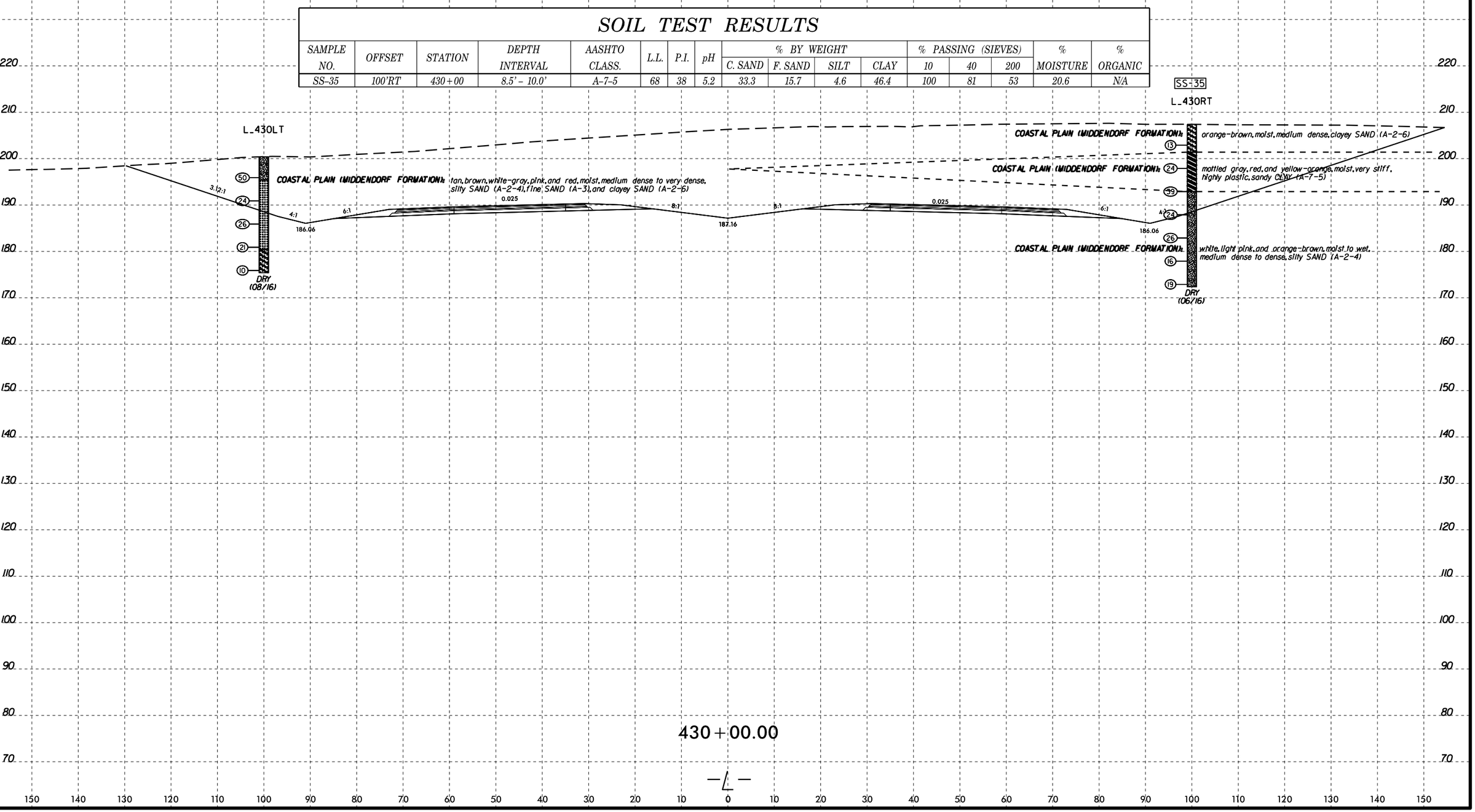
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-35	100'RT	430+00	8.5' – 10.0'	A-7-5	68	38	5.2	33.3	15.7	4.6	46.4	100	81	53	20.6	N/A



430+00.00

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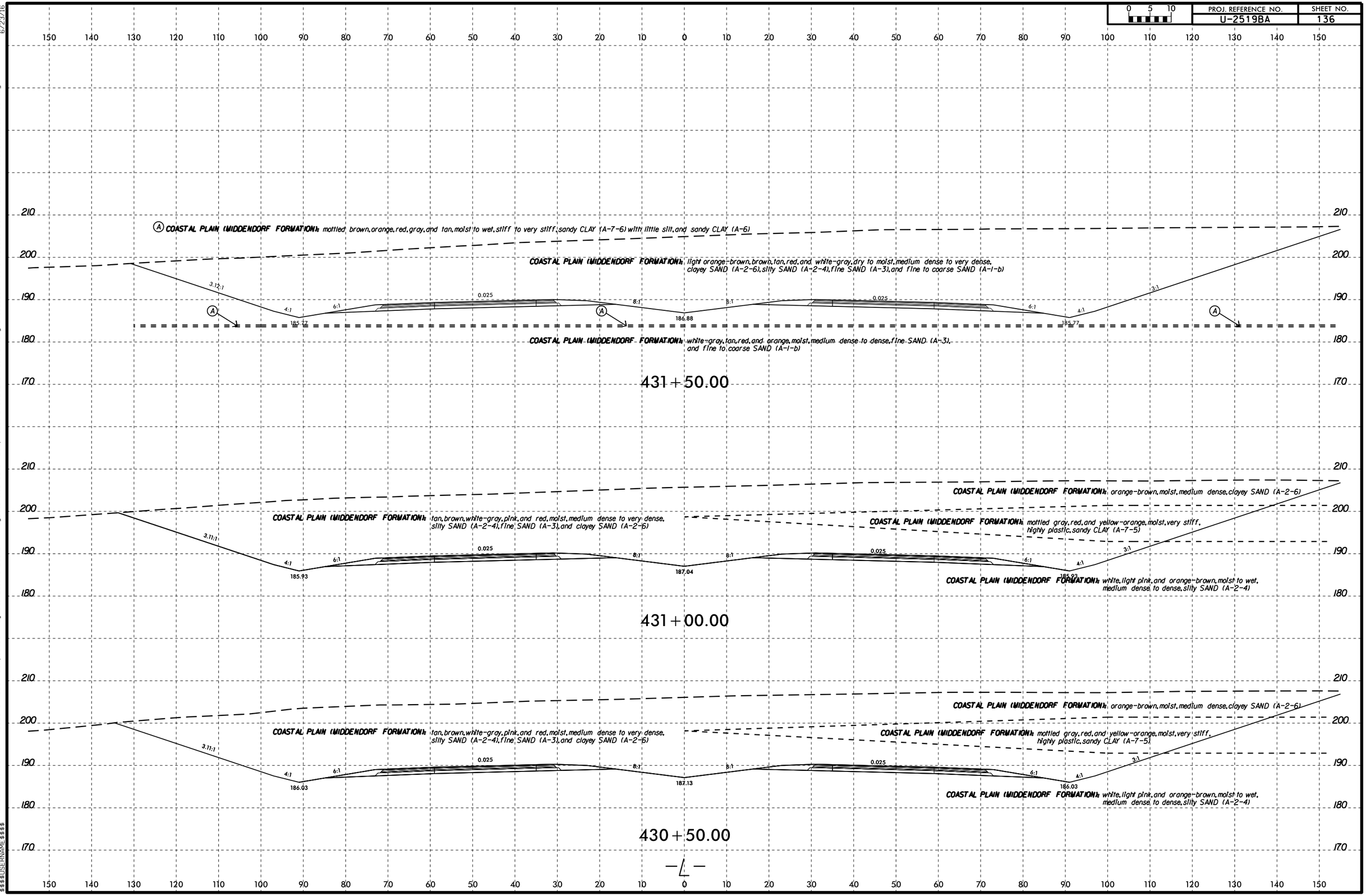

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

220 210 200 190 180 170

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *mottled brown,orange,red,gray,and tan,moist to wet,stiff to very stiff,sandy CLAY (A-7-6) with little silt,and sandy CLAY (A-6)*

COASTAL PLAIN (MIDDENDORF FORMATION): *light orange-brown,brown,tan,red,and white-gray,dry to moist,medium dense to dense, clayey SAND (A-2-6),silty SAND (A-2-4),and fine SAND (A-3)*

3.14:1 4:1 6:1 185.26 0.025 8:1 8:1 186.37 0.025 6:1 4:1 3:1

COASTAL PLAIN (MIDDENDORF FORMATION): *white-gray,tan,red,and orange,moist,medium dense to dense,fine SAND (A-3), and fine to coarse SAND (A-1-b)*

432+50.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *mottled brown,orange,red,gray,and tan,moist to wet,stiff to very stiff,sandy CLAY (A-7-6) with little silt,and sandy CLAY (A-6)*

COASTAL PLAIN (MIDDENDORF FORMATION): *light orange-brown,brown,tan,red,and white-gray,dry to moist,medium dense to dense, clayey SAND (A-2-6),silty SAND (A-2-4),and fine SAND (A-3)*

3.13:1 4:1 6:1 185.55 0.025 8:1 8:1 186.65 0.025 6:1 4:1 3:1

COASTAL PLAIN (MIDDENDORF FORMATION): *white-gray,tan,red,and orange,moist,medium dense to dense,fine SAND (A-3), and fine to coarse SAND (A-1-b)*

432+00.00

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SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-506	100'LT	433+00	8.8' - 10.3'	A-7-6	41	22	4.9	5.7	38.2	17.4	38.7	100	98	62	21.8	N/A
SS-509	100'RT	433+00	18.3' - 19.8'	A-6	29	11	4.6	2.7	53.3	10.7	33.3	100	99	49	28.1	N/A

SS-506
L_433LT

SS-509
L_433RT

COASTAL PLAIN (MIDDENDORF FORMATION): light orange-brown, brown, tan, red, and white-gray, dry to moist, medium dense to dense, clayey SAND (A-2-6), silty SAND (A-2-4), and fine SAND (A-3)

COASTAL PLAIN (MIDDENDORF FORMATION): white-gray, tan, red, and orange, moist, medium dense to dense, fine SAND (A-3), and fine to coarse SAND (A-1-b)

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled brown, orange, red, gray, and tan, moist to wet, stiff to very stiff, sandy CLAY (A-7-6) with little silt, and sandy CLAY (A-6)

433+00.00
-L-

6/23/16

30-AUG-2017 17:01
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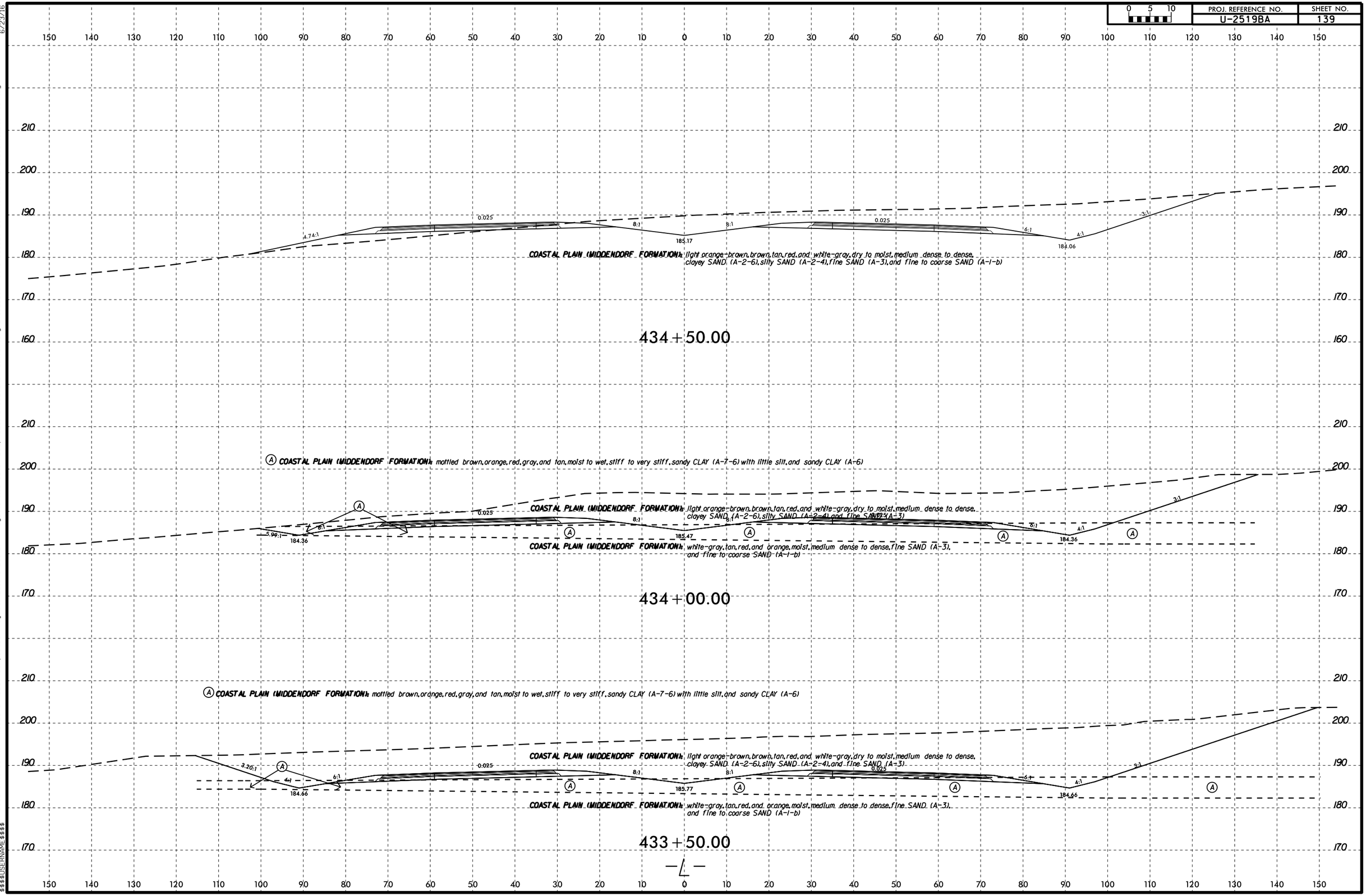

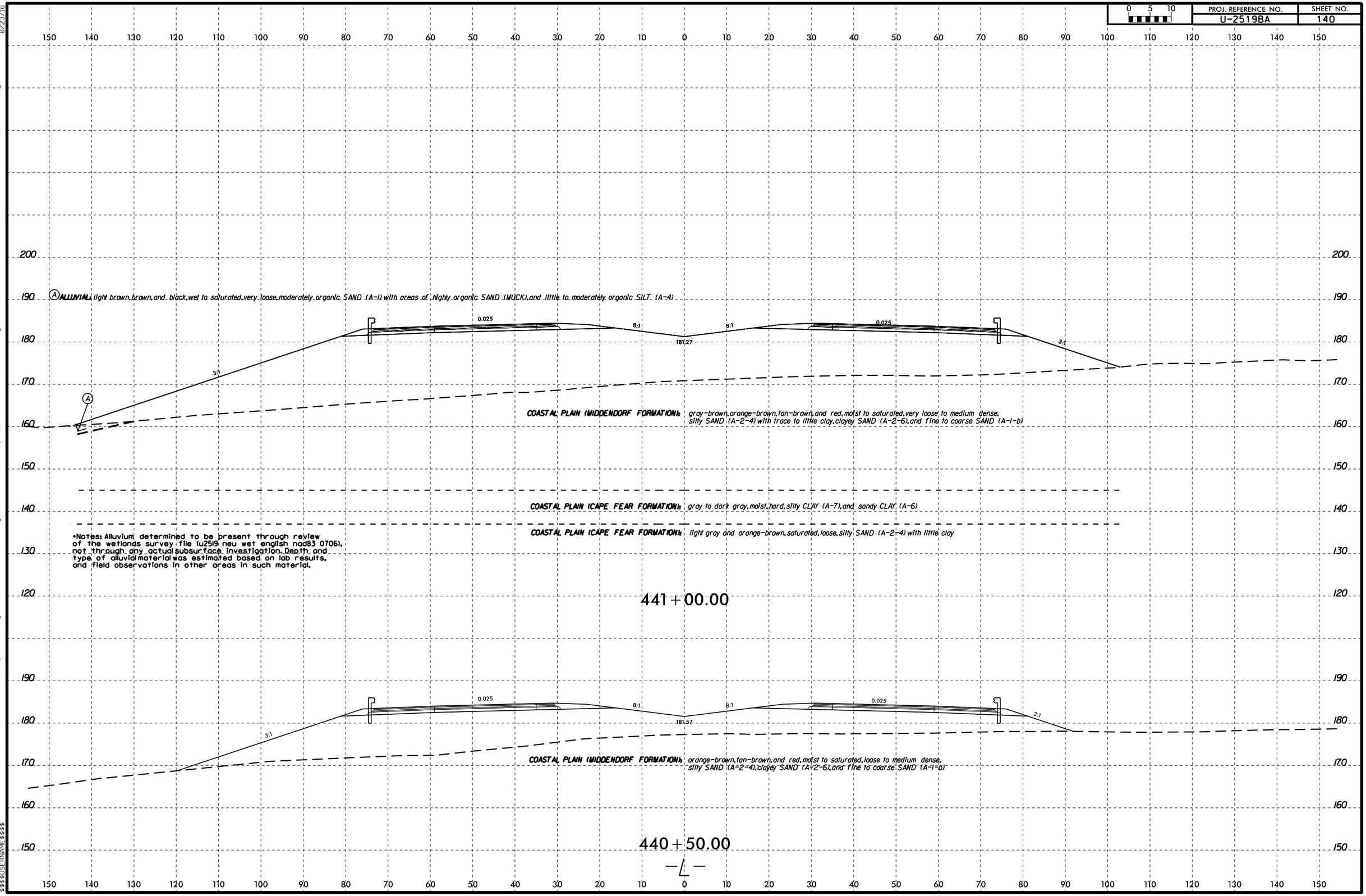

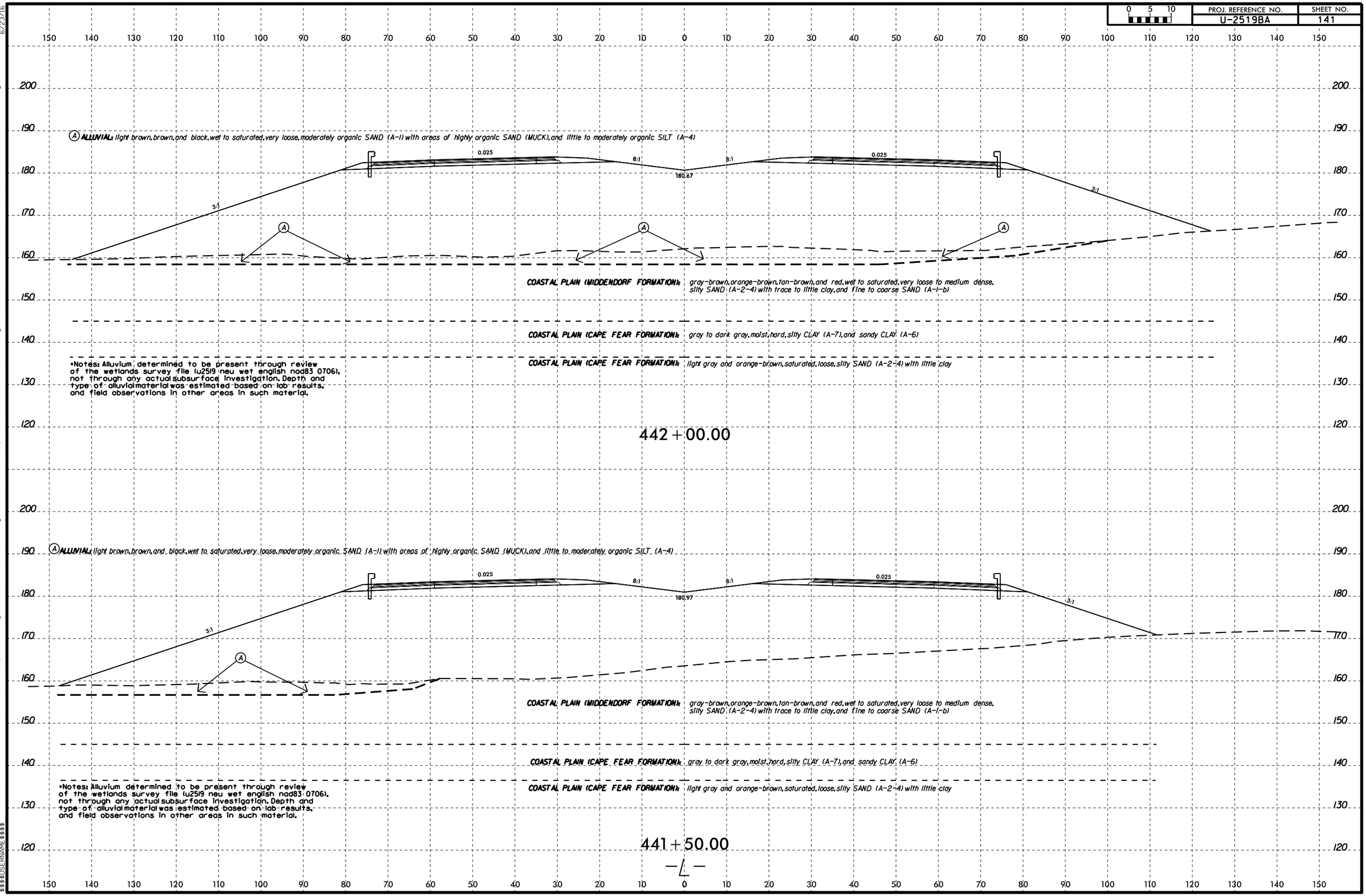

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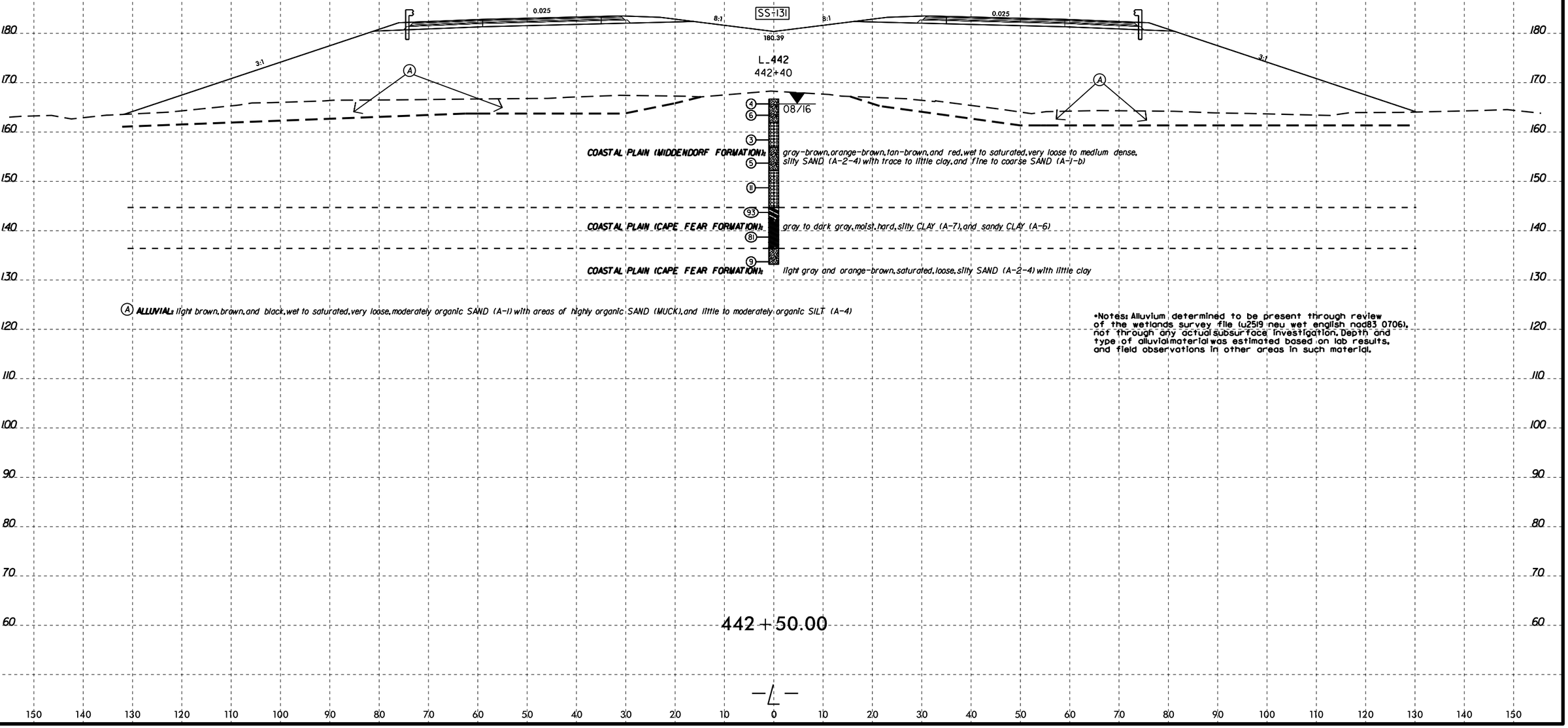
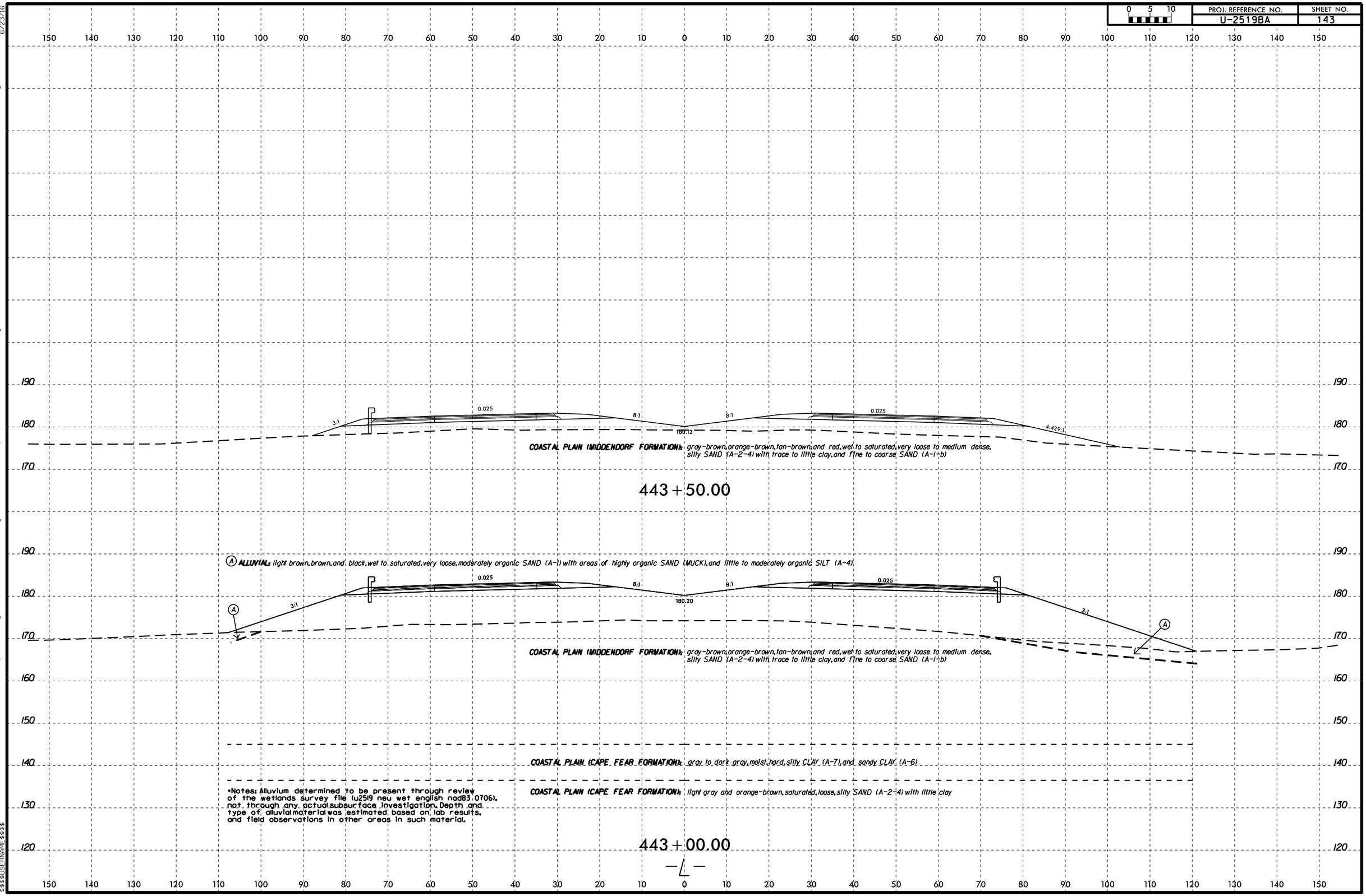
$$$$USERNAME$$$$

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-131	CL	442+40	0.0' - 1.5'	A-2-4	18	0	5.3	58.7	29.8	9.9	1.5	93	61	13	21.0	N/A

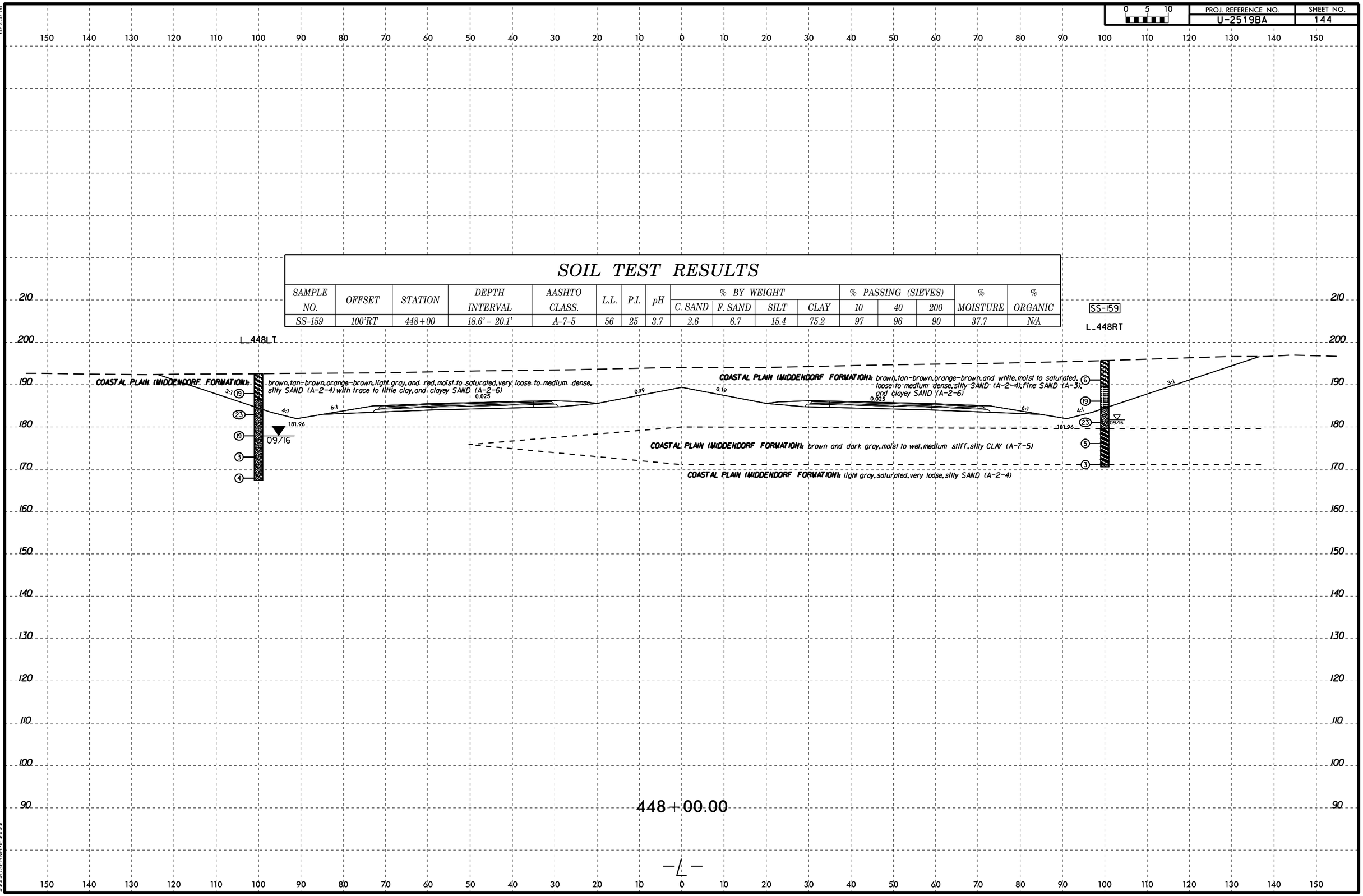


•Notes: Alluvium determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706), not through any actual subsurface investigation. Depth and type of alluvial material was estimated based on lab results, and field observations in other areas in such material.



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-159	100'RT	448+00	18.6' - 20.1'	A-7-5	56	25	3.7	2.6	6.7	15.4	75.2	97	96	90	37.7	N/A



Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown, brown, and orange-brown, moist, medium dense, silty SAND (A-2-4) with little clay, and fine SAND (A-3)

Ⓑ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray, red, yellow, and orange-brown, moist, stiff to very stiff, silty CLAY (A-7) with little fine sand, and sandy CLAY (A-6)

Ⓒ **COASTAL PLAIN (MIDDENDORF FORMATION):** dark gray, moist, stiff, sandy CLAY (A-6)

Ⓓ **COASTAL PLAIN (MIDDENDORF FORMATION):** gray, moist, hard, sandy CLAY (A-6)

Ⓔ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray, red, and orange-brown, moist, very stiff, silty CLAY (A-7)

L_450LT
449+63

3:1 6:1 0.025 4:1 4:1 0.025 6:1 4:1 3:1

183.31

14 15 23 (183.) 09/16

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, light gray, and red, wet to saturated, loose to medium dense, silty SAND (A-2-4) with little clay, and clayey SAND (A-2-6)

5 13

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and light gray, saturated, very loose, silty SAND (A-2-4) with little clay

3 42

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, white, and red, saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay

5 20

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, red-brown, and light gray, saturated, loose to medium dense, silty SAND (A-2-4) with little clay

100/0.9 100/0.8

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

17 83 100/0.4

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, orange-brown, red, and white, saturated, medium dense to very dense, silty SAND (A-2-4) with little clay, and clayey SAND (A-2-6)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION): mottled gray and yellow-brown, moist, hard, silty CLAY (A-7)

449+50.00

3:1 4:1 6:1 0.025 4:1 4:1 0.025 6:1 4:1 3:1

182.86 182.86

COASTAL PLAIN (MIDDENDORF FORMATION): brown, tan-brown, orange-brown, light gray, and red, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): brown, tan-brown, orange-brown, and white, moist to saturated, loose to medium dense, silty SAND (A-2-4), fine SAND (A-3), and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): brown and dark gray, moist to wet, medium stiff, silty CLAY (A-7-5)

COASTAL PLAIN (MIDDENDORF FORMATION): light gray, saturated, very loose, silty SAND (A-2-4)

449+00.00

—L—

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

200 190 180 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,tan-brown,and gray,moist to saturated,loose to medium dense,silty SAND (A-2-4) with little to some clay, and fine to coarse SAND (A-1-b)

3:1 4:1 6:1 0.025 184.21

450+50.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown,brown,and orange-brown,moist,medium dense,silty SAND (A-2-4) with little clay,and fine SAND (A-3)

Ⓑ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,red,yellow,and orange-brown,moist,stiff to very stiff,silty CLAY (A-7) with little fine sand,and sandy CLAY (A-6)

Ⓒ **COASTAL PLAIN (MIDDENDORF FORMATION):** dark gray,moist,stiff,sandy CLAY (A-6)

Ⓓ **COASTAL PLAIN (MIDDENDORF FORMATION):** gray,moist,hard,sandy CLAY (A-6)

Ⓔ **COASTAL PLAIN (MIDDENDORF FORMATION):** mottled gray,red,and orange-brown,moist,very stiff,silty CLAY (A-7)

ROADWAY EMBANKMENT FILL **ROADWAY EMBANKMENT FILL** **ROADWAY EMBANKMENT FILL**

L_450RT
450+18

3:1 4:1 6:1 0.025 183.76 09/18 3.76

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,light gray,and red,wet to saturated,loose to medium dense, silty SAND (A-2-4) with little clay,and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and light gray,saturated,very loose,silty SAND (A-2-4) with little clay

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,red-brown,and light gray,saturated,loose to medium dense, silty SAND (A-2-4) with little clay

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown,white,and red,saturated,very loose to medium dense, silty SAND (A-2-4) with trace to little clay

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION): gray,orange-brown,red,and white,saturated,medium dense to very dense,silty SAND (A-2-4) with little clay,and clayey SAND (A-2-6)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Mudstone)

COASTAL PLAIN (CAPE FEAR FORMATION): mottled gray and yellow-brown,moist,hard,silty CLAY (A-7)

12 21 16 24 2 2 3 4 6 23 100/0.9 23 10 100/0.7 60

450+00.00

—L—

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	147

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

200
190
180

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** gray-brown, moist, very stiff, sandy CLAY (A-6)

3:1 4:1 Ⓐ 6:1 0.025 0.06 0.06 0.025 6:1 Ⓐ 4.312:1

187.81 190.01 187.81

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist to saturated, medium dense, fine to coarse SAND (A-1-b)

454+50.00

210
200
190
180

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** gray-brown, moist, very stiff, sandy CLAY (A-6)

Ⓐ Ⓐ Ⓐ

3:1 4:1 6:1 0.025 0.00 0.025 6:1 4:1 3:1

187.36 187.36

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist to saturated, medium dense, fine to coarse SAND (A-1-b)

454+00.00

200
190
180

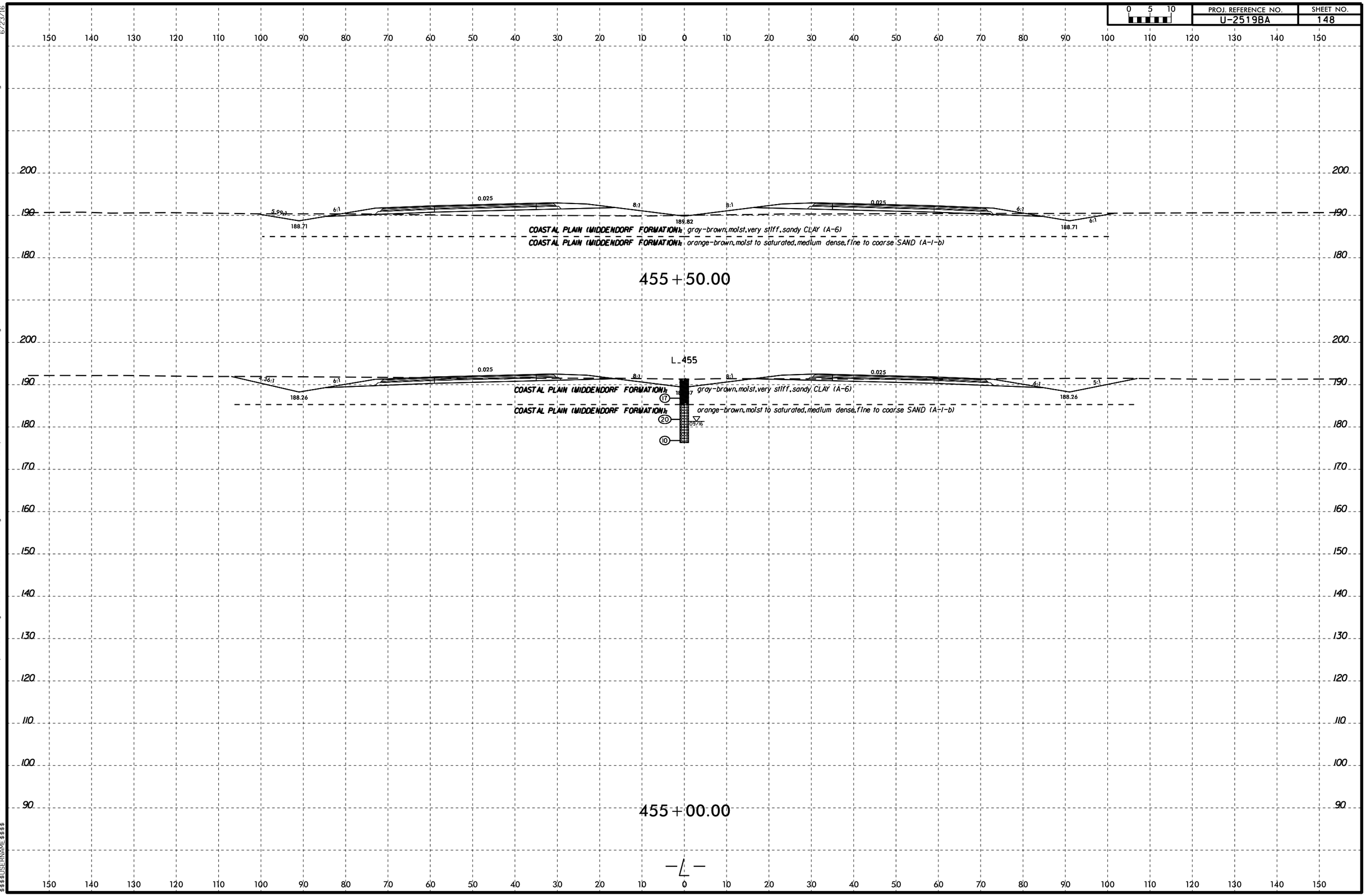
3:1 4:1 6:1 0.025 0.06 0.06 0.025 6:1 4:1 3:1

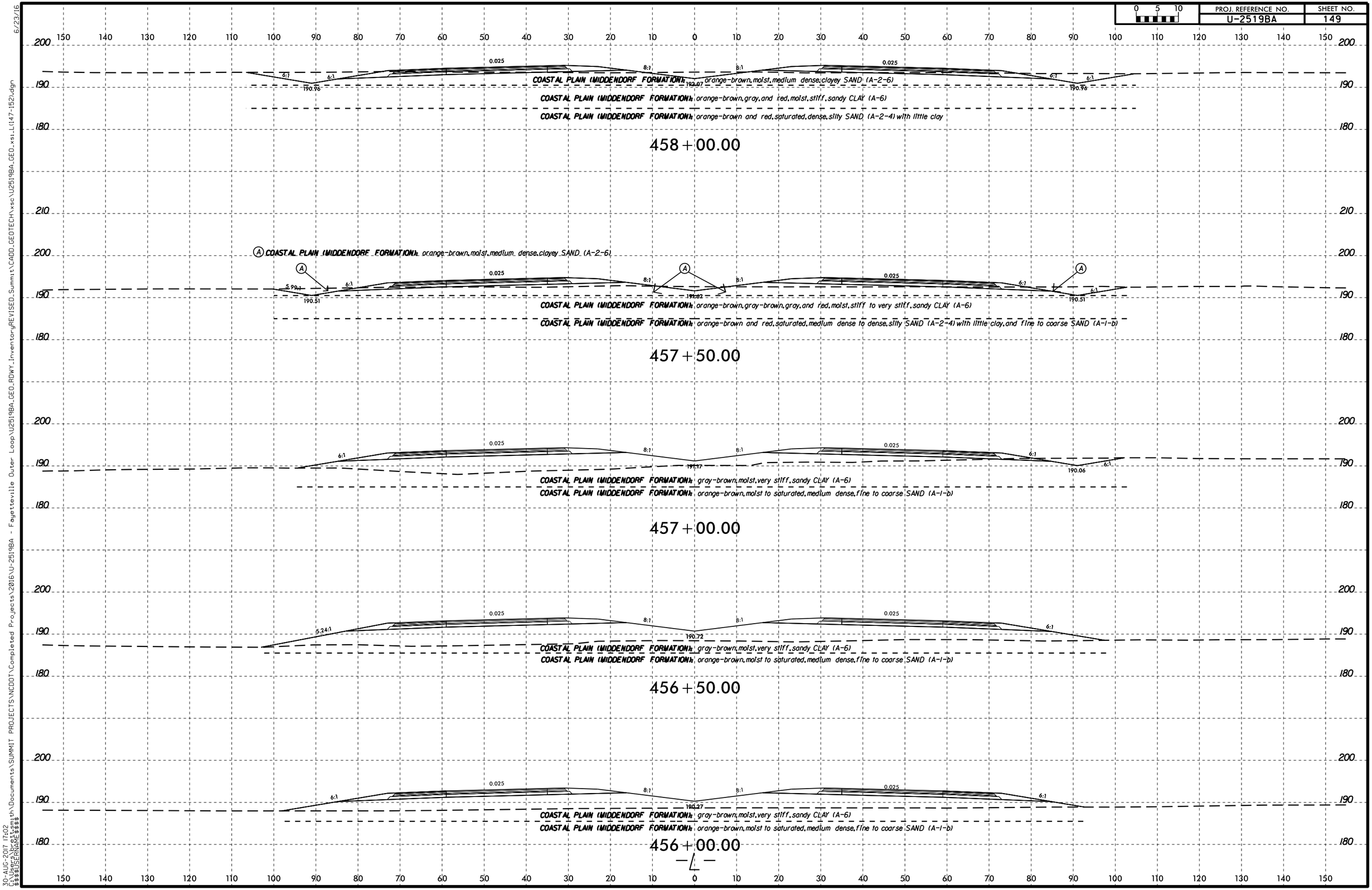
186.91 186.91

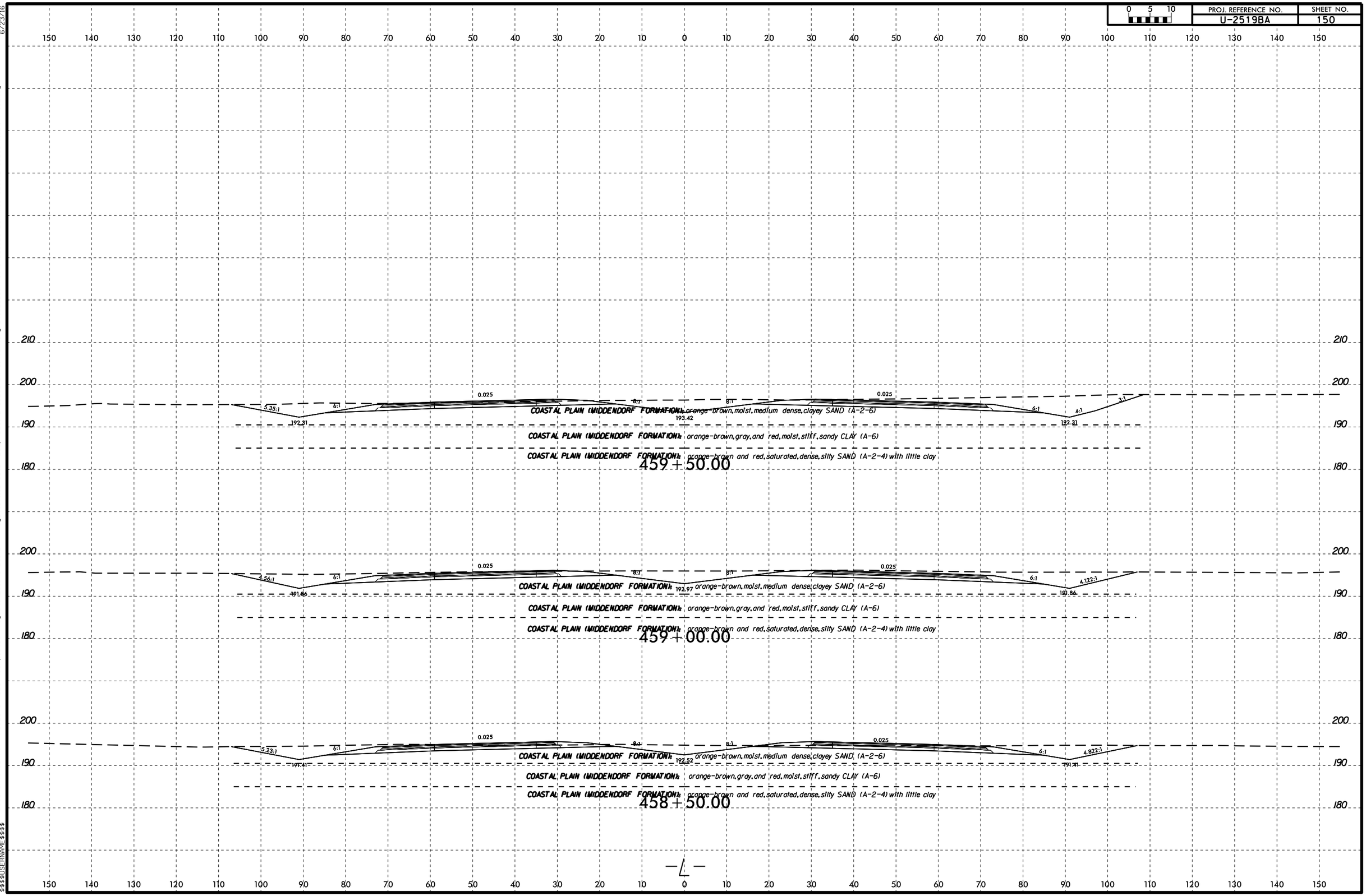
COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist to saturated, medium dense, fine to coarse SAND (A-1-b)

453+50.00

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







0 5 10

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

210 200 190 180 170 160 150 140 130 120 110 100 90

0.025 6:1 6:1 193.21 8:1 8:1 0.025 6:1 4:1 3:1 193.21

COASTAL PLAIN (MIDDENDORF FORMATION): 194.32 orange-brown, moist, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, gray, and red, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and red, saturated, dense, silty SAND (A-2-4) with little clay

460+50.00

L_460

0.025 5.9:1 6:1 192.76 8:1 8:1 0.025 6:1 4:1 3:1 192.76

COASTAL PLAIN (MIDDENDORF FORMATION): (12) 19[illegible]7 orange-brown, moist, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): (10) orange-brown, gray, and red, moist, stiff, sandy CLAY (A-6)

09/16

COASTAL PLAIN (MIDDENDORF FORMATION): (31) orange-brown and red, saturated, dense, silty SAND (A-2-4) with little clay

460+00.00

—L—

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

210 200 190 180

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** light tan-brown, moist, very loose, silty SAND (A-2-4)

Ⓐ 6:1 0.025 8:1 Ⓐ 195.67 8:1 0.025 6:1 Ⓐ 194.56 6:1

COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, yellow-brown, and red, moist, stiff, sandy CLAY (A-7-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and red, wet to saturated, medium dense, silty SAND (A-2-4)

462+00.00

6:1 0.025 8:1 195.22 8:1 0.025 6:1 5:1 194.11

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and light brown, moist, very loose to medium dense, clayey SAND (A-2-6), and silty SAND (A-2-4)

COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, orange-brown, yellow-brown, and red, moist, stiff, sandy CLAY (A-7-6 & A-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and red, wet to saturated, medium dense to dense, silty SAND (A-2-4) with trace to little clay

461+50.00

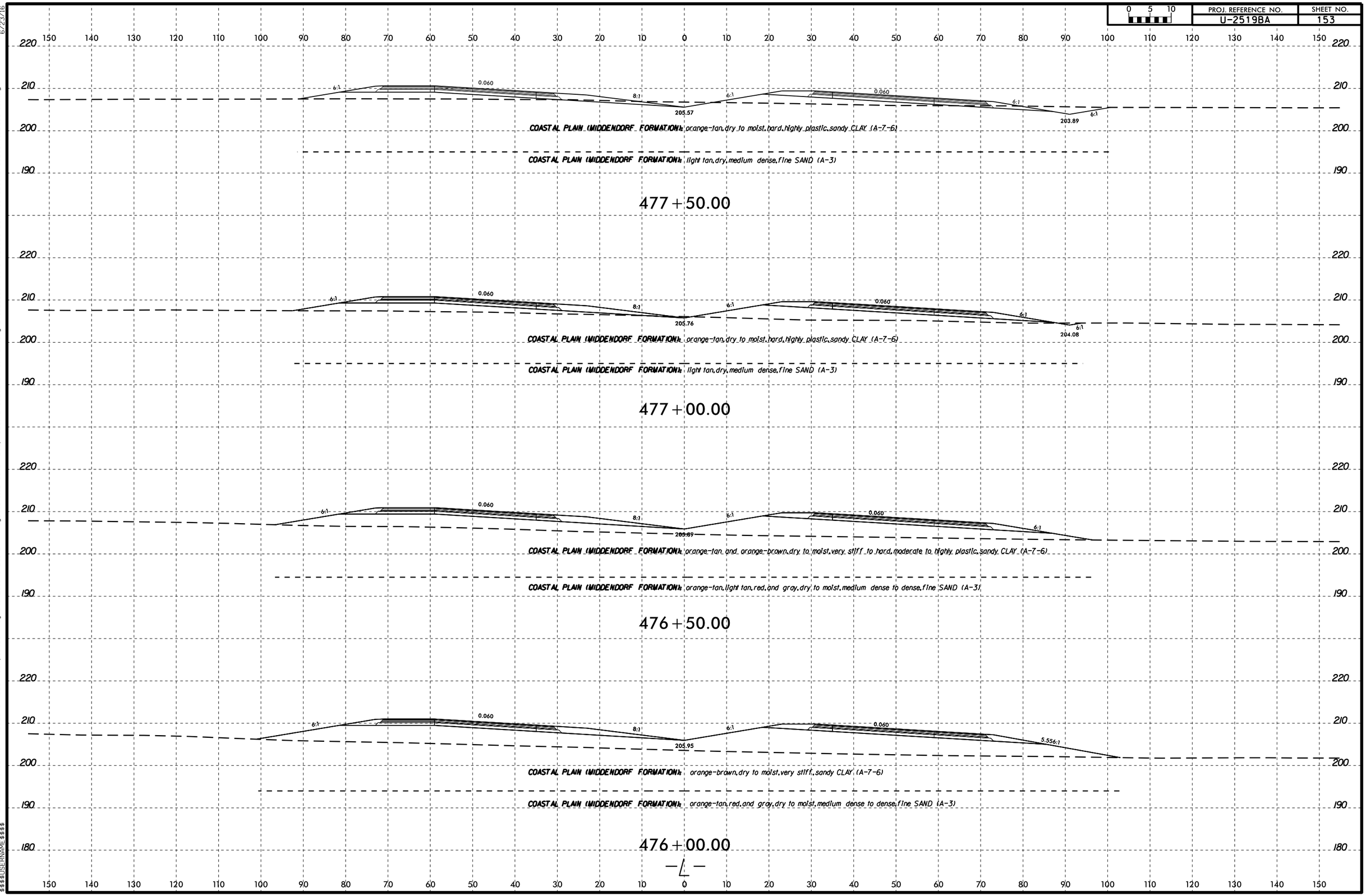
6:1 193.66 6:1 0.025 8:1 194.77 8:1 0.025 6:1 4:1 3:1 193.66

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, gray, and red, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown and red, saturated, dense, silty SAND (A-2-4) with little clay

461+00.00



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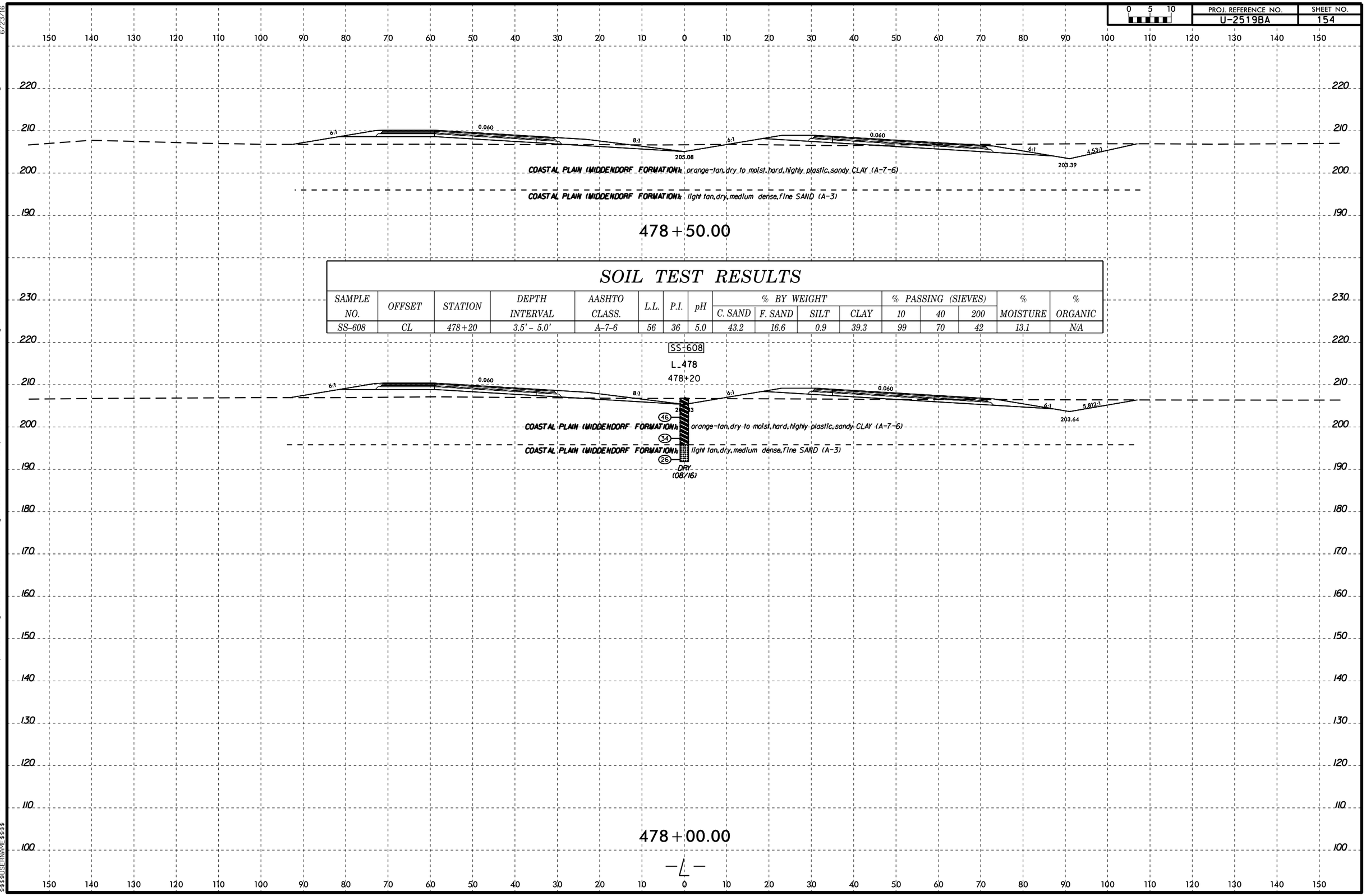
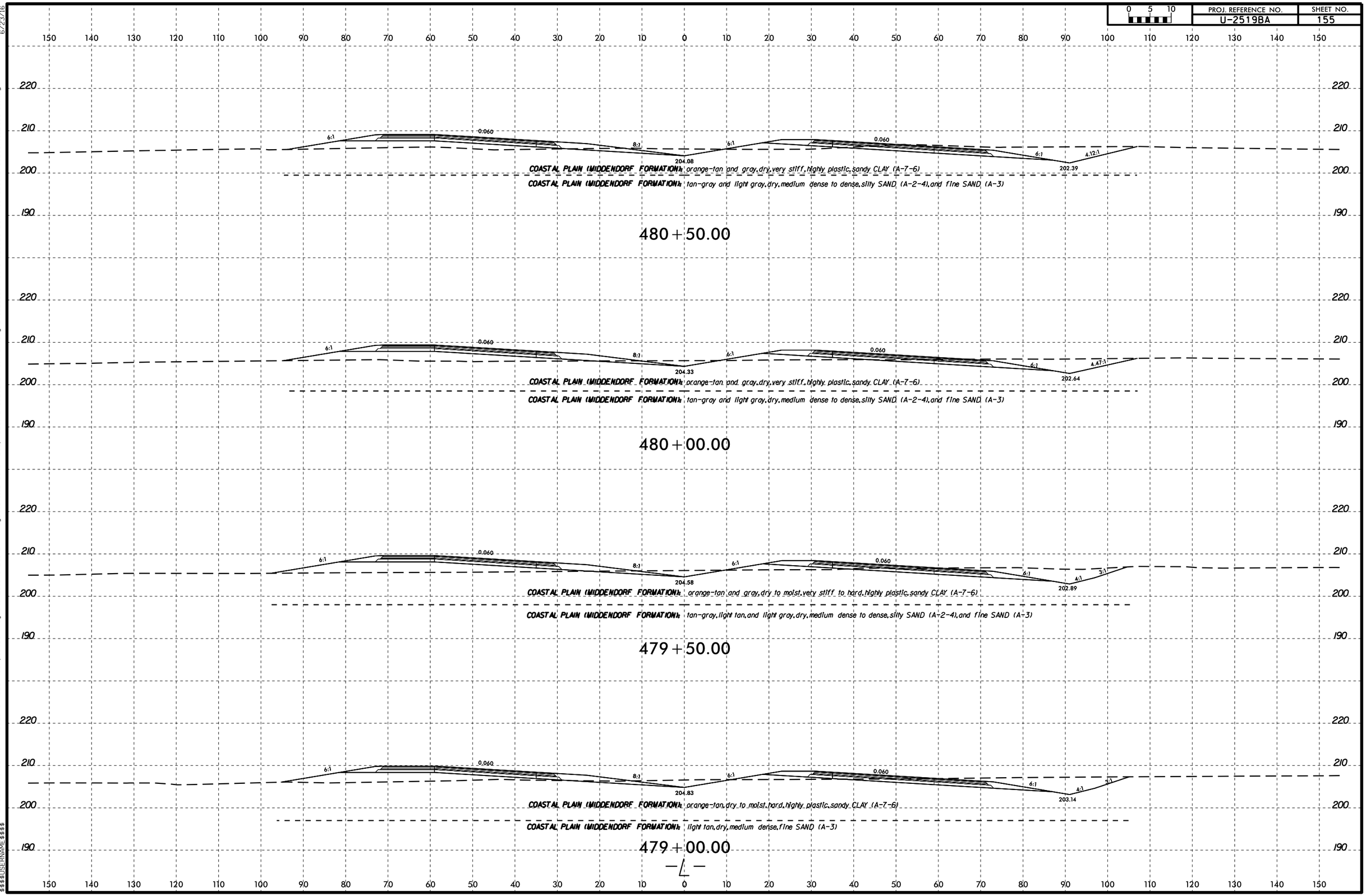
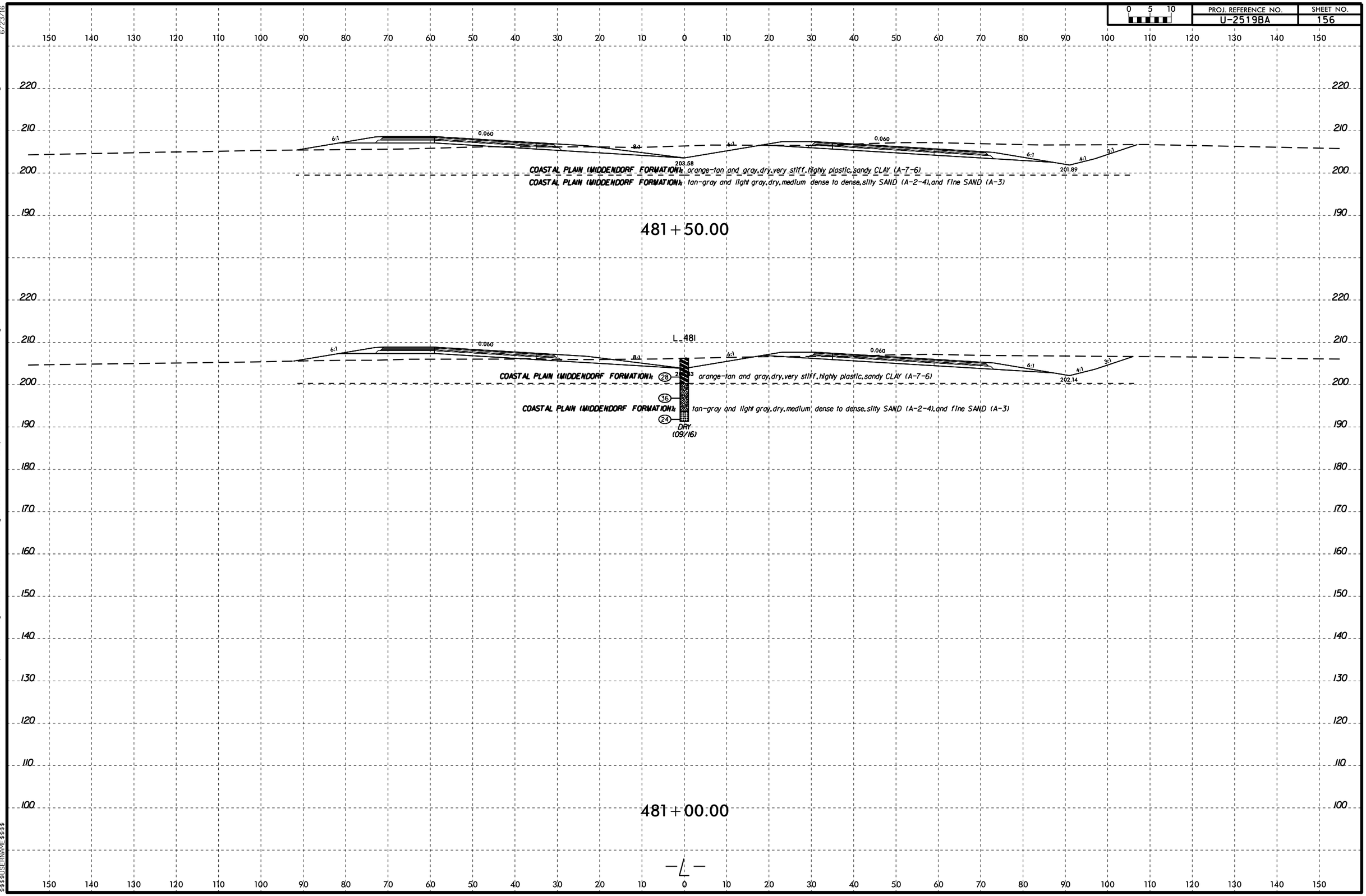


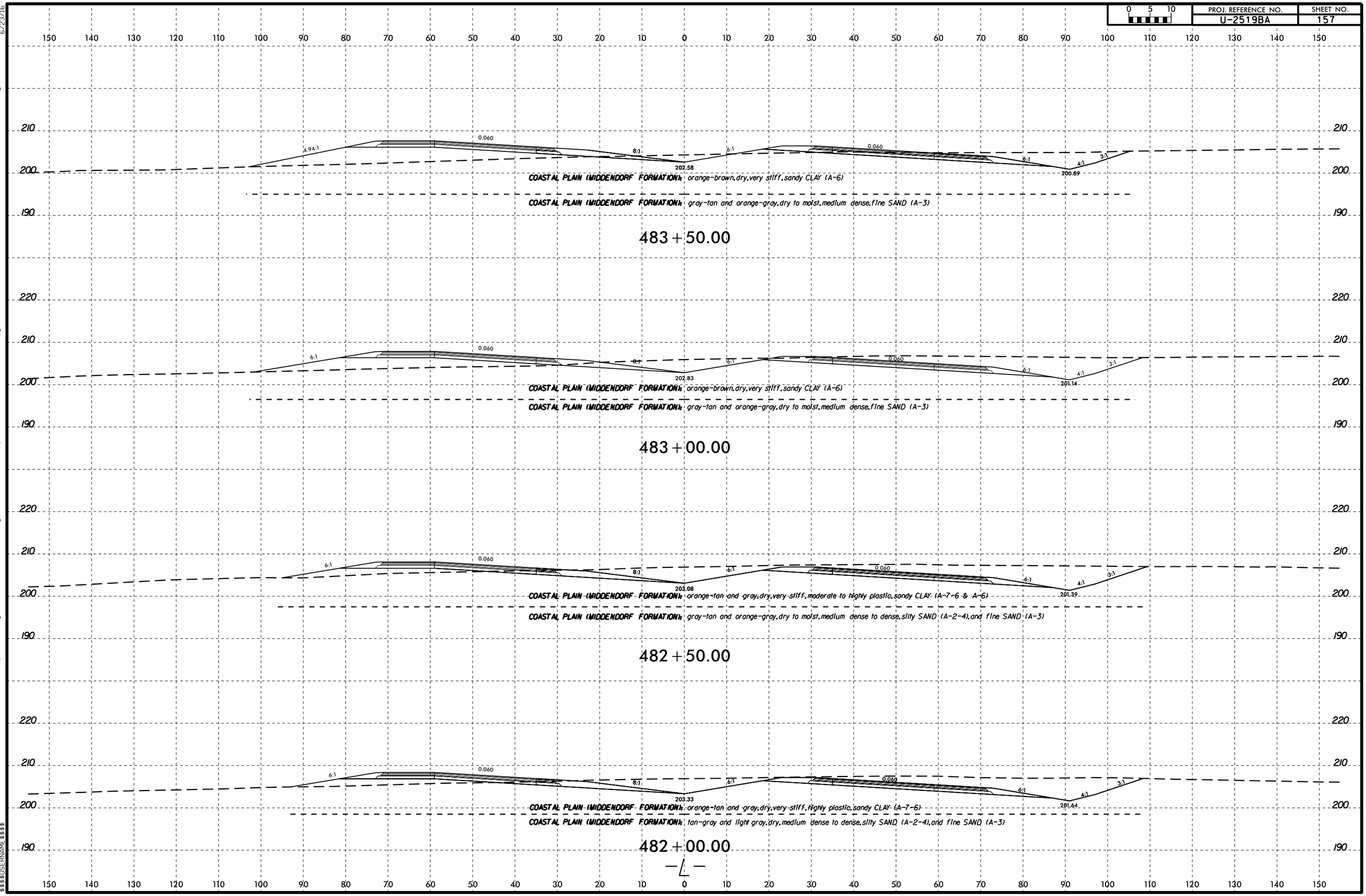
SOIL TEST RESULTS

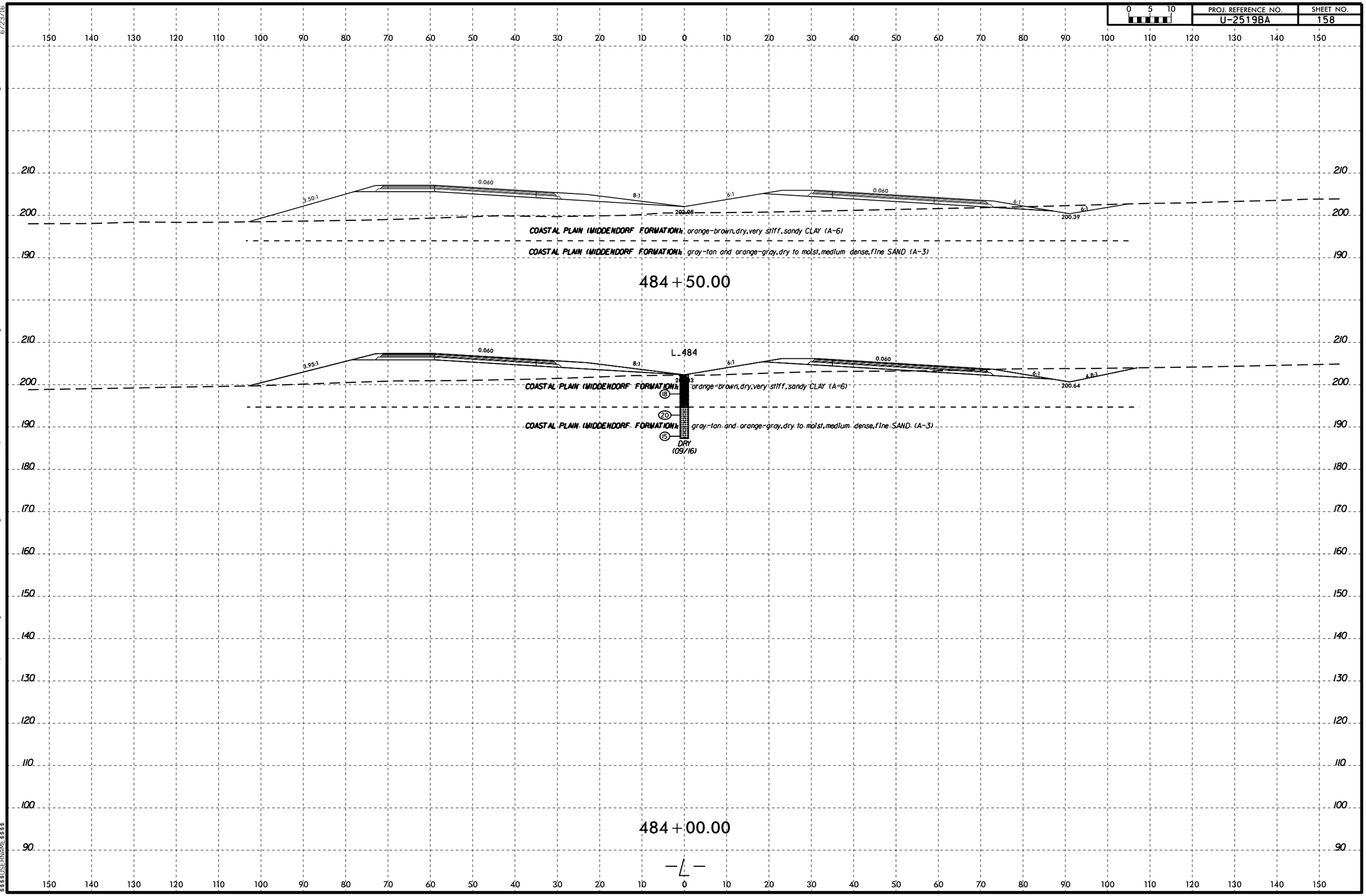
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-608	CL	478+20	3.5' – 5.0'	A-7-6	56	36	5.0	43.2	16.6	0.9	39.3	99	70	42	13.1	N/A

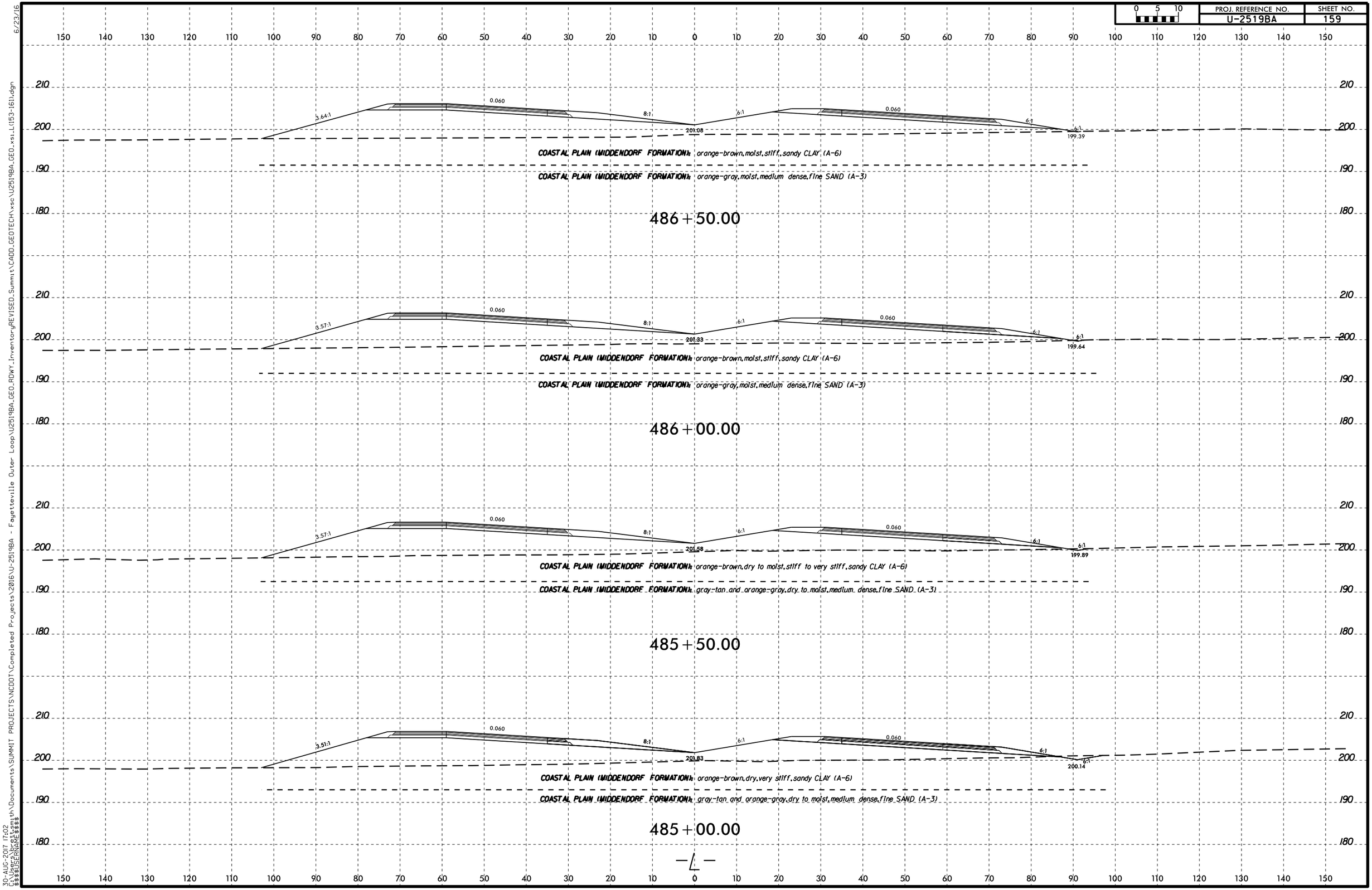
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	155

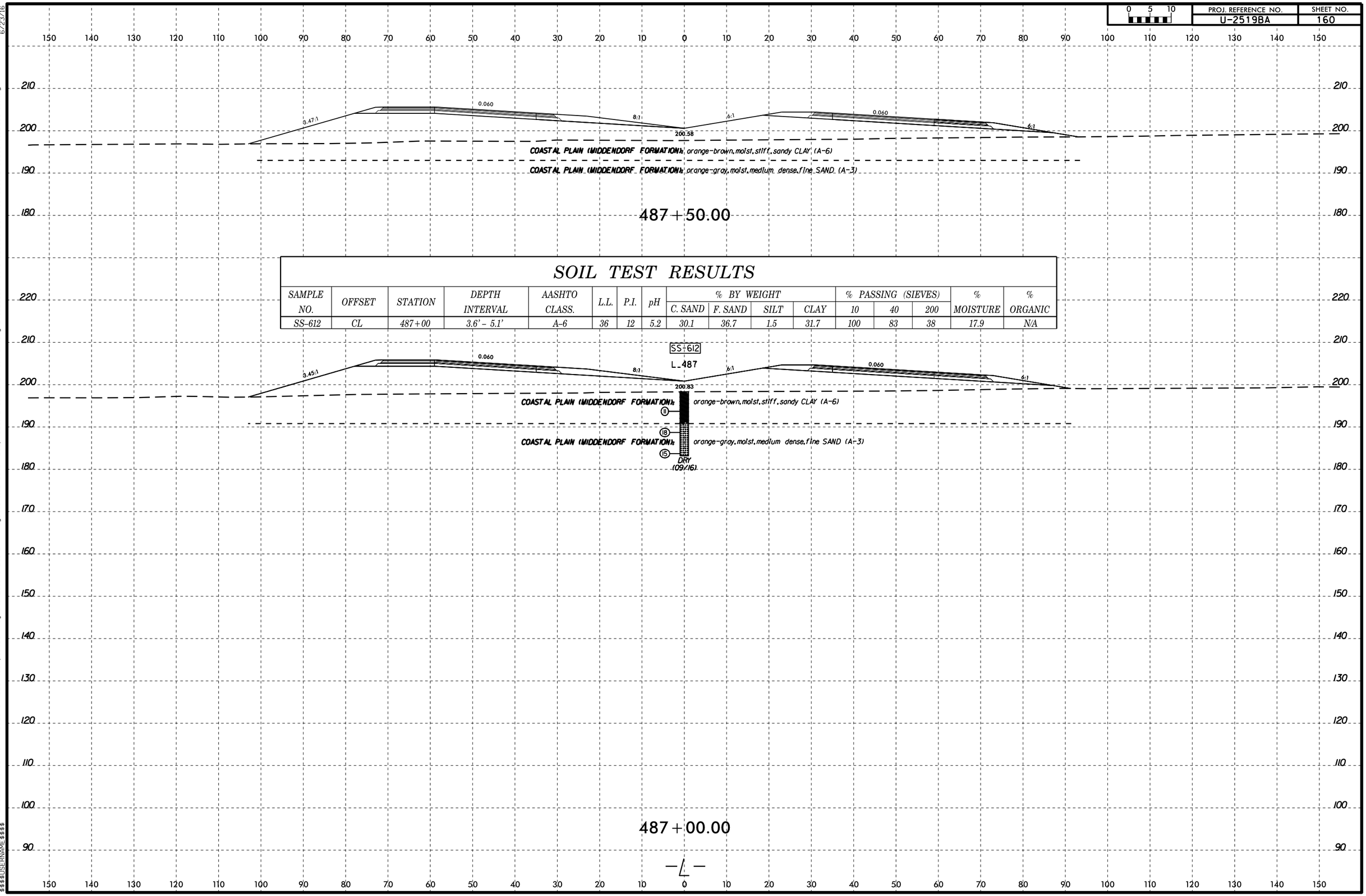






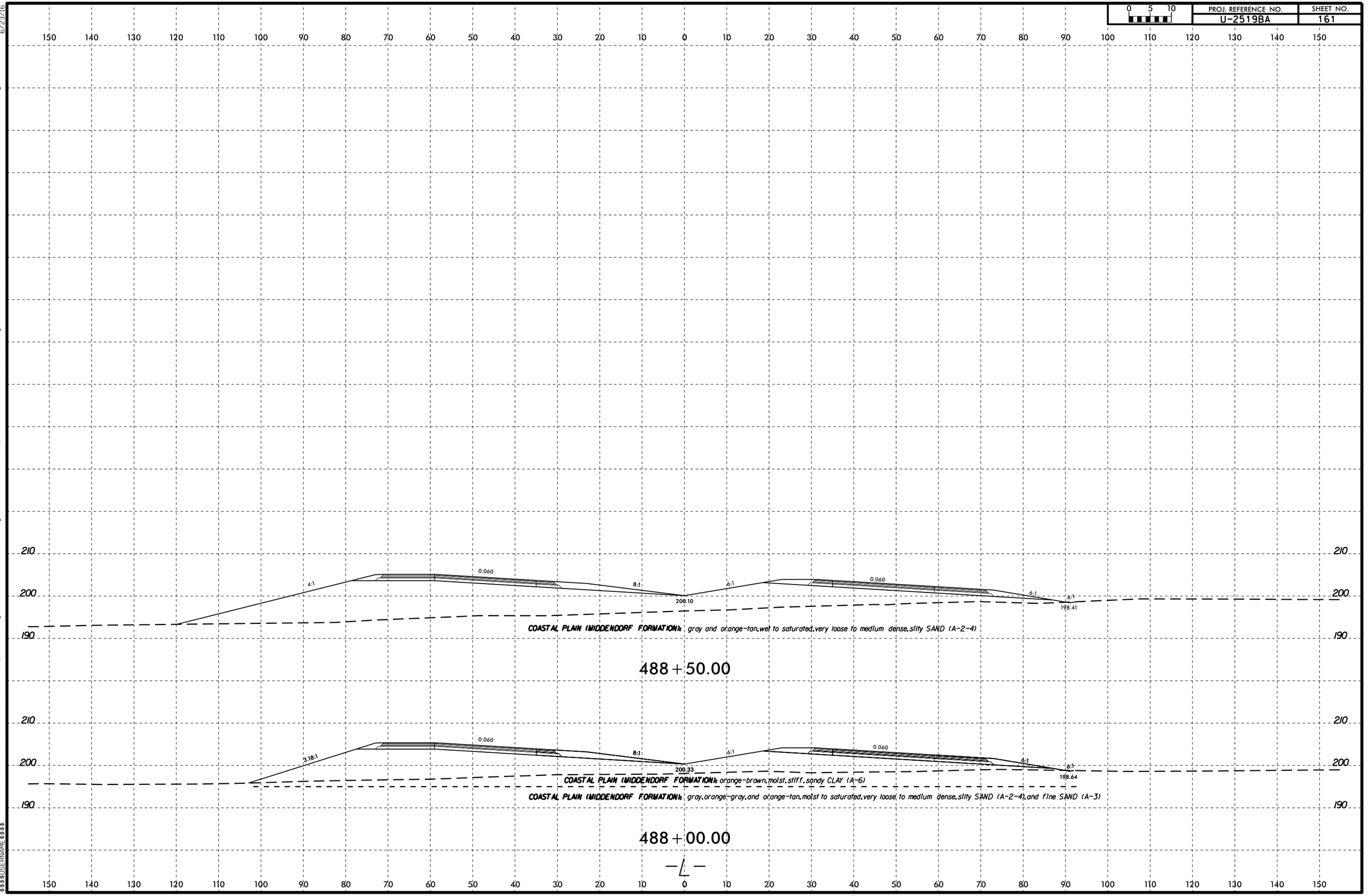






SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-612	CL	487+00	3.6' - 5.1'	A-6	36	12	5.2	30.1	36.7	1.5	31.7	100	83	38	17.9	N/A



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$$$$USERNAME$$$$

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

210 200 190

5.60:1 0.060 8:1 6:1 0.060 6:1

201.96

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, moist, stiff, sandy CLAY (A-6)

COASTAL PLAIN (MIDDENDORF FORMATION): orange-tan and orange-brown, wet to saturated, medium dense, silty SAND (A-2-4), and fine SAND (A-3)

492+50.00

220 210 200 190

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** orange-brown, moist, stiff, sandy CLAY (A-6)

4.68:1 0.060 8:1 6:1 0.060 6:1

201.44

COASTAL PLAIN (MIDDENDORF FORMATION): orange-tan and orange-brown, wet to saturated, medium dense, silty SAND (A-2-4), and fine SAND (A-3)

492+00.00

210 200 190

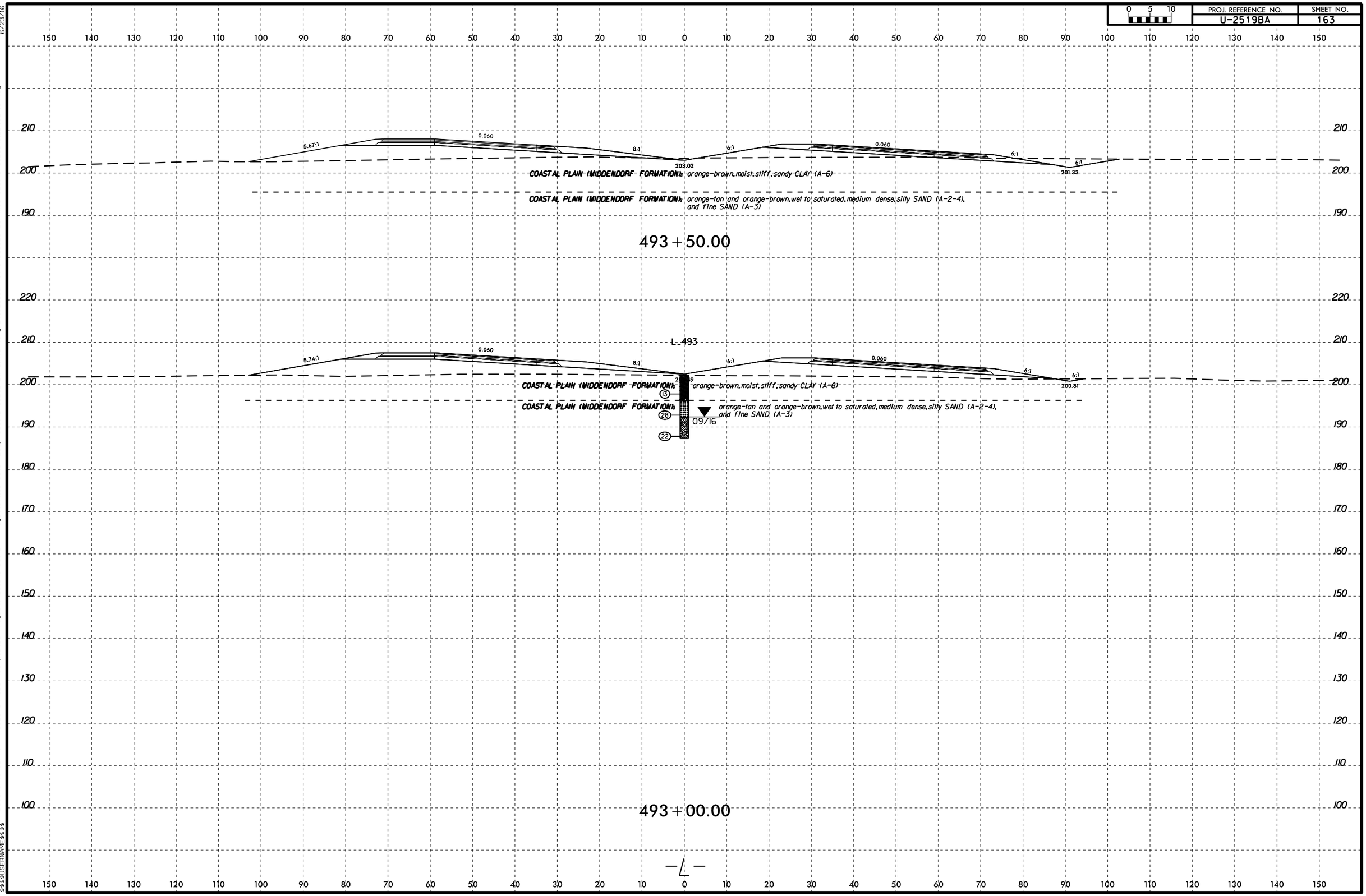
4.44:1 0.060 8:1 6:1 0.060 5.8:1

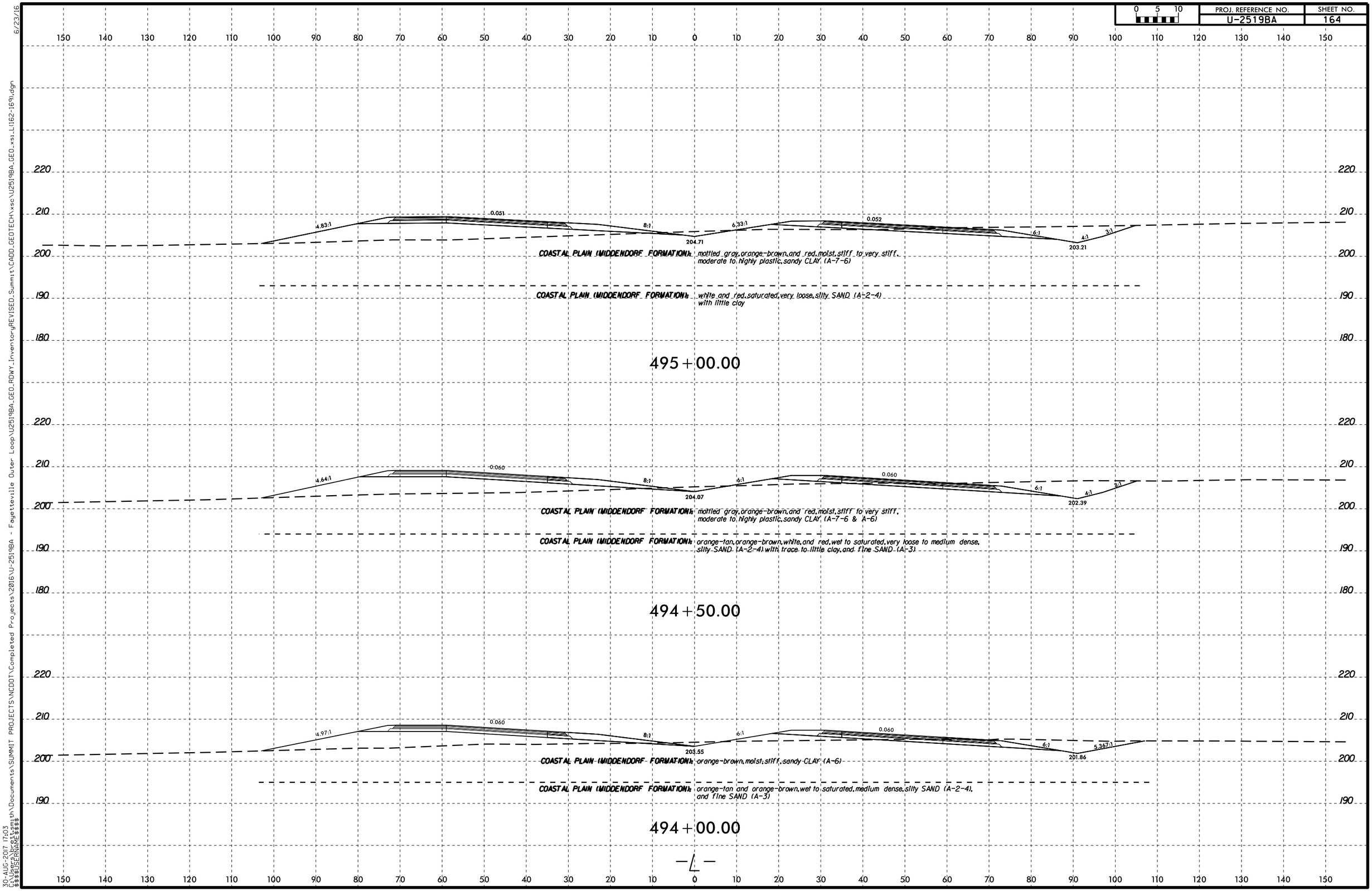
200.93

COASTAL PLAIN (MIDDENDORF FORMATION): tan-gray, orange-tan, and orange-brown, wet to saturated, very loose to medium dense, silty SAND (A-2-4), fine SAND (A-3), and fine to coarse SAND (A-1-b)

491+50.00

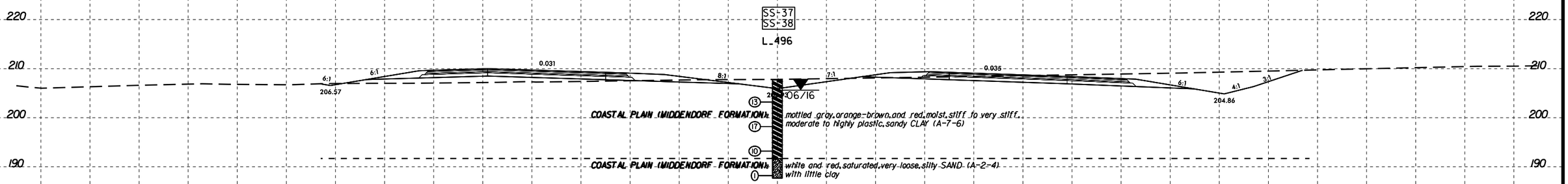
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



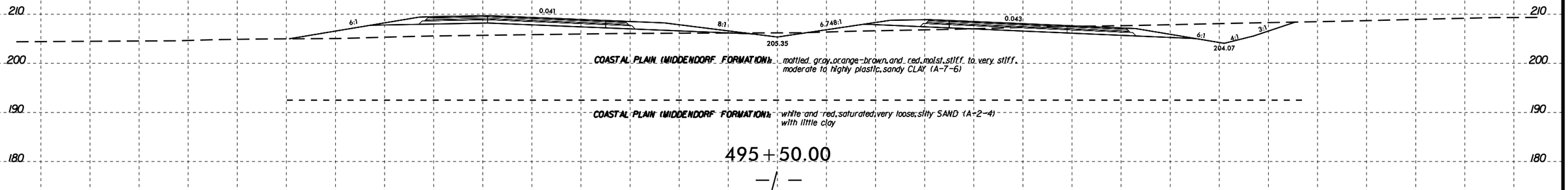


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-37	CL	496+00	3.5' - 5.0'	A-7-6	50	22	4.8	32.8	22.1	5.1	39.9	100	82	48	22.0	N/A
SS-38	CL	496+00	8.5' - 10.0'	A-7-6	49	32	4.8	40.7	22.9	4.9	31.5	100	76	40	11.7	N/A



496+00.00



495+50.00

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

220 210 200 190 180

COASTAL PLAIN (MIDDENDORF FORMATION): orange-brown, brown, and gray, dry to moist, medium dense to dense, clayey SAND (A-2-6), and silty SAND (A-2-4)

COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, orange-brown, and red, moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6)

COASTAL PLAIN (MIDDENDORF FORMATION): white and red, saturated, very loose, silty SAND (A-2-4) with little clay

3:1 4:1 6:1 0.001 8:1 207.30 207.63 0.025 6:1 4:1 3:1 206.67

497+50.00

220 210 200 190 180 230

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** orange-brown, brown, and gray, dry to moist, medium dense to dense, clayey SAND (A-2-6), and silty SAND (A-2-4)

COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, orange-brown, and red, moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6)

COASTAL PLAIN (MIDDENDORF FORMATION): white and red, saturated, very loose, silty SAND (A-2-4) with little clay

3:1 4:1 6:1 0.011 8:1 207.01 207.06 7.19:1 0.025 6:1 4:1 3:1 206.14

497+00.00

220 210 200 190 180

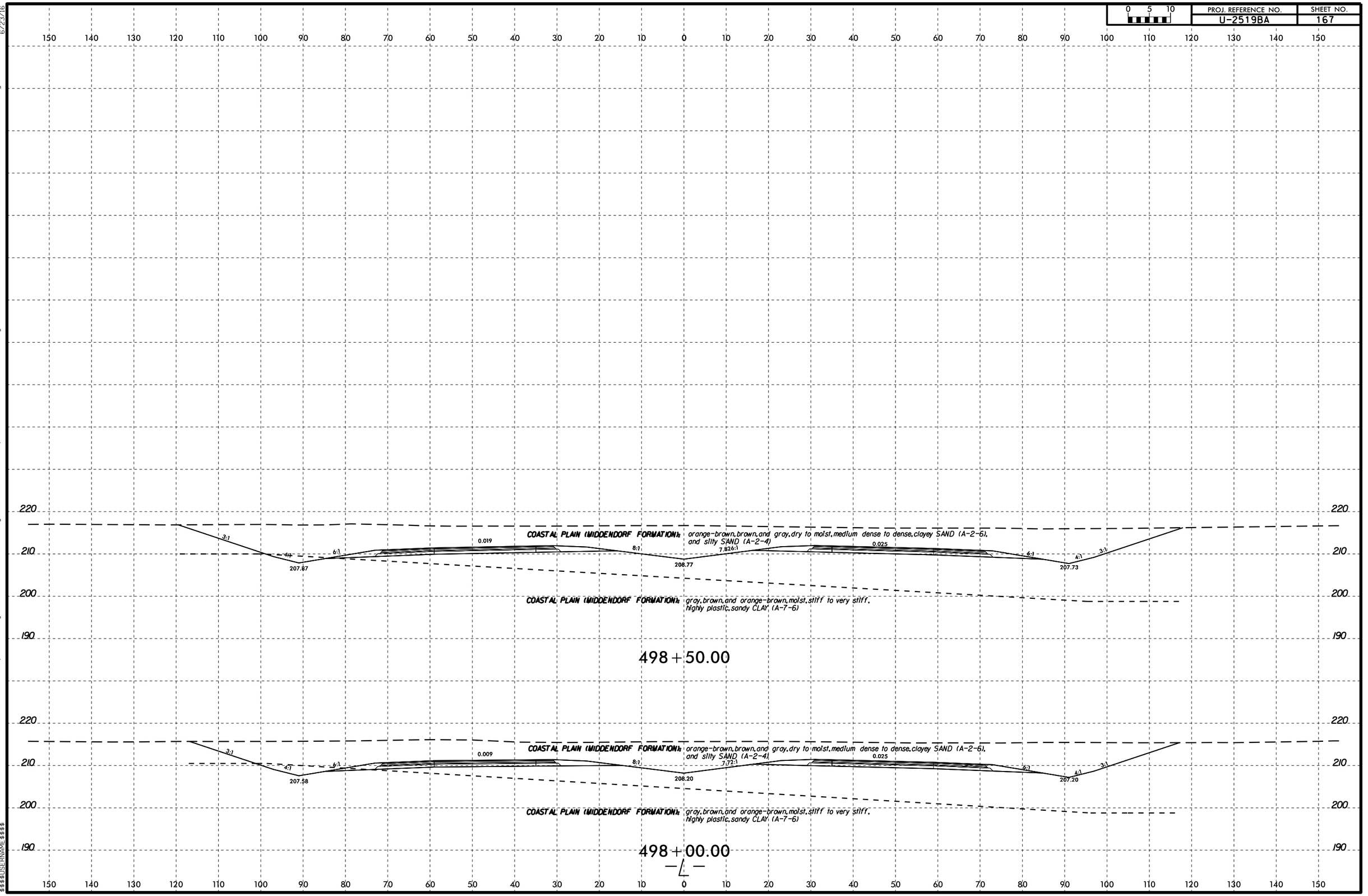
COASTAL PLAIN (MIDDENDORF FORMATION): mottled gray, orange-brown, and red, moist, stiff to very stiff, moderate to highly plastic, sandy CLAY (A-7-6)

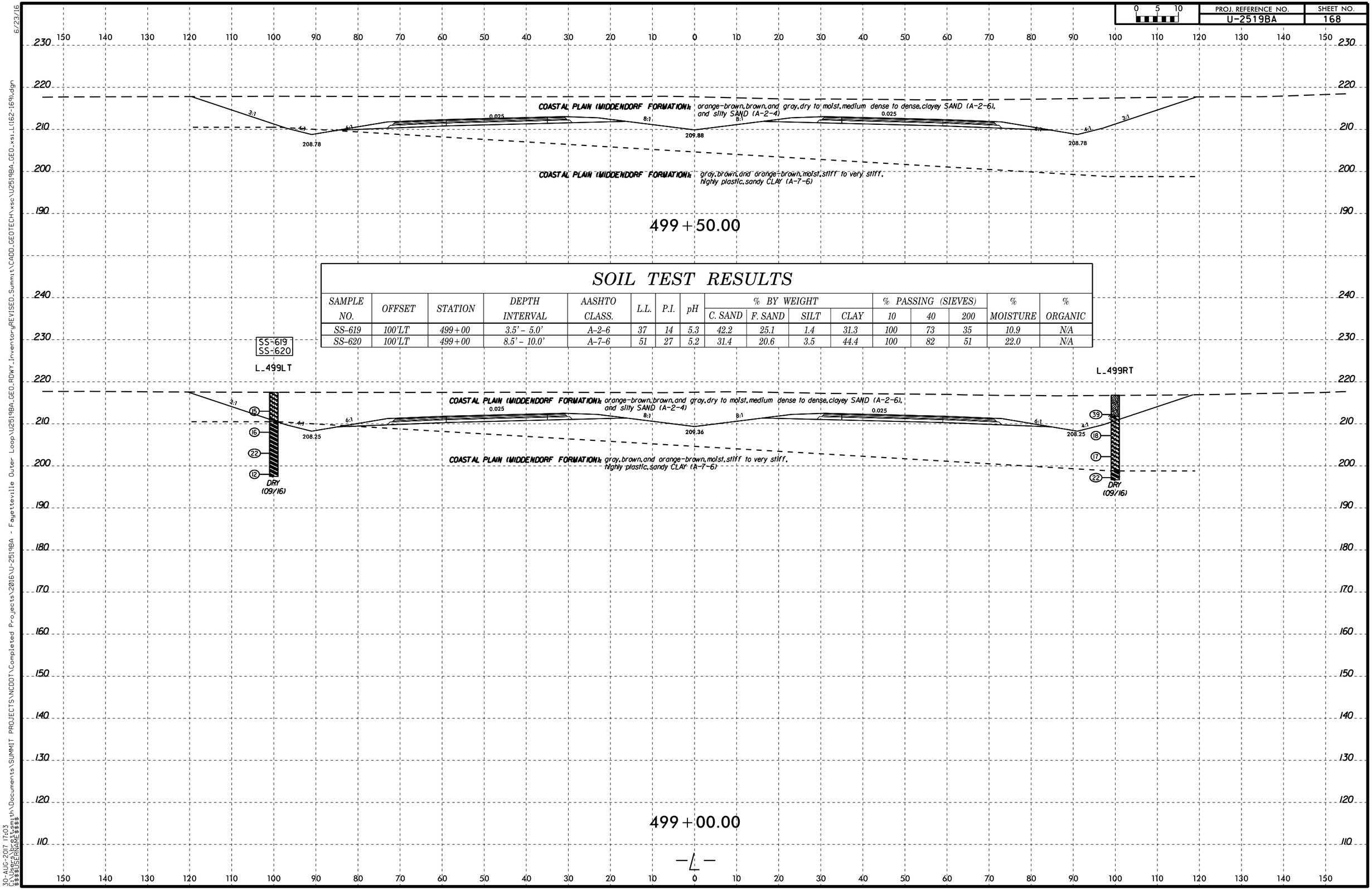
COASTAL PLAIN (MIDDENDORF FORMATION): white and red, saturated, very loose, silty SAND (A-2-4) with little clay

5.22:1 6:1 0.021 8:1 206.73 206.50 7.4:1 0.026 6:1 4:1 3:1 205.60

496+50.00

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





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-619	100'LT	499+00	3.5' - 5.0'	A-2-6	37	14	5.3	42.2	25.1	1.4	31.3	100	73	35	10.9	N/A
SS-620	100'LT	499+00	8.5' - 10.0'	A-7-6	51	27	5.2	31.4	20.6	3.5	44.4	100	82	51	22.0	N/A

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

230 220 210 200 190

3:1 4:1 4:1 0.025 0.06 212.03 0.06 0.025 4:1 4:1 3:1
209.83 209.83

COASTAL PLAIN (MIDDENDORF FORMATION): *tan-brown,orange-brown,yellow-brown,gray,and red,dry to saturated,loose to dense, silty SAND (A-2-4) with trace to some clay,and clayey SAND (A-2-6 & A-2-7)*

COASTAL PLAIN (MIDDENDORF FORMATION): *gray,brown,and orange-brown,moist,stiff to very stiff, highly plastic,sandy CLAY, (A-7-6)*

500+50.00

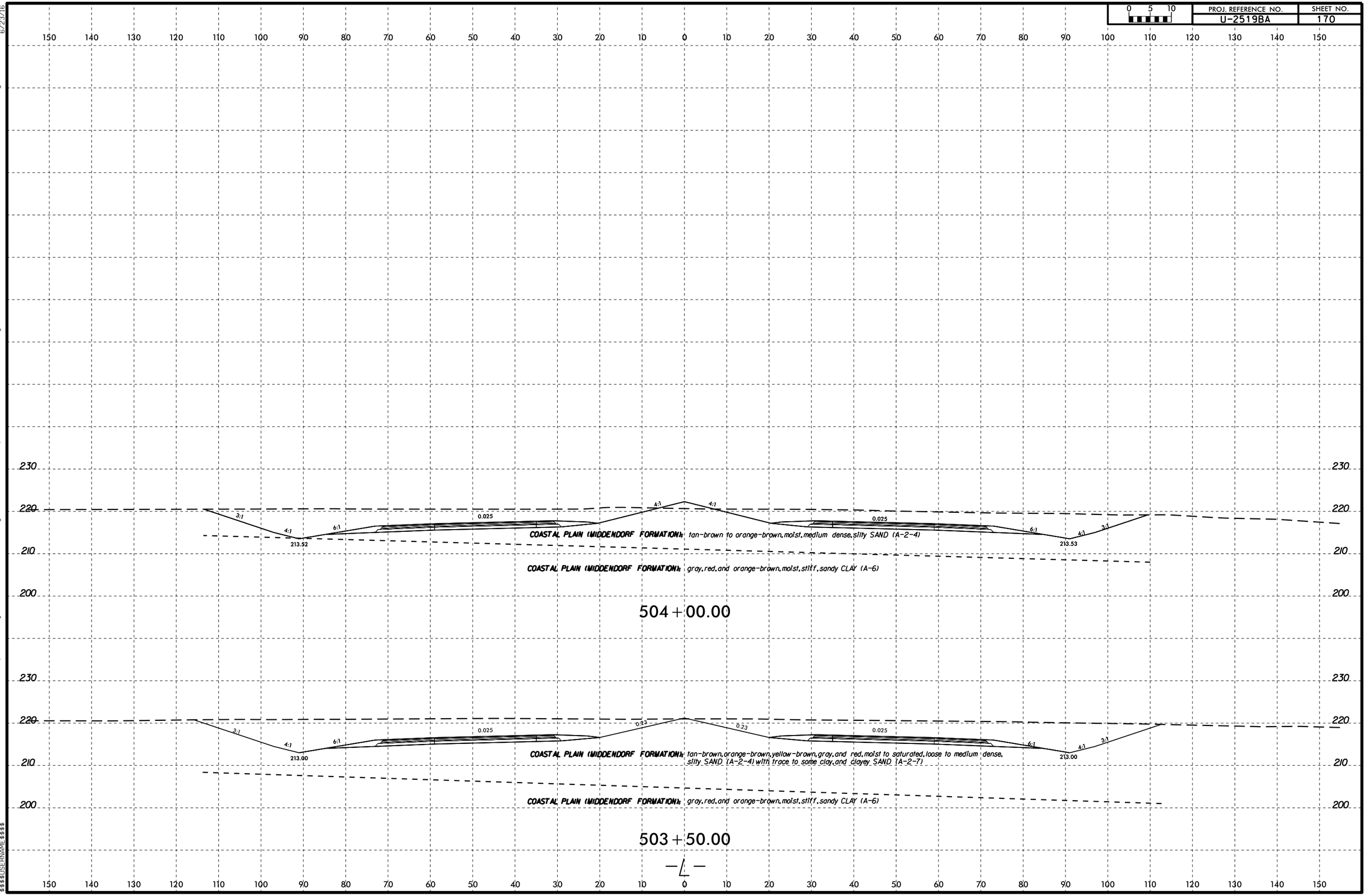
3:1 4:1 4:1 0.025 8:1 210.41 8:1 0.025 4:1 4:1 3:1
209.31 209.31

COASTAL PLAIN (MIDDENDORF FORMATION): *orange-brown,brown,and gray,dry to moist,medium dense to dense,clayey SAND (A-2-6), and silty SAND (A-2-4)*

COASTAL PLAIN (MIDDENDORF FORMATION): *gray,brown,and orange-brown,moist,stiff to very stiff, highly plastic,sandy CLAY, (A-7-6)*

500+00.00

—L—



6/23/16

30-AUG-2017 17:03
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$$$$USERNAME$$$$

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

240 230 220 210 200 190 180 170 160 150 140 130 120 110

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown to orange-brown, moist, medium dense, silty SAND (A-2-4)

ROADWAY EMBANKMENT FILL

3:1 4:1 6H 214.58 0.025 4:1 4:1 0.025 6:1 214.58

COASTAL PLAIN (MIDDENDORF FORMATION): gray, red, and orange-brown, moist, stiff, sandy CLAY (A-6)

505+00.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown to orange-brown, moist, medium dense, silty SAND (A-2-4)

3:1 4:1 214.05 6:1 0.025 4:1 4:1 0.025 6:1 214.05

COASTAL PLAIN (MIDDENDORF FORMATION): gray, red, and orange-brown, moist, stiff, sandy CLAY (A-6)

L_504RT
504+40

4:1 18 15 14 15 09/16 34 19 20 10 26 53 53 28 60 50

COASTAL PLAIN (MIDDENDORF FORMATION): gray, orange-brown, and red, saturated, very lose to dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): gray to dark gray, moist, very stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense to very dense, silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandstone)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense to dense, clayey SAND (A-2-6)

504+50.00

—L—

240 230 220 210 200 190 180 170 160 150 140 130 120 110

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

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown to orange-brown, moist, medium dense, silty SAND (A-2-4)

6:1 6:1 215.63 0.025 4:1 4:1 0.025 6:1

COASTAL PLAIN (MIDDENDORF FORMATION): gray, red, and orange-brown, moist, stiff, sandy CLAY (A-6)

506+00.00

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** tan-brown to orange-brown, moist, medium dense, silty SAND (A-2-4)

L_505LT
505+33

6:1 6:1 215.11 0.025 4:1 4:1 0.025 6:1 215.11 6:1

COASTAL PLAIN (MIDDENDORF FORMATION): gray, red, and orange-brown, moist, stiff, sandy CLAY (A-6)

9 12 10/16 18 20 15 20 18 2 26 61 31 53 100/0.9 29 30

COASTAL PLAIN (MIDDENDORF FORMATION): gray, orange-brown, and red, saturated, very lose to dense, silty SAND (A-2-4) with trace to little clay, and clayey SAND (A-2-6)

COASTAL PLAIN (MIDDENDORF FORMATION): gray to dark gray, moist, very stiff to hard, silty CLAY (A-7), and sandy CLAY (A-6)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense to very dense, silty SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK (CAPE FEAR FORMATION): (Sandstone)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, saturated, medium dense to dense, clayey SAND (A-2-6)

505+50.00

—L—

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

230
220
210
200

6:1 0.025 0.13 0.23 0.025 6:1

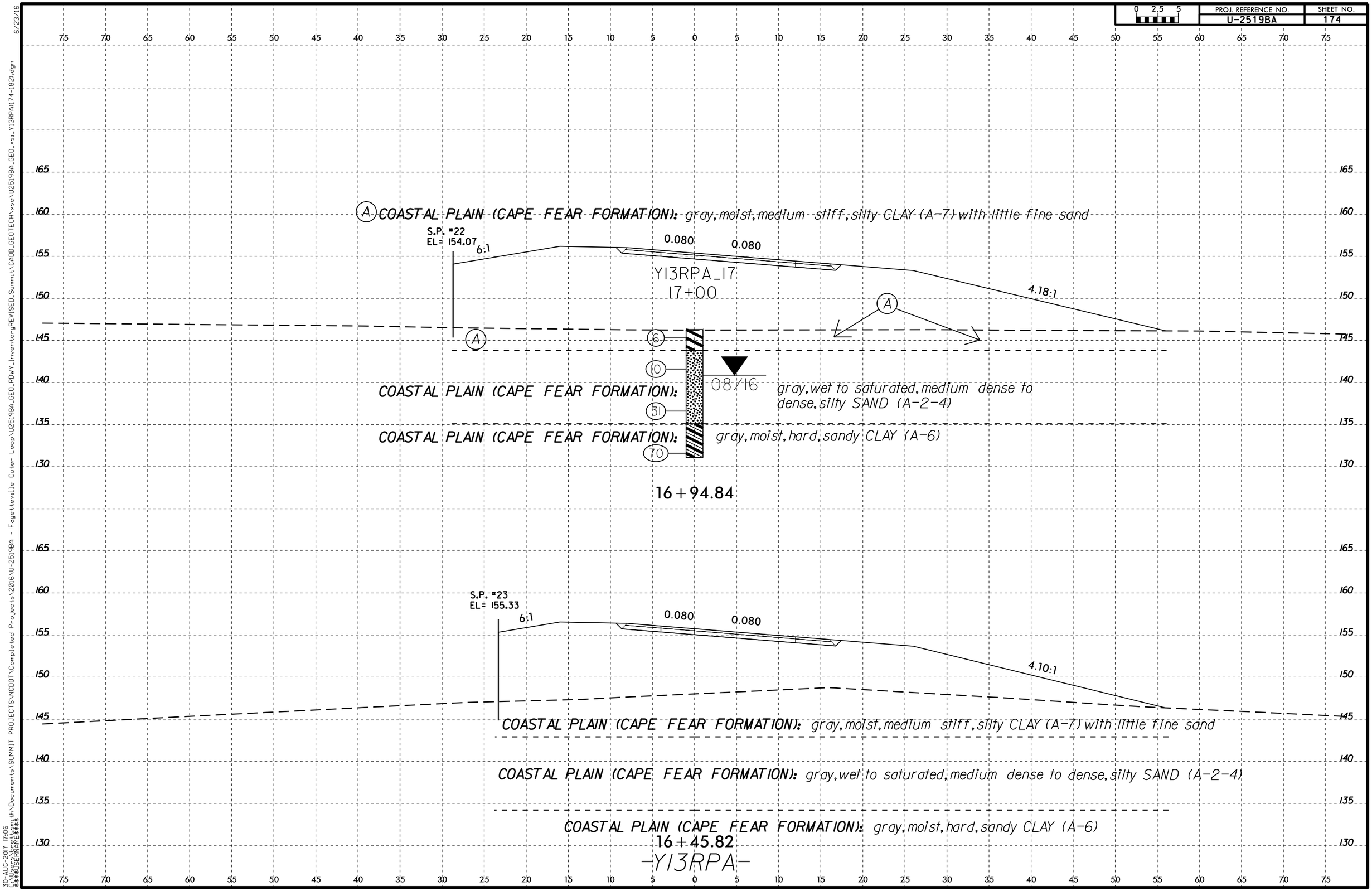
COASTAL PLAIN (MIDDENDORF FORMATION): brown,tan-brown,and orange-brown,moist,very loose to medium dense,silty SAND (A-2-4) with trace to little clay

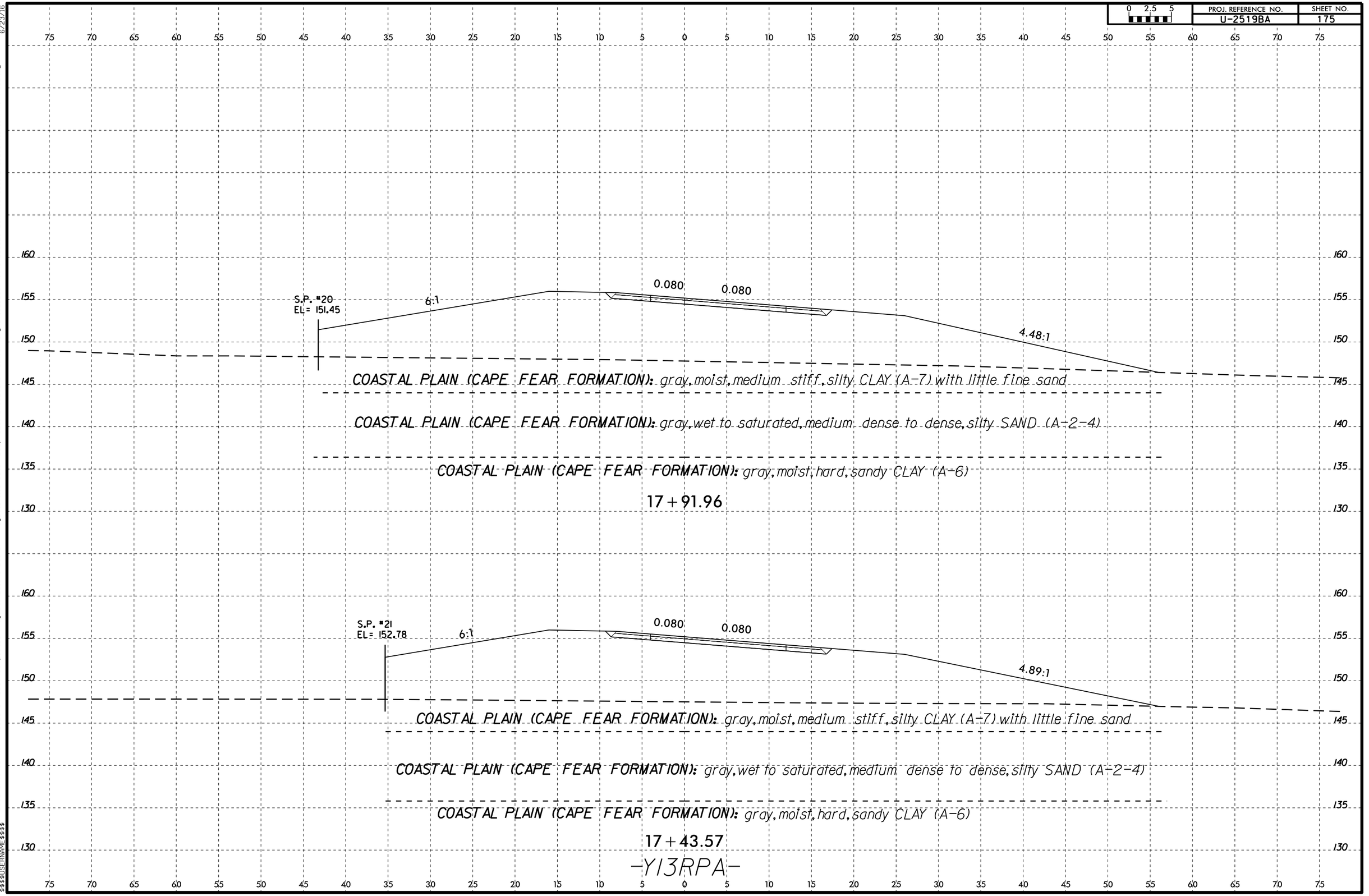
COASTAL PLAIN (MIDDENDORF FORMATION): gray,red,and orange-brown,moist,medium stiff to stiff,sandy CLAY (A-6)

506+50.00
—L—

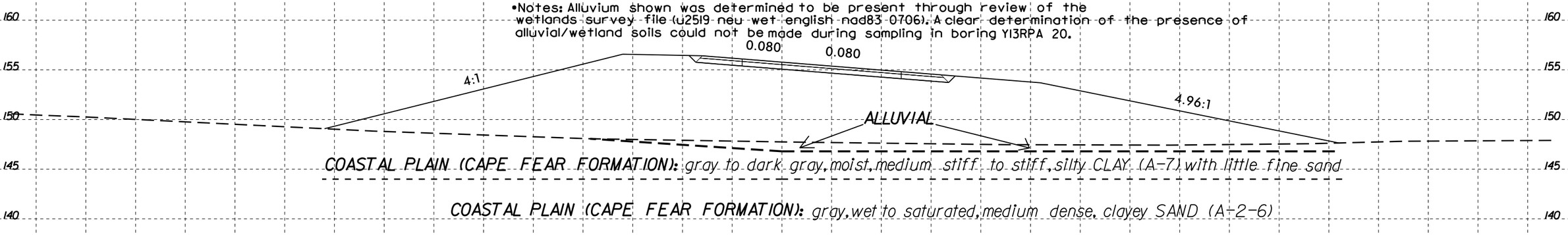
230
220
210
200

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





•Notes: Alluvium shown was determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706). A clear determination of the presence of alluvial/wetland soils could not be made during sampling in boring Y13RPA 20.



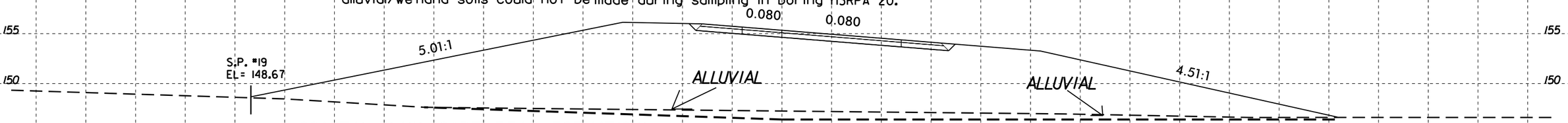
COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist, medium stiff to stiff, silty CLAY (A-7) with little fine sand

COASTAL PLAIN (CAPE FEAR FORMATION): gray, wet to saturated, medium dense, clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist, hard, silty CLAY (A-7)

19+00.00

•Notes: Alluvium shown was determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706). A clear determination of the presence of alluvial/wetland soils could not be made during sampling in boring Y13RPA 20.



COASTAL PLAIN (CAPE FEAR FORMATION): gray to dark gray, moist, medium stiff to stiff, silty CLAY (A-7) with little fine sand

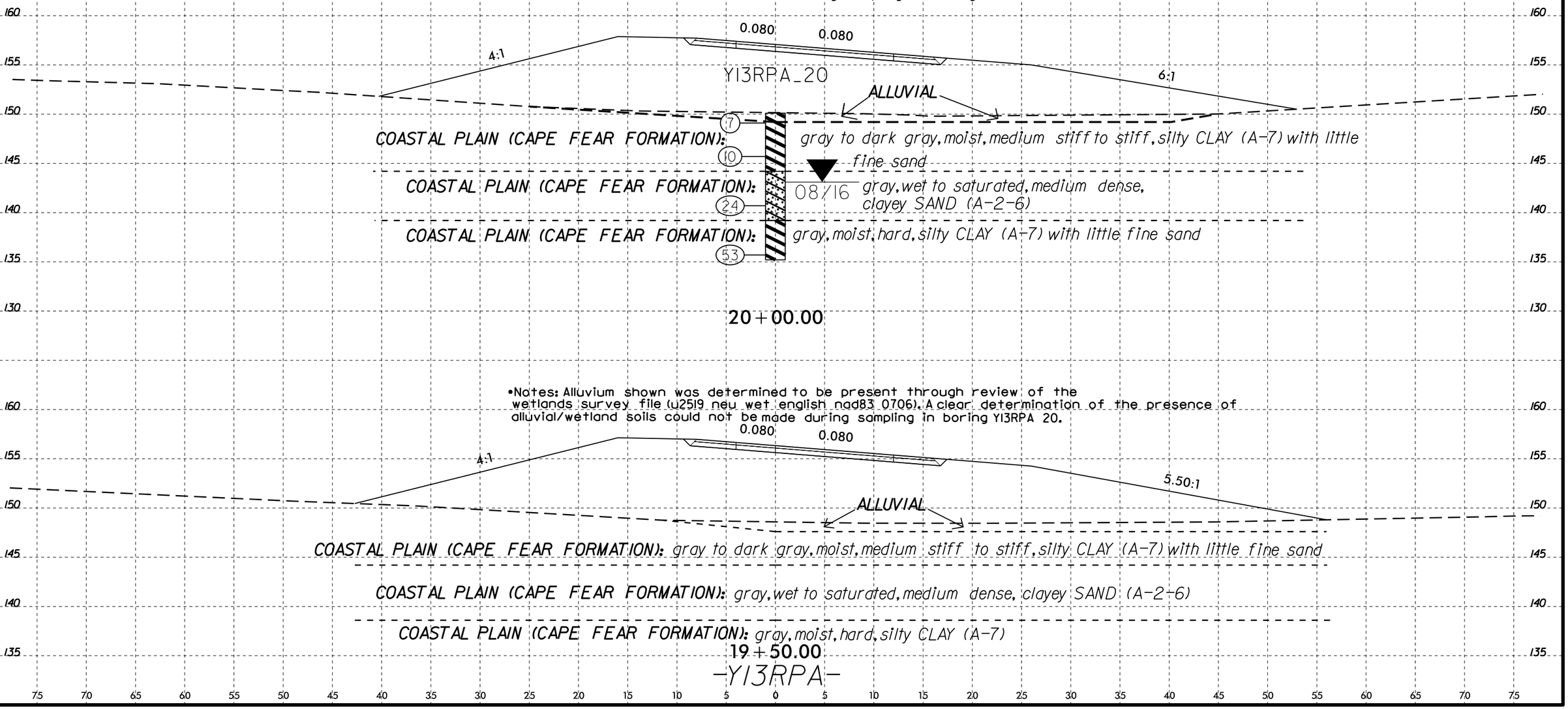
COASTAL PLAIN (CAPE FEAR FORMATION): gray, wet to saturated, medium dense to dense, silty SAND (A-2-4) and clayey SAND (A-2-6)

COASTAL PLAIN (CAPE FEAR FORMATION): gray, moist, hard, silty CLAY (A-7) and sandy CLAY (A-6)

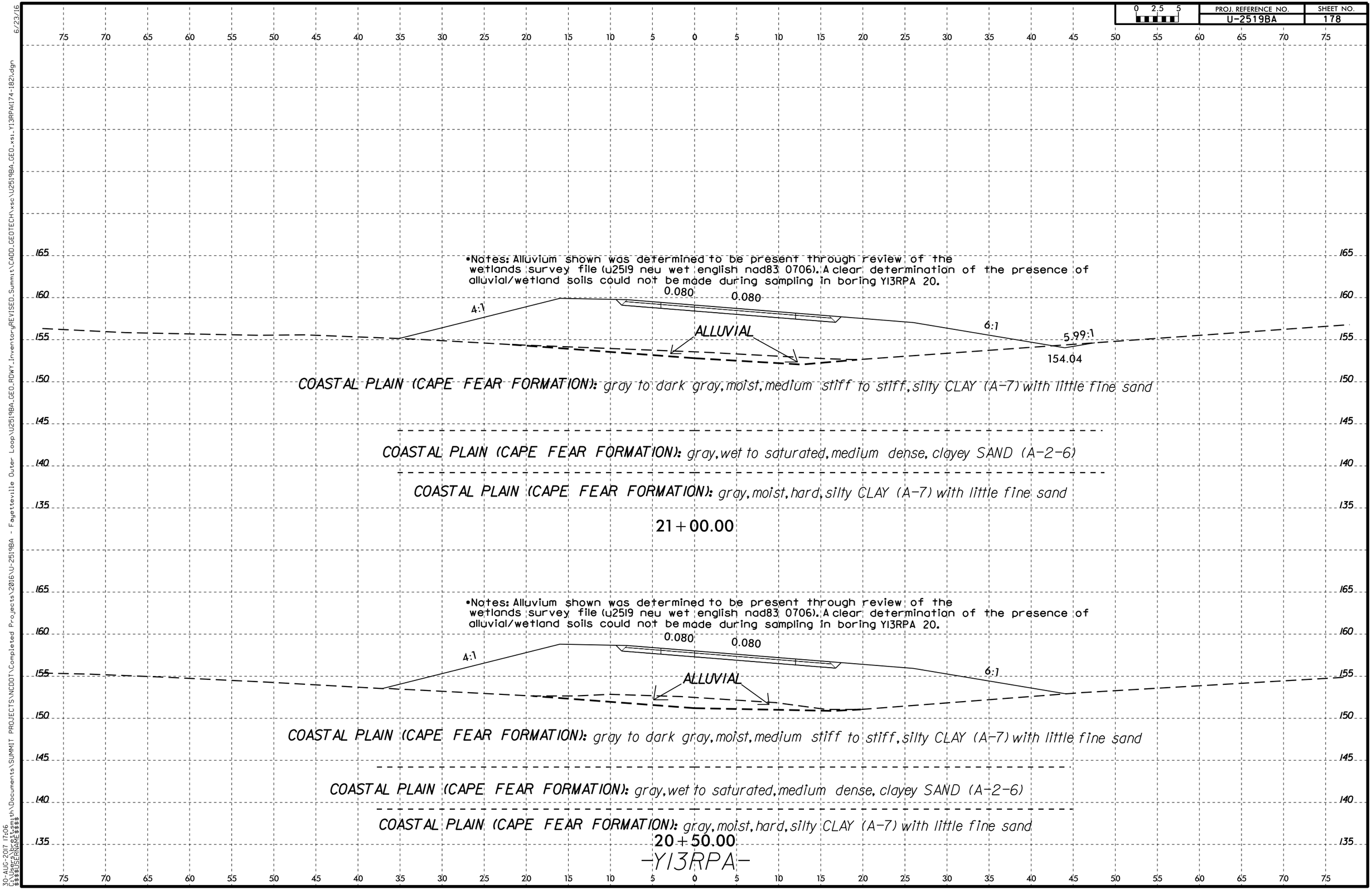
18+39.55

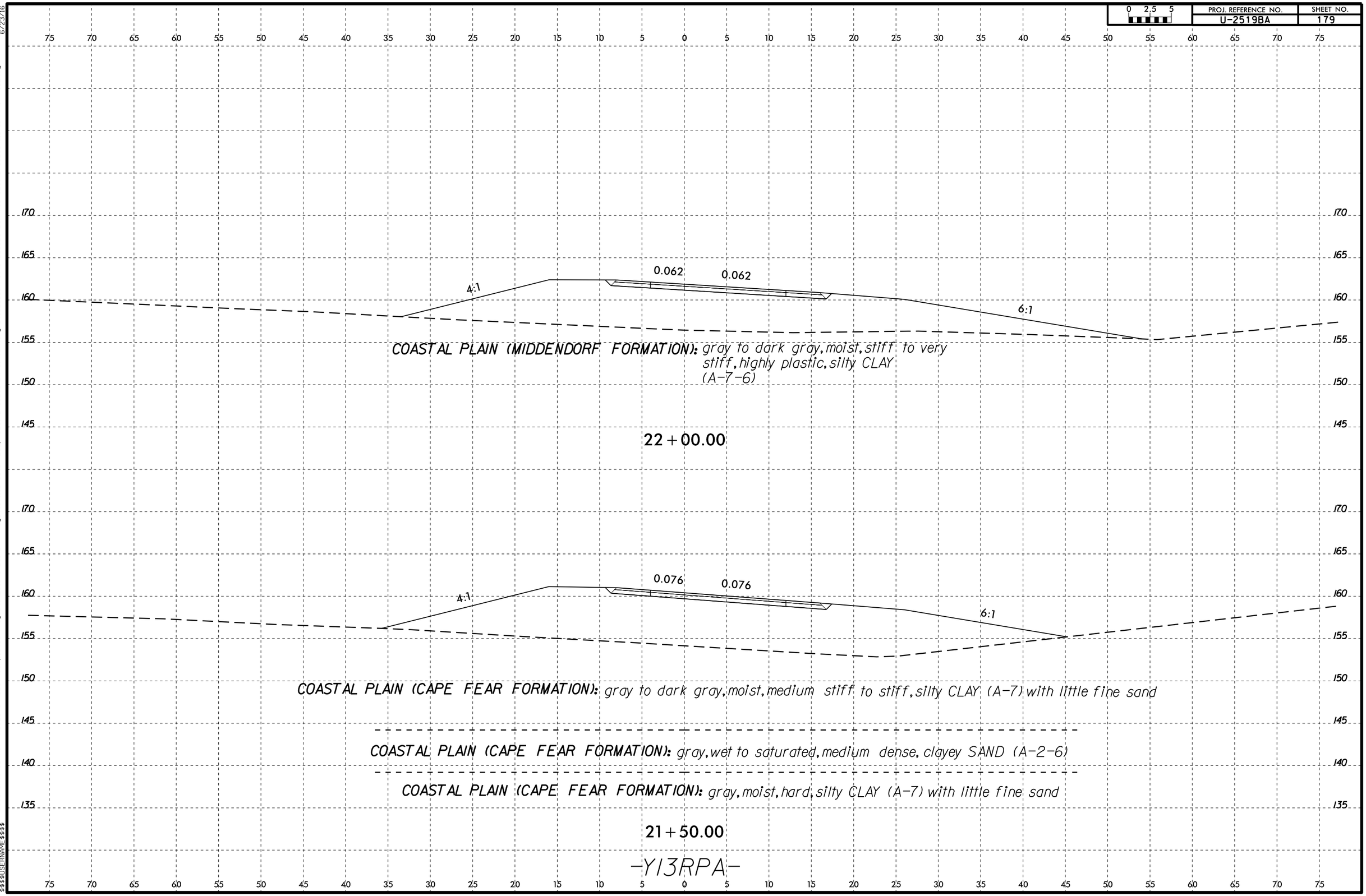
-Y13RPA-

•Notes: Alluvium shown was determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706). A clear determination of the presence of alluvial/wetland soils could not be made during sampling in boring YI3RPA 20.



•Notes: Alluvium shown was determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706). A clear determination of the presence of alluvial/wetland soils could not be made during sampling in boring YI3RPA 20.





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-136	CL	23+00	3.5' - 5.0'	A-7-6	80	42	5.1	1.4	1.0	3.5	94.1	100	99	98	29.9	N/A

SS-136

Y13RPA_23

4.37:1 6:1 0.036 0.036 6:1 5.99:1

161.95 160.49

(11) (23) (21)

COASTAL PLAIN (MIDDENDORF FORMATION): gray to dark gray, moist, stiff to very stiff, highly plastic, silty CLAY (A-7-6)

DRY

(08/16)

23+00.00

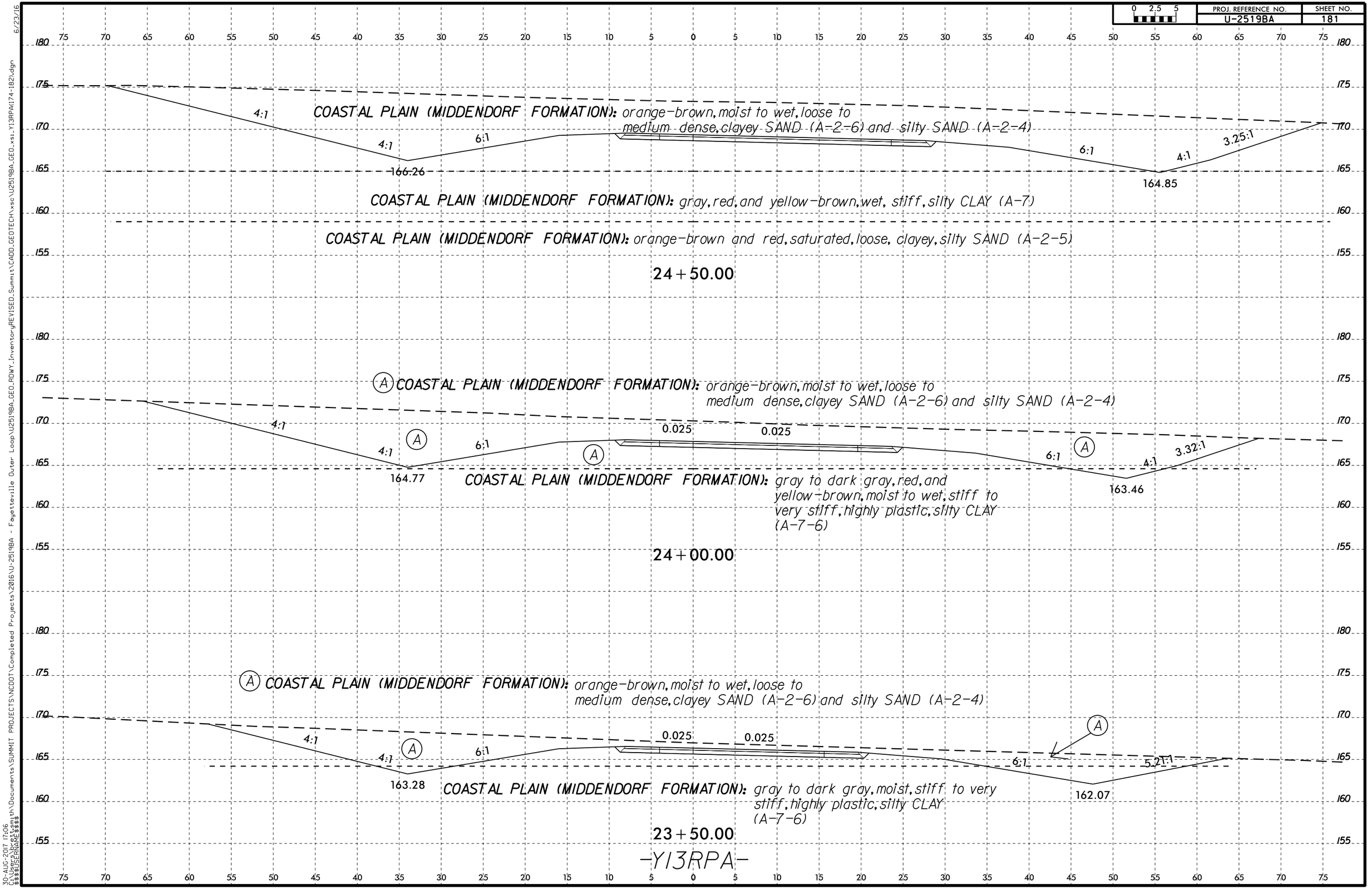
5.99:1 6:1 0.049 0.049 6:1 5.99:1

160.67 158.79

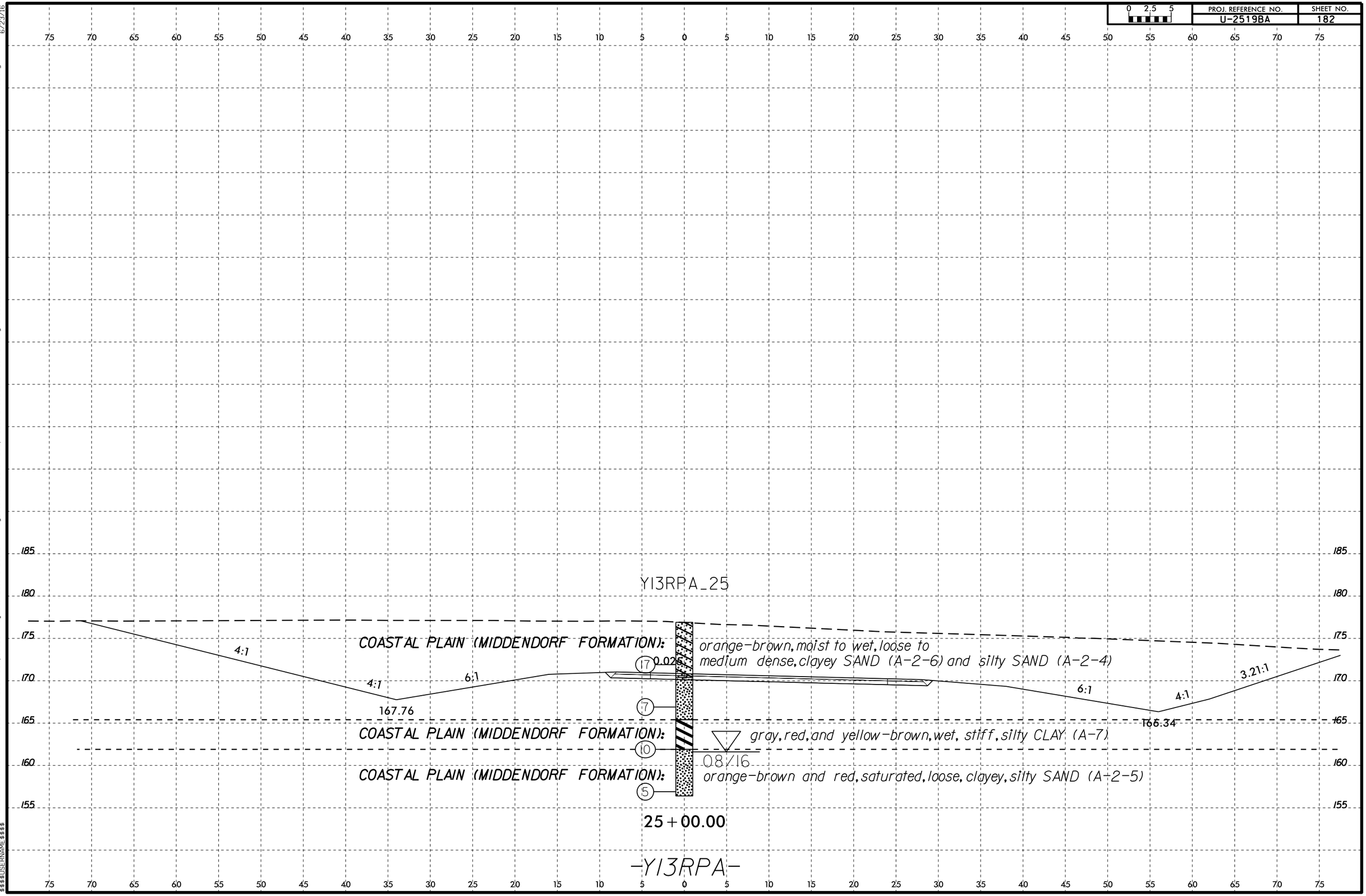
COASTAL PLAIN (MIDDENDORF FORMATION): gray to dark gray, moist, stiff to very stiff, highly plastic, silty CLAY (A-7-6)

22+50.00

-Y13RPA-

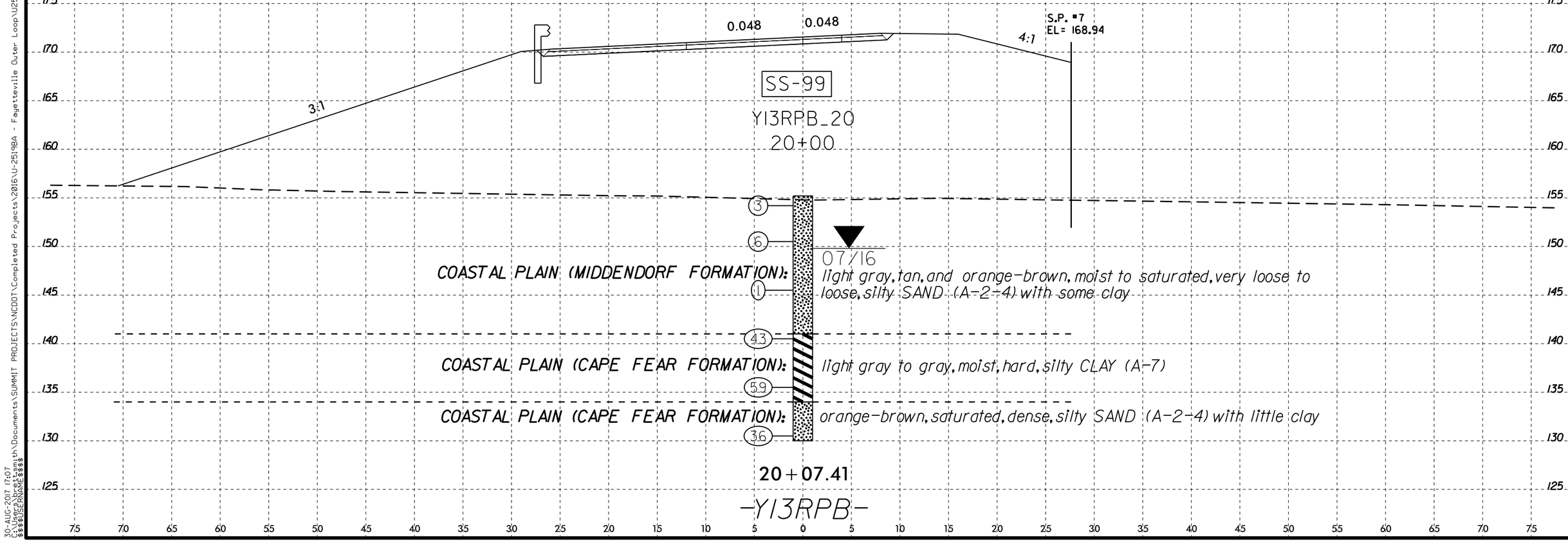


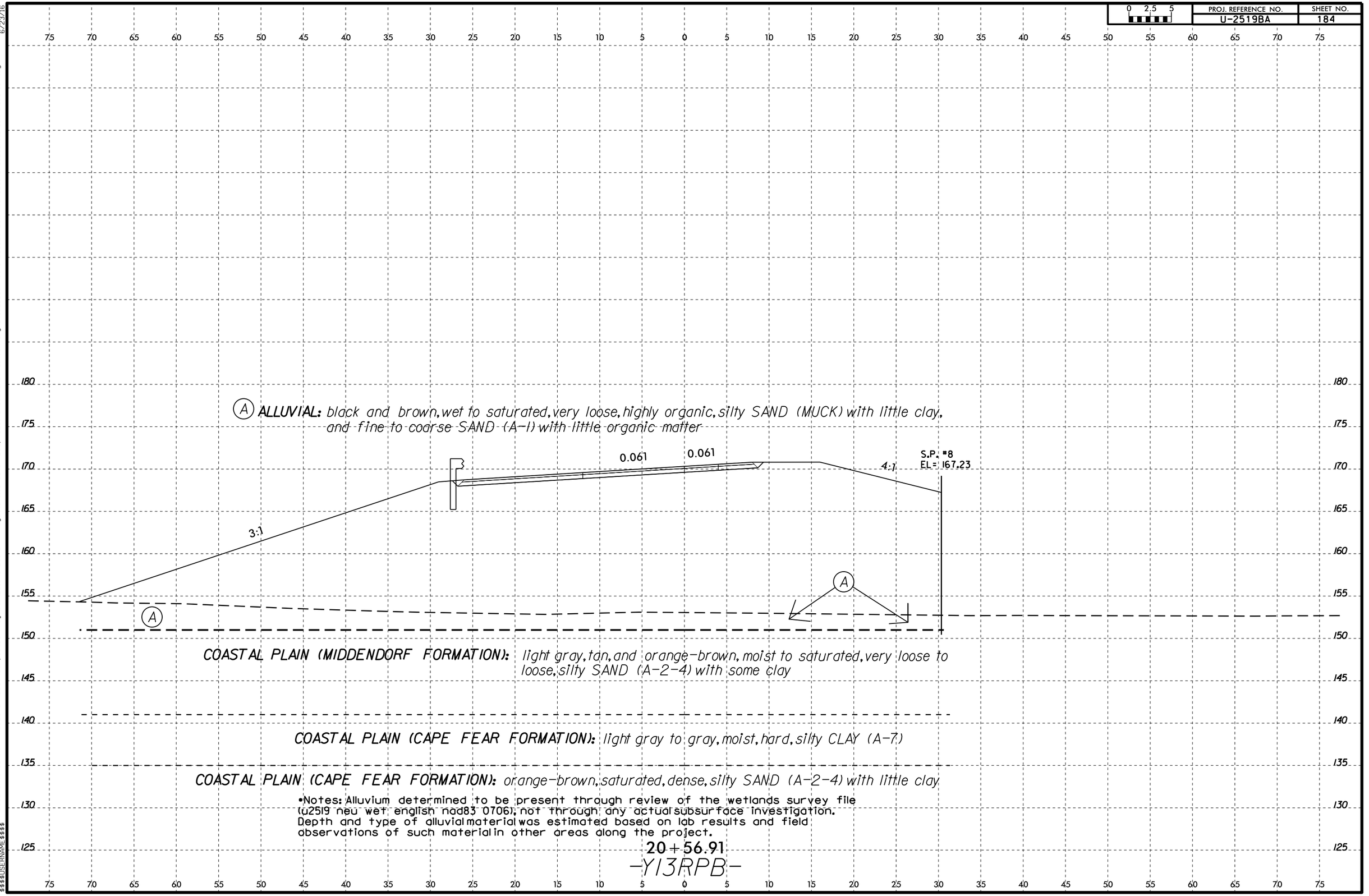
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	182



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	pH	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-99	CL	20+00	3.7' - 5.2'	A-2-4	22	1	5.2	48.3	28.7	0.2	22.8	100	82	24	17.8	N/A

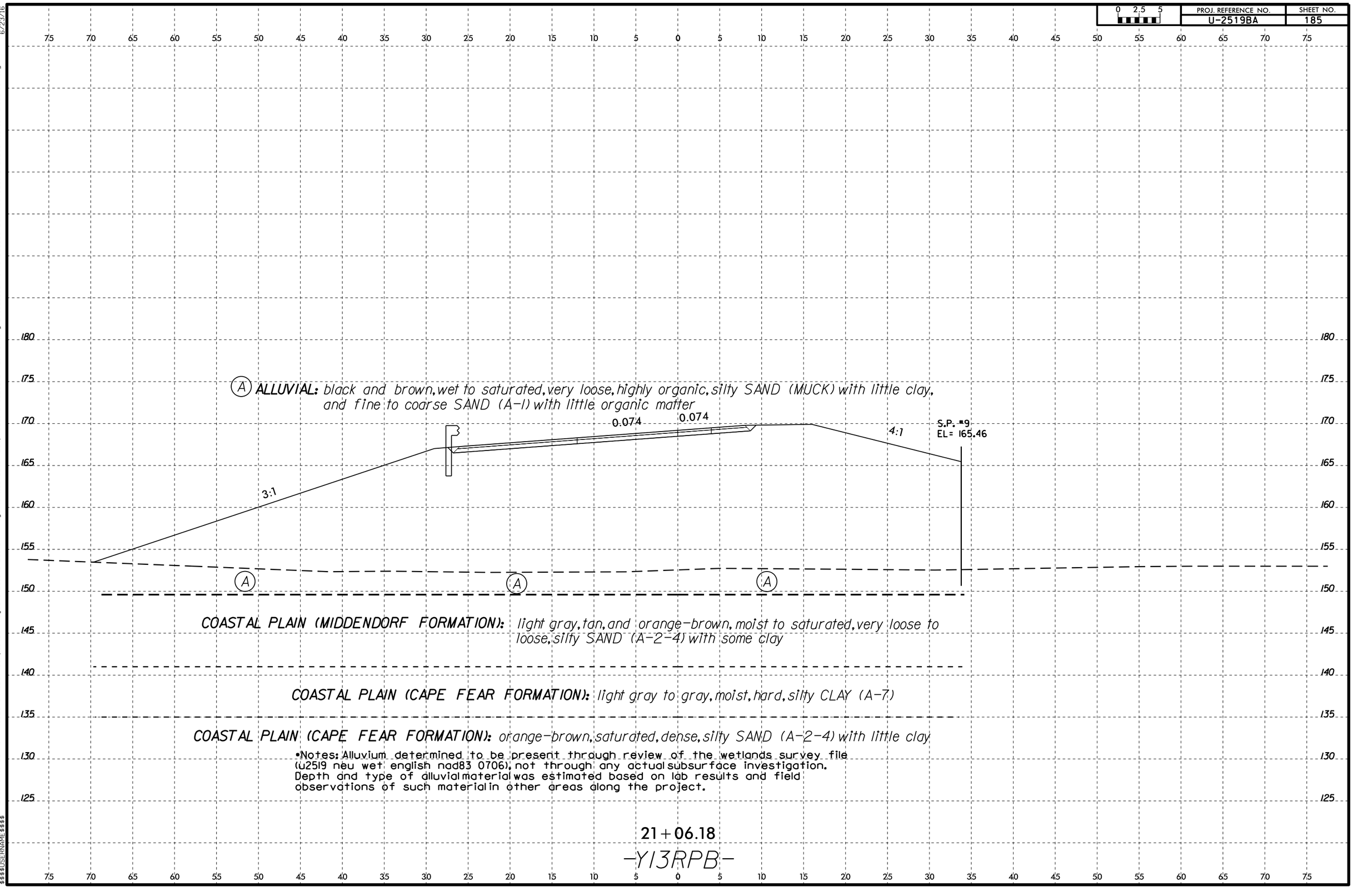




•Notes: Alluvium determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706), not through any actual subsurface investigation. Depth and type of alluvial material was estimated based on lab results and field observations of such material in other areas along the project.

20+56.91

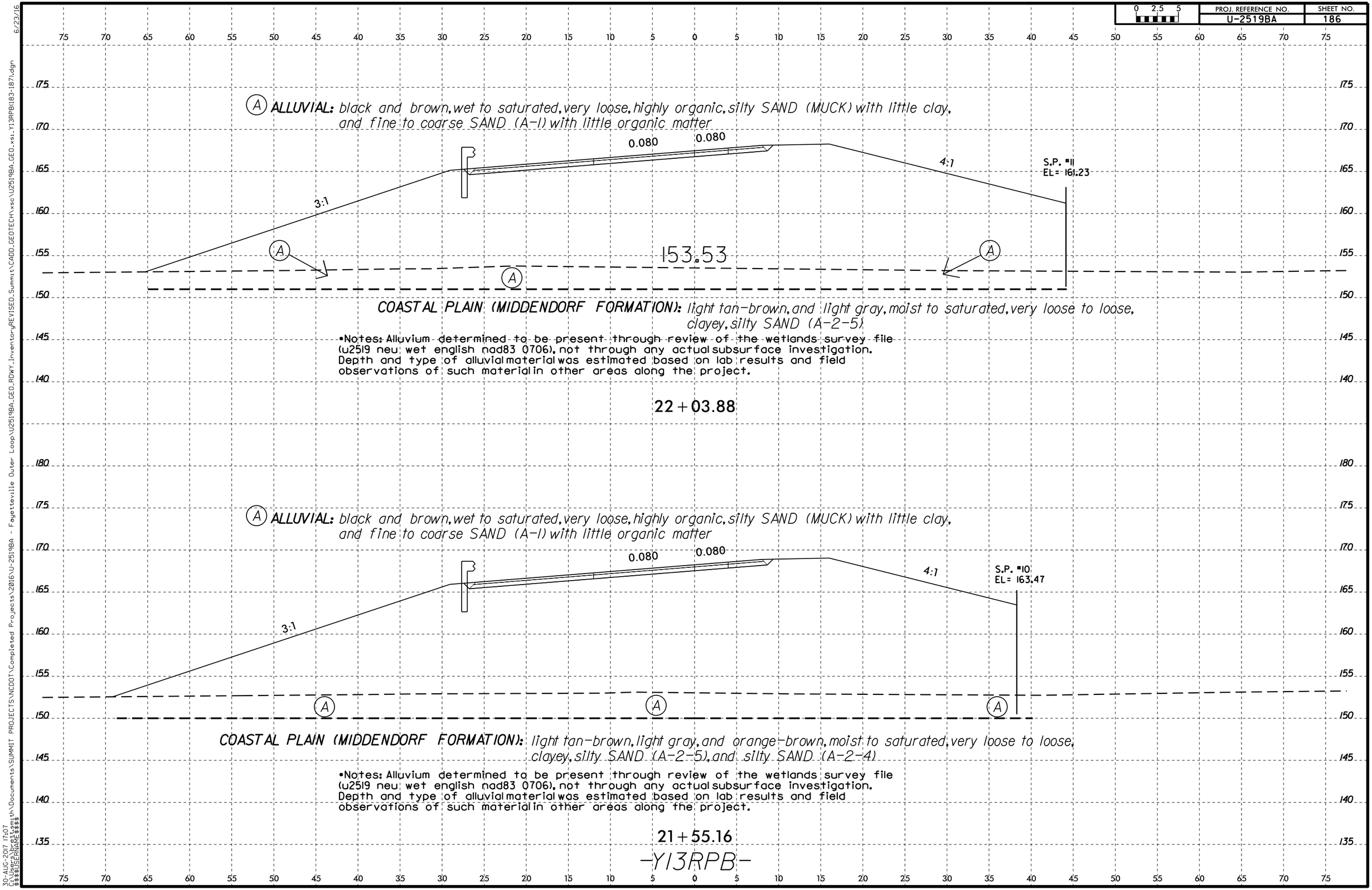
-Y13RPB-

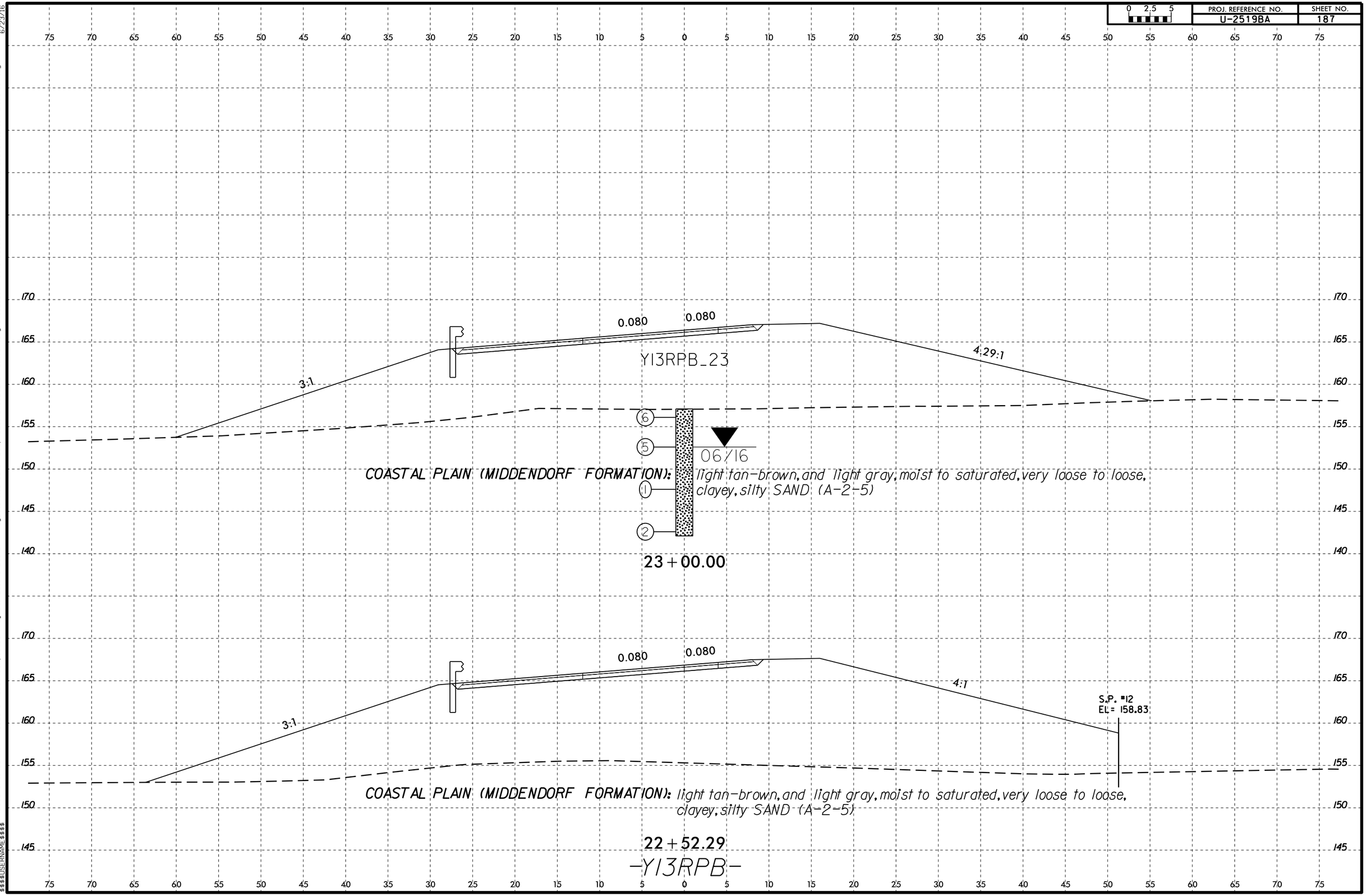


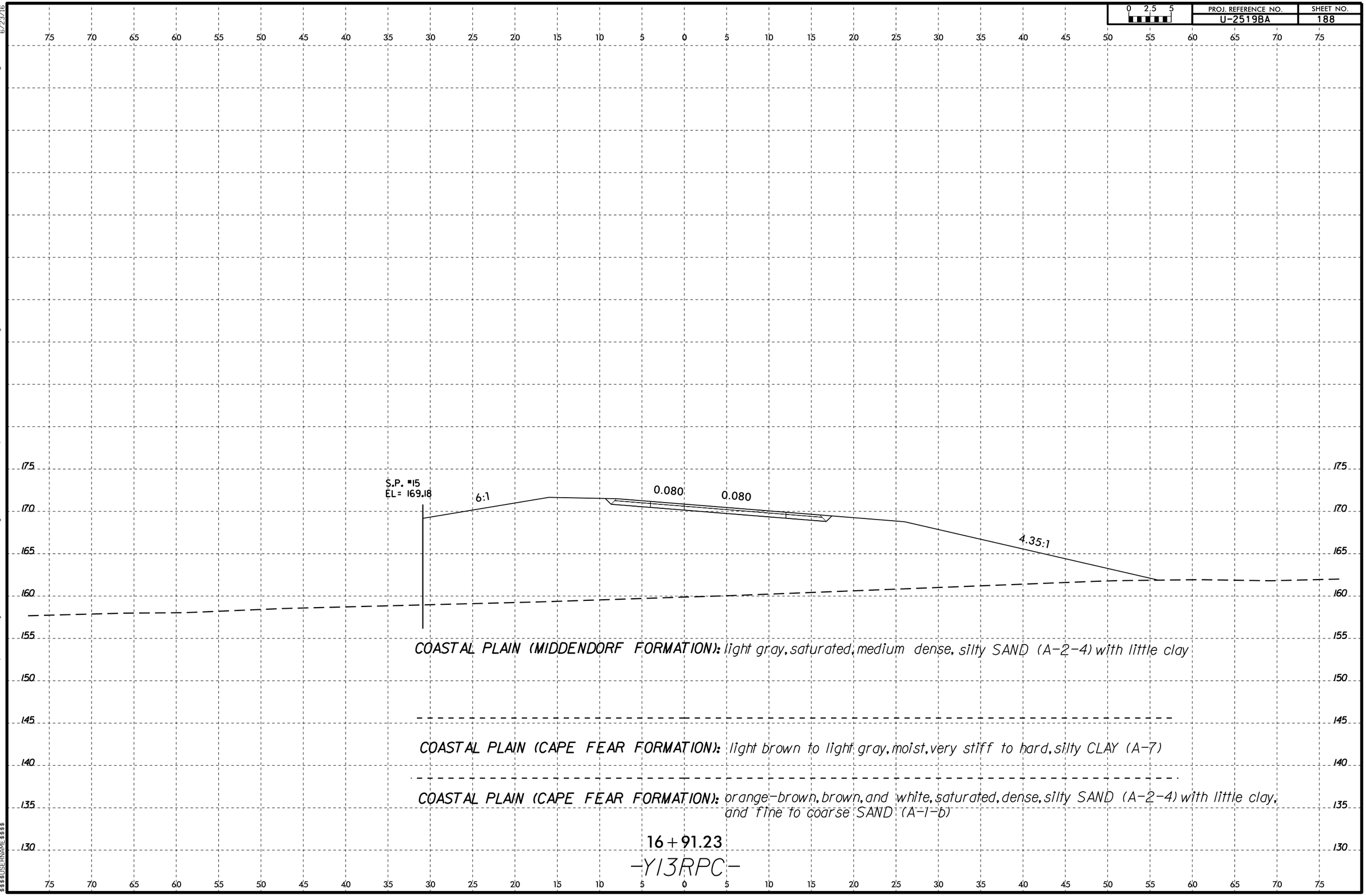
•Notes: Alluvium determined to be present through review of the wetlands survey file (u2519 neu wet english nad83 0706), not through any actual subsurface investigation. Depth and type of alluvial material was estimated based on lab results and field observations of such material in other areas along the project.

21+06.18

-Y13RPB-







(A) **ALLUVIAL:** *black, saturated, very loose, highly organic, silty SAND (MUCK)*

S.P. #16
EL= 167.35

6:1

0.080 0.080

3:1

Y13RPC_17
17+50

WOR 07/16

11

17

79

30

48

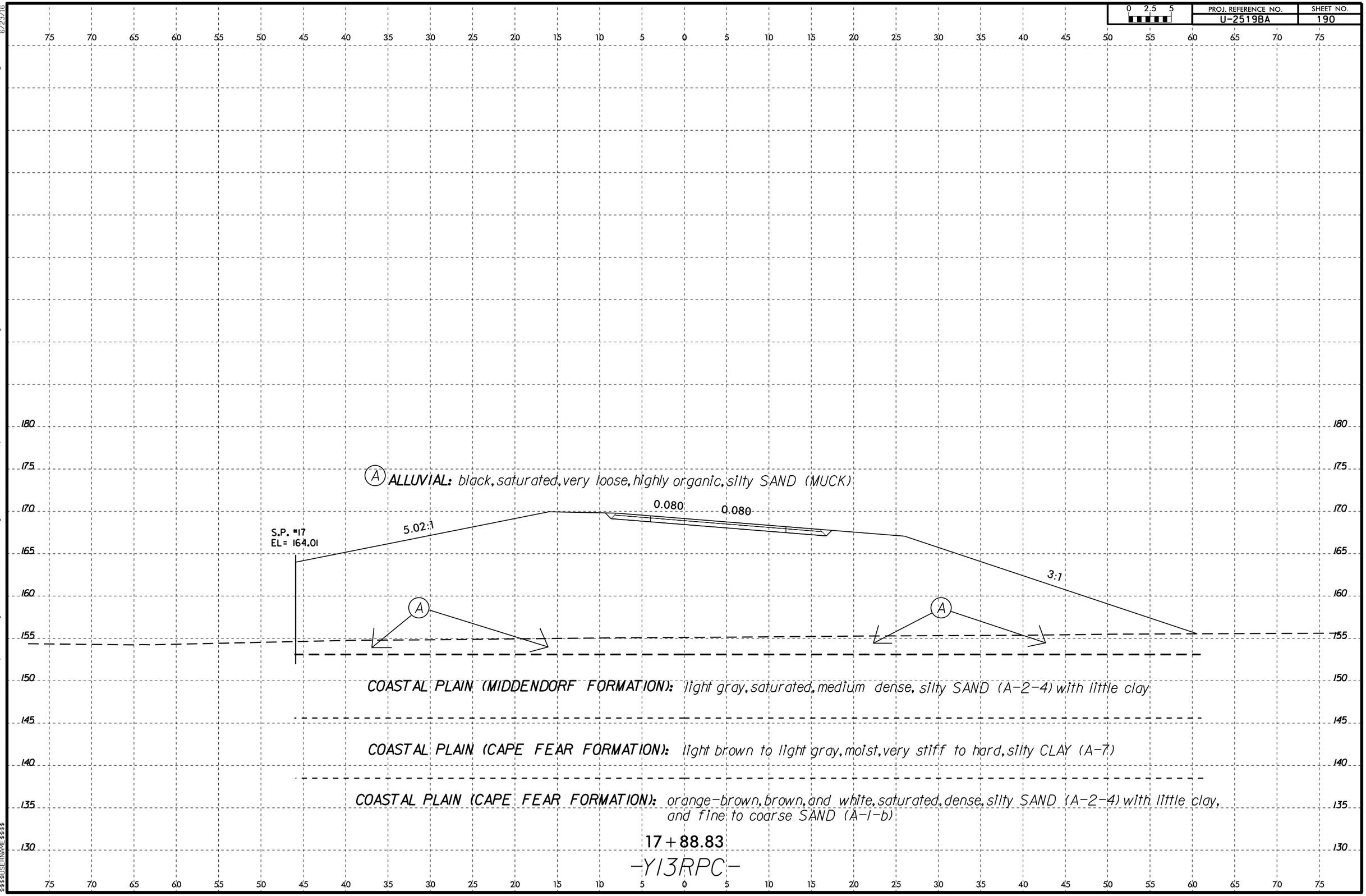
COASTAL PLAIN (MIDDENDORF FORMATION): *light gray, saturated, medium dense, silty SAND (A-2-4) with little clay*

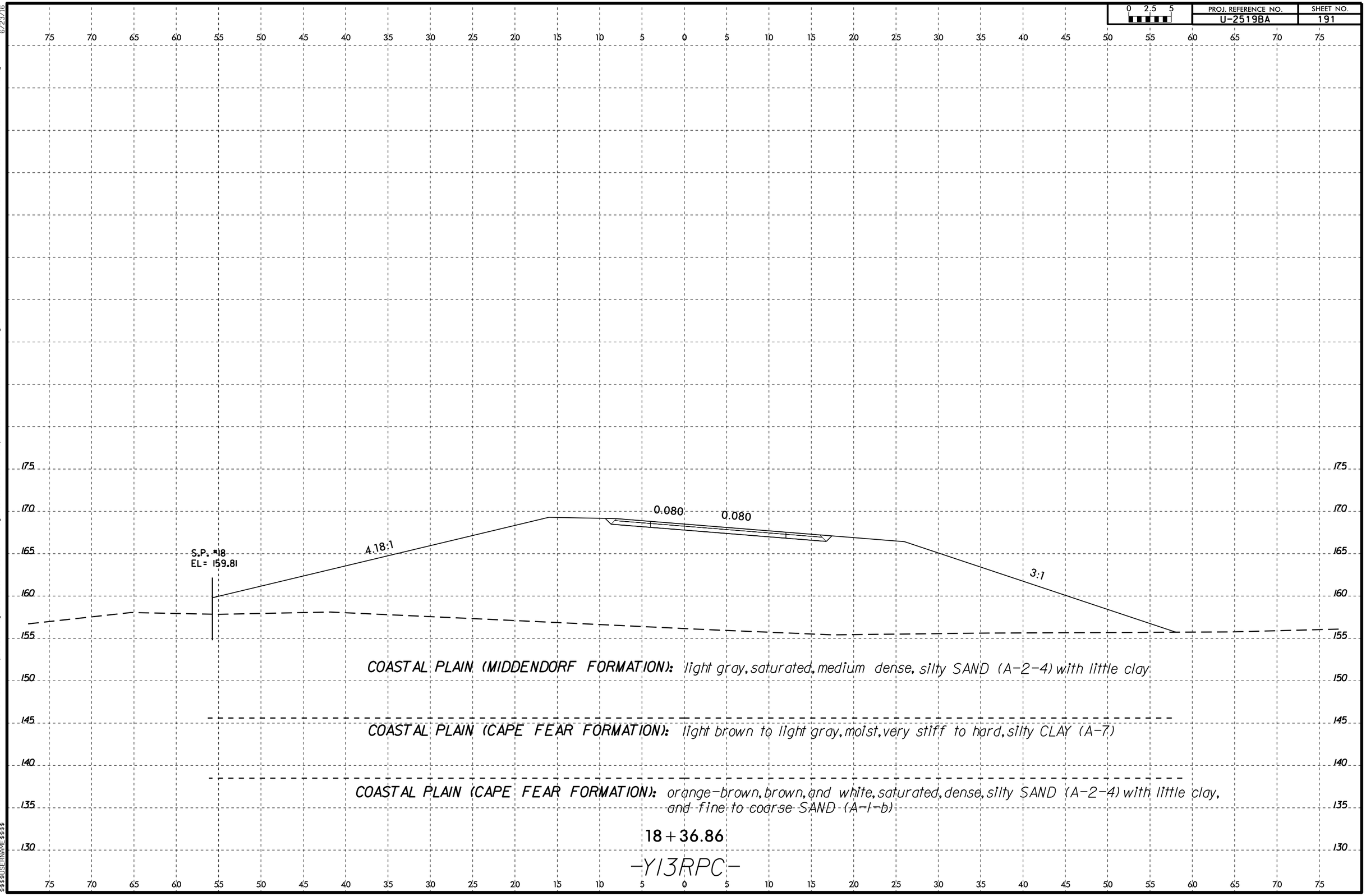
COASTAL PLAIN (CAPE FEAR FORMATION): *light brown to light gray, moist, very stiff to hard, silty CLAY (A-7)*

COASTAL PLAIN (CAPE FEAR FORMATION): *orange-brown, brown, and white, saturated, dense, silty SAND (A-2-4) with little clay, and fine to coarse SAND (A-1-b)*

17+40.59
-Y13RPC-

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	190





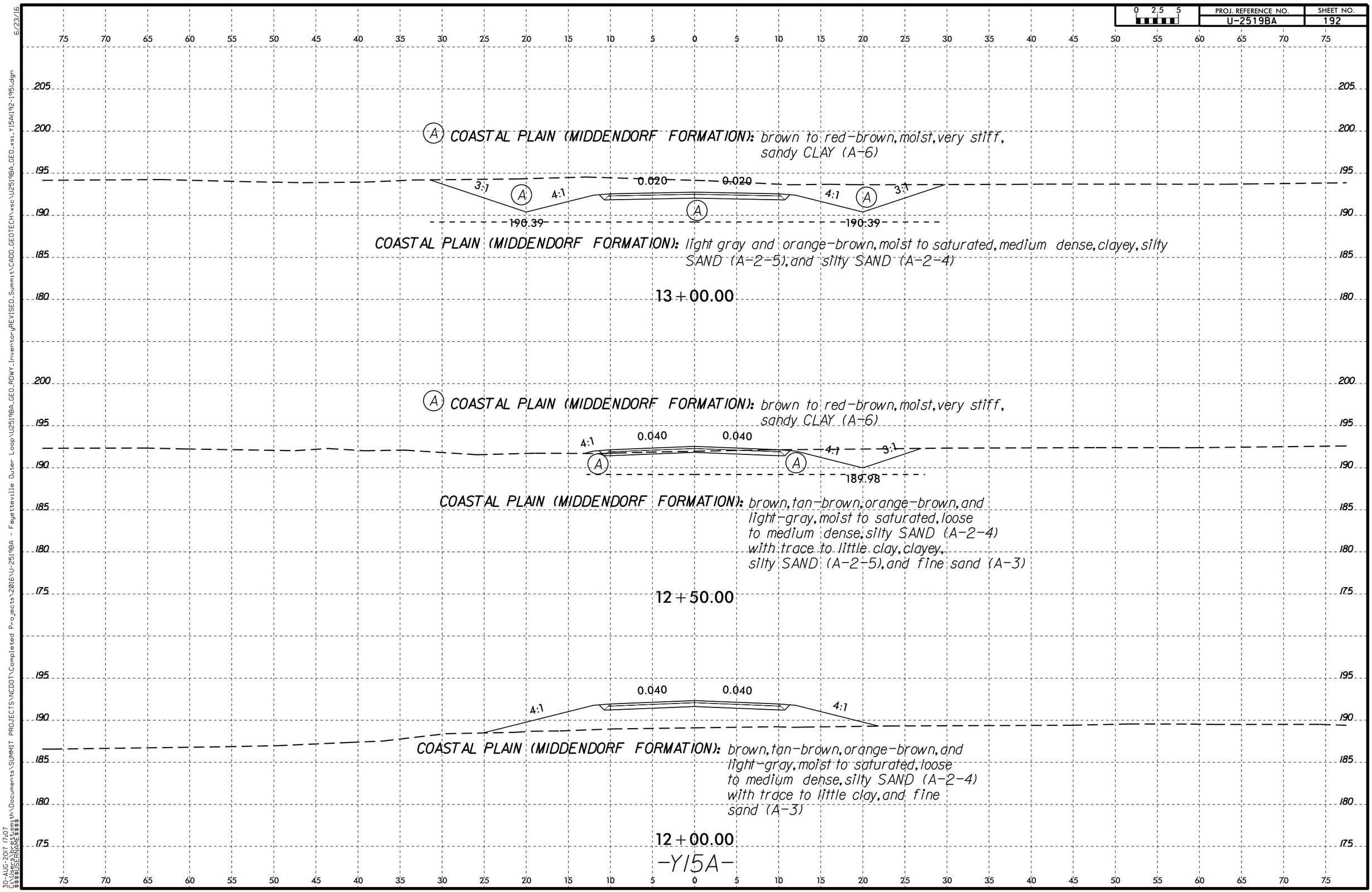
COASTAL PLAIN (MIDDENDORF FORMATION): *light gray, saturated, medium dense, silty SAND (A-2-4) with little clay*

COASTAL PLAIN (CAPE FEAR FORMATION): *light brown to light gray, moist, very stiff to hard, silty CLAY (A-7)*

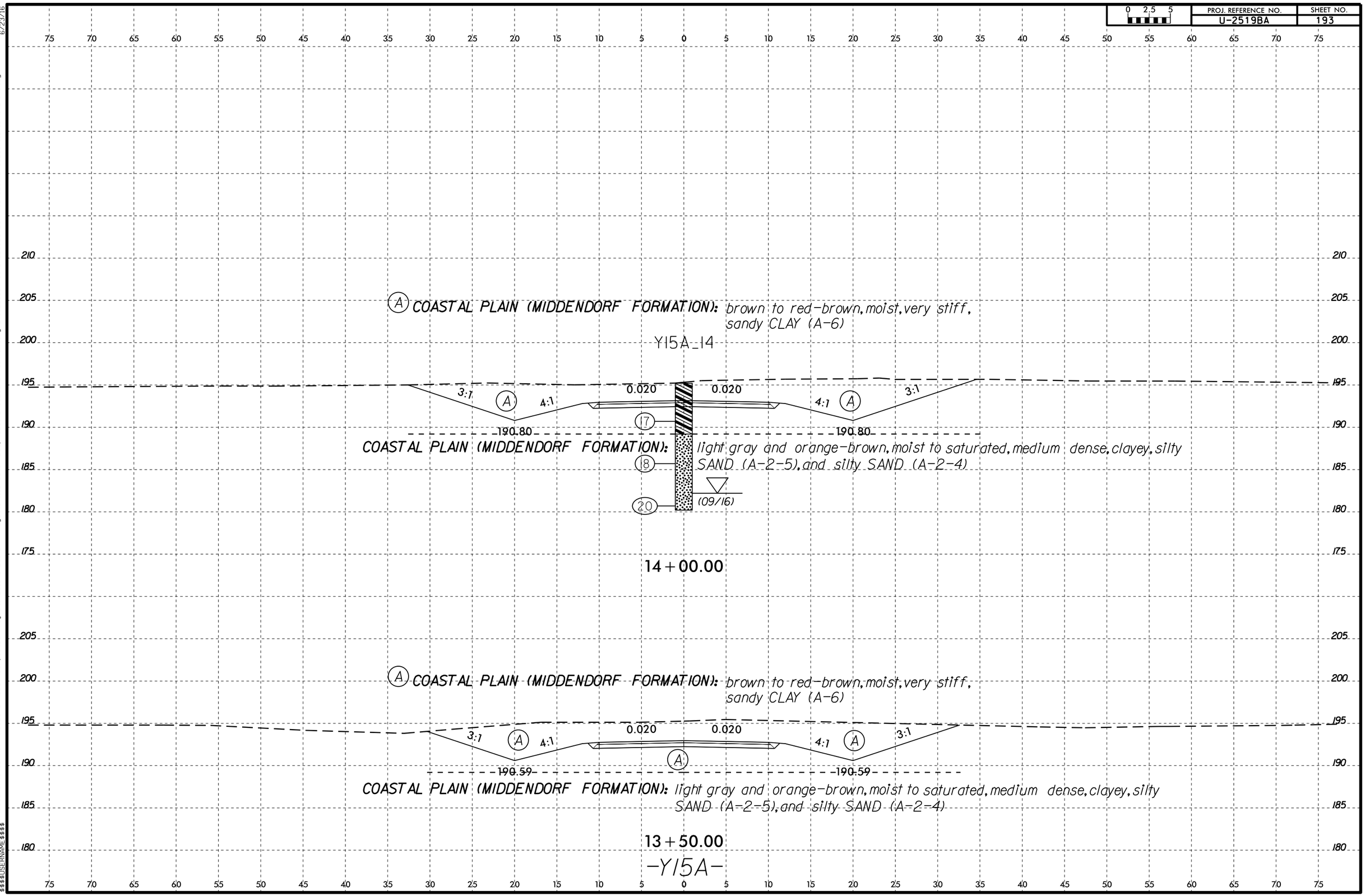
COASTAL PLAIN (CAPE FEAR FORMATION): *orange-brown, brown, and white, saturated, dense, silty SAND (A-2-4) with little clay, and fine to coarse SAND (A-1-b)*

18+36.86

-Y13RPC-



0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BA	193

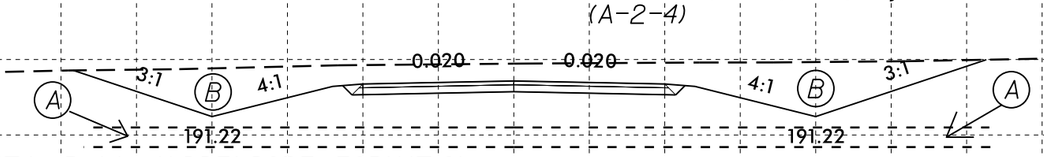


75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

210 205 200 195 190 185 180

Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *brown to red-brown, moist, very stiff, sandy CLAY (A-6)*

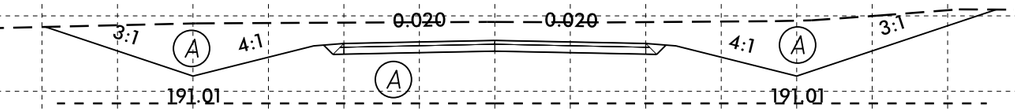
Ⓑ **COASTAL PLAIN (MIDDENDORF FORMATION):** *tan-brown, moist, loose, silty SAND (A-2-4)*



COASTAL PLAIN (MIDDENDORF FORMATION): *light gray and orange-brown, moist to saturated, medium dense, clayey, silty SAND (A-2-5), and silty SAND (A-2-4)*

15 + 00.00

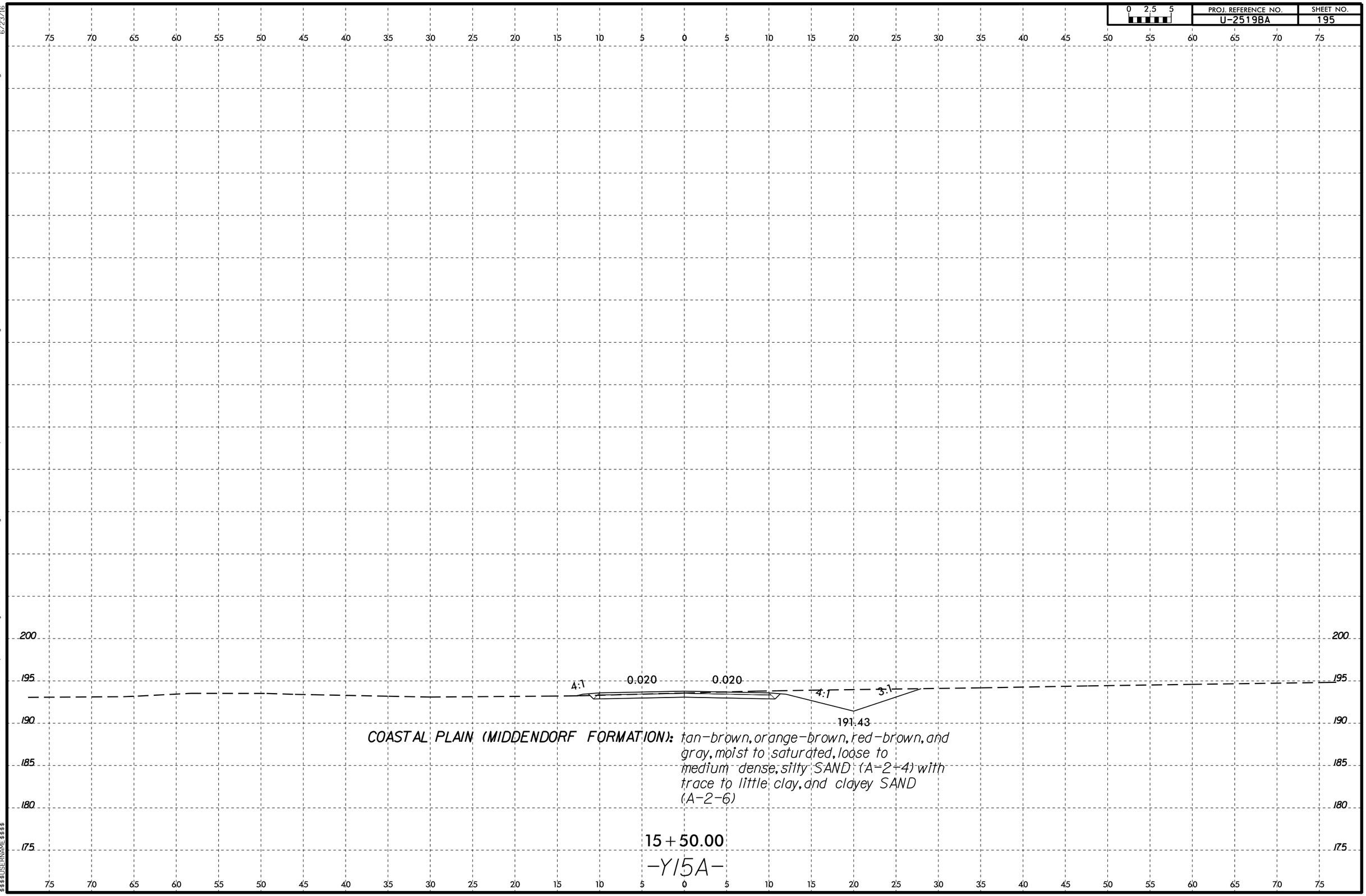
Ⓐ **COASTAL PLAIN (MIDDENDORF FORMATION):** *brown to red-brown, moist, very stiff, sandy CLAY (A-6)*



COASTAL PLAIN (MIDDENDORF FORMATION): *light gray and orange-brown, moist to saturated, medium dense, clayey, silty SAND (A-2-5), and silty SAND (A-2-4)*

14 + 50.00

-Y15A-



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34817.1.FR7	**TIP** U-2519BA	**COUNTY** CUMBERLAND	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Fayetteville Outer Loop from south of SR 1003 (Camden Rd.) to south of SR 1104 (Strickland Bridge Rd.)				**GROUND WTR (ft)**
BORING NO. L_409LT	**STATION** 409+50	**OFFSET** 145 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 144.6 ft	**TOTAL DEPTH** 49.3 ft	**NORTHING** 444,210	**EASTING** 1,987,999	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.	**START DATE** 08/19/16	**COMP. DATE** 08/19/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION / ELEV. (ft) / DEPTH (ft)
145	144.6	0.0	4	5	5	10	SS-130	14%		144.6 GROUND SURFACE 0.0
	141.5	3.1								**COASTAL PLAIN** 142.6 2.0 gray, sandy CLAY (A-6) / gray, silty SAND (A-2-4)
140			2	4	5	9				139.0 5.6 orange-brown, fine to coarse SAND (A-1-b)
	136.5	8.1						Sat.		
135			4	4	4	8				134.0 10.6 gray-brown to orange-brown, sandy CLAY (A-6)
	131.8	12.8								
130			10	9	15	24		W		
	126.8	17.8								126.3 18.3 **COASTAL PLAIN SEDIMENTARY ROCK** (Mudstone)
125			11	75	25/0.1	100/0.6				
	121.8	22.8								119.3 25.3 **COASTAL PLAIN** gray, sandy CLAY (A-6)
120			13	49	51/0.3	100/0.8				
	116.8	27.8								
115			10	15	22	37		M		
	111.8	32.8								
110			12	17	18	35		M		109.3 35.3 gray, silty CLAY (A-7) with little fine sand
	106.8	37.8								
105			6	11	18	29		M		104.3 40.3 gray, sandy CLAY (A-6)
	101.8	42.8								
100			4	6	10	16		M		99.3 45.3 gray, clayey SAND (A-2-6)
	96.8	47.8								
			3	4	6	10		Sat.		95.3 49.3 Boring Terminated at Elevation 95.3 ft in Coastal Plain (clayey SAND)

- Topsoil (0.0 - 0.3 feet)
- Unconfined aquifer (4.2 - 18.3 feet)
- Confined aquifer (45.3 - 49.3 feet)

WBS 34817.1.FR7	**TIP** U-2519BA	**COUNTY** CUMBERLAND	**GEOLOGIST** Worley, B.	
SITE DESCRIPTION Fayetteville Outer Loop from south of SR 1003 (Camden Rd.) to south of SR 1104 (Strickland Bridge Rd.)				**GROUND WTR (ft)**
BORING NO. L_424LT	**STATION** 424+00	**OFFSET** 100 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 185.6 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 445,667	**EASTING** 1,987,688	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Moseley, M.	**START DATE** 08/10/16	**COMP. DATE** 08/10/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
										185.6 GROUND SURFACE 0.0
185										**COASTAL PLAIN** tan-red, silty SAND (A-2-4)
	182.0	3.6	4	4	6	10		M		
180										
	177.0	8.6	4	6	5	11		M		
175										
	172.0	13.6	92	8/0.1		100/0.6				172.1 13.5 **COASTAL PLAIN SEDIMENTARY ROCK** (Sandstone) 171.1 14.5
170										**COASTAL PLAIN** tan-red, silty SAND (A-2-4)
	167.0	18.6	6	10	10	20		M		165.5 20.1 Boring Terminated at Elevation 165.5 ft in Coastal Plain (silty SAND)