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REFERENCE: U-4405

PROJECT: 39049

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4405	1	86

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ROADWAY SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
PROJECT DESCRIPTION US401 FROM WEST OF
HAMPTON OAKS DRIVE TO EAST OF
FAIRWAY DRIVE IN FAYETTEVILLE

INVENTORY

CAUTION NOTICE

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

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

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

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

PERSONNEL

T. HOLZAPFEL (MAD)

M. GOOGAN (MAD)

A. RIGGS (S&ME)

S. TIERNAN (S&ME)

J. GERDES (S&ME)

INVESTIGATED BY S&ME, INC.

DRAWN BY B. RATTI

CHECKED BY A.F. RIGGS JR, P.E.

SUBMITTED BY S&ME, INC.

DATE JAN 2016



DocuSigned by:
Abner F. Riggs, Jr., 2/24/2016
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SIGNATURE DATE

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																														
SOIL 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										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.										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:										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 DISLOGGED 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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																														
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										WEATHERED ROCK (WR) 										CRYSTALLINE ROCK (CR) 																																																														
MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										NON-CRYSTALLINE ROCK (NCR) 										COASTAL PLAIN SEDIMENTARY ROCK (CP) 										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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.																																																														
COMPRESSION SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										PERCENTAGE OF MATERIAL <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										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 PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP																																																				
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RECOMMENDATION SYMBOLS UNDERCUT EXCAVATION SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE 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 FRAG. - 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 ? - UNIT WEIGHT % - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										TEXTURE OR GRAIN SIZE																																																																								
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See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols

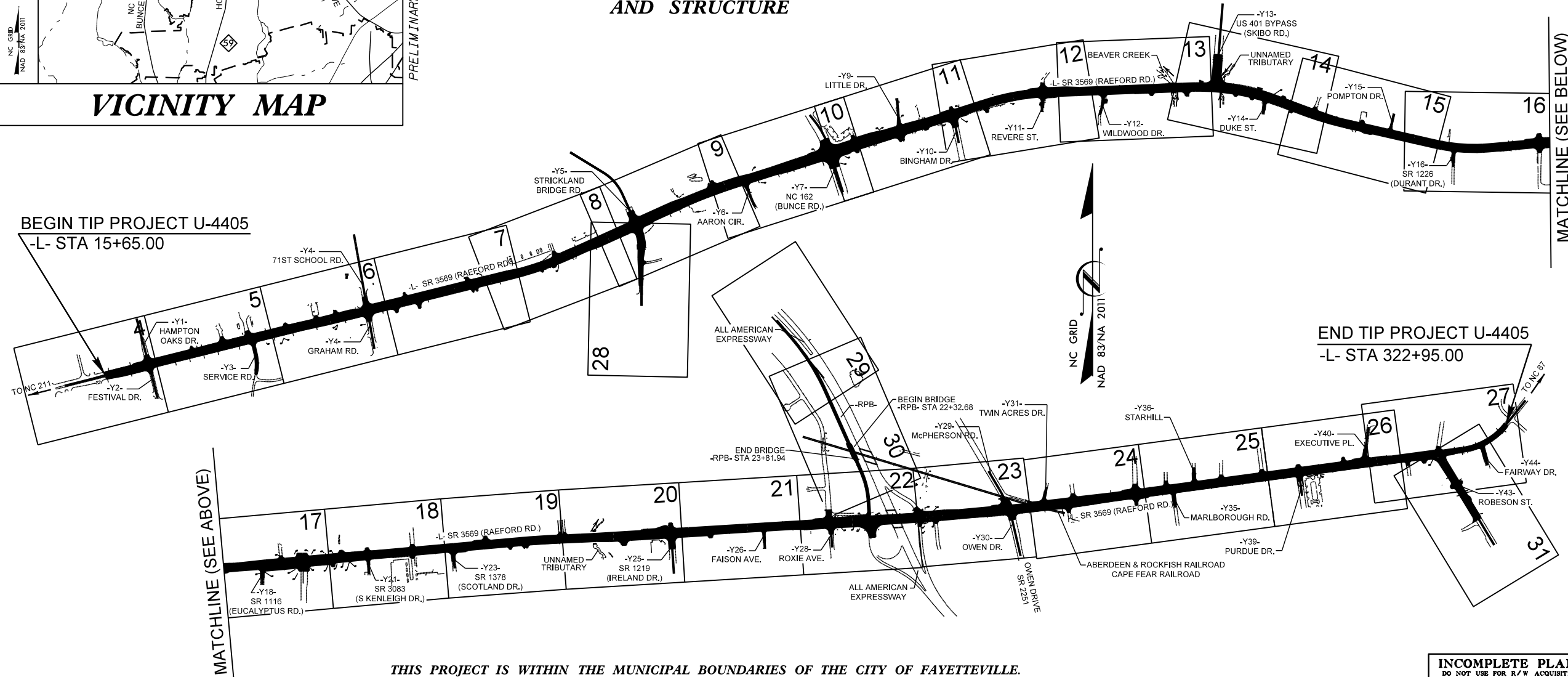
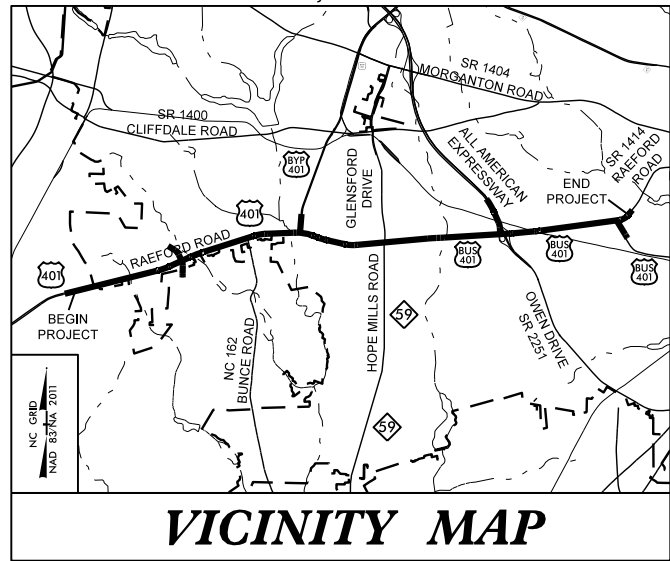
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CUMBERLAND COUNTY

LOCATION: US 401 FROM WEST OF HAMPTON OAKS DRIVE TO EAST OF FAIRWAY DRIVE IN FAYETTEVILLE

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNALS, WIDENING, RESURFACING, AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4405	3	86
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
39049.1.1	STPDA-0401(230)	PE	

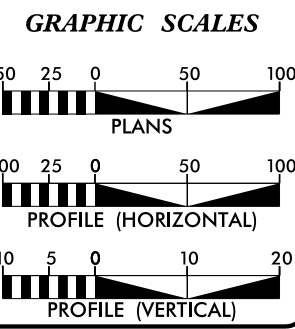


TIP PROJECT: U-4405

CONTRACT: 39049

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF FAYETTEVILLE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ____.

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



DESIGN DATA

ADT 2018 =	63,150
ADT 2038 =	70,975
K =	10 %
D =	60 %
T =	3 %*
V =	50 MPH
*TTST =	1% DUAL=2%
FUNC CLASS =	URBAN ARTERIAL
REGIONAL TIER	REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-4405 =	5.820 MILES
TOTAL LENGTH TIP PROJECT U-4405 =	5.820 MILES

NCDOT CONTACT: REKHA V. PATEL, PE

Prepared In the Office of:

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBES #F-0326

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JULY 15, 2016

LETTING DATE: JULY 17, 2018

CLINTON J. MORGAN, PE
PROJECT ENGINEER

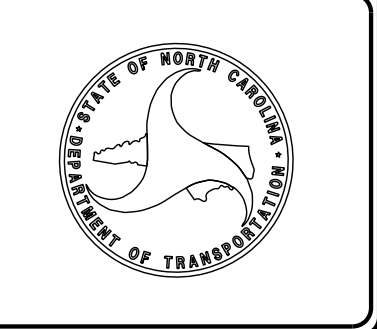
BRYAN LAMBETH, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





January 26, 2016

STATE PROJECT: 39049.1.1 (U-4405)
 FEDERAL PROJECT: STPDA-0401(230)
 COUNTY: Cumberland
 DESCRIPTION: US 401 from West of Hampton Oaks Drive to east of Fairway Drive in Fayetteville, North Carolina

SUBJECT: Geotechnical Report - Inventory

Project Description

This project consists of widening 5.82 miles of the existing roadway along US 401 (Raeford Road) Road (-L-) and construction of a new ramp (-RPB-) from the SBL of All American Freeway over the Aberdeen & Rockfish Railroad to US 401 in Fayetteville North Carolina. US 401 currently consists of 4-lanes with a grassed median along the western most section and center turn lanes along the remaining section. The roadway will be widened to include new roadway, turn lanes and sidewalks on both sides of US 401. This will also include extending 4 culverts on each side of the roadway and construction of a new bridge on ramp -RPB- over the Aberdeen & Rockfish Railroad.

The project area is comprised of rural and wooded areas with some commercial development along the western portion of the alignment and more urban commercialized areas with small businesses along the eastern portion of the alignment. The project crosses several creeks and tributaries, underneath the All American Expressway and grade crossing of the Aberdeen & Rockfish Railroad.

The geotechnical exploration was conducted in June and July of 2015. Standard penetration test (SPT) borings were advanced using a CME-45C track mounted drilling machine equipped with an automatic hammer. Standard Penetration Testing (SPT) methods utilizing wash boring techniques with casing and tri-cone roller bit were used to advance borings to the necessary depths. Additionally, hand auger borings were performed along the alignment to determine subsurface conditions and obtain soil samples. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by S&ME’s soil testing laboratory. Laboratory testing was performed in accordance with the AASHTO Soil Classification System.

The following alignments, totaling 6.287 miles, were investigated. Subsurface cross sections of the following alignment are included in this report.

<u>Line</u>	<u>Stations</u>
-L-	15+65 to 322+95
-RPB-	10+00 to 34+68.31

Areas of Special Geotechnical Interest

- 1) **Highly Plastic Soils:** Highly plastic Coastal Plain soils with plastic indices (PI) of 25 and greater with greater than 50 percent passing the #200 sieve were encountered within 3 feet of the proposed grade at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	19+00 to 25+00	55 LT to 55 RT
-L-	70+00 to 74+00	50 LT to 60 RT
-L-	102+00 to 107+00	75 LT to 55 RT
-L-	146+50 to 148+00	60 LT to 45 RT

A discussion of these highly plastic soils is located below in the section titled “Soil Properties”.

- 2) **Alluvial Soils:** Recent alluvial deposits typically consist of very soft to soft, wet alluvial soils (N-values less than 4) were encountered within 3 feet of proposed grades within fill extent and may impact subgrade or embankment construction. These soils were found at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	81+70 to 82+75	70 to 100 LT
-L-	82+70 to 85+70	70 to 80 RT
-L-	136+40 to 135+00	55 to 70 LT
-L-	137+60 to 138+30	60 RT
-L-	221+10 to 222+15	60 to 100 LT
-L-	221+10 to 223+40	60 to 80 RT

A discussion of these alluvial soils is located below in the section titled “Soil Properties”.

- 3) **Artificial Fill:** Artificial fill may contain soils placed in an uncontrolled manner and may contain unsuitable soils. Areas of artificial fill are present at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	78+00 to 82+70	65 RT
-L-	82+75 to 85+30	80 LT
-L-	85+65 to 87+00	70 RT
-L-	89+70 to 90+40	2 LT to 13 RT

-L-	127+35 to 128+30	35 to 50 RT
-L-	138+00 to 142+00	50 to 60 LT
-L-	138+30 to 143+30	50 to 90 RT
-L-	143+60 to 145+45	65 to 85 LT
-L-	148+70 to 149+35	30 to 70 RT
-L-	213+80 to 221+10	55 to 80 RT
-L-	218+10 to 221+10	60 to 65 LT

A discussion of these artificial fill soils is located below in the section titled "Soil Properties".

- 4) Groundwater: High water tables, seasonal high groundwater, as well as potential perched groundwater above or within 6 feet of proposed grade were encountered at the following location:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	300+00 to 311+00	50 to 60 LT

- 5) Culverts: Culverts will be extended on both sides of the roadway within the proposed right of way at the following locations:

<u>Line</u>	<u>Station</u>	<u>Offset (ft)</u>	<u>Within Fill Extent</u>
-L-	82+40	110 LT and 90 RT	Yes
-L-	137+95	90 LT and 100 RT	Yes
-L-	143+35	130 LT and 90 RT	Yes
-L-	221+20	110 LT and 105 RT	Yes

Physiography and Geology

The site is located in the south-western portion of the Coastal Plain Physiographic Province of North Carolina. The Coastal Plain Province is typically characterized by marine and eolian sediments that were deposited during periods of fluctuating sea levels and moving shorelines. The surface soils often consist of more recent deposits of interbedded sands, clayey sands and clays. Based on previous mapping (N.C. Geologic Map 1985) and our knowledge of the local geology, the predominant geological formation at this site is the Middendorf Formation. Portions of the Black Creek Formation which overlies the Middendorf Formation is also mapped in the eastern portion of the alignment near All American Freeway.

The Middendorf Formation consists of beds of sands and clays of alluvial origin. The lithology of the materials and mica content indicates that these sediments are derived from weathered crystalline granitic and metamorphosed gneiss rocks of the Piedmont. The sands consist of angular grains that are fine to coarse in texture and the clays are arenaceous.

The Black Creek Formation typically consists of dark gray to black clays with thinly bedded fine sands and often contain fine mica. The clays are often replaced abruptly in short distances both vertically and horizontally with highly cross bedded sands. Partially lignitized plant remains are also common.

Soil Properties

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

Roadway Embankment fill soils are present beneath the existing roadway and shoulders of the existing roadway on the project. The embankment fill materials within the widening sections extend to depths of at least 8.5 feet below existing grade. The roadway embankment fill soils generally consist of orange-brown, red-brown, tan and gray, loose to medium dense, dry to wet, coarse to fine sands (A-1-b, A-3) and silty to clayey fine to coarse sands (A-2-4, A-2-6) with trace amounts of organics and gravel. The fine grained soils in the roadway embankment fill consist of orange-brown, red-brown, tan and gray, medium stiff to stiff, moist to wet coarse to fine sandy silts (A-4) and fine to coarse sandy and silty clays (A-6) with trace of organic material. The silts and clays tested exhibit low plastic indices of no greater than 19 percent with no more than 37 percent fines passing the No. 200 sieve.

Artificial Fill soils are present within the median and outside of roadway embankment fill areas along commercial areas and sewer easements developed adjacent to the roadway. Artificial fill was encountered to depths of at least 8.0 feet beneath the ground surface. These soils consist mainly of red, tan and gray, very loose to loose fine to coarse sands and gravels, silty to clayey fine to coarse sands (A-1-b, A-2-4 and A-2-6) and soft gray and yellow-tan, moist, fine sandy clay (A-6) with trace of organics. SPT N-values in the artificial fill soils ranged from 4 to 7 blows per foot (bpf).

Alluvial soils are present at existing creek and tributary crossings where existing pipes and culverts are located as indicated by the alluvial boundary area shown on the plan sheets. Alluvial soils were also encountered beneath roadway embankment and artificial fill materials to depths of up to 22.5 feet beneath the ground surface. These soils consist of brown, tan, dark gray and black, very soft to soft, wet, coarse to fine sandy to silty clays (A-6, A-7-6) and very loose to loose, wet to saturated silty to clayey fine to coarse sands (A-2-4, A-2-6) with trace to little amounts of organic material and some small quartz gravel. The alluvial soils exhibited SPT N-values of weight-of-hammer (WOH) to 10 bpf.

Coastal Plain soils were encountered throughout the project and beneath the roadway embankment and artificial fill materials and alluvial materials. The Coastal Plain soils were derived from undifferentiated coastal plain deposits and soils characteristic of more well defined formations mapped in the project area. Formations mapped in the area are the Black Creek Formation and underlying Middendorf Formation. The undifferentiated coastal plain soils and the soils of the Middendorf Formation typically consist of orange-brown, yellow-orange, red-brown, tan and gray, loose to medium dense, dry to saturated, silty to clayey fine to coarse sands (A-2-4, A-2-6, A-2-7) with traces of mica, and moist to wet, stiff to hard fine to coarse sandy and silty clays (A-6, A-7-6) with mudstone. These soil exhibited low to high plastic indices of 3 to 34 percent with 17 to 92 percent fines passing the No. 200 sieve. SPT N-values in the Coastal Plain soils ranged from 13 bpf to 100 blows with 0.6 feet of penetration.

Soils of the Black Creek Formation were encountered along -RPB- as high as elevations 177.1 and 178.2 feet. These soils are characterized by their dark black color and consist of moist medium stiff dark gray silty clay (A-7-6) with thin lenses of fine sand and traces of mica and partially lignitized organic materials. SPT N-values in these soils ranged from 4 to 7 blows per foot (bpf).

Rock Properties

Mudstone was encountered during the roadway investigation at End Bent No. 2 of the proposed bridge location over the Aberdeen & Rockfish Railroad along -RPB-. The mudstone originates in the underlying Middendorf Formation. The mudstone was encountered between approximately elevations 144.2 and 134.7 feet. SPT N-values in the mudstone range from 100 blow per 0.6 to 0.9 feet of penetration.

Groundwater

Groundwater was typically greater than 6 feet below proposed grades in almost all borings throughout the project corridor. Groundwater was typically encountered in boring locations adjacent to existing culverts in alluvial soils either exposed at the ground surface or beneath fill materials at depths of about 1.4 to 10.8 feet beneath the ground surface. An exception to this was in hand auger borings HA-63 and HA-65 where groundwater was encountered at depths of 3.8 and 4.4 feet, respectively and along -RPB- where groundwater was encountered at depths of 3.1 to 22.3 feet beneath the ground surface in coastal plain soils. The depth of ground water, beneath the ground surface, will fluctuate with seasonal precipitation and may occur at higher levels at other times of the year above less permeable clayey soils or hard soils.

Prepared by,

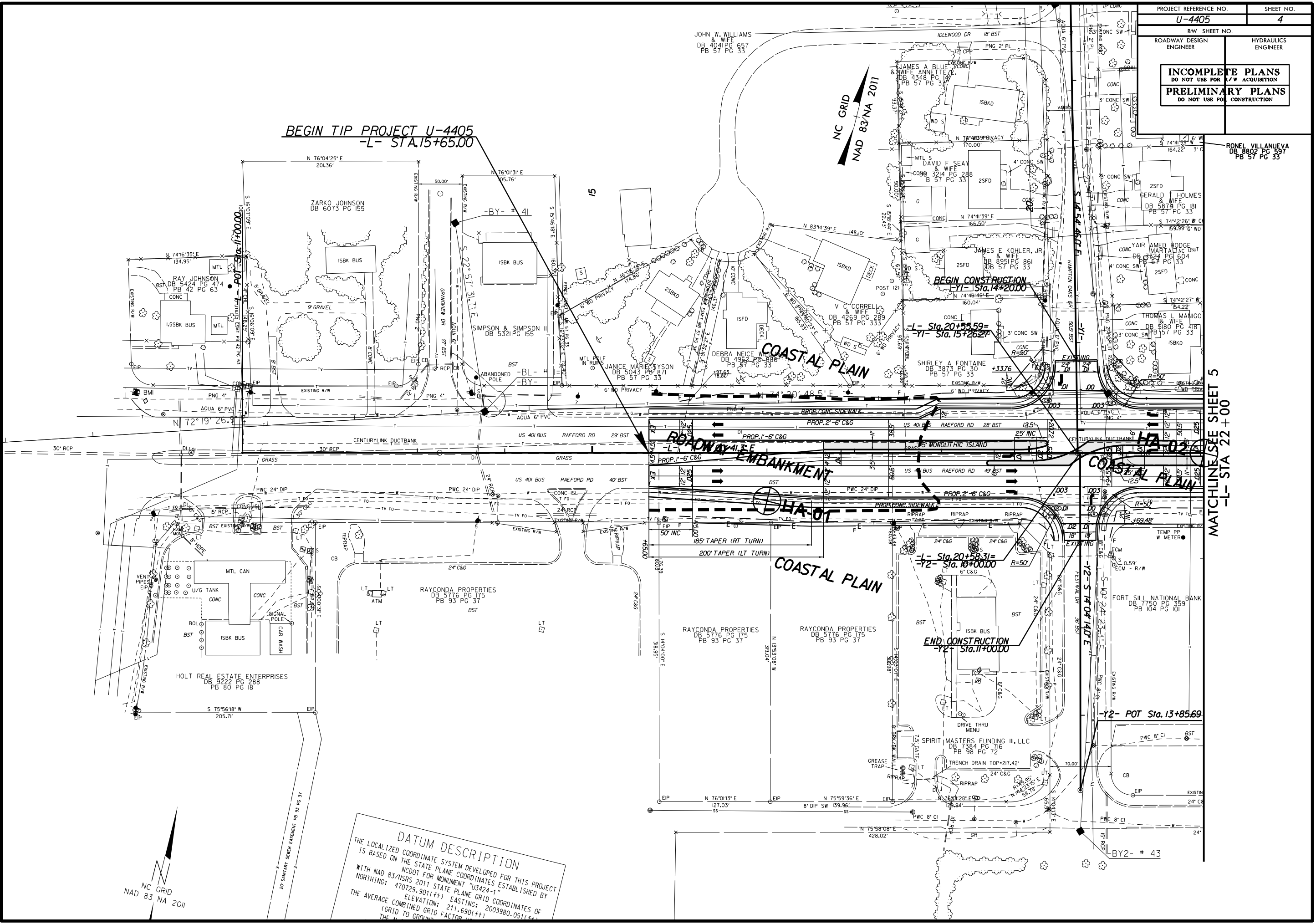


Abner F. Riggs, Jr. P.E.
Senior Geotechnical Engineer
N.C. Registration No. 14155

RONEL VILLANUEVA
DB 8802 PG 597
PB 57 PG 33

BEGIN TIP PROJECT U-4405
-L- STA.15+65.00

NC GRID
NAD 83/NA 2011



MATCHLINE SEE SHEET 5
-L- STA. 22 + 00

DATUM DESCRIPTION
 THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "U3424-1" WITH NAD 83/NSRS 2011 STATE PLANE GRID COORDINATES OF NORTHING: 470729.901(FT) EASTING: 2003980.051(FT) ELEVATION: 211.690(FT) (GRID TO GROUND FACTOR)

NC GRID
NAD 83 NA 2011

REVISIONS

20-JAN-2016 14:58
 PROJECT U-4405 15-050 U4405\CADD_GEO\ECH\Plan\Prof\U4405_rdy_pst_04.dgn
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PROJECT REFERENCE NO.	SHEET NO.
U-4405	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

ISBK
LOYD E. ALMAN
ELEMENTARY SCHOOL
DB 8304 PG 55

CUMBERLAND COUNTY
DB 8304 PG 55

ISBK BUS
DB 8993 PG 586

FAYETTEVILLE STORAGE 17
NC, LLC
DB 96 PG 3

MURRY EUGENE HODGES, JR
& WIFE
DB 4712 PG 298
PB 96 PG 3

TRINITY UNITED
METHODIST CHURCH
DB 2552 PG 413

GERALD T. HOLMES
& WIFE
DB 5874 PG 181
PB 57 PG 33

YAIR AMED HODGE
MARTA
DB 7324 PG 604
PB 57 PG 33

THOMAS L. MANIGO
& WIFE
DB 5180 PG 418
PB 57 PG 33

JOHN W. WILLIAMS
& WIFE
DB 4041 PG 657
PB 57 PG 33

RONEL VILLANUEVA
DB 8802 PG 597
PB 57 PG 33

RAYCONDA PROPERTIES
DB 5776 PG 175
PB 117 PG 64

PHILLIP R. TAYLOR
DB 8715 PG 230
PB 113 PG 117

MCNL ENTERPRISES, LLC
DB 6106 PG 294
PB 104 PG 101

M & S PIKE, LLC
DB 5493 PG 309
PB 104 PG 101

M & S PIKE, LLC
DB 5493 PG 309
PB 104 PG 101

WALTER E. CAULDER
& WIFE
DB 5016 PG 572
PB 49 PG 67

ROY LESTER
& WIFE SUNNY
DB 6931 PG 599
PB 49 PG 67

BEATRICE GLENN
DB 3594 PG 750
PB 19 PG 45

GERALD (BOON) SPEED, JR.
DB 2121 PG 371
PB 19 PG 45

CYNTHIA HARRIS STEVENS
DB 7425 PG 883
PB 19 PG 45

JOHNNY DEAN CAPPES
DB 6337 PG 296
PB 33 PG 54

END CONSTRUCTION
-Y3- Sta. 13+92.00

-Y3- POT Sta. 14+01.69

-Y3- PT Sta. 13+61.34

-Y3- PC Sta. 11+68.77

-Y3- Sta. 10+00.00

-Y3- Sta. 12+66.11

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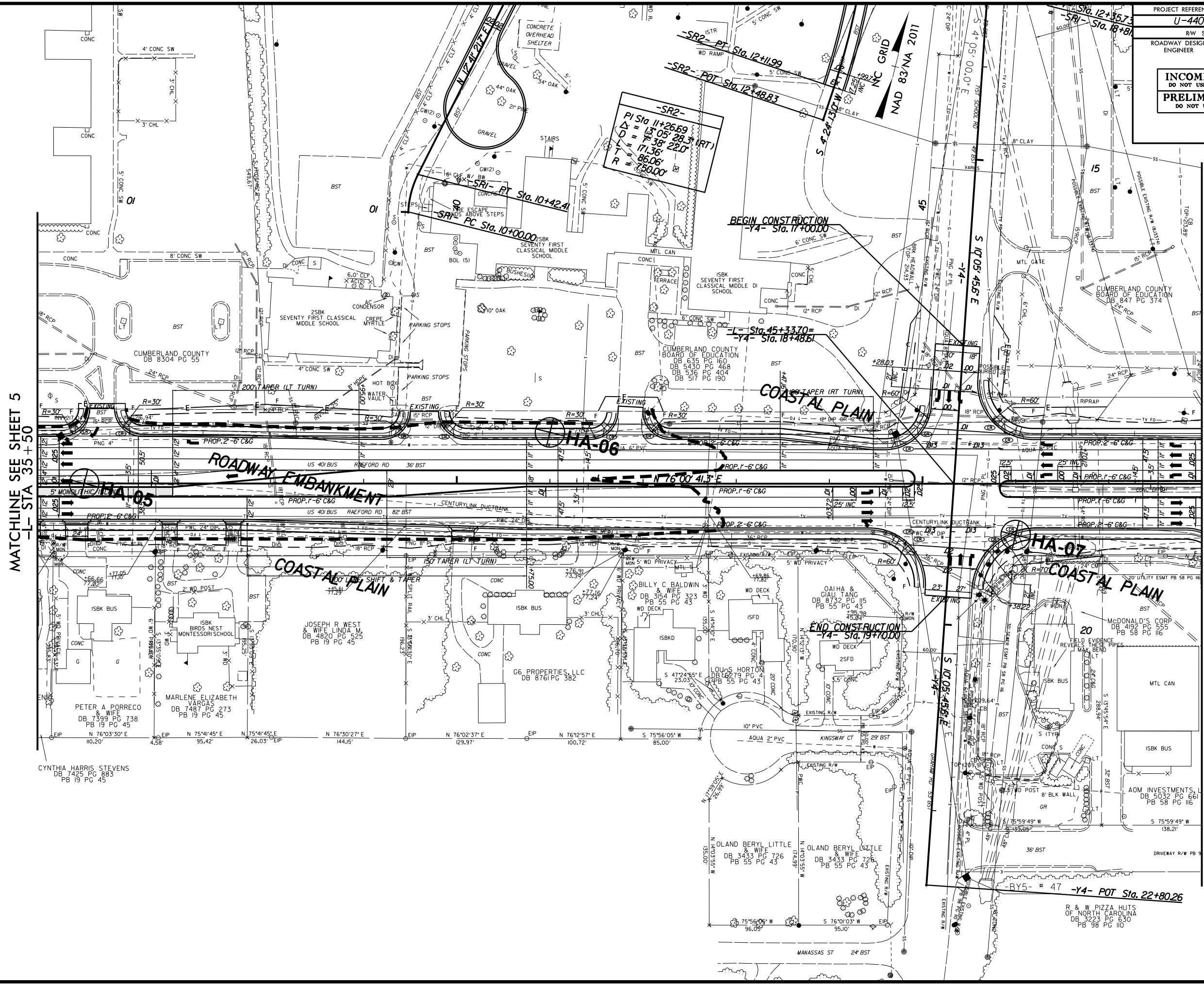
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-Y3- Sta. 10+00.00

-Y3- Sta. 10+00.00

-Y3- Sta. 10+00.00

PROJECT REFERENCE NO. U-4405	SHEET NO. 6
RW SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCHLINE SEE SHEET 5
-L- STA 35+50

MATCHLINE SEE SHEET 7
-L- STA 48+00

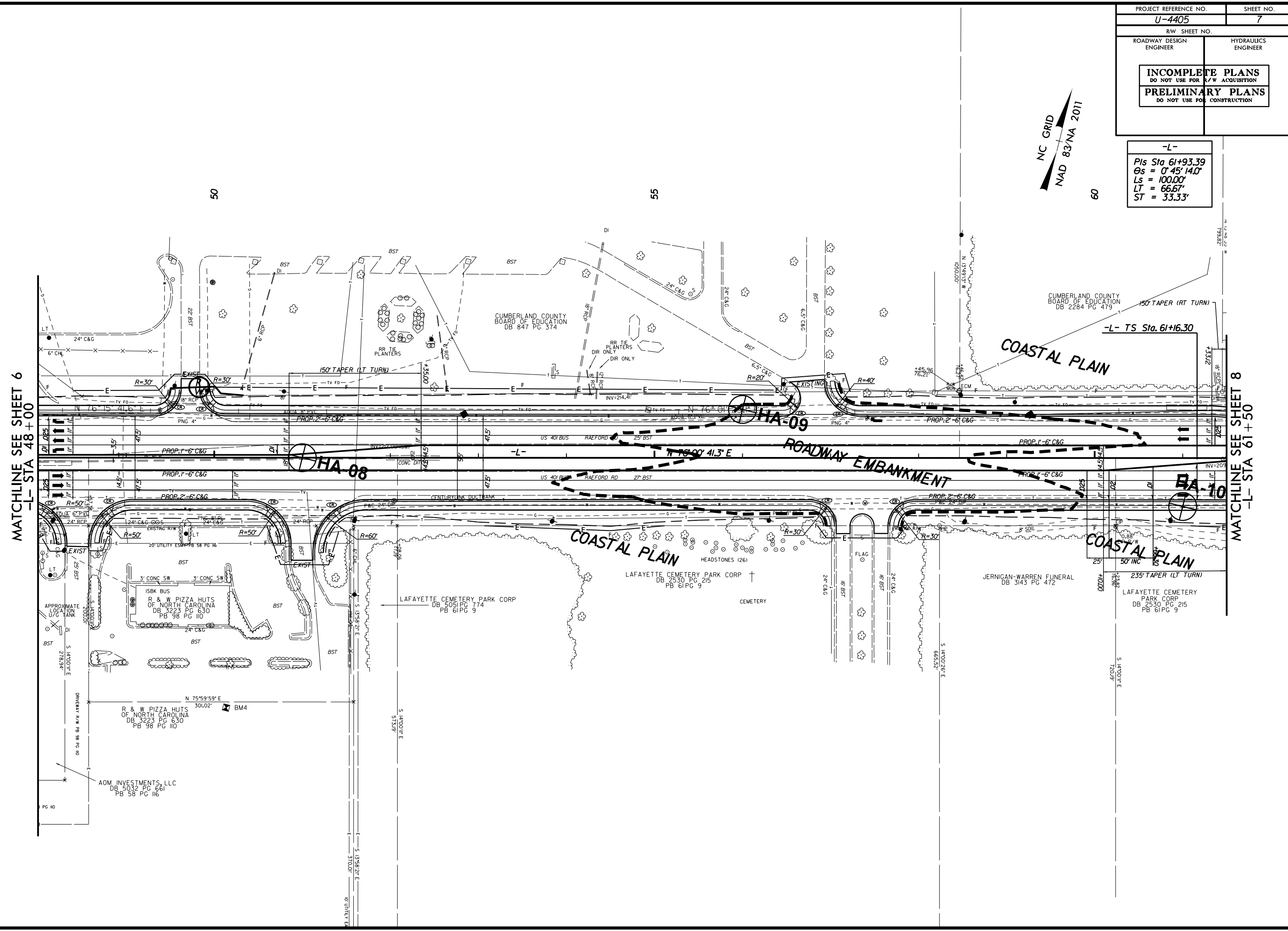
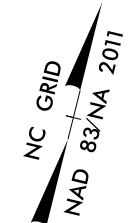
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PROJECT REFERENCE NO. U-4405	SHEET NO. 7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-

Pls Sta 61+93.39
 $\Theta_s = 0^\circ 45' 14.0''$
 $L_s = 100.00'$
 $LT = 66.67'$
 $ST = 33.33'$



MATCHLINE SEE SHEET 6
-L- STA 48+00

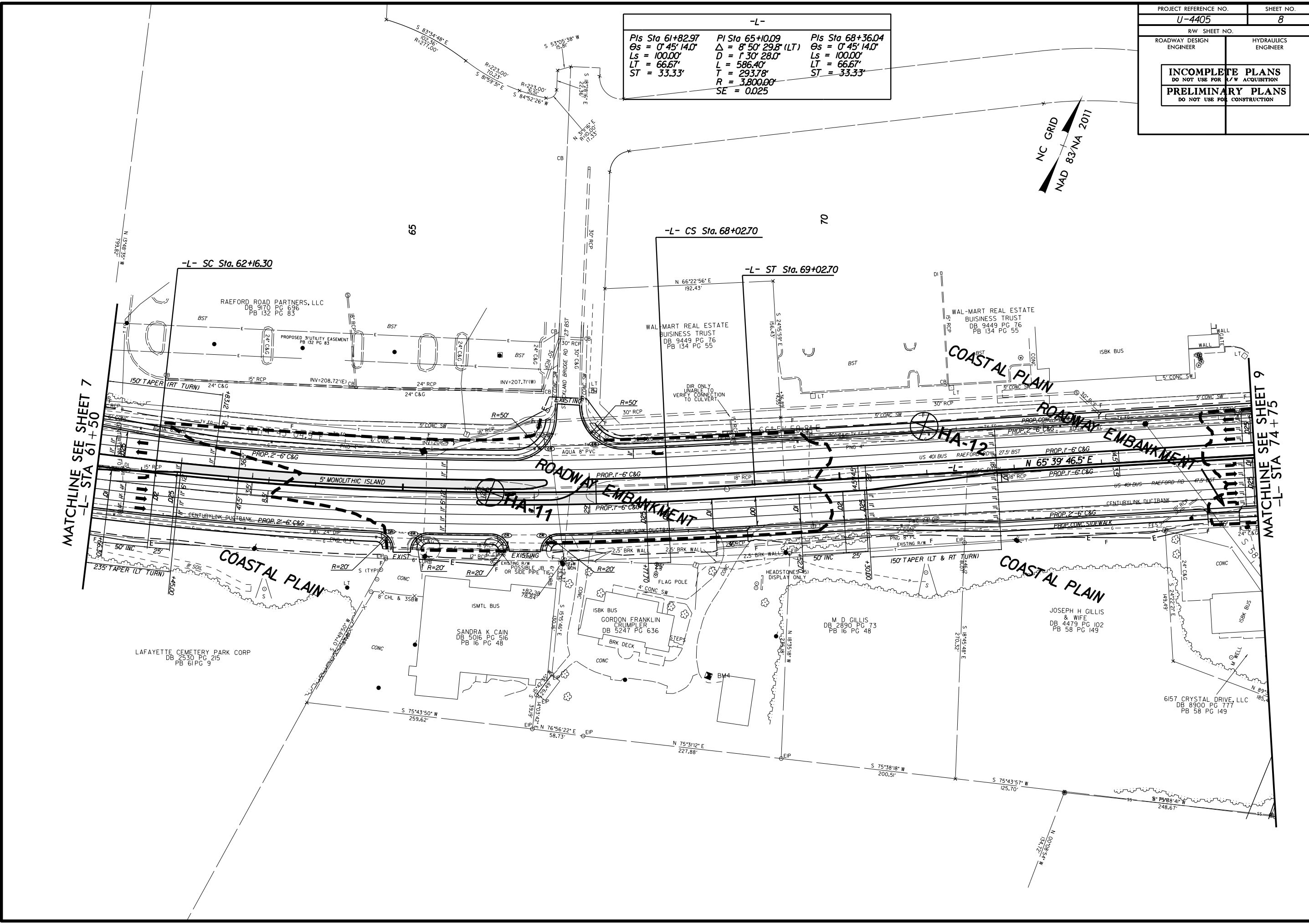
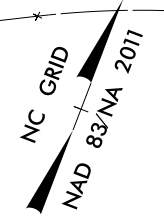
MATCHLINE SEE SHEET 8
-L- STA 61+50

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	8
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-		
Pls Sta 61+82.97	Pls Sta 65+10.09	Pls Sta 68+36.04
$\Theta_s = 0^\circ 45' 14.0''$	$\Delta = 8^\circ 50' 29.8''$ (LT)	$\Theta_s = 0^\circ 45' 14.0''$
$L_s = 100.00'$	$D = 1^\circ 30' 28.0''$	$L_s = 100.00'$
$LT = 66.67'$	$L = 586.40'$	$LT = 66.67'$
$ST = 33.33'$	$T = 293.78'$	$ST = 33.33'$
	$R = 3,800.00'$	
	$SE = 0.025$	



MATCHLINE SEE SHEET 7
-L- STA 61+50

MATCHLINE SEE SHEET 9
-L- STA 74+75

REVISIONS

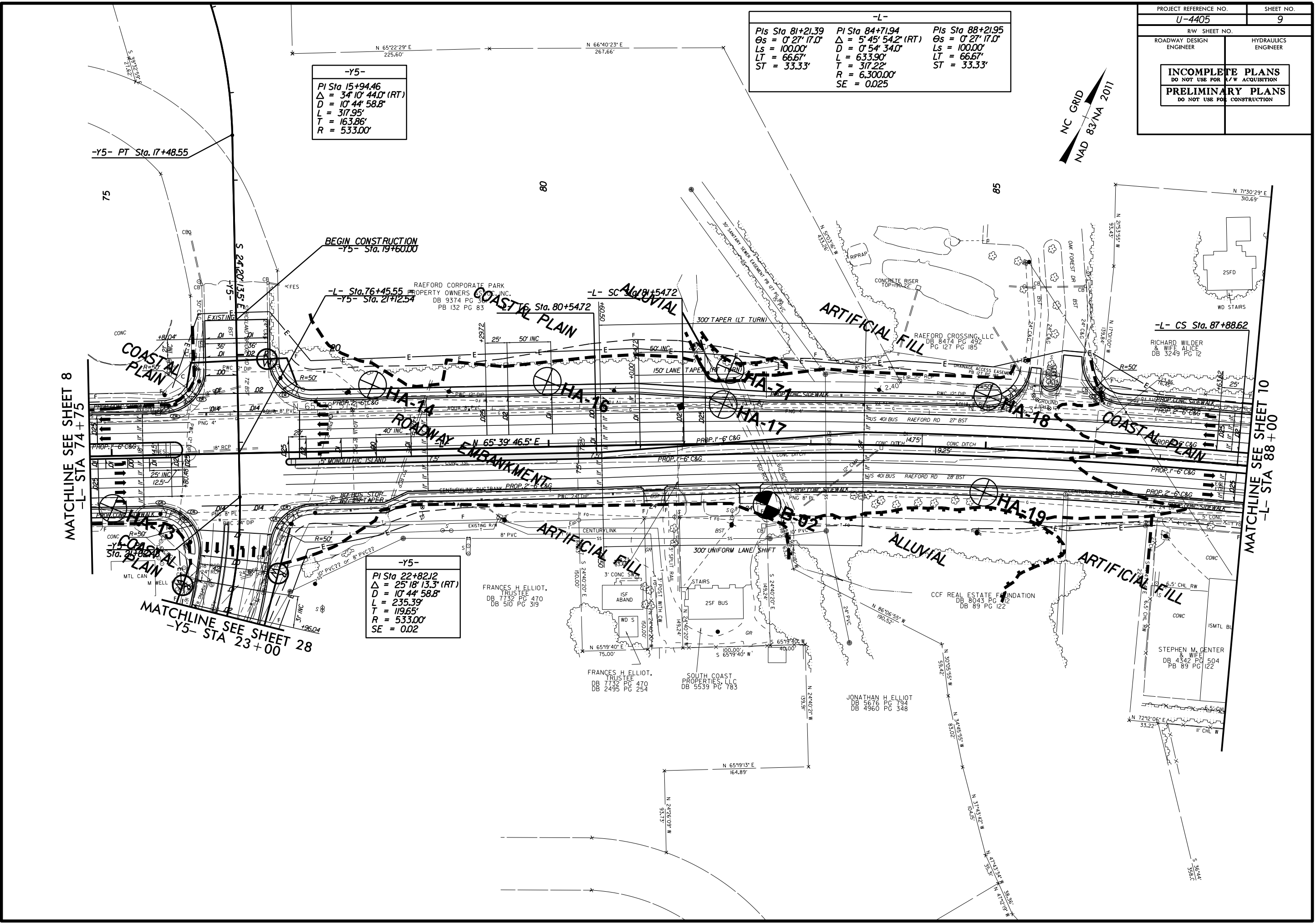
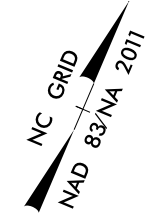
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PROJECT REFERENCE NO.	SHEET NO.
U-4405	9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-		
Pls Sta 81+21.39	PI Sta 84+71.94	Pls Sta 88+21.95
$\Theta_s = 0^\circ 27' 17.0''$	$\Delta = 5^\circ 45' 54.2''$ (RT)	$\Theta_s = 0^\circ 27' 17.0''$
LS = 100.00'	D = 0' 54' 34.0"	LS = 100.00'
LT = 66.67'	L = 633.90'	LT = 66.67'
ST = 33.33'	T = 317.22'	ST = 33.33'
	R = 6,300.00'	
	SE = 0.025	

-Y5-	
PI Sta 15+94.46	$\Delta = 34^\circ 10' 44.0''$ (RT)
D = 10' 44' 58.8"	L = 317.95'
T = 163.86'	R = 533.00'

-Y5-	
PI Sta 22+82.12	$\Delta = 25^\circ 18' 13.3''$ (RT)
D = 10' 44' 58.8"	L = 235.39'
T = 119.65'	R = 533.00'
	SE = 0.02



MATCHLINE SEE SHEET 8
-L- STA 74+75

MATCHLINE SEE SHEET 28
-Y5- STA 23+00

MATCHLINE SEE SHEET 10
-L- STA 88+00

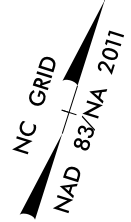
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PROJECT REFERENCE NO.	SHEET NO.
U-4405	10
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-Y7-

PI Sta 12+57.36
 $\Delta = 20' 39' 00.6''$ (RT)
 $D = 6' 30' 00.0''$
 $L = 317.69'$
 $T = 160.59'$
 $R = 881.47'$



-L-

PIs Sta 88+21.95
 $\Theta_s = 0' 27' 17.0''$
 $L_s = 100.00'$
 $LT = 66.67'$
 $ST = 33.33'$

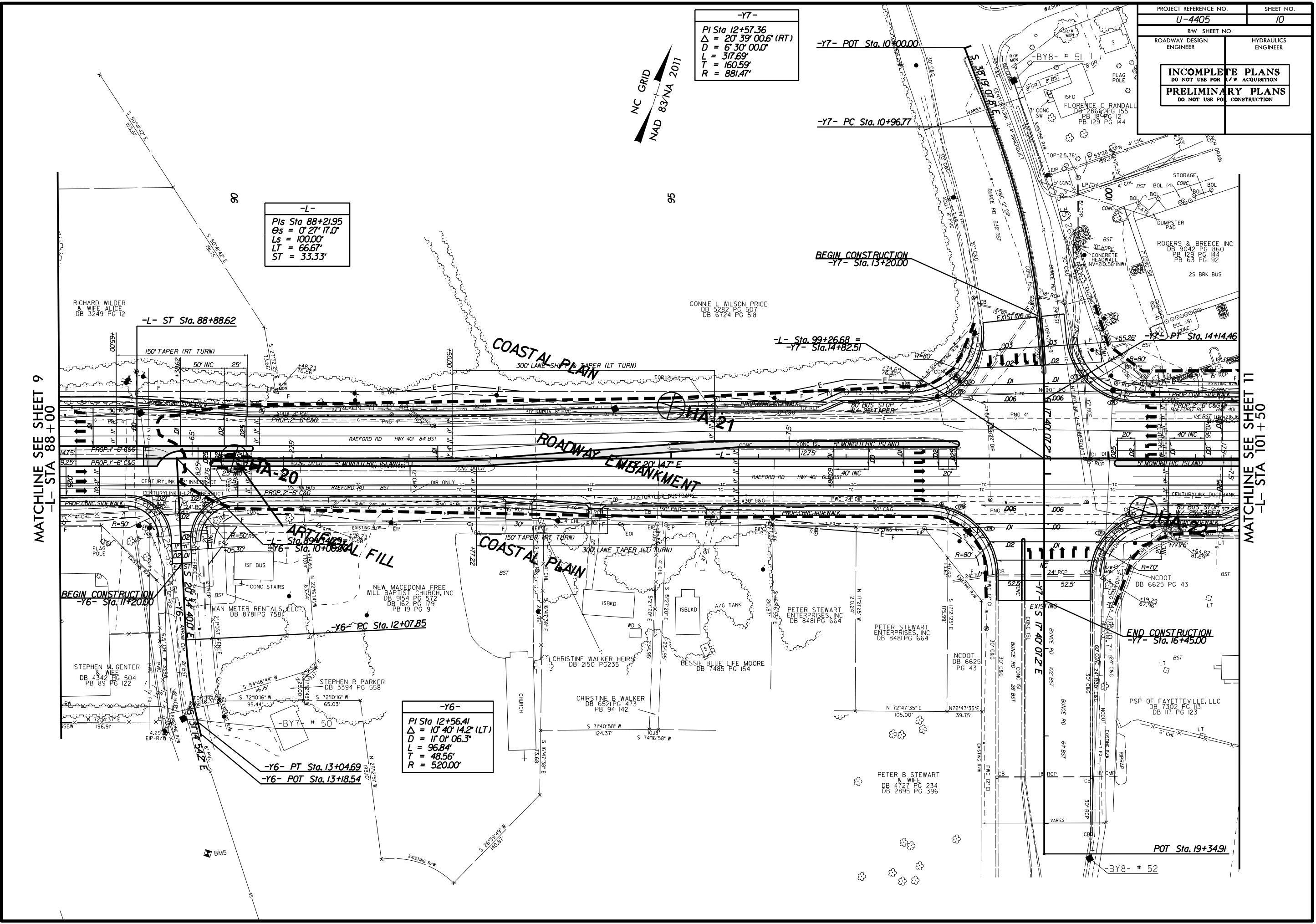
-Y6-

PI Sta 12+56.41
 $\Delta = 10' 40' 14.2''$ (LT)
 $D = 11' 01' 06.3''$
 $L = 96.84'$
 $T = 48.56'$
 $R = 520.00'$

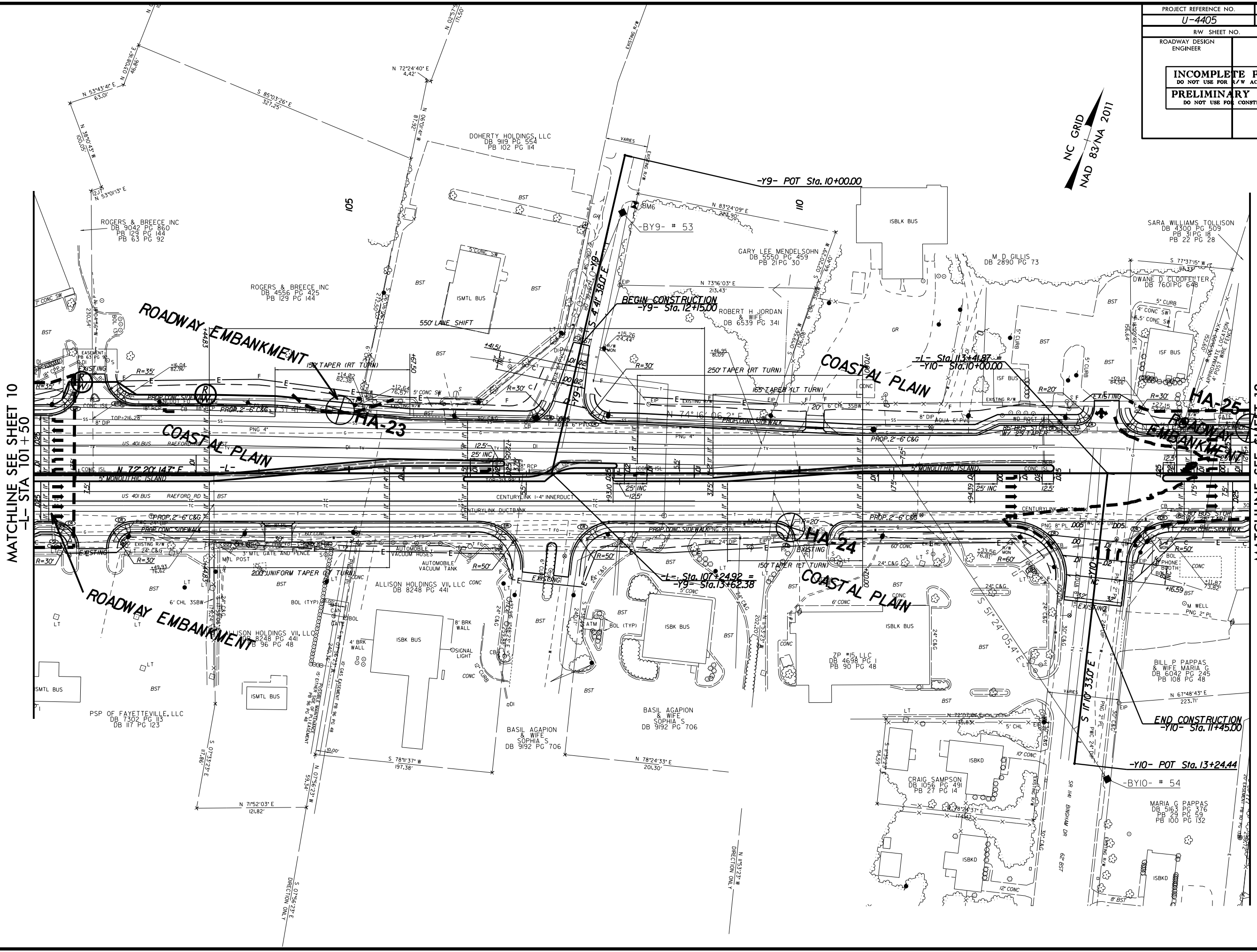
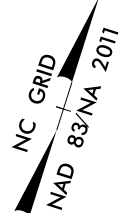
MATCHLINE SEE SHEET 9
-L- STA 88+00

MATCHLINE SEE SHEET 11
-L- STA 101+50

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	11
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



REVISIONS

MATCHLINE SEE SHEET 10
-L- STA 101 + 50

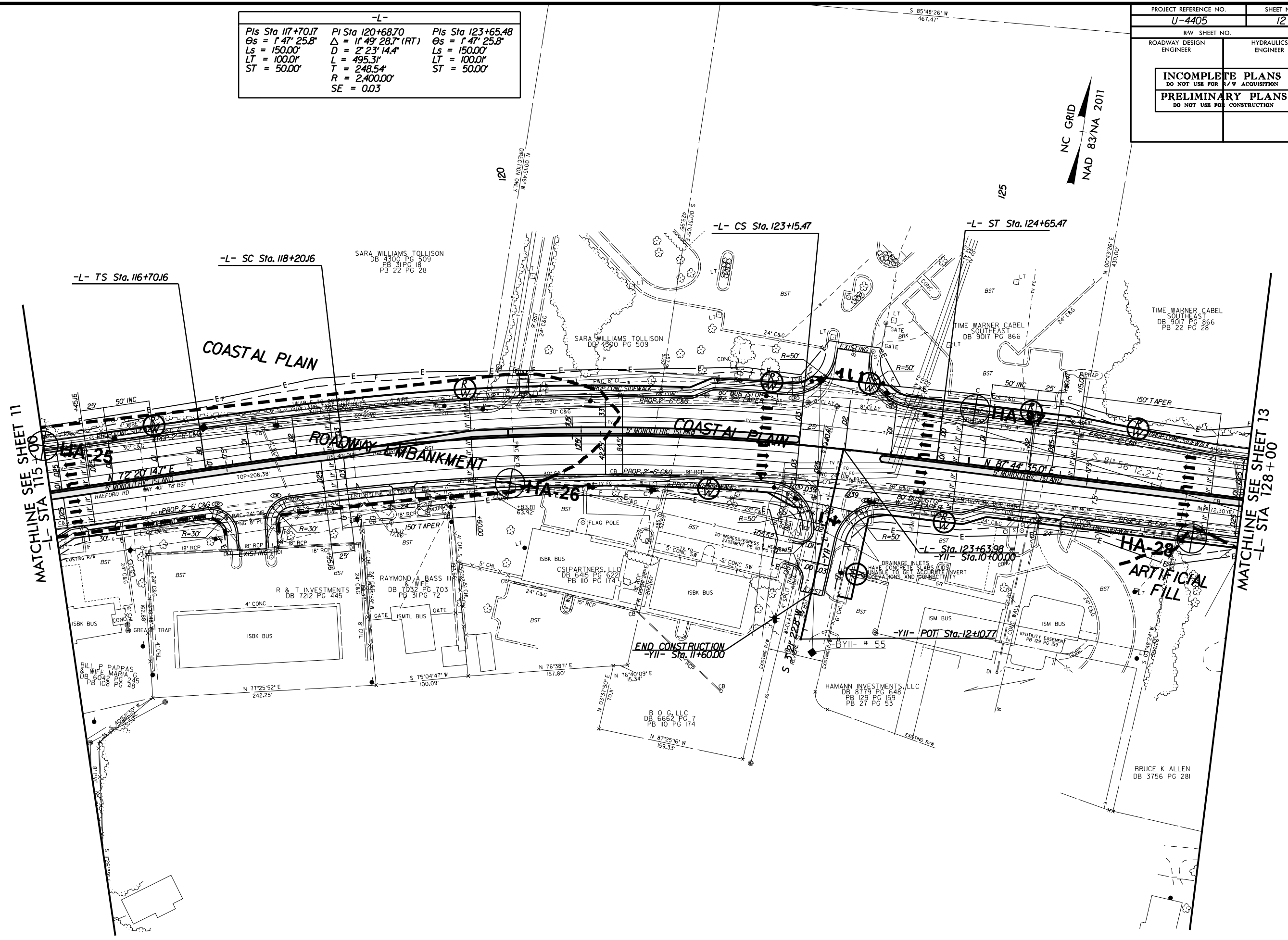
MATCHLINE SEE SHEET 12
-L- STA 115 + 00

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-		
Pls Sta 117+70.17	Pls Sta 120+68.70	Pls Sta 123+65.48
$\Theta_s = 1' 47' 25.8"$	$\Delta = 1' 49' 28.7" (RT)$	$\Theta_s = 1' 47' 25.8"$
$L_s = 150.00'$	$D = 2' 23' 14.4"$	$L_s = 150.00'$
$LT = 100.00'$	$L = 495.31'$	$LT = 100.00'$
$ST = 50.00'$	$T = 248.54'$	$ST = 50.00'$
	$R = 2,400.00'$	
	$SE = 0.03$	

NC GRID
NAD 83/NA 2011



MATCHLINE SEE SHEET 11
-L- STA 115+00

MATCHLINE SEE SHEET 13
-L- STA 128+00

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	13
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

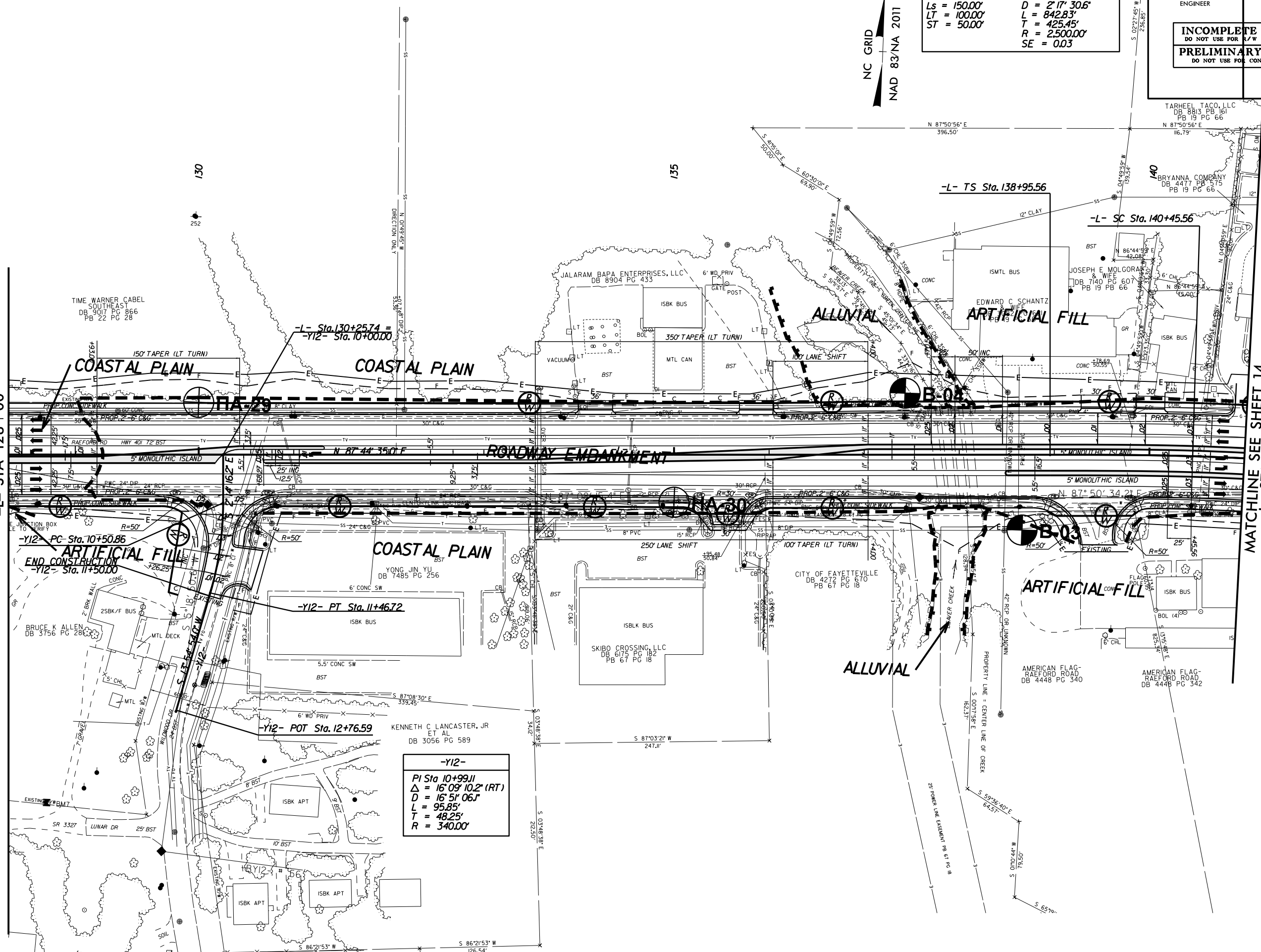
-L-

PI Sta 139+95.56	PI Sta 144+71.01
Δs = 1° 43' 07.9"	Δ = 19° 18' 58.8" (RT)
Ls = 150.00'	D = 2' 17" 306"
LT = 100.00'	L = 842.83'
ST = 50.00'	T = 425.45'
	R = 2,500.00'
	SE = 0.03

NC GRID
NAD 83/NA 2011

MATCHLINE SEE SHEET 12
-L- STA 128+00

MATCHLINE SEE SHEET 14
-L- STA 141+00



-Y12-

PI Sta 10+99.11
Δ = 16° 09' 10.2" (RT)
D = 16' 51" 06.1"
L = 95.85'
T = 48.25'
R = 340.00'

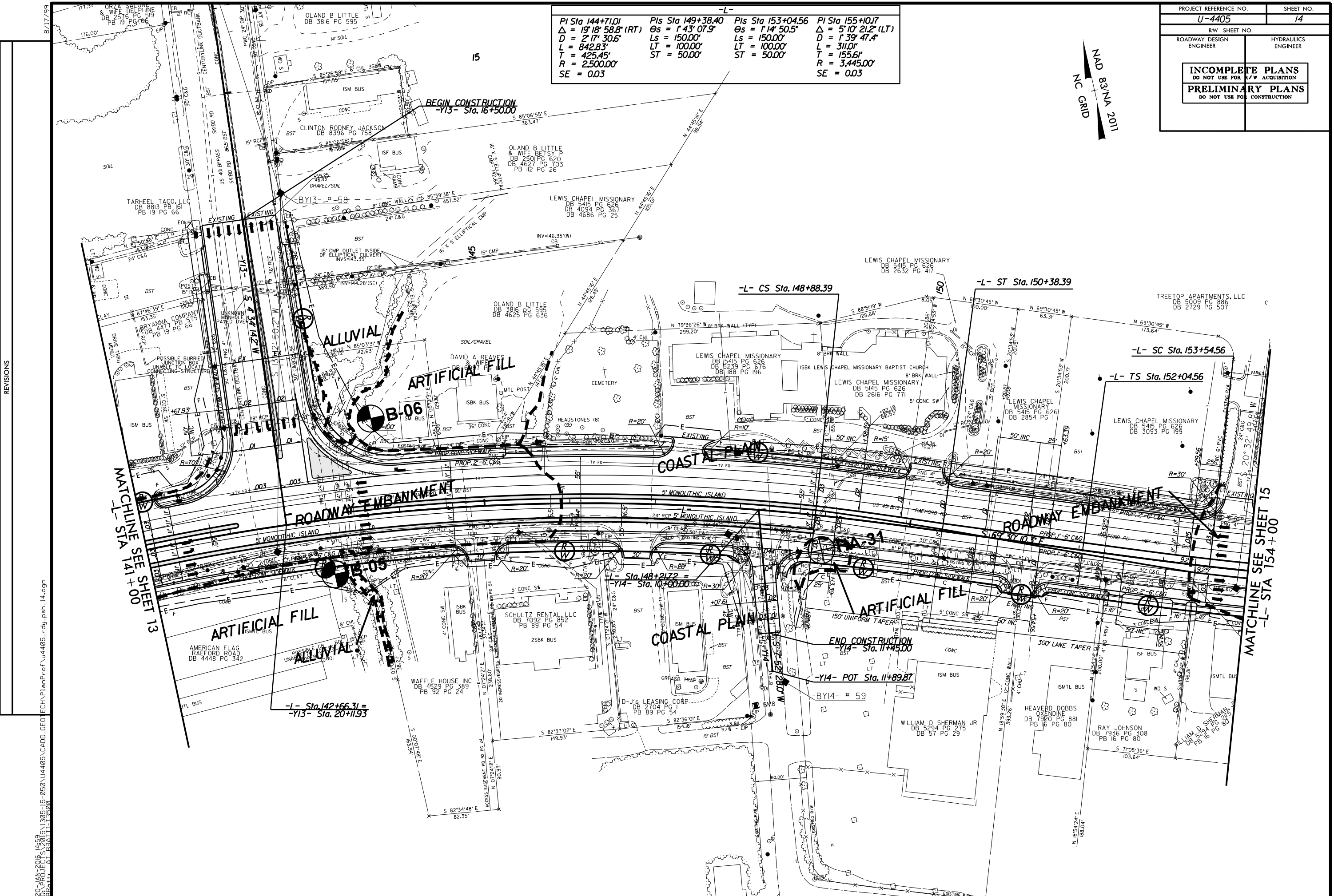
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PROJECT REFERENCE NO.	SHEET NO.
U-4405	14
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PI Sta 144+71.01 $\Delta = 19^{\circ}18'58.8"$ (RT) $D = 2^{\circ}17'30.6"$ $L = 842.83'$ $T = 425.45'$ $R = 2,500.00'$ $SE = 0.03$	PIs Sta 149+38.40 $\Theta_s = 1^{\circ}43'07.9"$ $L_s = 150.00'$ $LT = 100.00'$ $ST = 50.00'$	PIs Sta 153+04.56 $\Theta_s = 1^{\circ}14'50.5"$ $L_s = 150.00'$ $LT = 100.00'$ $ST = 50.00'$	PI Sta 155+10.7 $\Delta = 5^{\circ}10'21.2"$ (LT) $D = 1^{\circ}39'47.4"$ $L = 311.0'$ $T = 155.6'$ $R = 3,445.00'$ $SE = 0.03$
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NAD 83/NA 2011
NC GRID



REVISIONS

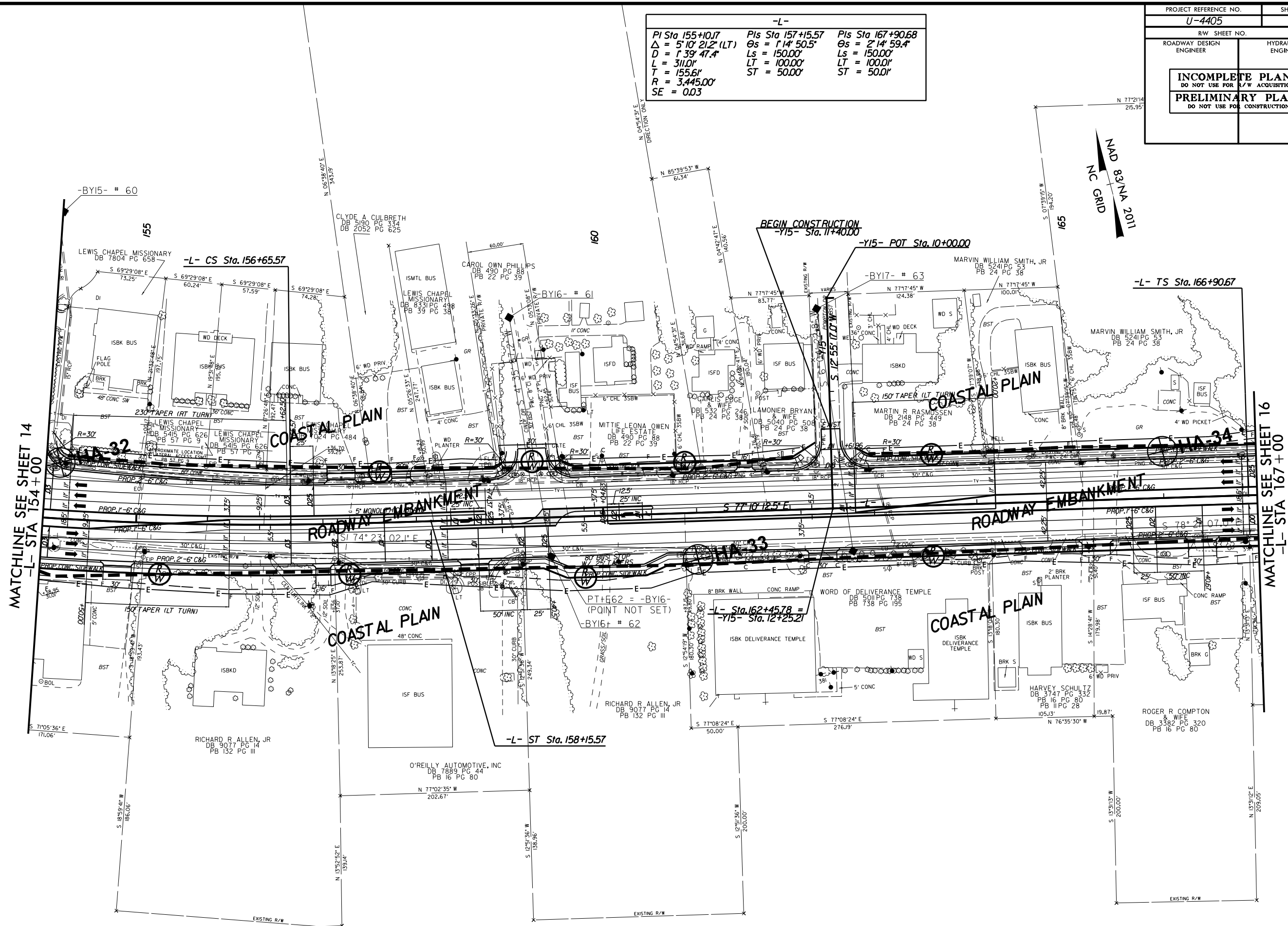
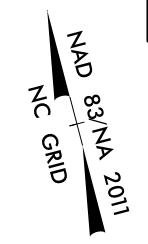
MATCHLINE SEE SHEET 13
-L- STA 141+00

MATCHLINE SEE SHEET 15
-L- STA 154+00

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-		
PI Sta 155+10.17	PIs Sta 157+15.57	PIs Sta 167+90.68
$\Delta = 5'10' 21.2''$ (LT)	$\Theta s = 1'14' 50.5''$	$\Theta s = 2'14' 59.4''$
$D = 1'39' 47.4''$	$Ls = 150.00'$	$Ls = 150.00'$
$L = 311.01'$	$LT = 100.00'$	$LT = 100.01'$
$T = 155.61'$	$ST = 50.00'$	$ST = 50.01'$
$R = 3,445.00'$		
$SE = 0.03$		



MATCHLINE SEE SHEET 14
-L- STA 154+00

MATCHLINE SEE SHEET 16
-L- STA 167+00

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	16
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

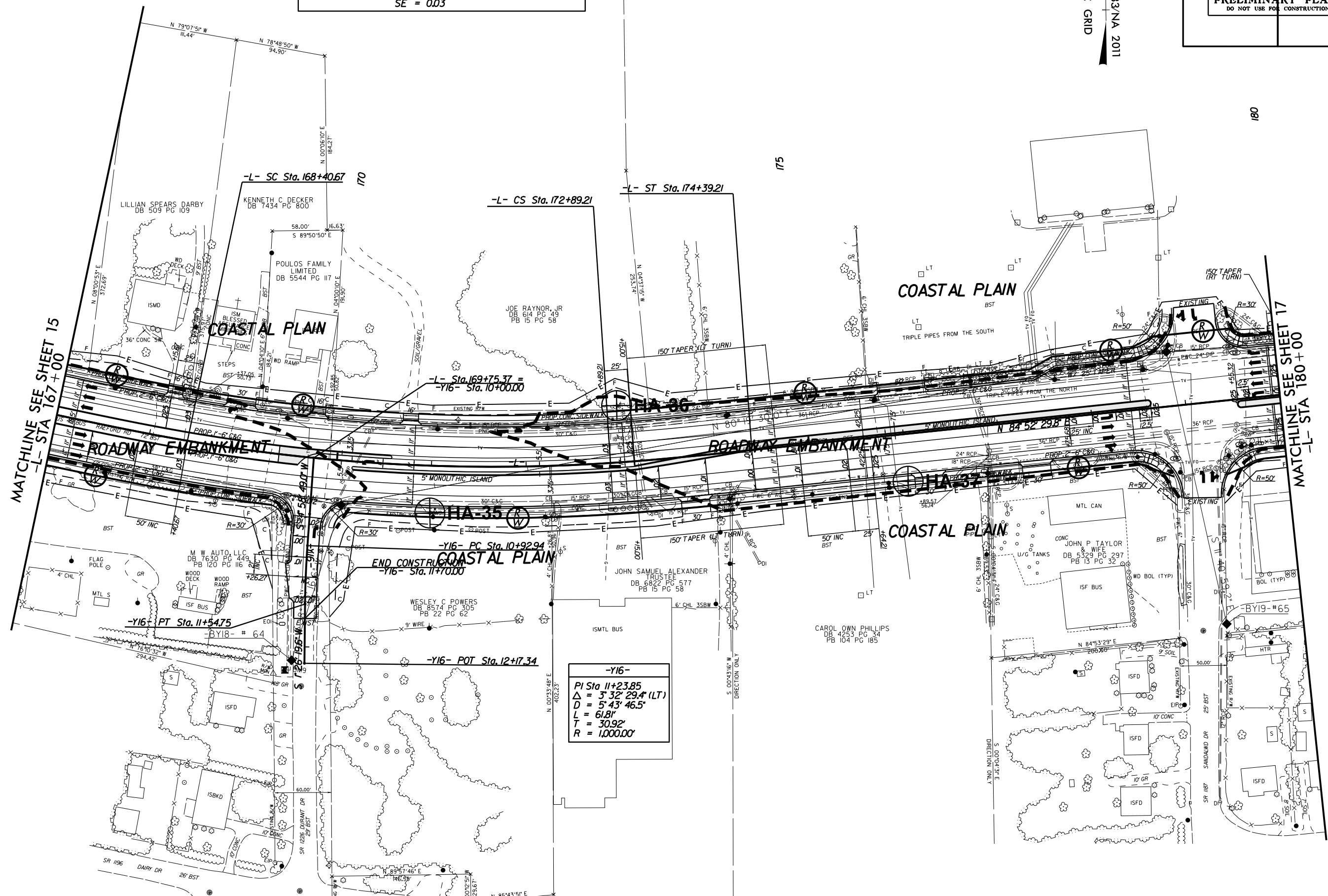
NAD 83/NA 2011
NC GRID

-L-

PIs Sta 167+90.68 Os = 2°14'59.4" Ls = 150.00' LT = 100.01' ST = 50.01'	PI Sta 170+65.98 Δ = 13°27'18.9" (LT) D = 2°59'59.2" L = 448.54' T = 225.31' R = 1,910.00' SE = 0.03	PIs Sta 173+39.22 Os = 2°14'59.4" Ls = 150.00' LT = 100.01' ST = 50.01'
---	--	---

-Y16-

PI Sta 11+23.85 Δ = 3°32'29.4" (LT) D = 5°43'46.5" L = 61.81' T = 30.92' R = 1,000.00'



MATCHLINE SEE SHEET 15
-L- STA 167+00

MATCHLINE SEE SHEET 17
-L- STA 180+00

REVISIONS

20-MAN-2016 14:59
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8/17/99

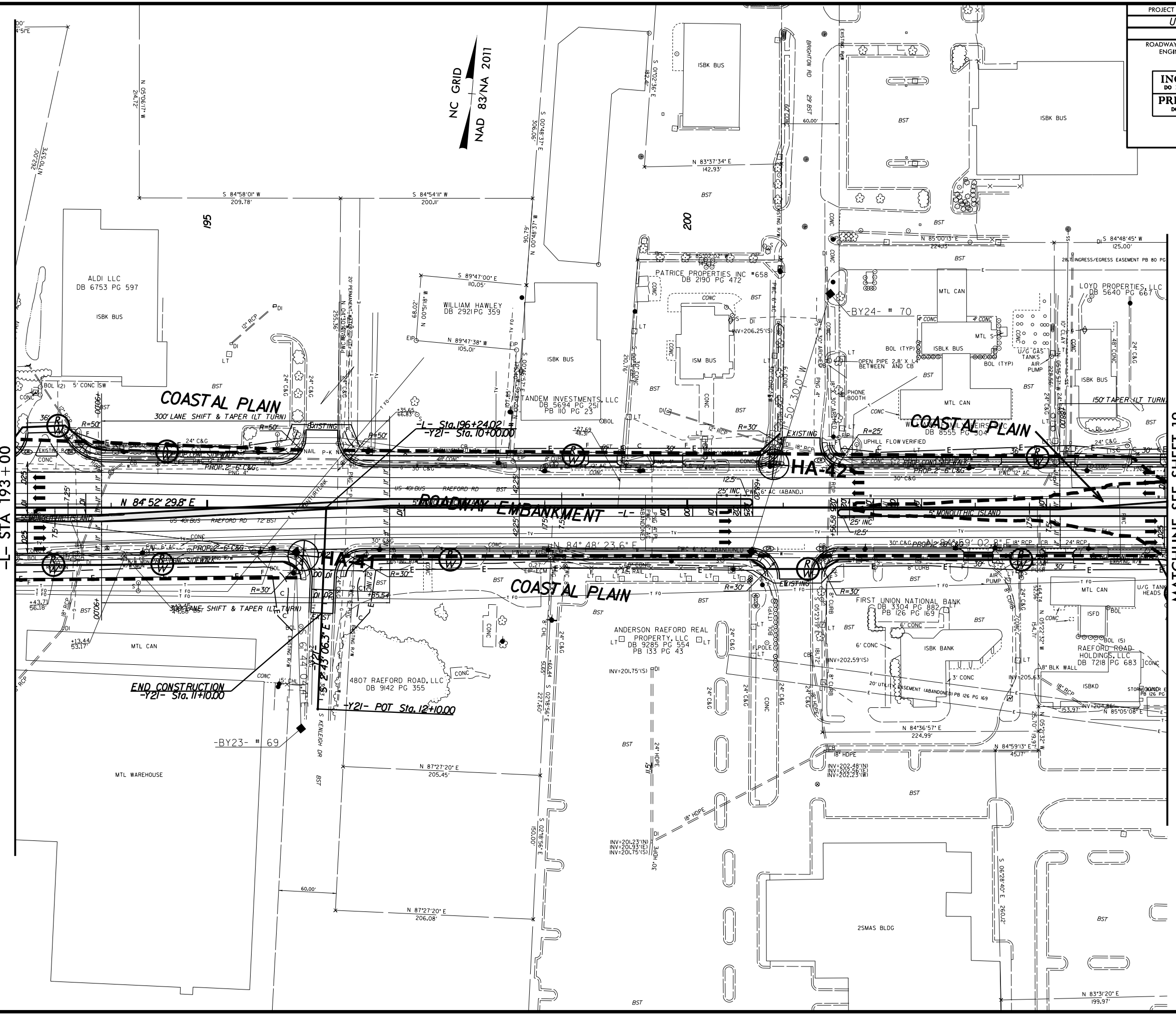
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U-4405	18
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

20-JAN-2016 14:59
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 8/17/99

REVISIONS

MATCHLINE SEE SHEET 17
-L- STA 193+00

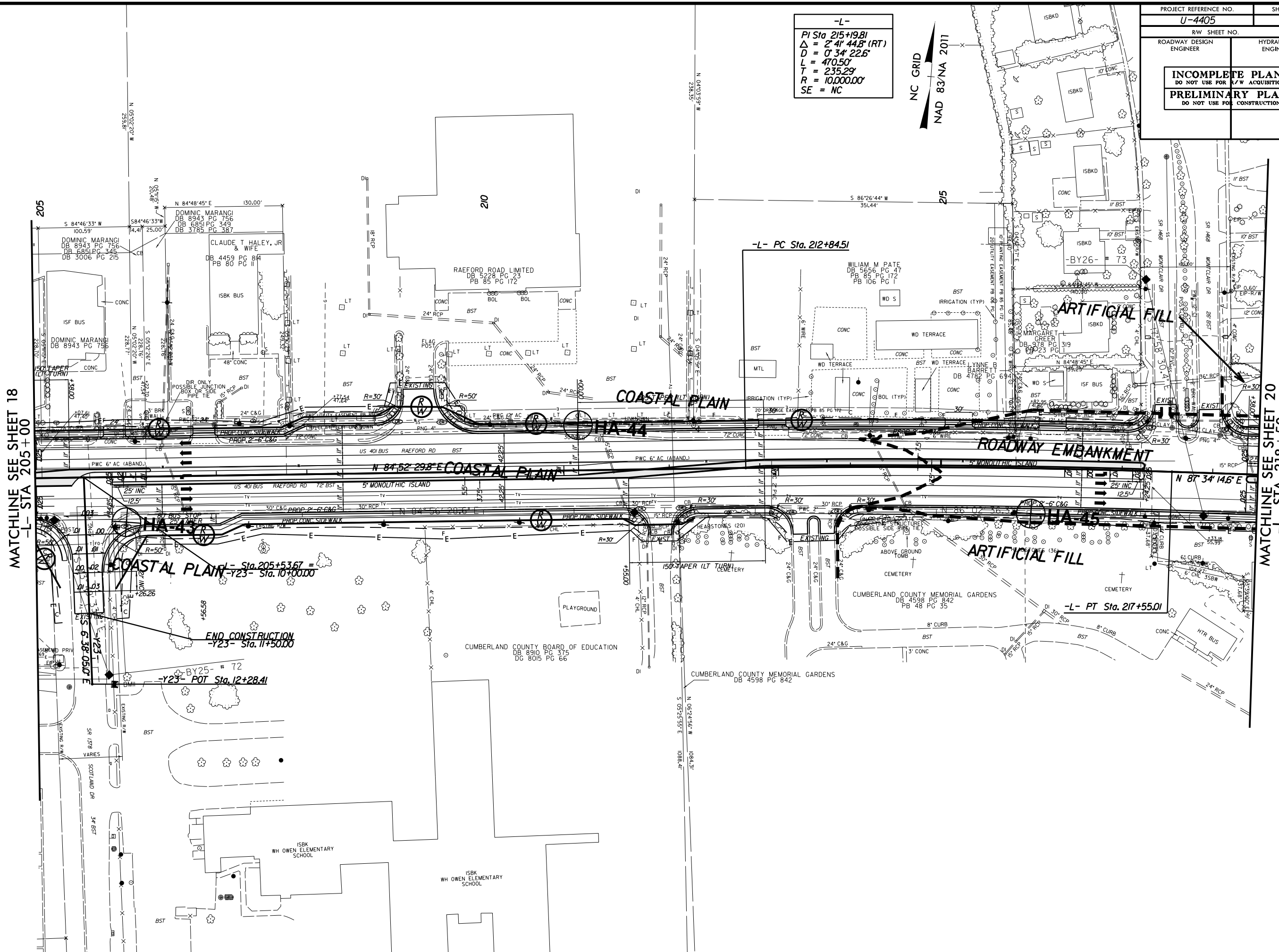
MATCHLINE SEE SHEET 19
-L- STA 205+00



PROJECT REFERENCE NO.	SHEET NO.
U-4405	19
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-
 PI Sta 215+19.81
 $\Delta = 2' 41'' 44.8''$ (RT)
 $D = 0' 34'' 22.6''$
 $L = 470.50'$
 $T = 235.29'$
 $R = 10,000.00'$
 SE = NC

NC GRID
 NAD 83/NA 2011



MATCHLINE SEE SHEET 18
 -L- STA 205+00

MATCHLINE SEE SHEET 20
 -L- STA 218+50

REVISIONS

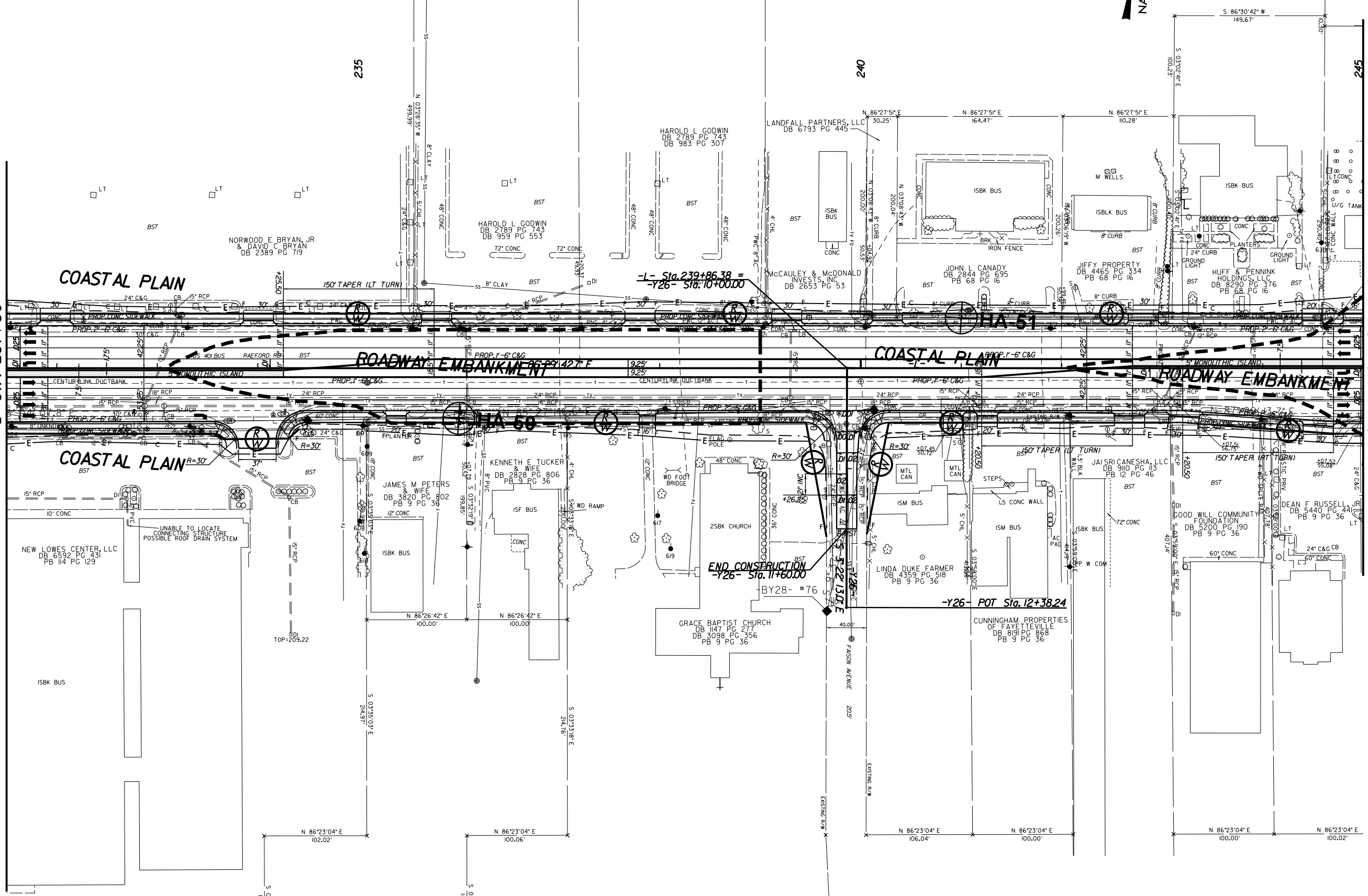
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 8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-4405	21
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NC GRID
NAD 83/NA 2011

MATCHLINE SEE SHEET 20
-L- STA 231+50

MATCHLINE SEE SHEET 22
-L- STA 245+00



REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	22
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-RPB-	
PI Sta 17+61.56	PI Sta 25+80.73
$\Theta_s = 1' 30' 27.7''$	$\Delta = 20' 28' 11.6''$ (RT)
Ls = 199.99'	D = 7' 09' 43.1'
LT = 133.33'	L = 285.81'
ST = 66.67'	T = 144.45'
	R = 800.00'
	SE = 0.08

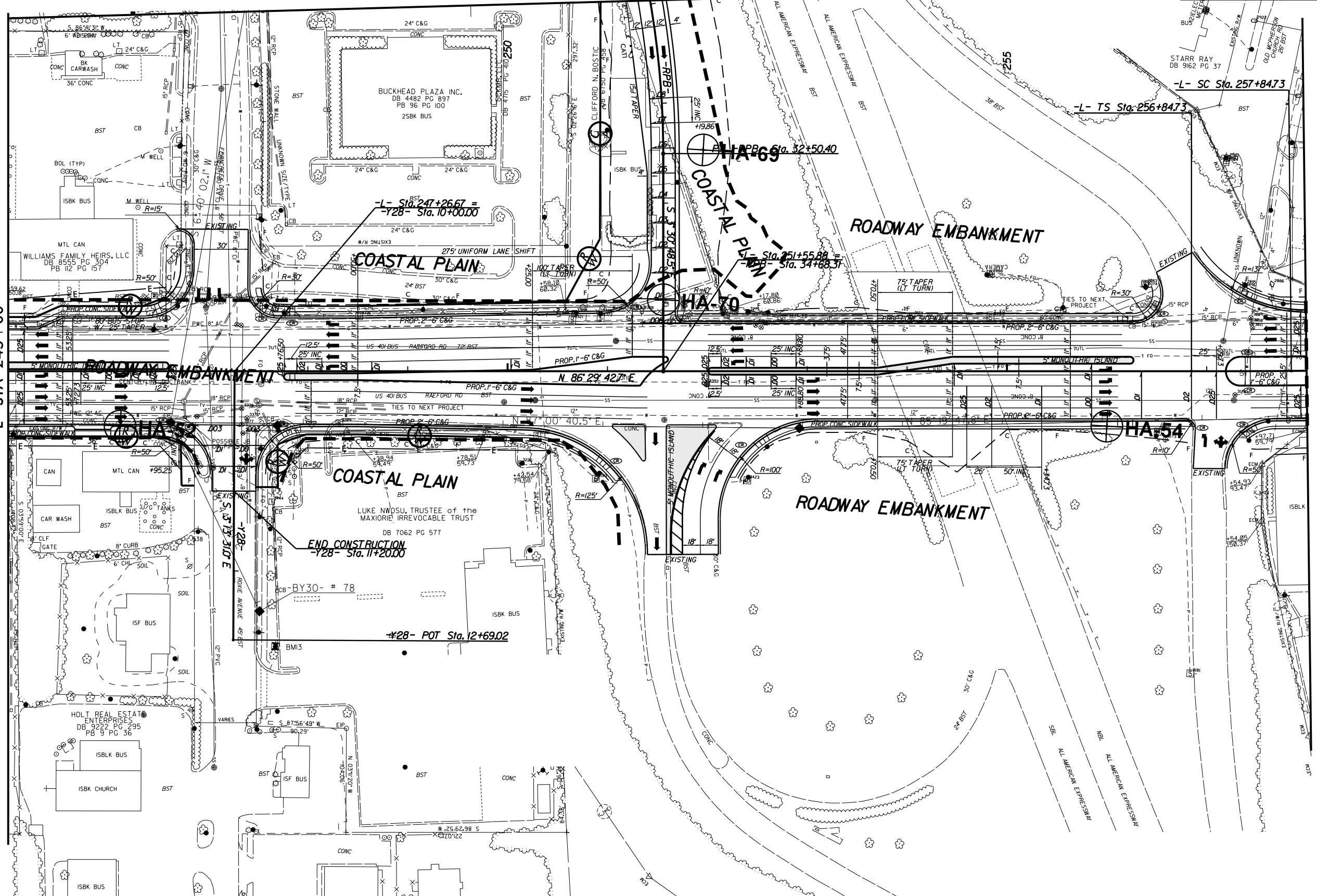
-L-	
PI Sta 257+51.40	PI Sta 258+20.74
$\Theta_s = 0' 31' 15.1''$	$\Delta = 0' 45' 00.9''$ (LT)
Ls = 100.00'	D = 1' 02' 30.3'
LT = 66.67'	L = 72.02'
ST = 33.33'	T = 36.01'
	R = 5,500.00'
	SE = 0.025

NC GRID
NAD 83/NA 2011

MATCHLINE SEE SHEET 30
-RPB- STA 30+96

MATCHLINE SEE SHEET 21
-L- STA 245+00

MATCHLINE SEE SHEET 23
-L- STA 258+00



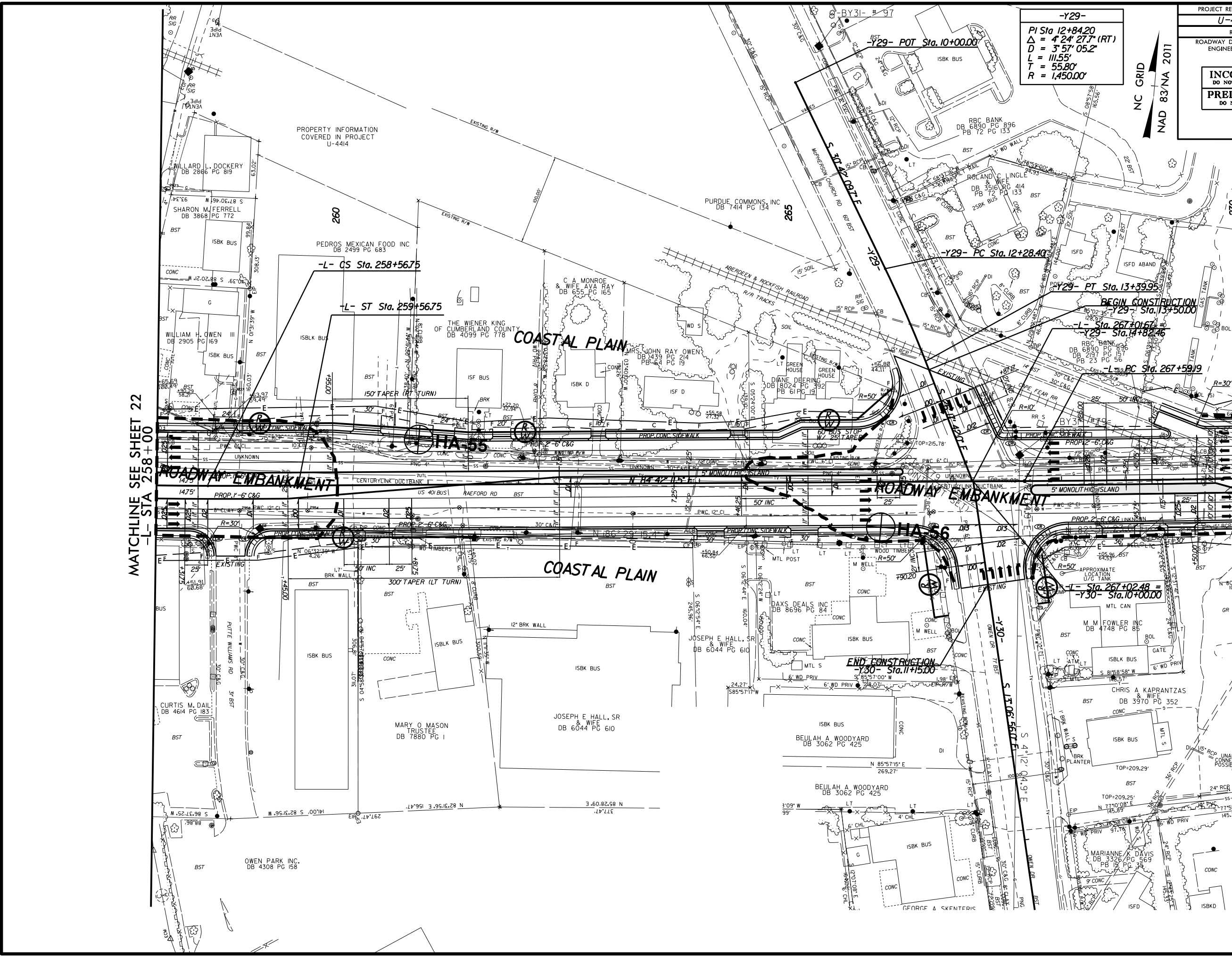
REVISIONS

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 8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-4405	23
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-Y29-
 PI Sta 12+84.20
 $\Delta = 4' 24' 27.7''$ (RT)
 $D = 3' 57' 05.2''$
 $L = 111.55'$
 $T = 55.80'$
 $R = 1,450.00'$

NC GRID
 NAD 83/NA 2011

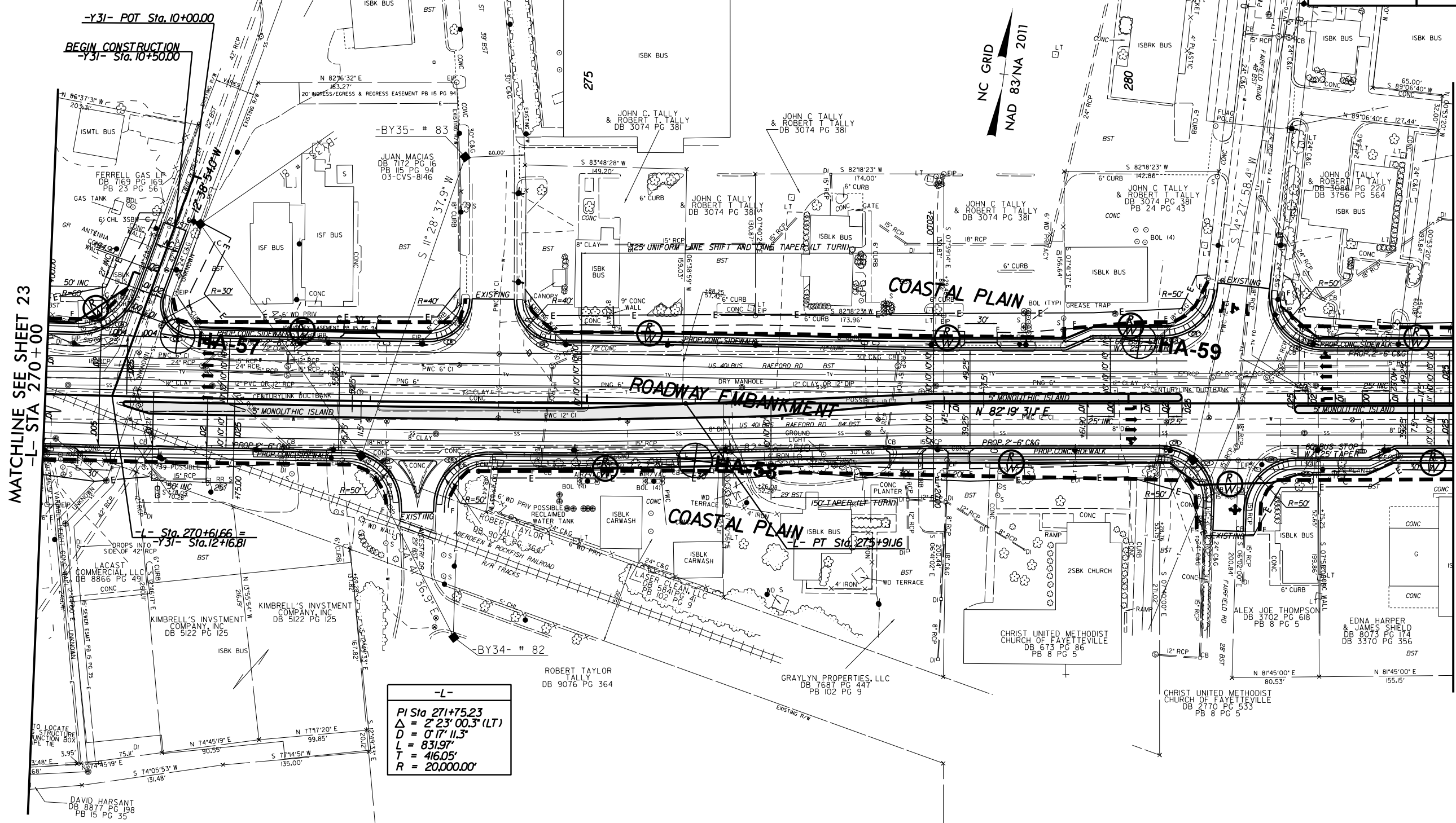


REVISIONS

8/17/99

20-JAN-2016 15:00
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 15:00 1/3/2015 11:30:15

PROJECT REFERENCE NO.	SHEET NO.
U-4405	24
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCHLINE SEE SHEET 23
-L- STA 270+00

MATCHLINE SEE SHEET 25
-L- STA 283+00

-L-
 PI Sta 271+75.23
 $\Delta = 2' 23'' 00.3''$ (LT)
 $D = 0' 17'' 11.3''$
 $L = 831.97'$
 $T = 416.05'$
 $R = 20,000.00'$

NC GRID
NAD 83/NA 2011

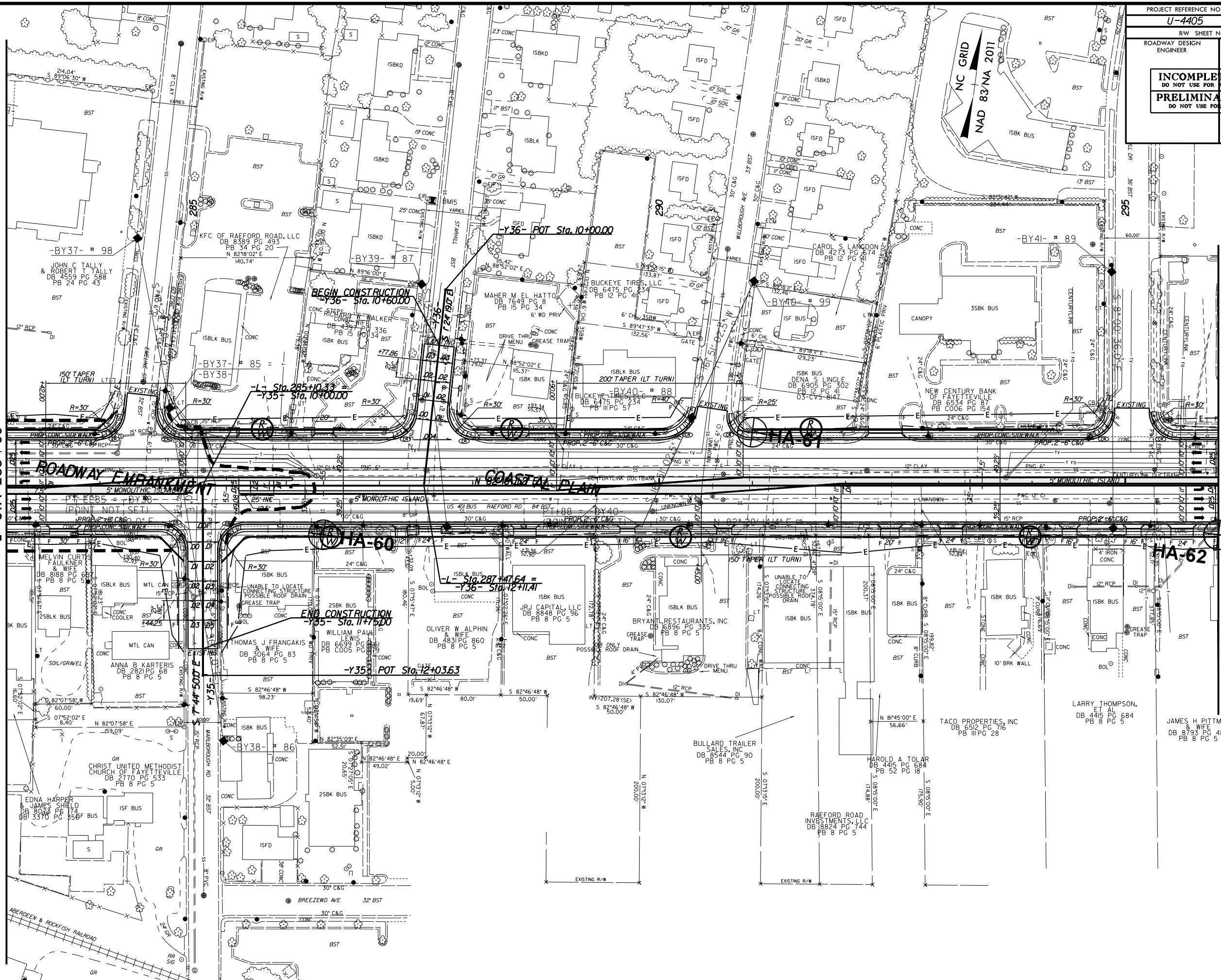
-Y31- POT Sta. 10+00.00
 BEGIN CONSTRUCTION
 -Y31- Sta. 10+50.00

-L- Sta. 270+61.66 =
 -Y31- Sta. 12+16.81

REVISIONS

20-JAN-2016 15:00
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 8/17/99

PROJECT REFERENCE NO. U-4405	SHEET NO. 25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCHLINE SEE SHEET 24
-L- STA 283+00

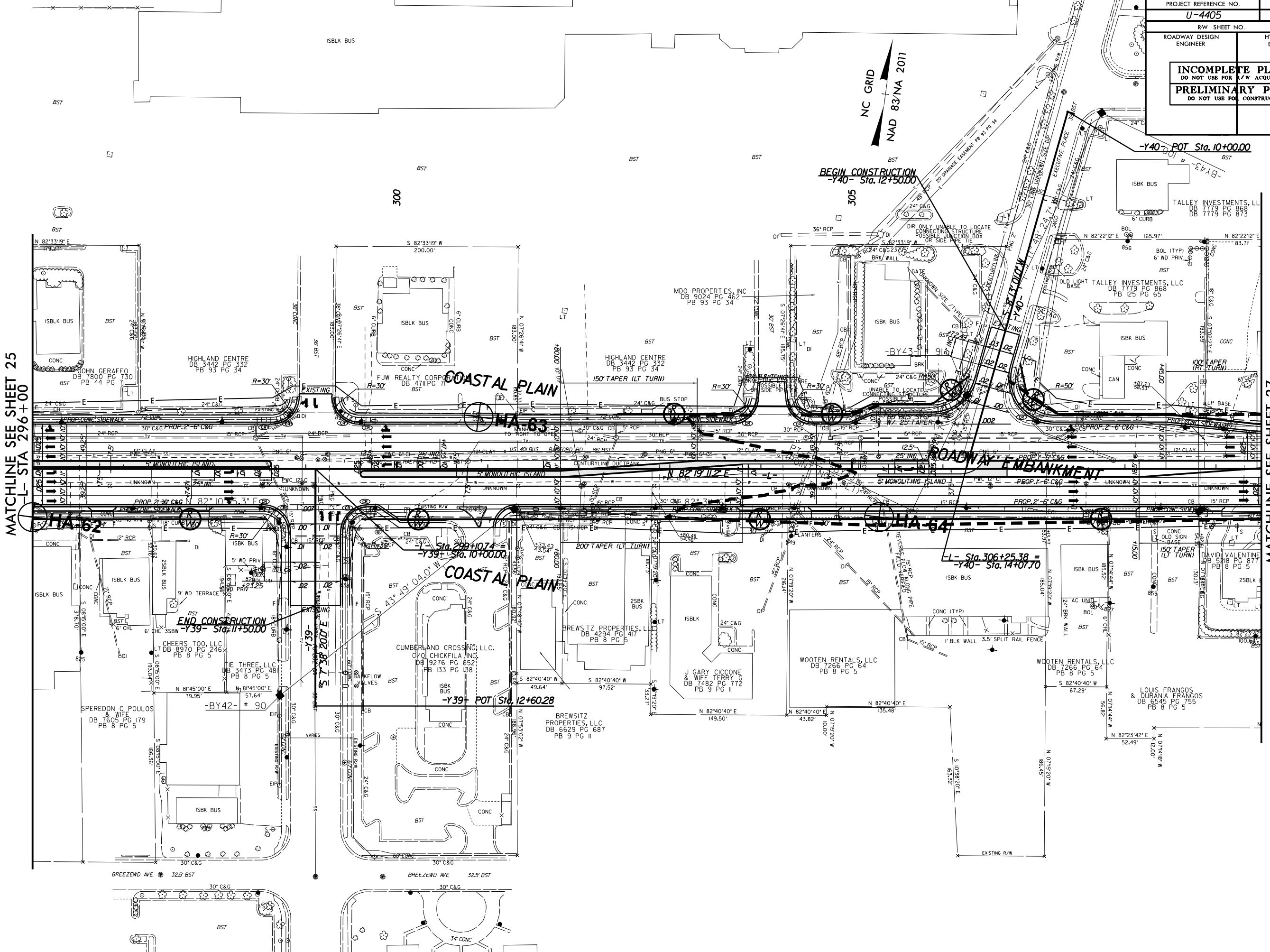
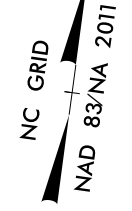
MATCHLINE SEE SHEET 26
-L- STA 296+00

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
U-4405	26
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCHLINE SEE SHEET 25
-L- STA 296+00

MATCHLINE SEE SHEET 27
-L- STA 309+50

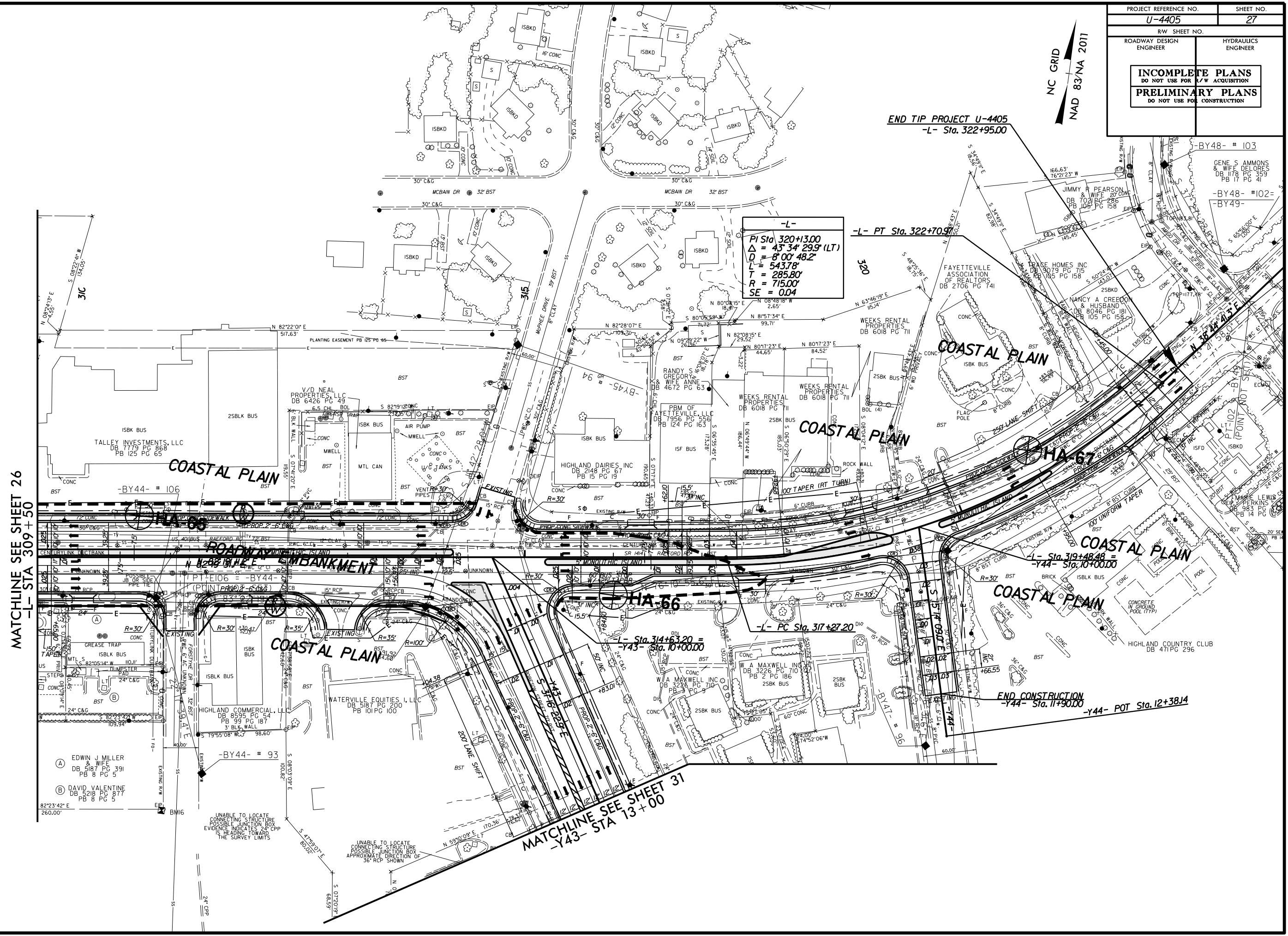
REVISIONS

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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-4405	27
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NC GRID
NAD 83/NA 2011

-L-
PI Sta 320+13.00
 $\Delta = 43^{\circ} 34' 29.9" (LT)$
D = 8' 00" 48.2"
L = 543.78'
T = 285.80'
R = 715.00'
SE = 0.04



MATCHLINE SEE SHEET 26
-L- STA 309+50

MATCHLINE SEE SHEET 31
-Y43- STA 13+00

- (A) EDWIN J MILLER
DB 5187 PG 391
PB 8 PG 5
- (B) DAVID VALENTINE
DB 5218 PG 577
PB 6 PG 5

UNABLE TO LOCATE
CONNECTING STRUCTURE
POSSIBLE JUNCTION BOX
EVIDENCE INDICATES 24" CPP
THE ADJACENT TOWARD
THE SURVEY LIMITS

UNABLE TO LOCATE
CONNECTING STRUCTURE
POSSIBLE JUNCTION BOX
APPROXIMATE DIRECTION OF
36" RCP SHOWN

REVISIONS

20-JAN-2016 15:00
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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-4405	28
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NC GRID
NAD 83/NA 2011

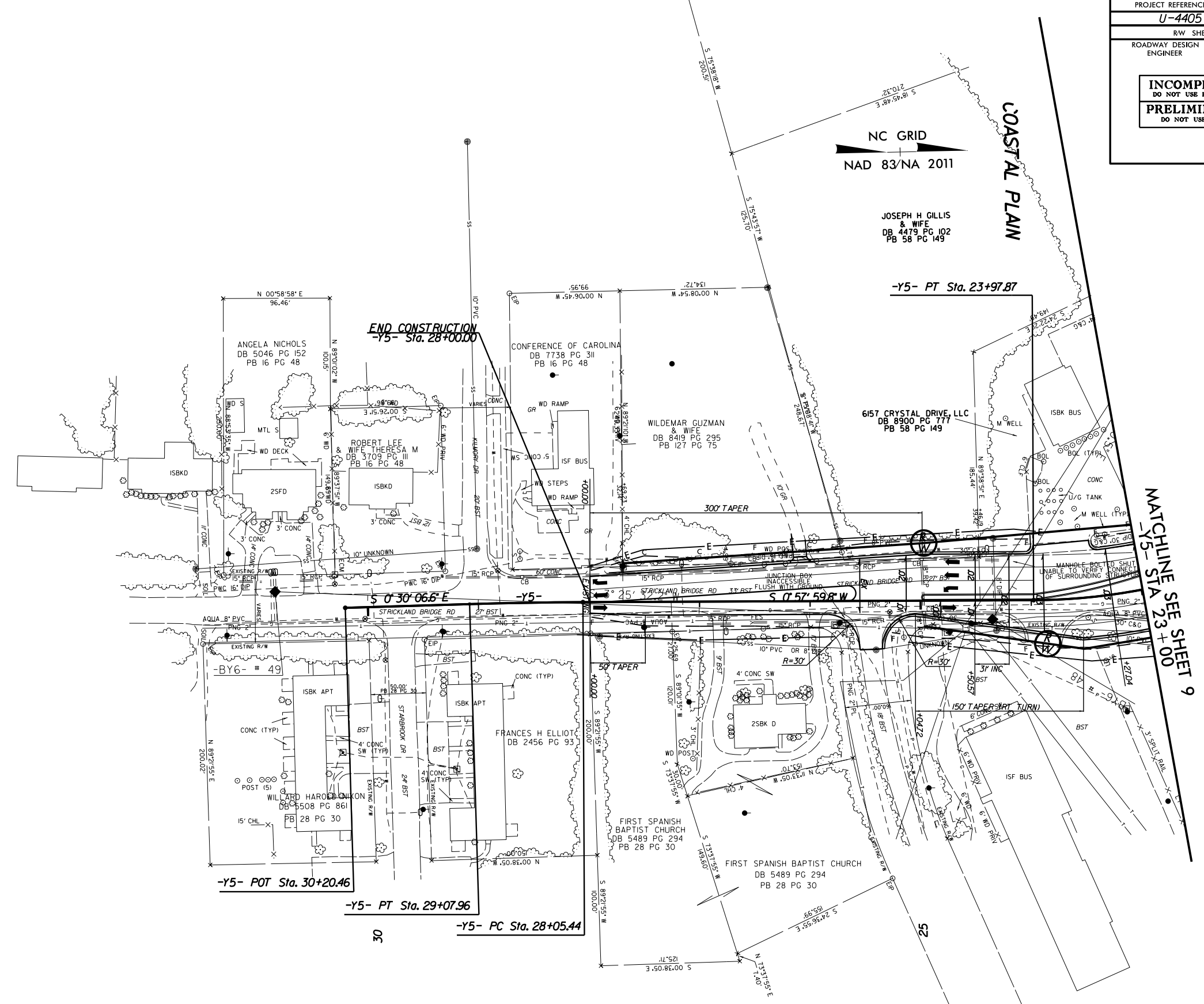
JOSEPH H GILLIS
& WIFE
DB 4479 PG 102
PB 58 PG 149

COASTAL PLAN

-Y5- PT Sta. 23+97.87

END CONSTRUCTION
-Y5- Sta. 28+00.00

MATCHLINE SEE SHEET 9
-Y5- STA 23+00



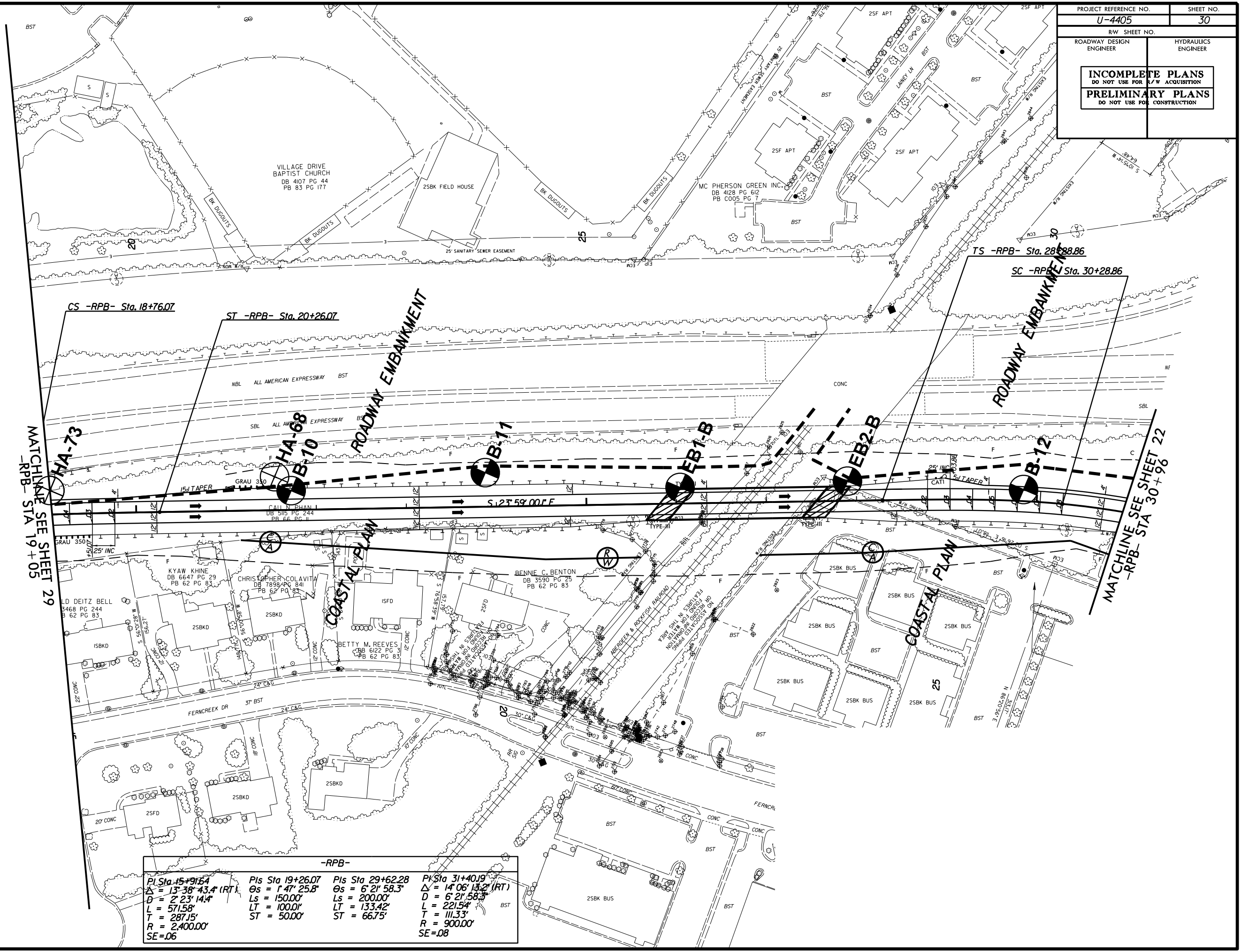
-Y5-	
PI Sta 28+56.71	PI Sta 22+82.12
$\Delta = 1^{\circ} 28' 06.4"$ (LT)	$\Delta = 25^{\circ} 18' 13.3"$ (RT)
$D = 1^{\circ} 25' 56.6"$	$D = 10^{\circ} 44' 58.8"$
$L = 102.52'$	$L = 235.39'$
$T = 51.26'$	$T = 119.65'$
$R = 4000.00'$	$R = 533.00'$
	$SE = 0.02$

REVISIONS

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20-JAN-2016 15:00
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PROJECT REFERENCE NO. U-4405	SHEET NO. 30
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

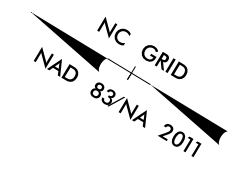
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 11-15-2016 11:25:04



-RPB-

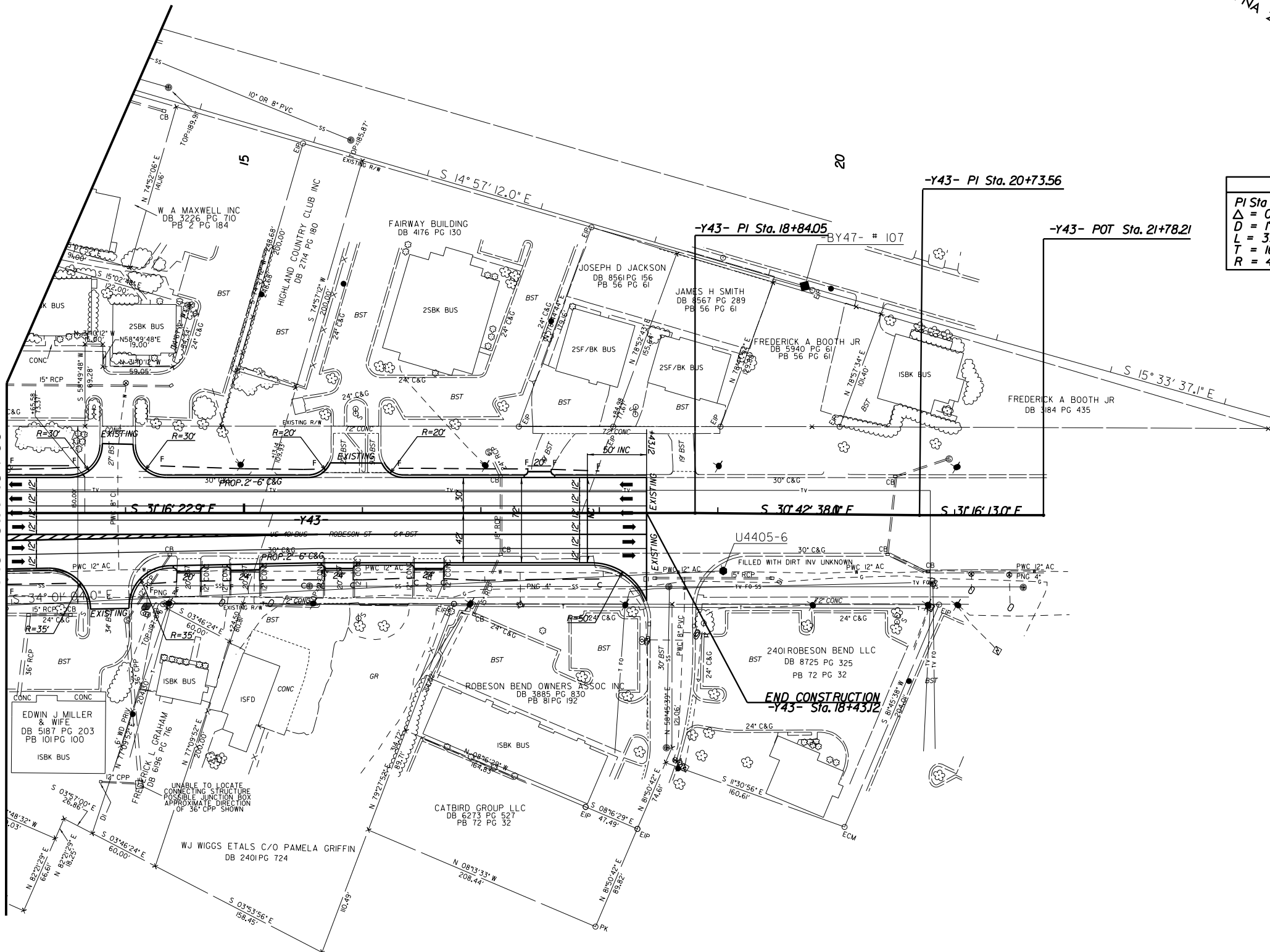
Pl Sta 15+91.64 $\Delta = 13' 38'' 43.4''$ (RT) $D = 2' 23'' 14.4''$ $L = 571.58'$ $T = 287.15'$ $R = 2,400.00'$ $SE = 06$	Pls Sta 19+26.07 $\Theta_s = 1' 47'' 25.8''$ $L_s = 150.00'$ $LT = 100.01'$ $ST = 50.00'$	Pls Sta 29+62.28 $\Theta_s = 6' 21'' 58.3''$ $L_s = 200.00'$ $LT = 133.42'$ $ST = 66.75'$	Pls Sta 31+40.19 $\Delta = 14' 06'' 15.2''$ (RT) $D = 6' 21'' 58.3''$ $L = 221.54'$ $T = 111.33'$ $R = 900.00'$ $SE = 08$
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PROJECT REFERENCE NO.	SHEET NO.
U-4405	31
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



-Y43-	
PI Sta 18+97.74	PI Sta 21+17.77
$\Delta = 0^\circ 29' 06.2''$ (RT)	$\Delta = 0^\circ 28' 56.2''$ (LT)
D = 1'25' 56.6"	D = 1'25' 56.6"
L = 33.86'	L = 33.67'
T = 16.93'	T = 16.83'
R = 4,000.00'	R = 4,000.00'

MATCHLINE SEE SHEET 27
-Y43- STA 13+00

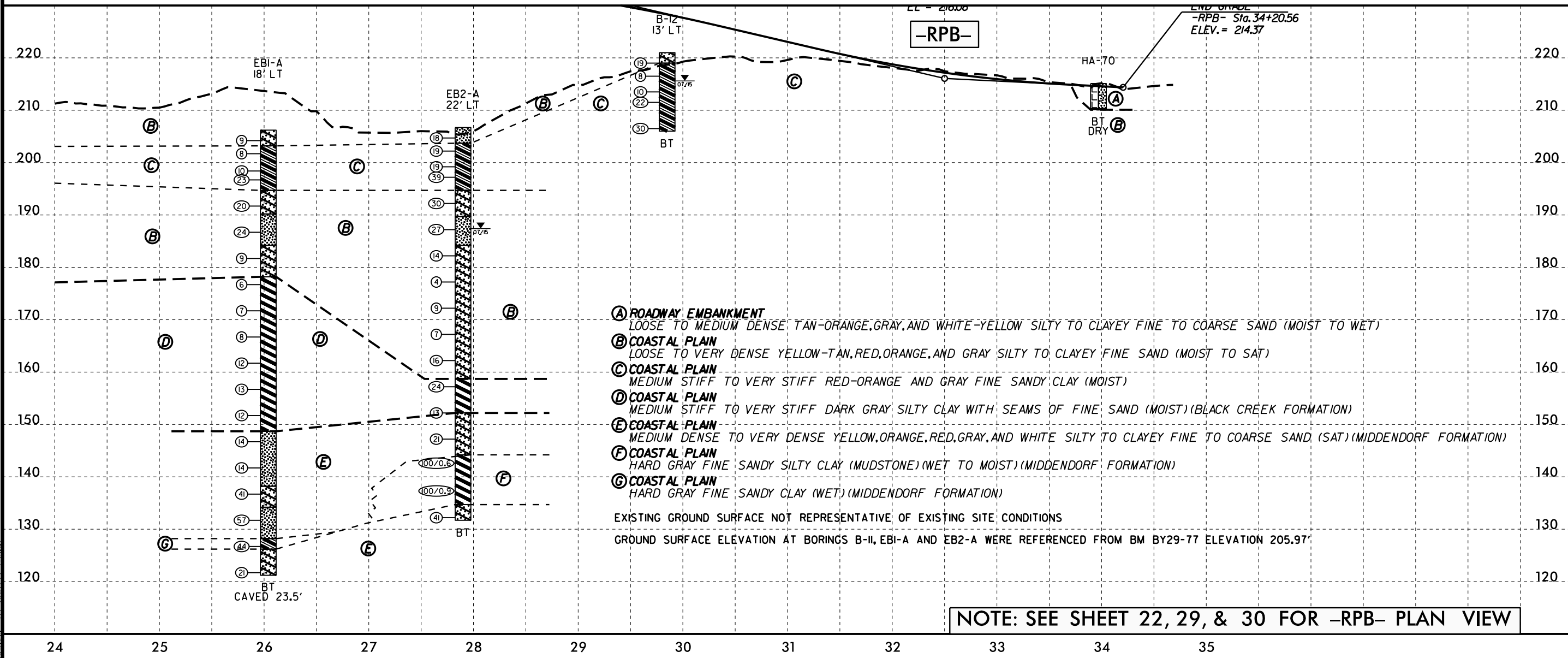
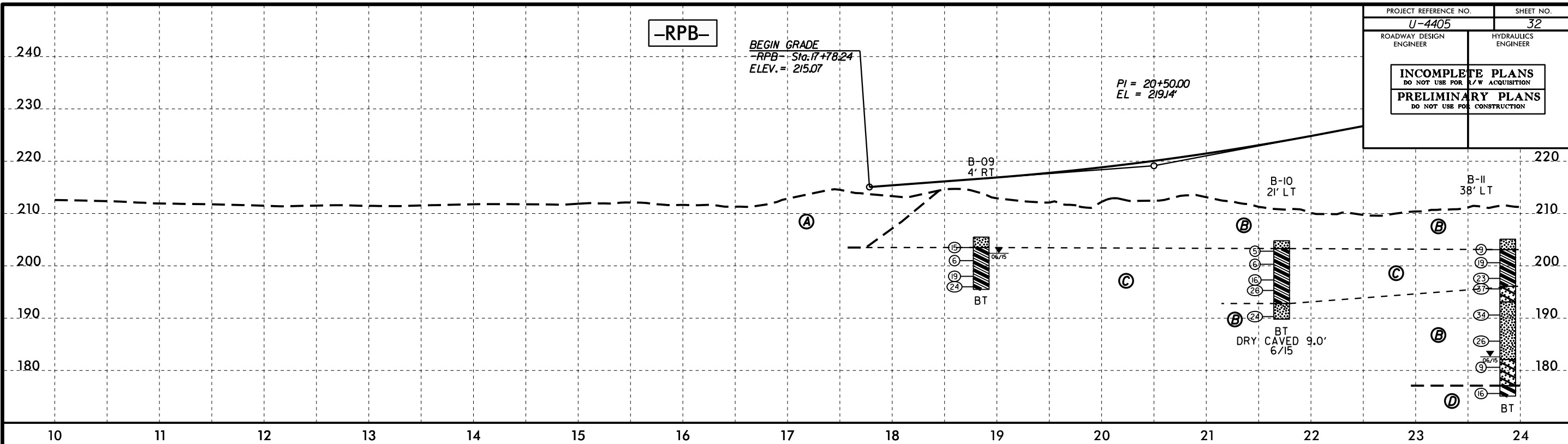


REVISIONS

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5/28/99

PROJECT REFERENCE NO. U-4405	SHEET NO. 32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



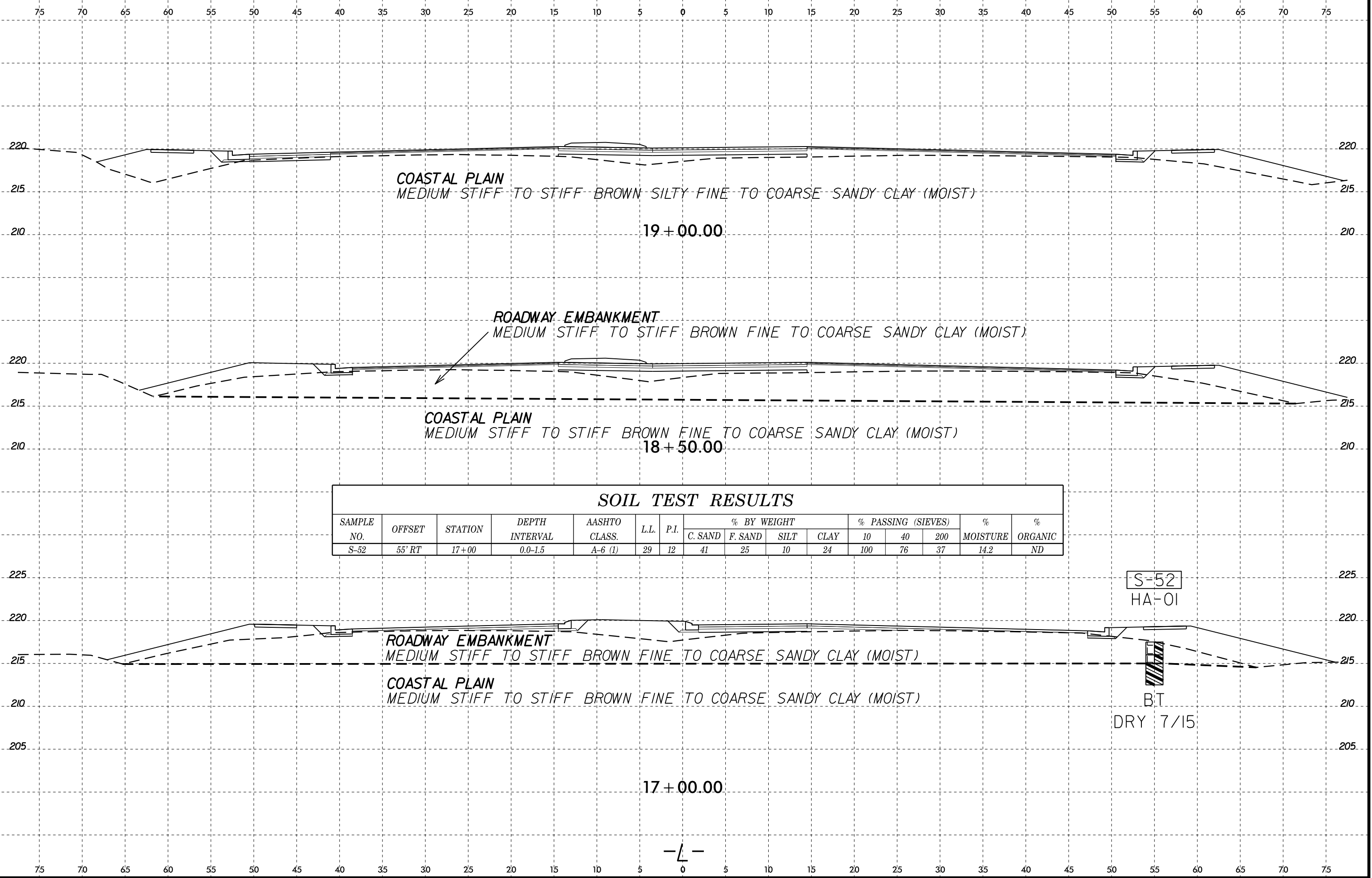
- (A) ROADWAY EMBANKMENT**
LOOSE TO MEDIUM DENSE TAN-ORANGE, GRAY, AND WHITE-YELLOW SILTY TO CLAYEY FINE TO COARSE SAND (MOIST TO WET)
- (B) COASTAL PLAIN**
LOOSE TO VERY DENSE YELLOW-TAN, RED, ORANGE, AND GRAY SILTY TO CLAYEY FINE SAND (MOIST TO SAT)
- (C) COASTAL PLAIN**
MEDIUM STIFF TO VERY STIFF RED-ORANGE AND GRAY FINE SANDY CLAY (MOIST)
- (D) COASTAL PLAIN**
MEDIUM STIFF TO VERY STIFF DARK GRAY SILTY CLAY WITH SEAMS OF FINE SAND (MOIST) (BLACK CREEK FORMATION)
- (E) COASTAL PLAIN**
MEDIUM DENSE TO VERY DENSE YELLOW, ORANGE, RED, GRAY, AND WHITE SILTY TO CLAYEY FINE TO COARSE SAND (SAT) (MIDDENDORF FORMATION)
- (F) COASTAL PLAIN**
HARD GRAY FINE SANDY SILTY CLAY (MUDSTONE) (WET TO MOIST) (MIDDENDORF FORMATION)
- (G) COASTAL PLAIN**
HARD GRAY FINE SANDY CLAY (WET) (MIDDENDORF FORMATION)

EXISTING GROUND SURFACE NOT REPRESENTATIVE OF EXISTING SITE CONDITIONS
 GROUND SURFACE ELEVATION AT BORINGS B-II, EB1-A AND EB2-A WERE REFERENCED FROM BM BY29-77 ELEVATION 205.97'

NOTE: SEE SHEET 22, 29, & 30 FOR -RPB- PLAN VIEW

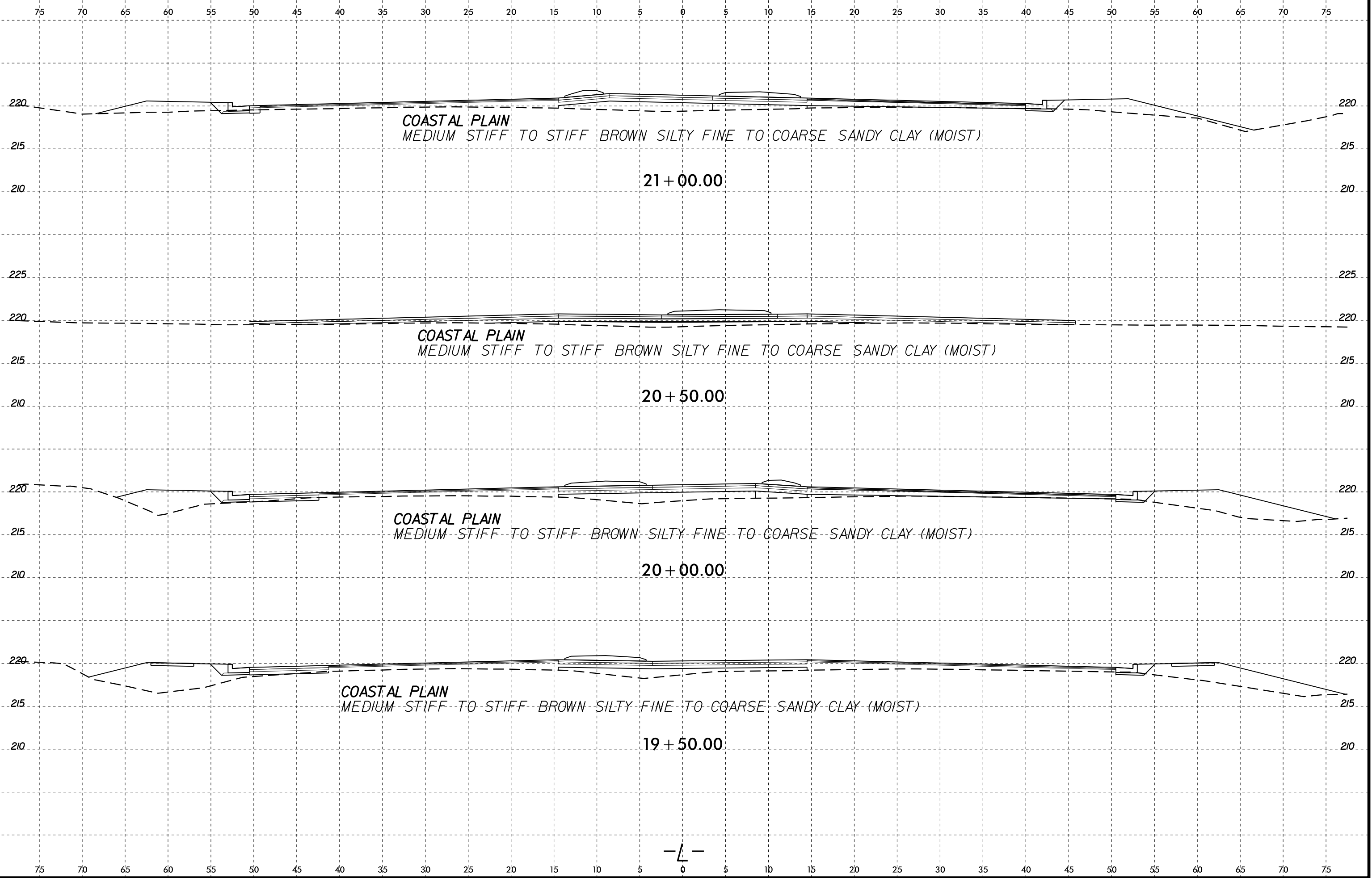
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 REVISION AT 11:15 AM

8/23/99
 25-JAN-2016 13:55
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 BRATTI-13500



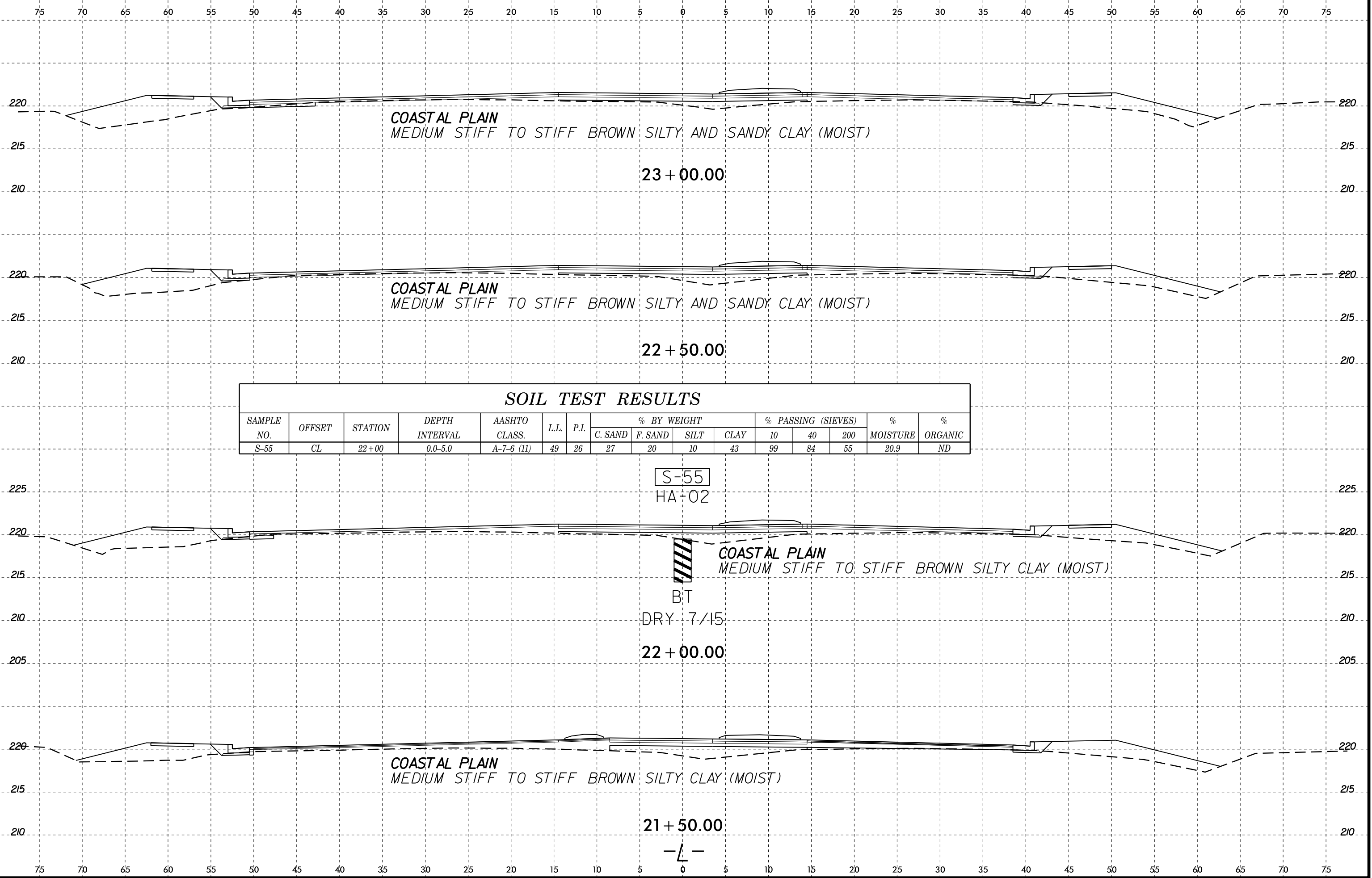
-L-

8/23/99



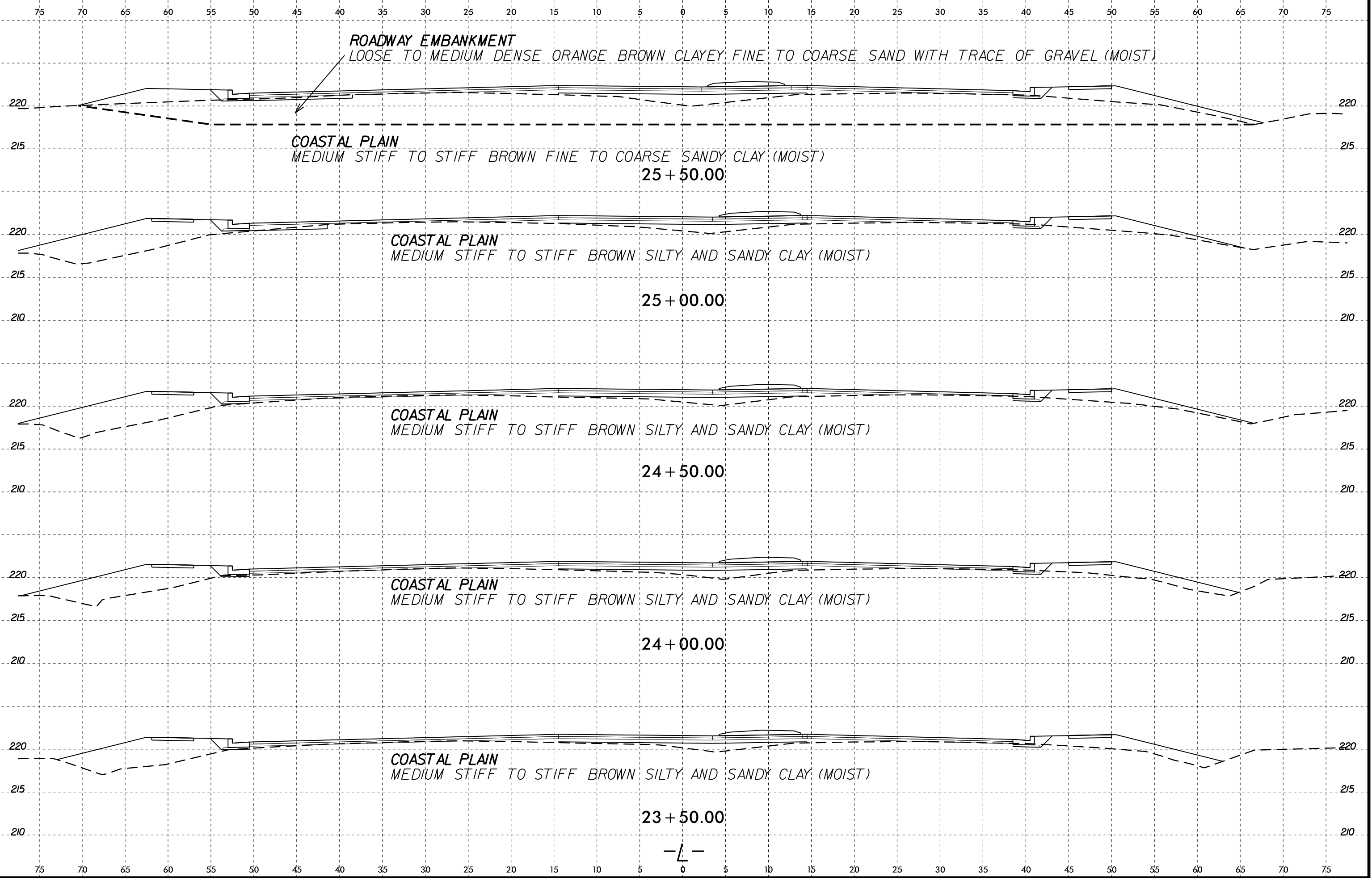
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BRettu AT BRA11-13508

8/23/99

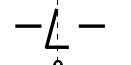


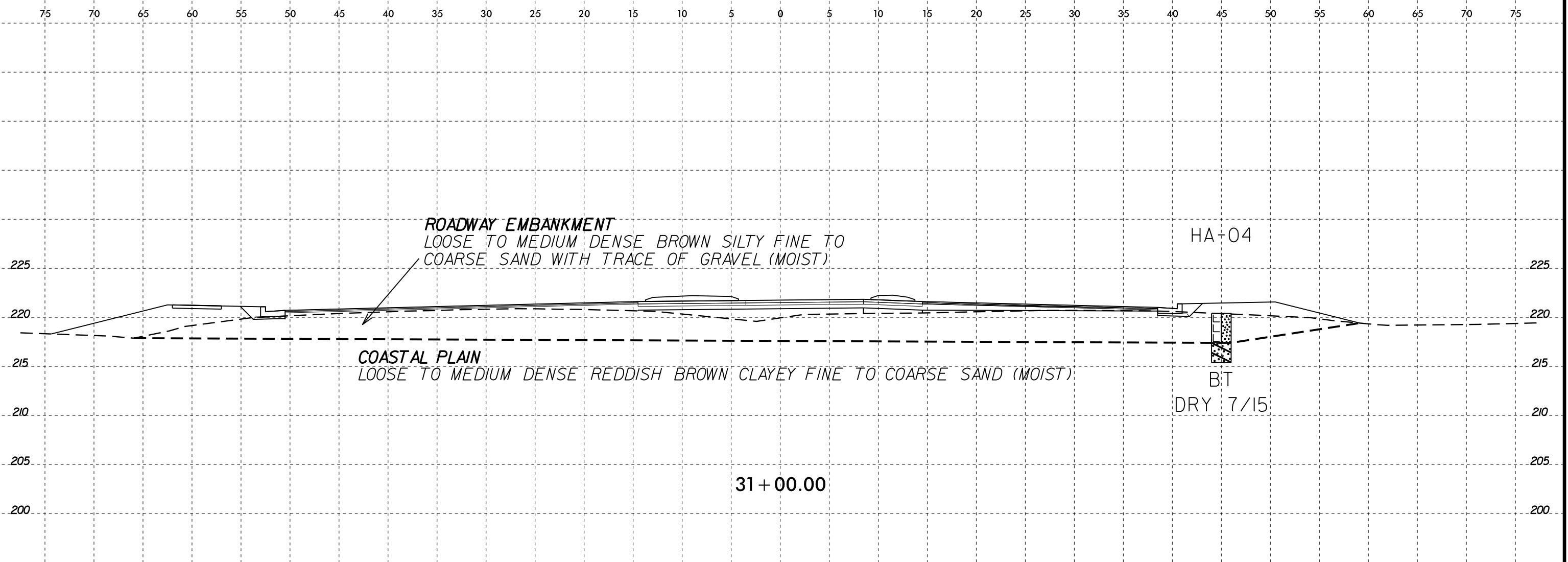
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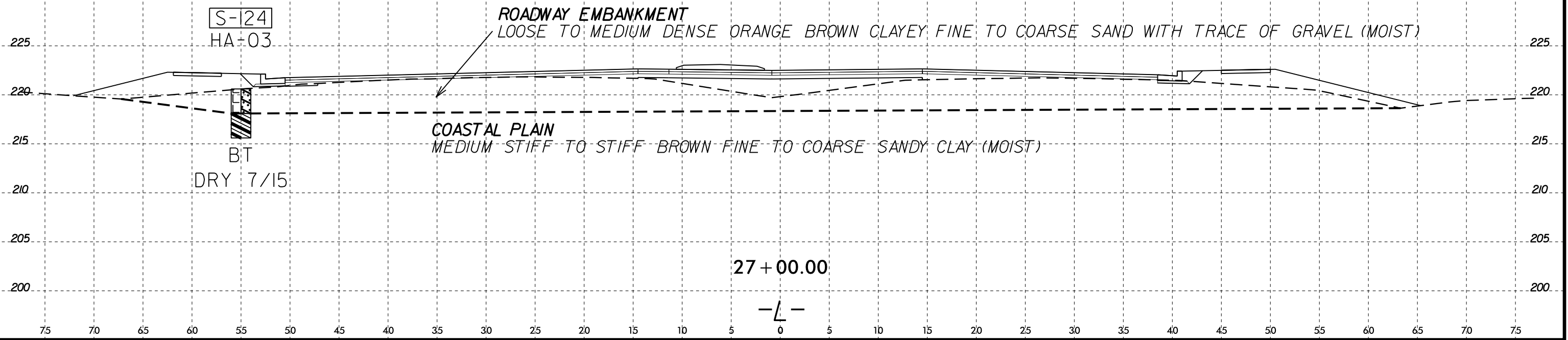


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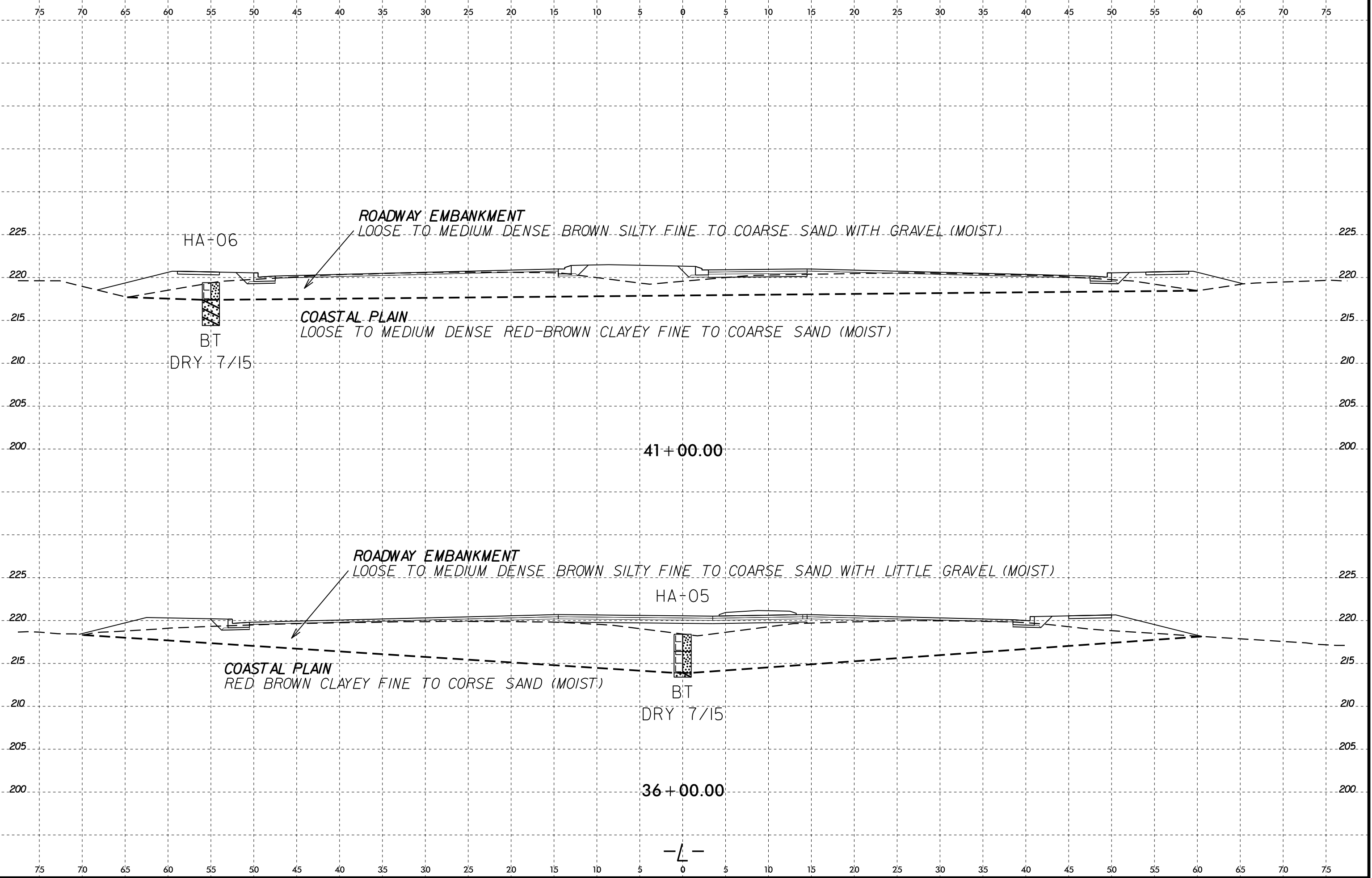




SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-124	55' LT	27+00	0.0-2.5	A-2-6 (0)	33	16	46	29	3	22	100	74	28	10.5	ND



8/23/99



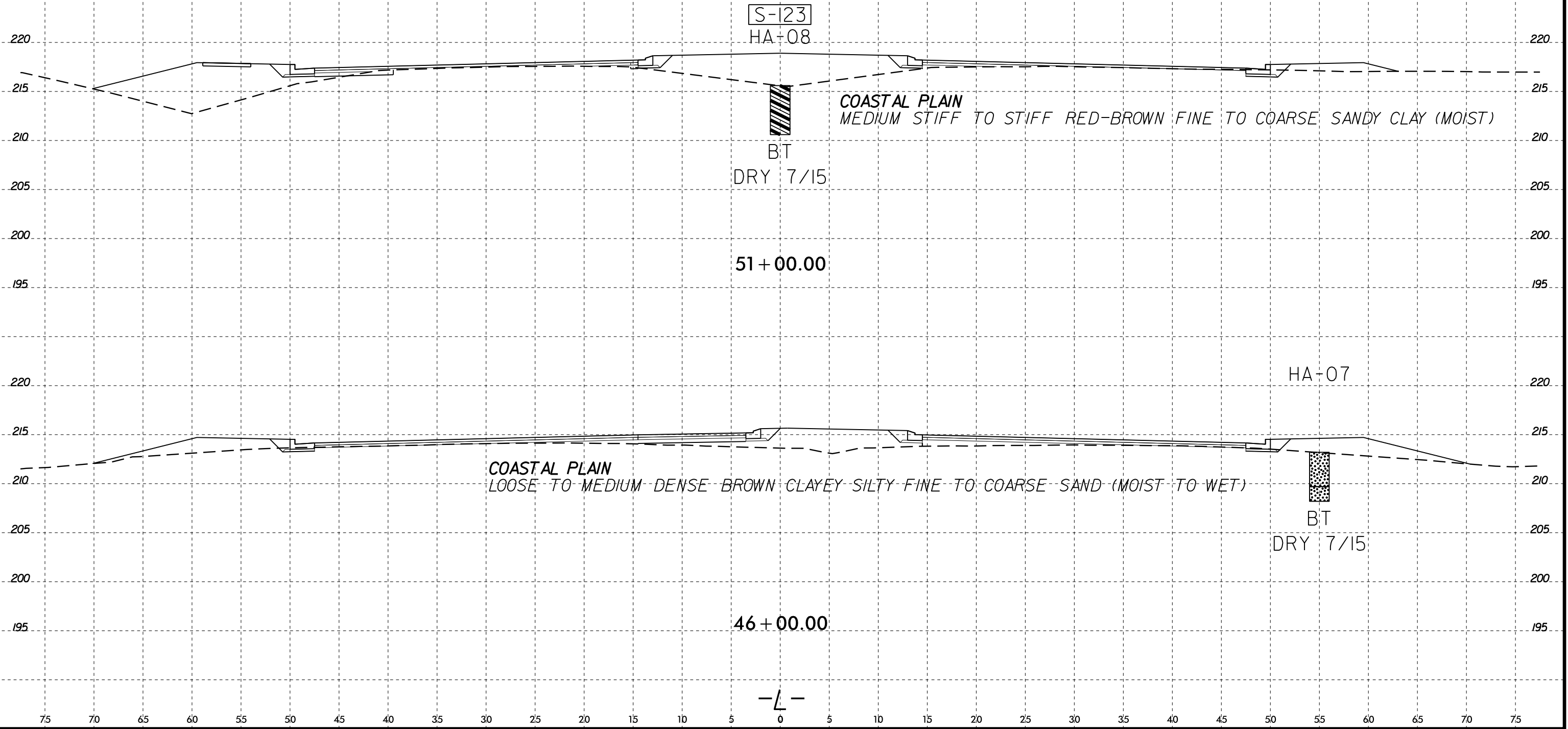
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BRettu AT BRA11-13500

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8/23/99

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

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-123	CL	51+00	0.0-5.0	A-6 (2)	34	19	40	27	6	27	99	75	36	12.9	ND



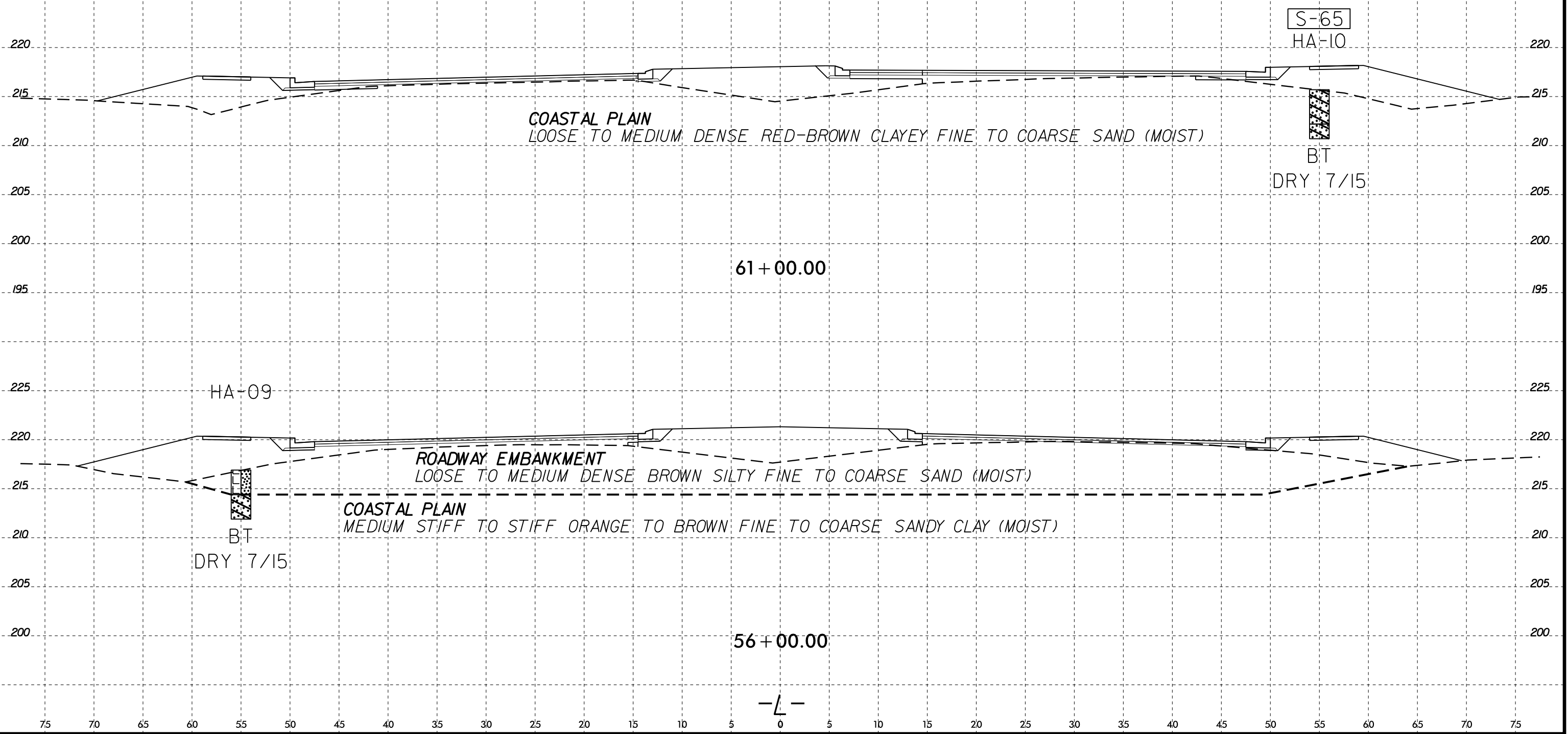
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

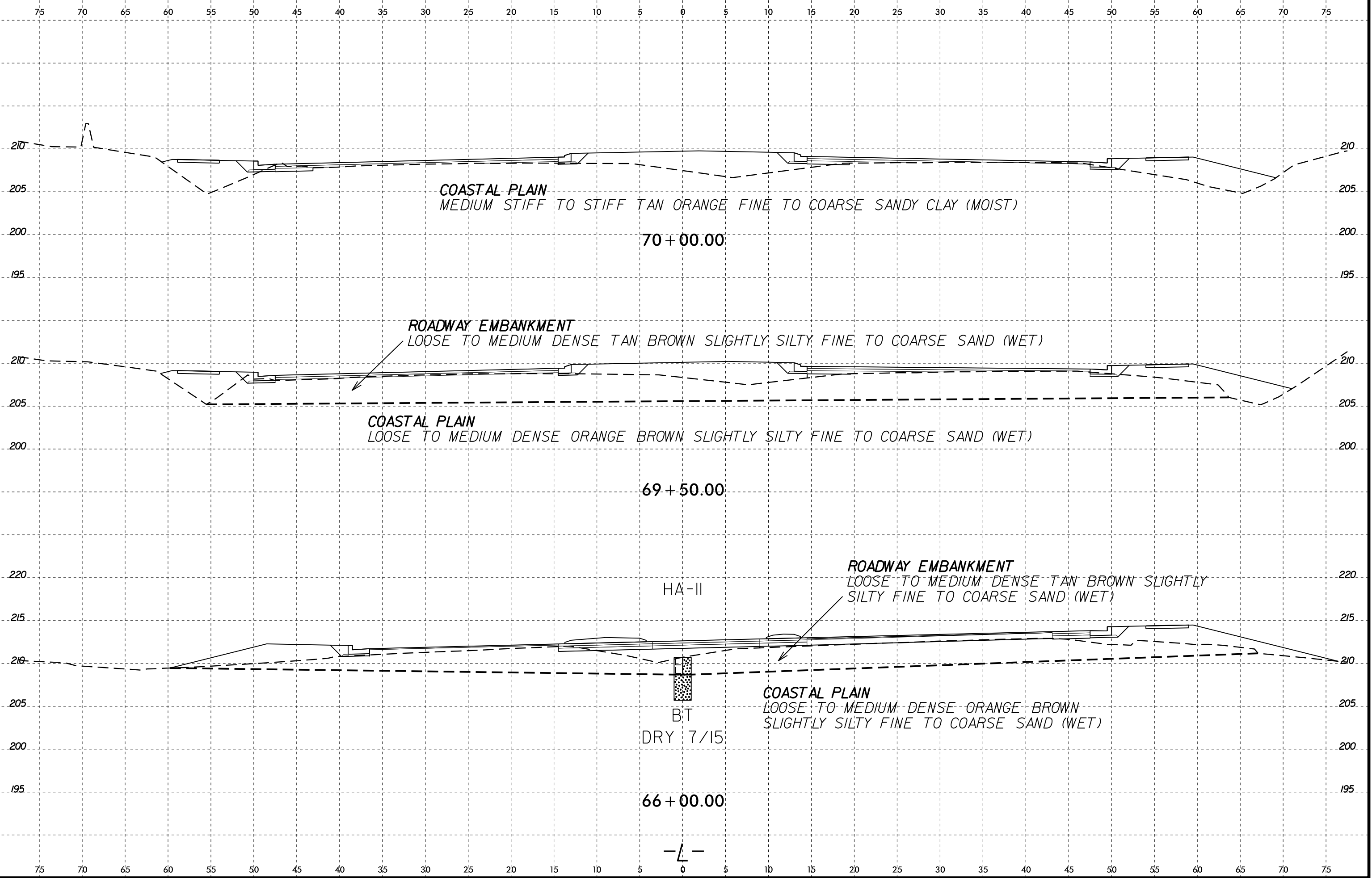
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-65	55' RT	61+00	0.0-3.5	A-2-6 (1)	34	15	46	24	5	25	100	73	33	11.8	ND



25-JAN-2016 13:55
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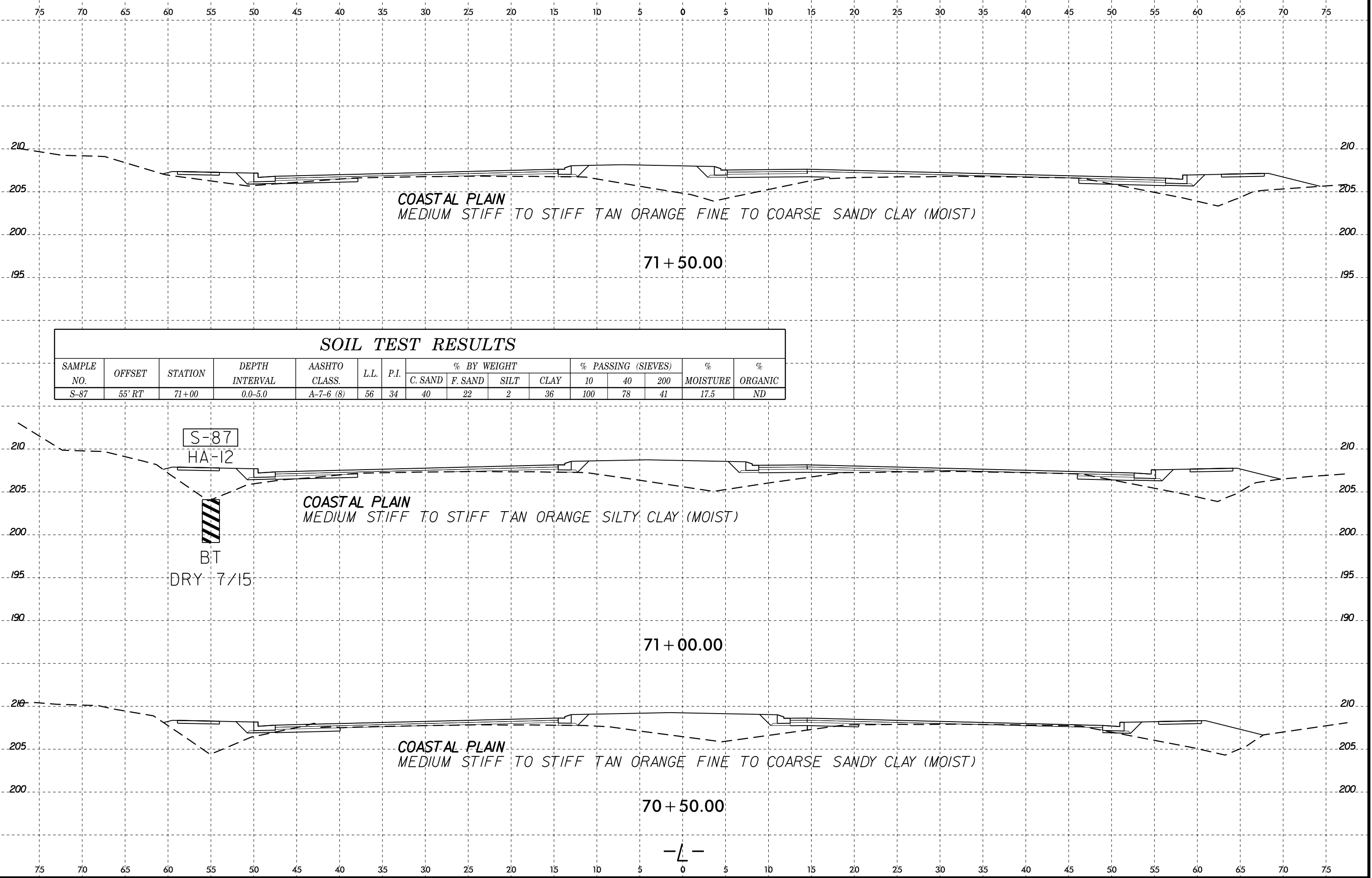
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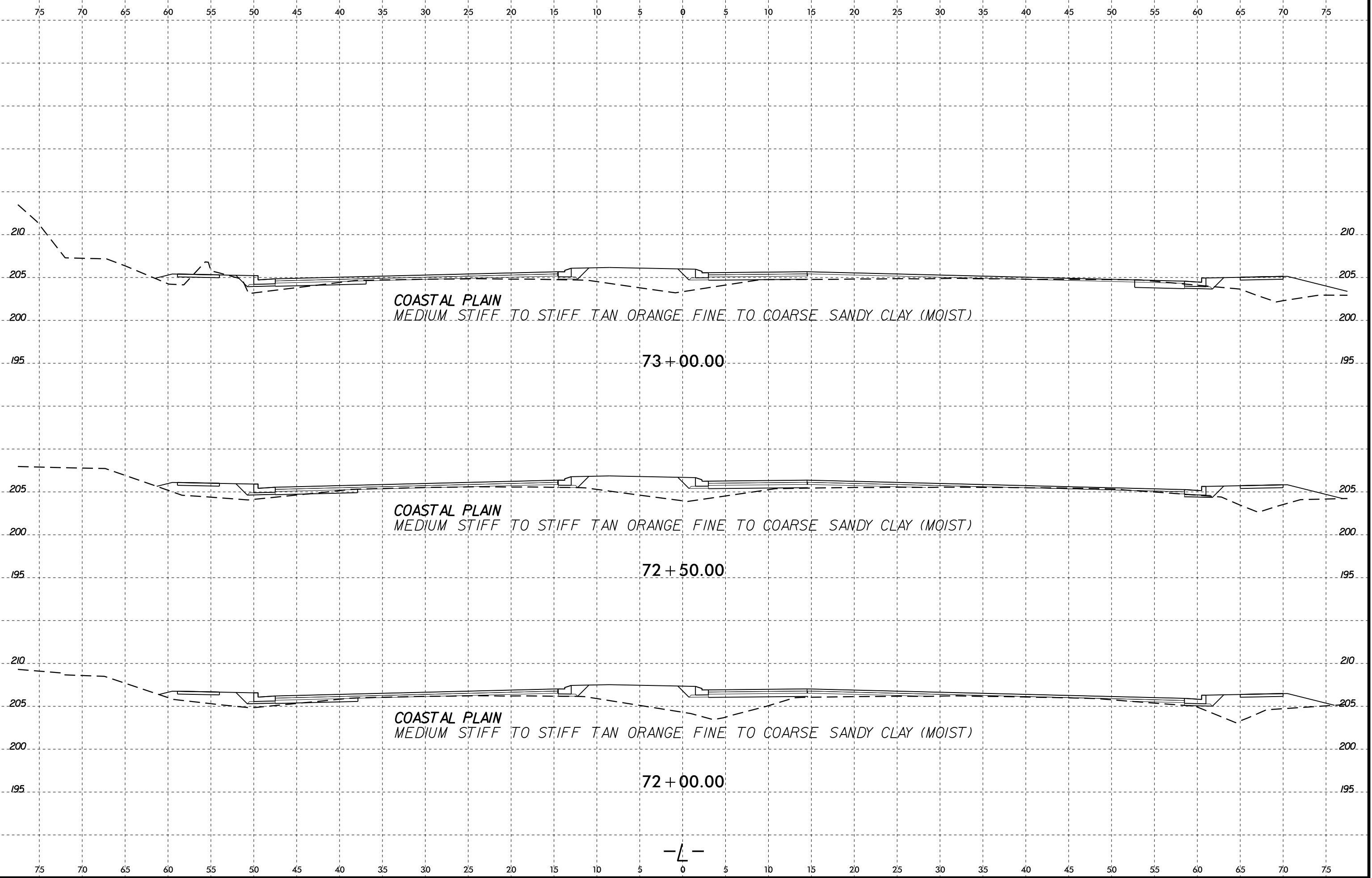
-L-

8/23/99



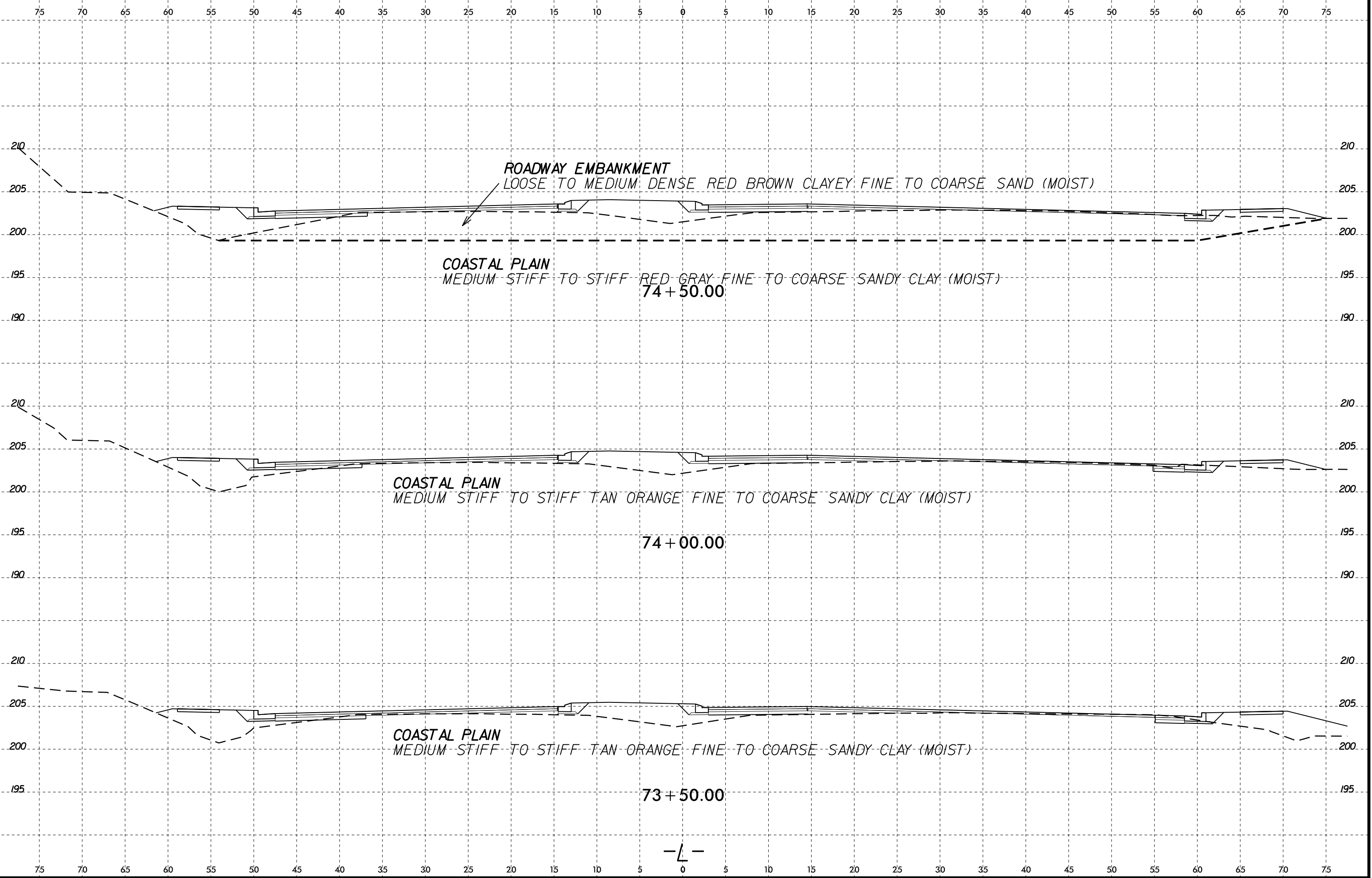
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 BRett AT BRA11-13500

8/23/99

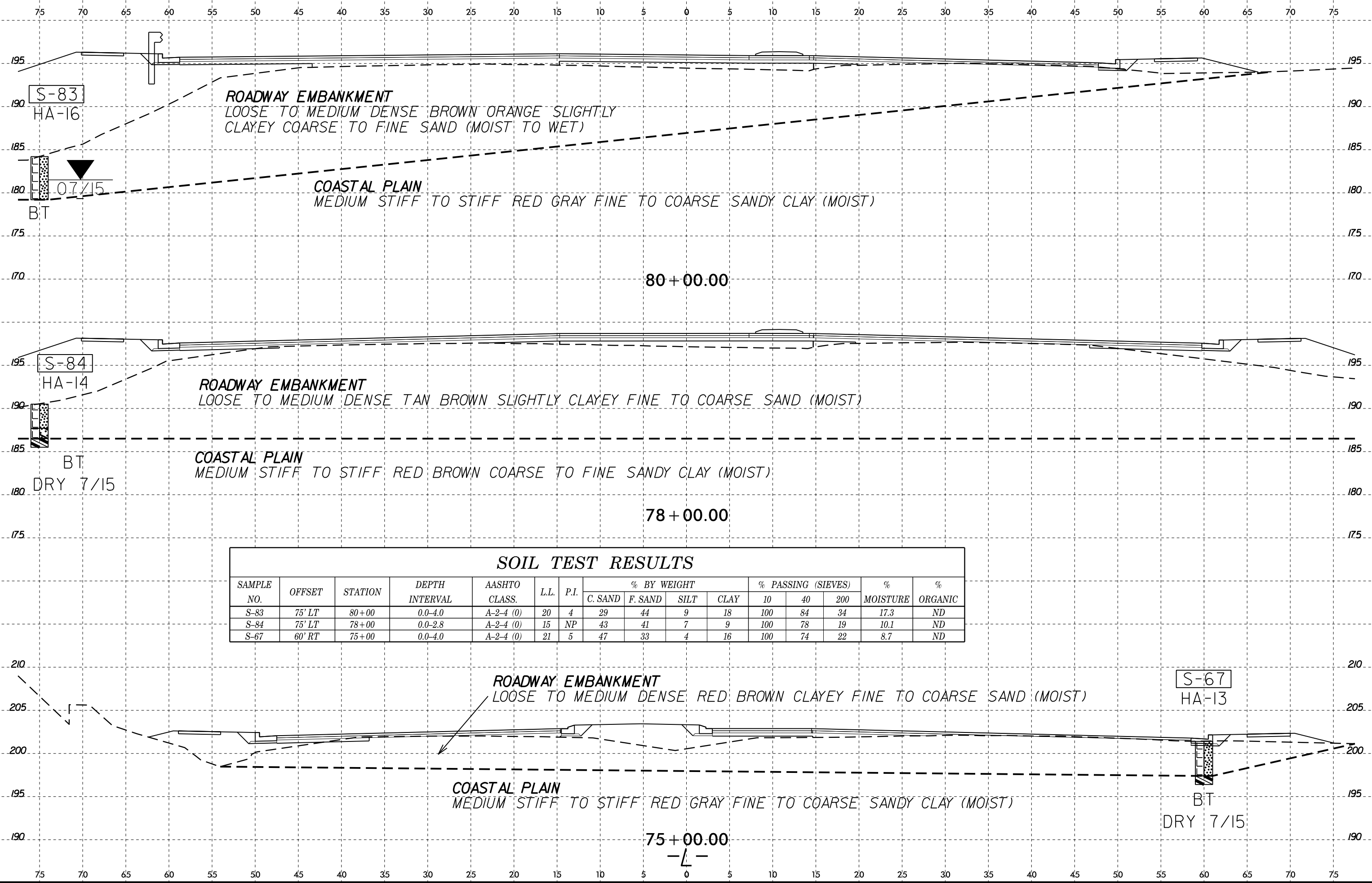


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BRettu AT BRA11-13500

8/23/99



25-JAN-2016 14:00
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BRettu AT BRA11-13500

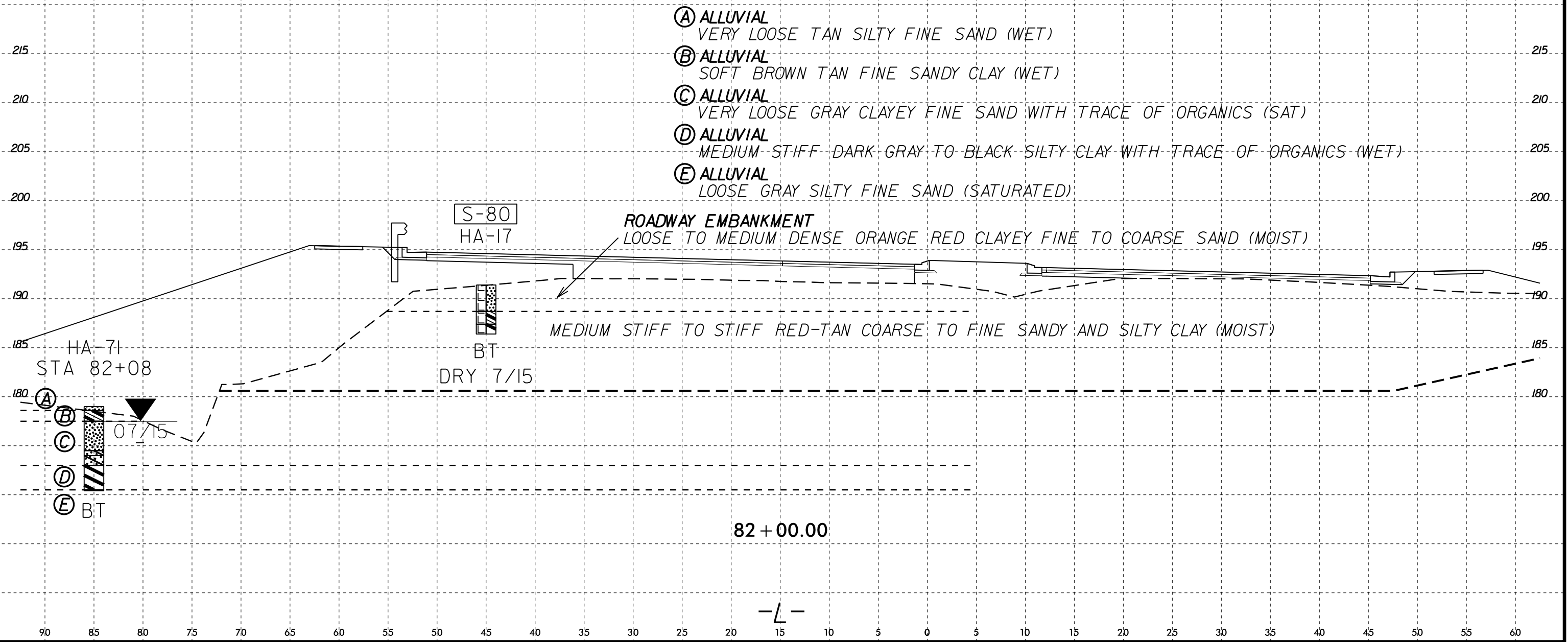


SOIL TEST RESULTS

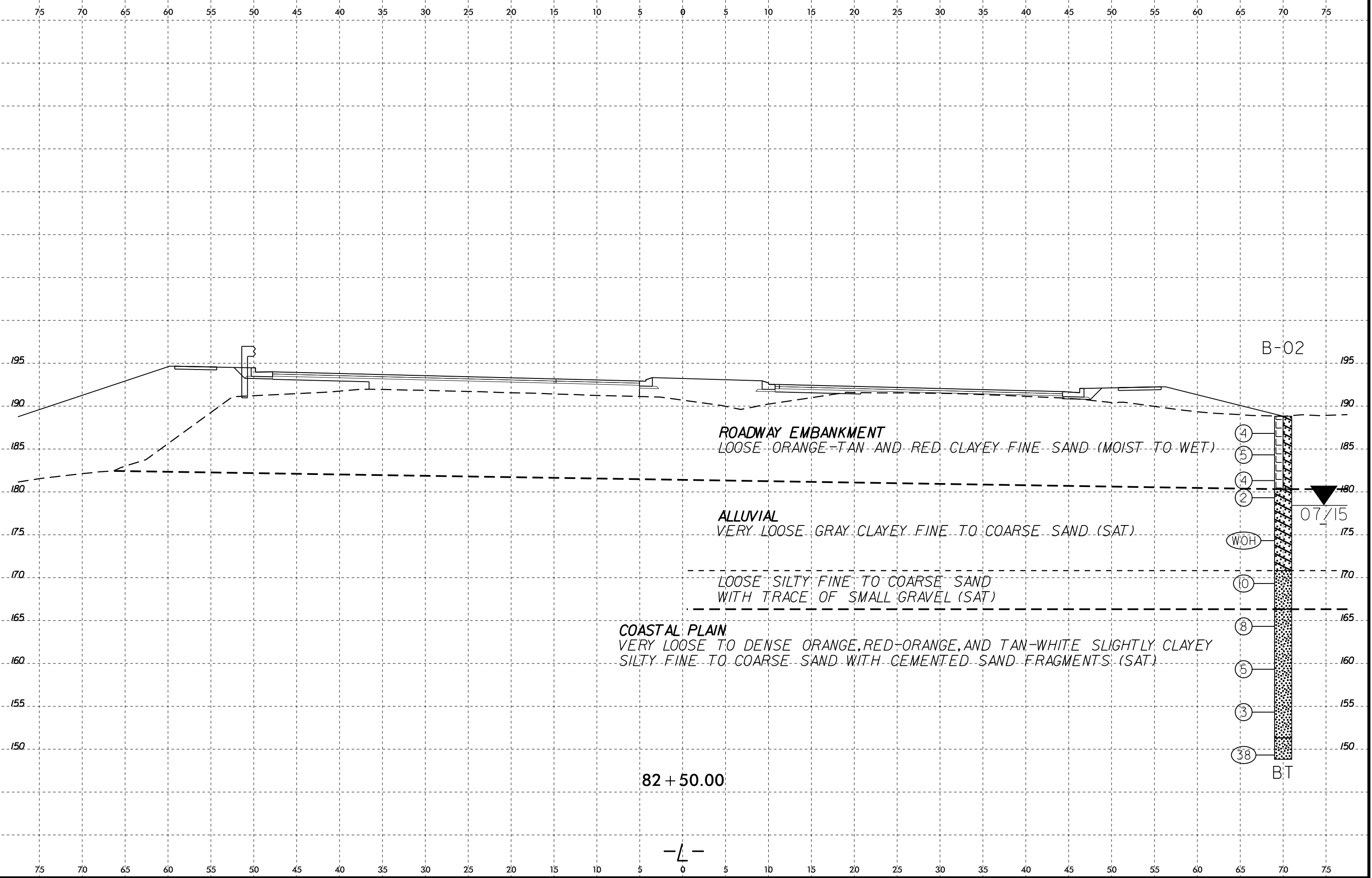
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-83	75' LT	80+00	0.0-4.0	A-2-4 (0)	20	4	29	44	9	18	100	84	34	17.3	ND
S-84	75' LT	78+00	0.0-2.8	A-2-4 (0)	15	NP	43	41	7	9	100	78	19	10.1	ND
S-67	60' RT	75+00	0.0-4.0	A-2-4 (0)	21	5	47	33	4	16	100	74	22	8.7	ND

90 85 80 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

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-80	45' LT	82+00	0.0-2.7	A-2-4 (0)	24	8	46	31	4	19	99	69	26	8.4	ND



8/23/99

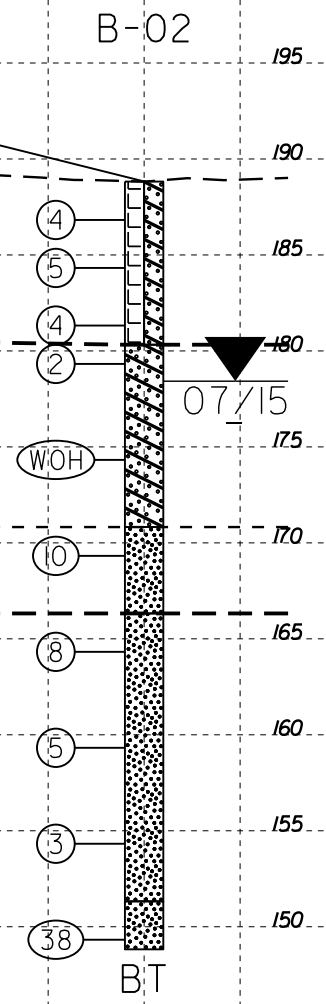


ROADWAY EMBANKMENT
 LOOSE ORANGE-TAN AND RED CLAYEY FINE SAND (MOIST TO WET)

ALLUVIAL
 VERY LOOSE GRAY CLAYEY FINE TO COARSE SAND (SAT)

LOOSE SILTY FINE TO COARSE SAND
 WITH TRACE OF SMALL GRAVEL (SAT)

COASTAL PLAIN
 VERY LOOSE TO DENSE ORANGE, RED-ORANGE, AND TAN-WHITE SLIGHTLY CLAYEY
 SILTY FINE TO COARSE SAND WITH CEMENTED SAND FRAGMENTS (SAT)

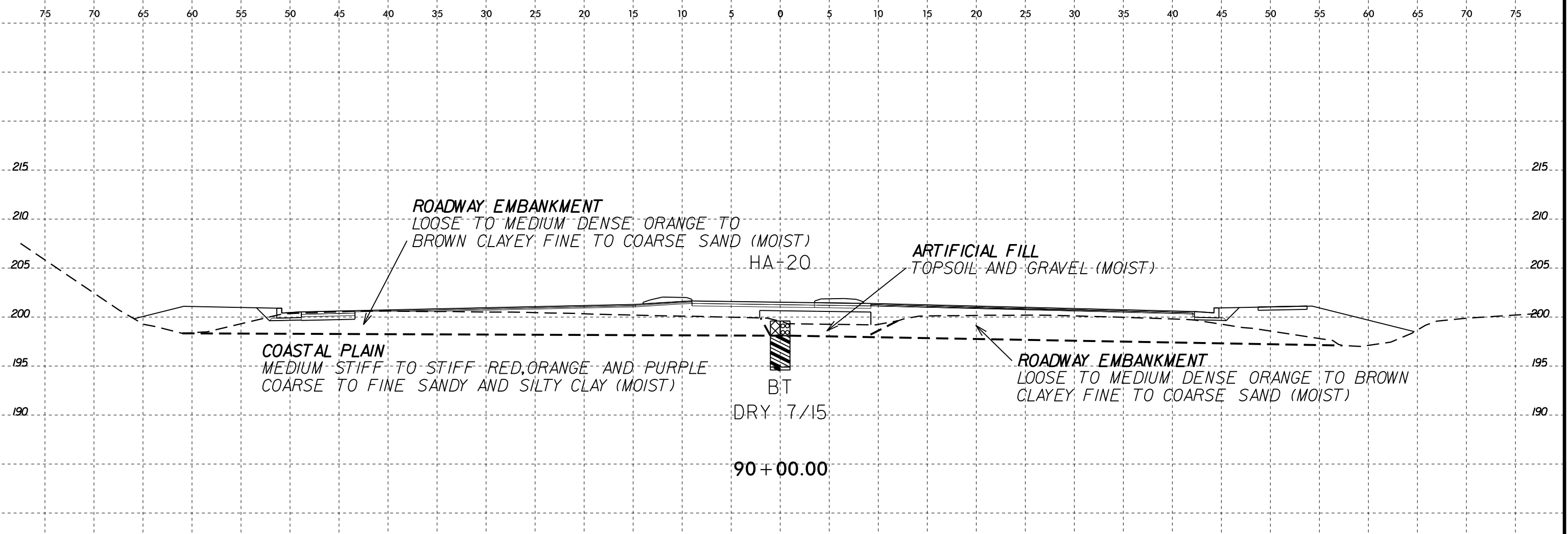


82 + 50.00

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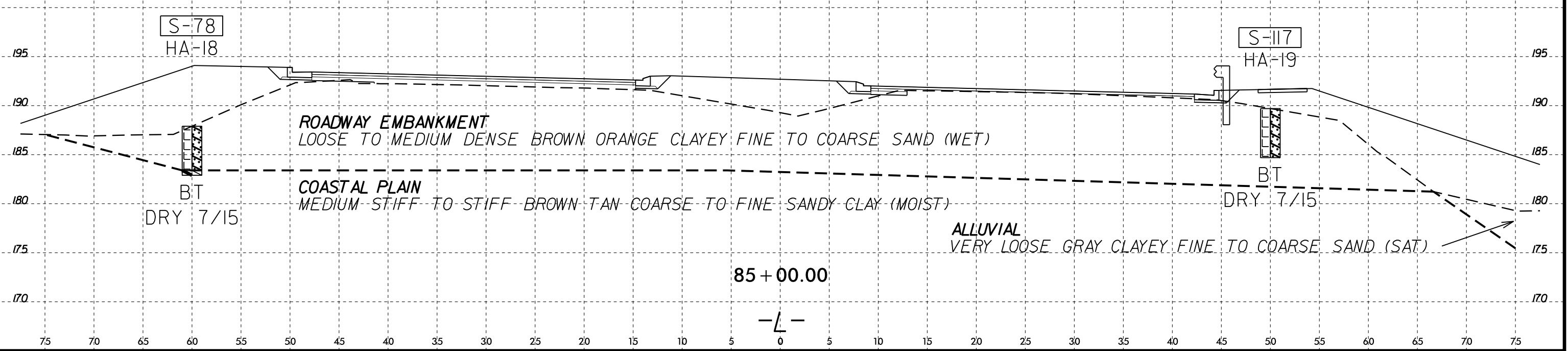
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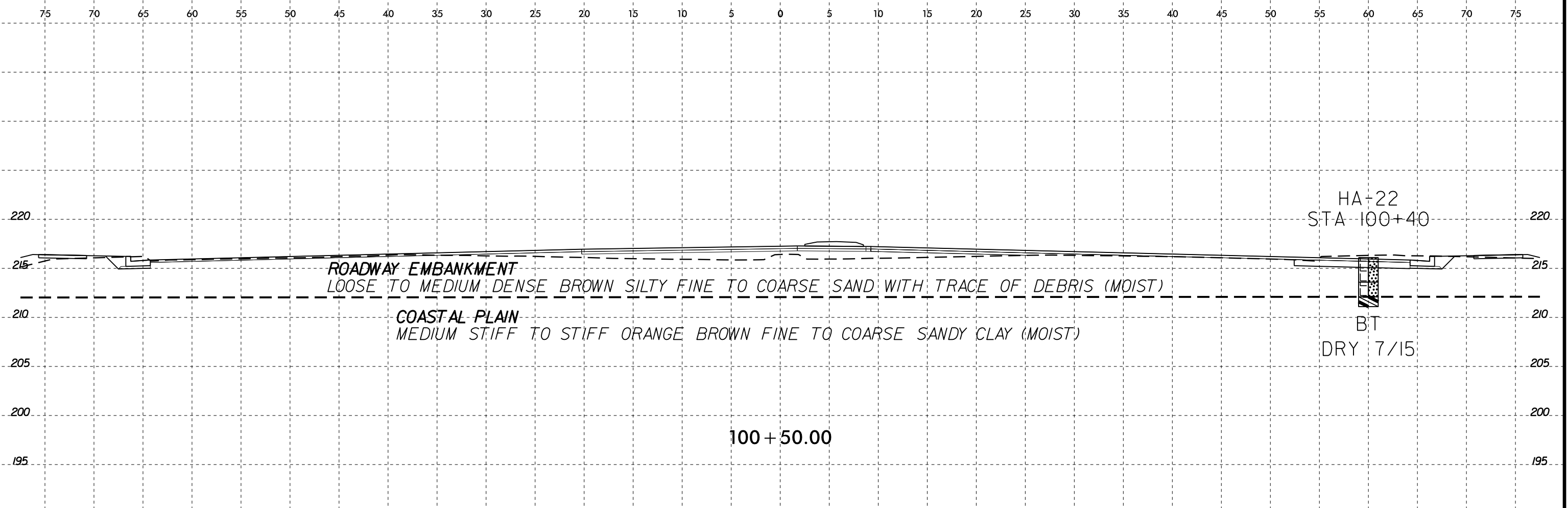


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-78	60' LT	85+00	0.0-4.5	A-2-6 (0)	27	11	44	31	2	23	100	74	28	14.4	ND
S-117	50' RT	85+00	0.0-5.0	A-2-6 (1)	35	19	48	21	4	27	99	70	32	14.6	ND



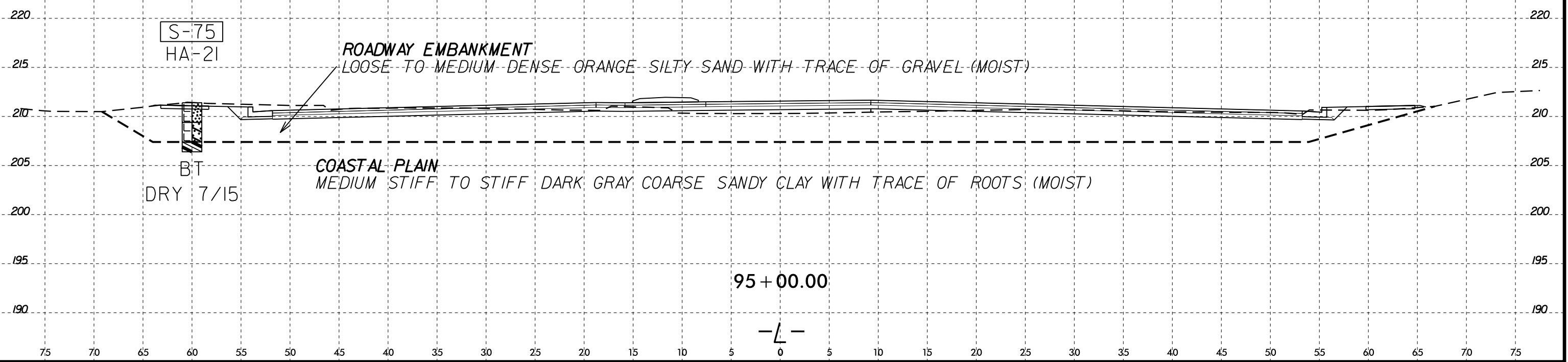
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100 + 50.00

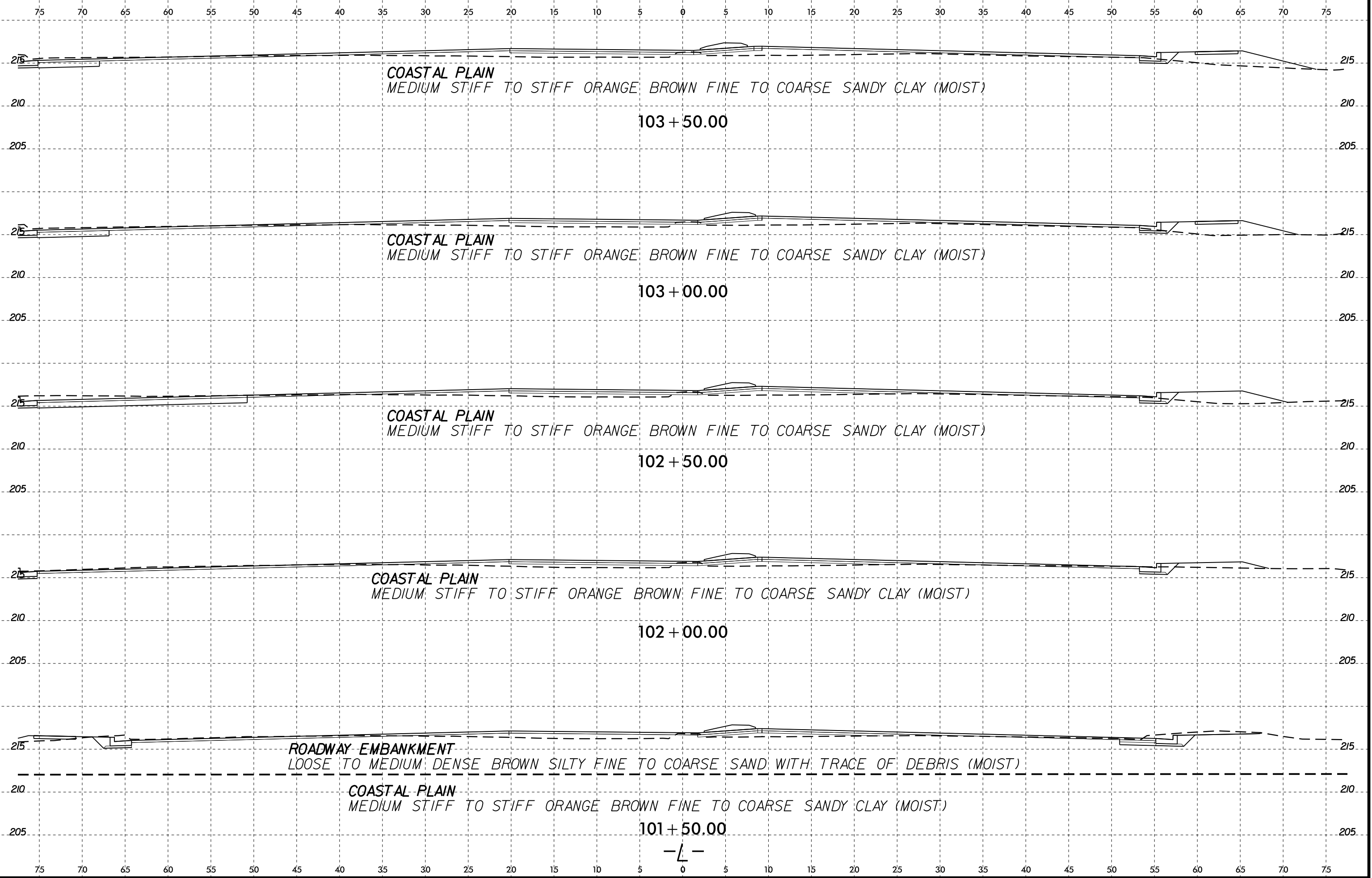
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-75	60' LT	95+00	0.0-2.0	A-2-4 (0)	25	7	35	44	3	18	99	77	23	7.3	ND



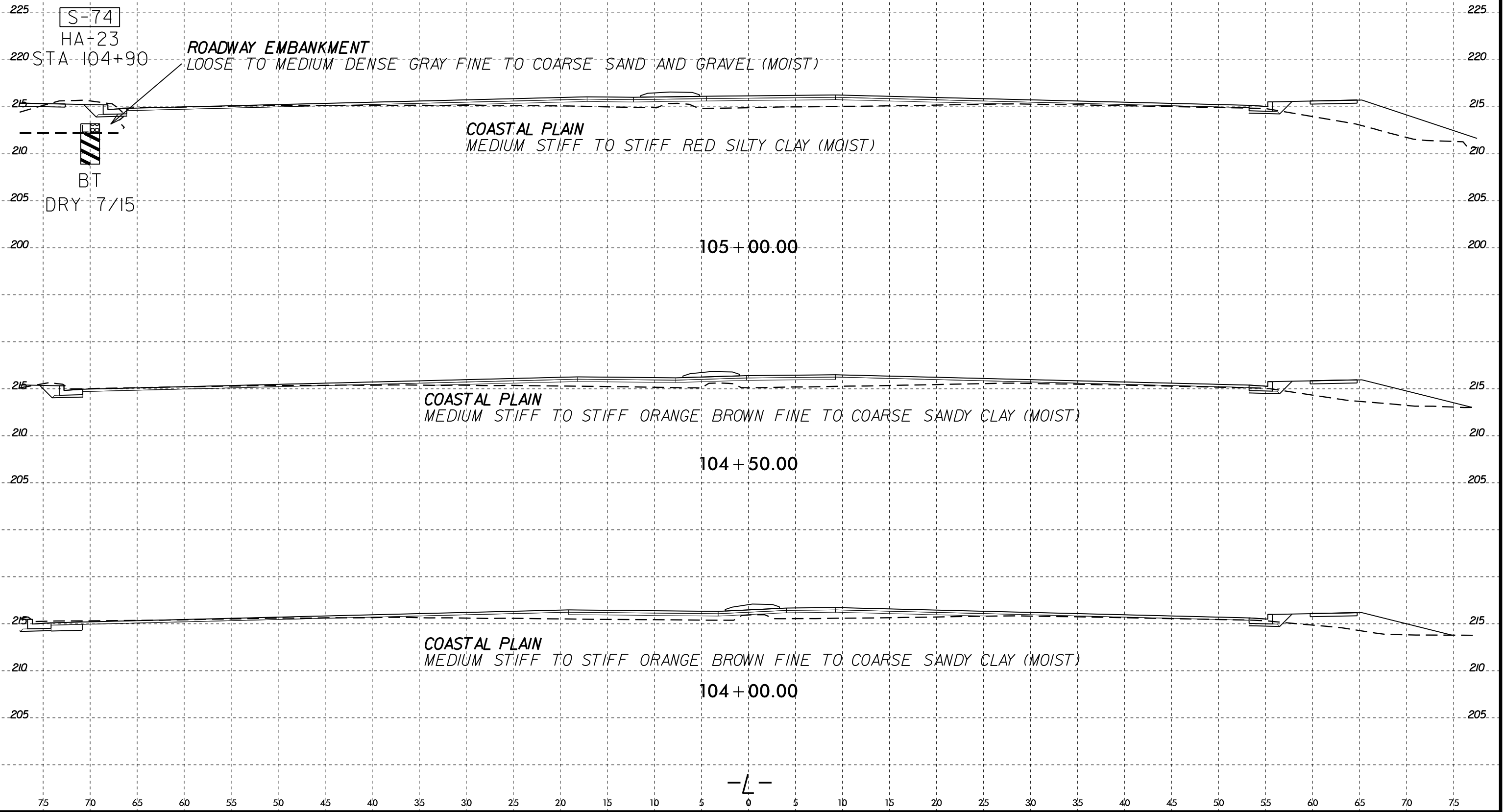
95 + 00.00

-L-

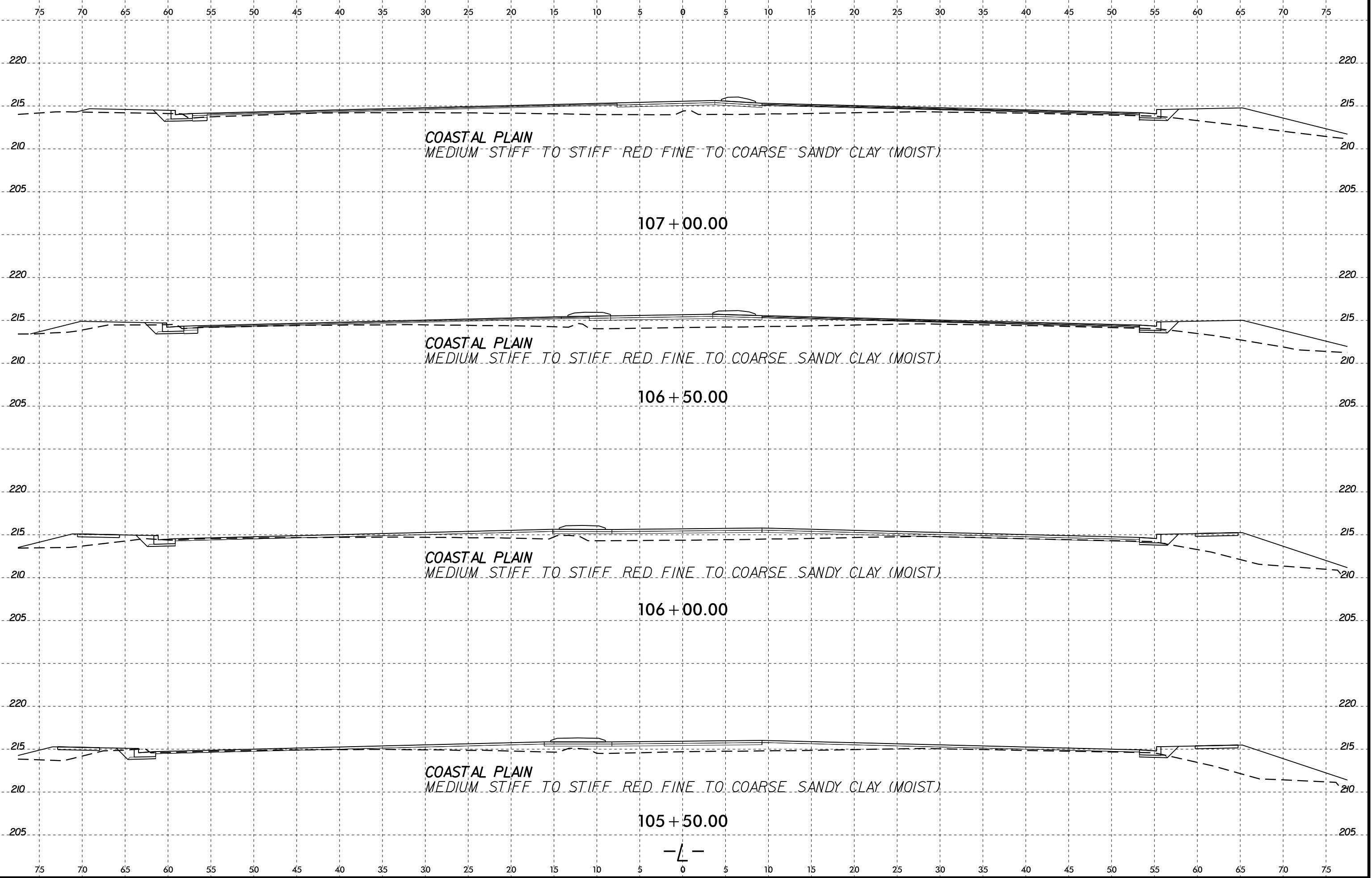


75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-74	70' LT	104+90	1.0-4.3	A-7-6 (14)	52	26	28	14	7	51	100	82	60	22.2	ND



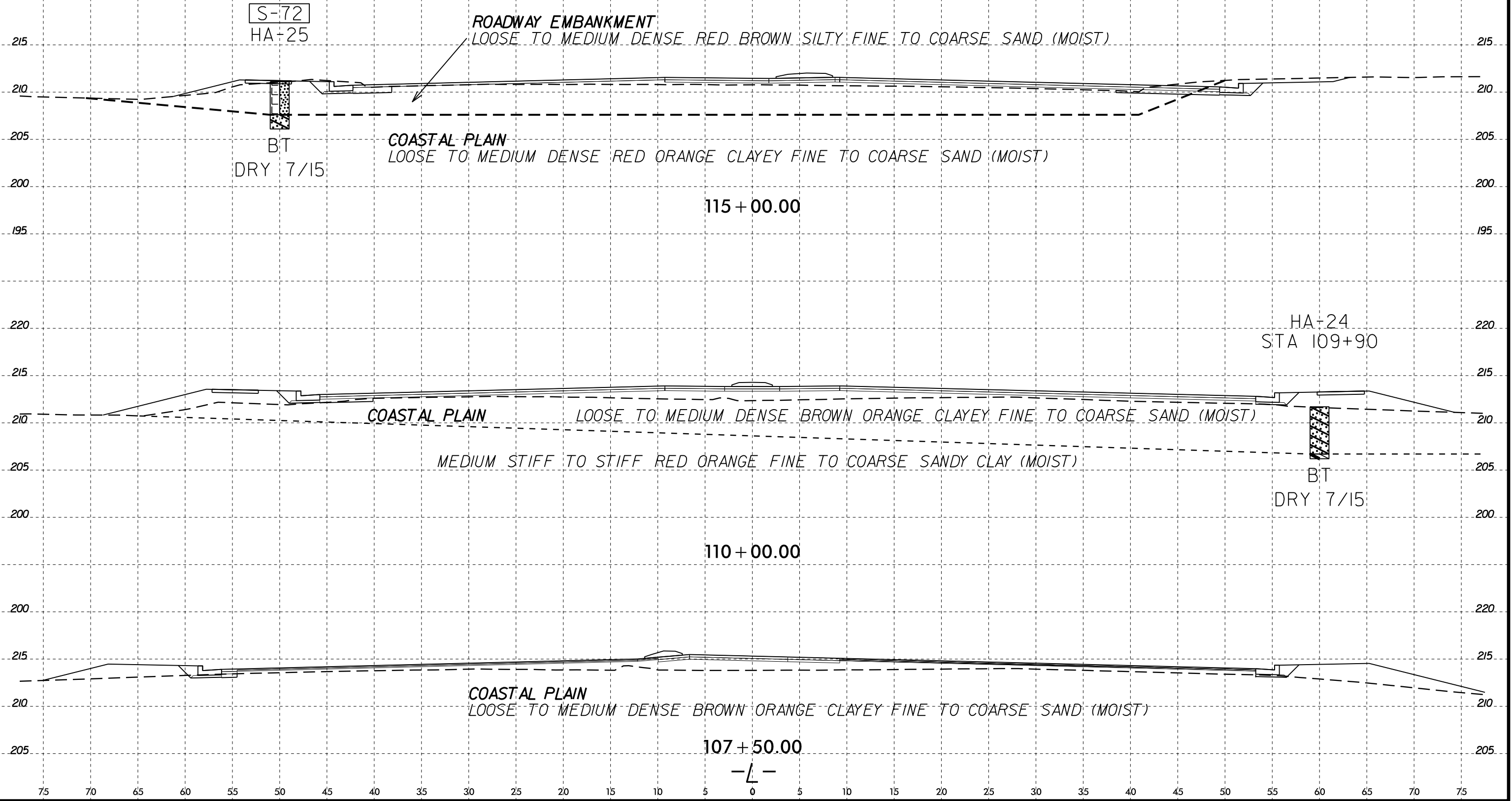
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BRett

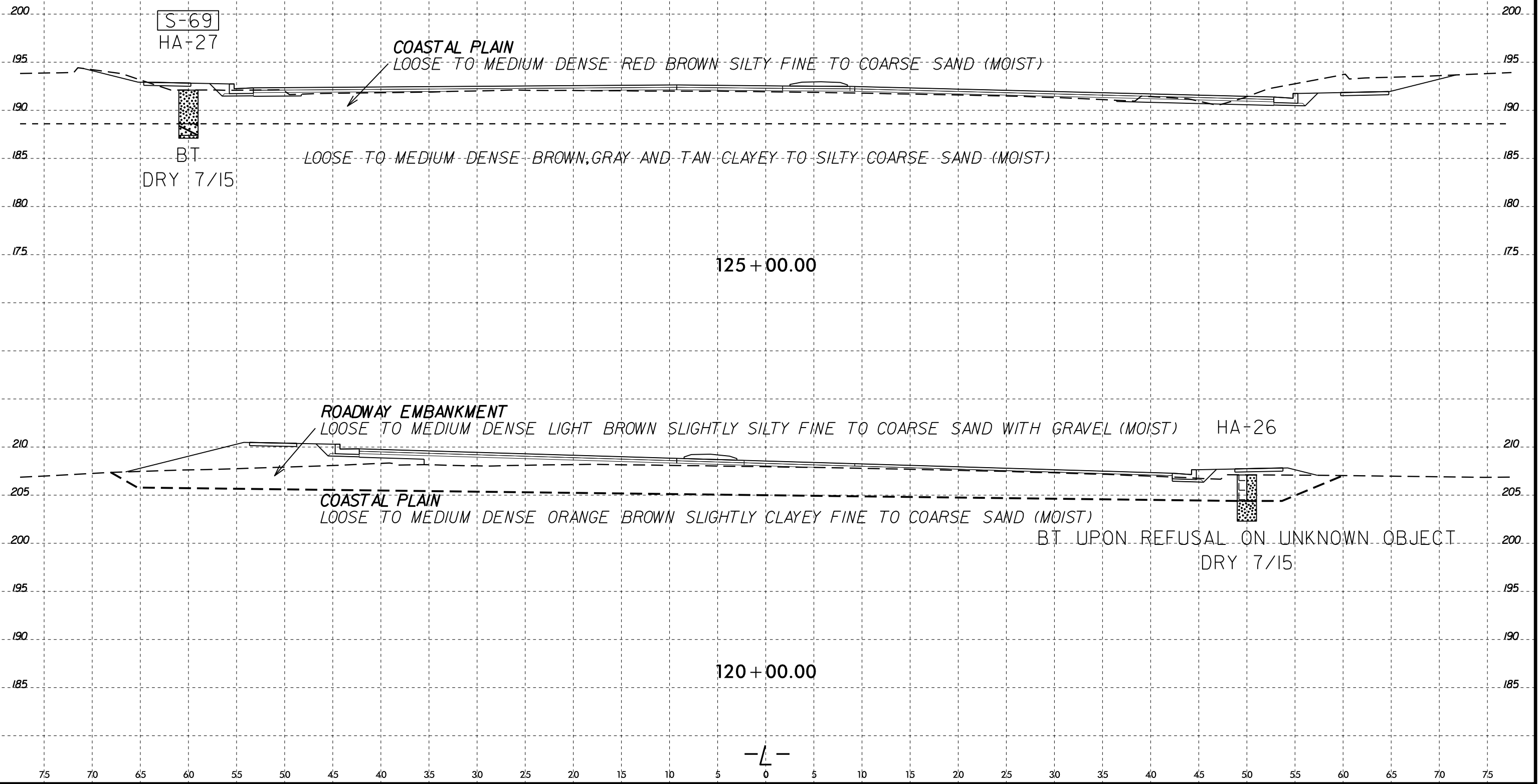
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-72	50' LT	115+00	0.0-3.5	A-2-4 (0)	18	3	55	27	5	13	100	64	21	6.7	ND



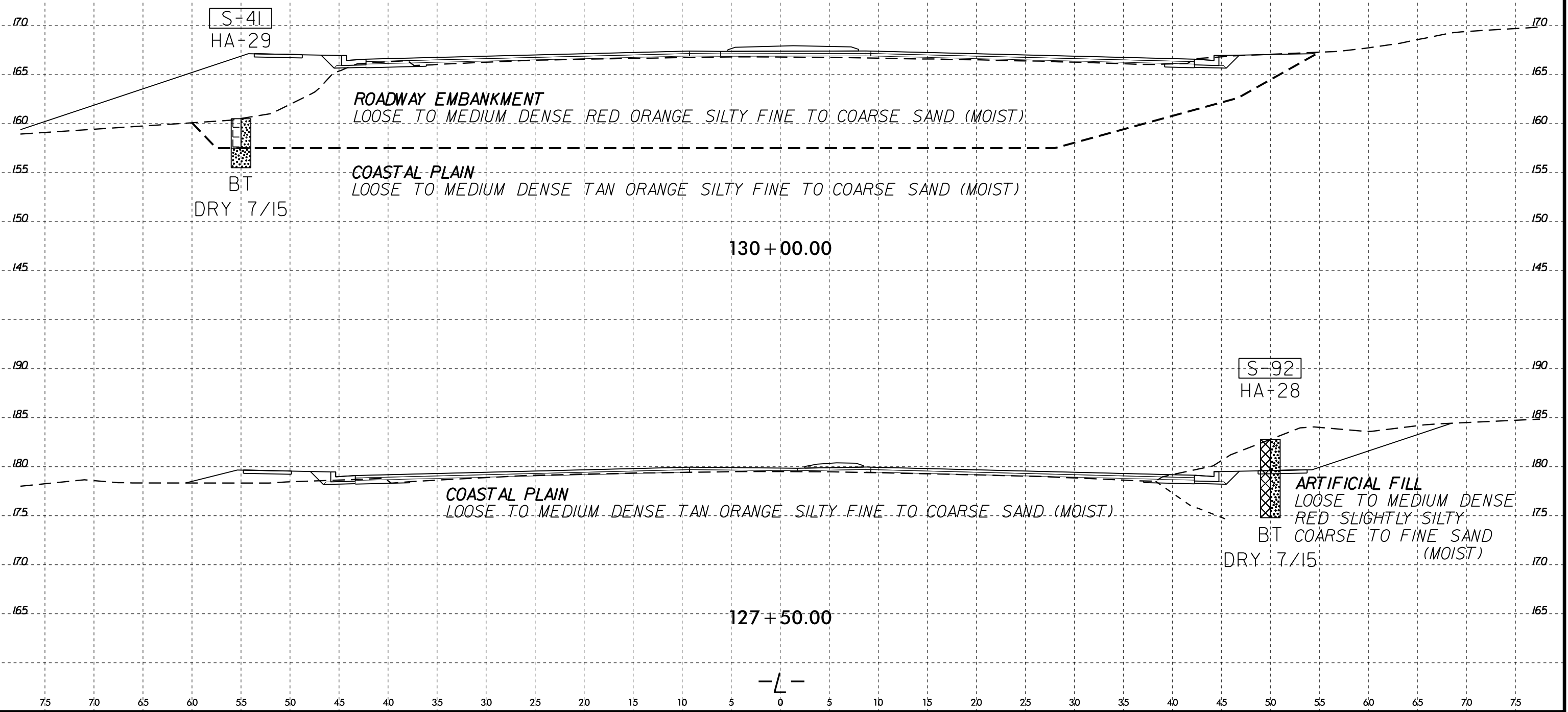
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BRettu AT BRA11-13508

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-69	60' LT	125+00	0.0-3.5	A-2-4 (0)	17	4	49	37	3	11	98	68	17	9.3	ND

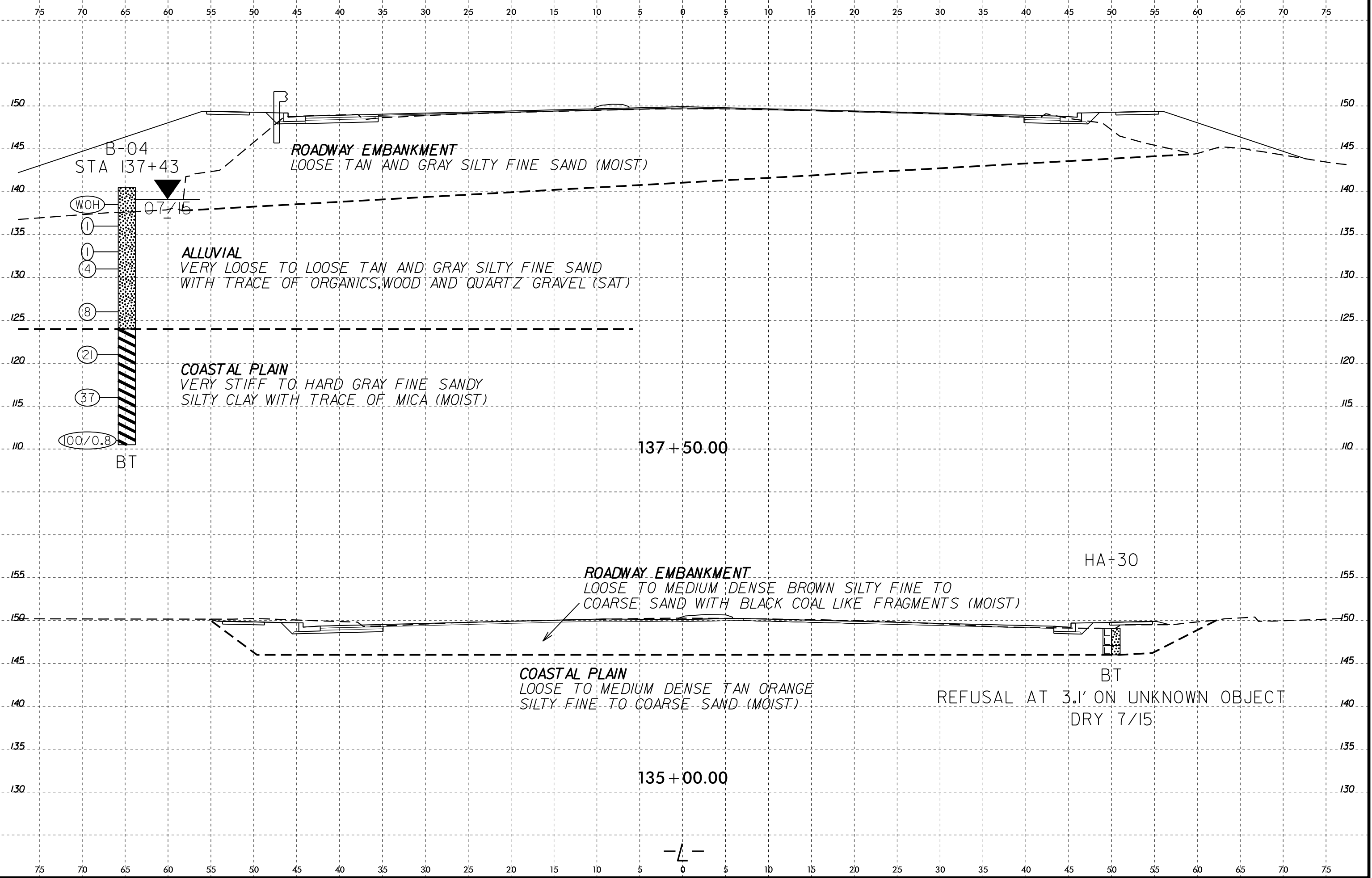


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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-41	55' LT	130+00	0.0-3.0	A-2-4 (0)	18	1	40	41	5	14	99	76	22	7.7	ND
S-92	50' RT	127+50	0.0-8.0	A-2-4 (0)	24	4	26	57	4	13	100	84	19	8	ND

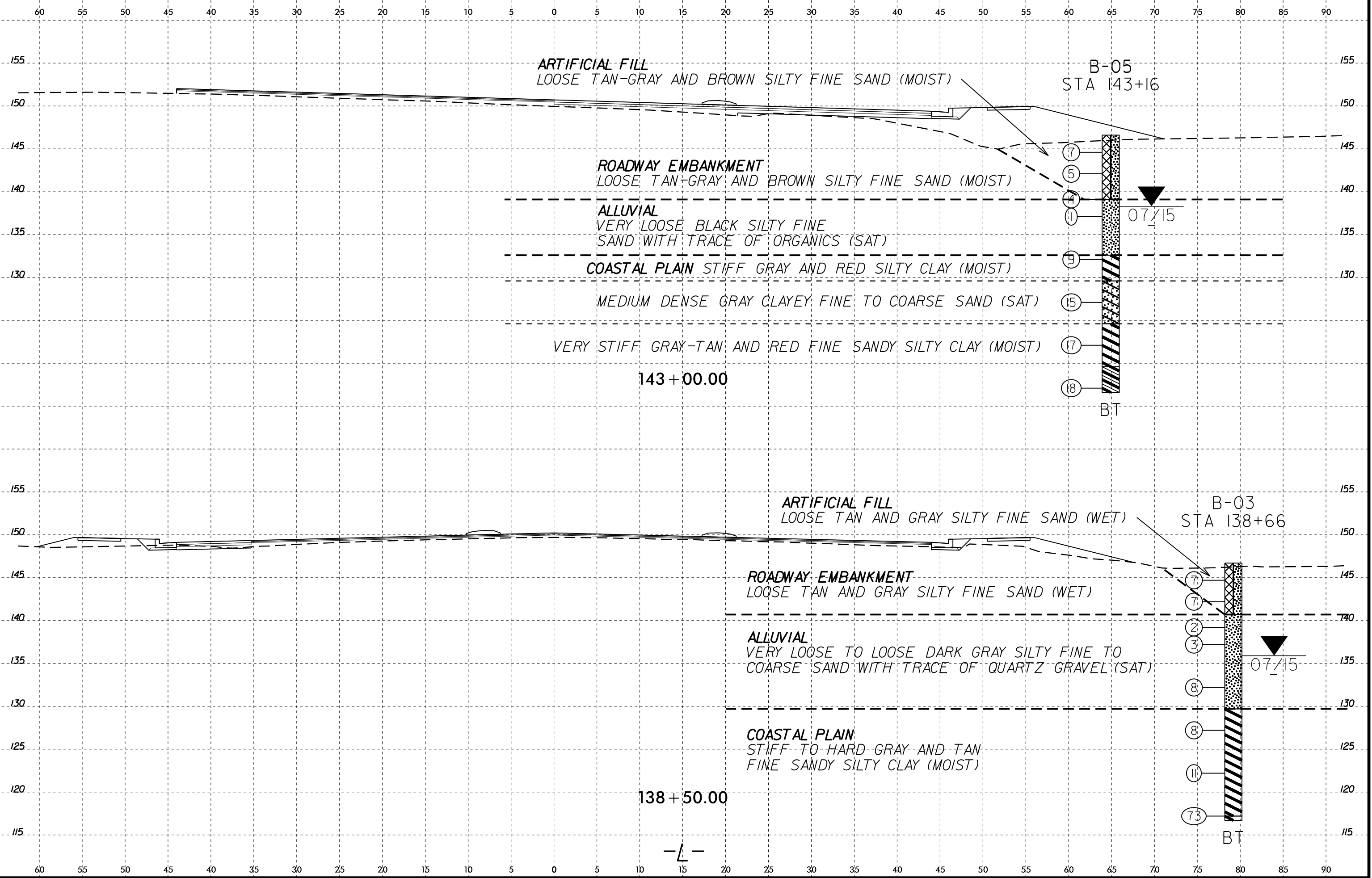


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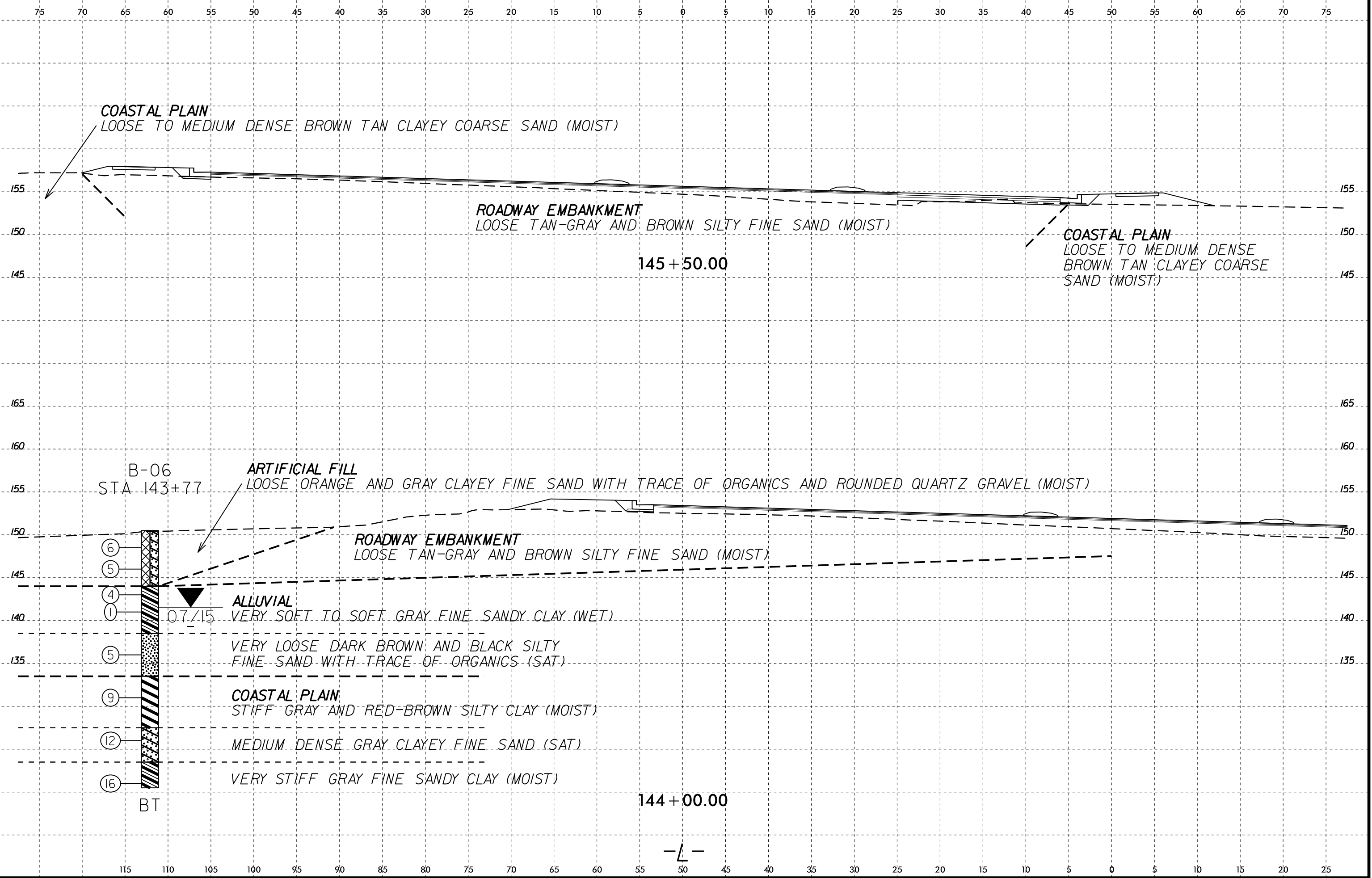


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BRett



COASTAL PLAIN
LOOSE TO MEDIUM DENSE BROWN TAN CLAYEY COARSE SAND (MOIST)

ROADWAY EMBANKMENT
LOOSE TAN-GRAY AND BROWN SILTY FINE SAND (MOIST)

COASTAL PLAIN
LOOSE TO MEDIUM DENSE
BROWN TAN CLAYEY COARSE
SAND (MOIST)

145 + 50.00

B-06
STA 143+77

ARTIFICIAL FILL
LOOSE ORANGE AND GRAY CLAYEY FINE SAND WITH TRACE OF ORGANICS AND ROUNDED QUARTZ GRAVEL (MOIST)

ROADWAY EMBANKMENT
LOOSE TAN-GRAY AND BROWN SILTY FINE SAND (MOIST)

- ⑥
- ⑤
- ④
- ①
- ⑤
- ⑨
- ⑫
- ⑯

0.7/15
ALLUVIAL
VERY SOFT TO SOFT GRAY FINE SANDY CLAY (WET)

VERY LOOSE DARK BROWN AND BLACK SILTY
FINE SAND WITH TRACE OF ORGANICS (SAT)

COASTAL PLAIN
STIFF GRAY AND RED-BROWN SILTY CLAY (MOIST)

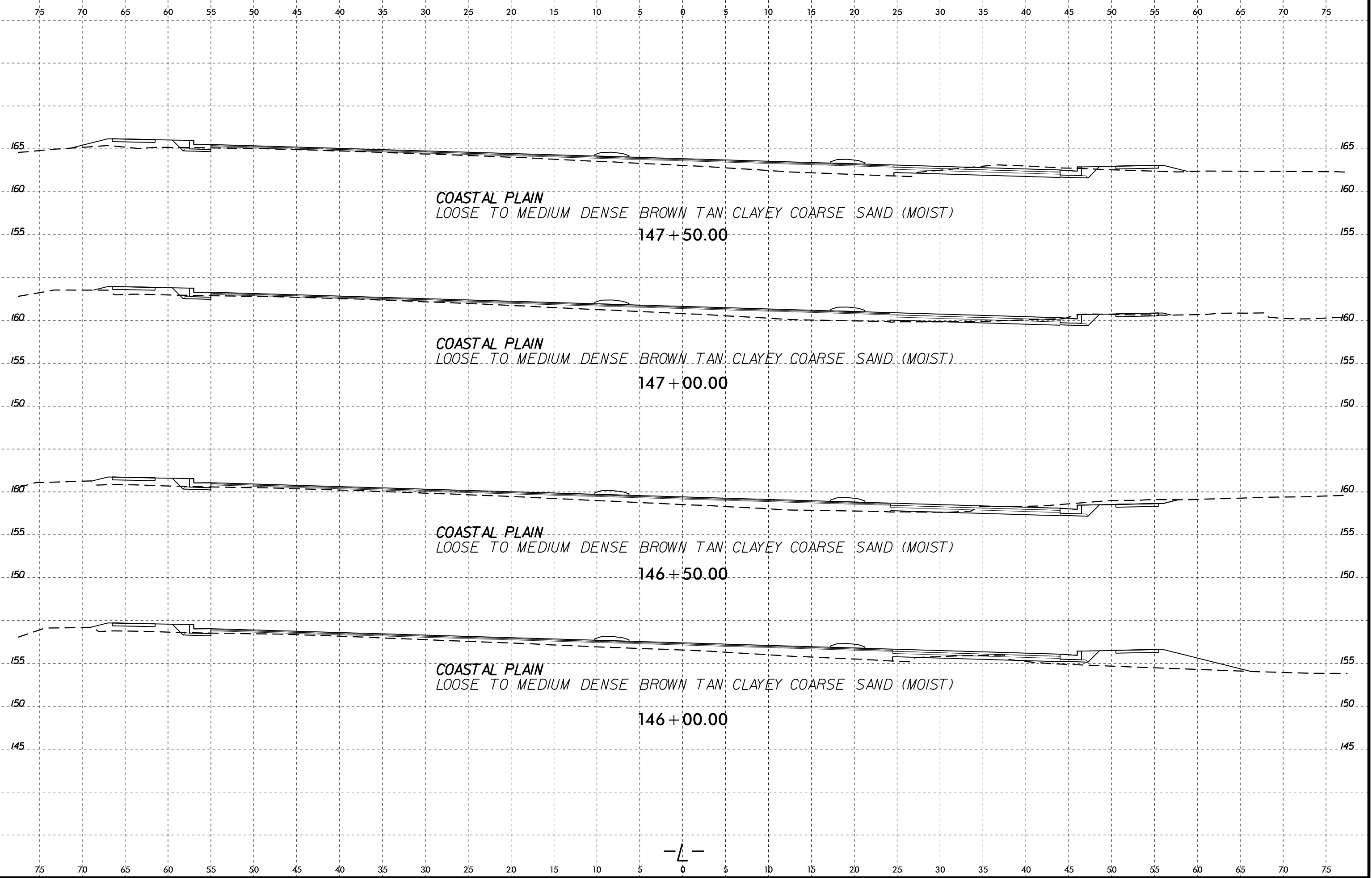
MEDIUM DENSE GRAY CLAYEY FINE SAND (SAT)

VERY STIFF GRAY FINE SANDY CLAY (MOIST)

144 + 00.00

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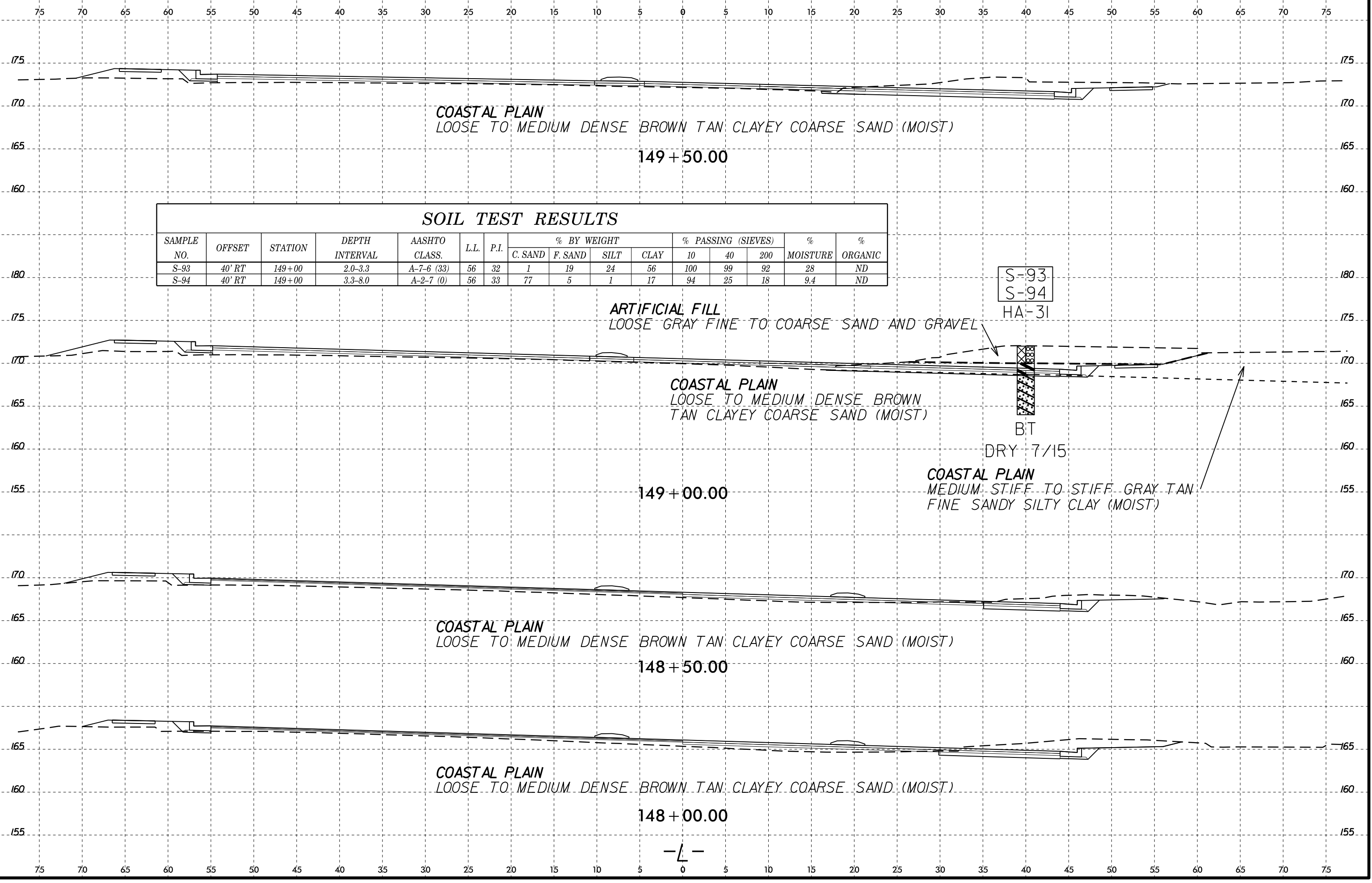
8/23/99



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 BRett AT BRA11-13508



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-93	40' RT	149+00	2.0-3.3	A-7-6 (33)	56	32	1	19	24	56	100	99	92	28	ND
S-94	40' RT	149+00	3.3-8.0	A-2-7 (0)	56	33	77	5	1	17	94	25	18	9.4	ND

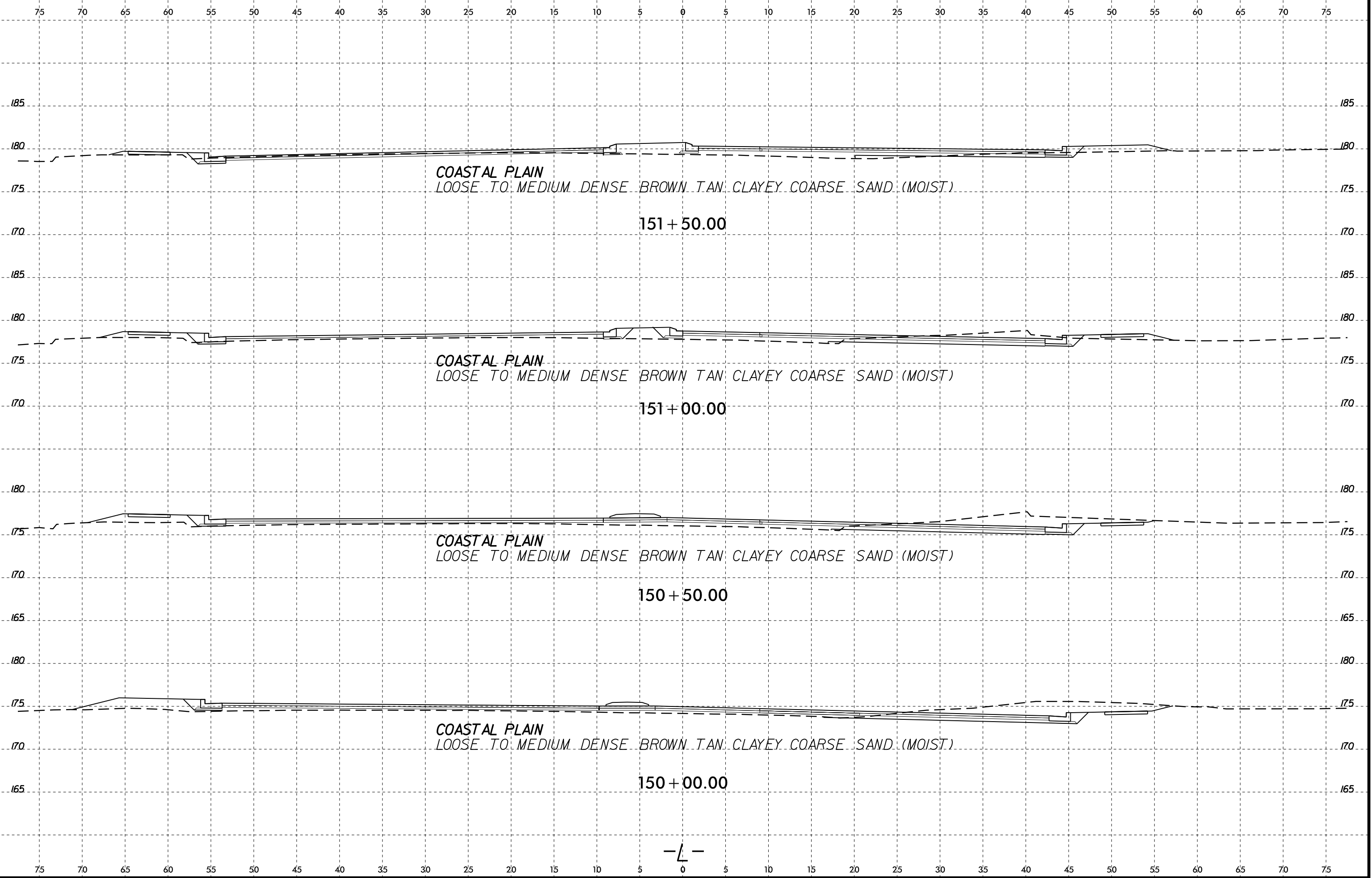
S-93
 S-94
 HA-31

BT

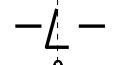
DRY 7/15

-L-

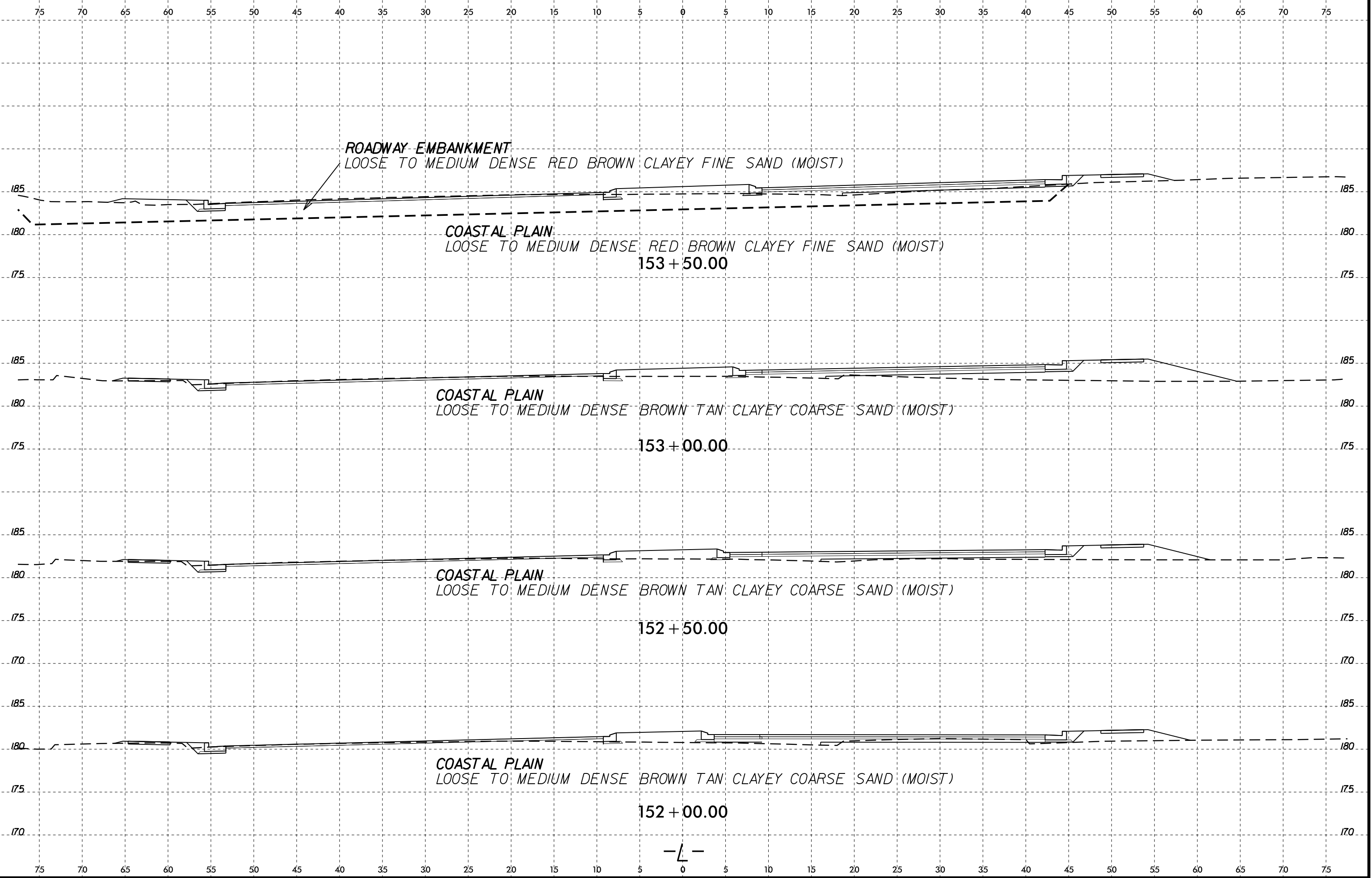
8/23/99



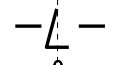
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BRettu AT BRA11-13500



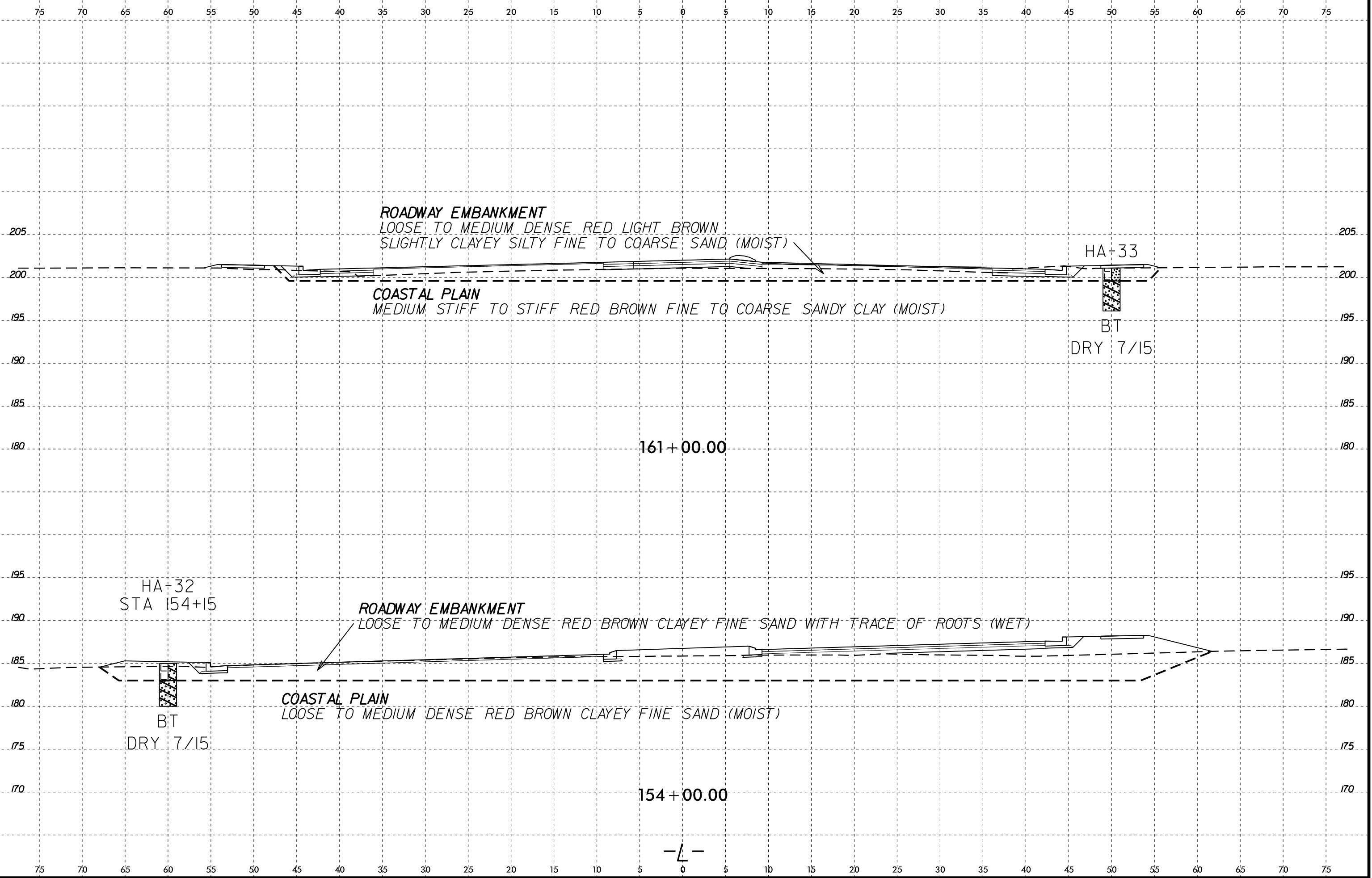
8/23/99



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BRett AT BRA11-13500



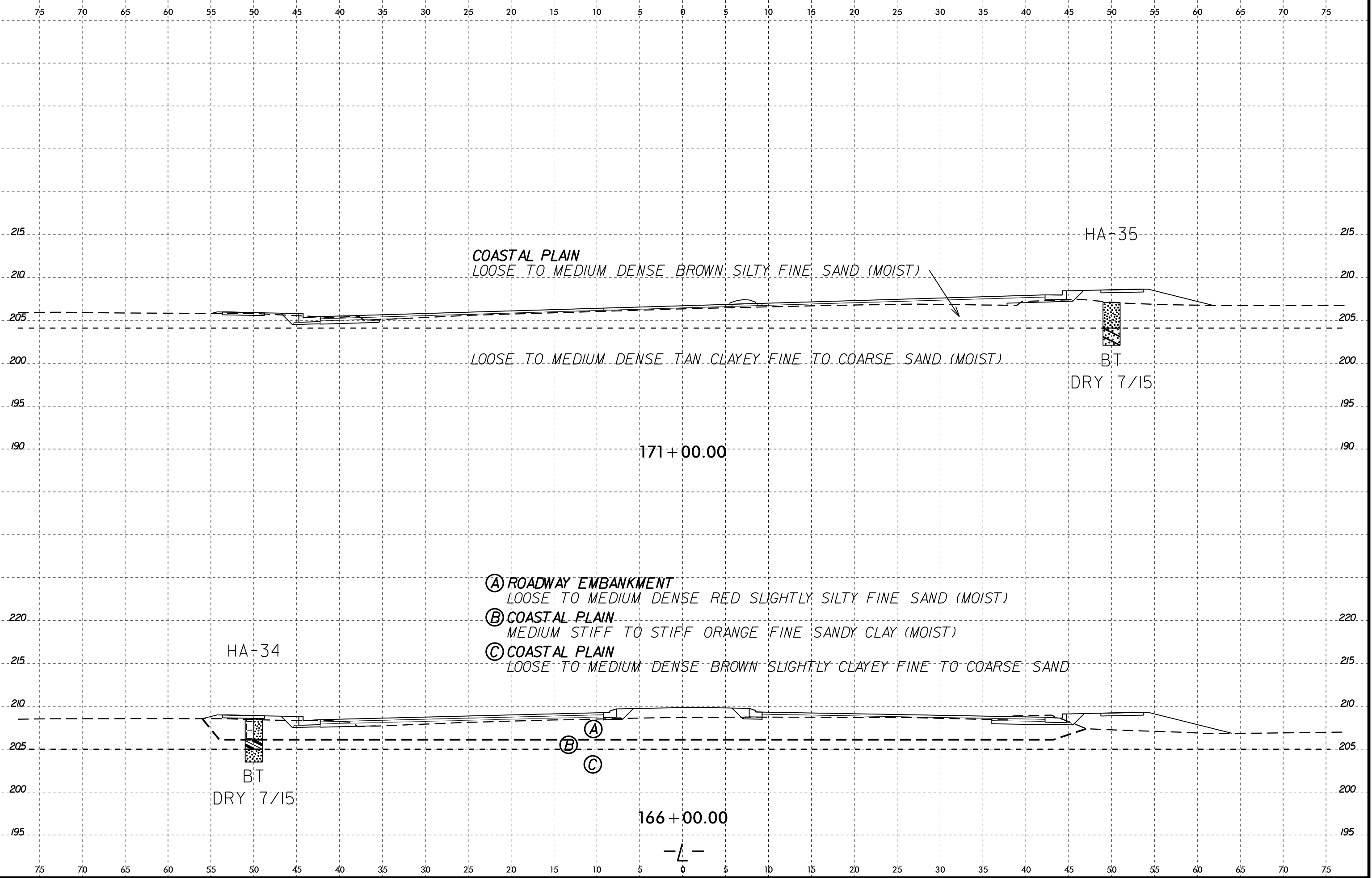
8/23/99



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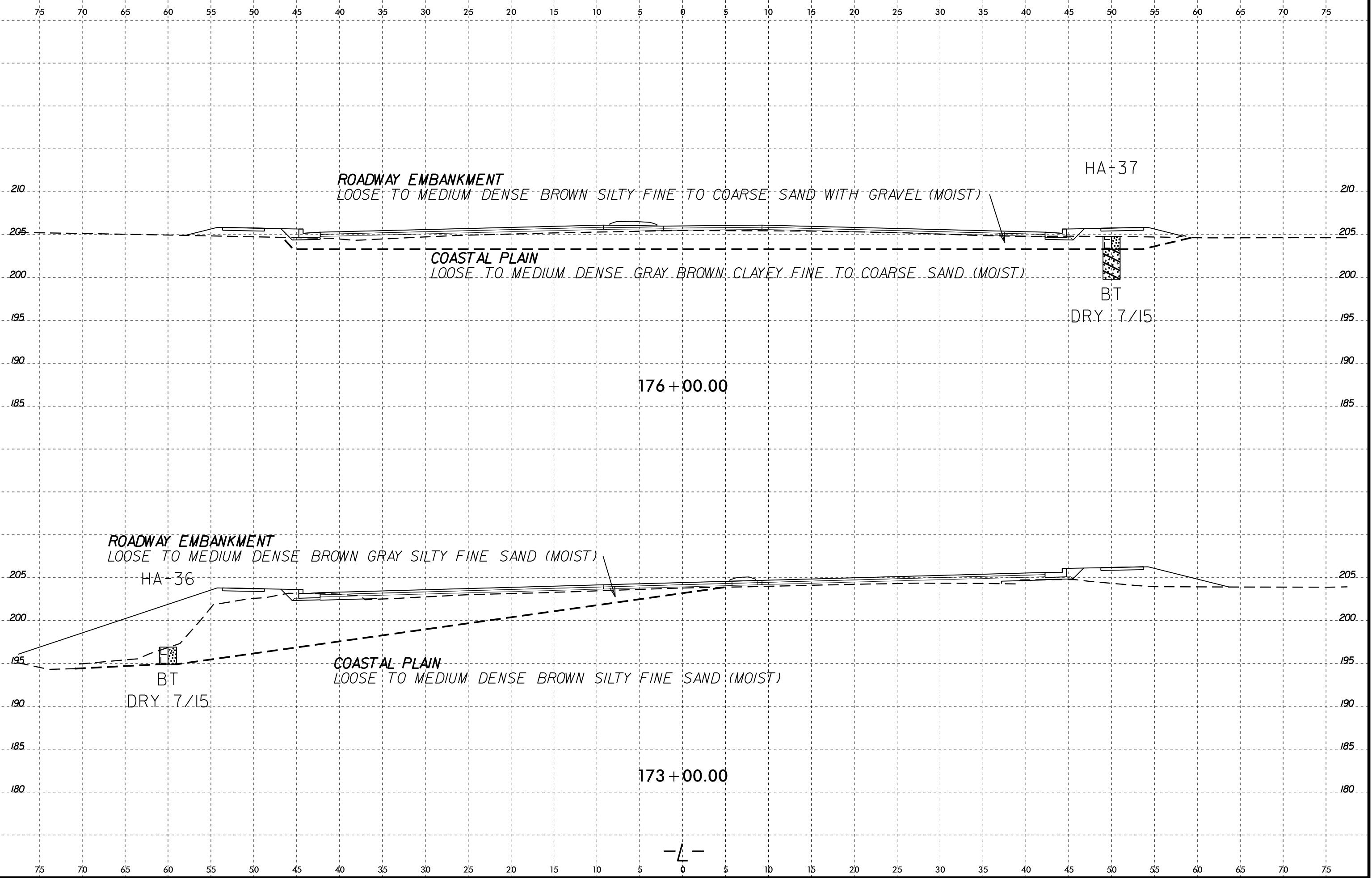
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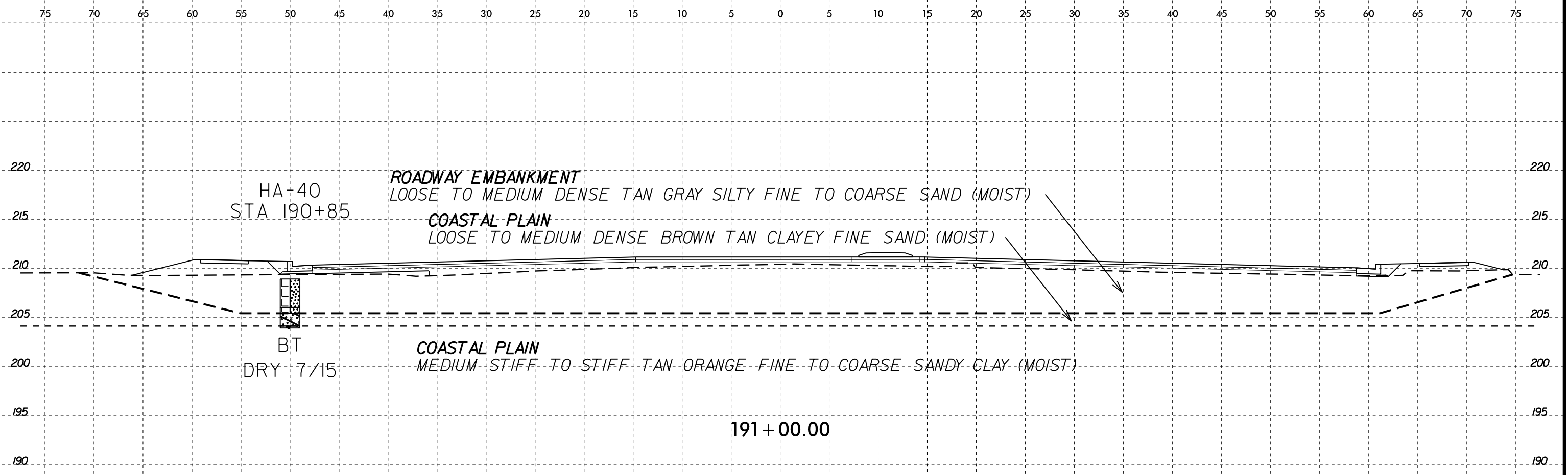
8/23/99



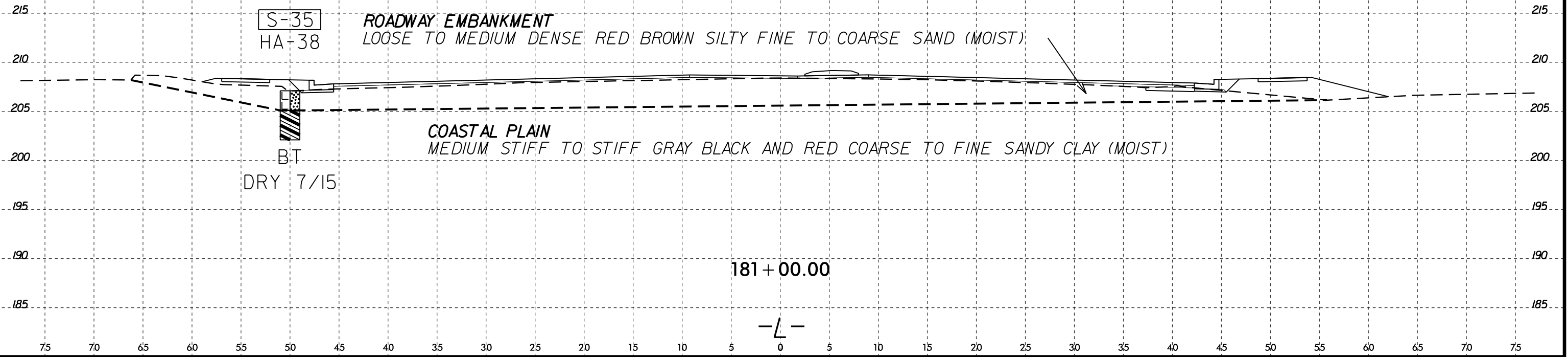
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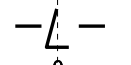
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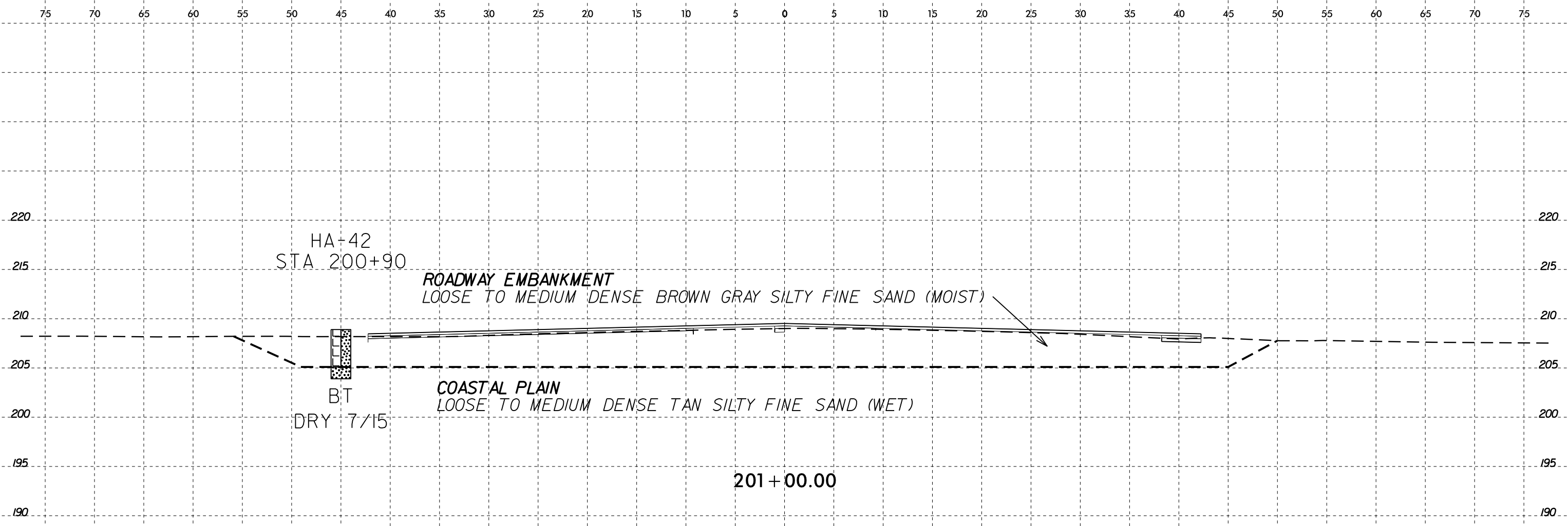


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-35	50' LT	181+00	0.0-2.0	A-2-4 (0)	23	6	51	30	2	17	96	66	20	13.5	ND



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BRettu AT BRA11-13500

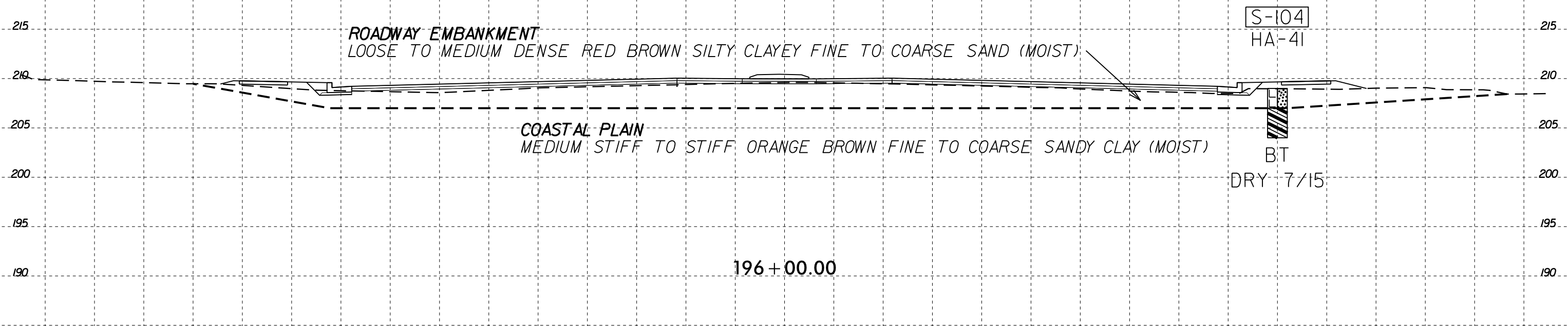




201+00.00

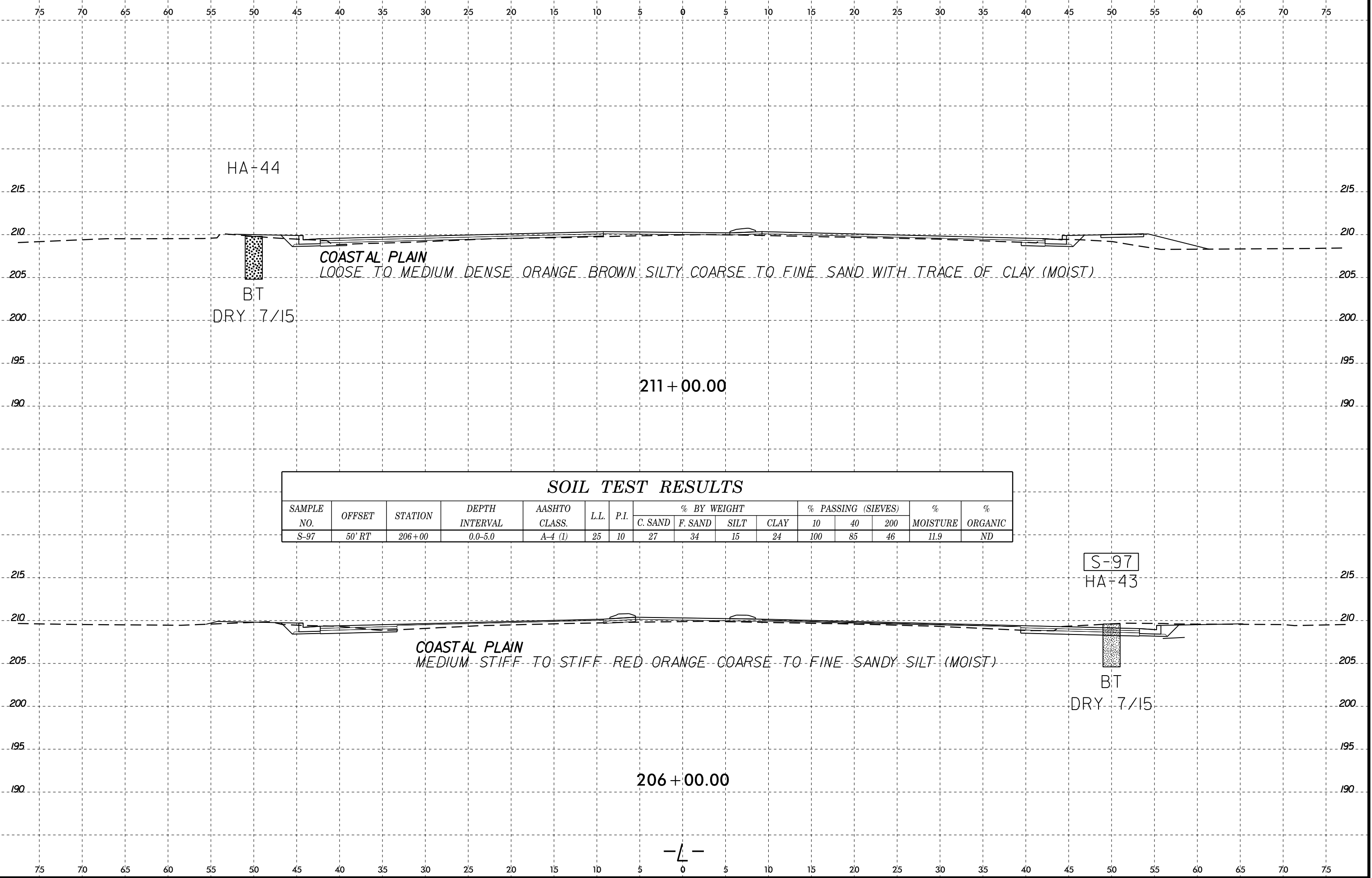
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-104	50' RT	196+00	0.0-2.0	A-2-4 (0)	25	7	45	34	3	18	98	71	23	10.9	ND



196+00.00

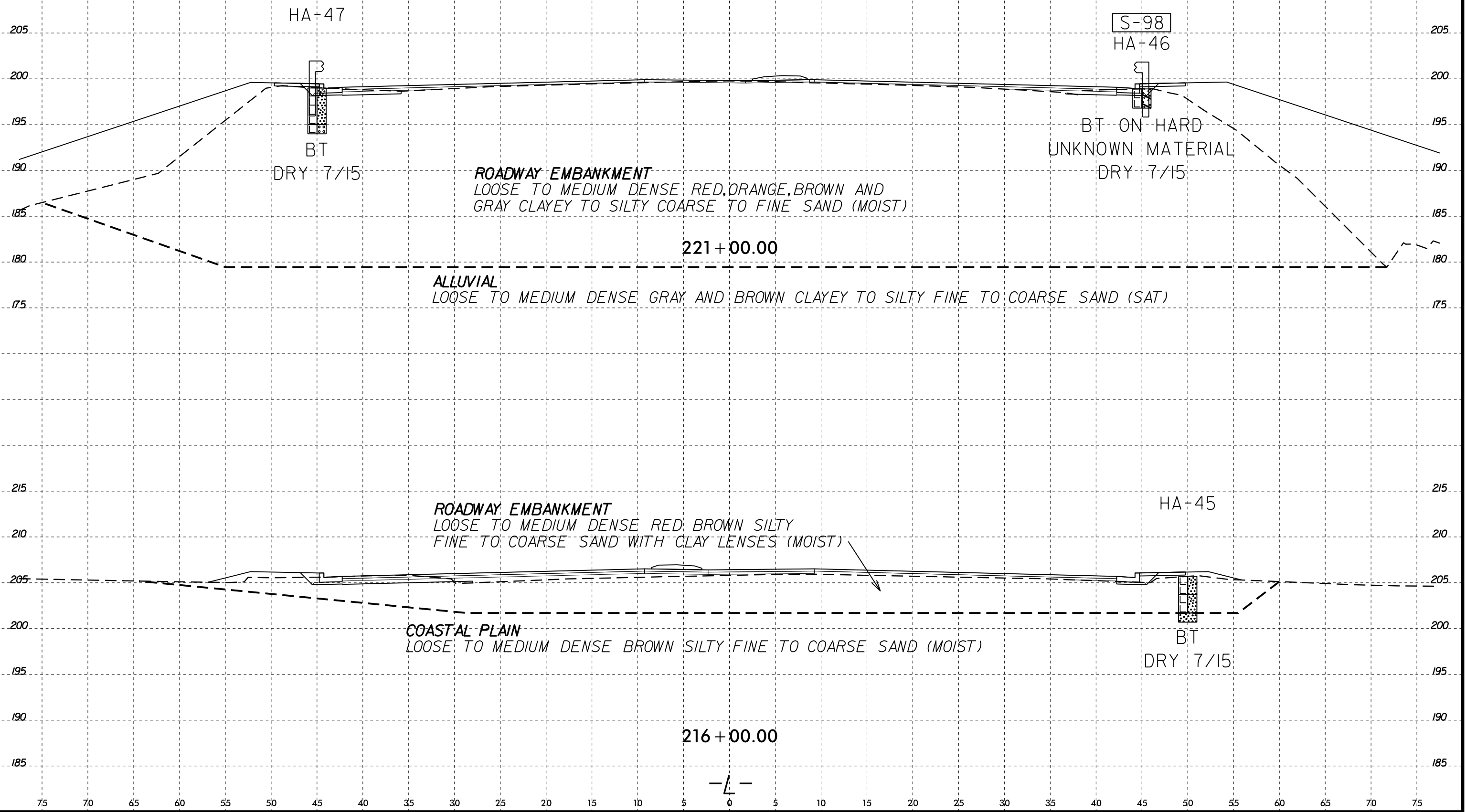
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-97	50' RT	206+00	0.0-5.0	A-4 (1)	25	10	27	34	15	24	100	85	46	11.9	ND

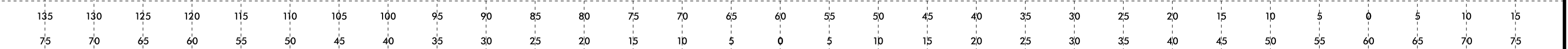
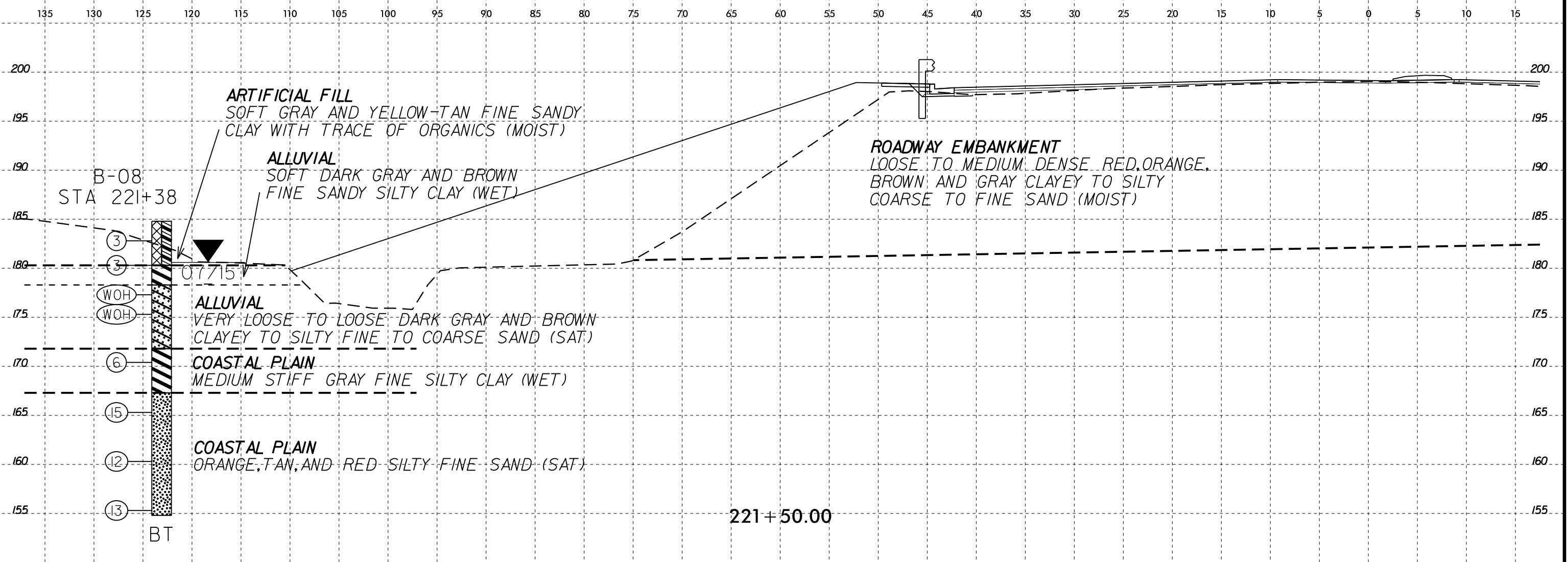
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-98	45' RT	221+00	0.0-2.1	A-2-6 (0)	27	12	38	31	6	25	86	66	30	9.6	ND

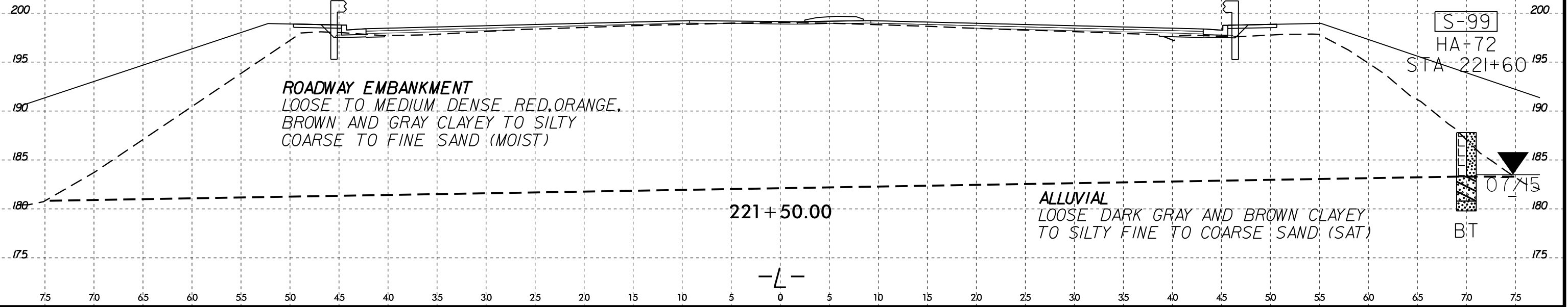


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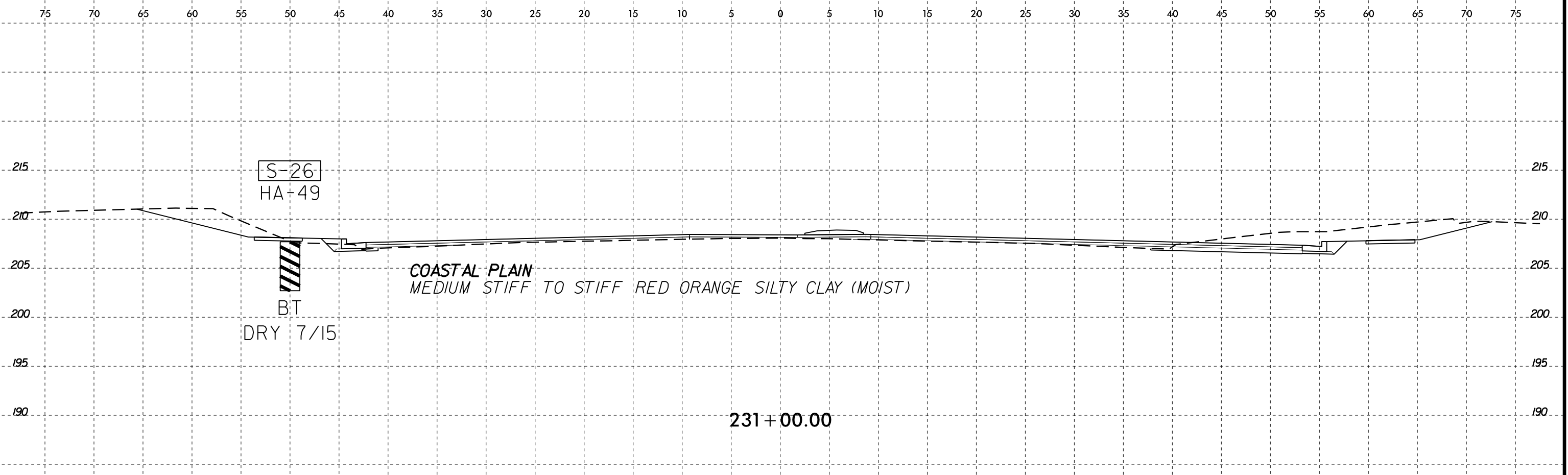
8/23/99



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-99	70' RT	221+60	0.0-4.5	A-2-4 (0)	21	2	43	38	5	14	95	70	21	14.8	ND

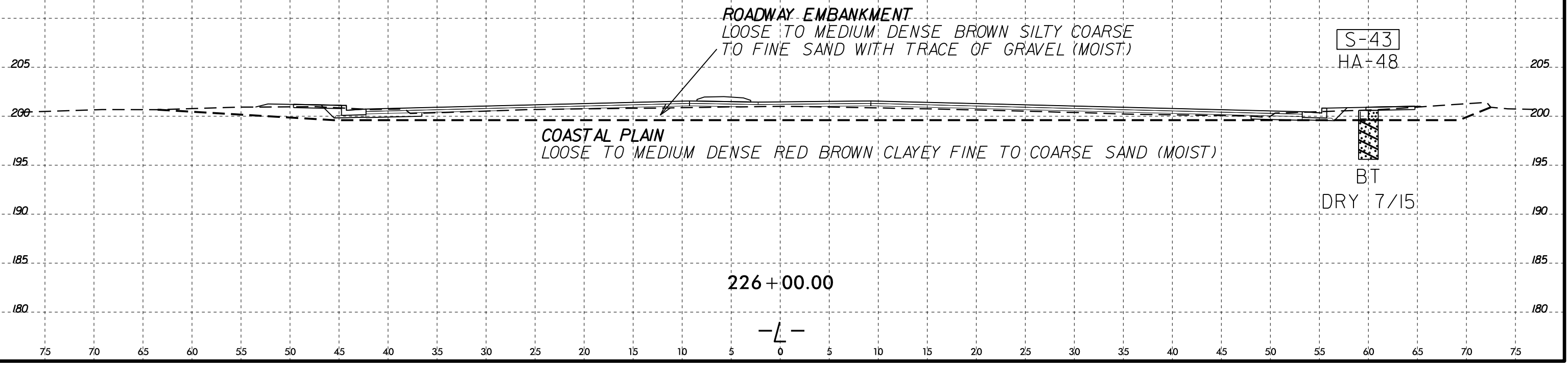


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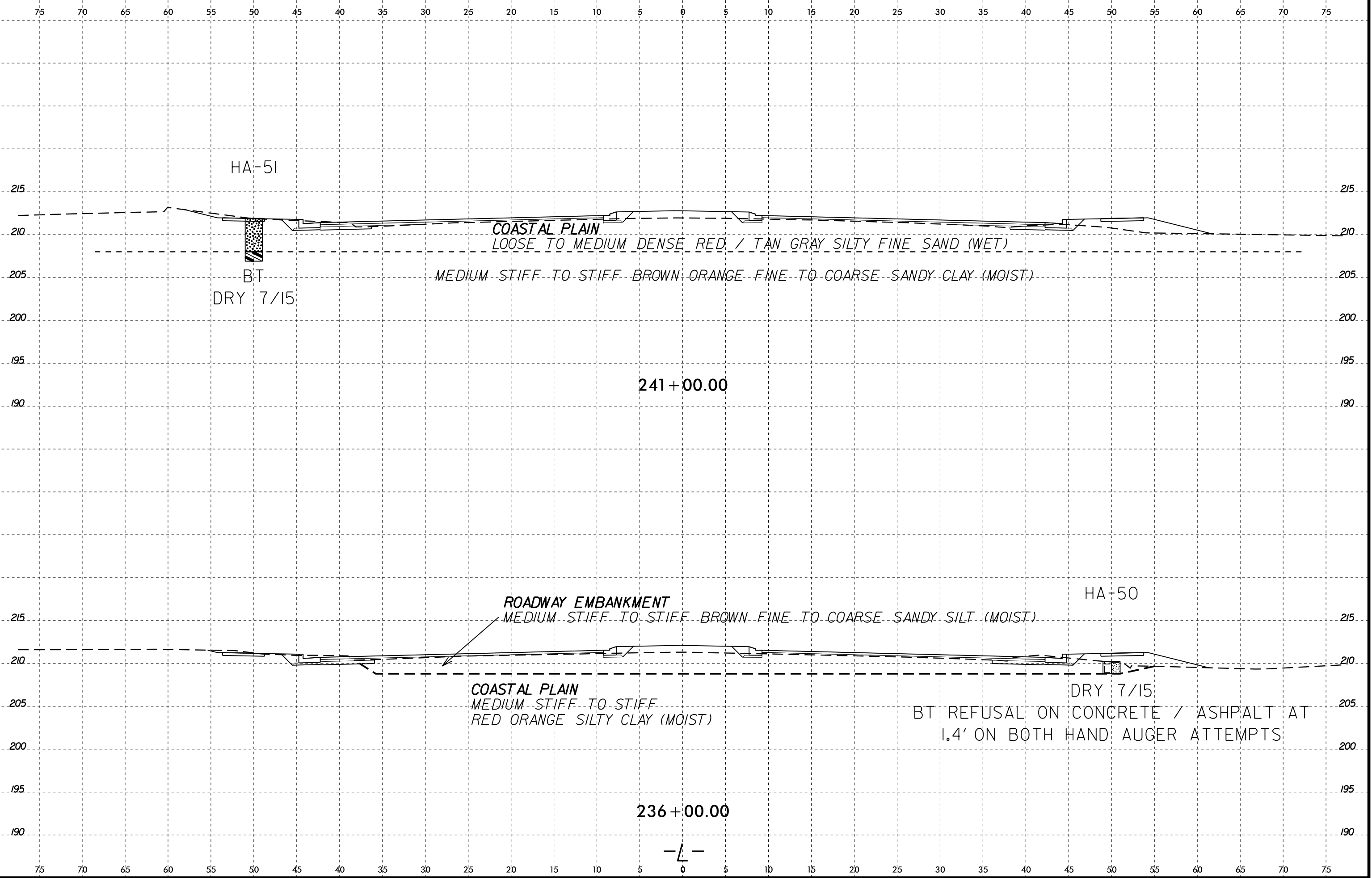
231+00.00

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-26	50' LT	231+00	0.0-5.0	A-7-6 (12)	48	29	24	28	11	37	100	86	54	19.1	ND
S-43	60' RT	226+00	0.3-1.0	A-2-4 (0)	18	2	34	41	9	16	98	81	29	9.3	ND



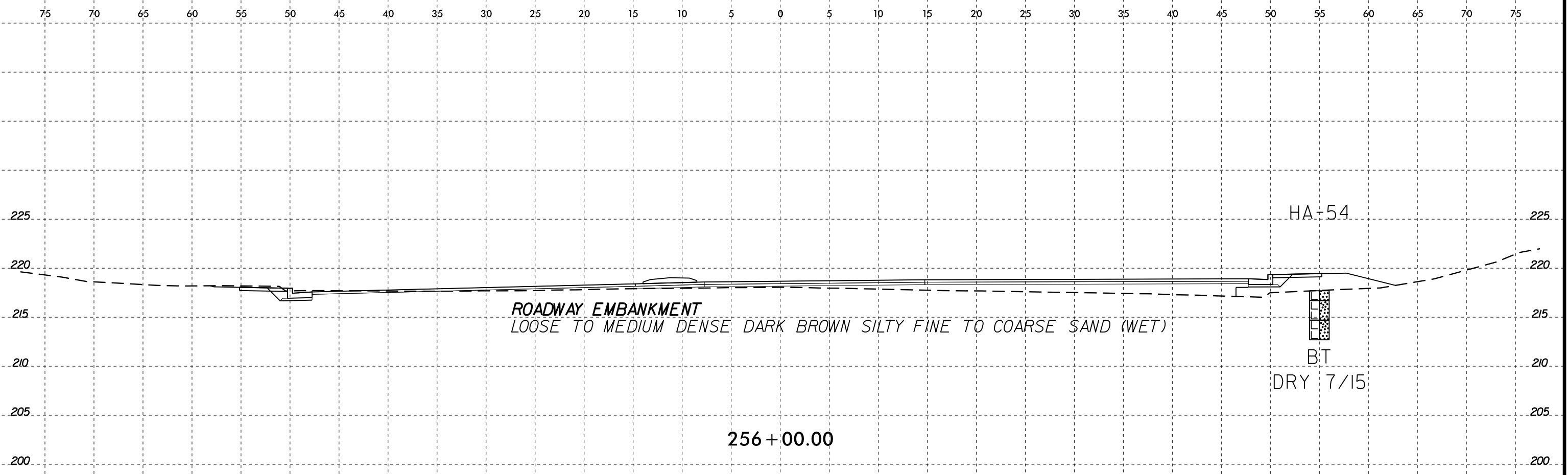
226+00.00

8/23/99

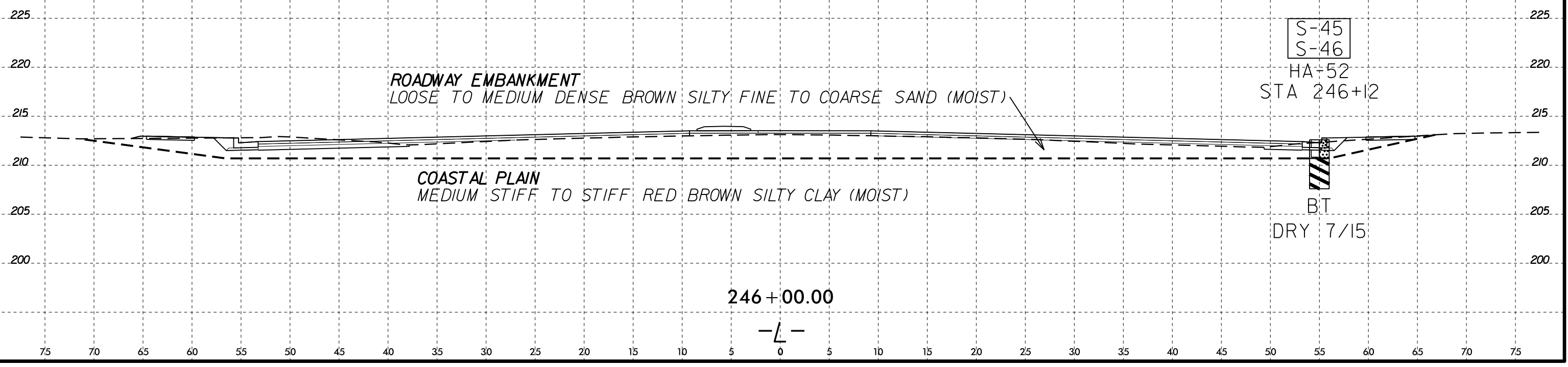


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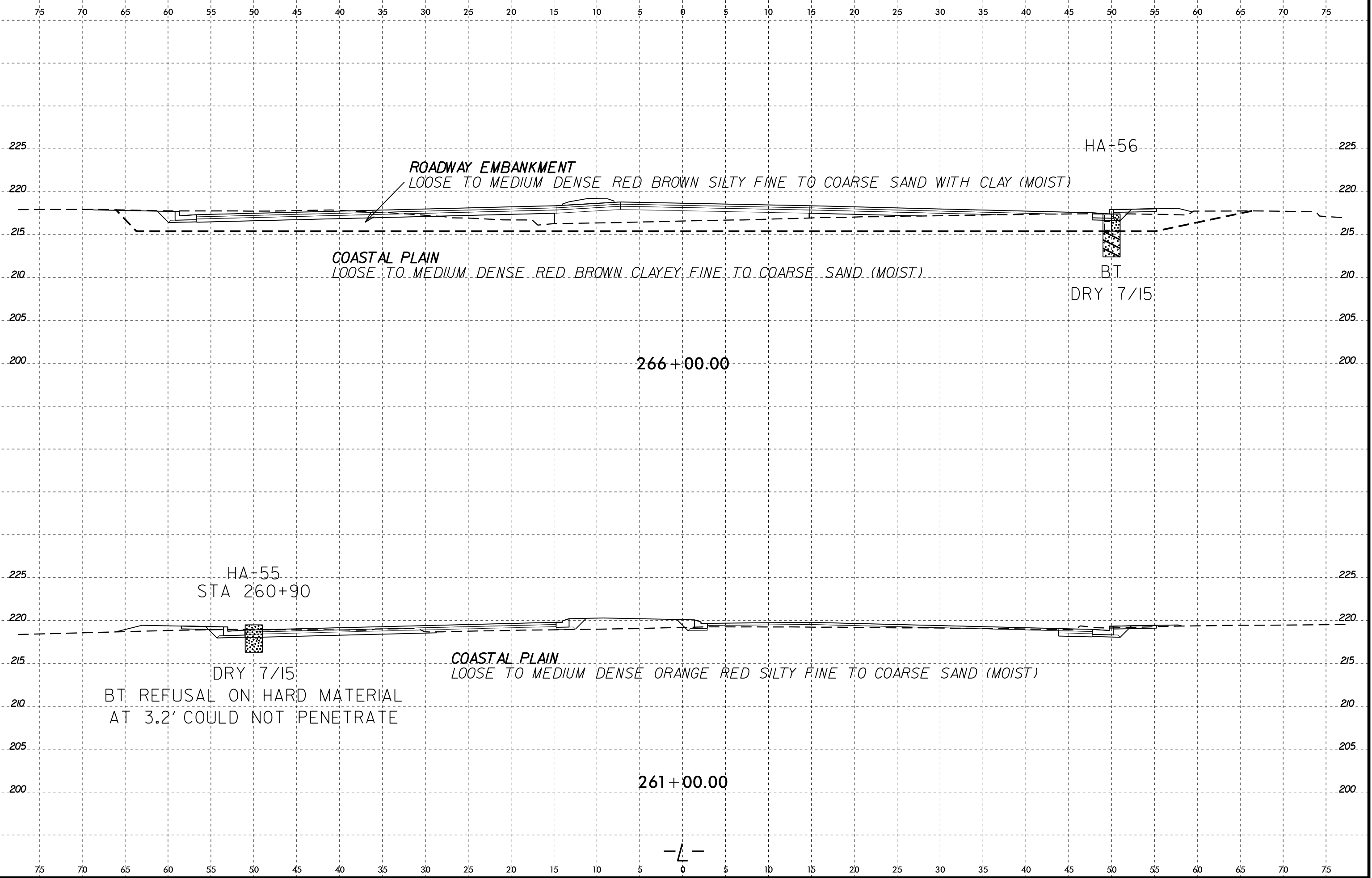


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-45	55' RT	246+12	0.0-1.9	A-2-4 (0)	27	10	36	31	8	25	95	75	35	9.2	ND
S-46	55' RT	246+12	1.9-5.0	A-7-6 (10)	44	22	22	28	12	38	100	89	56	18.3	ND



-L-

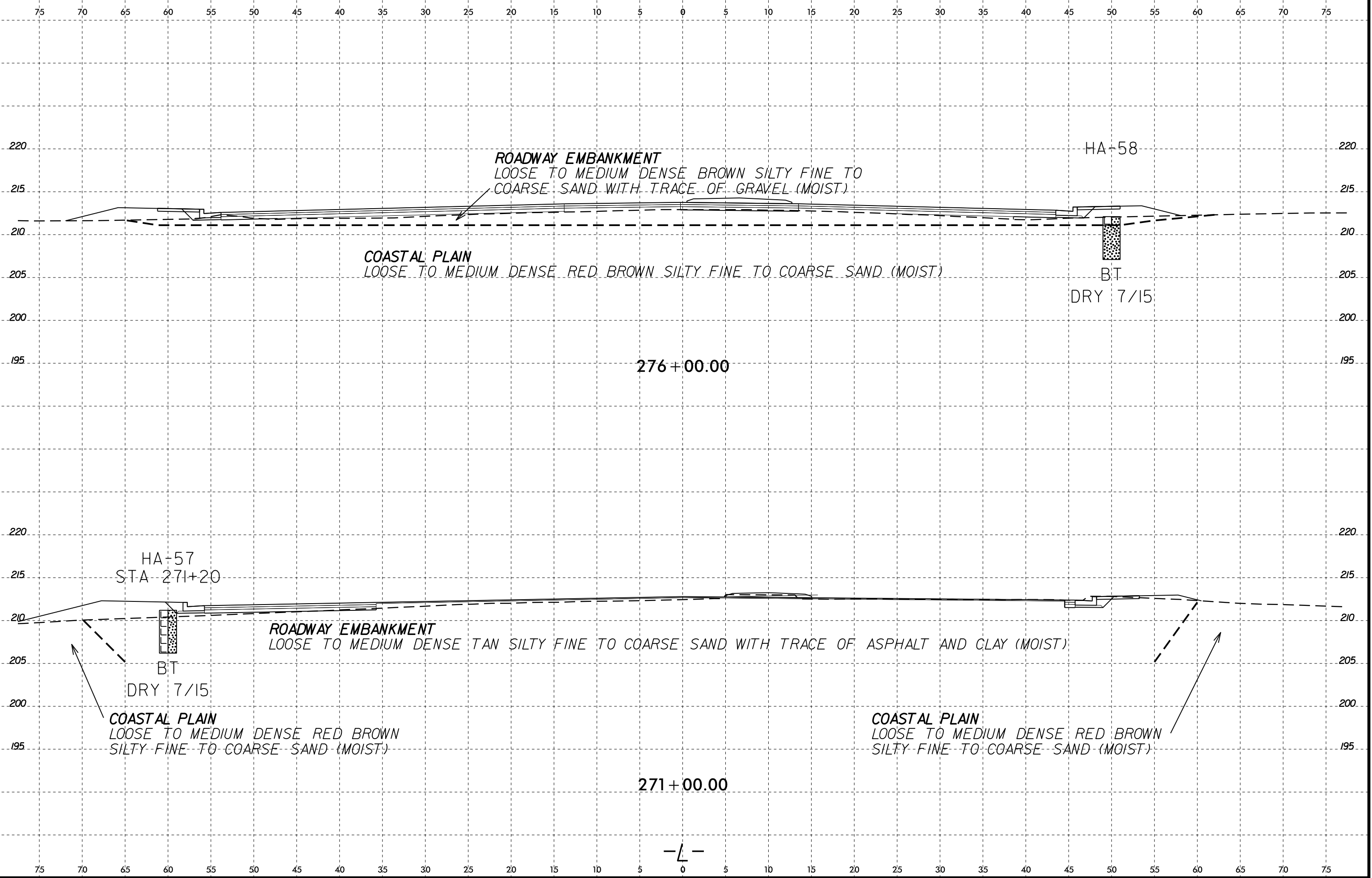
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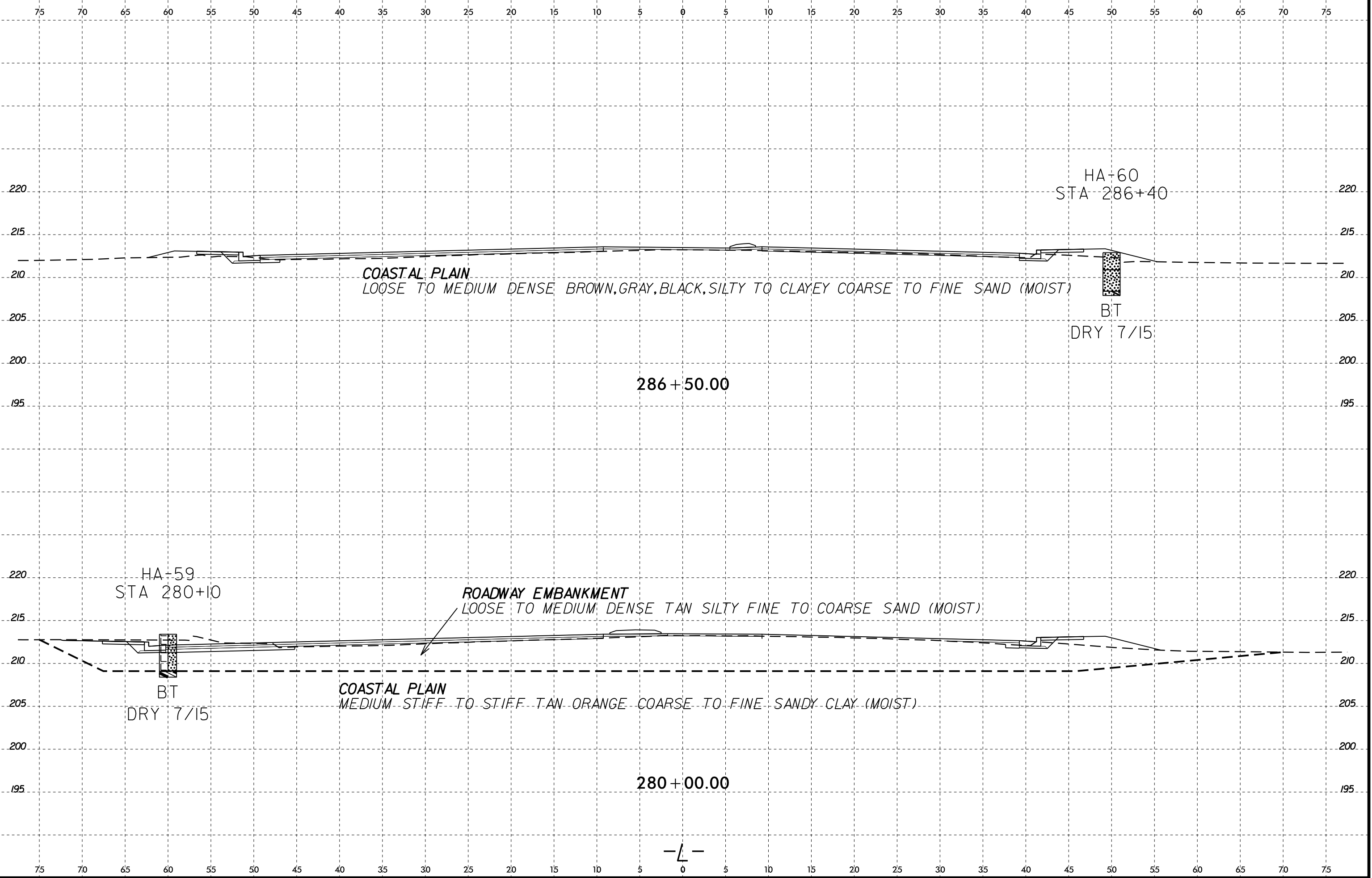
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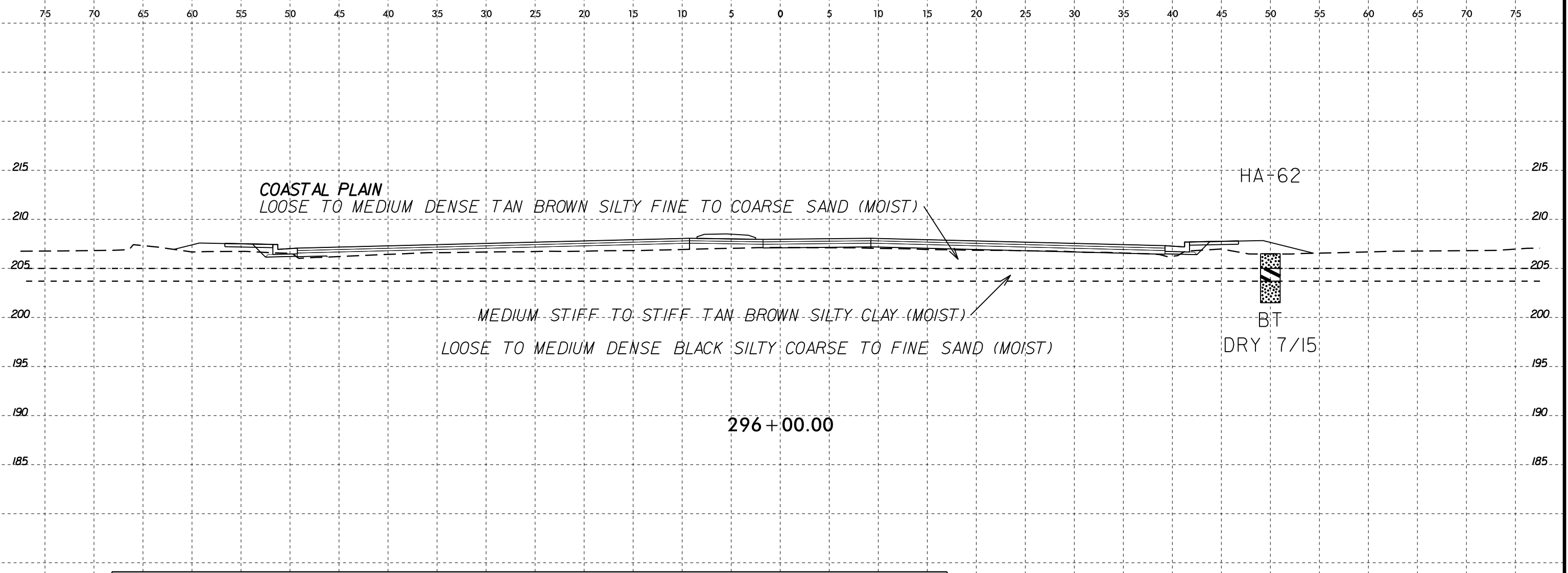
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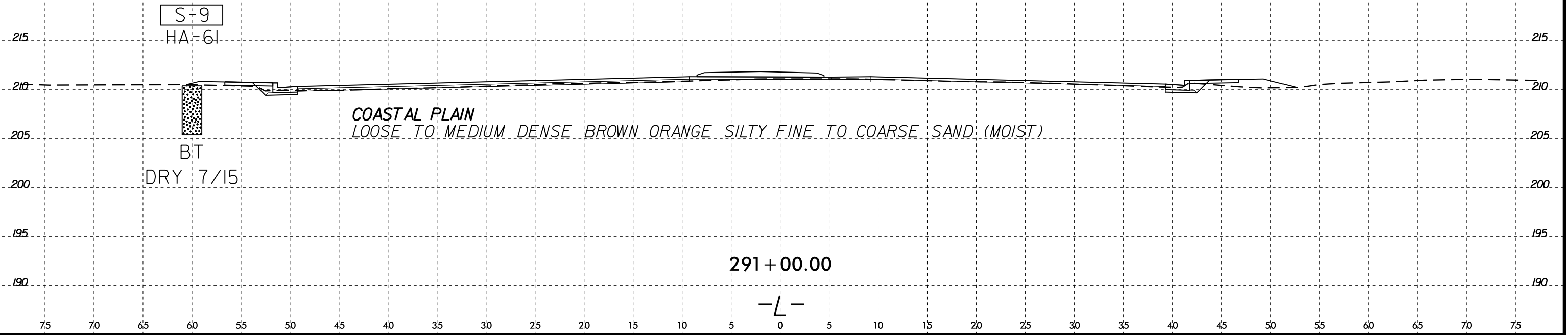
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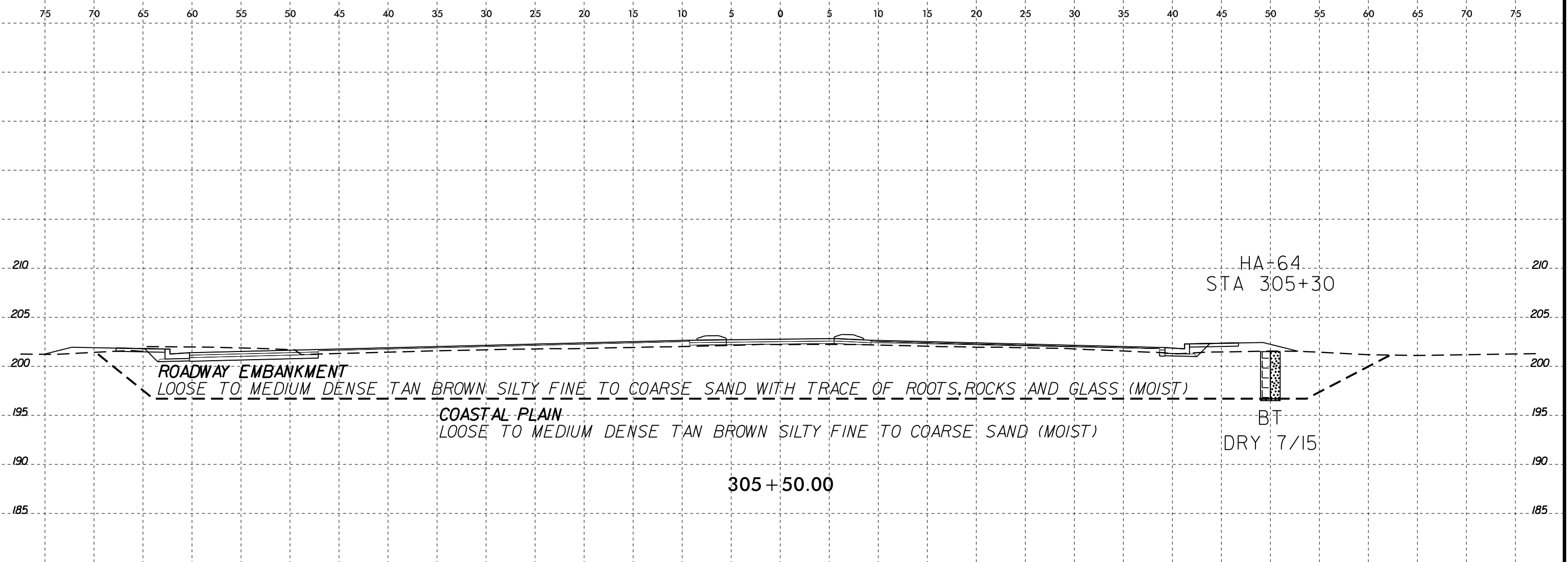
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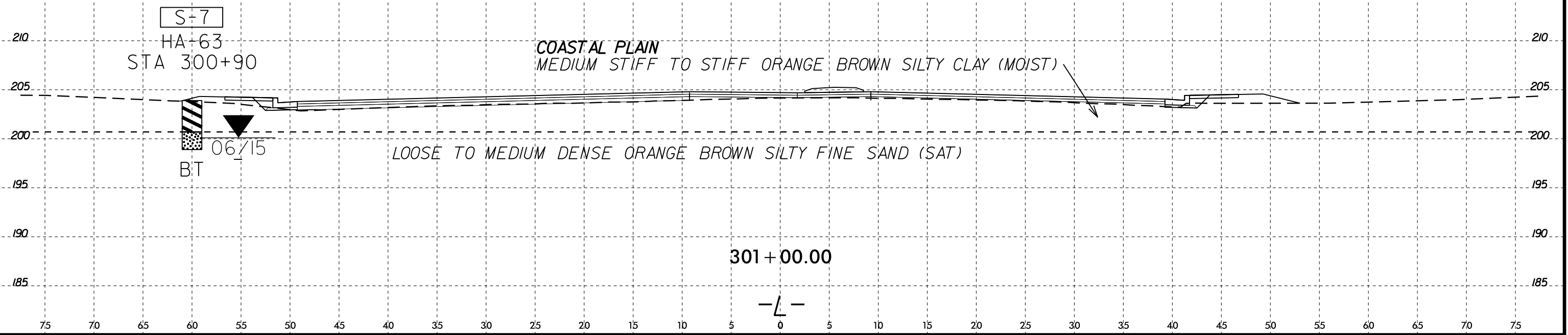


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-9	60' LT	291+00	0.0-5.0	A-2-4 (0)	17	3	38	35	10	17	98	76	32	12.8	ND

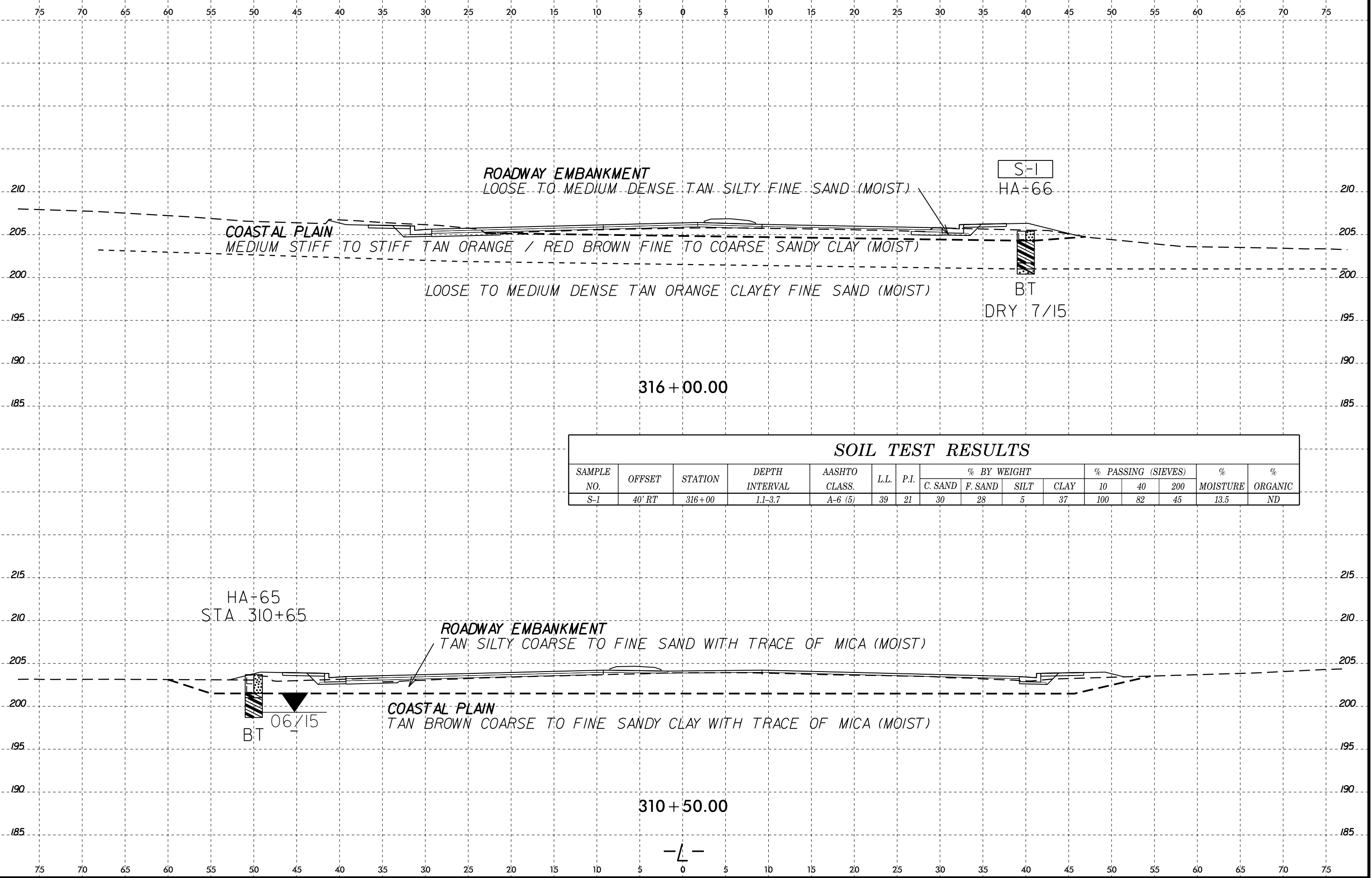




SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-7	60' LT	300+90	0.0-3.2	A-7-6 (7)	45	23	29	25	7	39	97	81	48	23.9	ND



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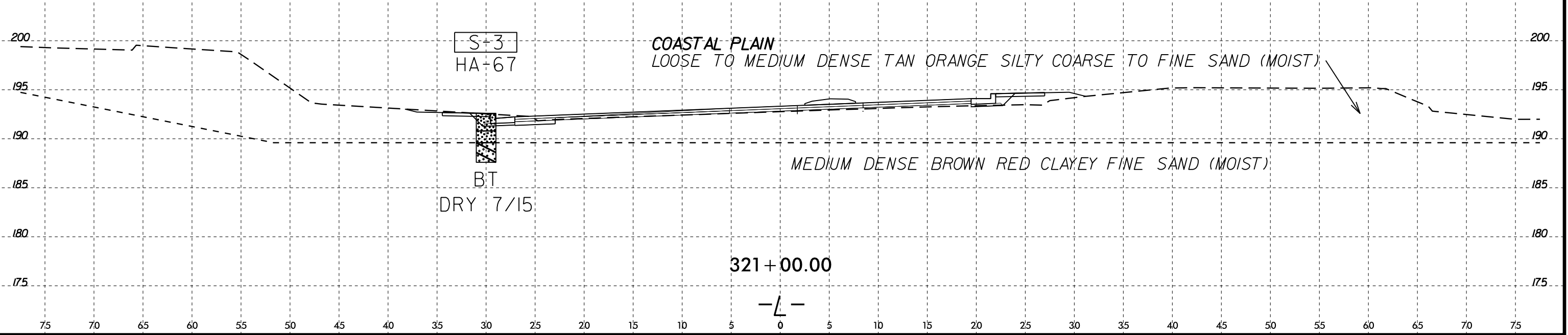


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-1	40' RT	316+00	1.1-3.7	A-6 (5)	39	21	30	28	5	37	100	82	45	13.5	ND

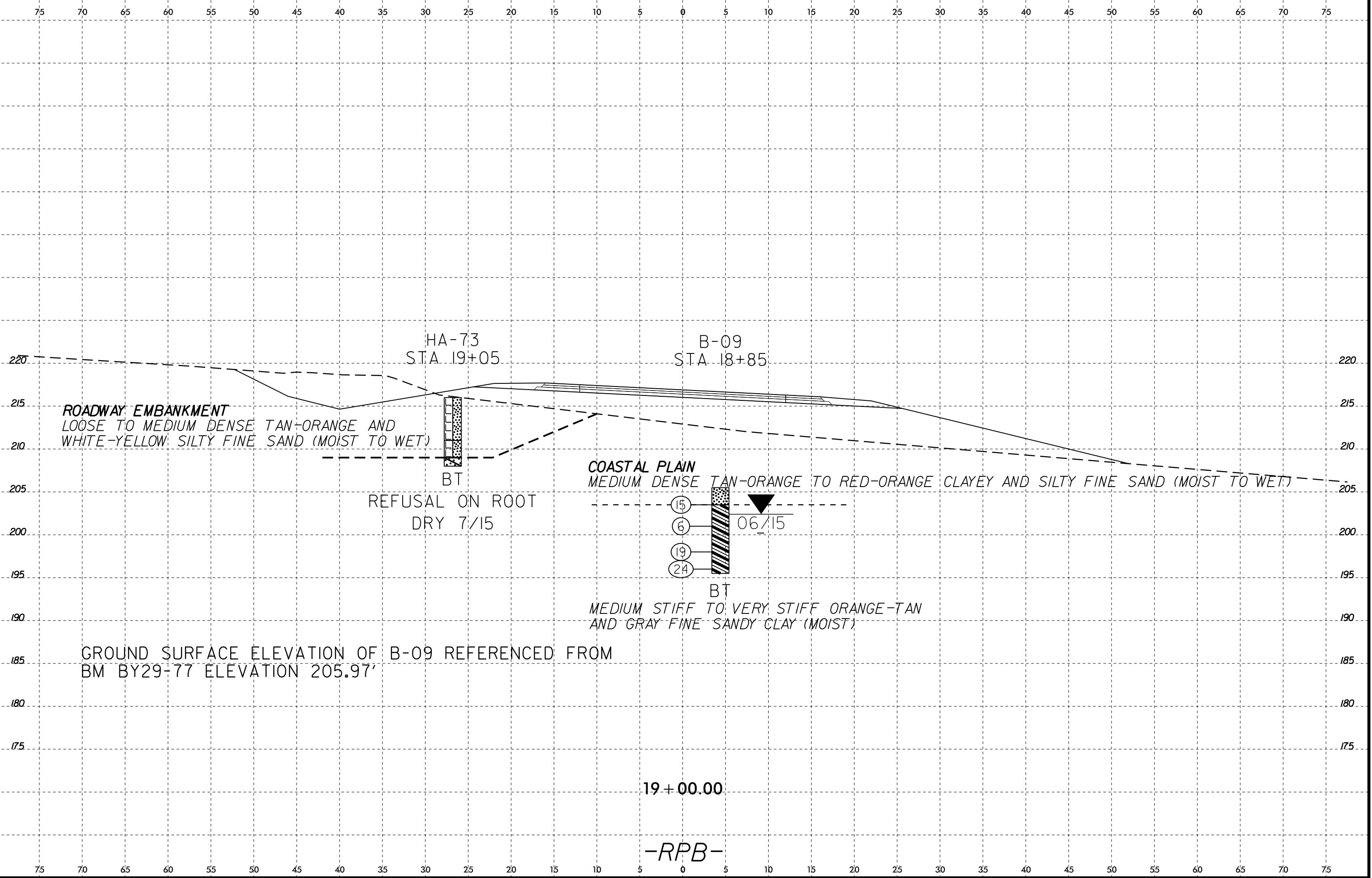
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-3	30' LT	321+00	0.0-1.8	A-2-4 (0)	23	7	25	50	5	20	100	87	28	10.9	ND

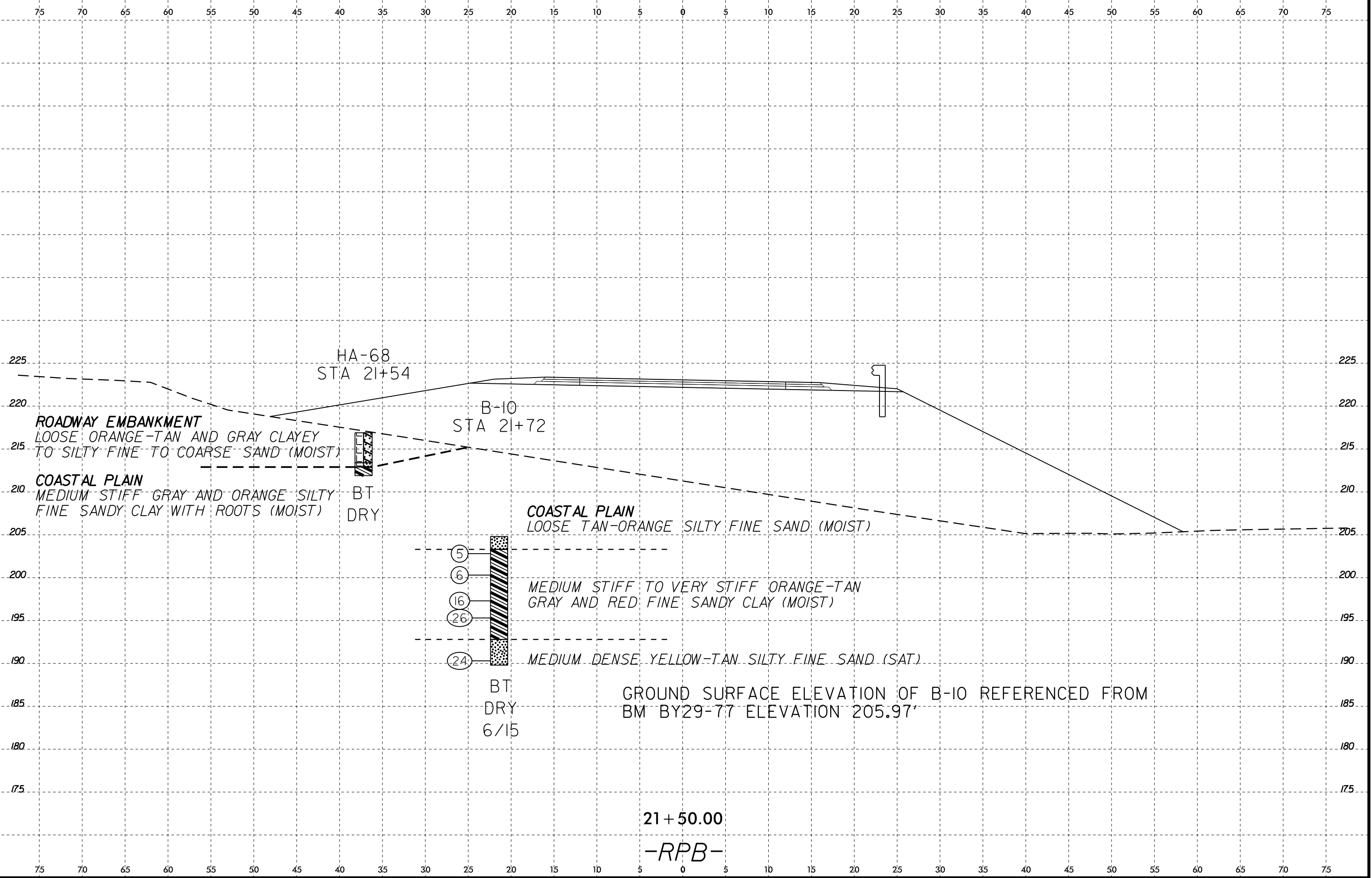


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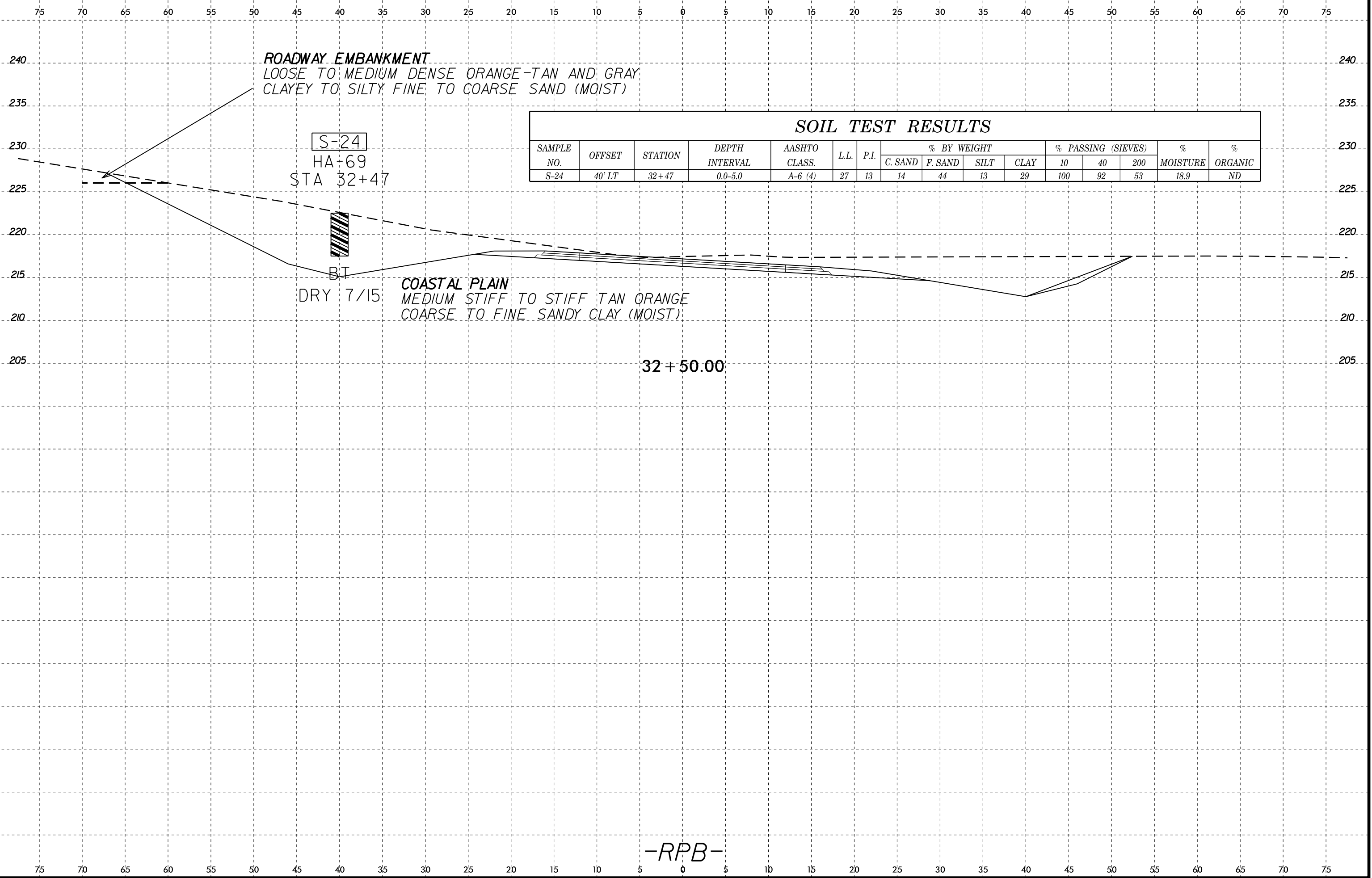
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BRettu AT BRA11-13508

21 + 50.00
-RPB-



ROADWAY EMBANKMENT
 LOOSE TO MEDIUM DENSE ORANGE-TAN AND GRAY
 CLAYEY TO SILTY FINE TO COARSE SAND (MOIST)

S-24
 HA-69
 STA 32+47

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-24	40' LT	32+47	0.0-5.0	A-6 (4)	27	13	14	44	13	29	100	92	53	18.9	ND

BT
 DRY 7/15
COASTAL PLAIN
 MEDIUM STIFF TO STIFF TAN ORANGE
 COARSE TO FINE SANDY CLAY (MOIST)

32 + 50.00

-RPB-