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REFERENCE: B-4491

PROJECT: 38389

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.	B-4491	1	30

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# ROADWAY SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND  
PROJECT DESCRIPTION BRIDGE NO. 22 OVER I-95  
BUSINESS 301 ON NC 59

## INVENTORY

**CAUTION NOTICE**

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

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

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

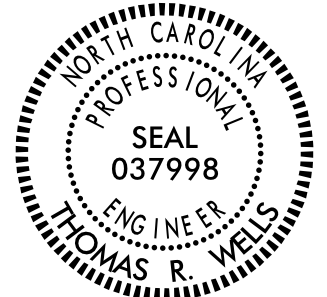
- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR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

PERSONNEL

R. TOOTHMAN  
W. TRAPP  
D. GOODNIGHT  
Z. HIGGINS

INVESTIGATED BY T. WELLS  
DRAWN BY T. WELLS  
CHECKED BY X. BARRETT  
SUBMITTED BY KLEINFELDER SE  
DATE OCTOBER 2015

NORTH CAROLINA FIRM LICENSE NO. F-1143



DocuSigned by:  
Thomas R. Wells 11/2/2015  
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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									
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - 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. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b>										<b>WEATHERED ROCK (WR)</b>										<b>CRYSTALLINE ROCK (CR)</b>									
<p>GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (&gt; 35% PASSING #200) ORGANIC MATERIALS</p>										<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</b></p>										<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p>										<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>									
<b>MINERALOGICAL COMPOSITION</b>										<b>COMPRESSION</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>									
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>										<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>									
<b>PERCENTAGE OF MATERIAL</b>										<b>GROUND WATER</b>										<b>WEATHERING</b>										<b>MISCELLANEOUS SYMBOLS</b>									
<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p> <p>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%</p> <p>LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%</p> <p>MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%</p> <p>HIGHLY ORGANIC &gt; 10% &gt; 20% HIGHLY 35% AND ABOVE</p>										<p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽ STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) 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.</p> <p>SLIGHT (SL.) 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.</p> <p>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.</p> <p>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></p> <p>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 &gt; 100 BPF</i></p> <p>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 &lt; 100 BPF</i></p> <p>COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. FABRIC MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p>									
<b>TEXTURE OR GRAIN SIZE</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>ROCK HARDNESS</b>										<b>ABBREVIATIONS</b>									
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270</p> <p>4.76 2.00 0.42 0.25 0.075 0.053</p>										<p>UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p> <p>SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>SOFT CAN BE GROOVED 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.</p> <p>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 FINGER NAIL.</p>										<p>AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST</p> <p>BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED</p> <p>CL. - CLAY MOD. - MODERATELY U - UNIT WEIGHT</p> <p>CPT - CLAY PENETRATION TEST NP - NON PLASTIC D - DRY UNIT WEIGHT</p> <p>CSE. - COARSE ORG. - ORGANIC PMT - PRESSUREMETER TEST</p> <p>DMT - DILATOMETER TEST SAP. - SAPROLITIC S - BULK</p> <p>DPT - DYNAMIC PENETRATION TEST SD. - SAND, SANDY SS - SPLIT SPOON</p> <p>e - VOID RATIO SL. - SILTY, SILTY ST - SHELBY TUBE</p> <p>F - FINE SLI. - SLIGHTLY RS - ROCK</p> <p>FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL</p> <p>FRAC. - FRACTURED, FRACTURES w - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO</p> <p>FRAGS. - FRAGMENTS V - VERY</p> <p>HI. - HIGHLY</p>									
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>FRACTURE SPACING</b>										<b>BEDDING</b>									
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</p> <p>PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</p> <p>OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE</p> <p>SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>										<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> MOBILE B-57</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input checked="" type="checkbox"/> TRICONE 2-1/8" TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>										<p>TERM SPACING MORE THAN 10 FEET 3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FOOT LESS THAN 0.16 FEET</p>										<p>TERM THICKNESS 4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET 0.03 - 0.16 FEET 0.008 - 0.03 FEET &lt; 0.008 FEET</p>									
<b>PLASTICITY</b>										<b>INDURATION</b>										<b>FRAC. SPACING</b>										<b>BEDDING</b>									
<p>NON PLASTIC 0-5 VERY LOW</p> <p>SLIGHTLY PLASTIC 6-15 SLIGHT</p> <p>MODERATELY PLASTIC 16-25 MEDIUM</p> <p>HIGHLY PLASTIC 26 OR MORE HIGH</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>VERY WIDE MORE THAN 10 FEET</p> <p>WIDE 3 TO 10 FEET</p> <p>MODERATELY CLOSE 1 TO 3 FEET</p> <p>CLOSE 0.16 TO 1 FOOT</p> <p>VERY CLOSE LESS THAN 0.16 FEET</p>										<p>VERY THICKLY BEDDED 4 FEET</p> <p>THICKLY BEDDED 1.5 - 4 FEET</p> <p>THINLY BEDDED 0.16 - 1.5 FEET</p> <p>VERY THINLY BEDDED 0.03 - 0.16 FEET</p> <p>THICKLY LAMINATED 0.008 - 0.03 FEET</p> <p>THINLY LAMINATED &lt; 0.008 FEET</p>									
<b>COLOR</b>										<b>REMARKS</b>										<b>FRAC. SPACING</b>										<b>BEDDING</b>									
<p>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.</p>										<p>BENCH MARK: BY-18, STA. 36+32.81 -BY- (434,917 FT N, 2,020,718 FT E)</p> <p style="text-align: right;">ELEVATION: 163.89 FEET</p>										<p>FRAC. SPACING</p>										<p>BEDDING</p>									
<b>NOTES</b>										<b>REMARKS</b>										<b>FRAC. SPACING</b>										<b>BEDDING</b>									
<p>FIAD: FILLED IN IMMEDIATELY AFTER DRILLING</p> <p>ROADWAY BORING ELEVATIONS OBTAINED USING THE B4491.LS.TIN.TIN FILE DATED JULY 24, 2015</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>FRAC. SPACING</p>										<p>BEDDING</p>									

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**TIP PROJECT: B-4491**

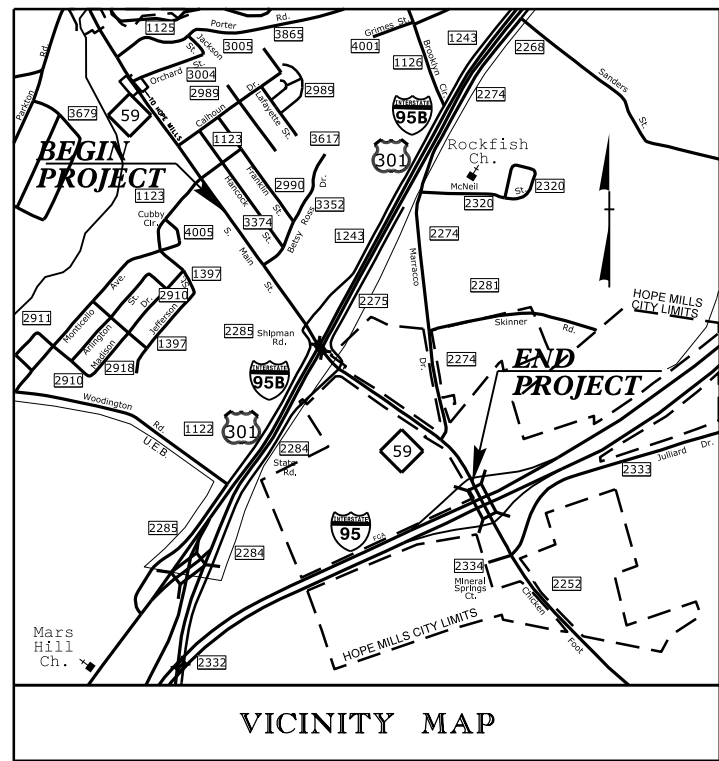
**CONTRACT:**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

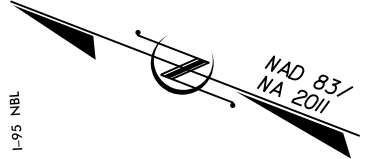
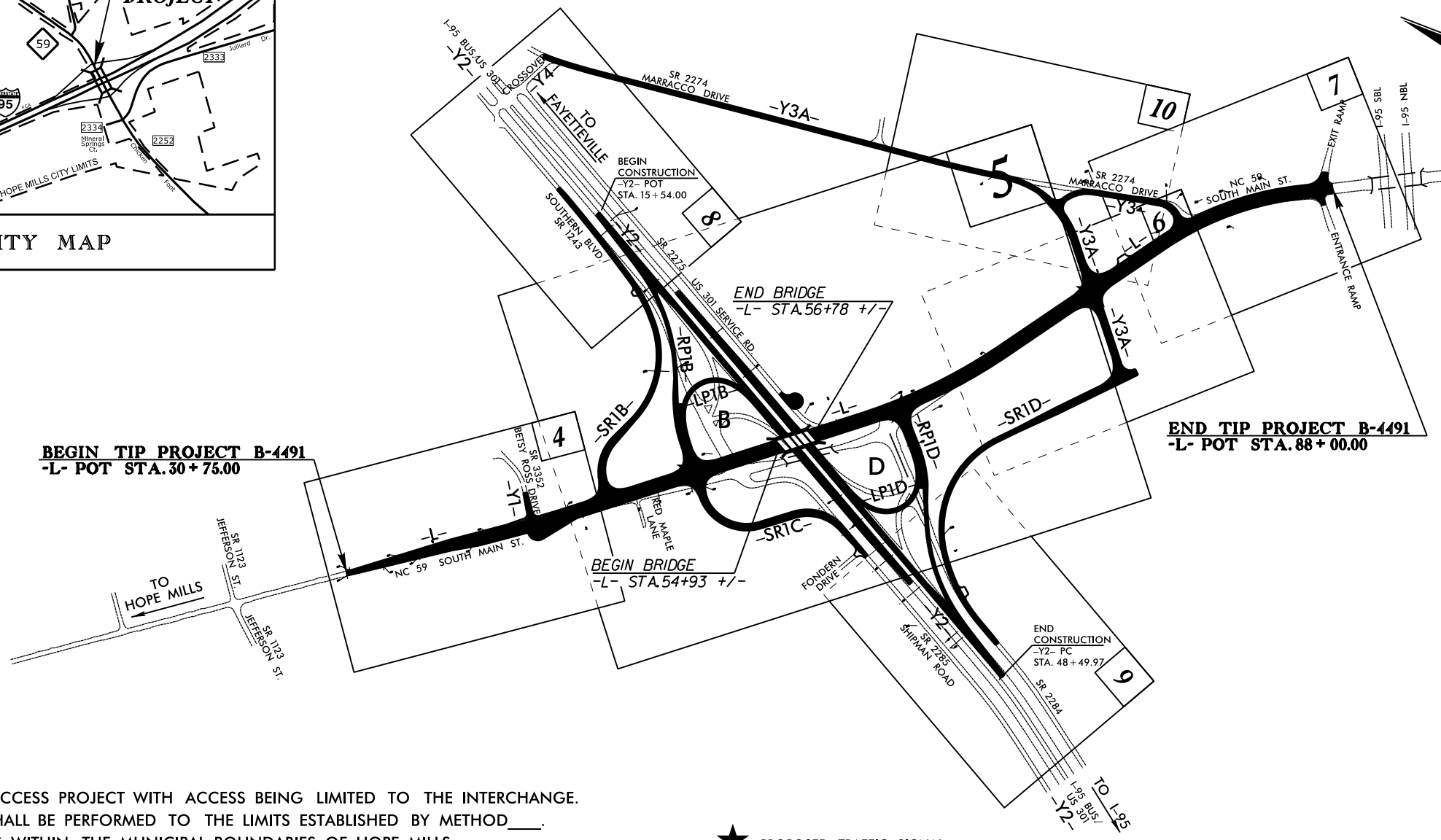
**CUMBERLAND COUNTY**

**LOCATION: BRIDGE NO. 22 OVER I-95 BUSINESS /US 301 ON NC 59**  
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE, SIGNING AND SIGNALS.**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4491	3	30
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38389.1.1	BRSTP-59(5)	PE	



VICINITY MAP

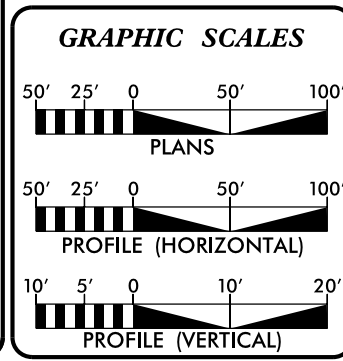


NOTE: THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO THE INTERCHANGE. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_\_. A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF HOPE MILLS.

★ PROPOSED TRAFFIC SIGNAL

**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION



**DESIGN DATA**

ADT 2017 =	20,990
ADT 2037 =	32,900
K =	9 %
D =	55 %
T =	9 % *
V =	50 MPH
FUNC. CLASS. =	COLLECTOR
* TTST 4 %	DUAL 5 %
REGIONAL TIER	

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-4491 =	1.049 MI. +/-
LENGTH STRUCTURE TIP PROJECT B-4491 =	0.035 MI. +/-
TOTAL LENGTH OF TIP PROJECT B-4491 =	1.084 MI.

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
1000 Birch Ridge Dr.  
Raleigh, NC 27610

2012 STANDARD SPECIFICATIONS

**RIGHT OF WAY DATE:**  
DECEMBER 18, 2015

**LETTING DATE:**  
DECEMBER 19, 2017

REKHA PATEL, P.E.  
PROJECT ENGINEER

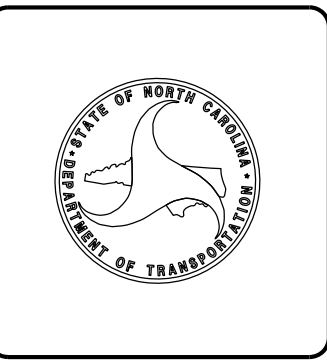
SAMUEL L. ST. CLAIR  
PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

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

**ROADWAY DESIGN ENGINEER**

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





October 12, 2015  
File No. 20151548.015A

STATE PROJECT: 38389.1.1 (B-4491)  
FEDERAL PROJECT: BRSTP-59 (5)  
COUNTY: Cumberland  
DESCRIPTION: Bridge No. 22 over I-95 Business/US 301 on NC 59

**SUBJECT: GEOTECHNICAL REPORT – INVENTORY - REVISED**

**PROJECT DESCRIPTION**

This project consists of the reconstruction of the interchange of NC 59 (-L-) and I-95/Business 301 (-Y2-). Also proposed is the replacement of the bridge and the reconstruction of the Betsy Ross Drive (-Y1-), Marraco Drive (-Y3- and -Y3A-), ramps (-RP1B- and -RP1D-), loops (-LP1B- and -LP1D-), and service roads (-SR1B-, -SR1C-, -SR1D-).

The geotechnical investigation was conducted during March and August of 2015. Standard Penetration Test borings were advanced with a Mobile B-57 with automatic hammer. Hand auger borings were also completed. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by Kleinfelder Southeast, Inc.

The following alignments, totaling 0.99 miles, were investigated. Subsurface profiles and cross sections of these alignments are included in this report.

<u>LINE</u>	<u>STATIONS</u>
-L-	30+75 to 88+00
-Y1-	10+05 to 11+45
-Y2-	15+54 to 48+50
-Y3-	10+47 to 17+85
-Y3A-	37+55 to 52+55
-RP1B-	10+00 to 22+29
-LP1B-	10+00 to 18+69
-RP1D-	10+00 to 23+03
-LP1D-	10+00 to 19+40
-SR1B-	10+15 to 29+22
-SR1C-	10+36 to 21+82
-SR1D-	8+25 to 29+50

**AREAS OF SPECIAL GEOTECHNICAL INTEREST**

1) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	52+00 to 57+50	LT to RT
-L-	72+20 to 76+20	LT to RT

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	80+75 to 86+00	LT to RT
-RP1D-	10+00 to 19+00	LT to RT
-SR1B-	10+00 to 19+00	LT to RT
-SR1C-	11+00 to 13+20	LT to RT

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

2) Artificial Fill: Artificial fill was encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	75+20 to 79+20	LT
-Y3-	13+40 to 16+50	RT
-SR1B-	14+00 to 16+40	RT

3) Groundwater: The following areas exhibit a high water table, seasonal high groundwater or the potential for groundwater related construction problems:

<u>LINE</u>	<u>STATIONS</u>
-L-	42+25 to 46+25
-L-	69+75 to 82+25
-Y2-	15+75 to 18+25
-Y3-	13+25 to 15+75
-RP1B-	10+25 to 13+00
-SR1B-	10+15 to 18+20
-SR1D-	11+25 to 15+75
-SR1D-	20+75 to 23+20

**PHYSIOGRAPHY AND GEOLOGY**

The project is located in the Coastal Plain Physiographic Province. The project corridor is comprised primarily of residential and agricultural properties. The general topography along the project is generally flat to gently sloping.

Geologically, the soils in the project area generally belong to Undivided Coastal Plain Sediments and Cape Fear Formation.

**SOIL PROPERTIES**

Soils encountered during this investigation are separated into five categories based on origin. They consist of artificial fill, roadway embankment, alluvium and coastal plain soils belonging to the Undivided Coastal Plain Sediments and Cape Fear Formation.

Artificial fill soils are present along -L-, -Y3-, and -SR1B- on the project. These soils consist of moist to wet, loose, non plastic, fine sands (A-3) and very loose, slightly plastic, silty, coarse to fine sands (A-2-5).

Roadway Embankment soils are present along the existing roadways on the project. These soils consist of moist to wet, loose to dense, non plastic, fine sand (A-3) with some gravel and trace of organic matter, very loose, non plastic, silty, coarse to fine sands (A-2-4) with trace of organic matter, slightly plastic, silty, coarse to fine sands (A-2-5), and loose, slightly plastic, clayey, coarse to fine sand with trace of organic matter. The plasticity index of the roadway embankment soils tested was 17.

Alluvial soils are soils that have been transported and deposited by water; these soils were encountered in a ditch between the existing roadways, -L- and -Y3-. The alluvial soils encountered consist of wet, slightly plastic, clayey, coarse to fine sand (A-2-6) with trace of organic matter.

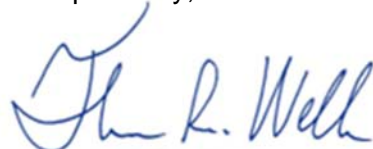
Soils identified as undivided coastal plain consist of moist to wet, loose to dense, non plastic, fine to coarse sands (A-1-b) with trace of organic matter and clay lenses, very loose to medium dense, non plastic, silty, coarse to fine sand (A-3) with trace of organic matter and clay lenses, very loose to medium dense, non plastic, silty, fine sand (A-2-4) with trace of organic matter, loose to medium dense, slightly plastic, silty, coarse to fine sand (A-2-5), very loose to dense, slightly plastic, clayey, coarse to fine sand (A-2-6), medium stiff to very hard, coarse to fine sandy clays (A-6), and soft to hard, fine sandy, silty clays (A-7-5) with sand lenses. The plasticity index of the soils tested ranged from 9 to 28.

Soils identified as Cape Fear Formation consist of moist, stiff to hard, highly plastic, coarse to fine sandy, silty clay (A-7-5), moist, very stiff to hard, moderately plastic, gray to light gray, coarse to fine sandy clay (A-6), moist to wet, dense to medium dense, moderately to slightly plastic, gray to light gray, clayey, coarse to fine sand (A-2-6).

#### **GROUNDWATER**

Groundwater was encountered at elevations ranging from 147.9 to 161.1 feet MSL along the proposed roadways of the project.

Prepared by,



Thomas R. Wells, PE  
Senior Professional



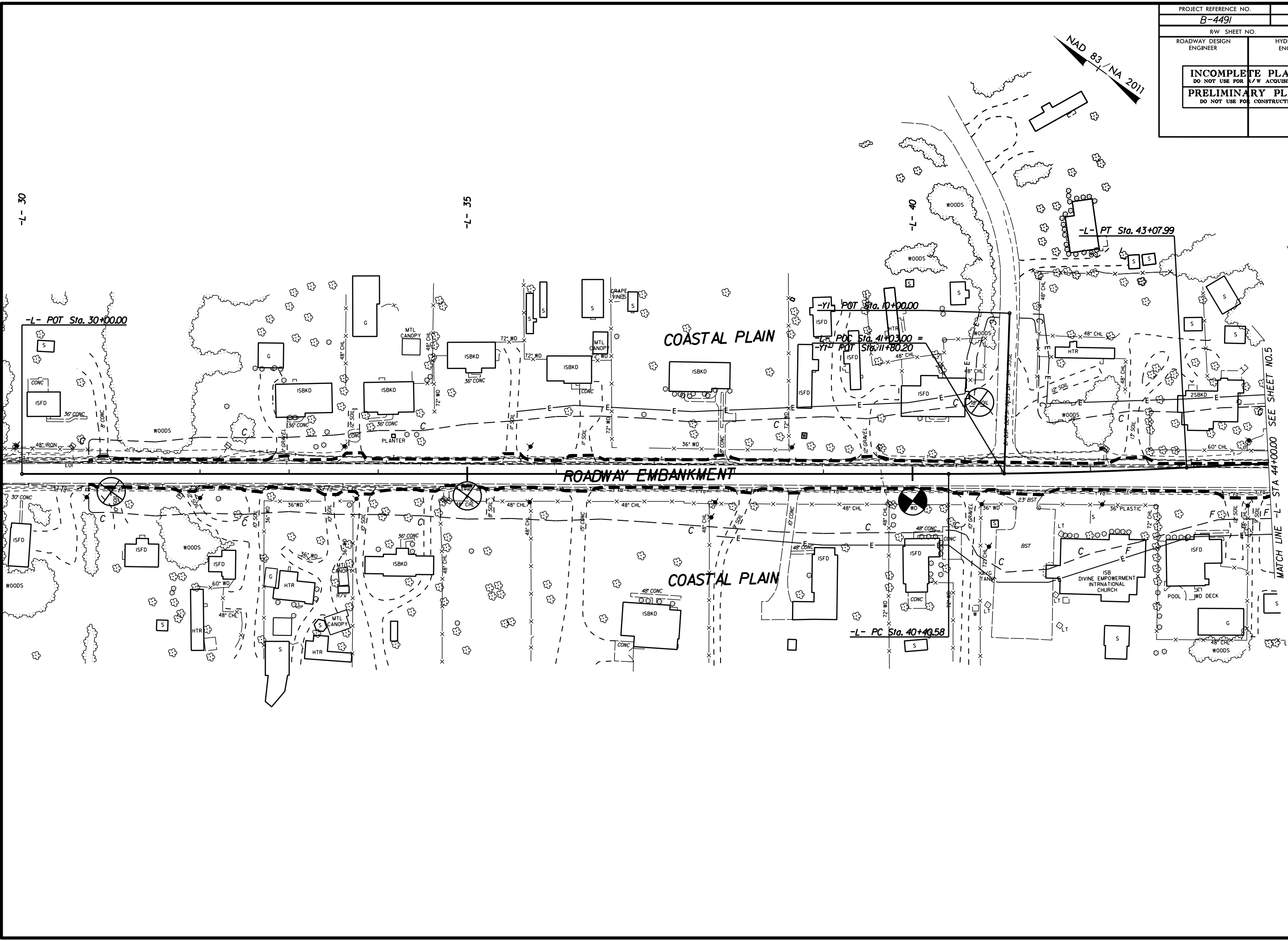
Xavier C. Barrett, PE  
Principal Professional

TRW/XCB:cas

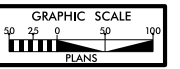
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

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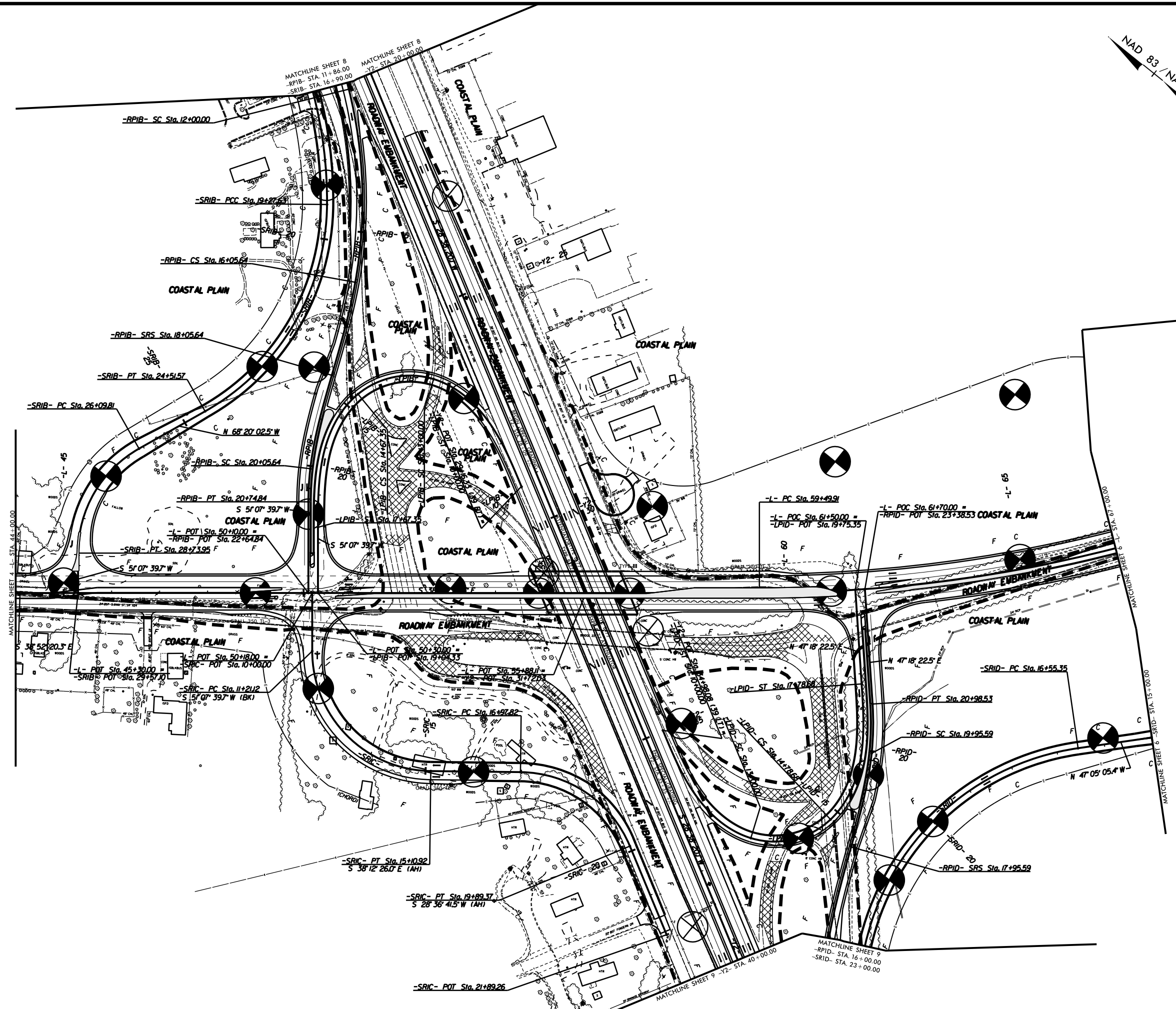
REVISIONS



PROJECT REFERENCE NO.	SHEET NO.
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RW SHEET NO.	
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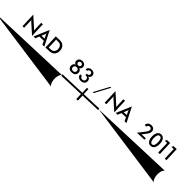


REVISIONS

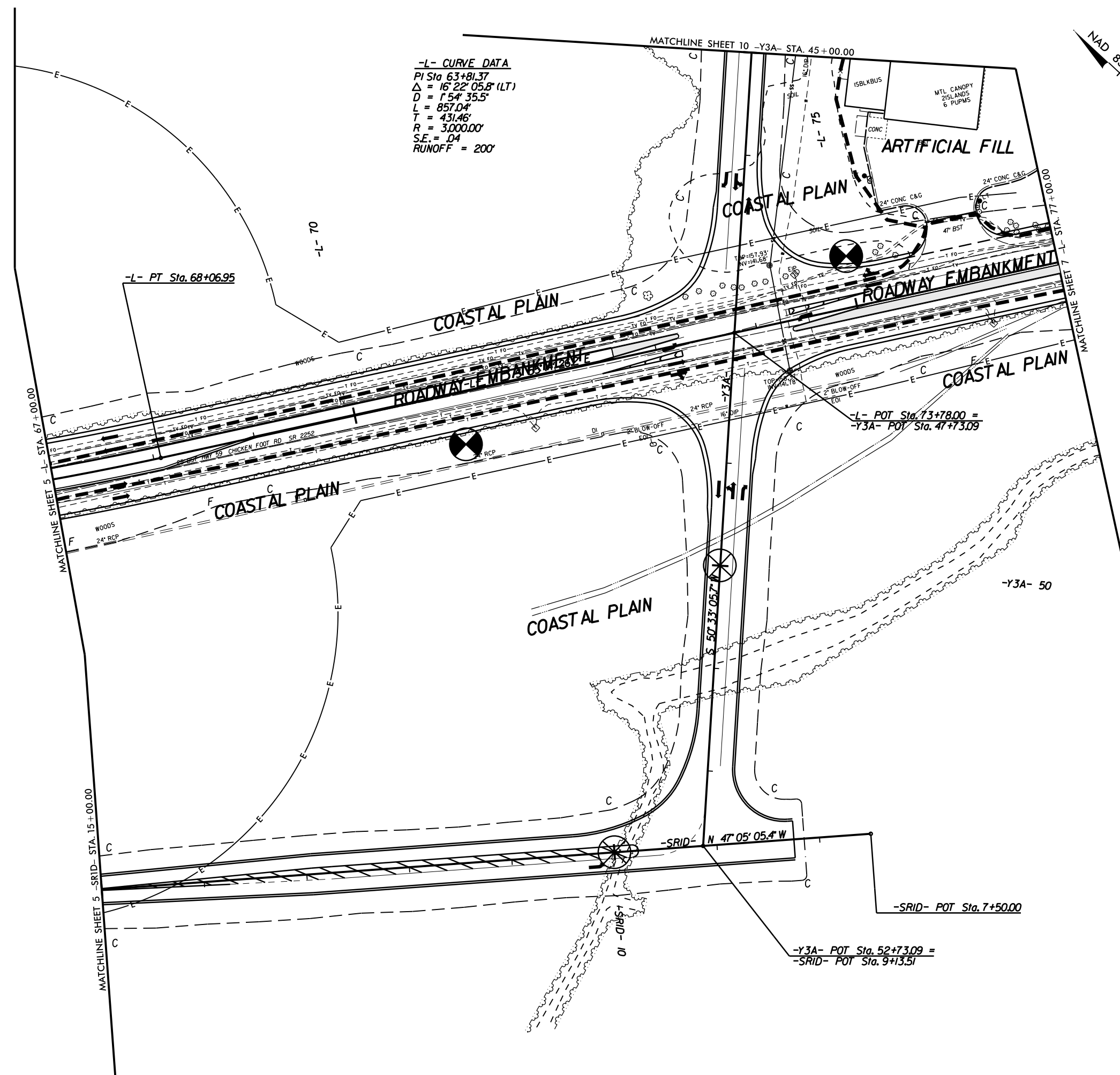
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PROJECT REFERENCE NO.	SHEET NO.
B-4491	6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



**-L- CURVE DATA**  
 PI Sta 63+81.37  
 $\Delta = 16^{\circ} 22' 05.8" (LT)$   
 $D = 1^{\circ} 54' 35.5"$   
 $L = 857.04'$   
 $T = 431.46'$   
 $R = 3,000.00'$   
 $S.E. = .04$   
 RUNOFF = 200'



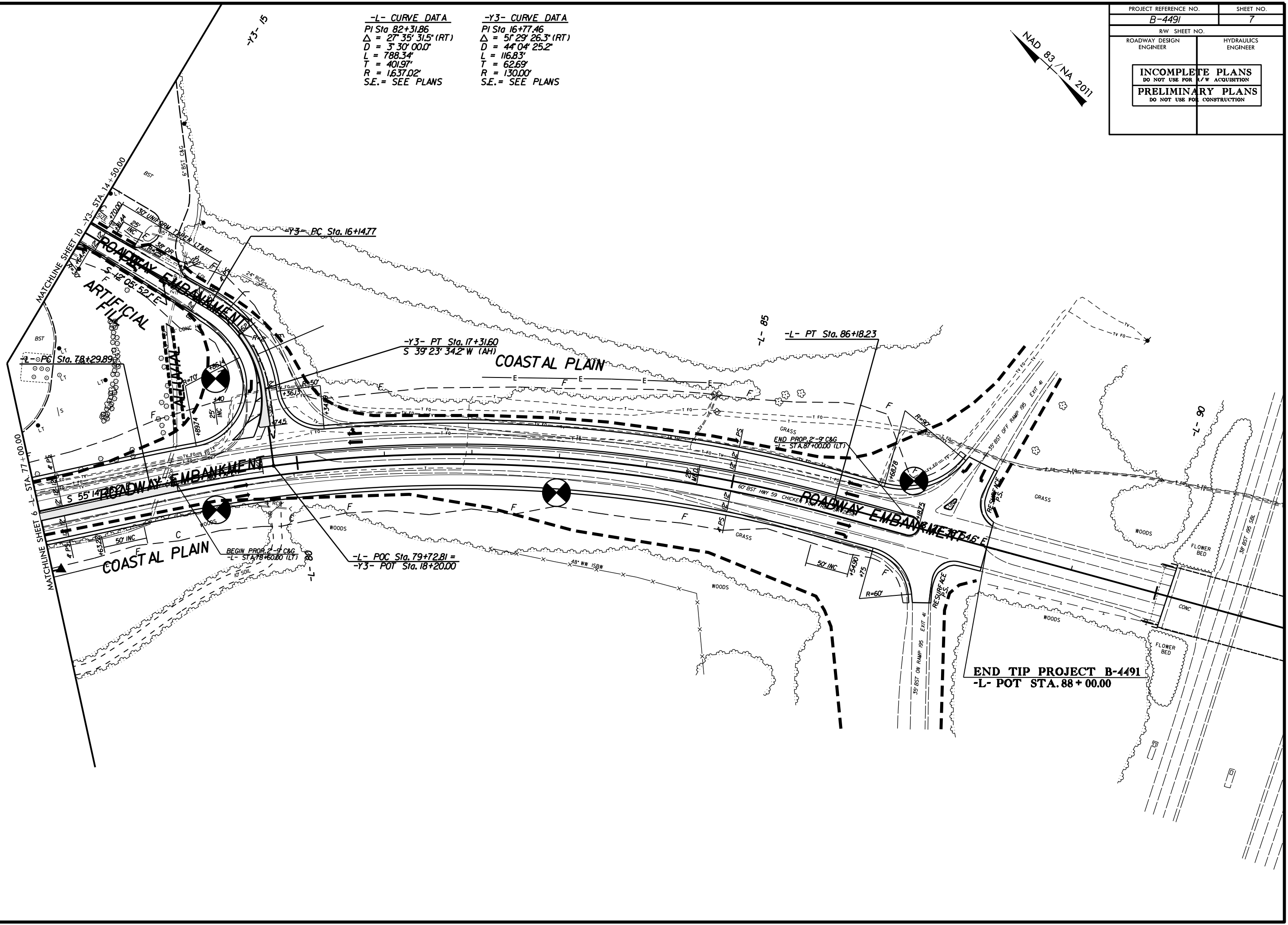
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 REVISIONS

PROJECT REFERENCE NO. <b>B-4491</b>	SHEET NO. <b>7</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



**-L- CURVE DATA**  
 PI Sta 82+31.86  
 $\Delta = 27^{\circ} 35' 31.5" (RT)$   
 $D = 3^{\circ} 30' 00.0"$   
 $L = 788.34'$   
 $T = 401.97'$   
 $R = 1637.02'$   
 S.E. = SEE PLANS

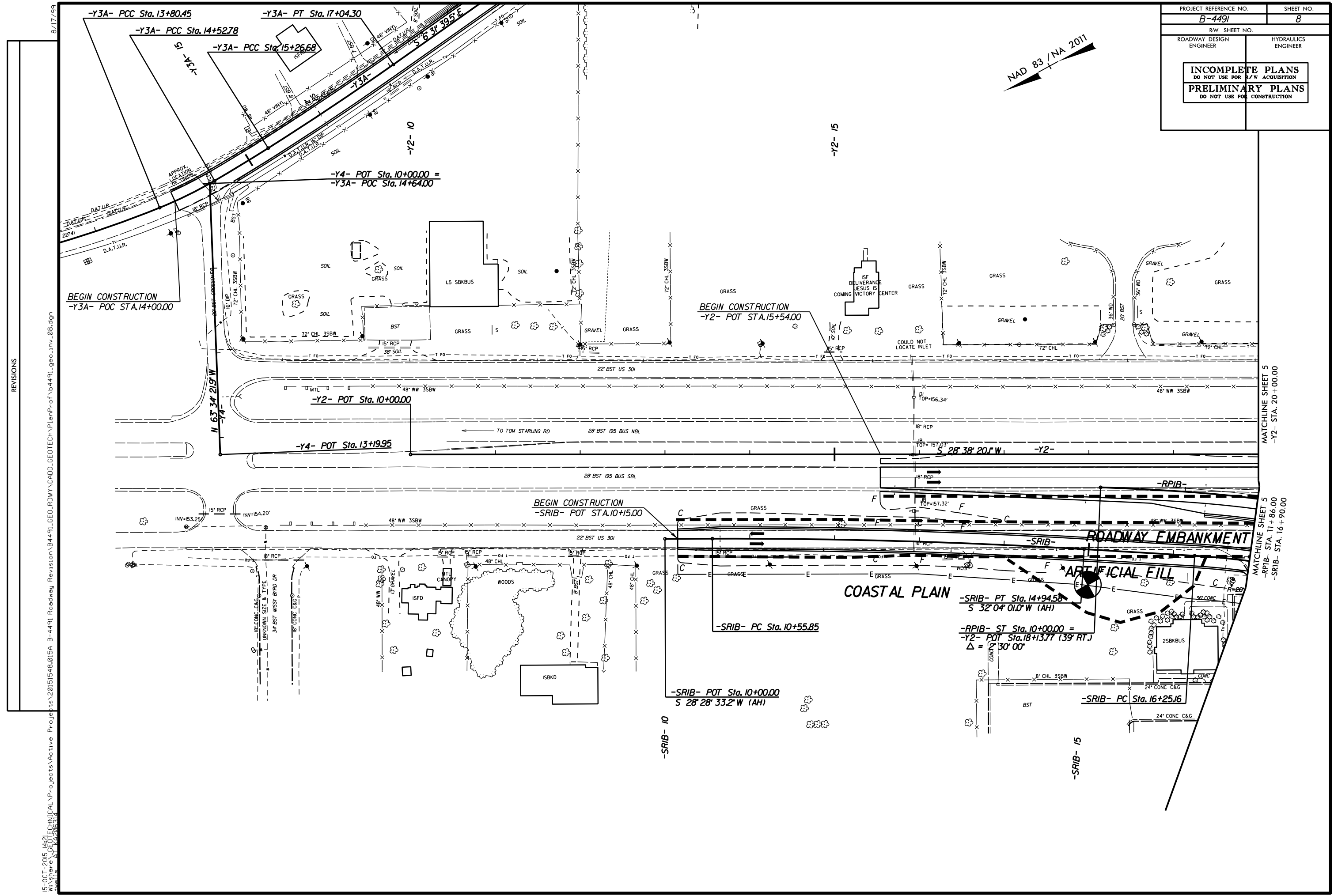
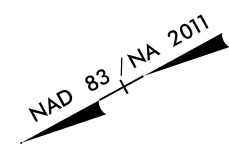
**-Y3- CURVE DATA**  
 PI Sta 16+77.46  
 $\Delta = 51^{\circ} 29' 26.3" (RT)$   
 $D = 44^{\circ} 04' 25.2"$   
 $L = 116.83'$   
 $T = 62.69'$   
 $R = 130.00'$   
 S.E. = SEE PLANS



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 REVISIONS

**END TIP PROJECT B-4491**  
**-L- POT STA. 88+00.00**

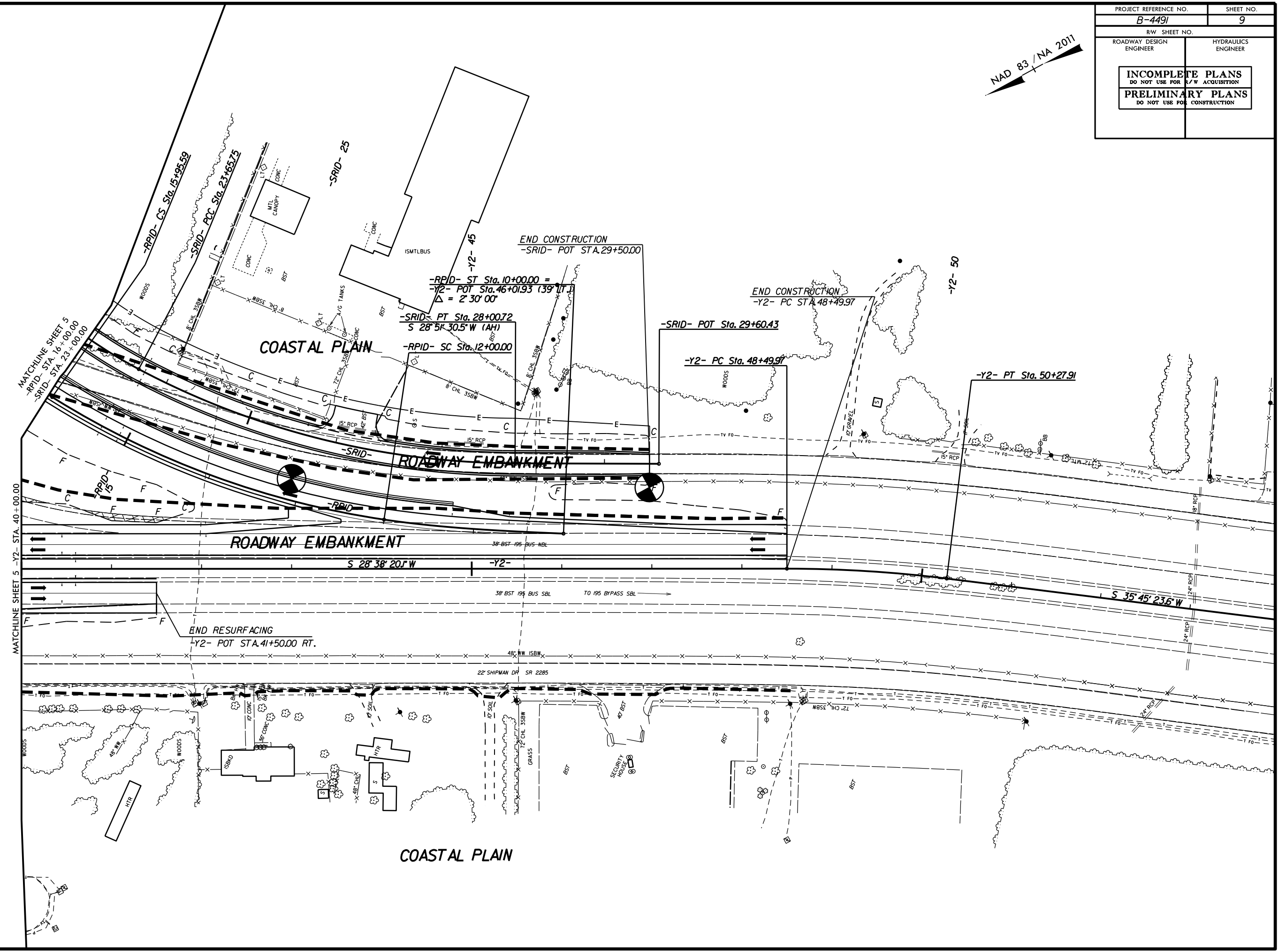
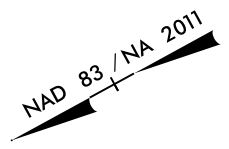
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



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 8/17/99  
 REVISIONS

MATCHLINE SHEET 5  
 -Y2- STA. 20+00.00  
 MATCHLINE SHEET 5  
 -RP1B- STA. 11+86.00  
 -SR1B- STA. 16+90.00

PROJECT REFERENCE NO.	SHEET NO.
B-4491	9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

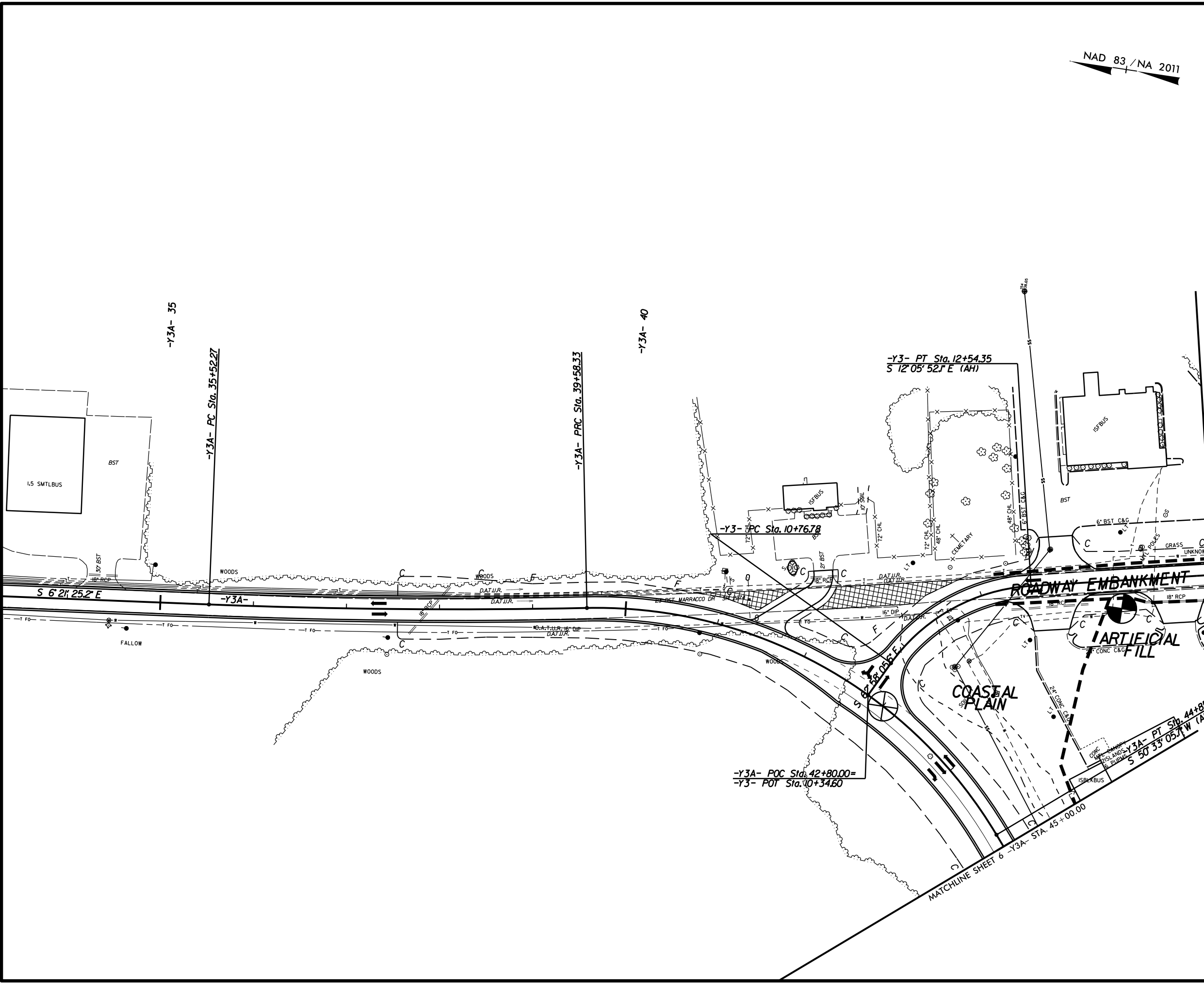


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 REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-4491	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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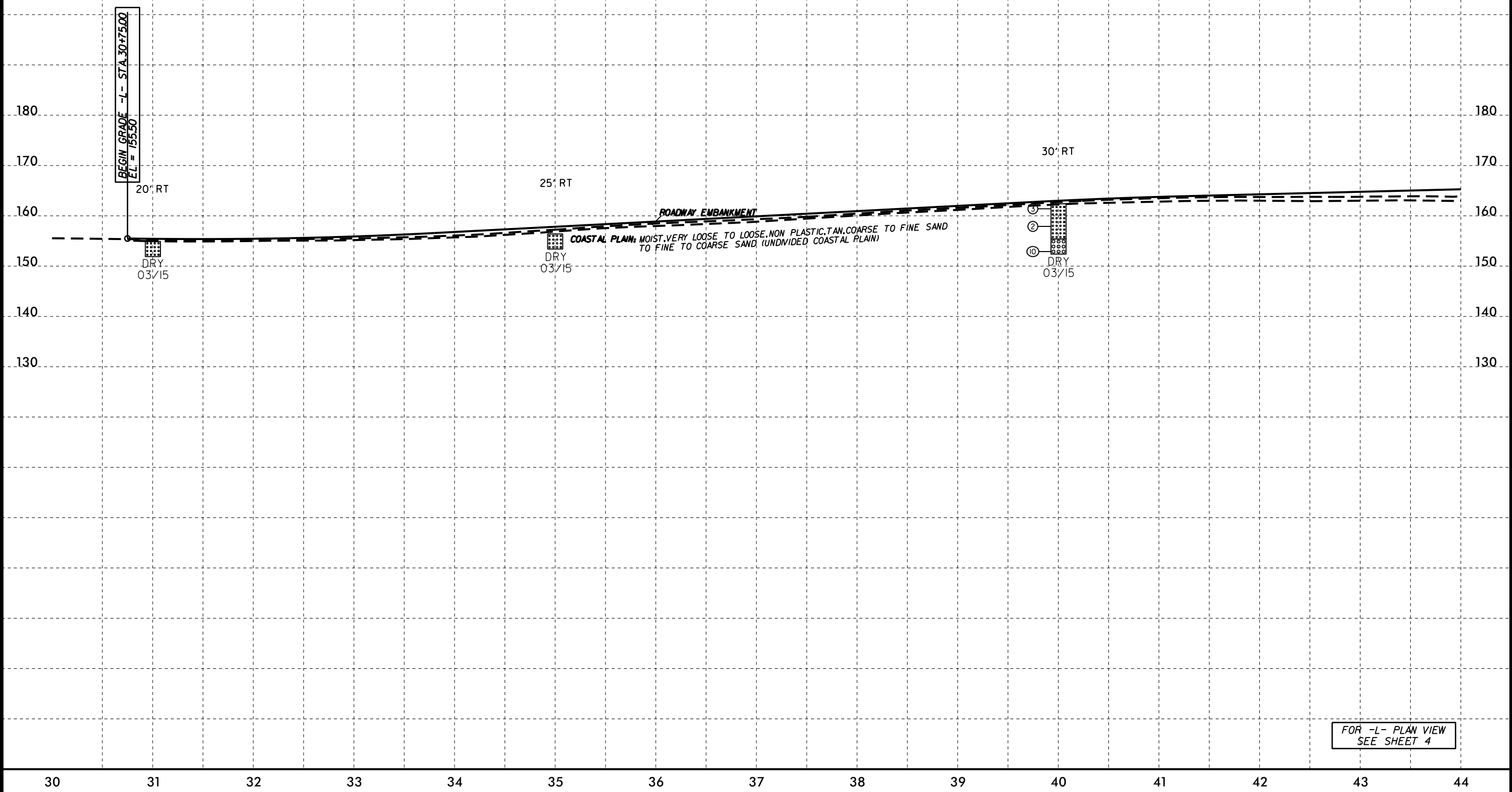
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 REVISIONS



5/14/99

PROJECT REFERENCE NO. <i>B-449I</i>	SHEET NO. <i>II</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-

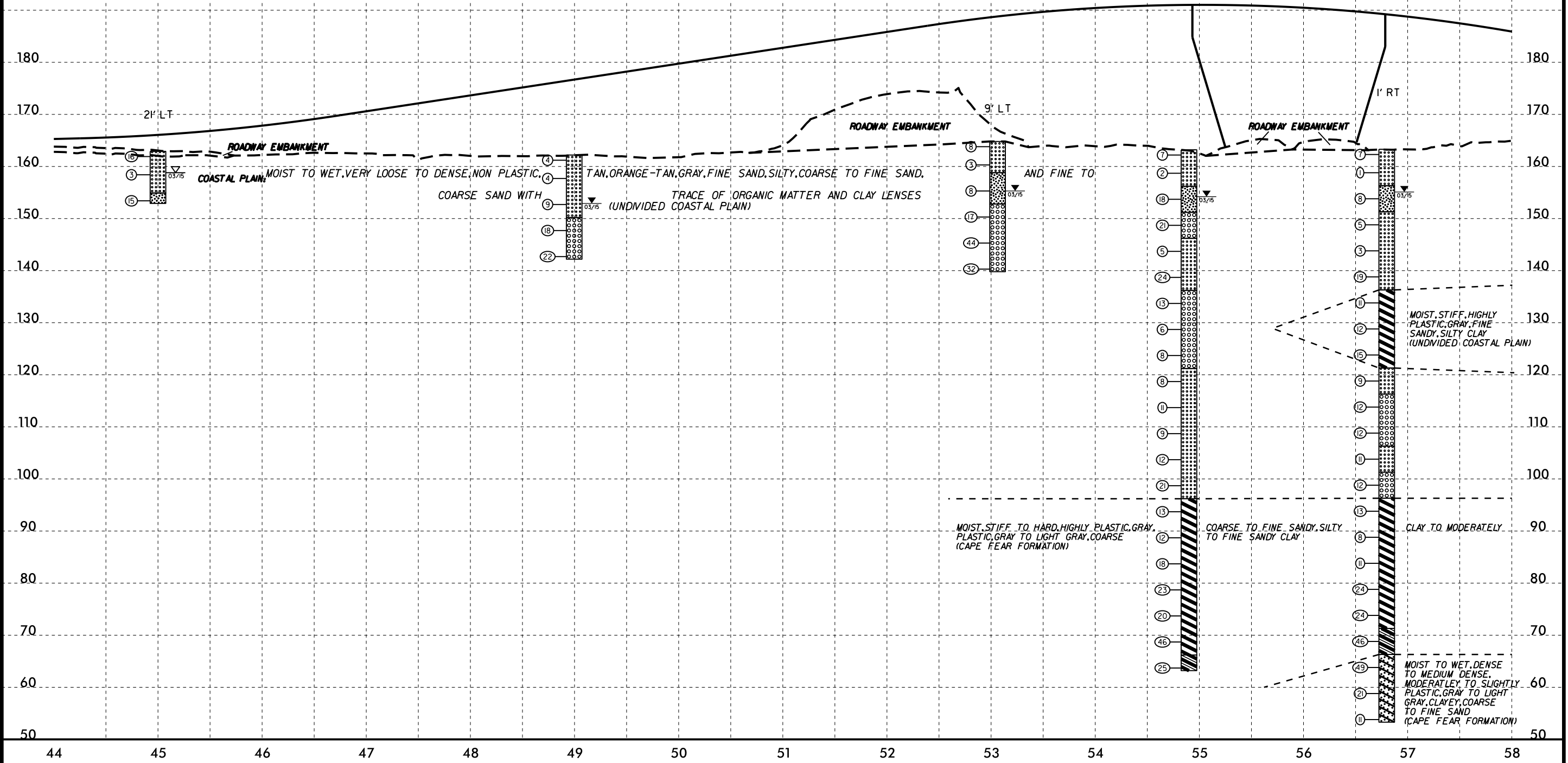


5/14/99

FOR -L- PLAN VIEW  
SEE SHEET 5

PROJECT REFERENCE NO. <b>B-4491</b>	SHEET NO. <b>12</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

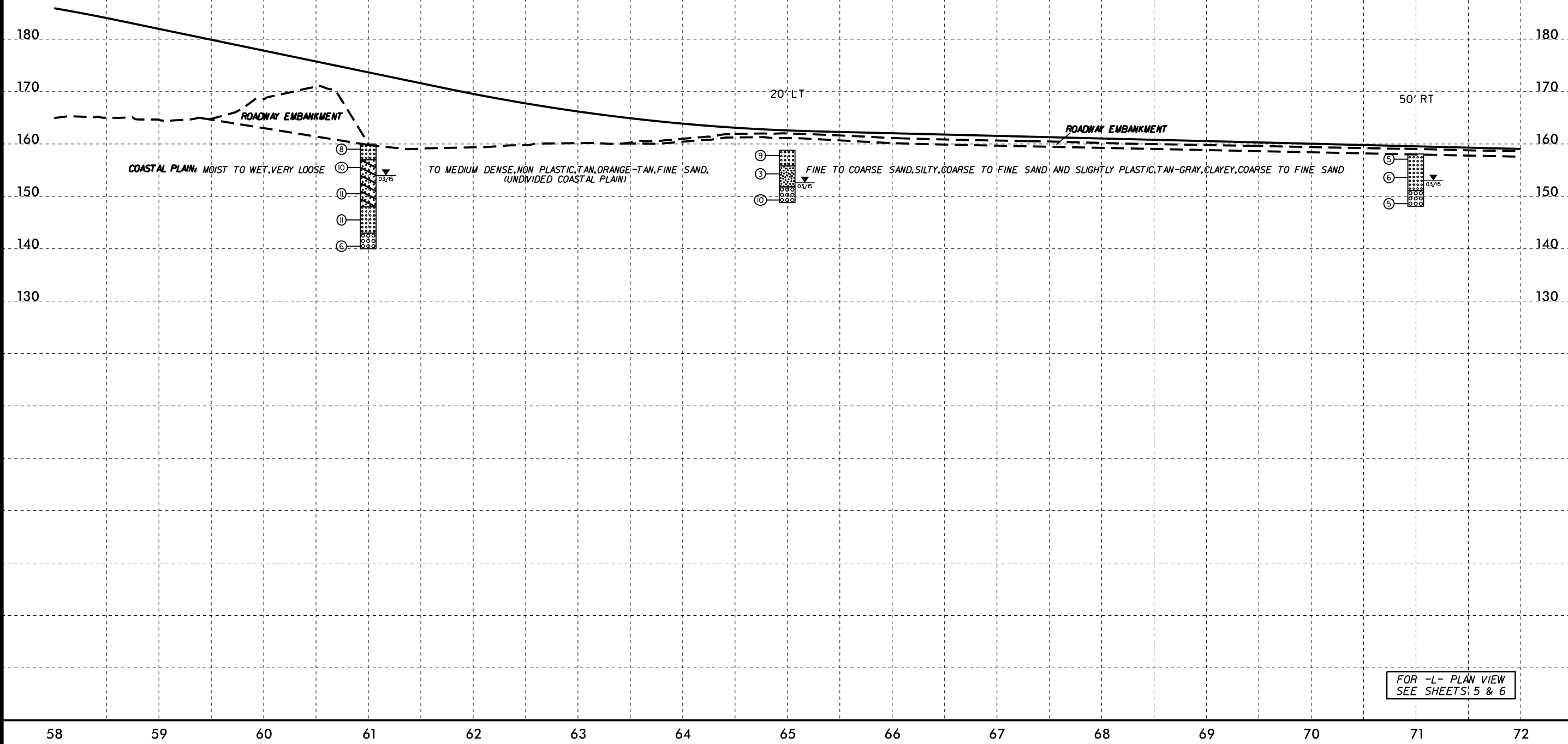
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PROJECT REFERENCE NO. <i>B-4491</i>	SHEET NO. <i>13</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-



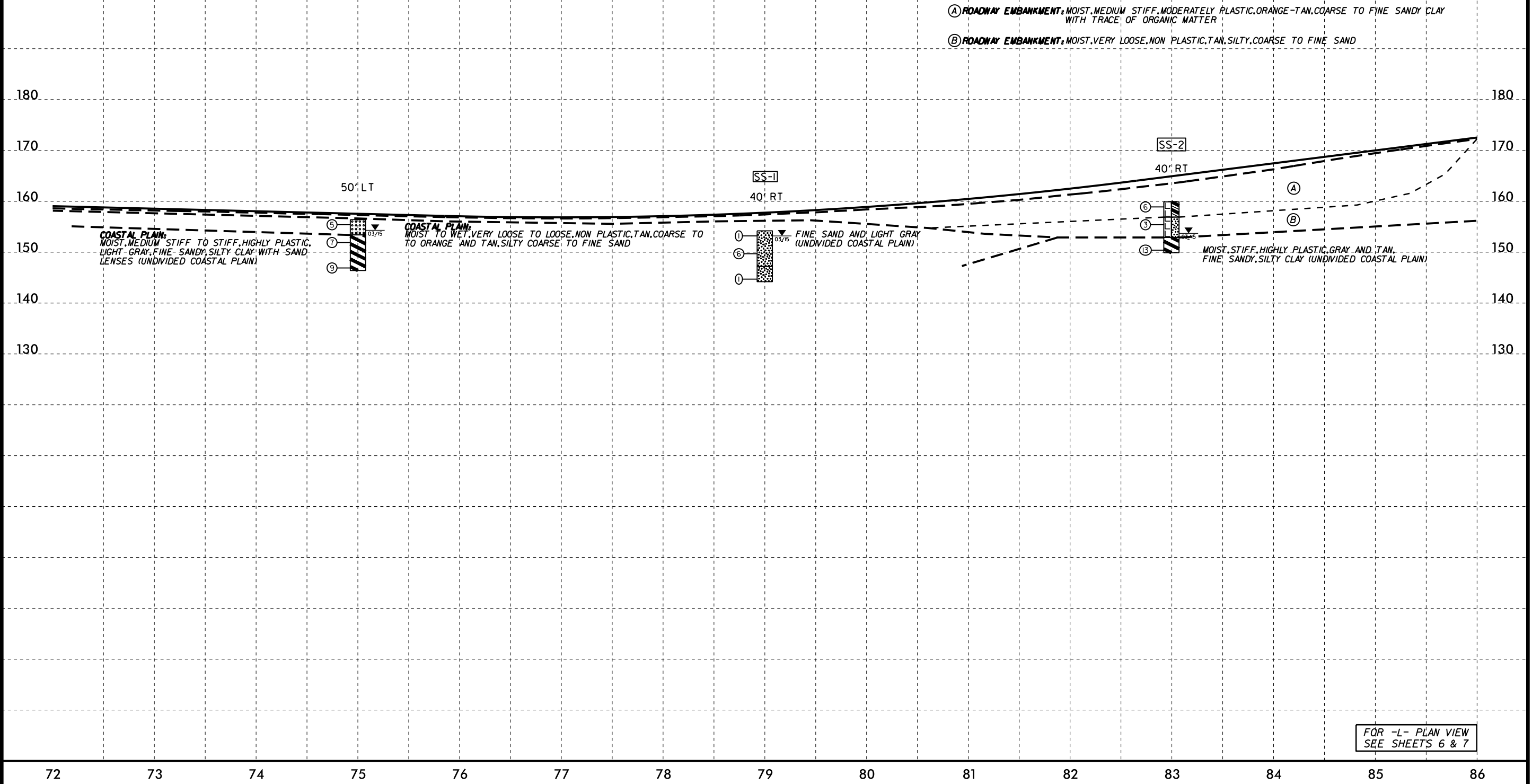
FOR -L- PLAN VIEW  
SEE SHEETS 5 & 6



5/14/99

PROJECT REFERENCE NO. <b>B-4491</b>	SHEET NO. <b>14</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-

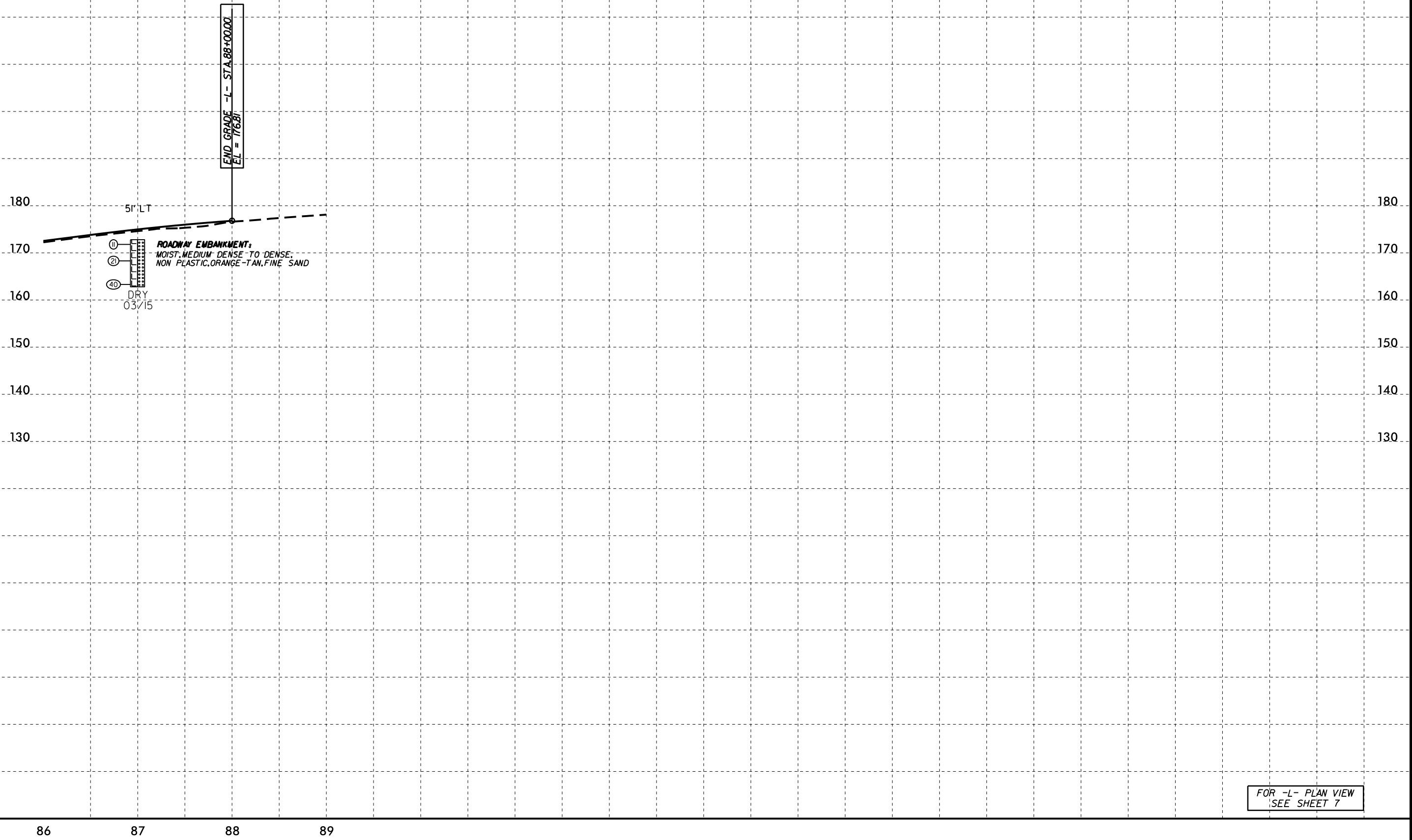


FOR -L- PLAN VIEW  
SEE SHEETS 6 & 7

5/14/99

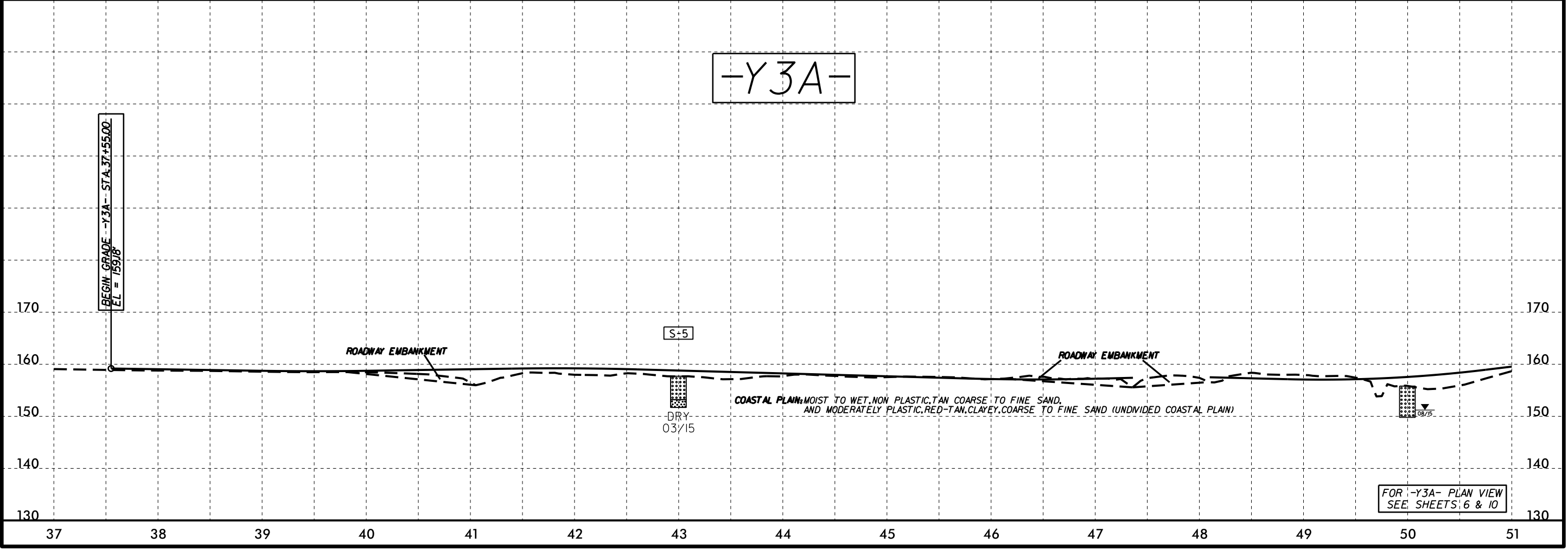
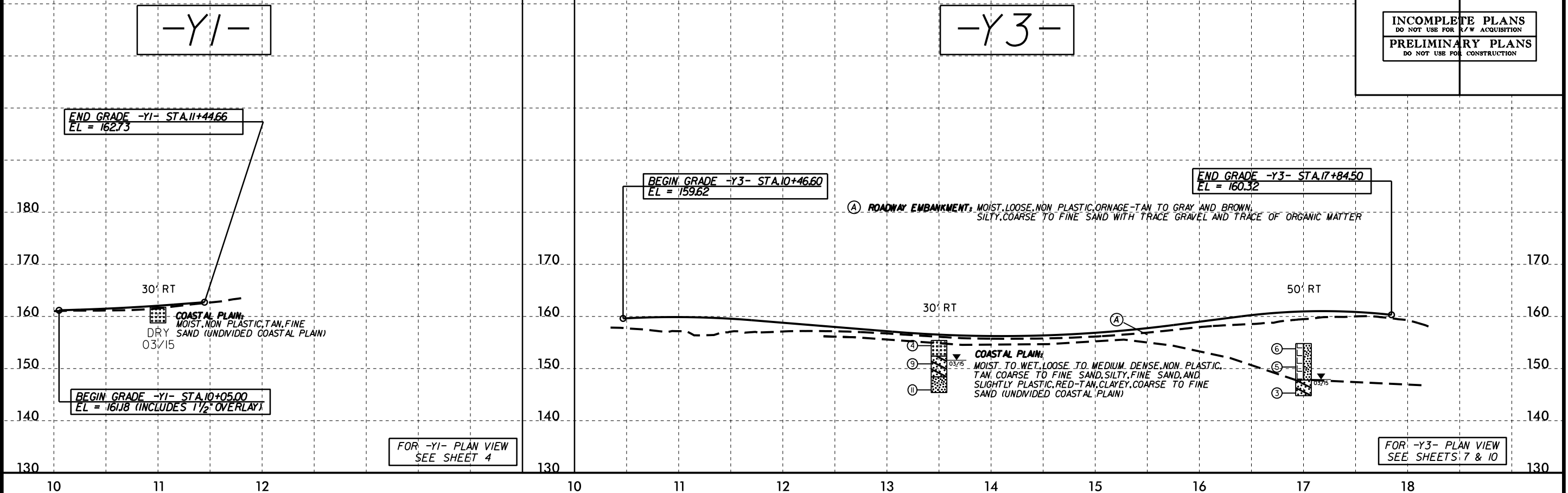
PROJECT REFERENCE NO. <i>B-449I</i>	SHEET NO. <i>15</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-



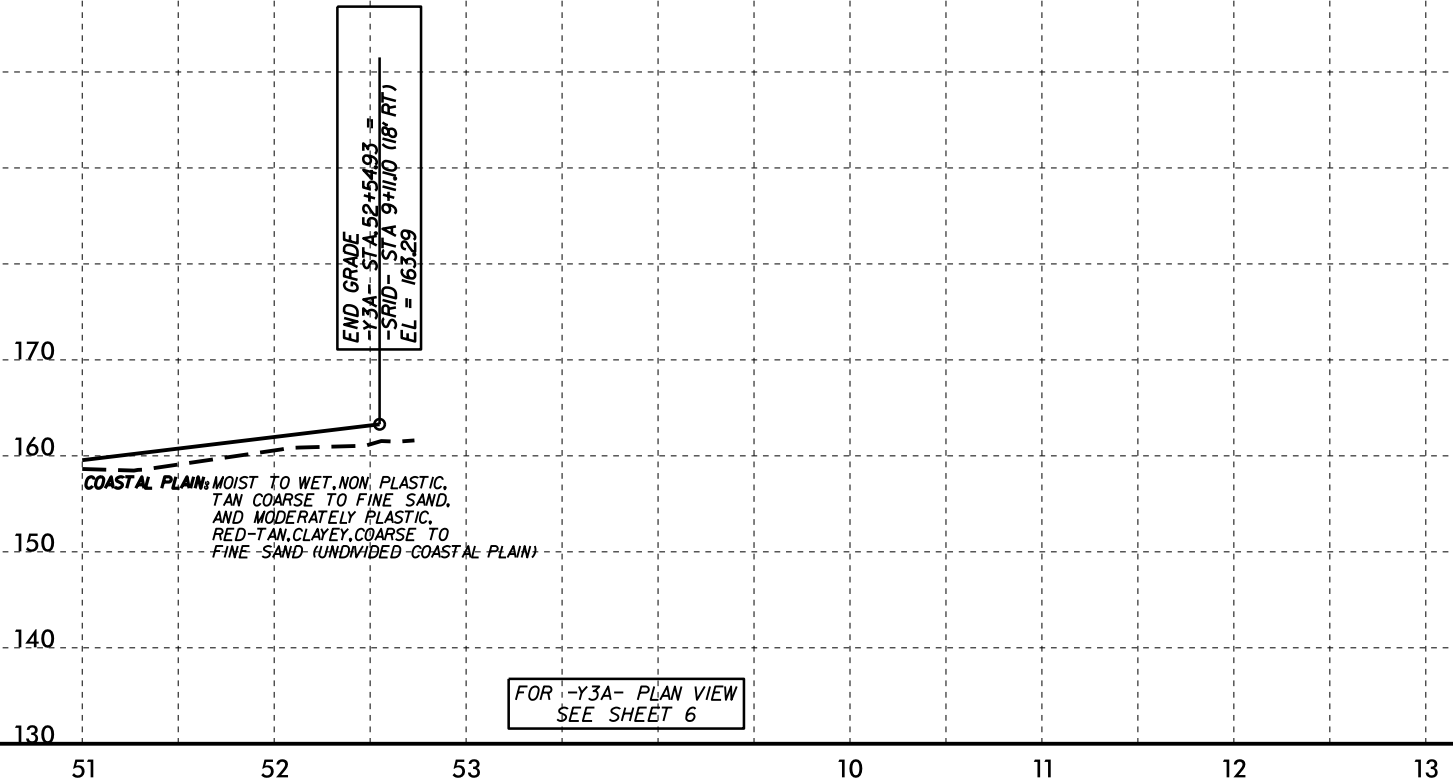
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PROJECT REFERENCE NO. B-4491	SHEET NO. 16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

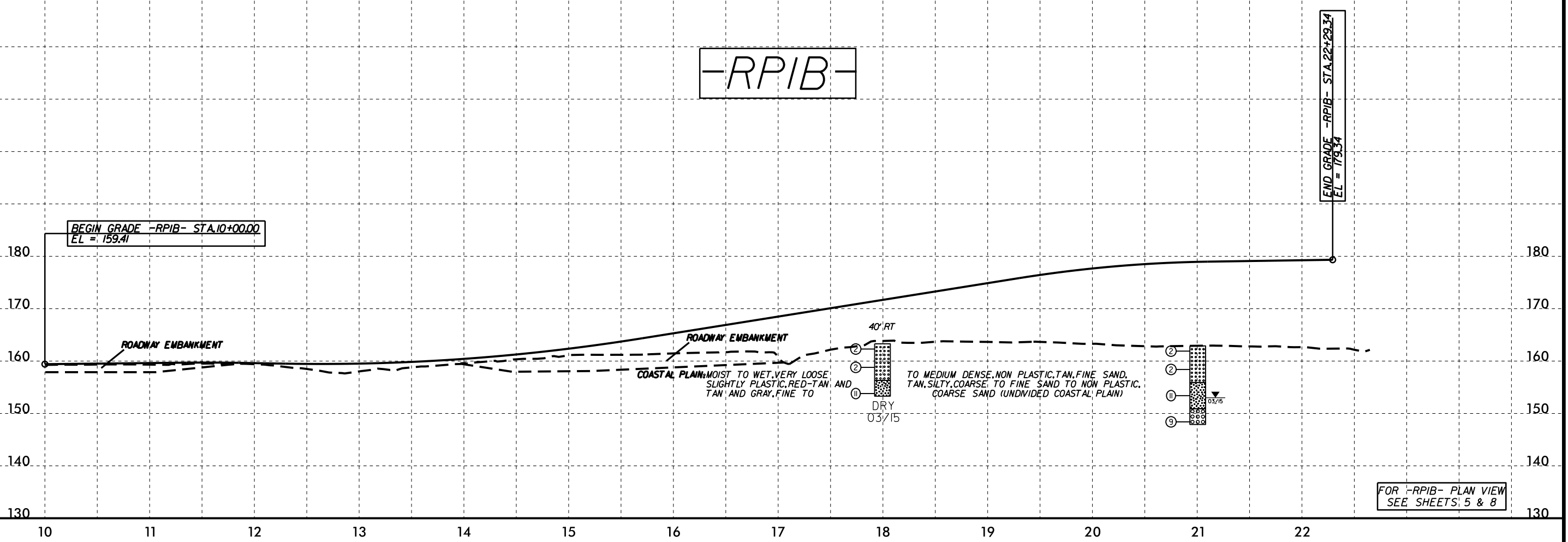


PROJECT REFERENCE NO. <b>B-4491</b>	SHEET NO. <b>17</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

-Y3A-



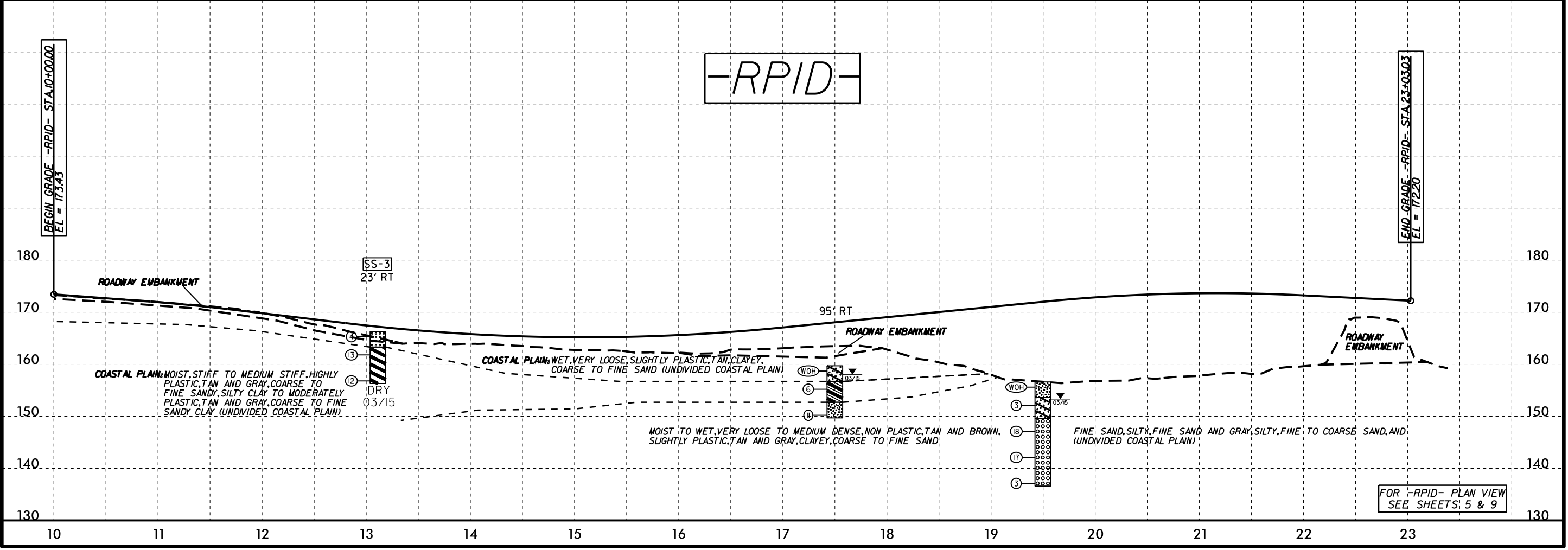
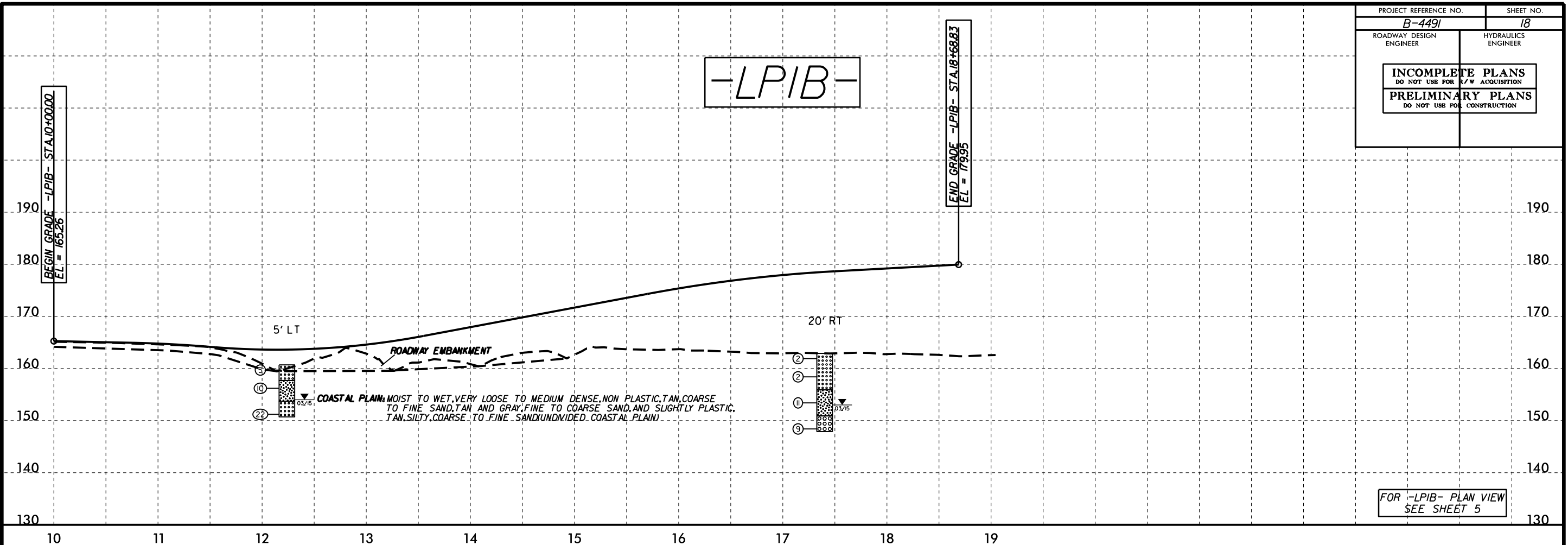
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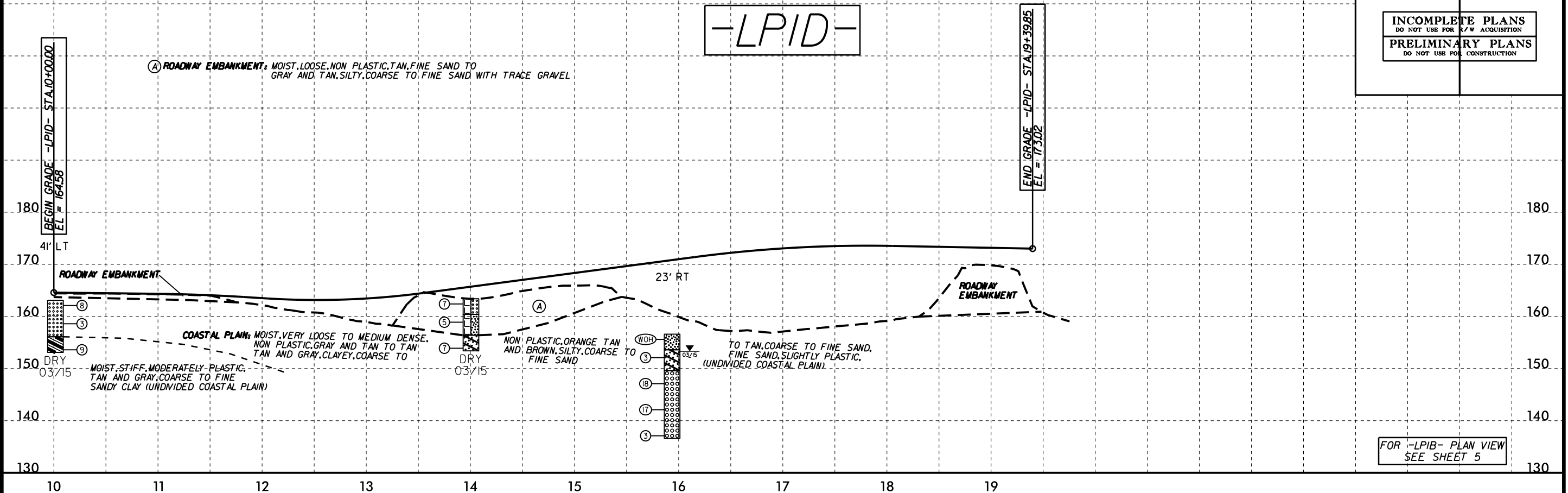
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PROJECT REFERENCE NO. B-4491	SHEET NO. 18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



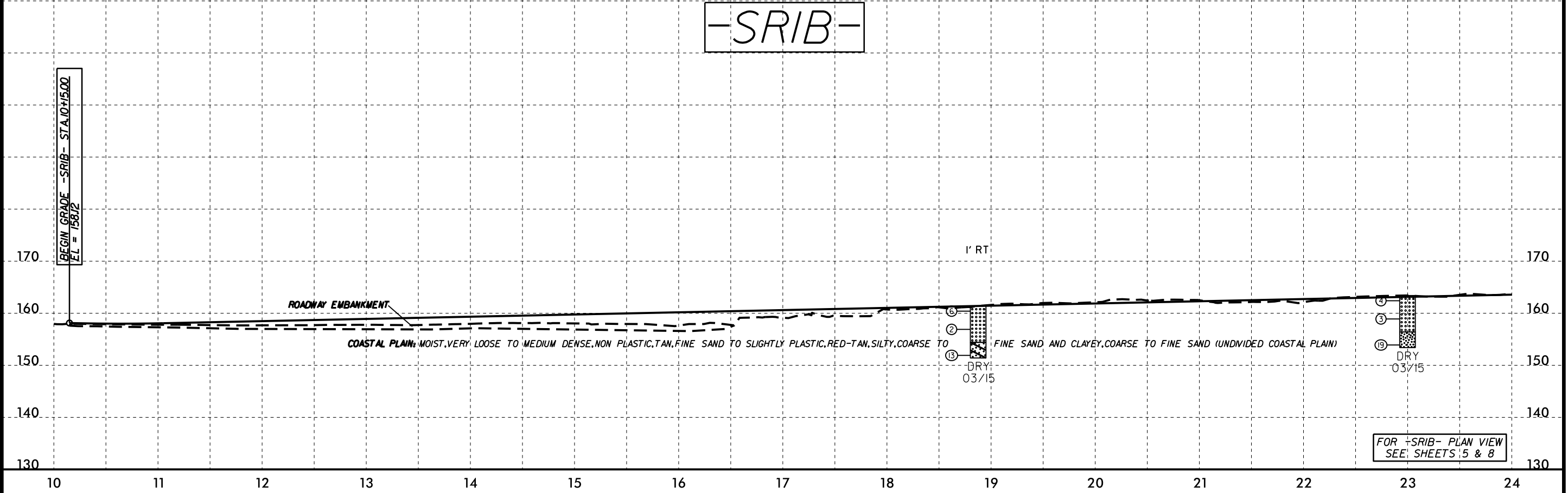
PROJECT REFERENCE NO. B-4491	SHEET NO. 19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

-LPID-



FOR -LPID- PLAN VIEW  
SEE SHEET 5

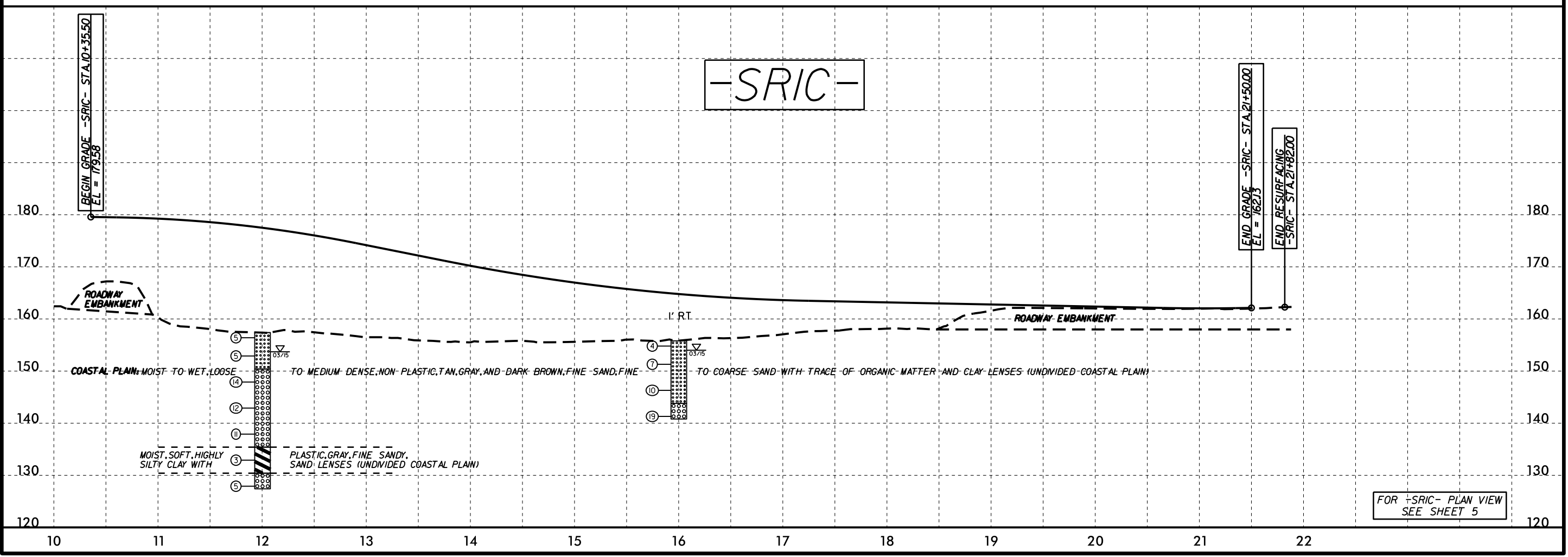
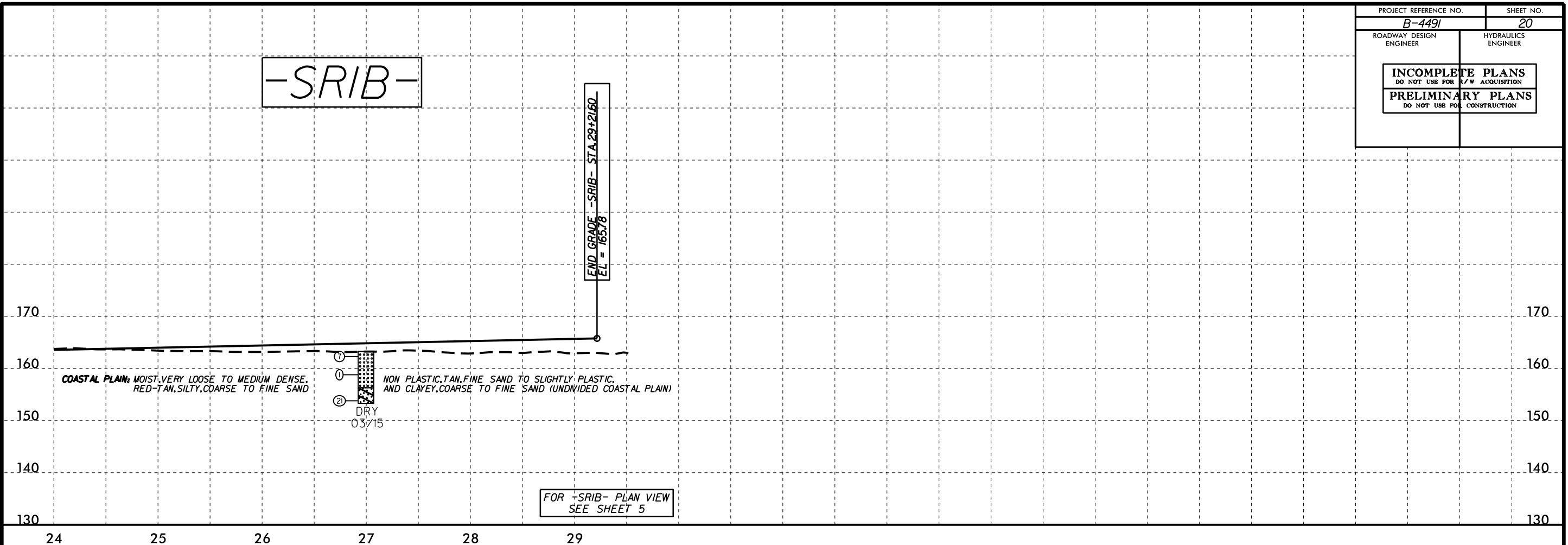
-SRIB-



FOR -SRIB- PLAN VIEW  
SEE SHEETS 5 & 8

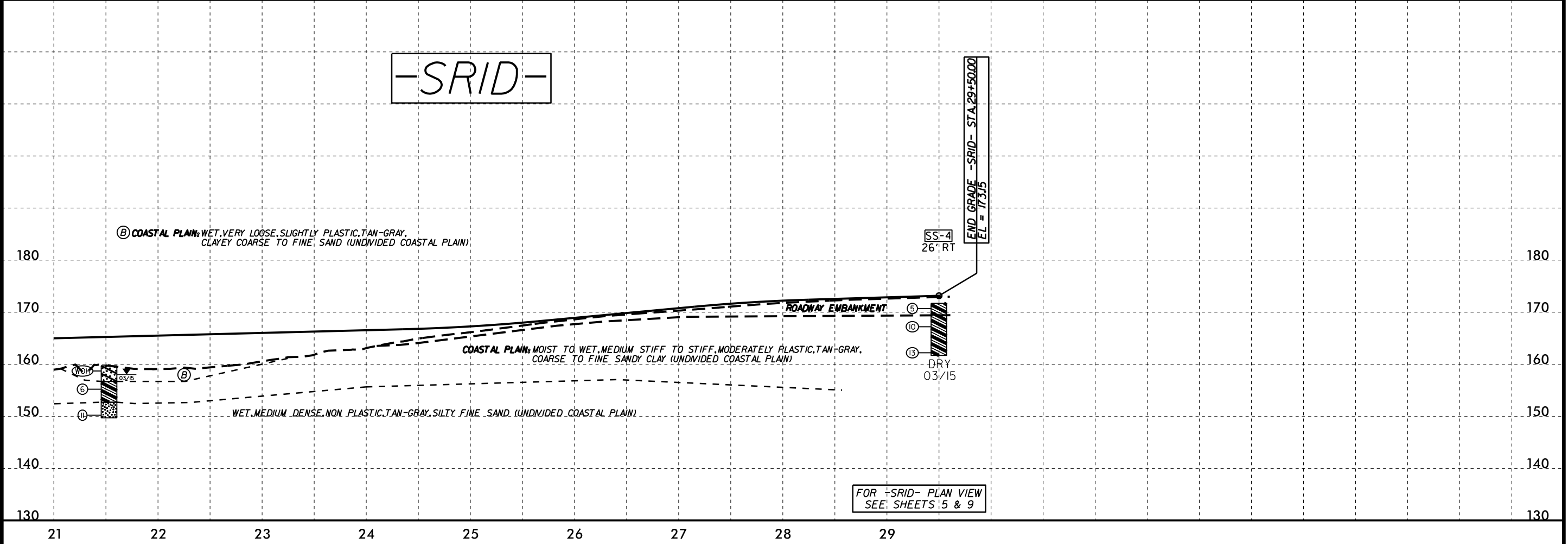
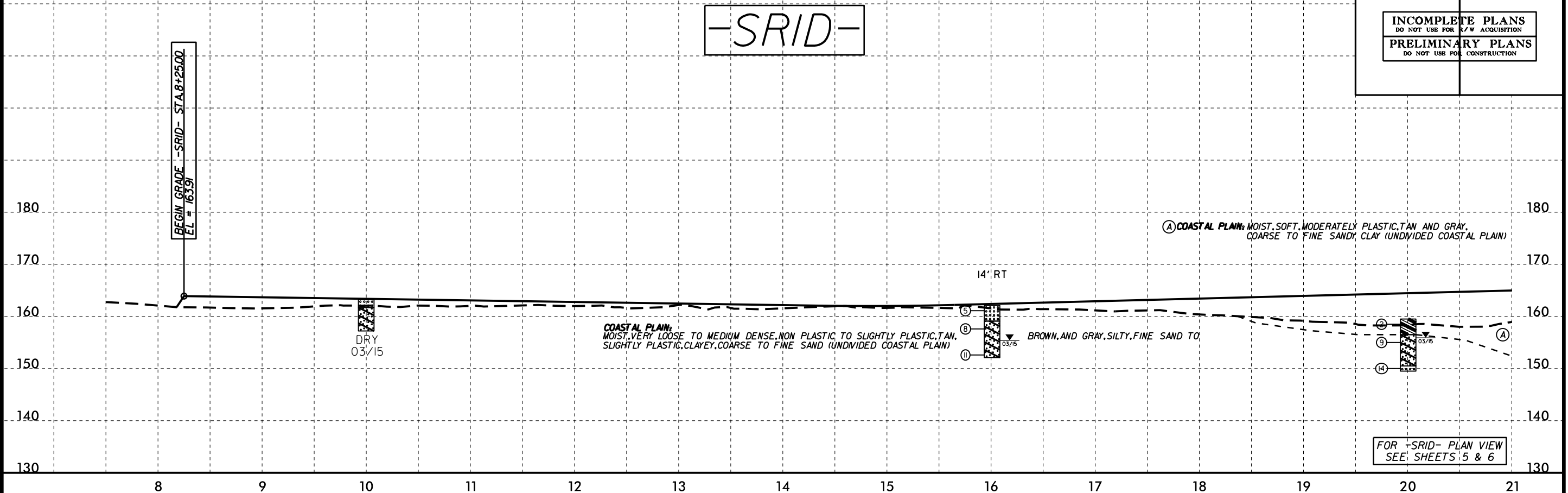
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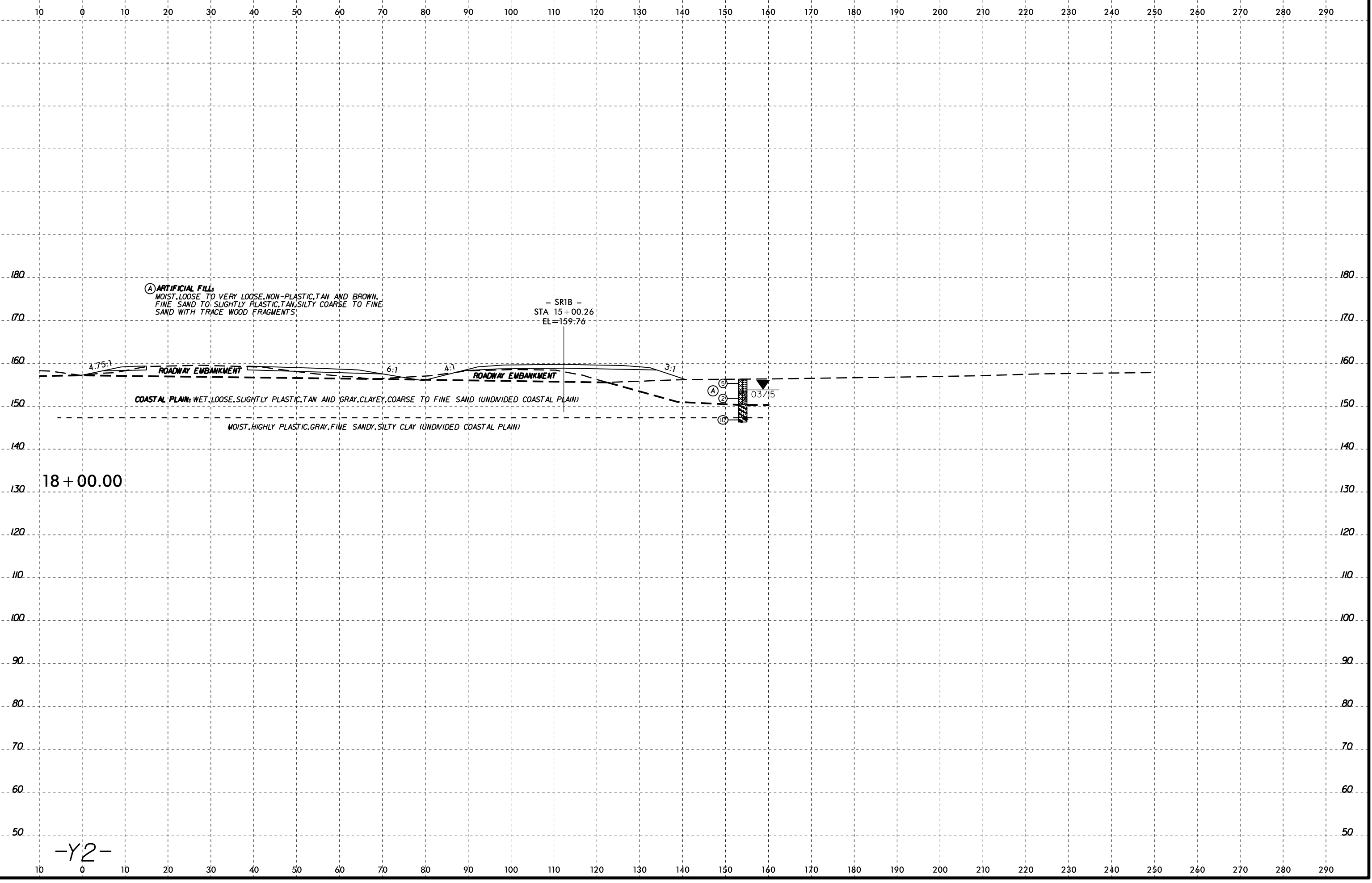
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PROJECT REFERENCE NO. B-4491	SHEET NO. 21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

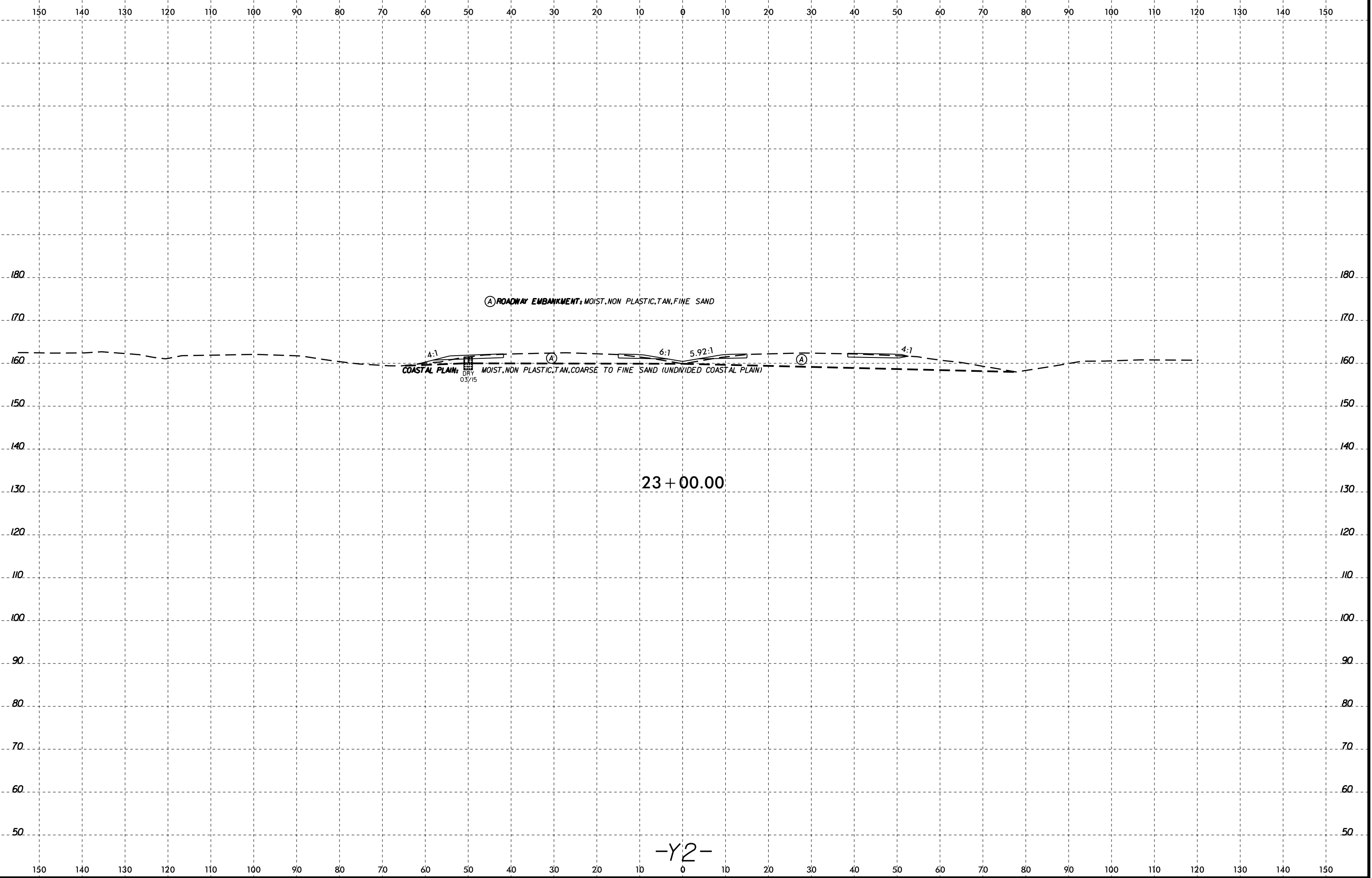




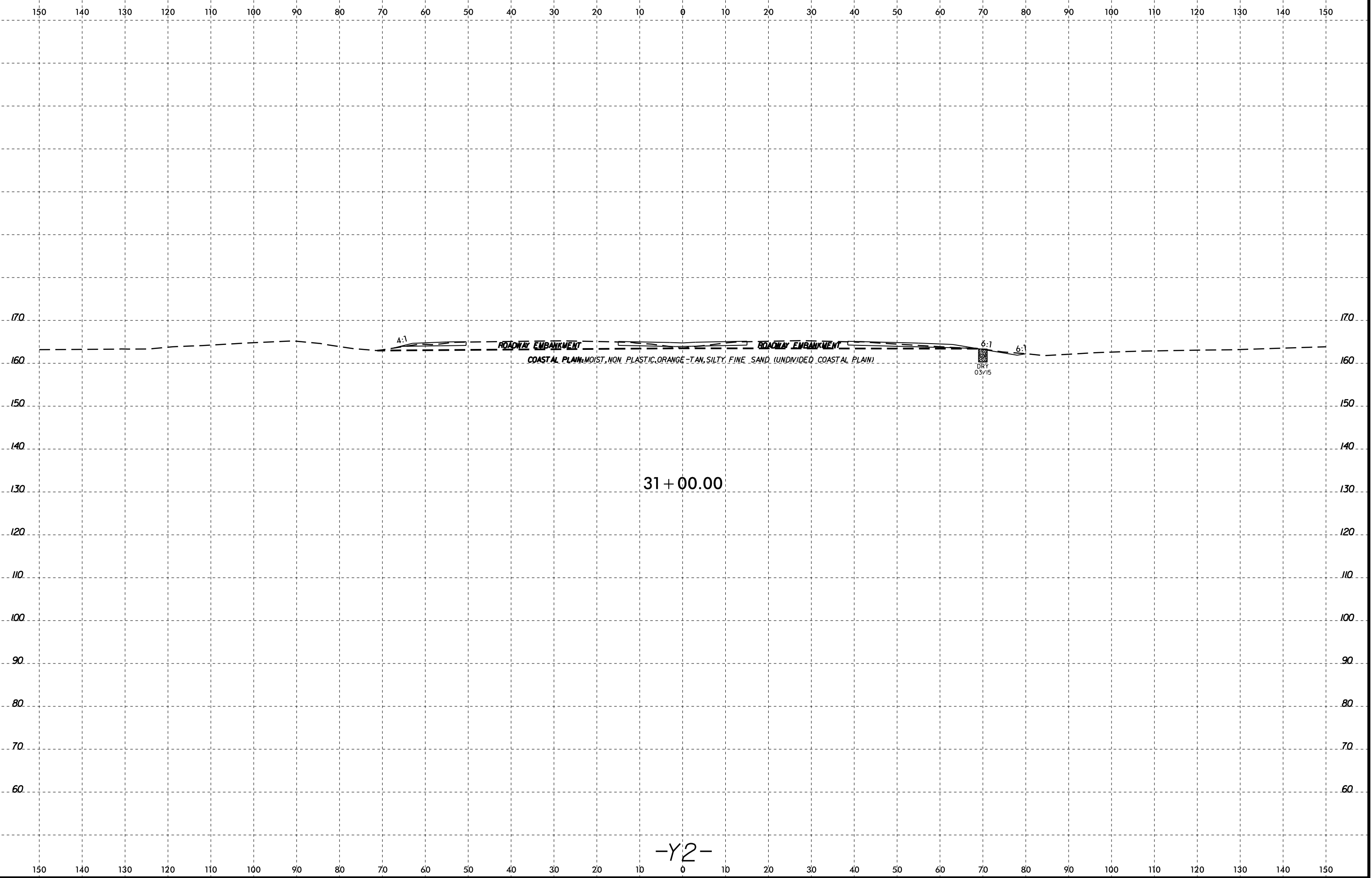
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8/23/99  
twellis



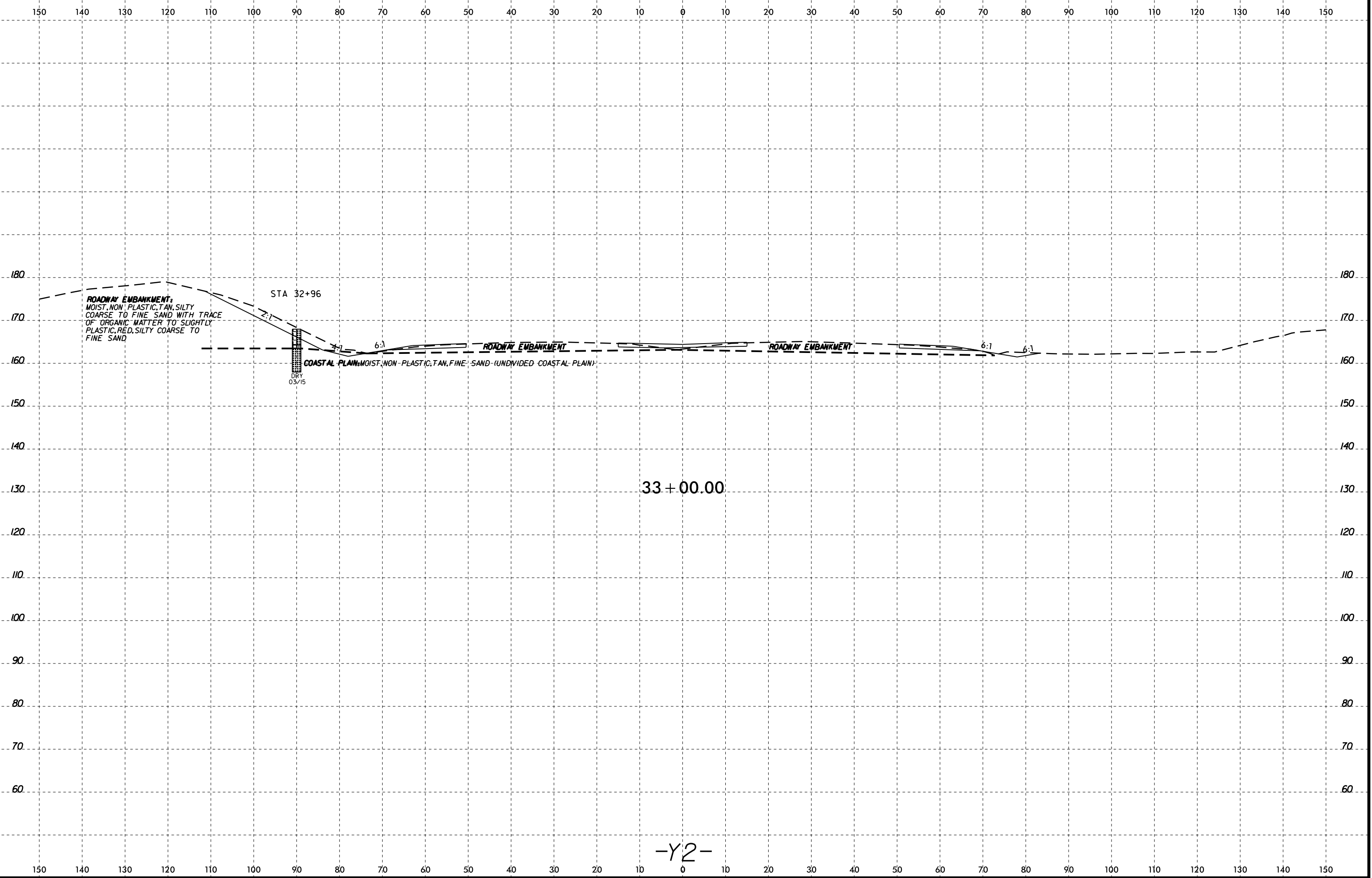
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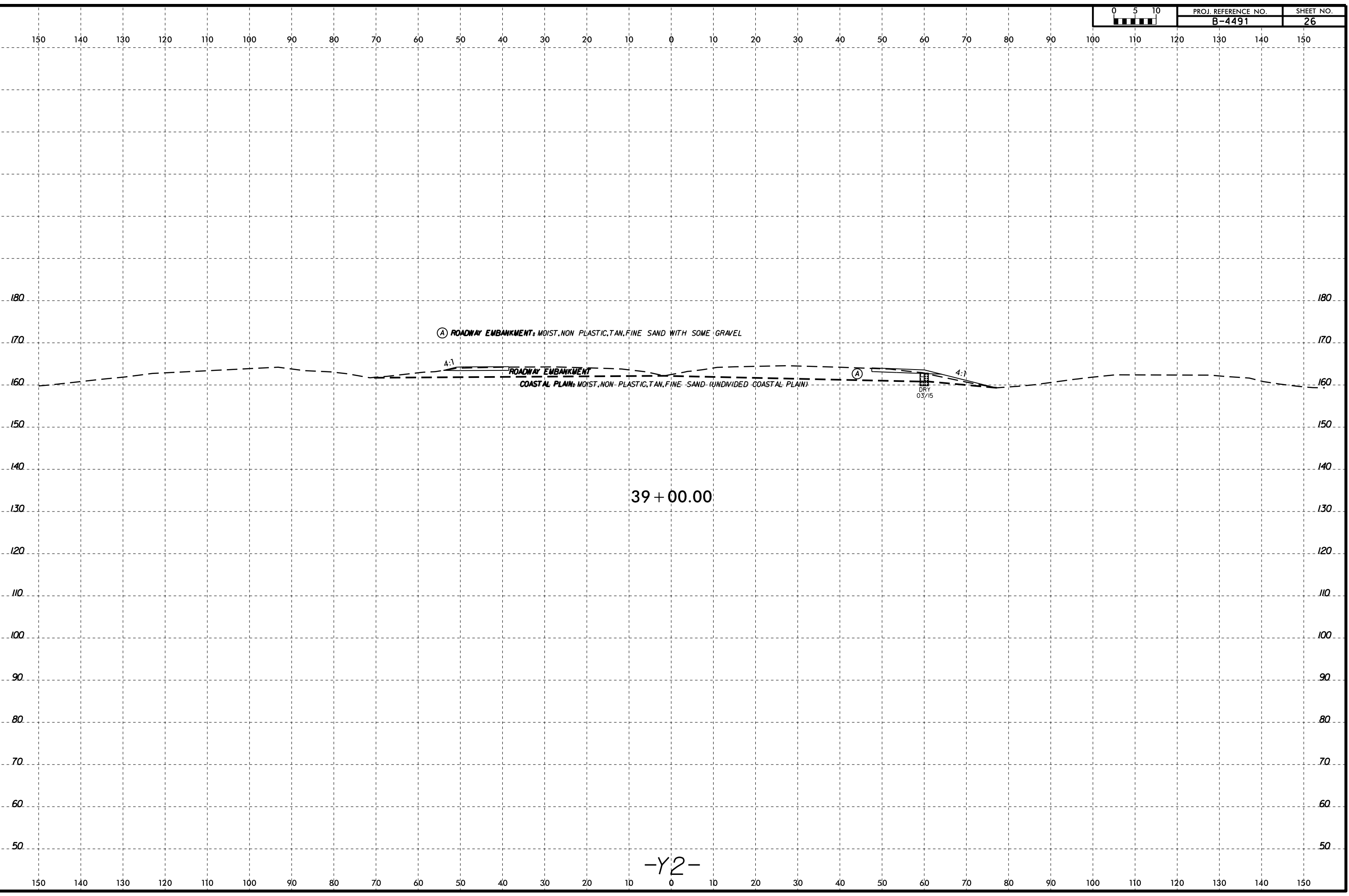


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twellis



(A) ROADWAY EMBANKMENT, MOIST, NON PLASTIC, TAN, FINE SAND WITH SOME GRAVEL

4:1

ROADWAY EMBANKMENT

COASTAL PLAIN, MOIST, NON-PLASTIC, TAN, FINE SAND (UNDIVIDED COASTAL PLAIN)

(A)

DRY  
03/15

4:1

39 + 00.00

-Y2-

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

REFERENCE: B-4491

PROJECT: 38389

INITIALS

DATE

**SUMMARY OF LABORATORY TEST RESULTS**

**PROJECT NO. 38389.1.1 (B-4491)**  
**FA NO. BRSTP-59(5)**  
**COUNTY: CUMBERLAND**  
**BRIDGE NO. 22 OVER 1-95 BUSINESS/US 301 ON NC 59**

Sample No.	Boring Number	Station	Offset	Alignment	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	Atterberg Limits			Gradation Results							
									L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
SS-1	L_7900	79+00	40' RT	-L-	3.5-5.0	-	A-2-4(0)	6	22	13	9	97	58	26	74.5	57.8	16.7	6.4	19.1
SS-2	L_8300	83+00	40' RT	-L-	0.0-1.5	-	A-6(2)	6	35	18	17	99	80	36	65.9	34.5	31.4	3.2	30.9
SS-3	Y2_4300_LT	43+00	100' LT	-Y2-	3.5-5.0	-	A-7-5(4)	13	48	20	28	99	72	37	64.5	40.3	24.2	2.8	32.7
SS-4	Y2_4697	46+97	90' LT	-Y2-	0.0-1.5	-	A-6(1)	5	29	17	12	99	86	41	62.7	28.4	34.3	8.4	28.9
S-5	Y3A_4300	43+00	CL	-Y3A-	4.5-6.0	13.7	A-2-7	-	47	29	18	98	47	24	76.4	67.3	9.2	5.0	18.6

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample

S = Grab Sample

NP -- Non Plastic

NA-- Non Applicable

Page: 1 of 1

Lab Technician: NCDOT Certification No.: 109-06-1003

Jonathon Creech