

NOTE: SEE SHEET 1A 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-3816	1	25
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34979.1.1	STP-0831 (2)	PE	
34979.2.2	STP-0831(2)	R/W & UTIL	
34979.3.1	STP-0831(2)	CONST	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	17+00.00 to 87+50.00	4-10	15-17	21-25
-Y-	16+70.00 to 34+00.00	5, 11	18	
-Y1A-	10+00.00 to 29+16.16	8, 12	19	
-Y2-	13+50.00 to 30+50.00	9, 14	20	

ROADWAY  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34979.1.1 (U-3816) F.A. PROJ. STP-0831 (2)  
COUNTY HOKE  
PROJECT DESCRIPTION PALMER STREET EXTENSION FROM NC 211 AT SR 1149 TO NC 20 AT SR 1403

CAUTION NOTICE

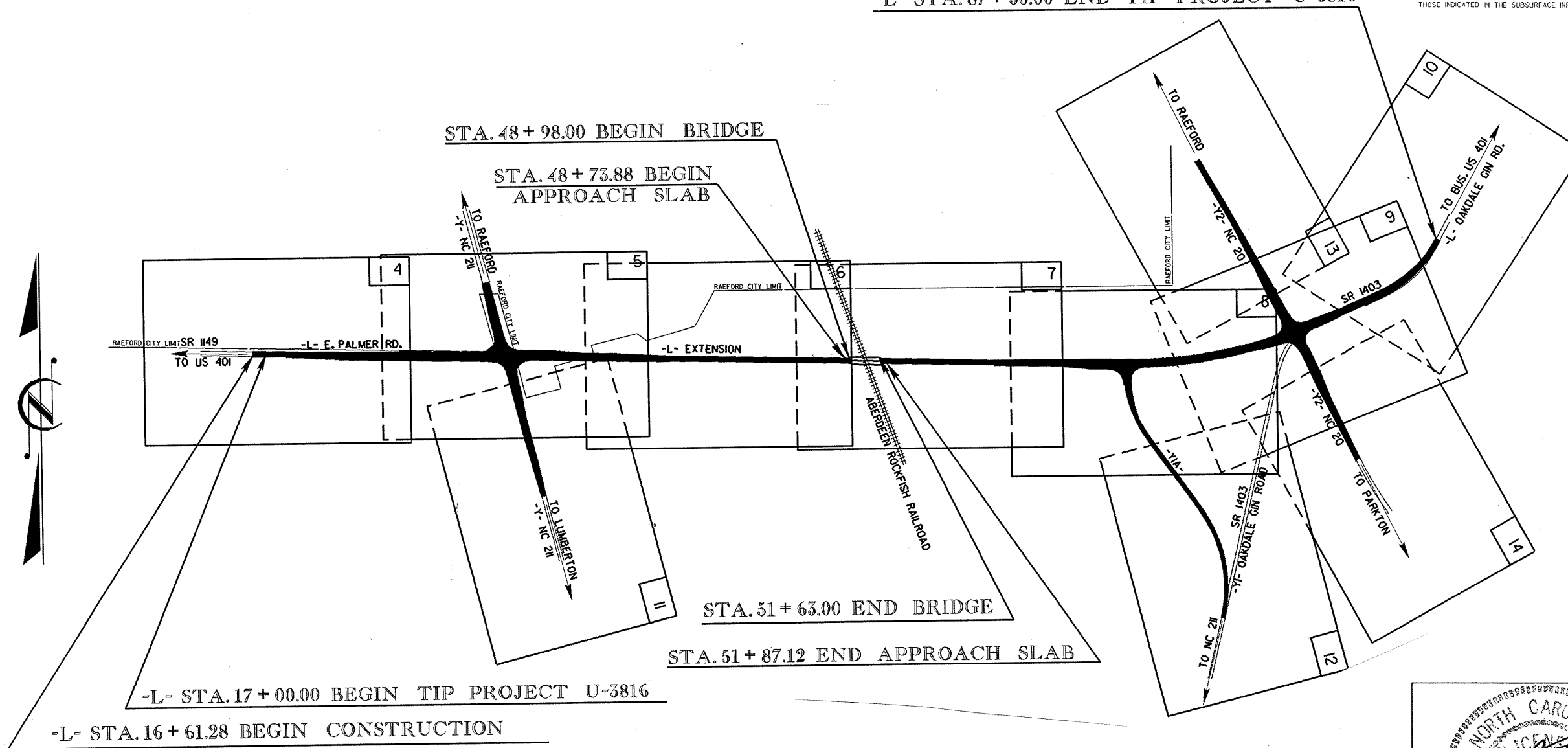
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

INVENTORY

-L- STA. 87 + 50.00 END TIP PROJECT U-3816



PERSONNEL

C.C. MURRAY

J.E. ESTEP

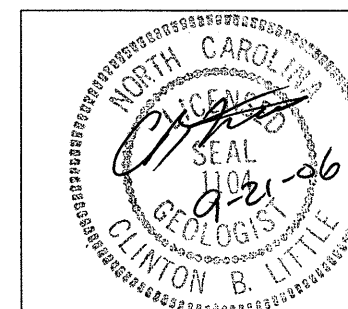
L.N. HARPER

INVESTIGATED BY \_\_\_\_\_

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

DATE JUNE 2006



DRAWN BY: J.K. McClURE

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

CONTRACT: C201738 ID: U-3816

09/08/99  
 12-JUN-2006 14:55  
 d:\projects\U3816\_geo\_rdw\_ahoke\_co\cadd\geotech\planprof\U3816\_GEO\_tshia\_rdy\_tshi.dgn  
 include AT 08/22/10

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

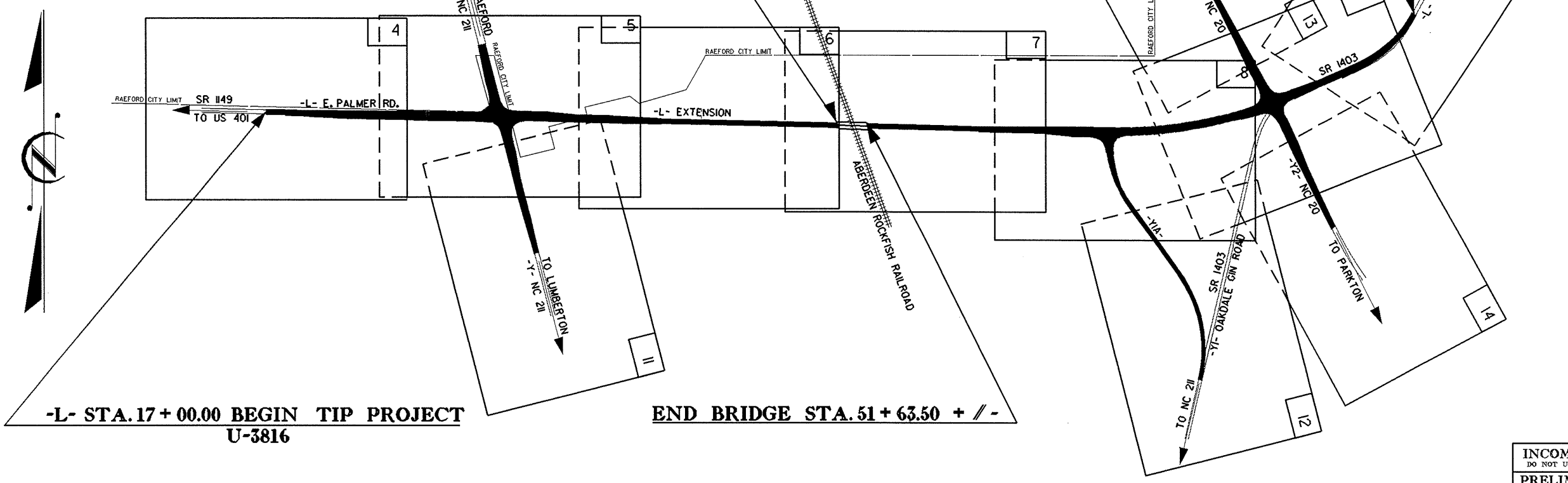
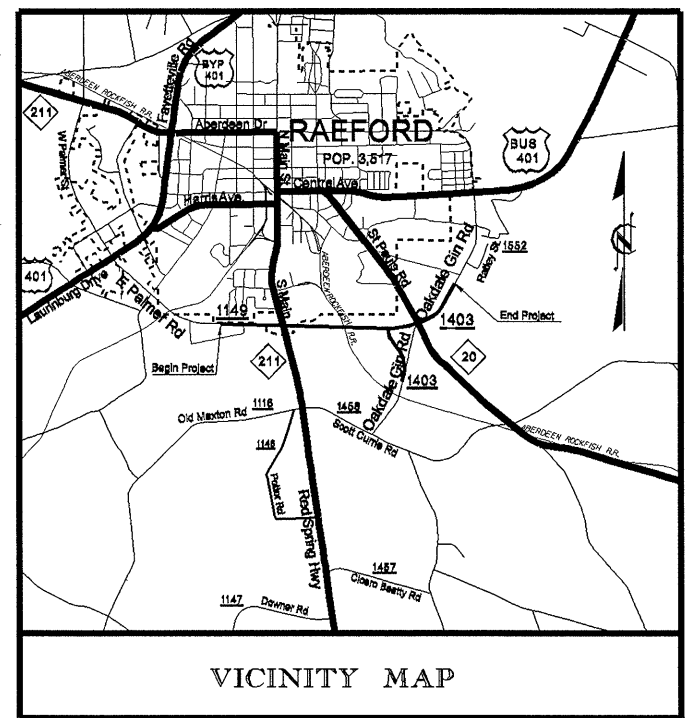
**HOKE COUNTY**

LOCATION: PALMER STREET EXTENSION FROM NC 211  
 AT SR 1149 TO NC 20 AT SR 1403

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3816	1A	25
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34979.1.1	STP-0831 (2)	PE	

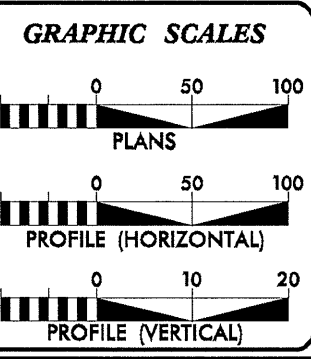
**TIP PROJECT: U-3816**



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF RAEFORD

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

**CONTRACT:**



**DESIGN DATA**

ADT 2005 =	7900
ADT 2025 =	13000
DHV =	14%
D =	60%
T =	6%
V =	50 MPH
TTST 2% DUAL 4%	
FUNC CLASS =	RURAL MAJOR COLLECTOR

**PROJECT LENGTH**

LENGTH OF ROADWAY TIP PROJECT U-3816 =	1.299 MI
LENGTH OF STRUCTURE TIP PROJECT U-3816 =	0.036 MI
TOTAL LENGTH OF TIP PROJECT U-3816 =	1.335 MI

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

2002 STANDARD SPECIFICATIONS	<b>G. E. BREW, PE</b> PROJECT ENGINEER
RIGHT OF WAY DATE: JULY 21, 2006	
PRODUCTION LETTING DATE: DECEMBER 18, 2007	
LETTING DATE: JULY 15, 2008	<b>W. T. BEST</b> PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

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

**ROADWAY DESIGN ENGINEER**

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

**DIVISION OF HIGHWAYS  
 STATE OF NORTH CAROLINA**

STATE DESIGN ENGINEER \_\_\_\_\_ P.E.

**DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION**

APPROVED \_\_\_\_\_ P.E.

DIVISION ADMINISTRATOR \_\_\_\_\_ DATE \_\_\_\_\_

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. U-3816  
SHEET NO. 2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																	
<p>SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>		<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED). <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b>, <b>SUBANGULAR</b>, <b>SUBROUNDED</b>, OR <b>ROUNDED</b>.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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>ADUFER</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, 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 DISLODGED 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 (ROD)</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 (SRQD)</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>																																																																																																																	
<p style="text-align: center;"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th>SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-b, A-3</td> <td>A-2, A-2-1, A-2-5, A-2-6, A-2-7</td> <td>A-4, A-5, A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td># 10, # 40, # 200</td> <td></td> <td></td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX, NP</td> <td></td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>4 MX, 8 MX, 12 MX, 16 MX, No MX</td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS, CLAYEY SOILS</td> </tr> <tr> <td>GENERATING AS A SUBGRADE</td> <td>EXCELLENT TO GOOD</td> <td>FAIR TO POOR</td> <td>FAIR TO POOR, POOR, UNSUITABLE</td> </tr> </table> <p>PI OF A-7-5 SUBGROUP IS &lt;= LL - 30 + PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS	GROUP CLASS.	A-1, A-1-b, A-3	A-2, A-2-1, A-2-5, A-2-6, A-2-7	A-4, A-5, A-6, A-7	SYMBOL				% PASSING	# 10, # 40, # 200			LIQUID LIMIT PLASTIC INDEX	6 MX, NP			GROUP INDEX	0	4 MX, 8 MX, 12 MX, 16 MX, No MX		USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS, CLAYEY SOILS	GENERATING AS A SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR, POOR, UNSUITABLE	<p style="text-align: center;"><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;"><b>COMPRESSIBILITY</b></p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;"><b>PERCENTAGE OF MATERIAL</b></p> <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</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt;10%</td> <td>&gt;20%</td> <td>HIGHLY</td> </tr> <tr> <td></td> <td></td> <td></td> <td>1 - 10%, 10 - 20%, 20 - 35%, 35% AND ABOVE</td> </tr> </table> <p style="text-align: center;"><b>GROUND WATER</b></p> <p> 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</p> <p style="text-align: center;"><b>MISCELLANEOUS SYMBOLS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td> SPT TEST BORING</td> <td> SAMPLE DESIGNATIONS</td> </tr> <tr> <td> SOIL SYMBOL</td> <td> AUGER BORING</td> <td>S - BULK SAMPLE</td> </tr> <tr> <td> ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td> CORE BORING</td> <td>SS - SPLIT SPOON SAMPLE</td> </tr> <tr> <td> INFERRED SOIL BOUNDARY</td> <td> MONITORING WELL</td> <td>ST - SHELBY TUBE SAMPLE</td> </tr> <tr> <td> INFERRED ROCK LINE</td> <td> PIEZOMETER INSTALLATION</td> <td>RS - ROCK SAMPLE</td> </tr> <tr> <td> ALLUVIAL SOIL BOUNDARY</td> <td> SLOPE INDICATOR INSTALLATION</td> <td>RT - RECOMPACTED TRIAXIAL SAMPLE</td> </tr> <tr> <td> DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</td> <td> SPT N-VALUE</td> <td>CBR - CALIFORNIA BEARING RATIO SAMPLE</td> </tr> <tr> <td> SOUNDING ROD</td> <td> SPT REFUSAL</td> <td></td> </tr> </table> <p style="text-align: center;"><b>ABBREVIATIONS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>AR - AUGER REFUSAL</td> <td>HL - HIGHLY</td> <td># - MOISTURE CONTENT</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MED. - MEDIUM</td> <td>V - VERY</td> </tr> <tr> <td>CL - CLAY</td> <td>MICA - MICACEOUS</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>MOD. - MODERATELY</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CSE - COARSE</td> <td>NP - NON PLASTIC</td> <td>% - UNIT WEIGHT</td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>ORG. - ORGANIC</td> <td>% - DRY UNIT WEIGHT</td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>e - VOID RATIO</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>SLL. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY				1 - 10%, 10 - 20%, 20 - 35%, 35% AND ABOVE	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	SPT TEST BORING	SAMPLE DESIGNATIONS	SOIL SYMBOL	AUGER BORING	S - BULK SAMPLE	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	CORE BORING	SS - SPLIT SPOON SAMPLE	INFERRED SOIL BOUNDARY	MONITORING WELL	ST - SHELBY TUBE SAMPLE	INFERRED ROCK LINE	PIEZOMETER INSTALLATION	RS - ROCK SAMPLE	ALLUVIAL SOIL BOUNDARY	SLOPE INDICATOR INSTALLATION	RT - RECOMPACTED TRIAXIAL SAMPLE	DIP & DIP DIRECTION OF ROCK STRUCTURES	SPT N-VALUE	CBR - CALIFORNIA BEARING RATIO SAMPLE	SOUNDING ROD	SPT REFUSAL		AR - AUGER REFUSAL	HL - HIGHLY	# - MOISTURE CONTENT	BT - BORING TERMINATED	MED. - MEDIUM	V - VERY	CL - CLAY	MICA - MICACEOUS	VST - VANE SHEAR TEST	CPT - CONE PENETRATION TEST	MOD. - MODERATELY	WEA. - WEATHERED	CSE - COARSE	NP - NON PLASTIC	% - UNIT WEIGHT	DMT - DILATOMETER TEST	ORG. - ORGANIC	% - DRY UNIT WEIGHT	DPT - DYNAMIC PENETRATION TEST	PMT - PRESSUREMETER TEST		e - VOID RATIO	SAP. - SAPROLITIC		F - FINE	SD. - SAND, SANDY		FOSS. - FOSSILIFEROUS	SL. - SILT, SILTY		FRAC. - FRACTURED, FRACTURES	SLL. - SLIGHTLY		FRAGS. - FRAGMENTS	TCR - TRICONE REFUSAL	
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LIQUID LIMIT PLASTIC INDEX	6 MX, NP																																																																																																																						
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USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS, CLAYEY SOILS																																																																																																																				
GENERATING AS A SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR, POOR, UNSUITABLE																																																																																																																				
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LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE																																																																																																																				
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME																																																																																																																				
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ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	SPT TEST BORING	SAMPLE DESIGNATIONS																																																																																																																					
SOIL SYMBOL	AUGER BORING	S - BULK SAMPLE																																																																																																																					
ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	CORE BORING	SS - SPLIT SPOON SAMPLE																																																																																																																					
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ALLUVIAL SOIL BOUNDARY	SLOPE INDICATOR INSTALLATION	RT - RECOMPACTED TRIAXIAL SAMPLE																																																																																																																					
DIP & DIP DIRECTION OF ROCK STRUCTURES	SPT N-VALUE	CBR - CALIFORNIA BEARING RATIO SAMPLE																																																																																																																					
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CPT - CONE PENETRATION TEST	MOD. - MODERATELY	WEA. - WEATHERED																																																																																																																					
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

September 18, 2006

STATE PROJECT: 34979.1.1 (U-3816)  
FEDERAL PROJECT: STP-0831(2)  
COUNTY: Hoke  
DESCRIPTION: Palmer Street Extension from NC 211 at SR 1149 to NC 20 at SR 1403  
SUBJECT: Geotechnical Report - Inventory

### PROJECT DESCRIPTION

The project is a southern bypass around the town of Raeford in Hoke County that will link US 401 with NC 20. It will consist of a two lane roadway, mostly on new location, with a grade separation at the Aberdeen Rockfish Rail Road. The grade separation will carry the roadway over the railroad, requiring up to 30 feet of embankment. The -L- alignment runs generally from west to east. The following alignments were investigated:

-L- Station 17+00 to 87+50  
-Y- Station 16+70 to 34+00  
-Y1A- Station 10+00 to 29+16.16  
-Y2- Station 14+00 to 30+00

The total length of lines investigated is 12296' or approximately 2.3 miles.

The geotechnical field investigation was conducted during April of 2006. Borings were conducted with a CME-550 drill machine with an automatic hammer. The investigation included 33 Standard Penetration Test borings and one hand auger boring.

### AREAS OF SPECIAL GEOTECHNICAL INTEREST

**Alluvial Soils:** Areas with significant alluvial deposits are discussed below.

Station 37+80 to 38+40 -L- (centerline): The alignment through this interval is mapped as a wetland. Alluvial deposits associated with this area are very soft wet organic (11%) clays and silts of about three and a half feet in thickness. Groundwater was present at one foot in the boring. In wet periods the area will be under shallow standing water.

Station 45+00 to 48+40 -L-: This area is also mapped as a wetland. Most of the area is to the left of the -L- alignment with the boundary very near the toe of the proposed slope. The floodplain/wetland area crosses the proposed alignment from Station 49+50 to 50+60 -L-. This area will be within the limits of the bridge over the Aberdeen & Rockfish Railroad as proposed. Alluvial deposits associated with this area are very soft wet organic (12.4%) clays and silts of about three and a half feet in thickness. Groundwater was present at the ground surface. In wet periods the area will be under shallow standing water.

**Groundwater:** Groundwater was present in numerous borings, commonly at five to ten feet in depth. It is present on or very near the ground surface in the wetland areas. Groundwater is within 10 feet of proposed grade in the following areas:

20+00 to 34+00 -L- (4-8' below grade)  
61+50 to 72+00 -L- (8-10')  
19+50 to 34+00 -Y- (8-10')  
22+00 to 29+04 -Y1A- (8-10')

Also, as previously noted, the areas near the toe of the proposed slopes in the vicinity of the railroad bridge are wetlands with shallow or surface water.

### PHYSIOGRAPHY AND GEOLOGY

The project is located in the Coastal Plain and below the Orangeburg Scarp region of North Carolina. The area is very flat. There is only one distinct terrain other than the wetlands. There is a surface layer of sand, one to three feet thick, running the entire length of the project.

## SOIL PROPERTIES

### *Alluvial Soils*

These soils were encountered in the two wetland areas as previously discussed.

### *Coastal Plain Soils*

A fairly consistent layer of tan & gray loose sand (A-2-4), commonly one to three feet thick, covers the entire project. Below this surface layer, the coastal plain soils are variable. We encountered nearly pure sands (A-1,A-3), silty sands (A-2-4), clayey sands (A-2-6), sandy clayey silts (A-4,A-5), and sandy clays (A-6,A-7). The clayey soils (A-2-6, A-6, A-7) appear to make up the largest percentage.

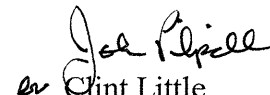
### *Roadway Embankment Fill Soils*

Minor amounts of roadway fill are present on most of the existing roadways associated with the project. The fill materials are predominantly clayey sands, averaging one to two feet in thickness.

Submitted by,



Clay Murray  
Project Engineering Geologist

  
for Clint Little  
Regional Geological Engineer

PROJECT: 34979.3.1 (U-3816)		COUNTY: Hoke				DONE BY: WTB		DATE: 10/2/2007		CHKD BY: SWH		DATE: 10/3/2007	
STATION TO STATION	EXCAVATION (CUBIC YARDS)					EMBANKMENT (CUBIC YARDS)				BORROW	WASTE (CUBIC YARDS)		
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL EMBANKMENT	ROCK EMBANKMENT	EARTH EMBANKMENT	EMBANKMENT PLUS 20%		ROCK	SUITABLE	UNSUITABLE
Summary No. 1													
17+00.00 to 29+50.00 -L- Lt. Side	907				907	597		597	716			191	191
17+00.00 to 22+50.00 -Y- Rt. Side	240				240	241		241	289	49			
<b>Total Summary No. 1</b>	<b>1,147</b>				<b>1,147</b>	<b>838</b>		<b>838</b>	<b>1,006</b>	<b>49</b>		<b>191</b>	<b>191</b>
Summary No. 2													
21+25.00 to 30+00.00 -L- Rt. Side	59				59	866		866	1,039	980			
23+50.00 to 34+00.00 -Y- Rt. Side	72				72	1,318		1,318	1,582	1,510			
<b>Total Summary No. 2</b>	<b>131</b>				<b>131</b>	<b>2,184</b>		<b>2,184</b>	<b>2,621</b>	<b>2,490</b>			
Summary No. 3													
31+00.00 to 49+00.00 -L-	3,088				3,088	40,284		40,284	48,341	45,253			
17+00.00 to 34+00.00 -Y- Lt. Side	366				366	2,206		2,206	2,647	2,281			
<b>Total Summary No. 3</b>	<b>3,454</b>				<b>3,454</b>	<b>42,490</b>		<b>42,490</b>	<b>50,988</b>	<b>47,534</b>			
Summary No. 4													
52+00.00 to 74+50.00 -L-	2,756				2,756	49,156		49,156	58,987	56,231			
10+00.00 to 28+50.00 -Y1A-	2,618				2,618	2,325		2,325	2,790	172			
14+00.00 to 21+00.00 -Y2- Rt. Side	488				488	120		120	144			344	344
22+00.00 to 29+50.00 -Y2- Rt. Side	605				605	87		87	104			501	501
<b>Total Summary No. 4</b>	<b>6,467</b>				<b>6,467</b>	<b>51,688</b>		<b>51,688</b>	<b>62,026</b>	<b>56,403</b>		<b>845</b>	<b>845</b>
Summary No. 5													
75+00.00 to 87+00.00 -L- Lt. Side	2,097				2,097	206		206	247			1,850	1,850
14+00.00 to 21+00.00 -Y2- Lt. Side	152				152	89		89	107			45	45
<b>Total Summary No. 5</b>	<b>2,249</b>				<b>2,249</b>	<b>295</b>		<b>295</b>	<b>354</b>			<b>1,895</b>	<b>1,895</b>
Summary No. 6													
75+00.00 to 87+00.00 -L- Rt. Side	841				841	467		467	560			281	281
22+00.00 to 29+50.00 -Y2- Lt. Side	226				226	466		466	559	333			
<b>Total Summary No. 4</b>	<b>1,067</b>				<b>1,067</b>	<b>933</b>		<b>933</b>	<b>1,120</b>	<b>333</b>		<b>281</b>	<b>281</b>
<b>Summary Totals</b>	<b>14,515</b>				<b>14,515</b>	<b>98,428</b>		<b>98,428</b>	<b>118,114</b>	<b>106,809</b>		<b>3,211</b>	<b>3,211</b>
Loss Due to Clearing and Grubbing	-2,500				-2,500					2,500			
Waste to be used in lieu of Borrow										-2,311		-3,211	-3,211
Addition Shoulder Material						3,317		3,317	3,980	3,980			
<b>Project Total</b>	<b>12,015</b>				<b>12,015</b>	<b>101,745</b>		<b>101,745</b>	<b>122,094</b>	<b>110,979</b>		<b>0</b>	<b>0</b>
Est. 5% for Replacing Topsoil at Borrow Pit										5,549			
<b>Grand Total</b>	<b>12,015</b>									<b>116,528</b>			
<b>Say</b>	<b>12,500</b>									<b>117,000</b>			
Estimate	1125 CU. YDS DDE					EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT.							
Estimate	2000 CU. YDS UNDERCUT					THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSUFRACE DATA							
Estimate	2000 CU. YDS SELECT GRANULAR MATERIAL					PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT							
Estimate	1000 CU. YDS. CLASS IV SUBGRADE STABILIZATION												





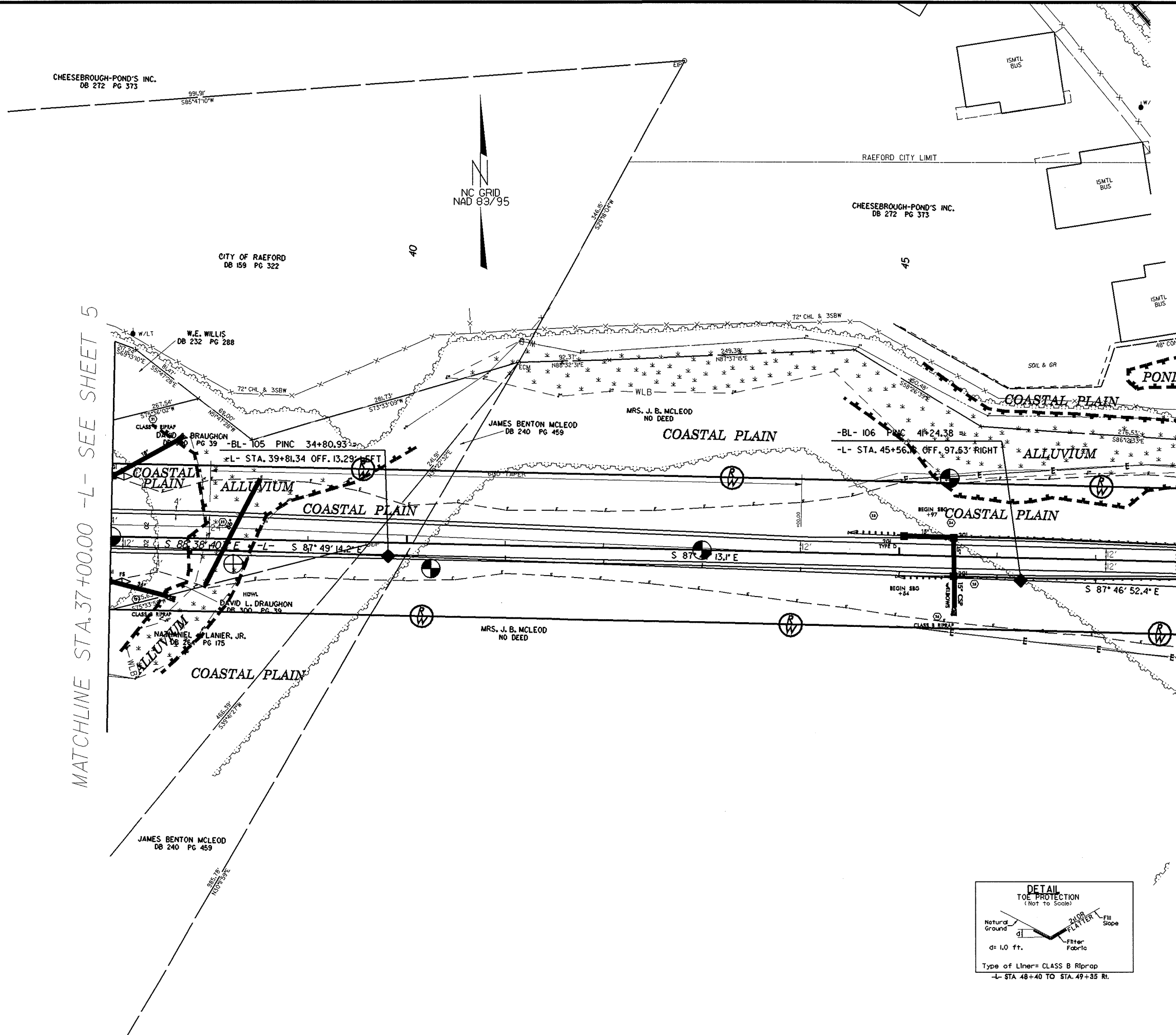


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12-JUN-2006 11:04  
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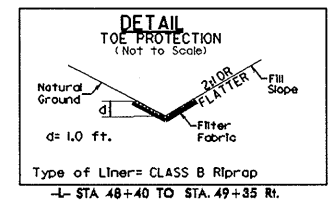
PROJECT REFERENCE NO. U-3816	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

NOTE: SEE SHEET 16 FOR -L- PROFILE



MATCHLINE STA. 37+00.00 -L- SEE SHEET 5

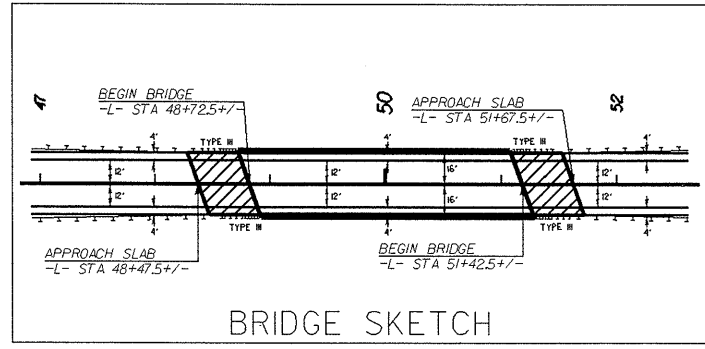
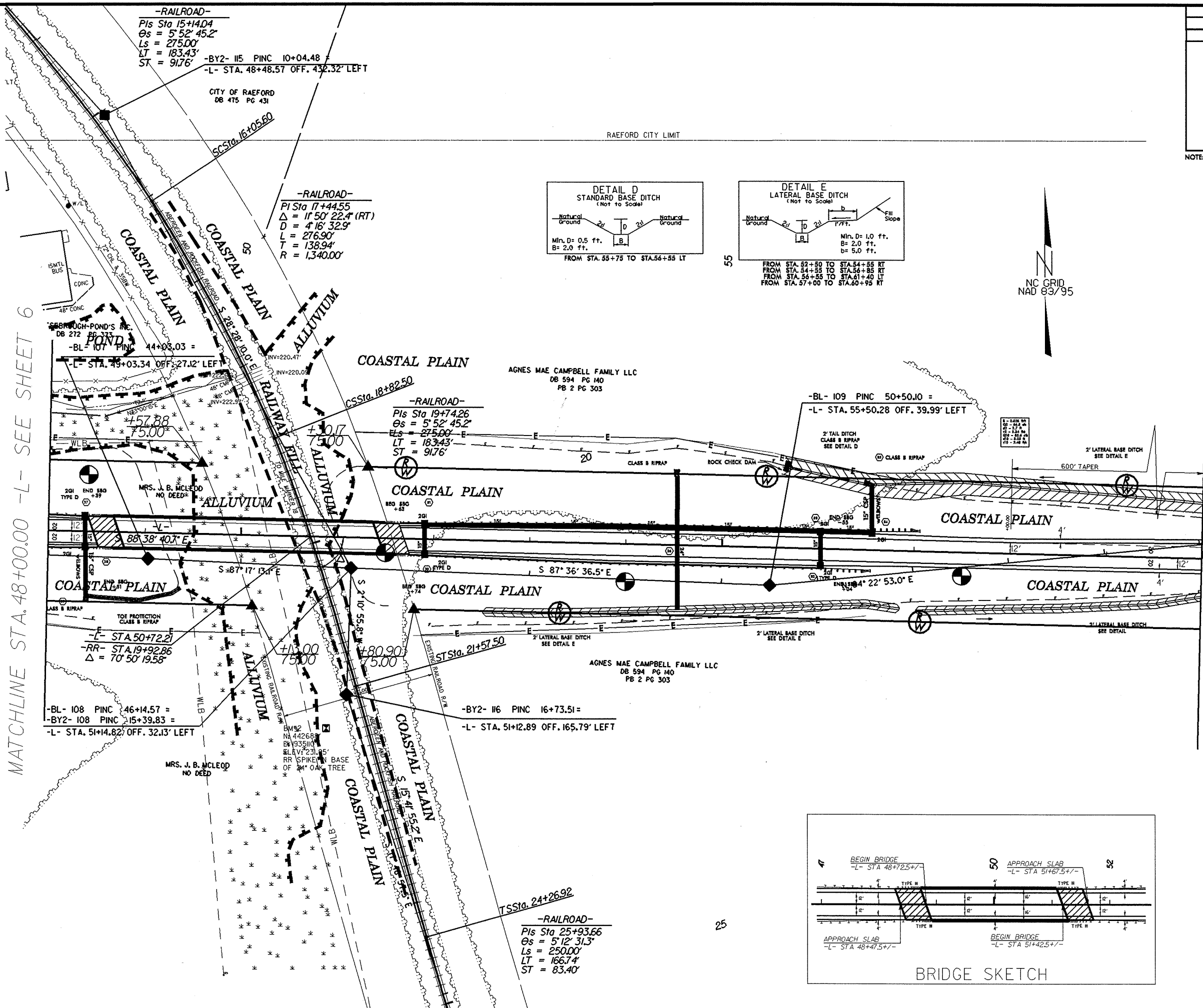
MATCHLINE STA. 48+00.00 -L- SEE SHEET 7



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PROJECT REFERENCE NO. U-3816	SHEET NO. 7
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	

NOTE: SEE SHEET 16 FOR -L- PROFILE



MATCHLINE STA. 48+00.00 -L- SEE SHEET 6

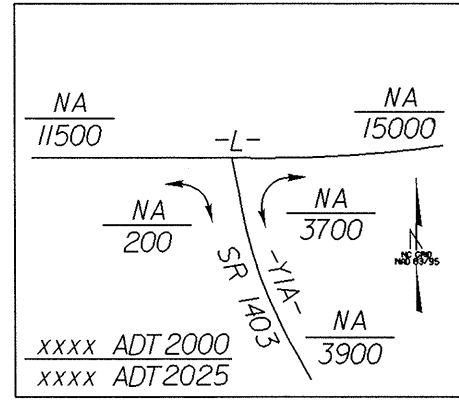
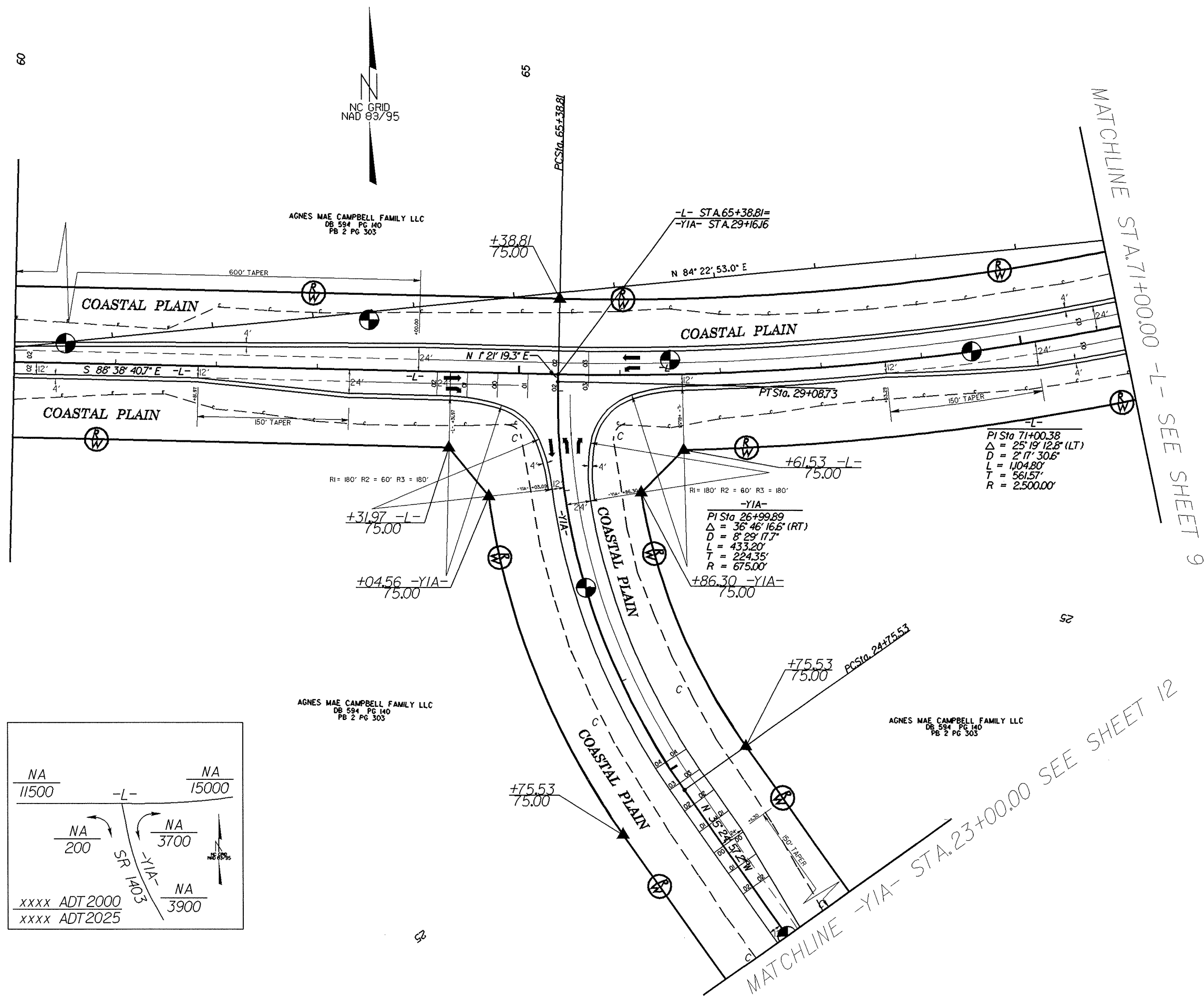
MATCHLINE STA. 60+00.00 -L- SEE SHEET 8

PROJECT REFERENCE NO. <i>U-3816</i>	SHEET NO. <i>8</i>
R/W SHEET NO.	
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	

NOTE: SEE SHEETS 16 & 17 FOR -L- PROFILE  
SEE SHEET 19 FOR -YIA- PROFILE

MATCHLINE STA.60+00.00 -L- SEE SHEET 7

MATCHLINE STA.71+00.00 -L- SEE SHEET 9



MATCHLINE -YIA- STA.23+00.00 SEE SHEET 12

8/17/99  
 12-JUN-2006 14:3  
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PROJECT REFERENCE NO. U-3816		SHEET NO. 9	
RW SHEET NO.			
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			

NOTE: SEE SHEET 17 FOR -L- PROFILE  
 SEE SHEET 20 FOR -Y2- PROFILE

MATCHLINE -Y2- STA.17+00.00 SEE SHEET 13

MATCHLINE STA.71+00.00 -L- SEE SHEET 8

MATCHLINE STA.82+00.00 -L- SEE SHEET 10

-Y2-  
 PI Sta 20+92.23  
 $\Delta = 4' 17" 41.0" (RT)$   
 $D = 0' 52" 53.3"$   
 $L = 487.22'$   
 $T = 243.72'$   
 $R = 6,500.00'$

AGNES MAE CAMPBELL FAMILY LLC  
 DB 594 PG 140  
 PB 2 PG 303

BM#3  
 N: 443147'  
 E: 1937265'  
 ELEV: 249.38'  
 RR SPIKE IN BASE  
 OF POWER POLE

-BL- IIO PINC 69+80.69 = +04.96 -Y2-  
 -BY3- IIO PINC 17+52.81 = 57.00  
 -BY4- IIO POT 5+00.00 = 57.00  
 -L- STA. 74+95.26 OFF. 14.75' RIGHT

+05.07 -L-  
 75.00  
 $RI = 180' R2 = 60' R3 = 180'$

AGNES MAE CAMPBELL FAMILY LLC  
 DB 594 PG 140  
 PB 2 PG 303

-L-  
 PI Sta 71+00.38  
 $\Delta = 25' 19" 12.8" (LT)$   
 $D = 2' 17" 30.6"$   
 $L = 1104.80'$   
 $T = 561.57'$   
 $R = 2,500.00'$

S 20° 05' 23.2" W  
 +13.29 -L-  
 75.00  
 $RI = 180' R2 = 60' R3 = 180'$

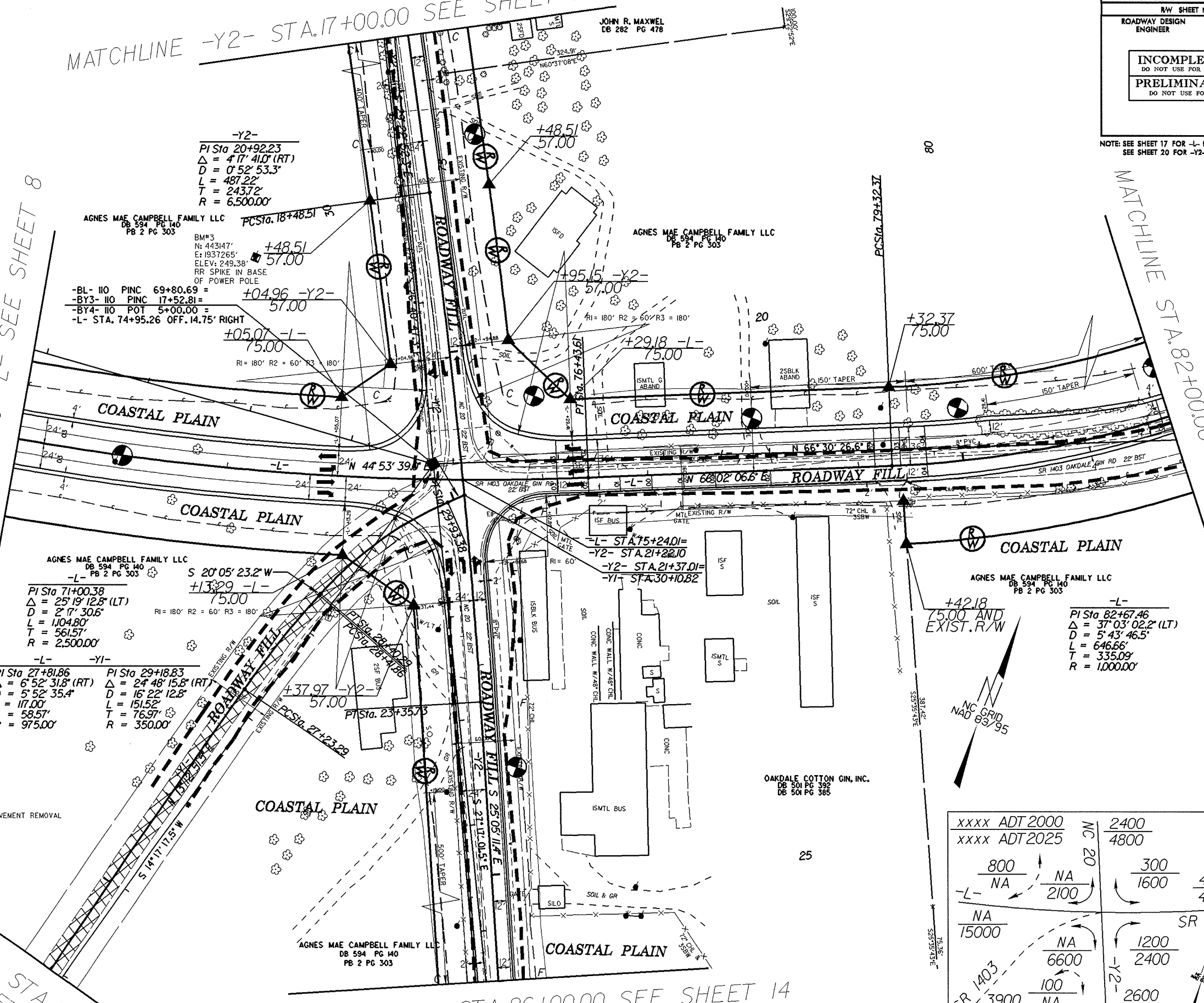
-L- -Y1-  
 PI Sta 27+81.86  
 $\Delta = 6' 52" 31.8" (RT)$   
 $D = 5' 52" 35.4"$   
 $L = 117.00'$   
 $T = 58.57'$   
 $R = 975.00'$

PI Sta 29+18.83  
 $\Delta = 24' 48" 15.8" (RT)$   
 $D = 16' 22" 12.8"$   
 $L = 151.52'$   
 $T = 76.97'$   
 $R = 350.00'$

PAVEMENT REMOVAL

MATCHLINE -Y1- STA.24+00.00  
 SEE SHEET 12

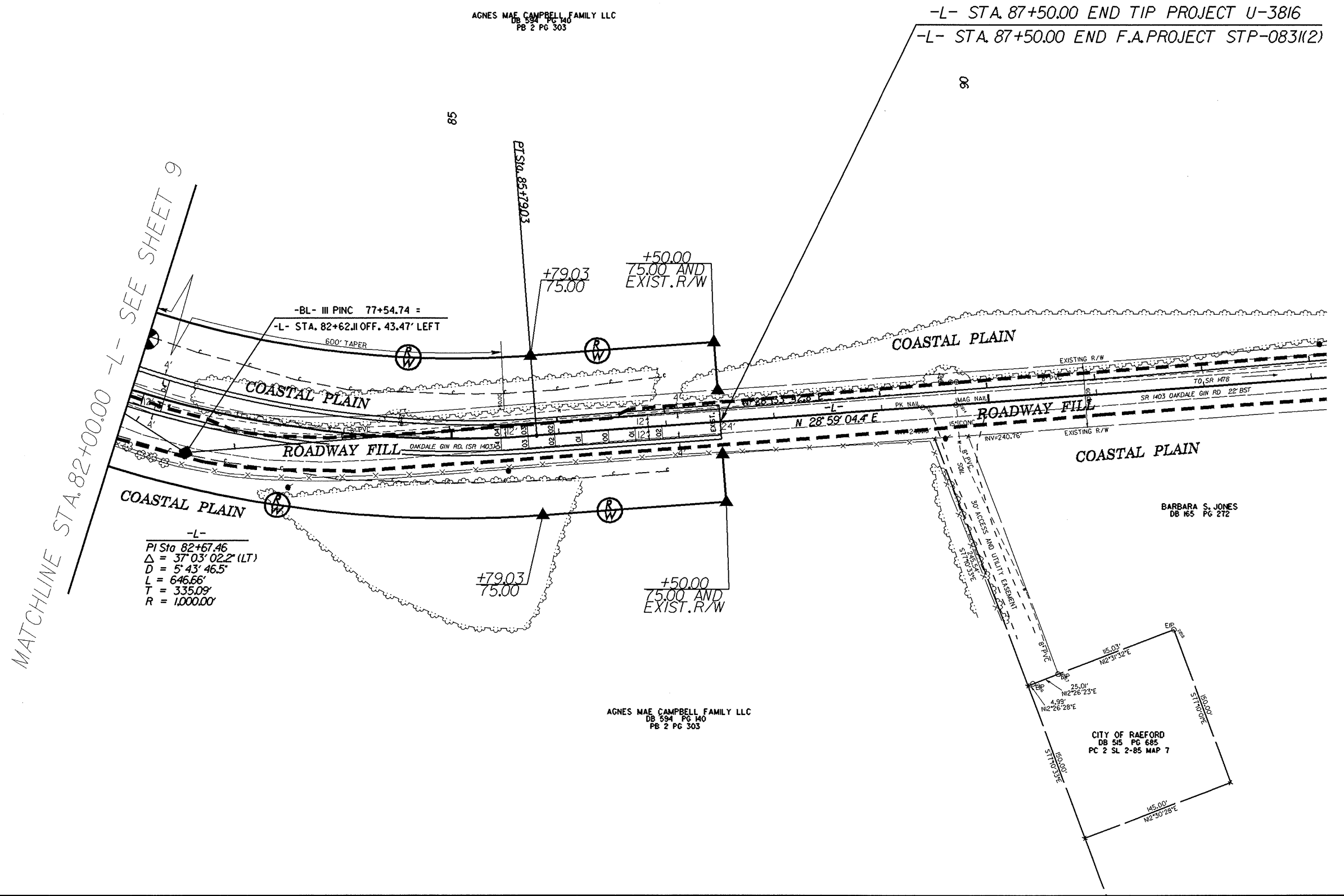
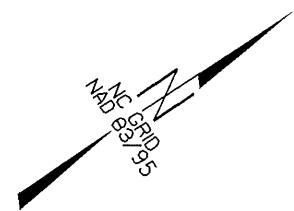
MATCHLINE -Y2- STA.26+00.00 SEE SHEET 14



xxxx ADT 2000	NC 20	2400	
xxxx ADT 2025		4800	
800	NA	300	4500
-L-	NA	1600	4800
NA	2100		
NA		1200	SR 1403
15000	NA	2400	
	6600		
SR 1403	100	2600	-Y2-
3900	NA	5400	
NA			

PROJECT REFERENCE NO. U-3816	SHEET NO. 10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NOTE: SEE SHEET 17 FOR -L- PROFILE



-L- STA. 87+50.00 END TIP PROJECT U-3816  
 -L- STA. 87+50.00 END F.A. PROJECT STP-0831(2)

AGNES MAE CAMPBELL FAMILY LLC  
 DB 594 PG 140  
 PG 2 PG 303

BARBARA S. JONES  
 DB 165 PG 212

AGNES MAE CAMPBELL FAMILY LLC  
 DB 594 PG 140  
 PG 2 PG 303

CITY OF RAEFORD  
 DB 515 PG 685  
 PC 2 SL 2-85 MAP 7

MATCHLINE STA. 82+00.00 -L- SEE SHEET 9

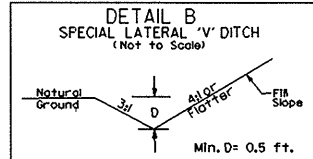
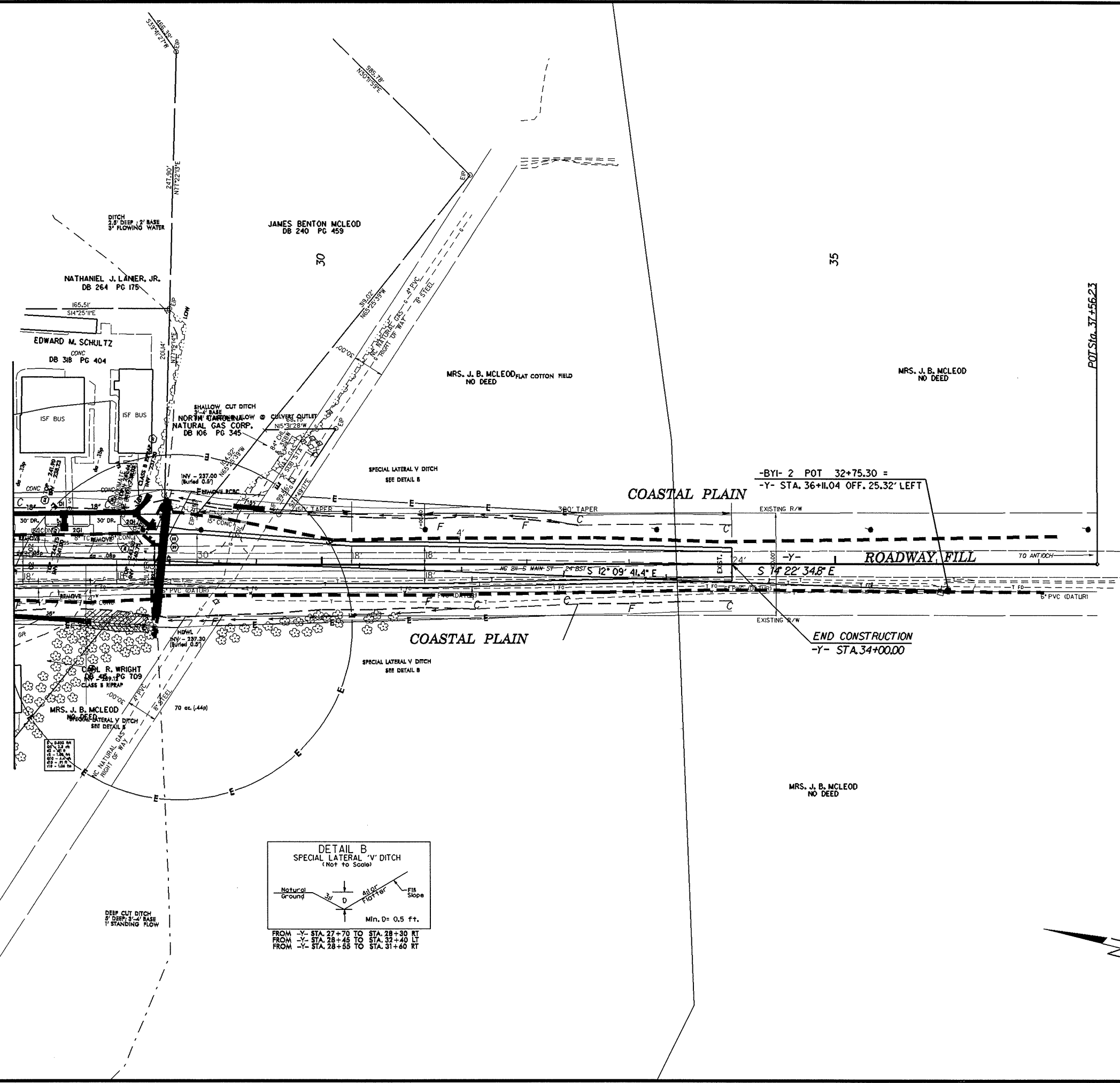
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uncchris

PROJECT REFERENCE NO.		SHEET NO.	
U-3816		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	

NOTE: SEE SHEET 18 FOR -Y- PROFILE

MATCHLINE STA. 27+00.00 -Y- SEE SHEET 5



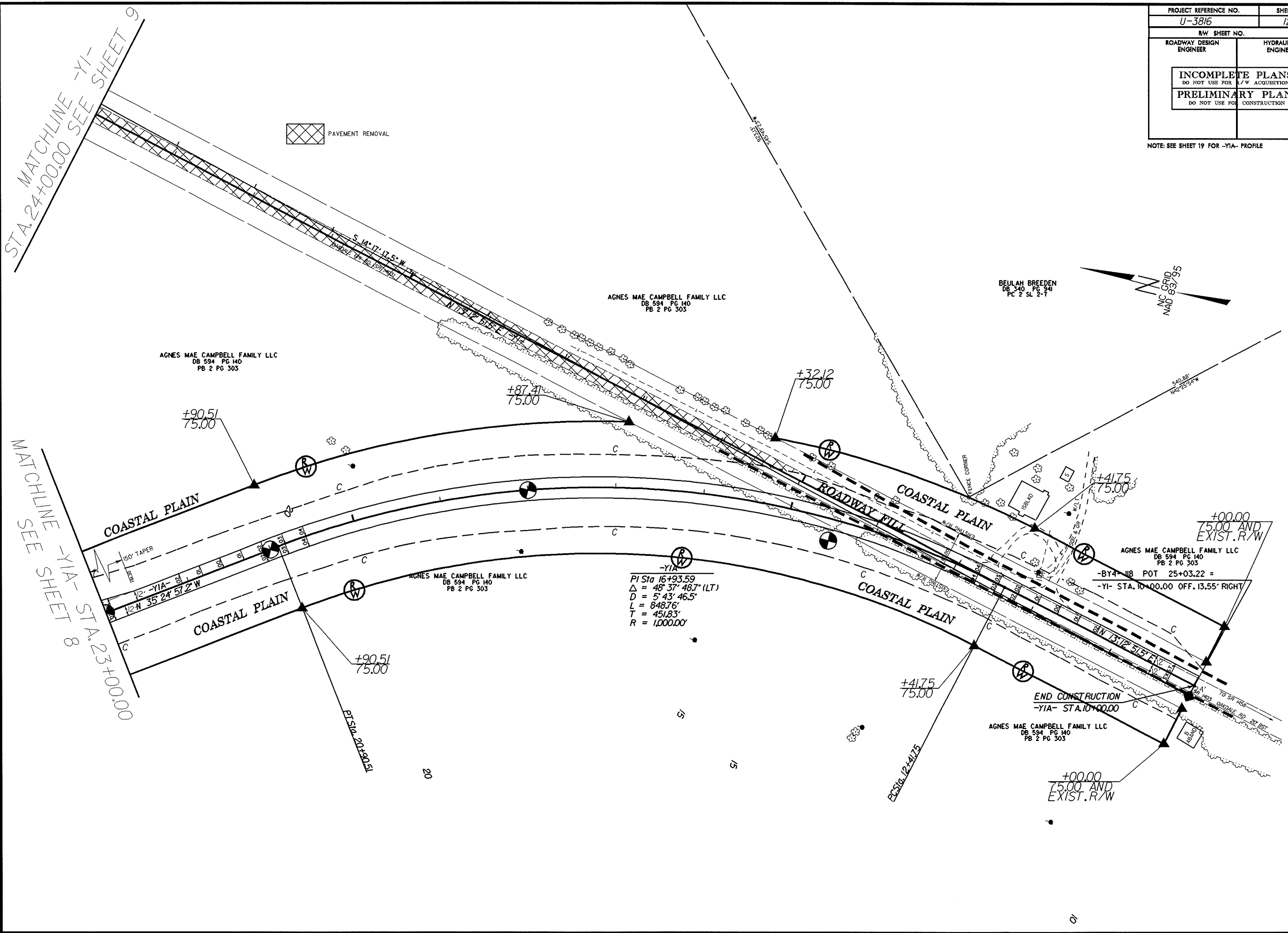
FROM -Y- STA. 27+70 TO STA. 28+30 RT  
 FROM -Y- STA. 28+45 TO STA. 32+40 LT  
 FROM -Y- STA. 28+55 TO STA. 31+60 RT



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 12-JUN-2006 14:19  
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 matches

PROJECT REFERENCE NO. U-3816	SHEET NO. 12
RW SHEET NO.	
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	

NOTE: SEE SHEET 19 FOR -Y1A- PROFILE

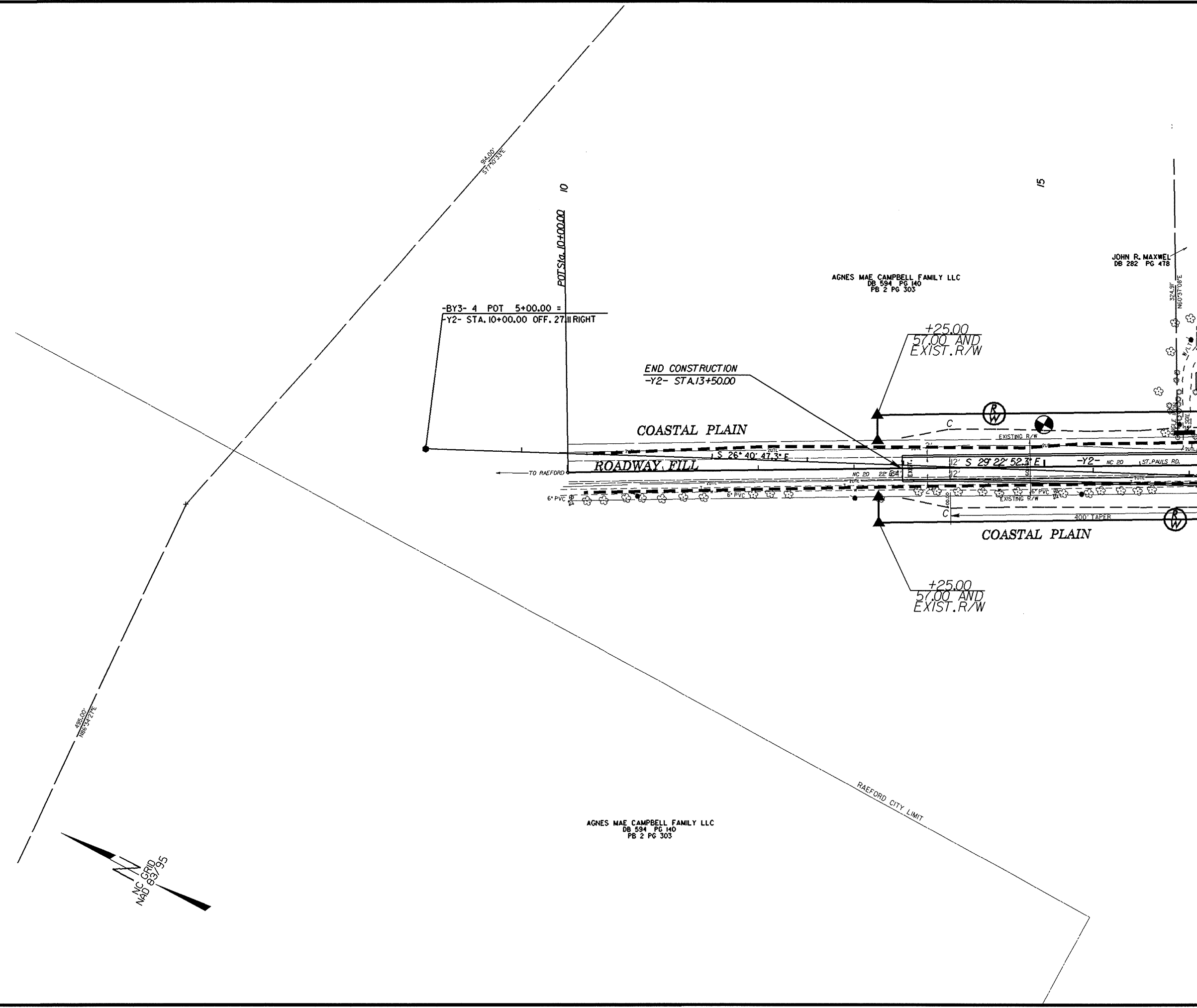


8/17/99

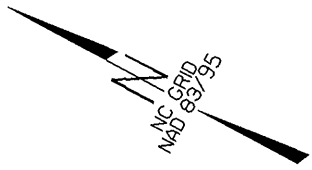
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PROJECT REFERENCE NO. U-3816		SHEET NO. 13	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION			

NOTE: SEE SHEET 20 FOR -Y2- PROFILE



MATCHLINE -Y2- STA.17+00.00 SEE SHEET 9



Q



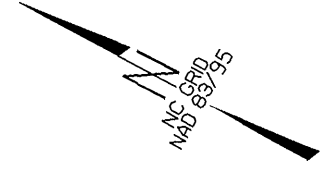
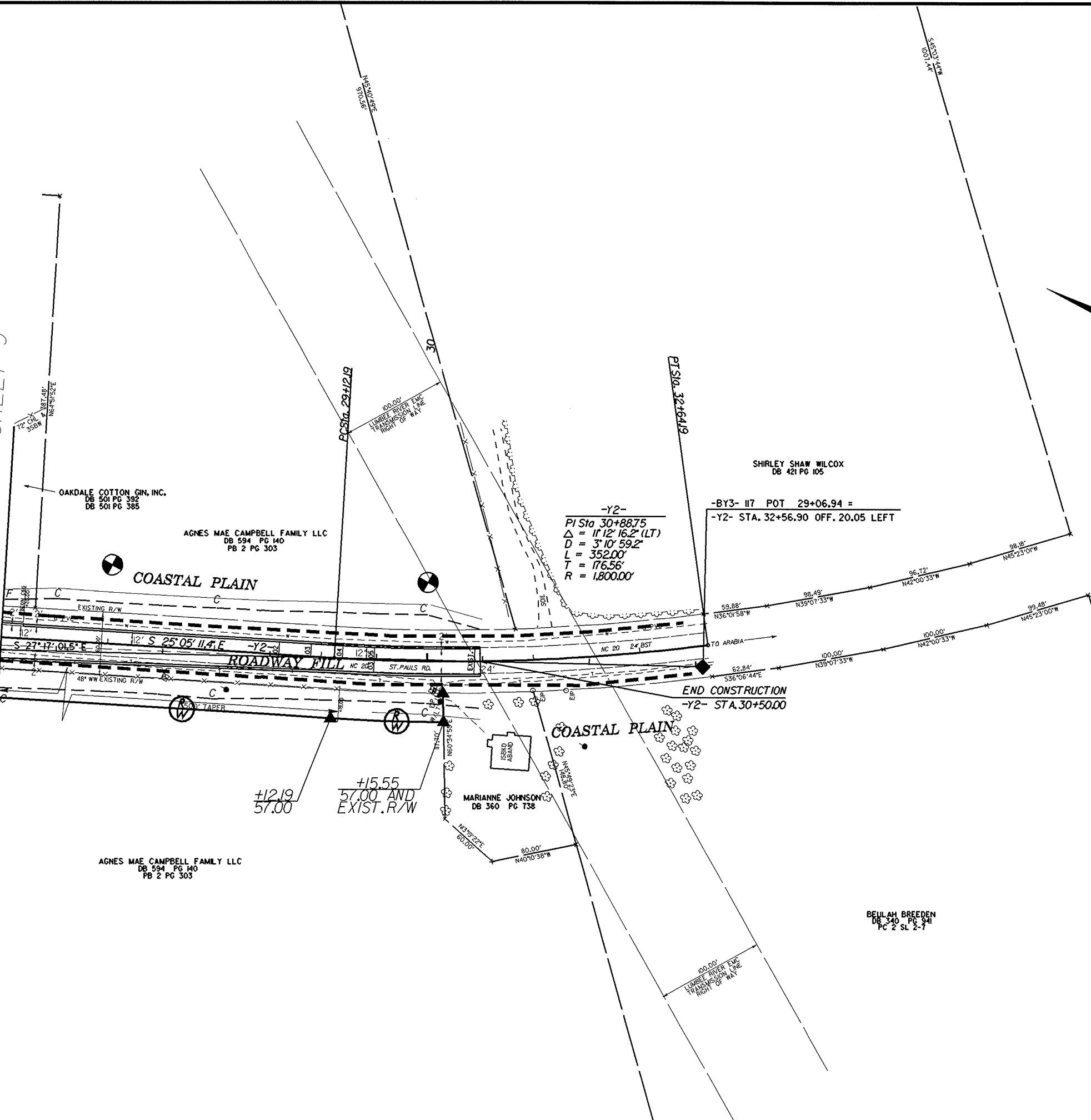
8/17/99

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PROJECT REFERENCE NO. <b>U-3816</b>		SHEET NO. <b>14</b>	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NOTE: SEE SHEET 20 FOR -Y2- PROFILE

MATCHLINE -Y2- STA. 26+00.00 SEE SHEET 9



AGNES MAE CAMPBELL FAMILY LLC  
DB 594 PG 140  
PB 2 PG 303

MARIANNE JOHNSON  
DB 360 PG 738

BEULAH BREEDEN  
DB 340 PG 341  
PC 2 SL 2-7

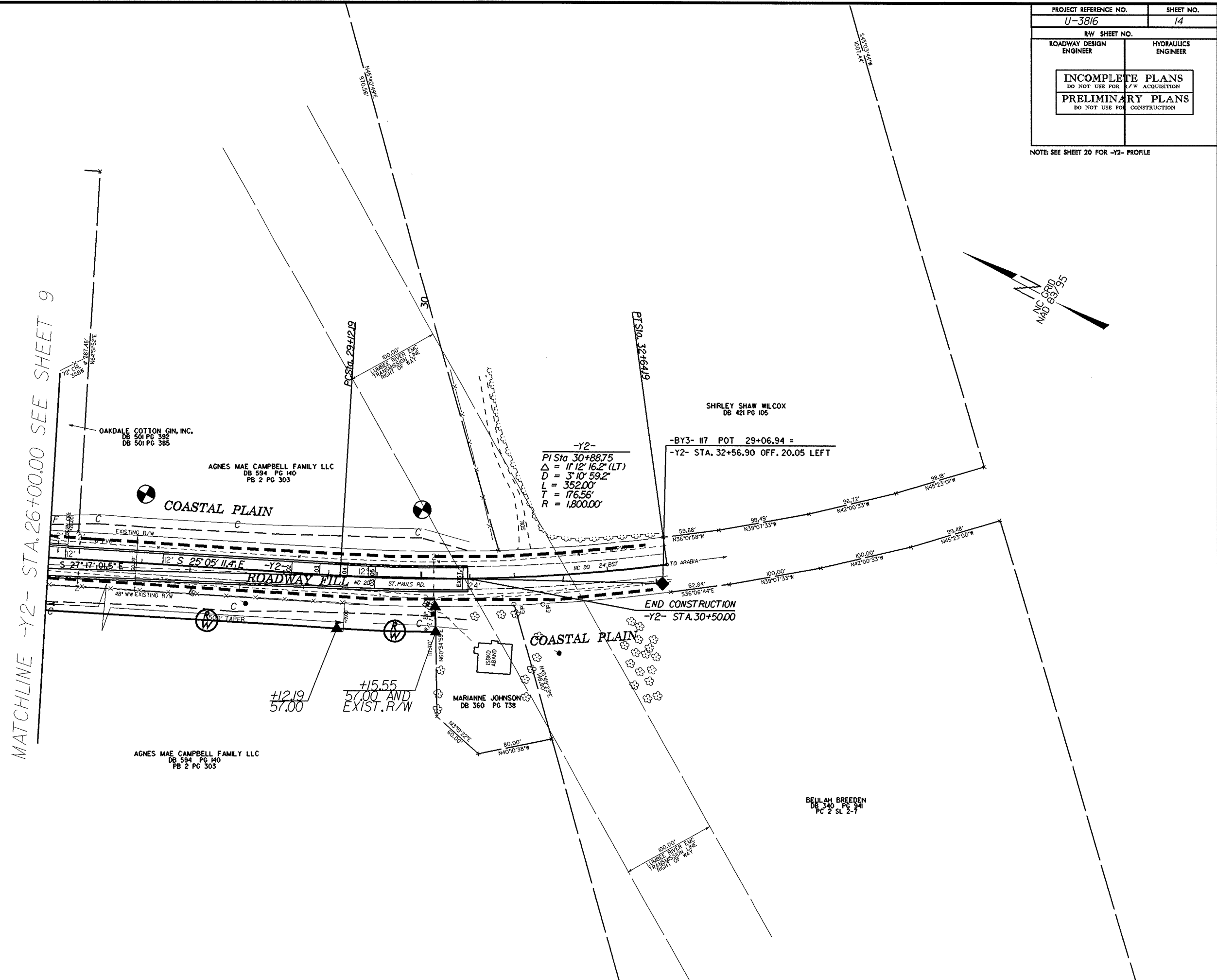
-Y2-  
PI Sta 30+88.75  
Δ = 11°12'16.2" (LT)  
D = 3°10'59.2"  
L = 352.00'  
T = 176.56'  
R = 1,800.00'

-BY3- II7 POT 29+06.94 =  
-Y2- STA. 32+56.90 OFF. 20.05 LEFT

END CONSTRUCTION  
-Y2- STA. 30+50.00

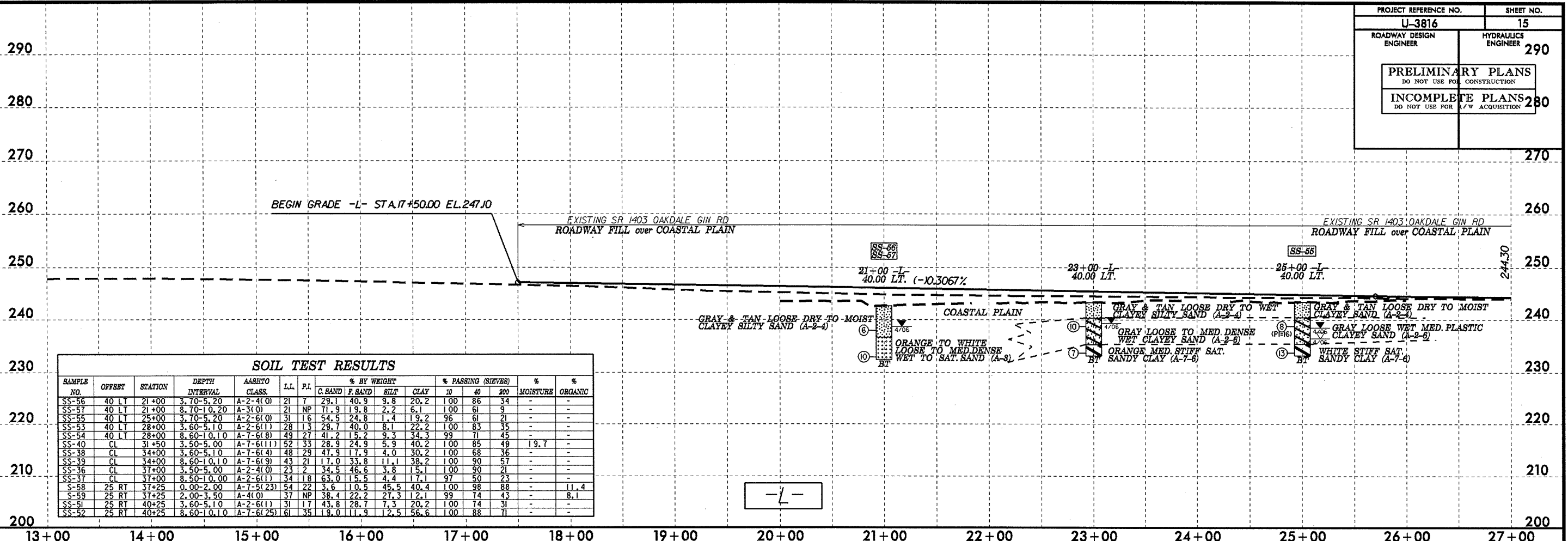
+12.19  
57.00

+15.55  
57.00 AND  
EXIST. R/W

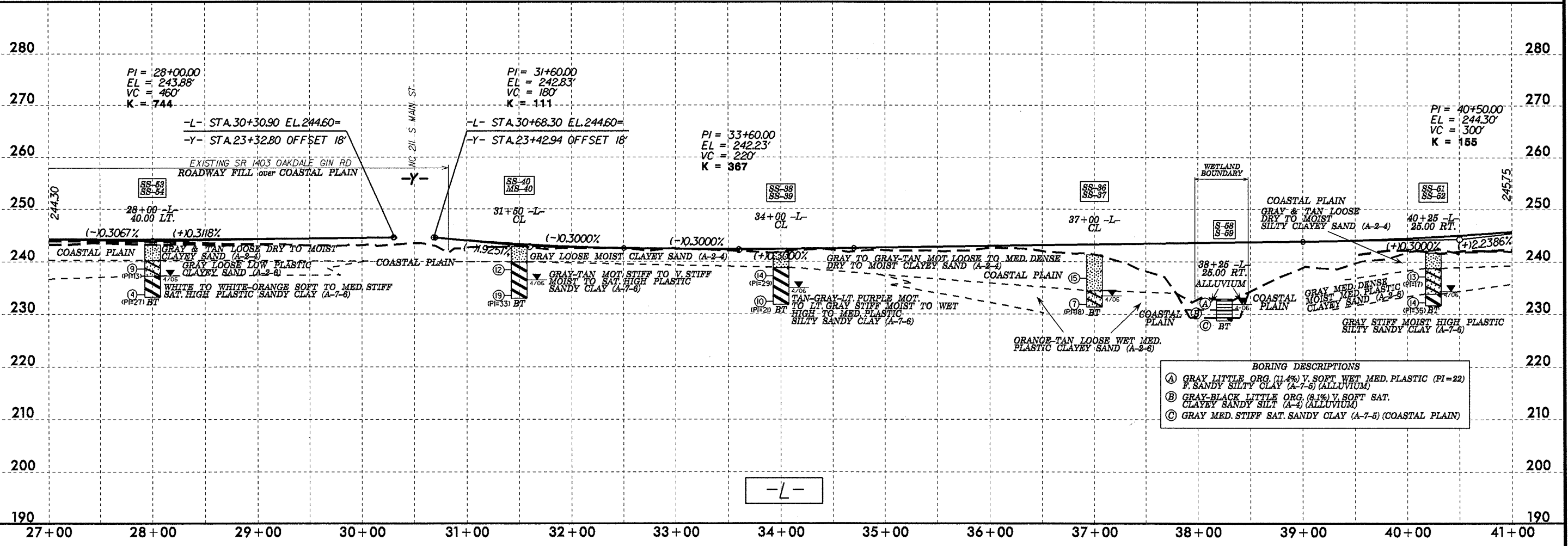


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 heke

PROJECT REFERENCE NO. <b>U-3816</b>	SHEET NO. <b>15</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	<b>290</b>
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	<b>280</b>



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AA&HTO CLASS.	L.L.	P.L.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40			200
SS-56	40 LT	21+00	3.70-5.20	A-2-4(0)	21	7	29.1	40.9	9.8	20.2	100	86	34	-	-
SS-57	40 LT	21+00	8.70-10.20	A-3(0)	21	NP	71.9	19.8	2.2	6.1	100	61	9	-	-
SS-55	40 LT	25+00	3.70-5.20	A-2-6(0)	31	16	54.5	24.8	1.4	19.2	96	61	21	-	-
SS-53	40 LT	28+00	3.60-5.10	A-2-6(1)	28	13	29.7	40.0	8.1	22.2	100	83	35	-	-
SS-54	40 LT	28+00	8.60-10.10	A-7-6(8)	49	27	41.2	15.2	9.3	34.3	99	71	45	-	-
SS-40	CL	31+50	3.50-5.00	A-7-6(11)	52	35	28.9	24.9	5.9	40.2	100	85	49	19.7	-
SS-38	CL	34+00	3.60-5.10	A-7-6(4)	48	29	47.9	17.9	4.0	30.2	100	68	36	-	-
SS-39	CL	34+00	8.60-10.10	A-7-6(9)	43	21	17.0	33.8	11.1	38.2	100	90	57	-	-
SS-36	CL	37+00	3.50-5.00	A-2-4(0)	23	2	34.5	46.6	3.8	15.1	100	90	21	-	-
SS-37	CL	37+00	8.50-10.00	A-2-6(1)	34	18	63.0	15.5	4.4	17.1	97	50	23	-	-
S-58	25 RT	37+25	0.00-2.00	A-7-5(23)	54	22	3.6	10.5	45.5	40.4	100	98	88	-	11.4
S-59	25 RT	37+25	2.00-3.50	A-4(0)	37	NP	38.4	22.2	27.3	12.1	99	74	43	-	8.1
SS-51	25 RT	40+25	3.60-5.10	A-2-6(1)	31	17	43.8	28.7	7.3	20.2	100	74	31	-	-
SS-52	25 RT	40+25	8.60-10.10	A-7-6(25)	61	35	18.0	11.9	12.5	56.6	100	88	71	-	-



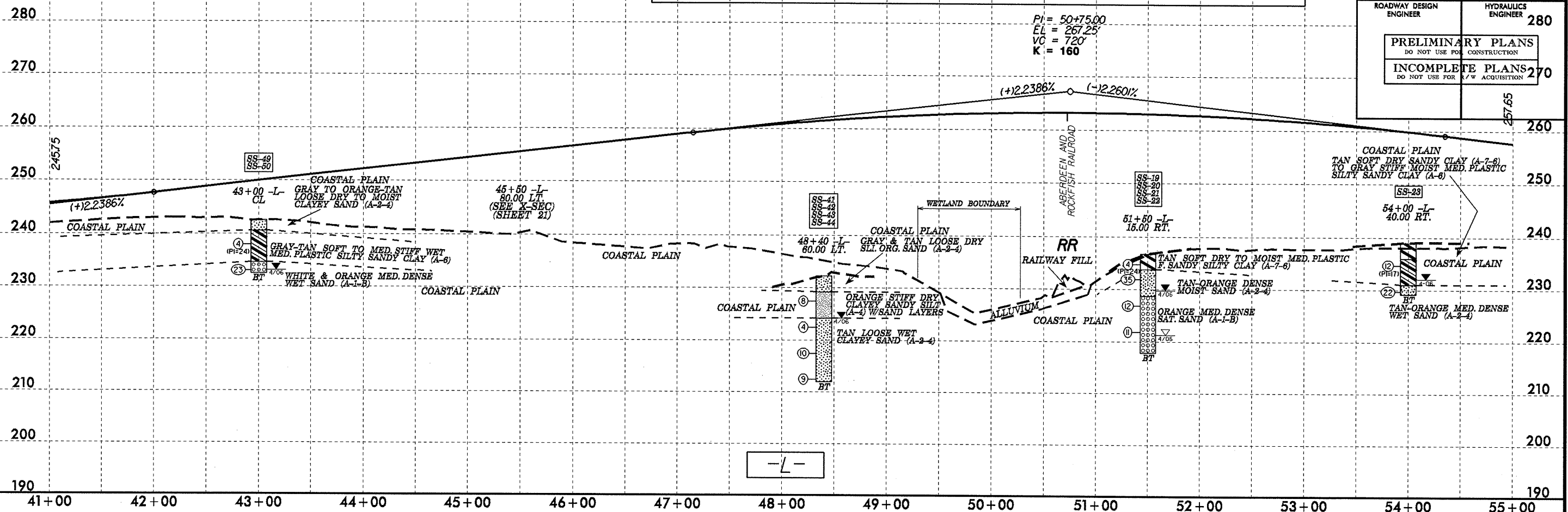
BORING DESCRIPTIONS	
(A)	GRAY LITTLE ORG. (11.4%) V. SOFT WET MED. PLASTIC (PI=22) F. SANDY SILTY CLAY (A-7-5) (ALLUVIUM)
(B)	GRAY-BLACK LITTLE ORG. (8.1%) V. SOFT SAT. CLAYEY SANDY SILT (A-4) (ALLUVIUM)
(C)	GRAY MED. STIFF SAT. SANDY CLAY (A-7-5) (COASTAL PLAIN)

5/28/99  
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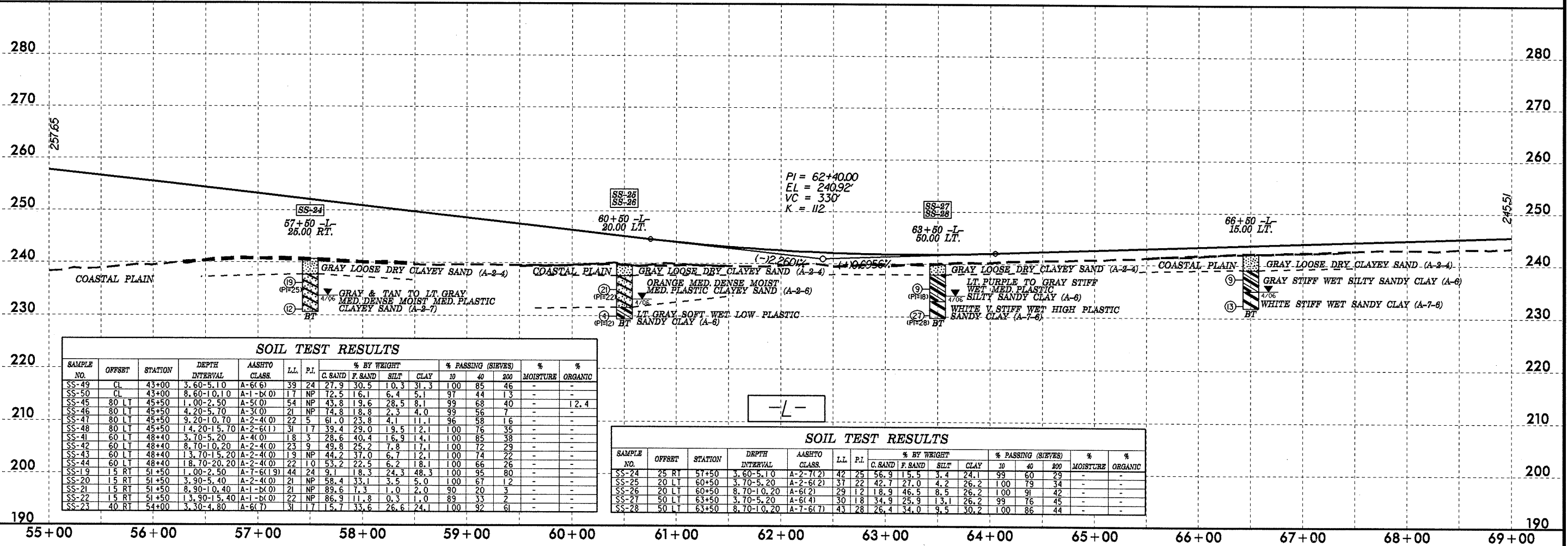
BM \*2 EL.231.85 RAILROAD SPIKE IN BASE OF 24" OAK TREE RIGHT OF -L- STA.50+92.68 OFFSET 200.55'

PROJECT REFERENCE NO. U-3816	SHEET NO. 16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER 280
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	

PI = 50+75.00  
 EL = 267.25'  
 VC = 720'  
 K = 160



-L-



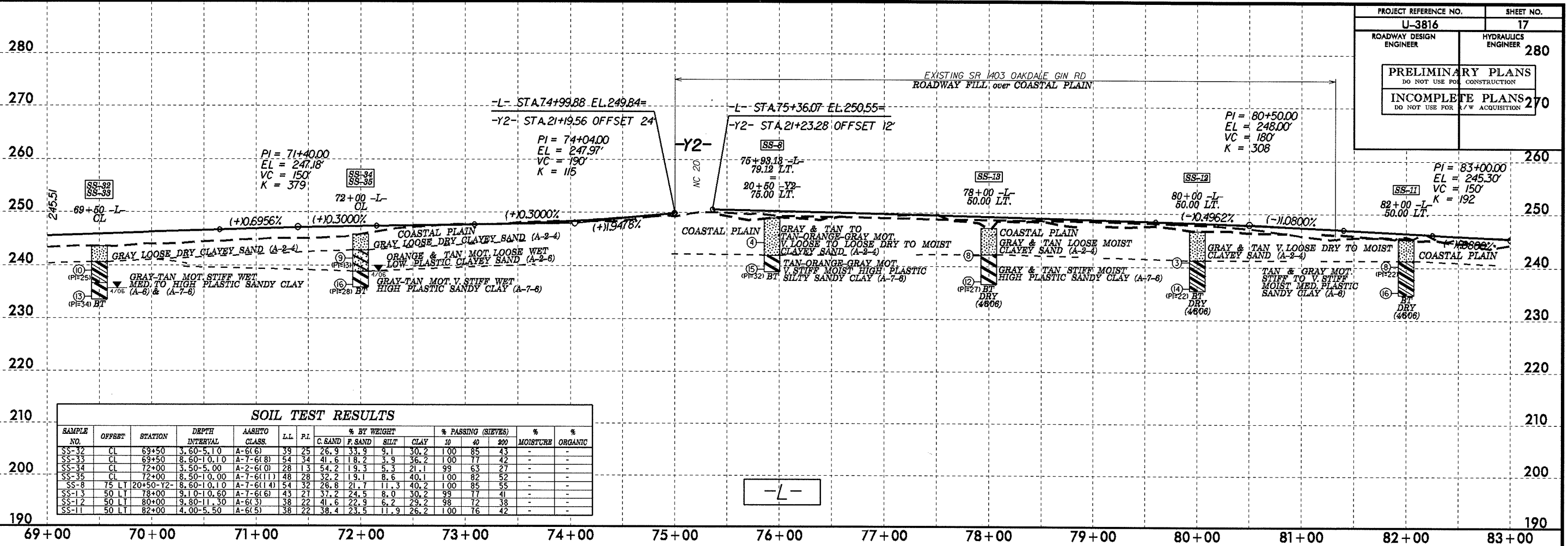
-L-

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		
SS-49	CL	43+00	3.60-5.10	A-6(6)	39	24	27.9	30.5	10.3	31.3	100	85	46	-	-
SS-50	CL	43+00	8.60-10.10	A-1-b(0)	17	NP	72.5	16.1	6.4	5.1	97	44	13	-	-
SS-45	80 LT	45+50	1.00-2.50	A-5(0)	54	NP	43.8	19.6	28.5	8.1	99	68	40	-	12.4
SS-46	80 LT	45+50	4.20-5.70	A-3(0)	21	NP	74.8	18.8	2.3	4.0	99	56	7	-	-
SS-47	80 LT	45+50	9.20-10.70	A-2-4(0)	22	5	61.0	23.8	4.1	11.1	96	58	16	-	-
SS-48	80 LT	45+50	14.20-15.70	A-2-6(1)	31	17	39.4	29.0	19.5	12.1	100	76	35	-	-
SS-41	60 LT	48+40	3.70-5.20	A-4(0)	18	3	28.6	40.4	16.9	14.1	100	85	38	-	-
SS-42	60 LT	48+40	8.70-10.20	A-2-4(0)	23	9	49.8	25.2	7.8	17.1	100	72	29	-	-
SS-43	60 LT	48+40	13.70-15.20	A-2-4(0)	19	NP	44.2	37.0	6.7	12.1	100	74	22	-	-
SS-44	60 LT	48+40	18.70-20.20	A-2-4(0)	22	10	53.2	22.5	6.2	18.1	100	66	26	-	-
SS-19	15 RT	51+50	1.00-2.50	A-7-6(19)	44	24	9.1	18.3	24.3	48.3	100	35	80	-	-
SS-20	15 RT	51+50	3.90-5.40	A-2-4(0)	21	NP	58.4	33.1	3.5	5.0	100	67	12	-	-
SS-21	15 RT	51+50	8.90-10.40	A-1-b(0)	21	NP	89.6	7.3	1.0	2.0	90	20	3	-	-
SS-22	15 RT	51+50	13.90-15.40	A-1-b(0)	22	NP	86.9	11.8	0.3	1.0	89	33	2	-	-
SS-23	40 RT	54+00	3.30-4.80	A-6(7)	31	17	15.7	33.6	26.6	24.1	100	92	61	-	-

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		
SS-24	25 RT	57+50	3.60-5.10	A-2-7(2)	42	25	56.9	15.5	3.4	24.1	99	60	29	-	-
SS-25	20 LT	60+50	3.70-5.20	A-2-6(2)	37	22	42.7	27.0	4.2	26.2	100	79	34	-	-
SS-26	20 LT	60+50	8.70-10.20	A-6(2)	29	12	18.9	46.5	8.5	26.2	100	91	42	-	-
SS-27	50 LT	63+50	3.70-5.20	A-6(4)	30	18	34.9	25.9	13.1	26.2	99	76	45	-	-
SS-28	50 LT	63+50	8.70-10.20	A-7-6(7)	43	28	26.4	34.0	9.5	30.2	100	86	44	-	-

5/28/99

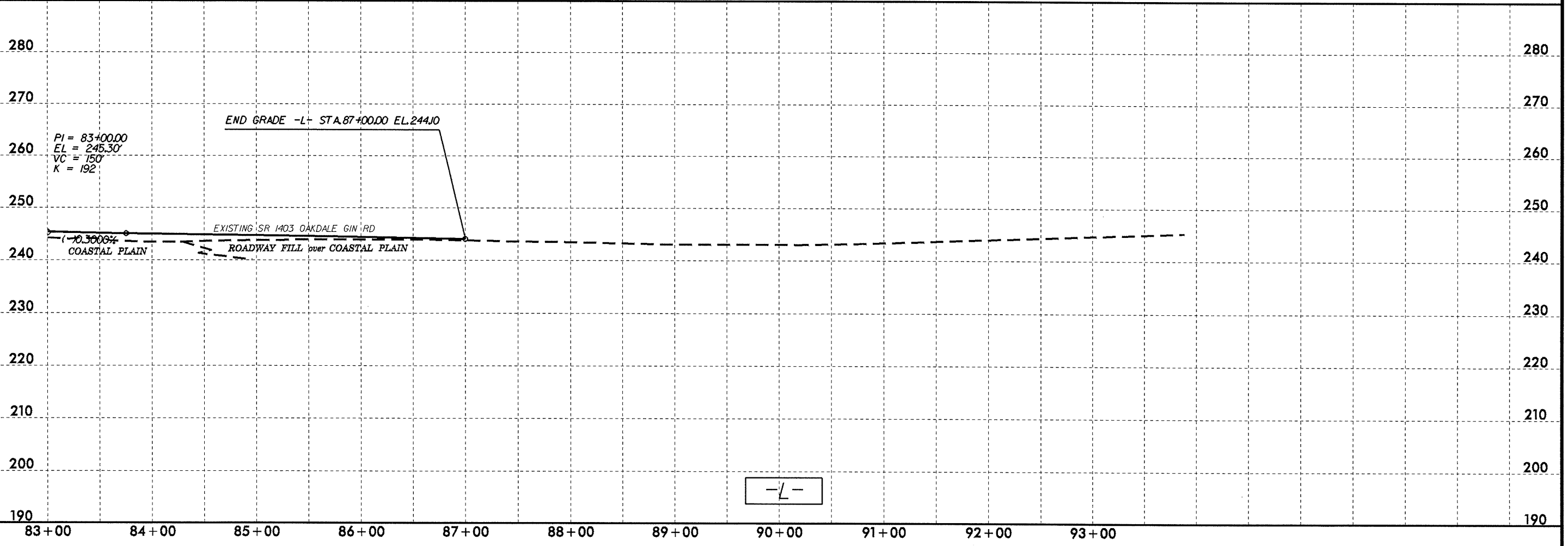
PROJECT REFERENCE NO.		SHEET NO.	
U-3816		17	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER		280
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		270	
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION			



**SOIL TEST RESULTS**

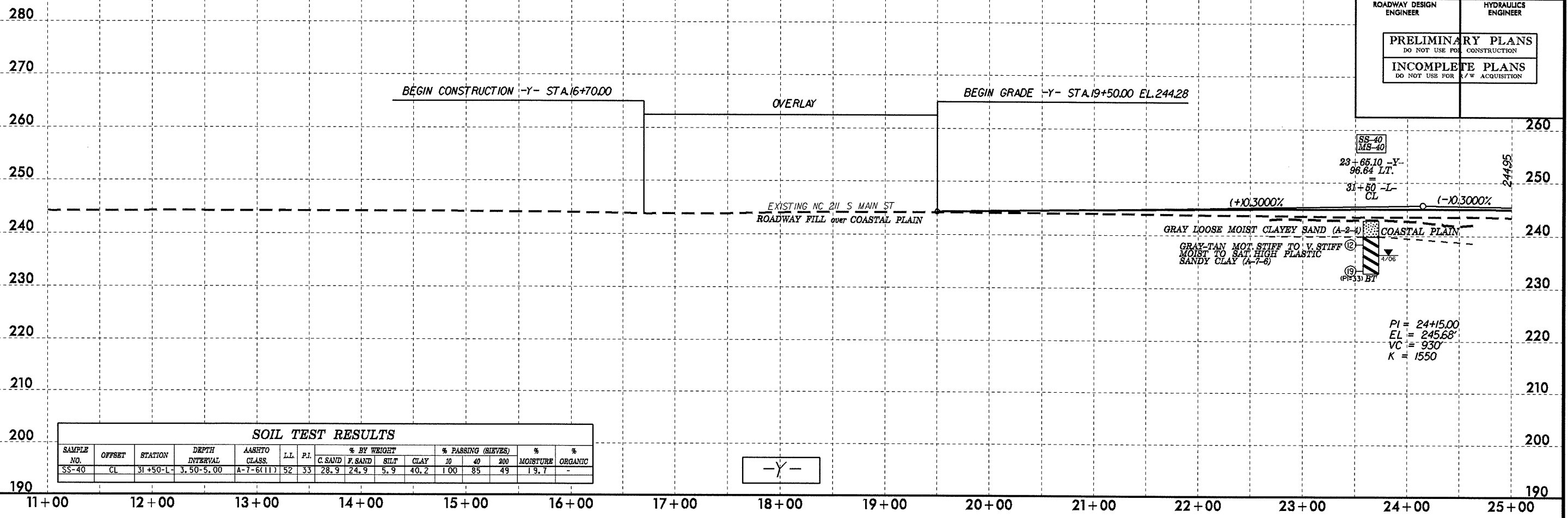
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-32	CL	69+50	3.60-5.10	A-6(6)	39	25	26.9	33.9	9.1	30.2	100	85	43	-	-
SS-33	CL	69+50	8.60-10.10	A-7-6(8)	54	34	41.6	18.2	3.9	36.2	100	77	42	-	-
SS-34	CL	72+00	3.50-5.00	A-2-6(10)	28	13	54.2	19.3	5.3	21.1	99	63	27	-	-
SS-35	CL	72+00	8.50-10.00	A-7-6(11)	48	28	32.2	19.1	8.6	40.1	100	82	52	-	-
SS-8	75 LT	70+50-Y2	8.60-10.10	A-7-6(14)	54	32	26.8	21.7	11.3	40.2	100	85	55	-	-
SS-13	50 LT	78+00	9.10-10.60	A-7-6(6)	43	27	37.2	24.5	8.0	30.2	99	77	41	-	-
SS-12	50 LT	80+00	9.30-11.30	A-6(3)	38	22	41.6	22.9	6.2	29.2	98	72	38	-	-
SS-11	50 LT	82+00	4.00-5.50	A-6(5)	38	22	38.4	23.5	11.9	26.2	100	76	42	-	-

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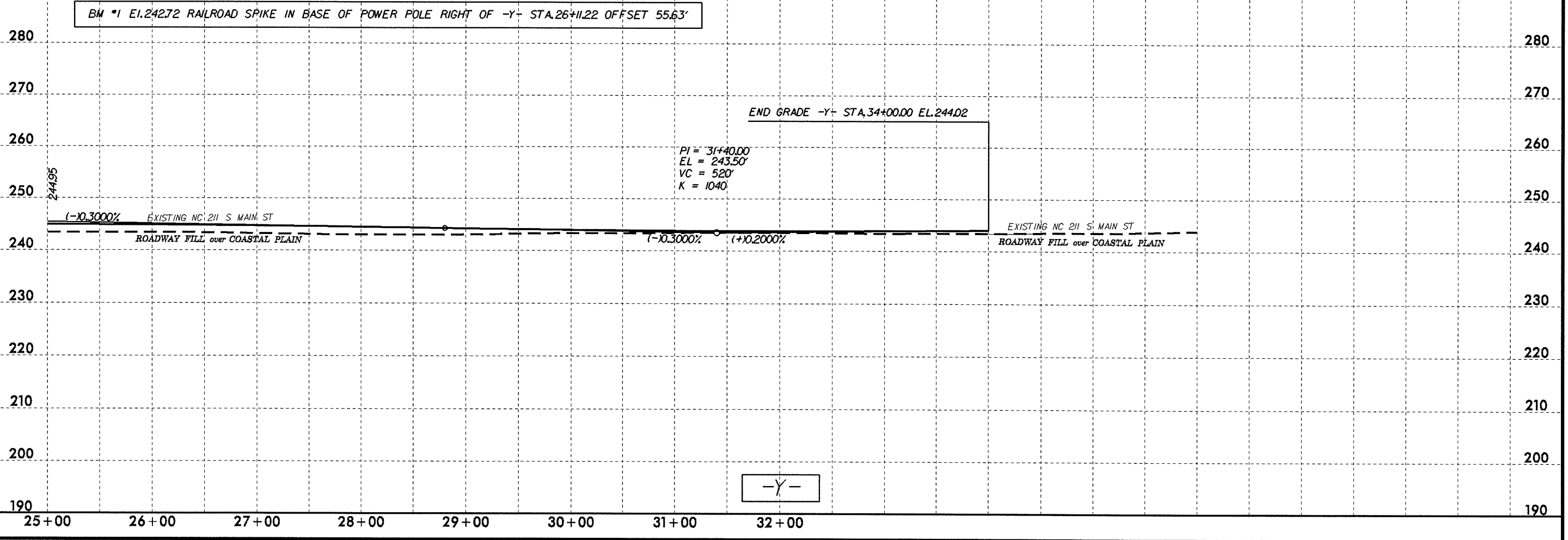
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	

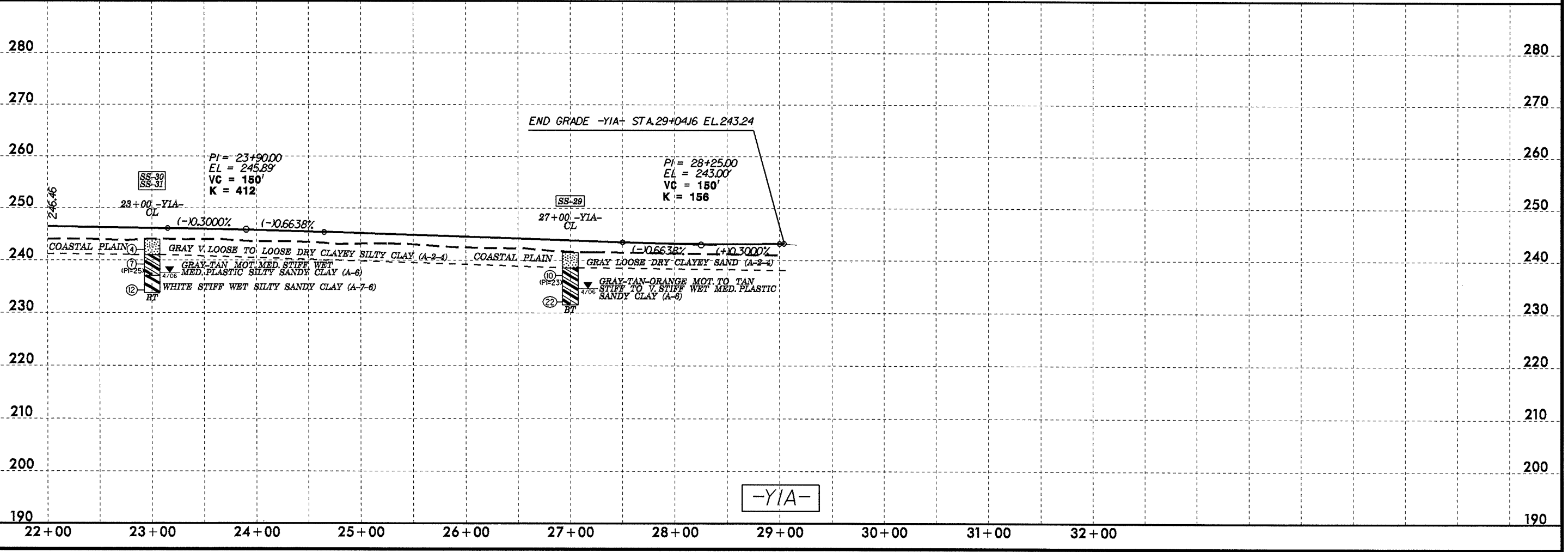
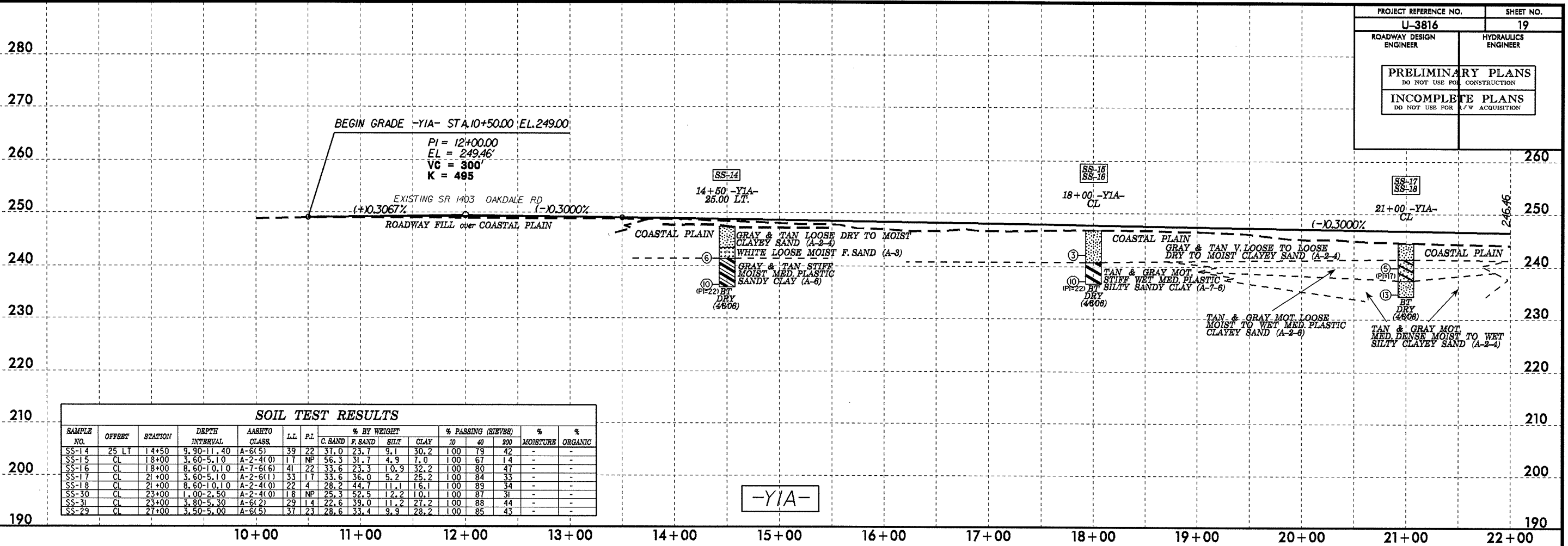


**SOIL TEST RESULTS**

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		
SS-40	CL	31+50-L	3.50-5.00	A-7-6(11)	52	33	28.9	24.9	5.9	40.2	100	85	49	19.7	-

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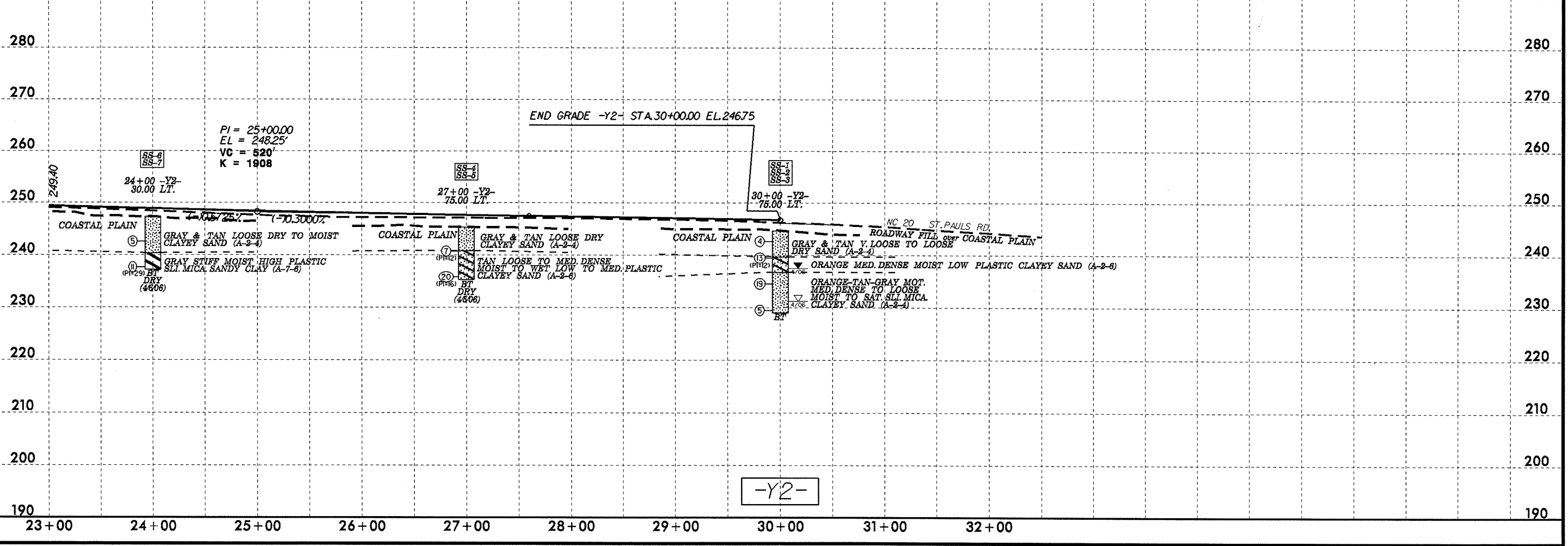
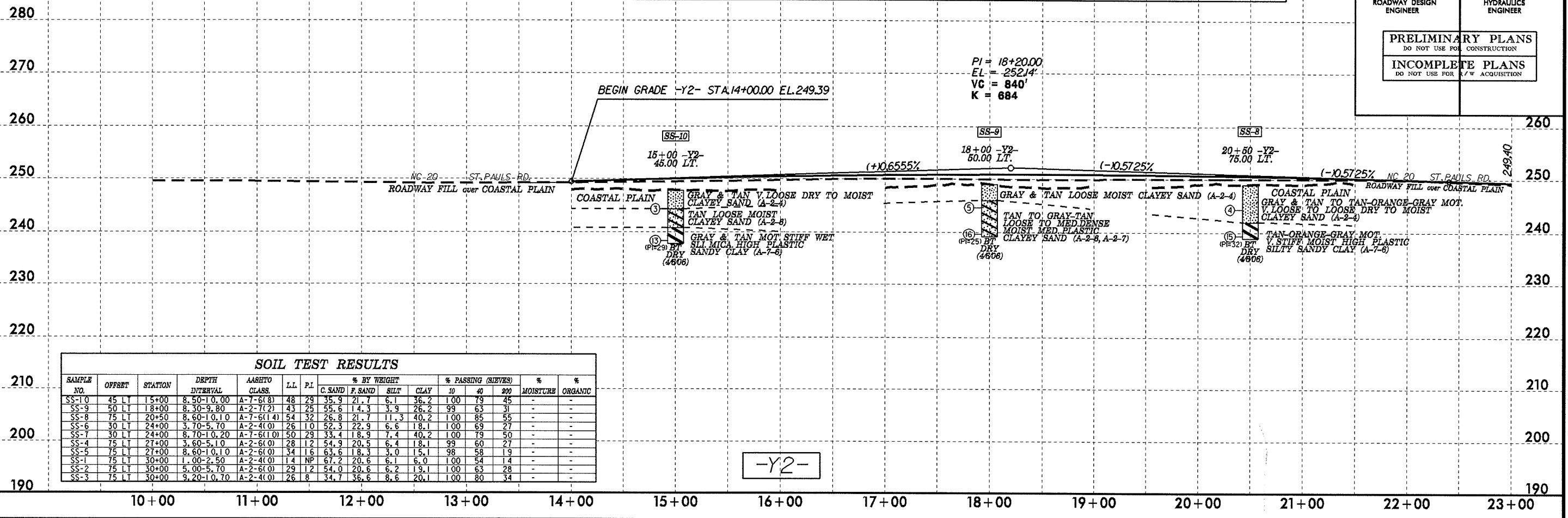




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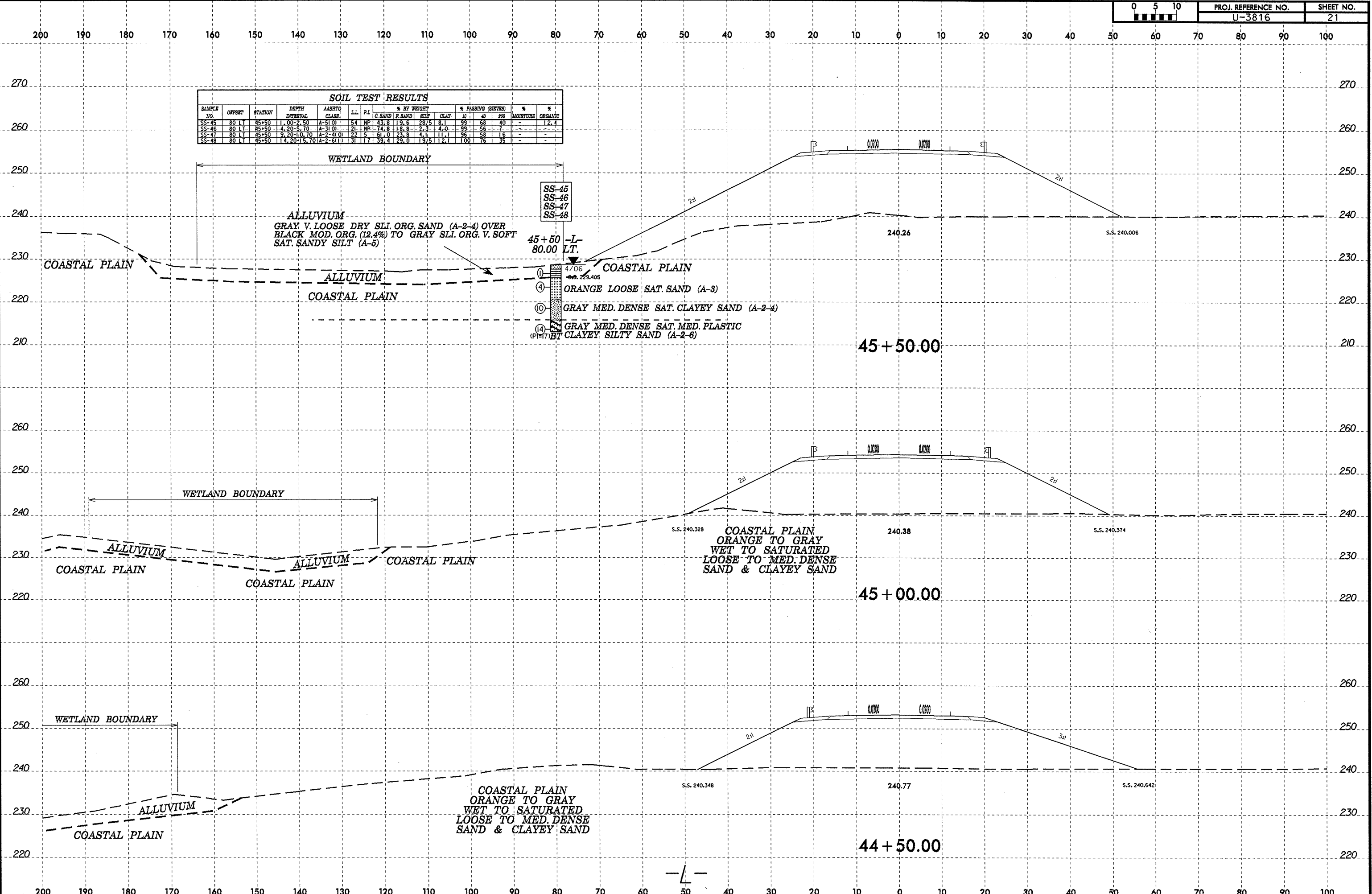
BM \*3 EL.249.38 RAILROAD SPIKE IN BASE OF POWER POLE RIGHT OF -Y2- STA.18+87.66 OFFSET 171.49'

PROJECT REFERENCE NO. <b>U-3816</b>	SHEET NO. <b>20</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	



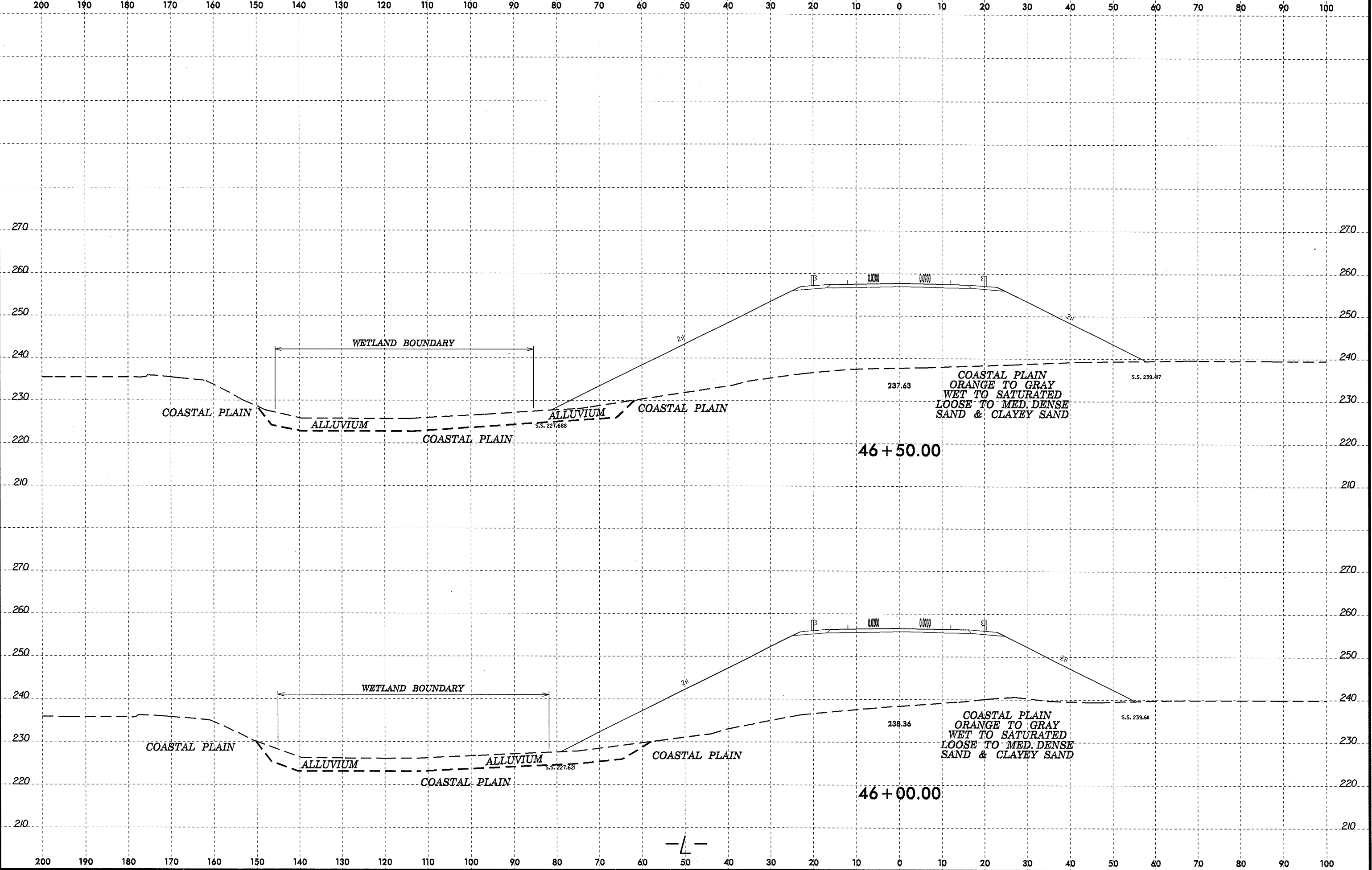
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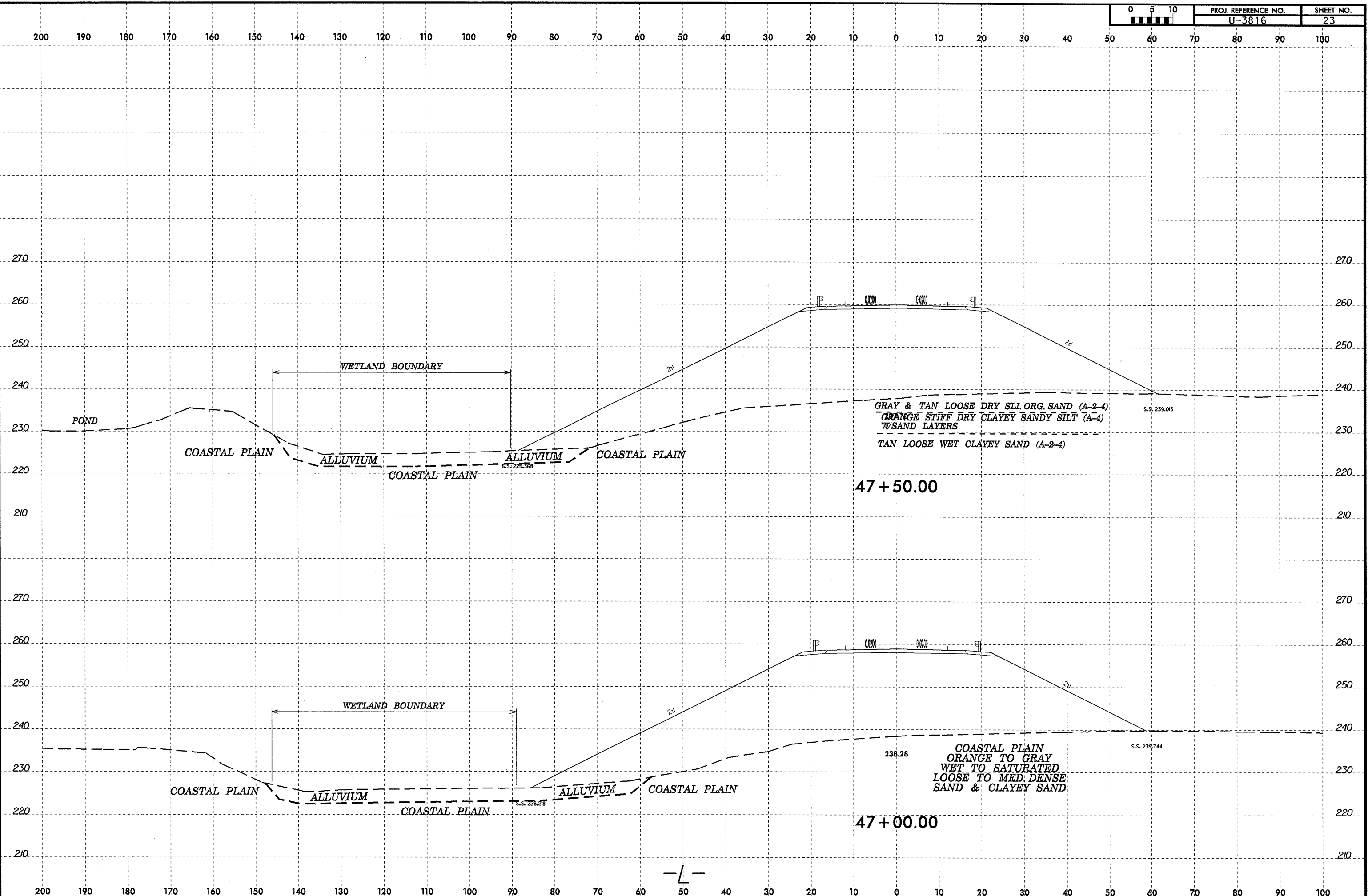




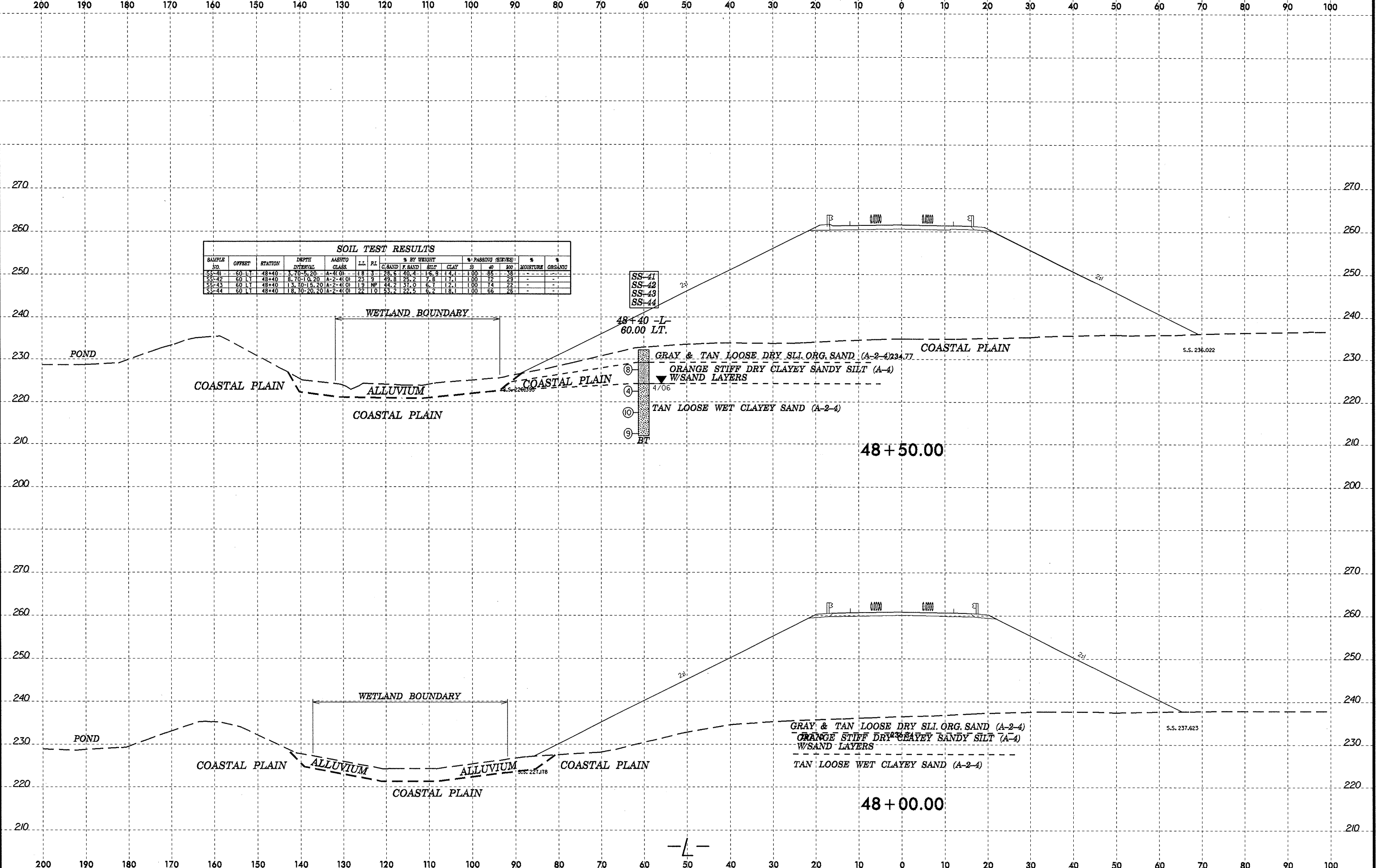
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-L-



**SOIL TEST RESULTS**

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ASHPTO CLASS	LL	PL	% BY WEIGHT				% PASSING (SIEVES)		% MOISTURE		% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	# 20	# 40	# 200	WET	
SS-41	60 LT.	48+40	3.76-5.20	A-4(0)	18	3	28.6	46.4	16.9	14.1	100	85	38	-	-
SS-42	60 LT.	48+40	8.70-10.20	A-2-4(0)	23	9	49.8	25.2	7.8	17.1	100	72	29	-	-
SS-43	60 LT.	48+40	13.70-15.20	A-2-4(0)	19	NP	44.2	37.0	6.7	12.1	100	74	22	-	-
SS-44	60 LT.	48+40	18.70-20.20	A-2-4(0)	22	10	53.2	22.5	6.2	18.1	100	66	26	-	-

SS-41  
SS-42  
SS-43  
SS-44

48+40 -L-  
60.00 LT.

⑧  
④  
⑩  
⑨  
BT

GRAY & TAN LOOSE DRY SLI. ORG. SAND (A-2-4) 234.77  
ORANGE STIFF DRY CLAYEY SANDY SILT (A-4)  
W/SAND LAYERS 4/06  
TAN LOOSE WET CLAYEY SAND (A-2-4)

48+50.00

S.S. 236.022

WETLAND BOUNDARY

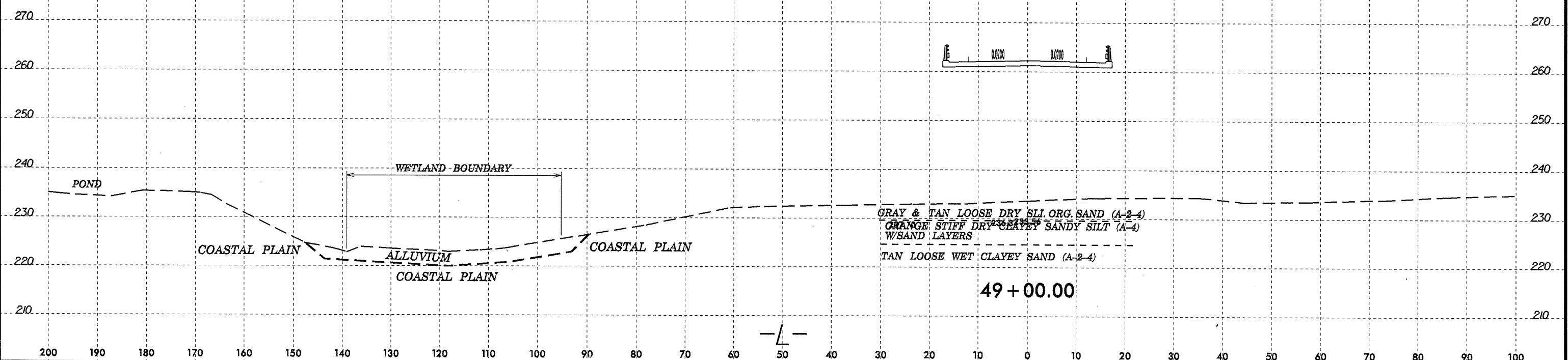
GRAY & TAN LOOSE DRY SLI. ORG. SAND (A-2-4)  
ORANGE STIFF DRY CLAYEY SANDY SILT (A-4)  
W/SAND LAYERS  
TAN LOOSE WET CLAYEY SAND (A-2-4)

48+00.00

S.S. 237.623

8/23/99

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-L-

NOTE: SEE SHEET 2A 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-3816	1	9
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34979.1.1	STP-0831 (2)	PE	
34979.2.2	STP-0831(2)	RW & UTIL	
34979.3.1	STP-0831(2)	CONST	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	45+00-48+75	4	5	6-9

ROADWAY  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34979.1.1 F.A. PROJ. STP-0831(2)  
COUNTY HOKE  
PROJECT DESCRIPTION PALMER ST. EXTENSION FROM NC 211 AT SR 1149 (McLEAN RD.) TO NC 20 AT SR 1403 (PROSPECT AVE.)

INVENTORY-ADDENDUM

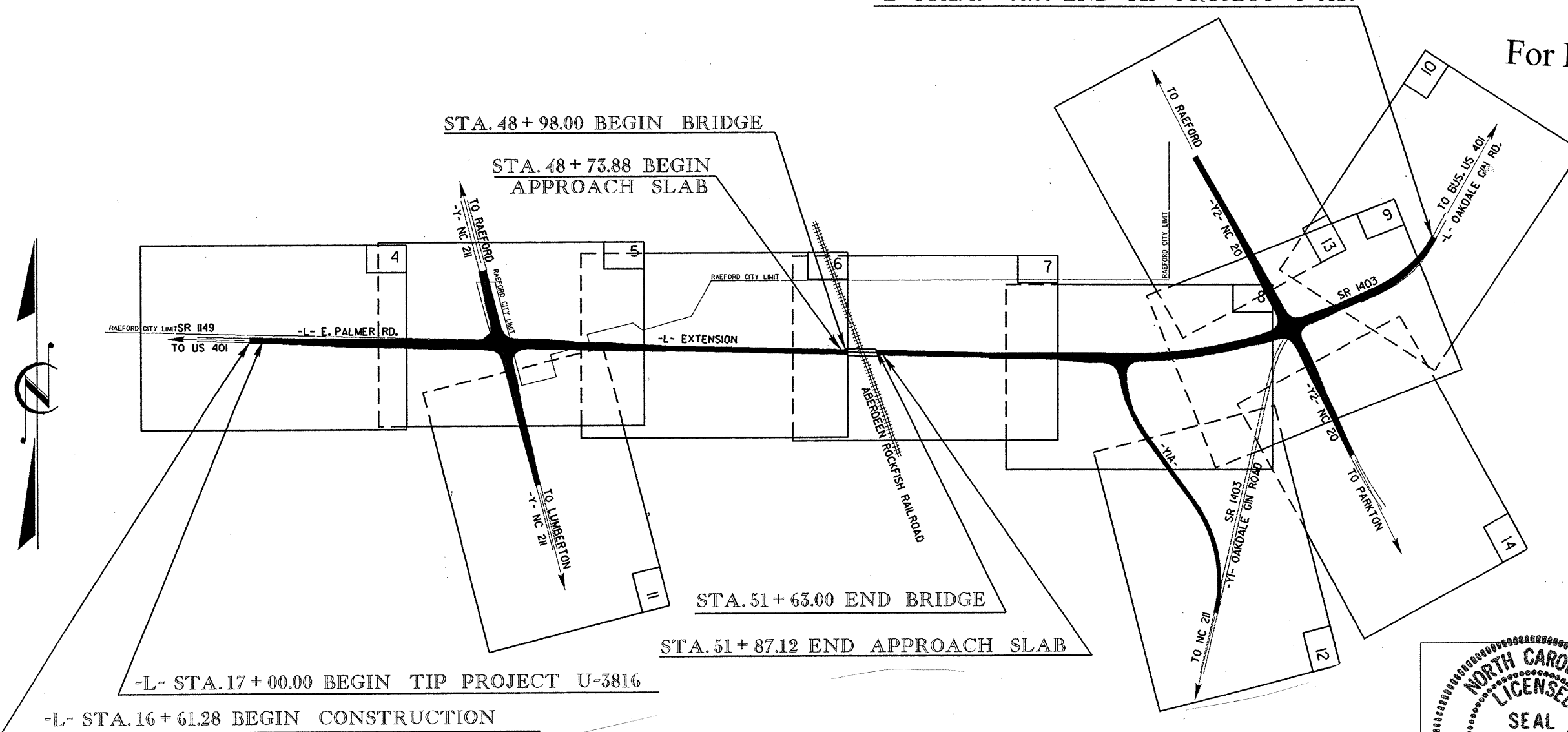
**CAUTION NOTICE**  
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

CONTRACT: C201738 ID: U-3816

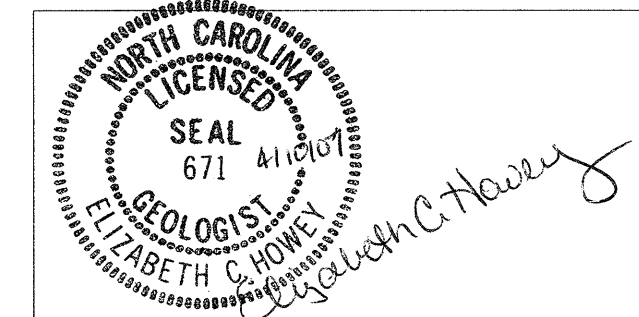
-L- STA. 87 + 50.00 END TIP PROJECT U-3816



For Letting

- PERSONNEL
- C. BALDWIN
  - P. ALTON
  - D. TIGNOR
  - M. RENZA
  - D. RACEY
  - S. DAVIS
  - S. DEEGAN

INVESTIGATED BY F&R, Inc.  
CHECKED BY E. HOWEY, P.E., L.G.  
SUBMITTED BY F&R, Inc.  
DATE 1/2007



DRAWN BY: D. RACEY

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with 4 columns: ID, STATE PROJECT NO., SHEET NO., TOTAL SHEETS. Values: U-3816, 34979.1.1, 2, 9.

Main content area containing: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSION, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, PLASTICITY, and COLOR.

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

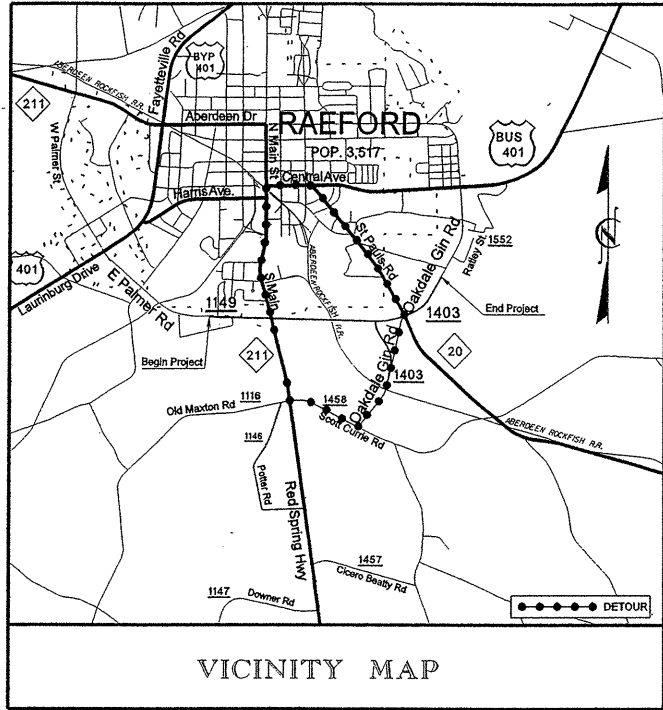
**HOKE COUNTY**

LOCATION: PALMER STREET EXTENSION FROM NC 211  
AT SR 1149 TO NC 20 AT SR 1403

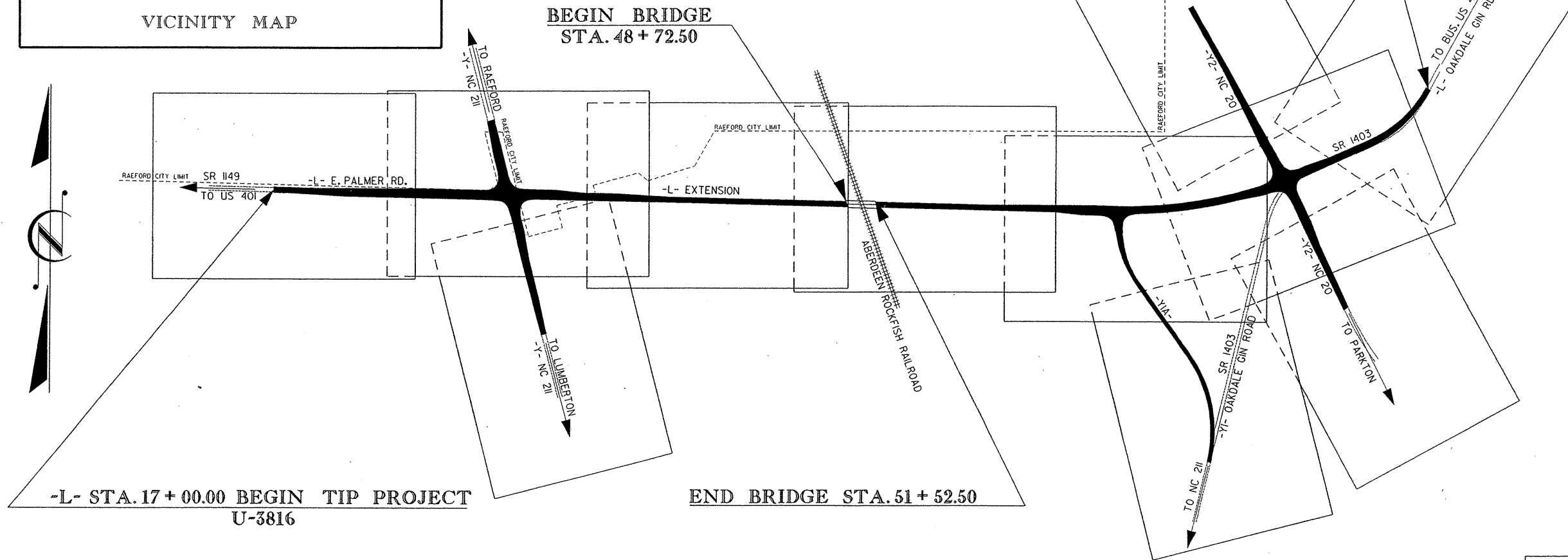
TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE AND SIGNALS

-L- STA. 87 + 50.00  
END TIP PROJECT U-3816

STATE	STATE PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
N.C.	U-3816	2A	9
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34979.1.1	STP-0831 (2)	PE	



VICINITY MAP



-L- STA. 17 + 00.00 BEGIN TIP PROJECT  
U-3816

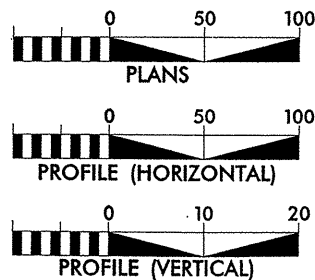
END BRIDGE STA. 51 + 52.50

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF RAEFORD.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

CONTRACT:

GRAPHIC SCALES



DESIGN DATA

ADT 2005 = 7900  
ADT 2025 = 13000  
DHV = 14%  
D = 60%  
T = 6%  
V = 50 MPH  
TTST 2% DUAL 4%  
FUNC CLASS =  
RURAL MAJOR COLLECTOR

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-3816 = 1.299 MI  
LENGTH OF STRUCTURE TIP PROJECT U-3816 = 0.036 MI  
TOTAL LENGTH OF TIP PROJECT U-3816 = 1.335 MI

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

2006 STANDARD SPECIFICATIONS  
RIGHT OF WAY DATE:  
JULY 21, 2006  
PRODUCTION LETTING DATE:  
DECEMBER 18, 2007  
LETTING DATE:  
JULY 15, 2008

**G. E. BREW, PE**  
PROJECT ENGINEER  
**W. T. BEST**  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.  
**ROADWAY DESIGN ENGINEER**  
SIGNATURE: \_\_\_\_\_ P.E.

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER  
**DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**  
APPROVED  
DIVISION ADMINISTRATOR DATE

\$\$\$\$\$SYTIME\$\$\$\$\$  
\$\$\$\$\$DGN\$\$\$\$\$  
\$\$\$\$\$USERNAME\$\$\$\$\$



**FROEHLING & ROBERTSON, INC**  
 GEOTECHNICAL • ENVIRONMENTAL • MATERIALS  
 ENGINEERS • LABORATORIES  
 "OVER ONE HUNDRED YEARS OF SERVICE"  
 310 Hubert Street  
 Raleigh, North Carolina 27603  
 Telephone: (919) 828-3441 Fax: (919) 828-5751

April 10, 2007

STATE PROJECT: 34979.1.1 (U-3816)  
 F.A. PROJECT.: STP-0831(2)  
 COUNTY: Hoke

DESCRIPTION: Raeford – Palmer Street Extension from NC 211 at SR 1149  
 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)

SUBJECT: Geotechnical Inventory – Addendum

**Project Description**

The project area lies at the southern edge of the town of Raeford in Hoke County, North Carolina. The project begins at existing E. Palmer Road (-L- Station 17+00) and extends east approximately 1.3 miles to connect with Oakdale Gin Road (-L- Station 87+50). The portion of Palmer Street Extension between existing NC 211 and NC 20 is along new location across an area of woods and farm fields.

This Geotechnical Inventory Addendum addresses subsurface conditions in the area of a proposed retaining wall left of -L- Stations 45+00 to 48+75. Note that the retaining wall has now been eliminated and a reinforced slope is proposed. Borings W1-1 to W1-5 were staggered within the original proposed wall footprint as shown on the attached plan view. Note that the plan view also shows the location of borings advanced for the proposed structure over the Aberdeen and Rockfish Railroad; see the Structure Subsurface Investigation for the additional subsurface information.

The geotechnical field investigation was performed in December, 2006. Borings were advanced with a CME-55 track-mounted drill rig equipped with an automatic hammer. Standard penetration tests (SPT) were performed in all borings. The (SPT) soil samples were collected for visual evaluation and representative samples were subjected to laboratory analysis consisting of grain size, Atterberg limits, and moisture content.

**Physiography and Geology**

The area of investigation is located in a wooded area between two farm fields. The topography at the area of investigation slopes gently down to a wetland area just west of the existing railroad tracks. The wetland area contained standing water at the time of our investigation.

The project corridor is located within the Coastal Plain Physiographic Province in deposits mapped as the Middendorf Formation. The soils encountered exhibit characteristics of the Middendorf Formation and generally consist of sand and sandy clay which are mostly gray in color but contain some brown, orange, and yellow.



**Ground Water**

Ground water data was collected during December, 2006. The stabilized groundwater elevation was measured near elevation 229 feet at the time of our investigation. In addition, the recovered samples were consistently wet below elevations of approximately 230 to 225 feet in the borings advanced at the site. A water surface was measured at elevation 225.7 feet in the wetland area during our field investigation

**Soils**

Borings advanced across the site encountered Coastal Plain Middendorf Formation soils from the ground surface to the boring termination depths. A surficial layer of fine sandy silt (A-4) or silty, fine sandy clay (A-6) was encountered in some of the borings. However, the soils encountered generally consist of silty and/or clayey fine to coarse sand (A-2-4) interlayered with fine to coarse sandy clay (A-6). The tested sand samples have less than 25 percent passing the No. 200 sieve while the tested silts and clays generally have less than 50 percent passing the No. 200 sieve. The tested silts are non-plastic while the clays tested across the site exhibit low to medium plasticity. The consistencies range from very loose to very dense in the sands and very soft to soft in the surficial silt/clay soils to stiff in the deeper clay encountered.

**Qualifications of Report**

This report has been prepared for the exclusive use of the North Carolina Department of Transportation and their assignees for specific application to the referenced property in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. The conclusions provided in this report do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations, or in unexplored areas of the site. Should such variations become apparent during construction, we reserve the right to re-evaluate our conclusions based upon an on-site observation of the conditions. In the event that changes are made in the proposed construction plans, the findings presented in this report shall not be considered valid unless reviewed by our firm and conclusions of this report modified or verified in writing.



Respectfully Submitted,

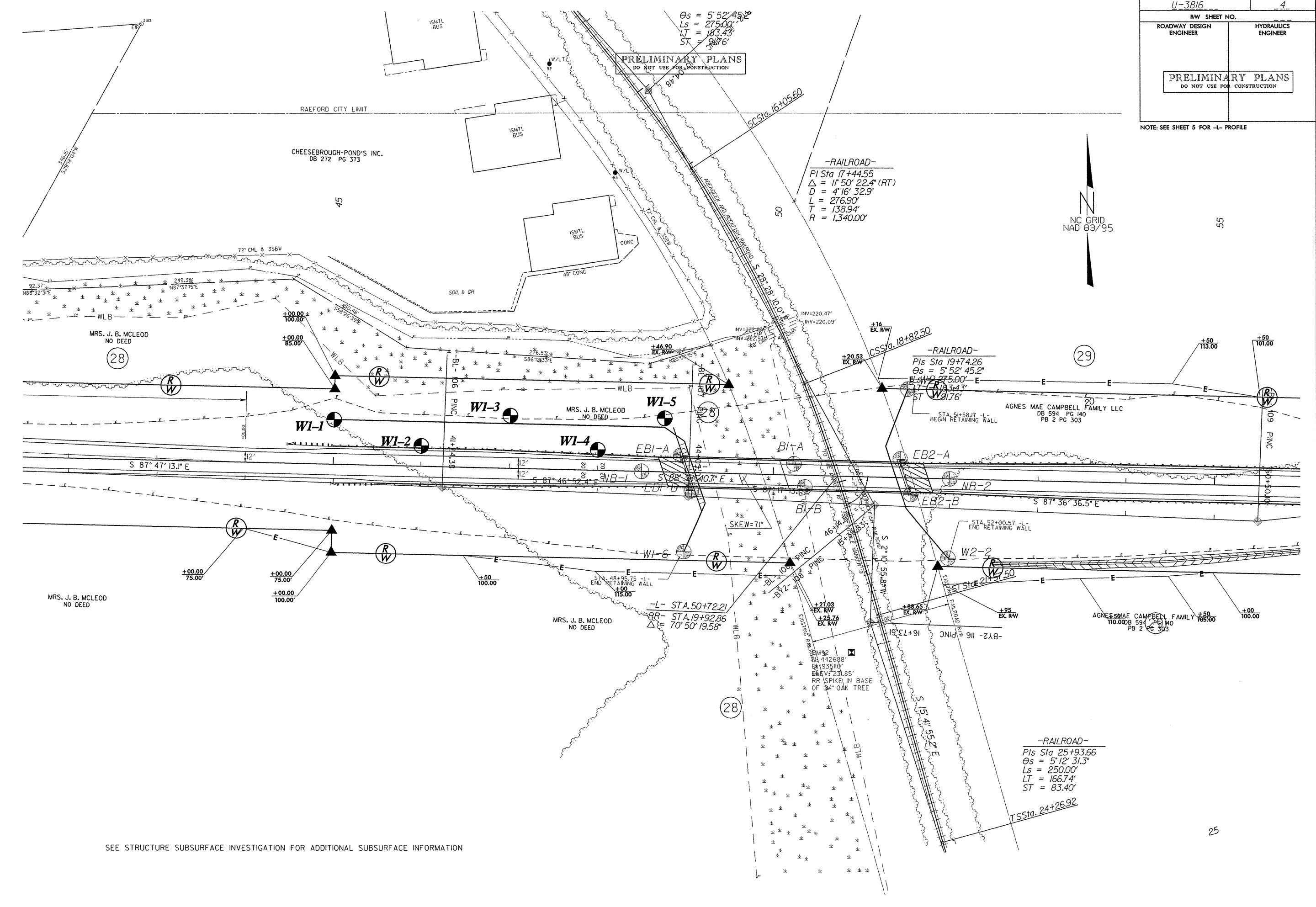
*Elizabeth C. Howey*  
 Elizabeth C. Howey, L.G., P.E.  
 Project Geotechnical Engineer



PROJECT: 34979.3.1 (U-3816) COUNTY: Hoke DONE BY: WTB DATE: 10/2/2007 CHKD BY: SWH DATE: 10/3/2007														
STATION TO STATION	EXCAVATION (CUBIC YARDS)					EMBANKMENT (CUBIC YARDS)				BORROW	WASTE (CUBIC YARDS)			TOTAL
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL EMBANKMENT	ROCK EMBANKMENT	EARTH EMBANKMENT	EMBANKMENT PLUS 20%		ROCK	SUITABLE	UNSUITABLE	
<b>Summary No. 1</b>														
17+00.00 to 29+50.00 -L- Lt. Side	907				907	597		597	716			191		191
17+00.00 to 22+50.00 -Y- Rt. Side	240				240	241		241	289	49				
<b>Total Summary No. 1</b>	<b>1,147</b>				<b>1,147</b>	<b>838</b>		<b>838</b>	<b>1,006</b>	<b>49</b>		<b>191</b>		<b>191</b>
<b>Summary No. 2</b>														
21+25.00 to 30+00.00 -L- Rt. Side	59				59	866		866	1,039	980				
23+50.00 to 34+00.00 -Y- Rt. Side	72				72	1,318		1,318	1,582	1,510				
<b>Total Summary No. 2</b>	<b>131</b>				<b>131</b>	<b>2,184</b>		<b>2,184</b>	<b>2,621</b>	<b>2,490</b>				
<b>Summary No. 3</b>														
31+00.00 to 49+00.00 -L-	3,088				3,088	40,284		40,284	48,341	45,253				
17+00.00 to 34+00.00 -Y- Lt. Side	366				366	2,206		2,206	2,647	2,281				
<b>Total Summary No. 3</b>	<b>3,454</b>				<b>3,454</b>	<b>42,490</b>		<b>42,490</b>	<b>50,988</b>	<b>47,534</b>				
<b>Summary No. 4</b>														
52+00.00 to 74+50.00 -L-	2,756				2,756	49,156		49,156	58,987	56,231				
10+00.00 to 28+50.00 -Y1A-	2,618				2,618	2,325		2,325	2,790	172				
14+00.00 to 21+00.00 -Y2- Rt. Side	488				488	120		120	144			344		344
22+00.00 to 29+50.00 -Y2- Rt. Side	605				605	87		87	104			501		501
<b>Total Summary No. 4</b>	<b>6,467</b>				<b>6,467</b>	<b>51,688</b>		<b>51,688</b>	<b>62,026</b>	<b>56,403</b>		<b>845</b>		<b>845</b>
<b>Summary No. 5</b>														
75+00.00 to 87+00.00 -L- Lt. Side	2,097				2,097	206		206	247			1,850		1,850
14+00.00 to 21+00.00 -Y2- Lt. Side	152				152	89		89	107			45		45
<b>Total Summary No. 5</b>	<b>2,249</b>				<b>2,249</b>	<b>295</b>		<b>295</b>	<b>354</b>			<b>1,895</b>		<b>1,895</b>
<b>Summary No. 6</b>														
75+00.00 to 87+00.00 -L- Rt. Side	841				841	467		467	560			281		281
22+00.00 to 29+50.00 -Y2- Lt. Side	226				226	466		466	559	333				
<b>Total Summary No. 4</b>	<b>1,067</b>				<b>1,067</b>	<b>933</b>		<b>933</b>	<b>1,120</b>	<b>333</b>		<b>281</b>		<b>281</b>
<b>Summary Totals</b>	<b>14,515</b>				<b>14,515</b>	<b>98,428</b>		<b>98,428</b>	<b>118,114</b>	<b>106,809</b>		<b>3,211</b>		<b>3,211</b>
Loss Due to Clearing and Grubbing	-2,500				-2,500					2,500				
Waste to be used in lieu of Borrow										-2,311		-3,211		-3,211
Addition Shoulder Material						3,317		3,317	3,980	3,980				
<b>Project Total</b>	<b>12,015</b>				<b>12,015</b>	<b>101,745</b>		<b>101,745</b>	<b>122,094</b>	<b>110,979</b>		<b>0</b>		<b>0</b>
Est. 5% for Replacing Topsoil at Borrow Pit										5,549				
<b>Grand Total</b>	<b>12,015</b>									<b>116,528</b>				
<b>Say</b>	<b>12,500</b>									<b>117,000</b>				
Estimate	1125 CU. YDS DDE					EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT.								
Estimate	2000 CU. YDS UNDERCUT					THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSUFACE DATA								
Estimate	2000 CU. YDS SELECT GRANULAR MATERIAL					PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT								
Estimate	1000 CU. YDS. CLASS IV SUBGRADE STABILIZATION													

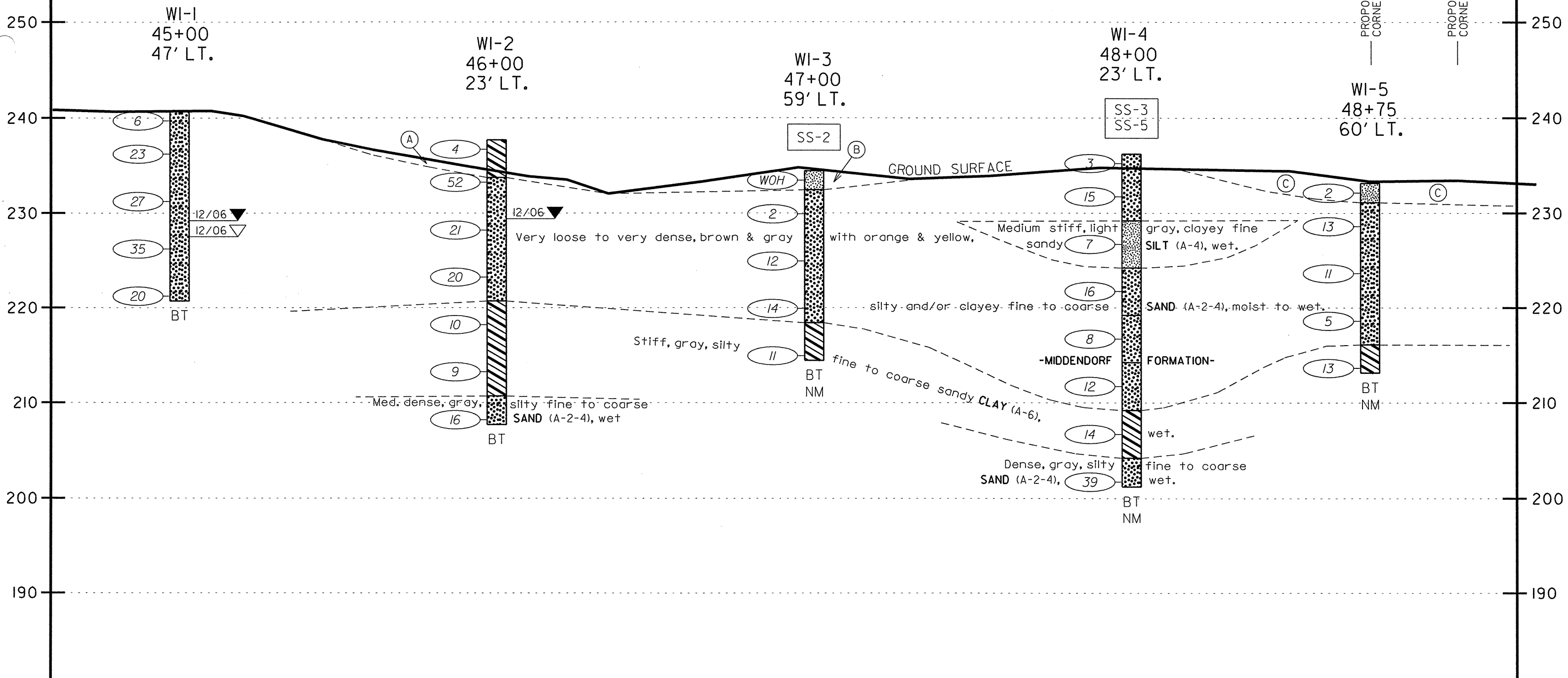
PROJECT REFERENCE NO. U-3816	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

NOTE: SEE SHEET 5 FOR -L- PROFILE



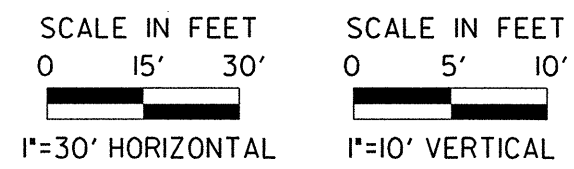
SEE STRUCTURE SUBSURFACE INVESTIGATION FOR ADDITIONAL SUBSURFACE INFORMATION

PROFILE 50' LEFT OF -L-




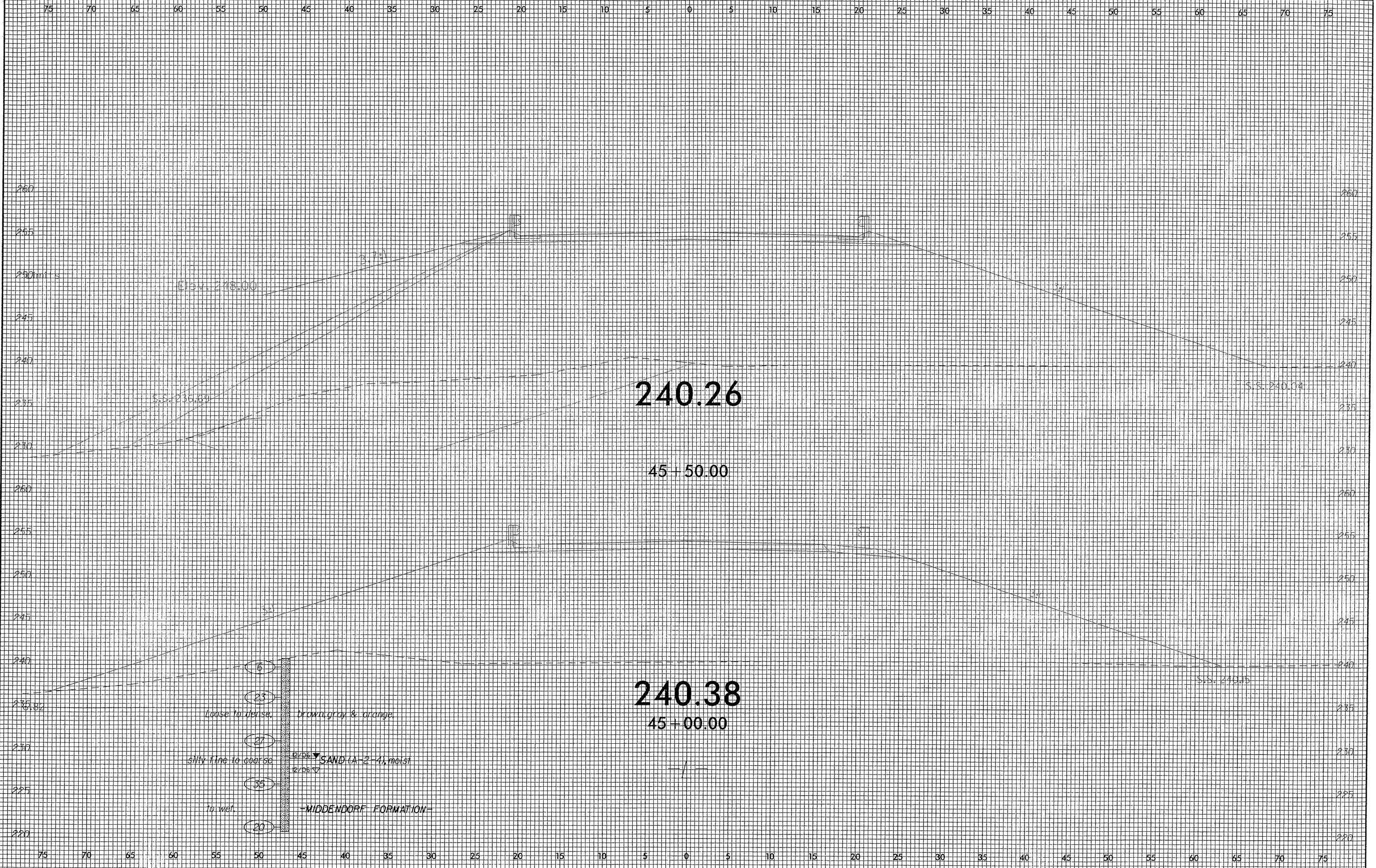
- (A) Soft to medium stiff, yellowish-brown, silty fine sandy CLAY (A-6), wet. -MIDDENDORF FORMATION-
- (B) Very soft, dark brown, fine sandy SILT (A-4), moist. -MIDDENDORF FORMATION-
- (C) Soft, brown, fine to coarse sandy SILT (A-4), moist. -MIDDENDORF FORMATION-

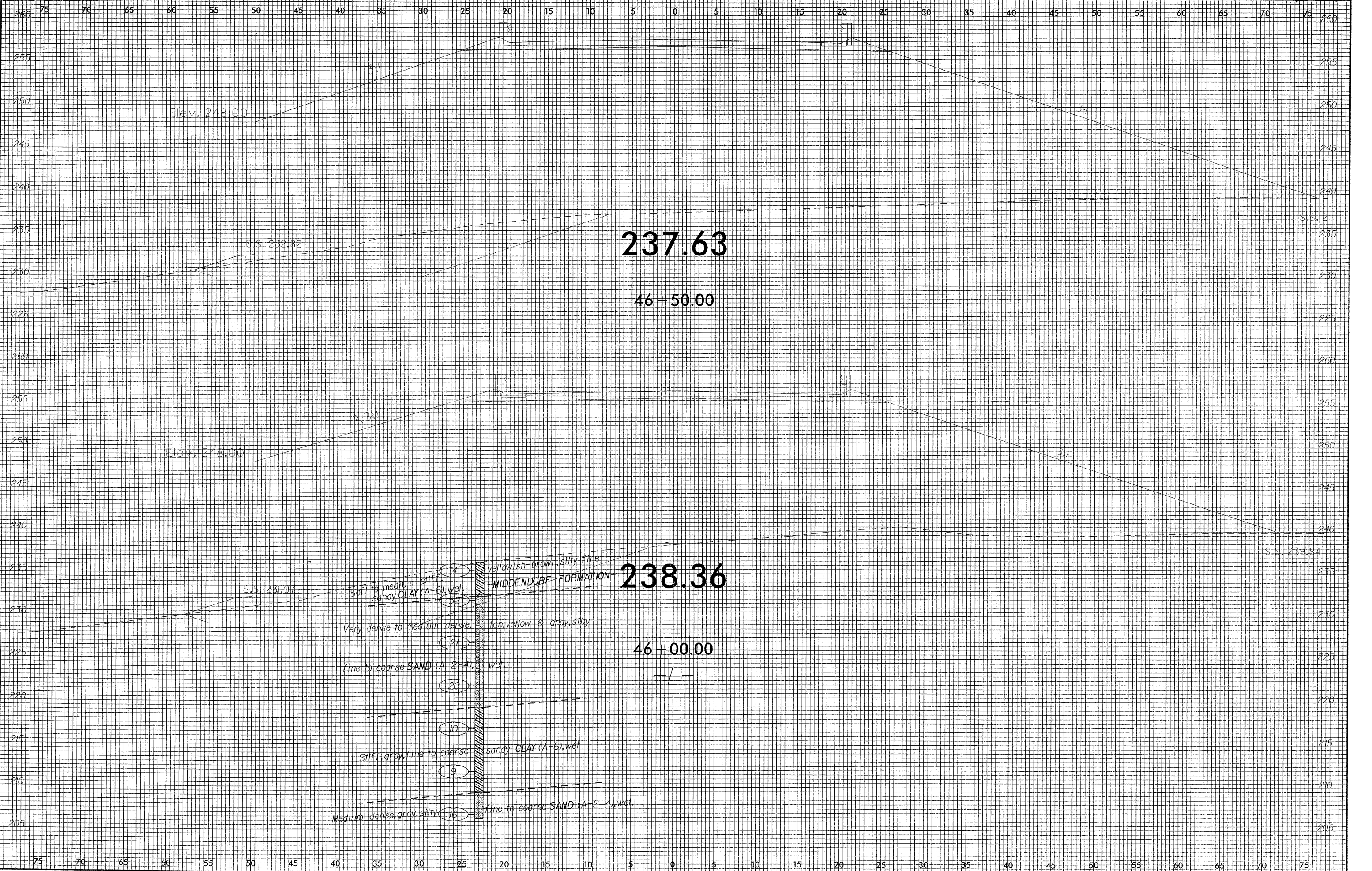
\* 0 hr. groundwater not measured due to mud rotary drilling techniques (except WI-1; advanced with hollow stem augers);  
 NM: 24 hr. groundwater not measured.

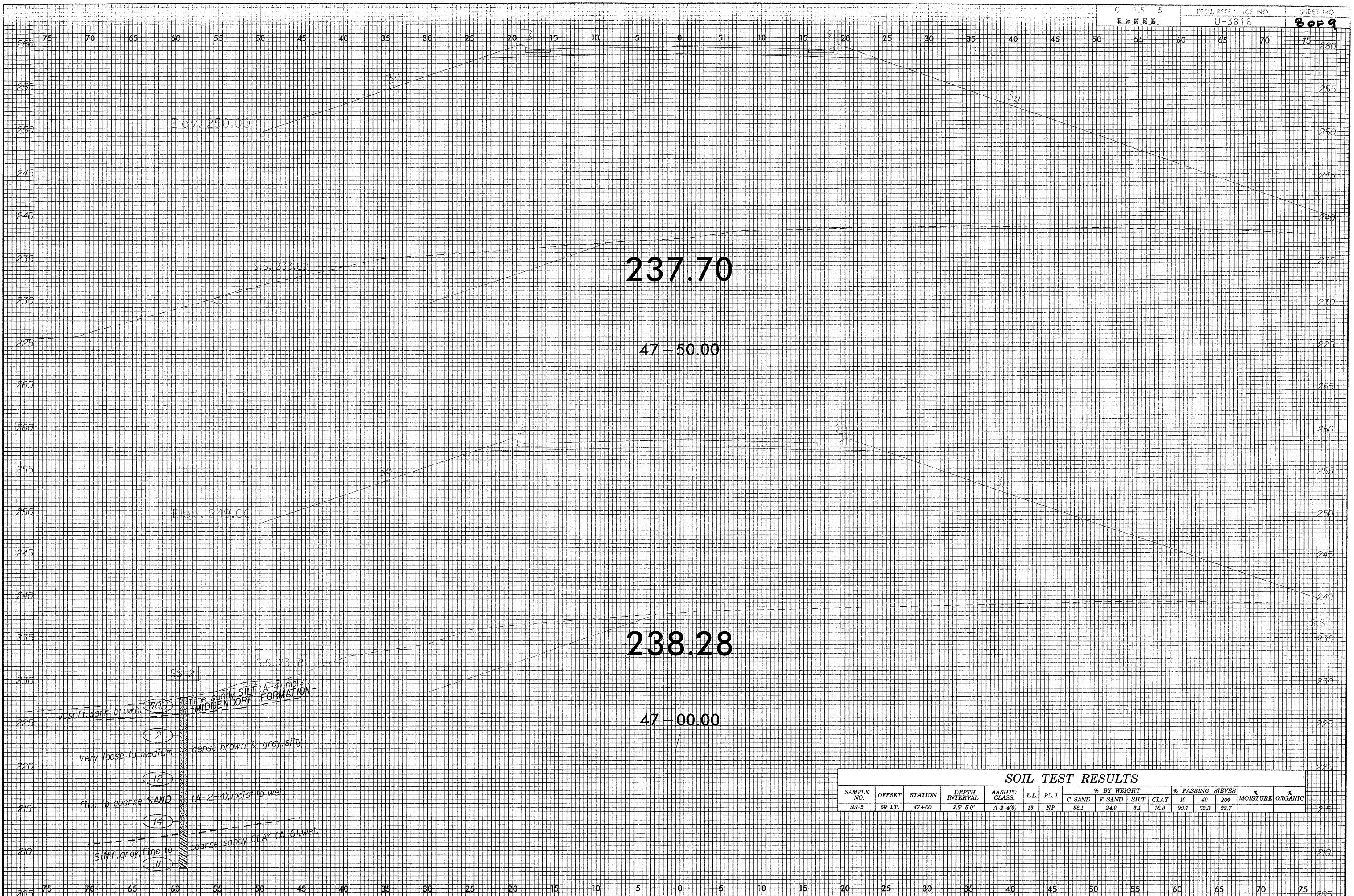


SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	59' LT.	47+00	3.5'-5.0'	A-2-4(0)	13	NP	56.1	24.0	3.1	16.8	99.1	62.3	22.7		
SS-3	23' LT.	48+00	8.5'-10.0'	A-4(0)	21	3	7.3	59.7	1.2	31.8	100.0	98.9	42.1	26.3	
SS-5	23' LT.	48+00	18.5'-20.0'	A-2-4(0)	16	3	58.9	16.4	0.0	24.7	99.5	59.9	22.2	14.6	

 <p><b>FROEHLING &amp; ROBERTSON, INC.</b>                  GEOTECHNICAL • ENVIRONMENTAL • MATERIALS                  ENGINEERS • LABORATORIES                  "OVER ONE HUNDRED YEARS OF SERVICE"                  310 Hubert Street                  Raleigh, North Carolina 27603                  (919) 828-3441; Fax: (919) 828-5751                  www.FandR.com</p>	CLIENT: N.C. Department of Transportation	
	LOCATION: Palmer St. Ext. from NC 211 at SR 1149 to NC 20 at SR 1403	
	PROJECT No.: 34979.1.1	COUNTY: Hoke
	TIP No.: U-3816	FA No.: STP-0831(2)
	DATE: 1/07	SCALE: 1"=30' HORIZ.; 1"=10' VERT.
	DRAWING No.: 2	

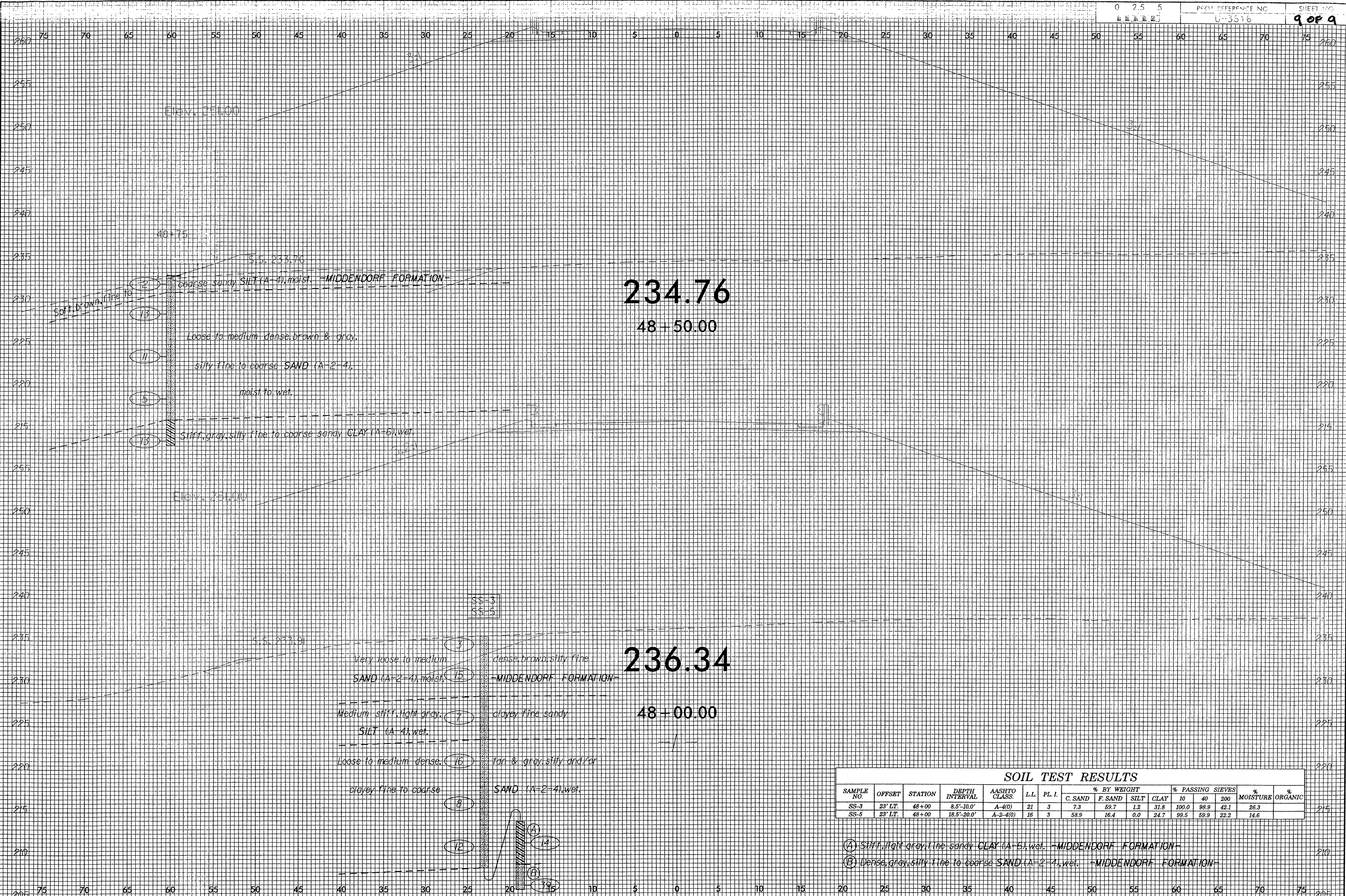






**SOIL TEST RESULTS**

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL I	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	59' LT.	47+00	3.5'-5.0'	A-2-4(0)	13	NP	56.1	24.0	3.1	16.8	99.1	62.3	22.7		



234.76  
 48 + 50.00

236.34  
 48 + 00.00

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PL. I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-3	23' LT.	48+00	8.5'-10.0'	A-4(0)	21	3	7.3	69.7	1.2	31.8	100.0	98.9	42.1	26.3	
SS-5	23' LT.	48+00	18.5'-20.0'	A-2-4(0)	16	3	58.9	16.4	0.0	24.7	99.5	59.9	22.2	14.6	

- (A) Stiff, light gray, fine sandy CLAY (A-6), wet. -MIDDENDORF FORMATION-
- (B) Dense, gray, silty fine to coarse SAND (A-2-4), wet. -MIDDENDORF FORMATION-