

**This electronic collection of documents is provided  
for the convenience of the user  
and is Not a Certified Document –**

**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
shall not be considered a certified document.**

REFERENCE: B-4929

PROJECT: 40233

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-4929	01	34

**CONTENTS**

LINE	STATION (+/-)	PLAN	PROFILE
-L1-	13+25 TO 16+00	04	10
-L2-	16+00 TO 59+06	04 TO 07	11 TO 12
-RA1-	10+00 TO 14+08	04	13
-RA2-	10+00 TO 14+08	07	14
-SL1-	10+00 TO 12+25	07	15
-SL2-	10+00 TO 13+09	07	16
-Y1-	10+62 TO 17+50	04	17
-Y1-	20+78 TO 21+63	08	17
-Y1-	31+95 TO 53+75	07 TO 09	18 TO 20
-Y1A-	12+90 TO 15+05	04	21
-Y2-	10+00 TO 12+35	04	22
-Y3-	10+00 TO 15+86	07	23
-Y4-	10+00 TO 14+35	07	24

**ROADWAY**  
**SUBSURFACE INVESTIGATION**

COUNTY PENDER  
PROJECT DESCRIPTION REPLACE BR NO 16 ON NC 50  
- 210 OVER THE INTRACOASTAL WATERWAY

**INVENTORY**

**CAUTION NOTICE**

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

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

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

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

**CROSS SECTIONS**

LINE	STATION	SHEETS
-Y1-	12+50 TO 16+00	25 TO 32
-Y4-	11+50, 14+00	33 TO 34

PERSONNEL

STEVEN HUDSON, LG

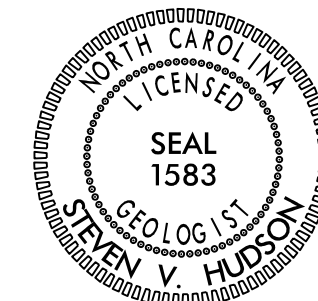
JACOB C. WESSELL, PE

SHAWN MCGUIRE

MICHAEL D. MASON

D. T. CHALMERS, CWC

INVESTIGATED BY CATLIN  
DRAWN BY STEVEN HUDSON, LG  
CHECKED BY JACOB C. WESSELL, PE  
SUBMITTED BY STEVEN HUDSON, LG  
DATE AUGUST 2015



DocuSigned by:  
Steven V. Hudson 8/28/2015  
62EFD88181E445F SIGNATURE DATE

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED

SIGNATURE DATE SIGNATURE DATE

**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 208, 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 DISLOADED 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>SLICKENISE</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>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>																																																																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="5">GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="5"></td> </tr> </table>										GRANULAR MATERIALS (<= 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7						SYMBOL																		<b>MINERALOGICAL COMPOSITION</b>										<b>CRYSTALLINE ROCK (CR)</b>										<b>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</b>																												
GRANULAR MATERIALS (<= 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																			
GROUP CLASS.	A-1	A-3	A-2	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																	
SYMBOL																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">COMPRESSION</th> </tr> <tr> <td colspan="5">SLIGHTLY COMPRESSIBLE</td> <td colspan="5">MODERATELY COMPRESSIBLE</td> <td colspan="5">HIGHLY COMPRESSIBLE</td> </tr> <tr> <td colspan="5">LL &lt; 31</td> <td colspan="5">LL = 31 - 50</td> <td colspan="5">LL &gt; 50</td> </tr> </table>										COMPRESSION										SLIGHTLY COMPRESSIBLE					MODERATELY COMPRESSIBLE					HIGHLY COMPRESSIBLE					LL < 31					LL = 31 - 50					LL > 50					<b>COMPRESSIBILITY</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>										<b>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.</b>																																							
COMPRESSION																																																																																																													
SLIGHTLY COMPRESSIBLE					MODERATELY COMPRESSIBLE					HIGHLY COMPRESSIBLE																																																																																																			
LL < 31					LL = 31 - 50					LL > 50																																																																																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">PERCENTAGE OF MATERIAL</th> </tr> <tr> <th colspan="3">ORGANIC MATERIAL</th> <th colspan="3">GRANULAR SOILS</th> <th colspan="3">SILT - CLAY SOILS</th> <th colspan="3">OTHER MATERIAL</th> </tr> <tr> <td colspan="3">TRACE OF ORGANIC MATTER</td> <td colspan="3">2 - 3%</td> <td colspan="3">3 - 5%</td> <td colspan="3">TRACE</td> </tr> <tr> <td colspan="3">LITTLE ORGANIC MATTER</td> <td colspan="3">3 - 5%</td> <td colspan="3">5 - 12%</td> <td colspan="3">LITTLE</td> </tr> <tr> <td colspan="3">MODERATELY ORGANIC</td> <td colspan="3">5 - 10%</td> <td colspan="3">12 - 20%</td> <td colspan="3">SOME</td> </tr> <tr> <td colspan="3">HIGHLY ORGANIC</td> <td colspan="3">&gt; 10%</td> <td colspan="3">&gt; 20%</td> <td colspan="3">HIGHLY</td> </tr> </table>										PERCENTAGE OF MATERIAL										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			<b>GROUND WATER</b>										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>										<b>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</b>									
PERCENTAGE OF MATERIAL																																																																																																													
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																																																																																																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">CONSISTENCY OR DENSENESS</th> </tr> <tr> <th>PRIMARY SOIL TYPE</th> <th colspan="3">COMPACTNESS OR CONSISTENCY</th> <th colspan="3">RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th colspan="3">RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td colspan="3">VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td colspan="3">4 4 TO 10 10 TO 30 30 TO 50 &gt; 50</td> <td colspan="3">N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td colspan="3">VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td colspan="3">2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 &gt; 30</td> <td colspan="3">&lt; 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 &gt; 4</td> </tr> </table>										CONSISTENCY OR DENSENESS										PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY			RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)			RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )			GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE			4 4 TO 10 10 TO 30 30 TO 50 > 50			N/A			GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD			2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30			< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4			<b>MISCELLANEOUS SYMBOLS</b>										<b>WEATHERING</b>										<b>FRESH</b>																																							
CONSISTENCY OR DENSENESS																																																																																																													
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY			RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)			RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )																																																																																																						
GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE			4 4 TO 10 10 TO 30 30 TO 50 > 50			N/A																																																																																																						
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD			2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30			< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4																																																																																																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">TEXTURE OR GRAIN SIZE</th> </tr> <tr> <th colspan="2">U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> <th colspan="2"></th> </tr> <tr> <td colspan="2"></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> <td colspan="2"></td> </tr> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> <th colspan="3"></th> </tr> <tr> <td>GRAIN SIZE</td> <td>MM</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td colspan="3"></td> </tr> </table>										TEXTURE OR GRAIN SIZE										U.S. STD. SIEVE SIZE OPENING (MM)		4	10	40	60	200	270					4.75	2.00	0.42	0.25	0.075	0.053			BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)				GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005				<b>RECOMMENDATION SYMBOLS</b>										<b>VERY SLIGHT (IV SL.)</b>										<b>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.</b>																												
TEXTURE OR GRAIN SIZE																																																																																																													
U.S. STD. SIEVE SIZE OPENING (MM)		4	10	40	60	200	270																																																																																																						
		4.75	2.00	0.42	0.25	0.075	0.053																																																																																																						
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																							
GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005																																																																																																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">SOIL MOISTURE - CORRELATION OF TERMS</th> </tr> <tr> <th colspan="2">SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th colspan="2">FIELD MOISTURE DESCRIPTION</th> <th colspan="2">GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td colspan="2">LL - LIQUID LIMIT</td> <td colspan="2">- SATURATED - (SAT.)</td> <td colspan="2">USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td colspan="2">PL - PLASTIC LIMIT</td> <td colspan="2">- WET - (W)</td> <td colspan="2">SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="2">OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td colspan="2">- MOIST - (M)</td> <td colspan="2">SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td colspan="2"></td> <td colspan="2">- DRY - (D)</td> <td colspan="2">REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>										SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		LL - LIQUID LIMIT		- SATURATED - (SAT.)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		PL - PLASTIC LIMIT		- WET - (W)		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		OM - OPTIMUM MOISTURE SHRINKAGE LIMIT		- MOIST - (M)		SOLID; AT OR NEAR OPTIMUM MOISTURE				- DRY - (D)		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		<b>ABBREVIATIONS</b>										<b>SLIGHT (SLI.)</b>										<b>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.</b>																																							
SOIL MOISTURE - CORRELATION OF TERMS																																																																																																													
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																									
LL - LIQUID LIMIT		- SATURATED - (SAT.)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																									
PL - PLASTIC LIMIT		- WET - (W)		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																									
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT		- MOIST - (M)		SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																									
		- DRY - (D)		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">PLASTICITY</th> </tr> <tr> <th colspan="2">NON PLASTIC</th> <th colspan="3">PLASTICITY INDEX (PI)</th> <th colspan="3">DRY STRENGTH</th> <th colspan="2"></th> </tr> <tr> <td colspan="2"></td> <td colspan="3">0-5</td> <td colspan="3">VERY LOW</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">SLIGHTLY PLASTIC</td> <td colspan="3">6-15</td> <td colspan="3">SLIGHT</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">MODERATELY PLASTIC</td> <td colspan="3">16-25</td> <td colspan="3">MEDIUM</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">HIGHLY PLASTIC</td> <td colspan="3">26 OR MORE</td> <td colspan="3">HIGH</td> <td colspan="2"></td> </tr> </table>										PLASTICITY										NON PLASTIC		PLASTICITY INDEX (PI)			DRY STRENGTH							0-5			VERY LOW					SLIGHTLY PLASTIC		6-15			SLIGHT					MODERATELY PLASTIC		16-25			MEDIUM					HIGHLY PLASTIC		26 OR MORE			HIGH					<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>MODERATE (MOD.)</b>										<b>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.</b>																			
PLASTICITY																																																																																																													
NON PLASTIC		PLASTICITY INDEX (PI)			DRY STRENGTH																																																																																																								
		0-5			VERY LOW																																																																																																								
SLIGHTLY PLASTIC		6-15			SLIGHT																																																																																																								
MODERATELY PLASTIC		16-25			MEDIUM																																																																																																								
HIGHLY PLASTIC		26 OR MORE			HIGH																																																																																																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">COLOR</th> </tr> <tr> <td colspan="10">DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</td> </tr> </table>										COLOR										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										<b>FRACURE SPACING</b>										<b>SEVERE (SEV.)</b>										<b>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL</b>																																																											
COLOR																																																																																																													
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">ELEVATION: FEET</th> </tr> </table>										ELEVATION: FEET										<b>BEDDING</b>										<b>SEVERE (SEV.)</b>										<b>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</b>																																																																					
ELEVATION: FEET																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">INDURATION</th> </tr> <tr> <td colspan="10">FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</td> </tr> </table>										INDURATION										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										<b>VERY HARD</b>										<b>VERY SEVERE (IV SEV.)</b>										<b>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</b>																																																											
INDURATION																																																																																																													
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="10">NOTES:</th> </tr> <tr> <td colspan="10">Coordinate System = North Carolina State Plane 1983 Project Datum = North American Datum 1983 (Conus) Zone = North Carolina 3200 Geoid Model = GEOID03 (Conus) Vertical Datum = NGVD88 All Units = US Feet  U.C.P. = UNDIVIDED COASTAL PLAIN</td> </tr> </table>										NOTES:										Coordinate System = North Carolina State Plane 1983 Project Datum = North American Datum 1983 (Conus) Zone = North Carolina 3200 Geoid Model = GEOID03 (Conus) Vertical Datum = NGVD88 All Units = US Feet  U.C.P. = UNDIVIDED COASTAL PLAIN										<b>COMPLETE</b>										<b>COMPLETE</b>										<b>ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</b>																																																											
NOTES:																																																																																																													
Coordinate System = North Carolina State Plane 1983 Project Datum = North American Datum 1983 (Conus) Zone = North Carolina 3200 Geoid Model = GEOID03 (Conus) Vertical Datum = NGVD88 All Units = US Feet  U.C.P. = UNDIVIDED COASTAL PLAIN																																																																																																													

31-JUL-2015 14:31 S:\wpmk\p\PROJECT\2015\215037 NCDOT-B-4929-SURF-CITY BRIDGE ROADWAY\B4929\B4929-CADD\_GEO\RDY\B4929-GEO\_Rdy\_ignd-title.dgn  
 09/08/99  
 31-JUL-2015 14:31 S:\wpmk\p\PROJECT\2015\215037 NCDOT-B-4929-SURF-CITY BRIDGE ROADWAY\B4929\B4929-CADD\_GEO\RDY\B4929-GEO\_Rdy\_ignd-title.dgn  
 09/08/99

**CONTRACT:** TIP PROJECT: B-4929

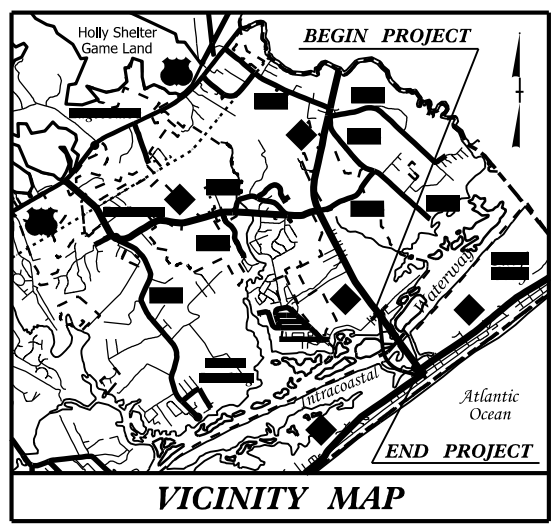
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**PENDER COUNTY**

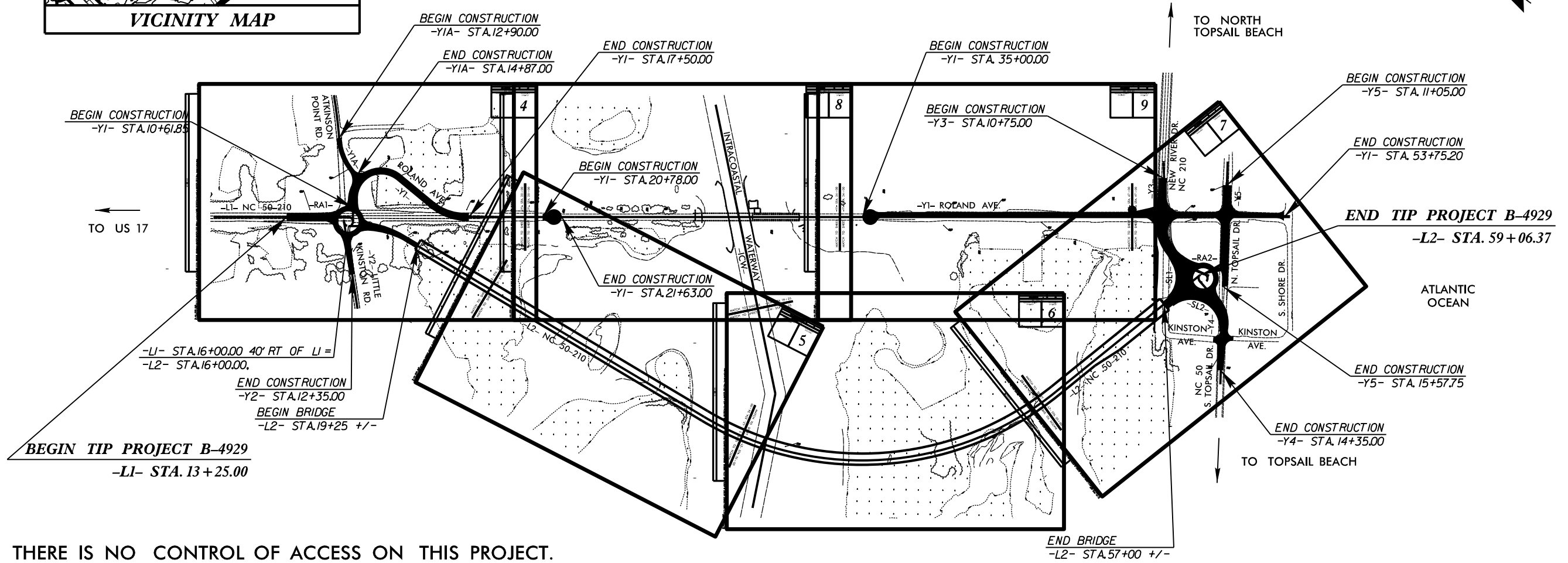
LOCATION: BRIDGE NO. 16 OVER THE INTRACOASTAL WATERWAY ON NC 50-210

TYPE OF WORK: GRADING, PAVING, RESURFACING, DRAINAGE, STRUCTURE, AND WALLS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4929	3	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
40233.1.1	BRSTP-0050(10)	PE	

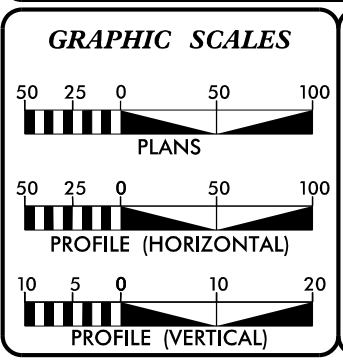


25% PRELIMINARY PLANS



THERE IS NO CONTROL OF ACCESS ON THIS PROJECT.  
 THIS PROJECT IS WITHIN THE MUNICIPAL ETJ BOUNDARIES OF SURF CITY.  
 CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_.

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



**DESIGN DATA**

ADT 2017 =	17,200
ADT 2035 =	30,000
K =	9 %
D =	55 %
T =	3 % *
V =	40 MPH
* TTST =	1% DUAL = 2%
FUNC CLASS =	MAJOR COLLECTOR STATEWIDE TIER

**PROJECT LENGTH**

LENGTH ROADWAY =	0.153 MILES
LENGTH STRUCTURE =	0.715 MILES
TOTAL LENGTH =	0.868 MILES

-L1- AND -L2- USED TO CALCULATE PROJECT LENGTH

PLANS PREPARED BY:

8601 SIX FORKS ROAD, SUITE 260  
RALEIGH, NC 27615  
919-926-4100

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 2015

LETTING DATE: FEBRUARY 21, 2017

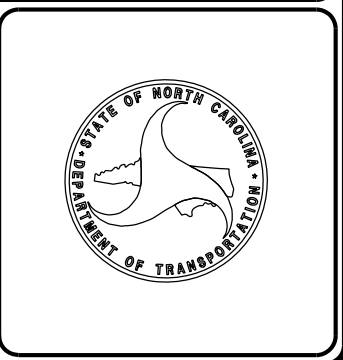
JENNIFER FARINO, PE PROJECT ENGINEER
SEAN KORTOVICH, EI PROJECT DESIGNER
TONY HOUSER, PE NCDOT CONTACT

**HYDRAULICS ENGINEER**

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

**ROADWAY DESIGN ENGINEER**

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



AUGUST 2015

WBS PROJECT: 40233.1.1  
TIP NUMBER: B-4929  
PROJECT ID: 24763  
COUNTY: PENDER

DESCRIPTION: Replace Br. No. 16 on NC 50-210 over the Intracoastal Waterway

SUBJECT: Geotechnical Inventory Report

**PROJECT DESCRIPTION**

The proposed project is located in Pender County in the central portion of Topsail Island and consists of replacing an existing swing span bridge over the Intracoastal Waterway on NC 50/210 (-Y1-) in Surf City.

A geotechnical investigation was conducted by CATLIN Engineers and Scientists (CATLIN) in March through June 2015. Standard penetration test borings were advanced under the direct supervision of a North Carolina Licensed Well Contractor with a Central Mine Equipment (CME) 550 drilling rig equipped with an automatic hammer. Standard penetration testing was conducted in general accordance with American Society for Testing and Materials (ASTM) D-1586-84, "Penetration Test and Split Barrel Sampling of Soils" or American Association of State Highway and Transportation Officials (AASHTO) Standard Method T206-81.

Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by CATLIN Geotechnical Laboratory located in Wilmington, North Carolina. Samples were prepared and analyzed in accordance with one or more of the following AASHTO Standards as modified by NCDOT:

- T 87-86 (Dry Preparation of Disturbed Soil)
- T 88-93 (Particle Size Analysis)
- T 89-94 (Liquid Limit)
- T 90-94 (Plastic Limit)
- T 265-93 (Soil Moisture Content)
- T 267 (Organic Content)

Proposed drilling locations as well as drilled locations were determined in the field by CATLIN personnel using a survey grade Global Positioning System (GPS) capable of vertical and horizontal accuracy of less than 0.01 feet or a mapping grade GPS capable of horizontal accuracies of less than three feet. All horizontal locations were recorded to the nearest foot and are presented in the North Carolina State Plane (NCSP), North American Datum 1983

(NAD 83) system. Vertical control was measured to the nearest 0.01 foot and referenced to the National Geodetic Vertical Datum 1988. All measurements were recorded and reported in United States Survey Feet.

The following alignments were investigated. Plan sheets, subsurface profiles, and selected cross sections of the alignment are included in this report.

<u>Line</u>	<u>Station (±)</u>
-L1-	13+25 to 16+00
-L2-	16+00 to 59+06
-RA1-	10+00 to 14+08
-RA2-	10+00 to 14+08
-SL1-	10+00 to 12+25
-SL2-	10+00 to 13+09
-Y1-	10+62 to 17+50
-Y1-	20+78 to 21+63
-Y1-	31+95 to 53+75
-Y1A-	12+90 to 15+05
-Y2-	10+00 to 12+35
-Y3-	10+00 to 15+86
-Y4-	10+00 to 14+35

The project reportedly will consist of 0.868 miles of roadway and bridge.

**AREAS OF SPECIAL GEOTECHNICAL INTEREST**

- 1) **GROUNDWATER:** As approximately one half of this project is located within a barrier island environment with relatively low topography, seasonal high groundwater, or the potential for groundwater related construction problems may exist. Although specific instances of such conditions were not identified during this investigation, it should be noted that the investigation was conducted during seasonal low groundwater conditions.

Standing water with depths of up to two feet was noted along the following section:

<u>Line</u>	<u>Station (±)</u>
-Y1-	13+20 to 15+85

The standing water appears to be either an ephemeral pond or the result of surficial drainage into the low lying, poorly draining organic soils and may be tidally influenced.

- 2) **COHESIVE SOILS:** Clay soils which may have the potential to cause embankment/subgrade and or slope stability problems during construction was encountered within portions of this project at the following sections:

<u>Line</u>	<u>Station (±)</u>
-L1-	12+25 to 15+38
-L2-	16+62 to 19+27
-RA1-	10+00 to 14+08
-Y1-	10+62 to 13+80
-Y1A-	12+90 to 14+87
-Y2-	10+62 to 12+35

- 3) **ORGANIC SOILS:** Organic material (root mat and organic topsoil) that may cause construction related issues was identified at the following sections on the project:

<u>Line</u>	<u>Station (±)</u>
-Y1-	12+22 to 16+18
-Y1-	33+65 to 38+60
-Y1-	47+57 to 49+40
-Y3-	11+63 to 13+68

Material within the identified organic soil area consisted of approximately three feet (land surface to elevation of approximately zero feet) of root mat and organic debris (muck with reported organic content ranging from 20.0% to 49.9%) underlain by silty sand with trace to moderate organic content (organic granular with reported organic contents ranging from 2.8% to 9.9%) to a depth of approximately six feet below land surface (approximate elevation of -8 feet). The organic material appears to have accumulated in a relic low feature as the organics are thickest in the central portion of the area and “pinch out” at the surface near the estimated areal extent.

- 4) **WATER WELLS:** No water wells were identified within the proposed construction limits. Potable water is supplied to residences in the vicinity by a public water supply.

Water supply wells may be present along the project corridors that were not detected.

## **PHYSIOGRAPHY AND GEOLOGY**

The project is located within the eastern most portion of the North Carolina Coastal Plain physiographic province. Geology in the vicinity of Surf City is dominated by Undivided Coastal Plain (U.C.P.) materials which are noted as Quaternary Surficial Deposits on the Geologic Map of North Carolina. Coastal Plain materials are described as sand, clay, gravel, and peat deposits which were deposited in marine, fluvial, eolian, and lacustrine environments. Sediments of the River Bend, Castle Hayne, and Peedee Formations are reported to underlay the U.C.P. deposits in the vicinity of Surf City.

Land use in the area is primarily residential, commercial, and recreational. The land surface in the project vicinity is dominated by flat to gently rolling terrain typical of coastal environments with land surface elevations ranging from approximately one foot along the Intracoastal Waterway to approximately 14 feet along the existing bridge embankments. According to available data, The Intracoastal Waterway and surrounding waters in the area are tidally influenced with tidal fluctuations of approximately four feet between low and high tides. As the project is located in a Barrier Island environment, no discernible flood plain was noted. Highway NC 50/210 is oriented approximately south southeast with existing bridge embankments at roughly 2 to 10 feet above surrounding existing grade. Numerous underground and overhead utilities exist in the vicinity of the proposed project. The project is primarily drained by surficial runoff which drains into the Intracoastal Waterway.

## **GROUNDWATER**

Groundwater data was collected from open boreholes, where possible, during the field investigation conducted during March and April 2015. According to available data, rainfall in Holly Ridge, North Carolina, located approximately five miles west of the project, was reported as follows:

<u>MONTH</u> <u>(2015)</u>	<u>RECORDED RAINFALL</u> <u>(inches)</u>	<u>AVERAGE RAINFALL</u> <u>(inches)</u>
February	4.87	3.42
March	2.98	4.04
April	2.41	2.98

Measured groundwater elevations (24 hour measurements) ranged from elevation -0.4 feet to 3.6 feet with an average elevation of 1.3 feet. Depth to groundwater measurements ranged from 2.6 feet to 6.8 feet (below existing land surface), with an average depth to water of 4.2 feet. Formational material in which groundwater was typically observed was found to be predominantly sandy material with an assumed moderate to high permeability.

### SOIL PROPERTIES

Soils encountered at the project site include roadway embankment, artificial fill, alluvial, and undifferentiated coastal plain sediments.

Roadway Embankment soils were identified beneath and adjacent to existing roadways and consists of loose to medium dense, sand and silty sand (A-3 and A-2-4). Field observations indicate that a large portion of the roadway embankment was constructed with material obtained on site or from the immediate vicinity and therefore is difficult to discern from in situ U.C.P. materials.

Artificial fill consisting of loose to medium dense sand and silty sand was encountered adjacent to wooded areas and low lying areas next to roadway embankments. Artificial fill consisting of moderately organic fine sand was encountered along -Y1- from Station 12+22 to 13+00 from land surface to a depth of approximately one foot. As with the embankment material, the artificial fill appears to have been obtained on site or locally and is hard to discern from in situ material except in areas where the fill is in contact with organic soils.

The predominant alluvial material identified along the project consists of organic materials that appear to have been deposited upon a relic flood plain. These materials occur within the thickly wooded area along -Y1- from approximate stations 12+50 to 16+00. All of the wooded area in the vicinity was found to contain a minimum of 0.3 feet to one foot and up to approximately three feet of muck (root mat and organic topsoil previously discussed in the Organic Soils Section). Organic granular material was encountered beneath the muck at an approximate average elevation of zero feet along -Y1- from approximate station 12+50 to roughly 17+00. This same organic stratigraphy was identified on the eastern side of the Intracoastal Waterway to approximate -Y1- station 38+00. However, the only construction related activities proposed in this area are associated with removal of the existing bridge embankment.

Undivided coastal plain material is between and beneath the roadway embankment and alluvial material. The dominant material is brown to gray, very loose to loose, fine to coarse sand and silty sand (A-3 and A-2-4) with trace to some shell fragments and well-rounded rock fragments. A thin layer (0.5 to two feet) of very soft to medium stiff, clay and clayey to sandy silt (A-7-6, A-6, and A-4) was identified in some areas along -L1-, -L2-, -RA1-, -Y1-, -Y1A-, and -Y2- at an average elevation of approximately -4 feet. Laboratory analysis of three samples collected within the silt and clay material reported liquid limits ranging from 30 to 48 (38 average) and plasticity indices ranging from 10 to 29 (20 average).

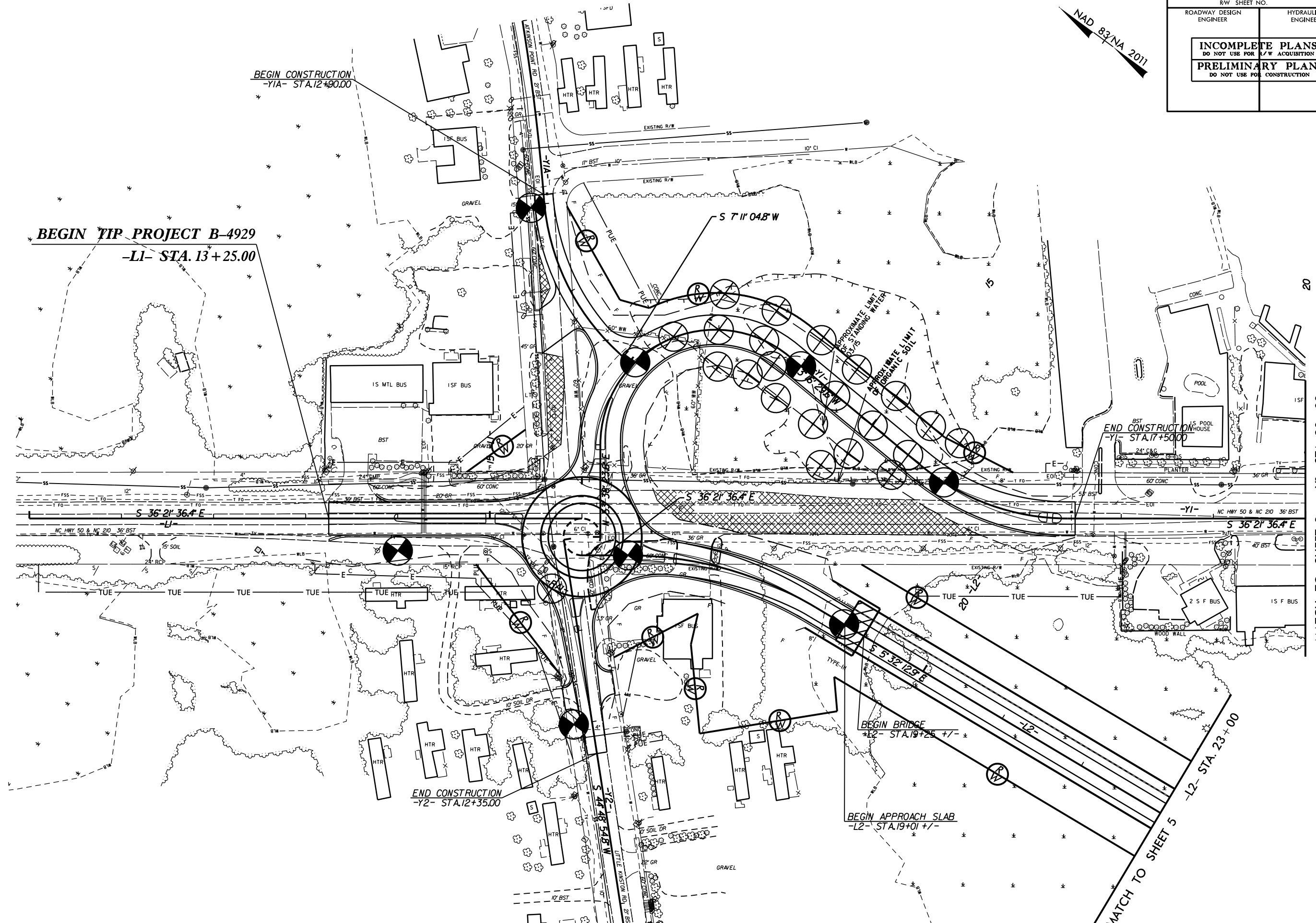
Prepared by,  
DocuSigned by:

*Steven V. Hudson*

62EFD881816445E  
Steven V. Hudson, L.G.  
Project Geologist

PROJECT REFERENCE NO.	SHEET NO.
B-4929	4
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	

NAD 83/NA 2011



REVISIONS

27-AUG-2015 14:16 S:\p\mk\g\PROJECT\2015\215937 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\GEO\RDWY\cadtin\CADD\_GEO\TECH\_Site&Sub\B4929\_GEO\_Rdwy\_psh\_04.dgn  
 8/17/99

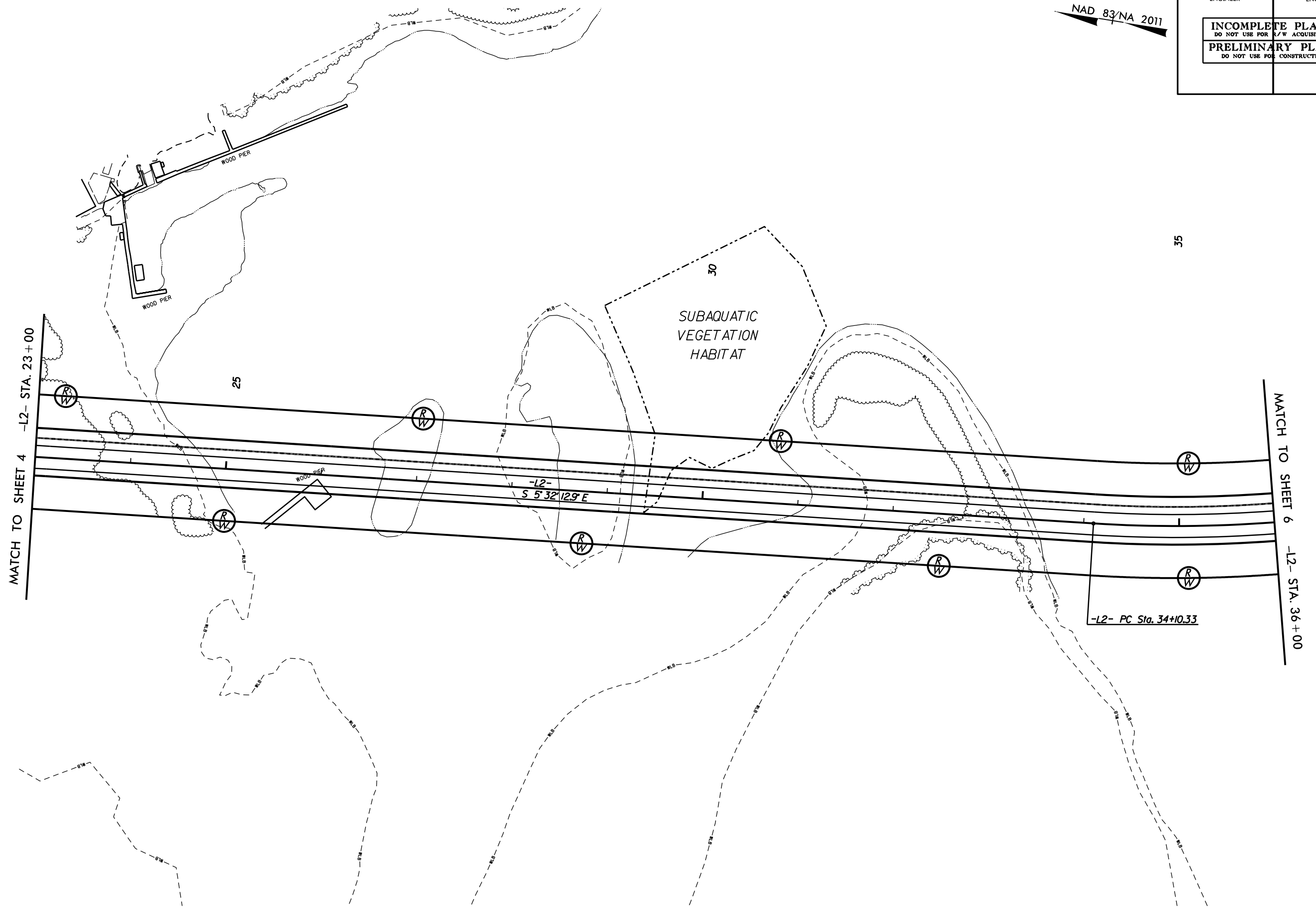
MATCH TO SHEET 8 -Y1- STA. 20+00

MATCH TO SHEET 5 -L2- STA. 23+00



PROJECT REFERENCE NO.	SHEET NO.
B-4929	5
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	

NAD 83/NA 2011



MATCH TO SHEET 4 -L2- STA. 23+00

MATCH TO SHEET 6 -L2- STA. 36+00

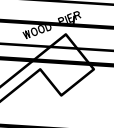
-L2- PC Sta. 34+10.33

SUBAQUATIC VEGETATION HABITAT

25

30

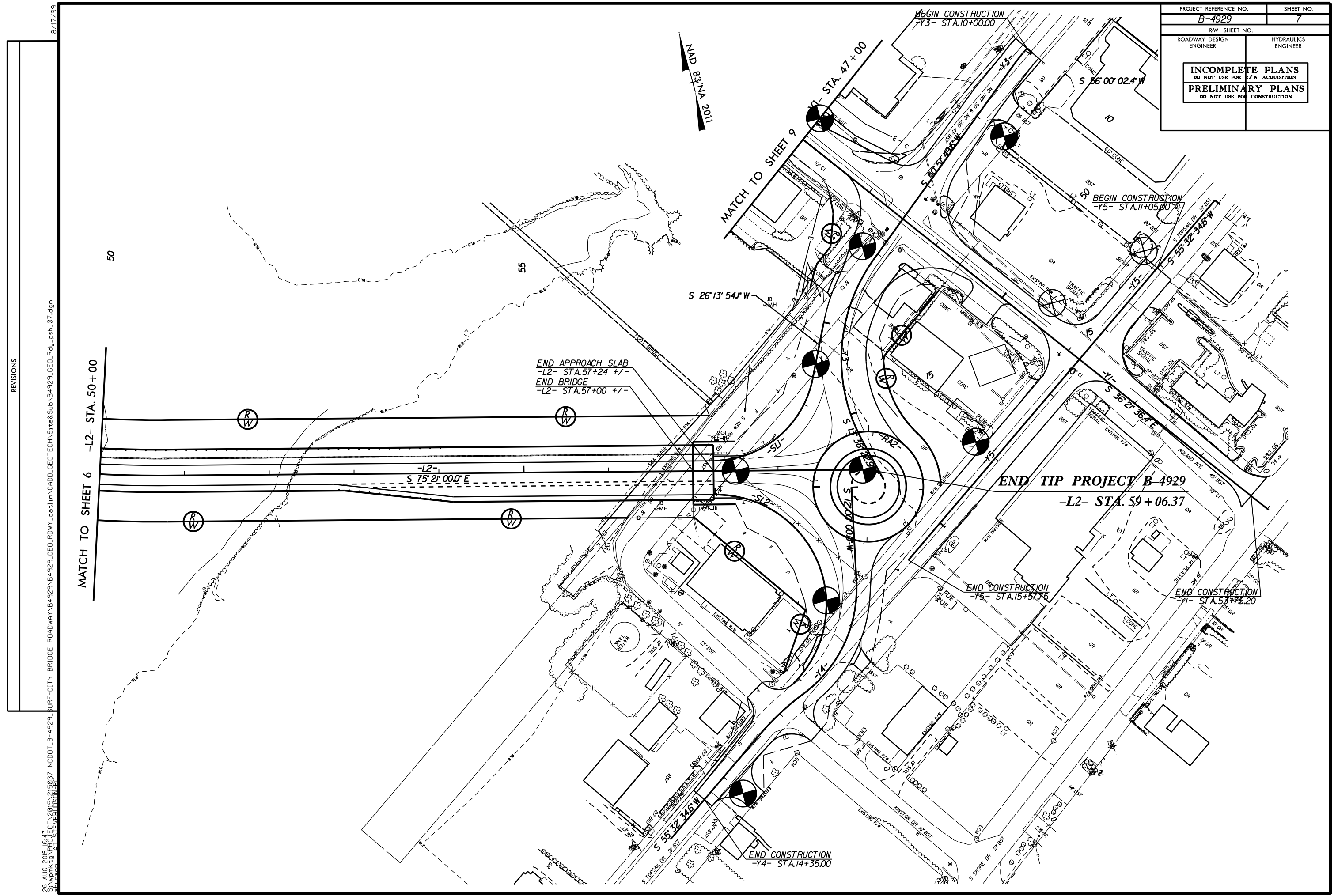
35



REVISIONS  
 26-AUG-2015 16:45  
 S:\pml\g\PROJECTS\2015\215937 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\GEO\RDWY\cont\cadd\_GEO\RDWY\B4929\_GEO\_Rdy\_psh\_05.dgn  
 8/17/99



PROJECT REFERENCE NO. <b>B-4929</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	



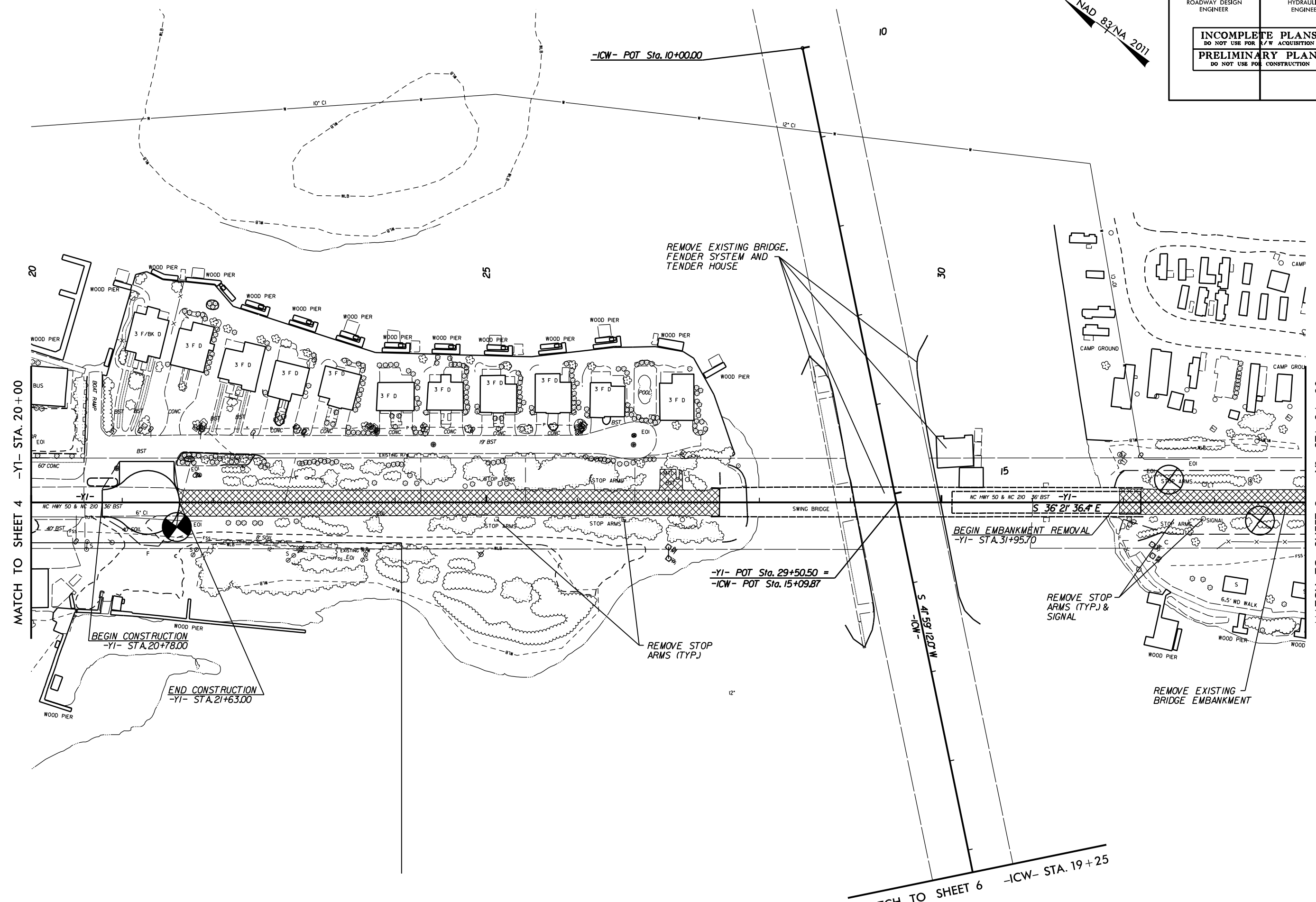
REVISIONS

26-AUG-2015 16:47 S:\pml\g\PROJECTS\2015\215037 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\_GEO\_PDWY.cad\lin\CADD\_GEO\TECH\Site&Sub\B4929\_GEO\_Rdy\_psh\_07.dgn  
 8/17/99

PROJECT REFERENCE NO. <b>B-4929</b>	SHEET NO. <b>8</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	

NAD 83/NA 2011

REVISIONS  
 26-AUG-2015 16:48  
 S:\pml\g\PROJECT\_2015\215037 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\B4929\_GEO\_PDWY\_cad\lin\CADD\_GEO\TECH\_Site&Sub\B4929\_GEO\_Rdy\_psh\_08.dgn  
 8/17/99



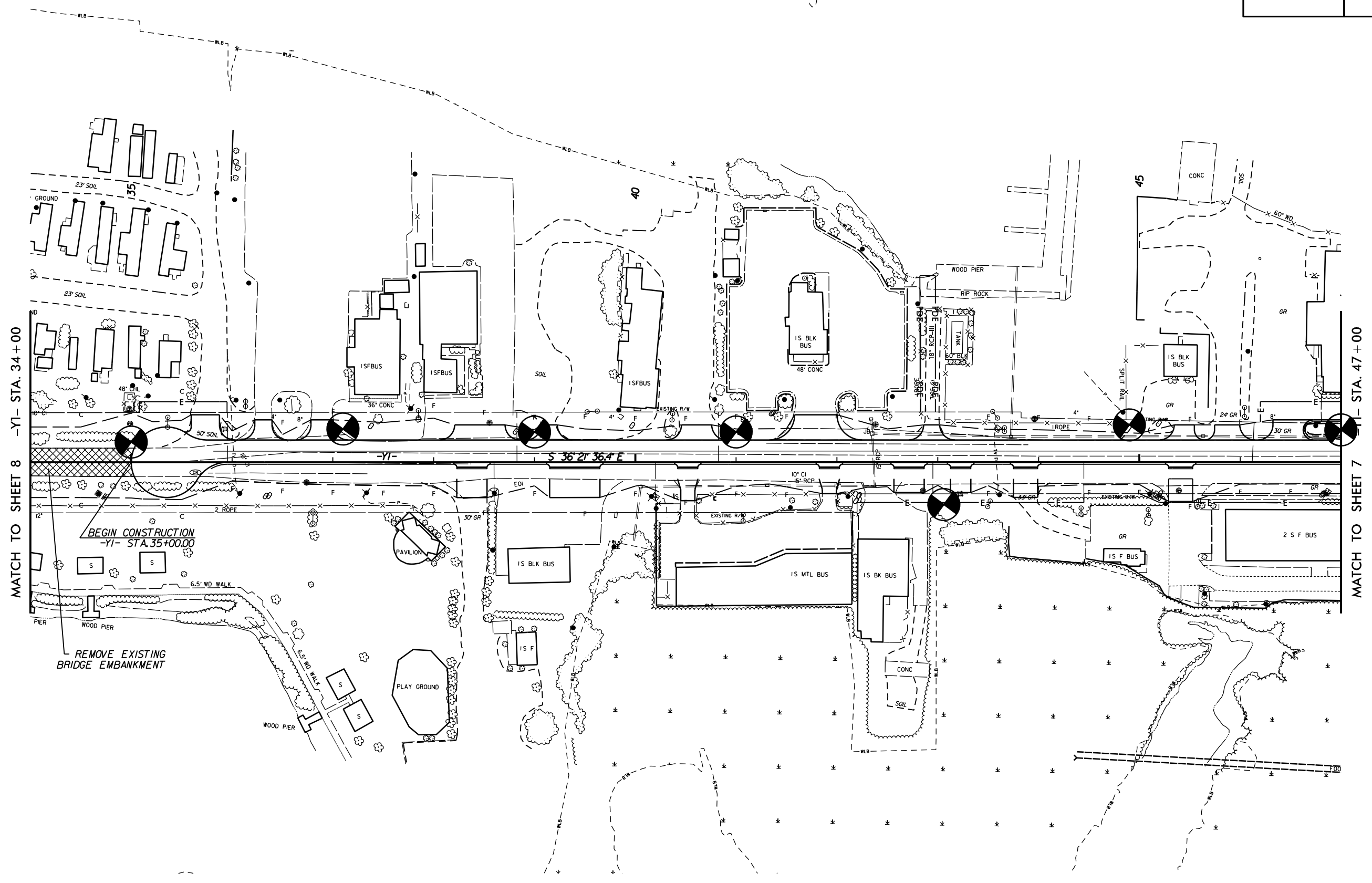
MATCH TO SHEET 4 -YI- STA. 20+00

MATCH TO SHEET 9 -YI- STA. 34+00

MATCH TO SHEET 6 -ICW- STA. 19+25

PROJECT REFERENCE NO. <b>B-4929</b>	SHEET NO. <b>9</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	

NAD 83/NA 2011

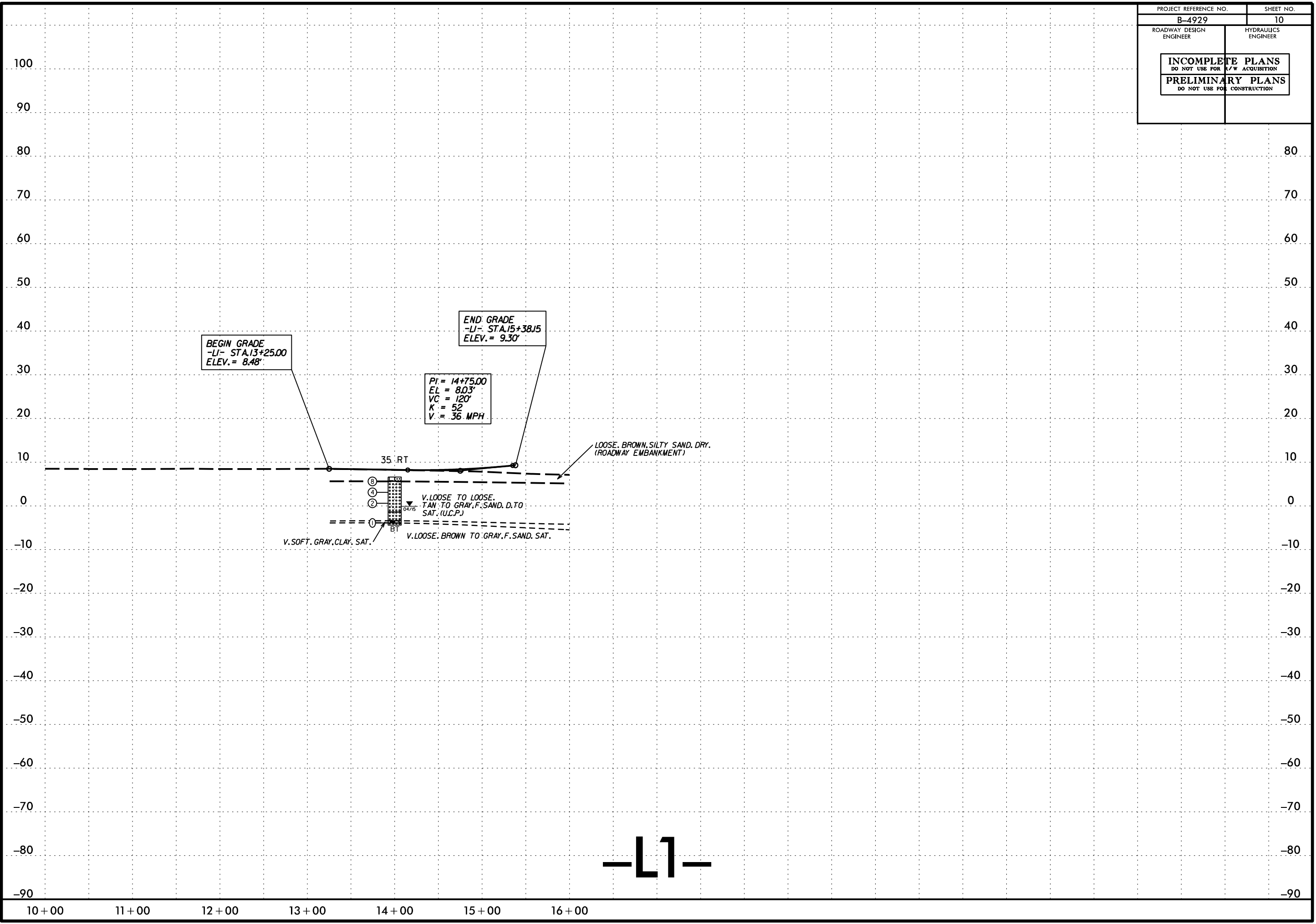


REVISIONS

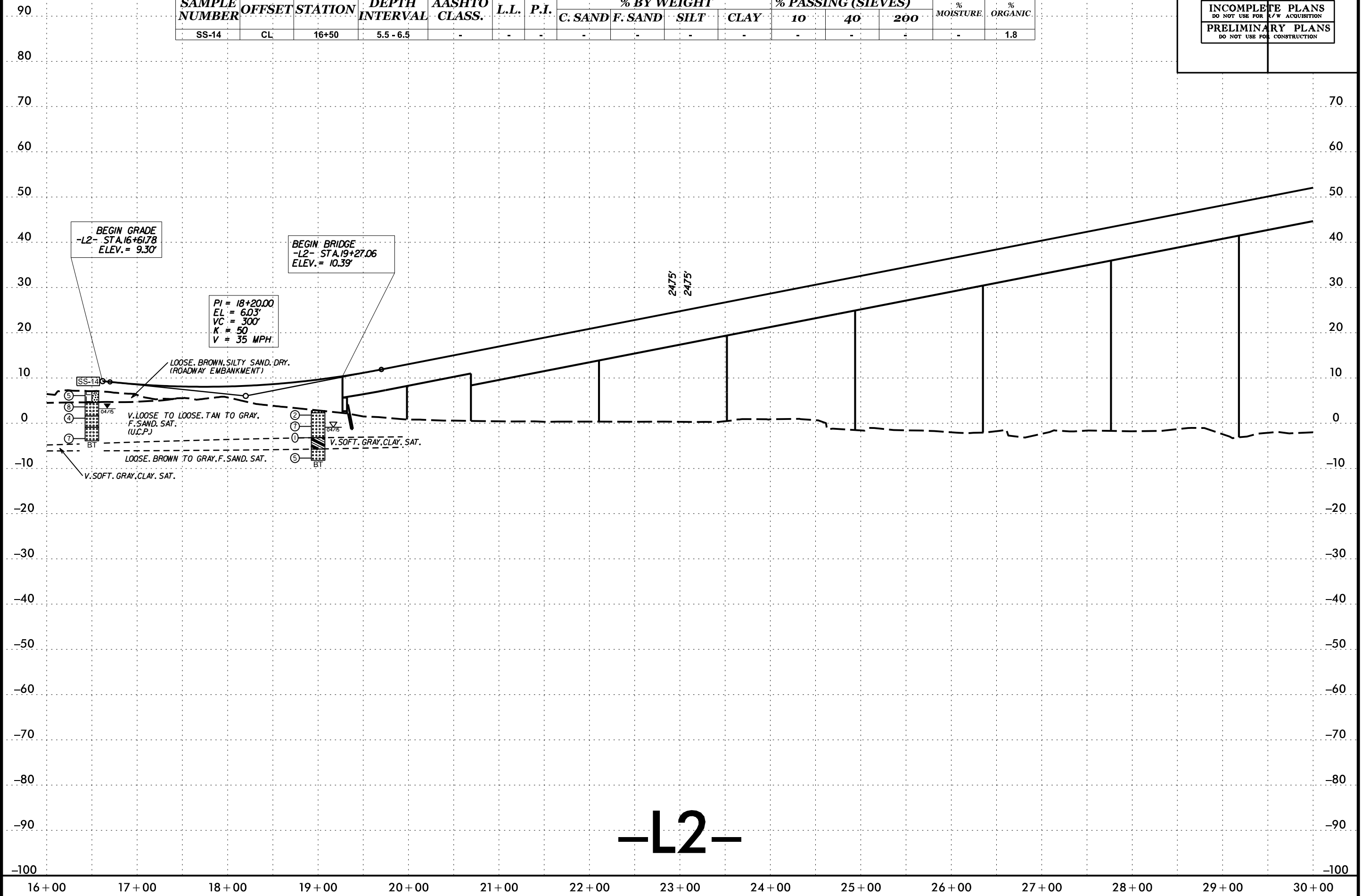
26-AUG-2015 16:19  
 S:\pml\g\PROJECT\2015\215037 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\B4929\_GEO\_PDWY.co.tin\CADD\_GEO\TECH\_Site&Sub\B4929\_GEO\_Rdy\_psh\_09.dgn  
 8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-4929	10
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	

5/14/99  
 26-AUG-2015 16:51  
 S:\work\proj\PROJECT\_2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929.GEO\_PDWY\_cad\cadd.GEOTECHN.Plan\Prof\B4929\_GEO\_pf\_10\_LL.dgn  
 10:11:51 AM  
 AT: STEPHENSON



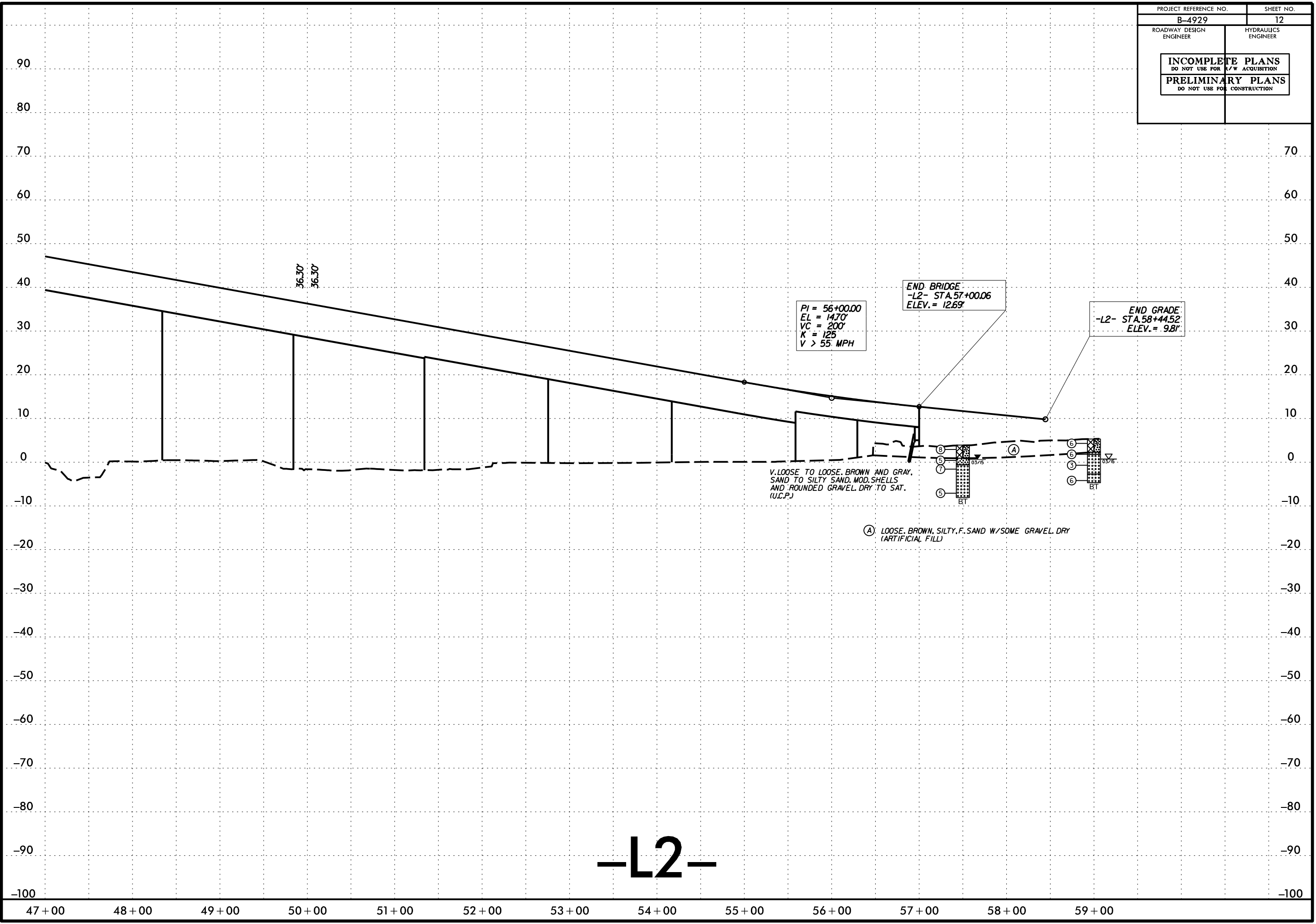
SOIL TEST RESULTS															
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-14	CL	16+50	5.5 - 6.5	-	-	-	-	-	-	-	-	-	-	-	1.8



-L2-

5/14/99  
 26-AUG-2015 16:53  
 S:\pwork\g\PROJECT\2015\215037 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929-GEO-FD\WY-CADD-GEO\TECH\Plan\Prof\B4929-GEO-pf\_11.L2.dgn  
 AT: STEPHENSON

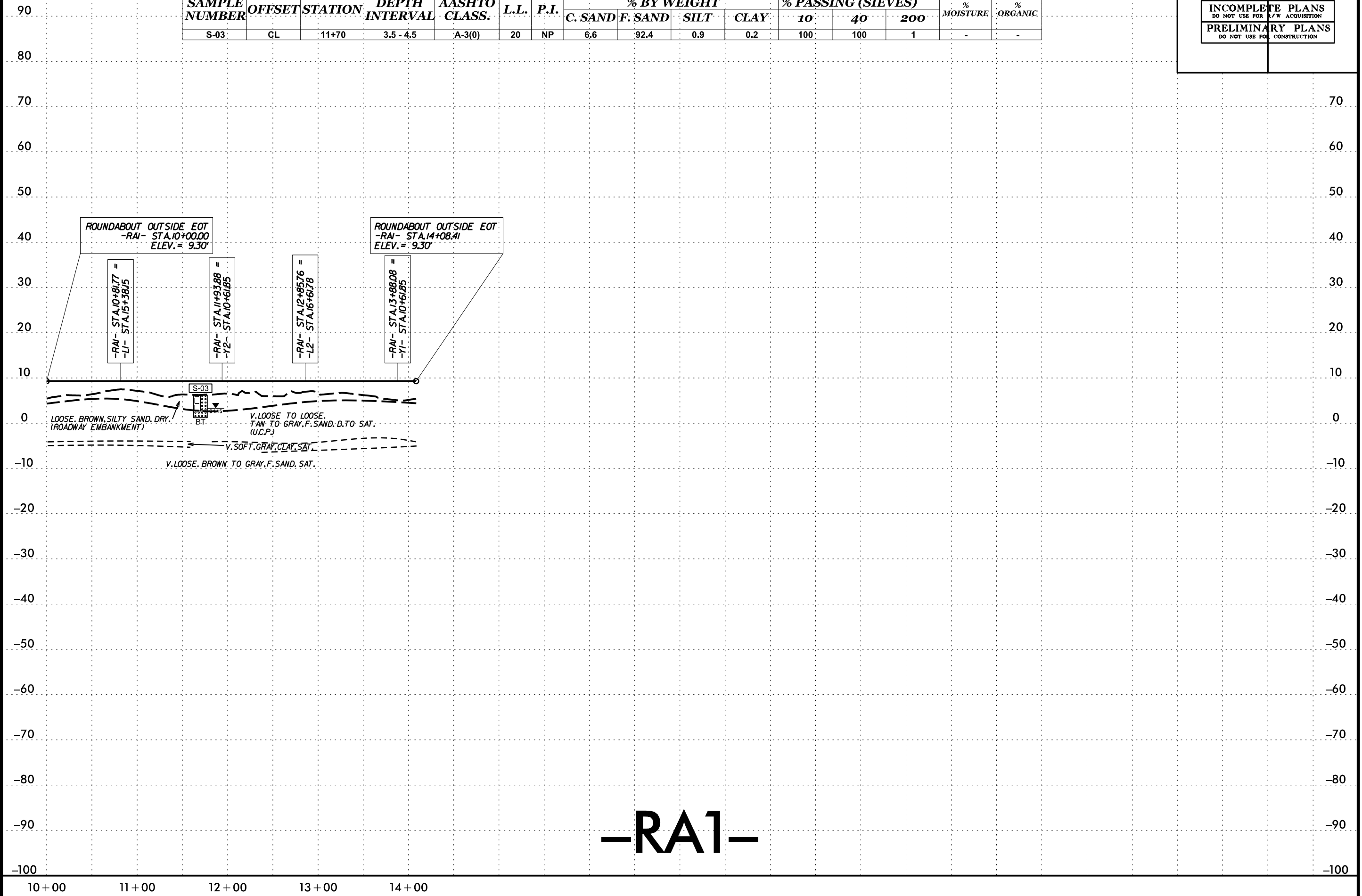
5/14/99  
 26-AUG-2015 16:54  
 S:\pwork\proj\PROJECT\_2015\215037 NCDOT.B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\_GEO\_PDWY.cad\cadd\GEO\TECH\Plan\Prof\B4929\_GEO\_pf.12.L2.2.dgn  
 AT: STEPHENSON.PT



-L2-



SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-03	CL	11+70	3.5 - 4.5	A-3(0)	20	NP	6.6	92.4	0.9	0.2	100	100	1	-	-

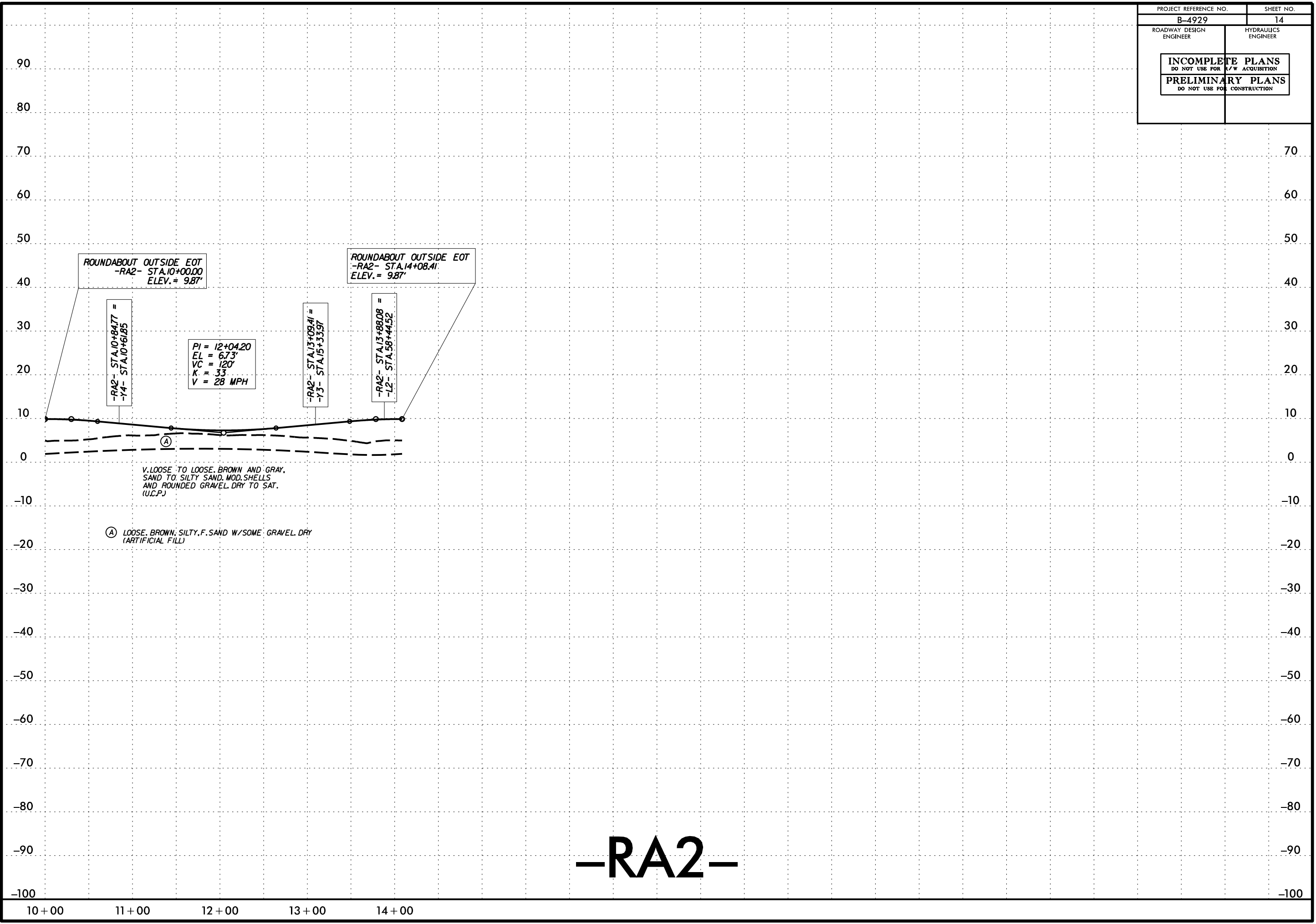


**-RA1-**

5/14/99  
 26-AUG-2015 16:55  
 S:\pwork\proj\PROJECT\_2015\215937 NCDOT.B-4929-SURF-CITY BRIDGE ROADWAY\B4929-GEO\_PDWY.cad\cadd\GEO\TECH\Plan\Prof\B4929\_GEO\_pf\_13\_RA1.dgn

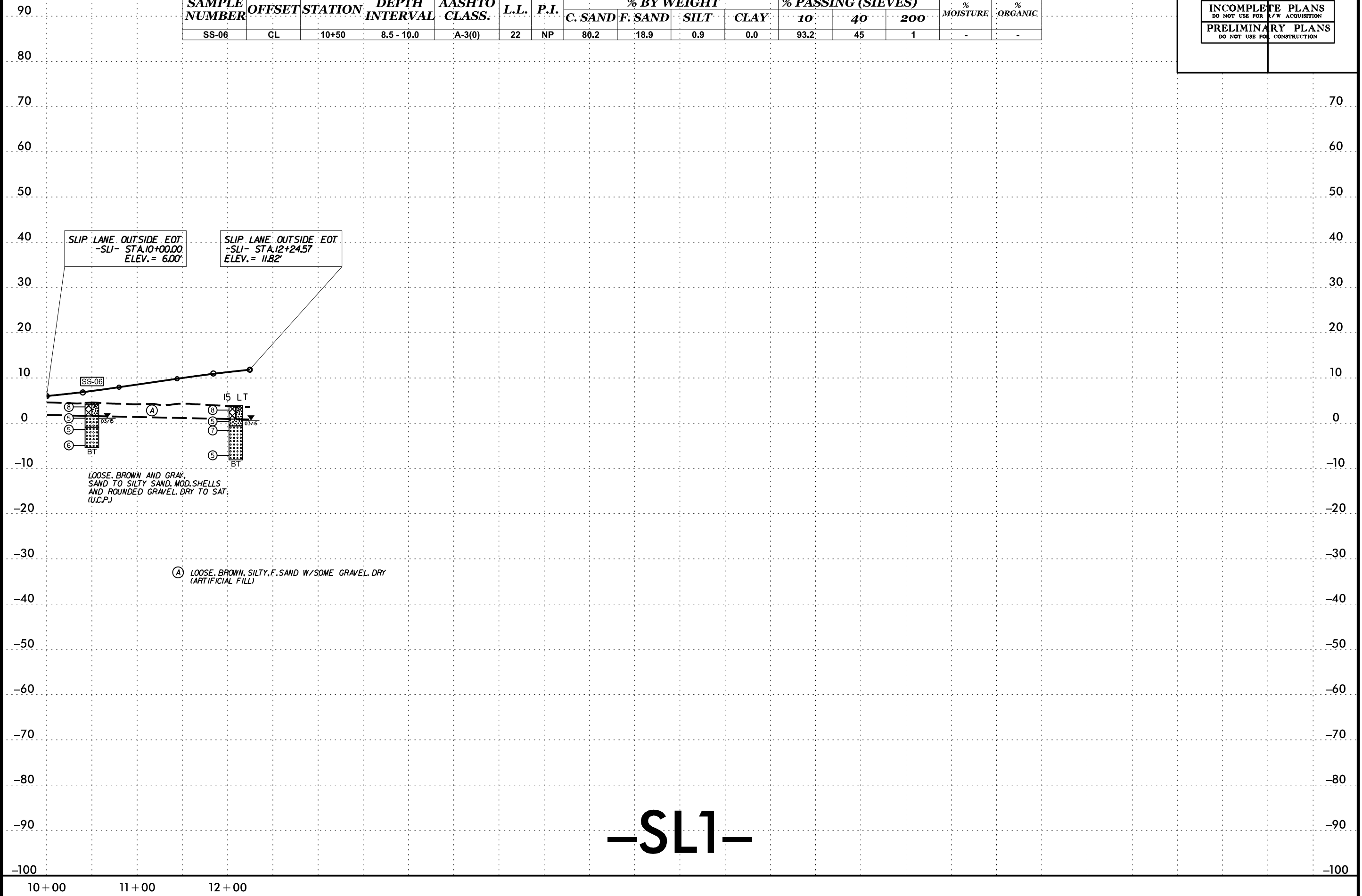
PROJECT REFERENCE NO.	SHEET NO.
B-4929	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

26-AUG-2015 16:56  
 S:\pwork\proj\PROJECT\_2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929.GEO.FD.WY.CAD\TIN\CADD.GEOTECHN.Plan\Prof\B4929.GEO.pf.14.RA2.dgn  
 5/14/99



-RA2-

<b>SOIL TEST RESULTS</b>															
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-06	CL	10+50	8.5 - 10.0	A-3(0)	22	NP	80.2	18.9	0.9	0.0	93.2	45	1	-	-



SLIP LANE OUTSIDE EOT.  
-SLI- STA. 10+00.00  
ELEV. = 6.00'

SLIP LANE OUTSIDE EOT.  
+SLI- STA. 12+24.57  
ELEV. = 11.82'

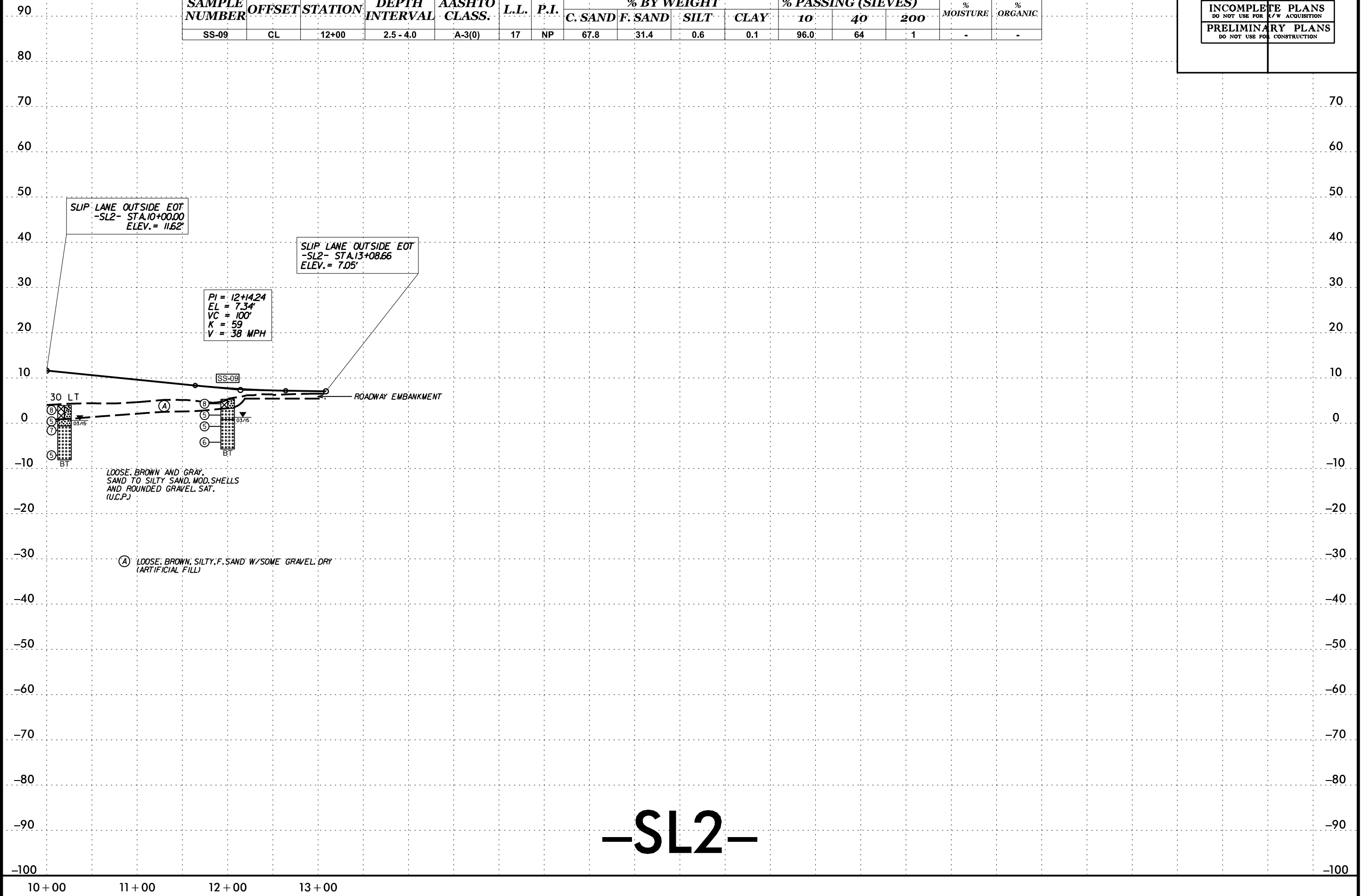
LOOSE, BROWN AND GRAY,  
SAND TO SILTY SAND, MOD. SHELLS  
AND ROUNDED GRAVEL, DRY TO SAT.  
(U.C.P.)

(A) LOOSE, BROWN, SILTY, F. SAND W/SOME GRAVEL, DRY  
(ARTIFICIAL FILL)

**-SLI-**

26-AUG-2015 16:57  
 S:\pwork\proj\PROJECT\_2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929.GEO.FDWY.cad\cadd.GEOTECH.Plan\Prof\B4929.GEO.pf.15.SLI.dgn  
 5/14/99

<b>SOIL TEST RESULTS</b>															
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-09	CL	12+00	2.5 - 4.0	A-3(0)	17	NP	67.8	31.4	0.6	0.1	96.0	64	1	-	-



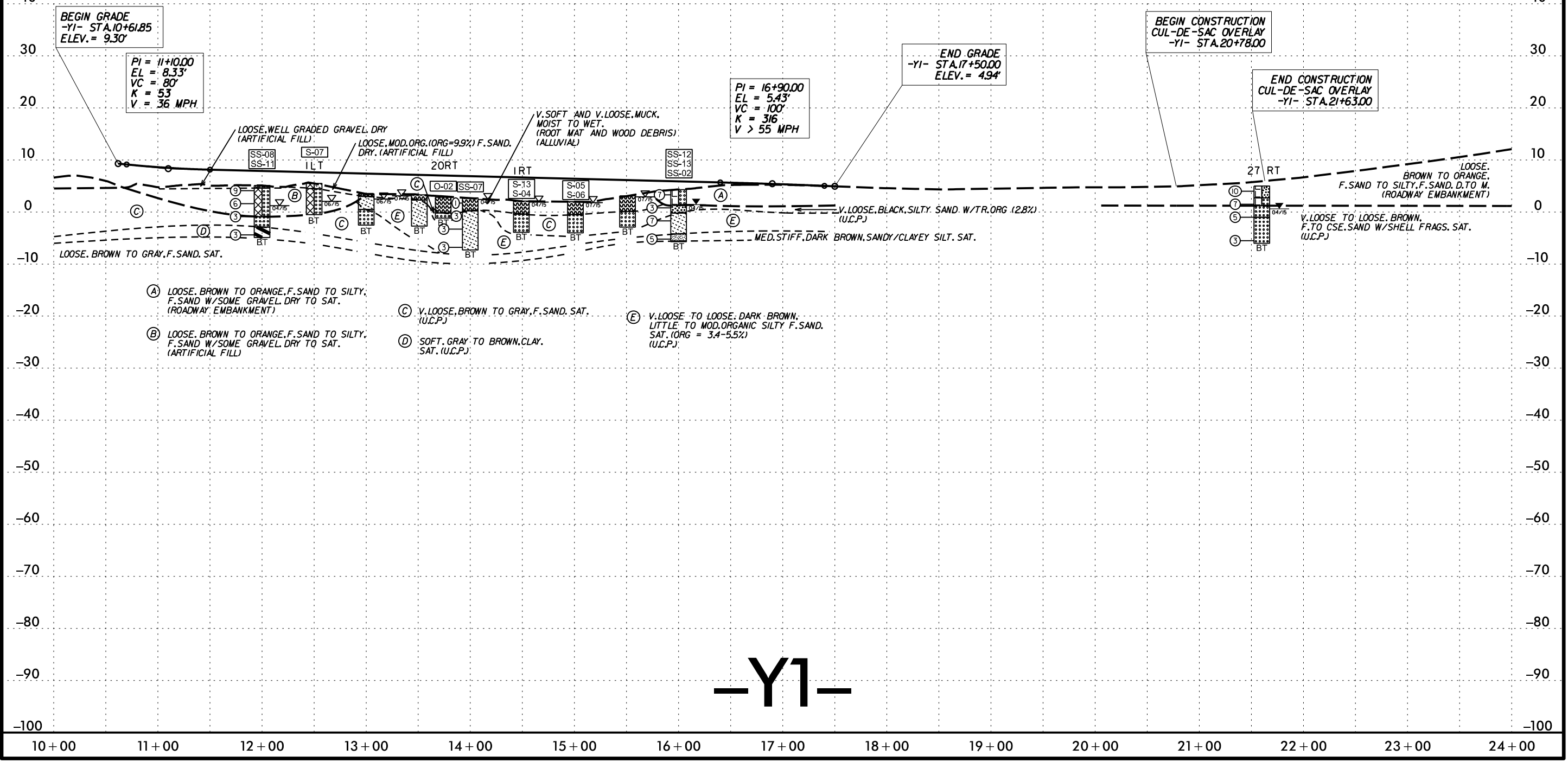
5/14/99  
 27-AUG-2015 10:03  
 S:\work\project\2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929.GEO.FDWY.cad\cadd.GEOTECH.Plan\Prof\B4929.GEO.pf.16.SL2.dgn

-SL2-

### SOIL TEST RESULTS

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-08	CL	12+00	5.0 - 6.0	A-3(0)	22	NP	52.1	44.5	2.4	1.0	98.1	78	4	-	-
SS-11	CL	12+00	8.5 - 10.0	A-7-6(29)	48	29	0.6	6.2	32.8	60.4	100	100	94	-	-
S-07	1ft LT	12+50	0.5 - 1.0	A-3(0)	28	NP	32.4	63.0	4.6	0.0	99.7	92	5	-	9.9
O-02	20ft RT	13+74	3.0 - 3.5	-	-	-	-	-	-	-	-	-	-	-	1.3
SS-07	CL	14+00	2.5 - 4.0	A-3(0)	32	NP	31.2	63.3	4.3	1.2	98.7	94	6	-	5.5
S-13	1ft RT	14+49	2.0 - 2.5	A-5(0)	97	NP	32.6	28.4	30.3	8.7	100	84	41	-	49.9
S-04	1ft RT	14+49	2.5 - 3.0	A-3(0)	17	NP	27.3	63.6	4.1	5.0	100	97	9	-	1.5
S-05	CL	15+01	0.0 - 2.5	A-2-5(0)	49	NP	39.3	41.9	14.7	4.1	99.6	86	20	-	20.0
S-06	CL	15+01	2.5 - 3.0	A-3(0)	17	NP	52.9	43.3	1.8	2.0	99.6	85	4	-	1.9
SS-12	CL	16+00	3.0 - 4.0	-	-	-	-	-	-	-	-	-	-	-	2.8
SS-13	CL	16+00	5.0 - 7.5	-	-	-	-	-	-	-	-	-	-	-	3.4
SS-02	CL	16+00	8.5 - 9.9	A-4(5)	30	10	6.0	32.1	27.1	34.8	100	99	67	-	-

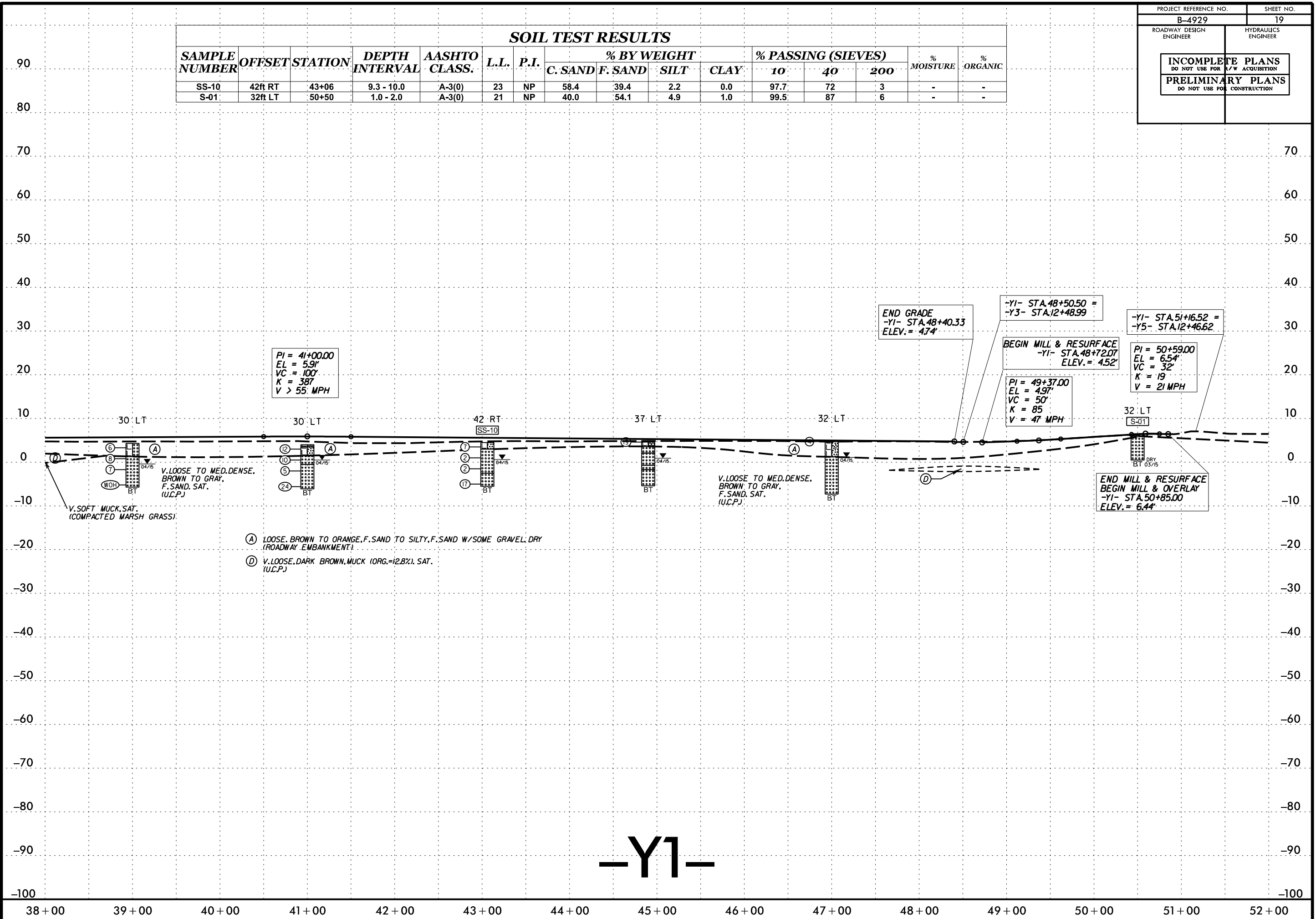
26-AUG-2015 17:03 S:\pwork\proj\PROJECT\_2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\RDWY\cadd\CADD\_GEO\TECH\Plan\Prof\B4929\_GEO\_pf\_17\_Y1.dgn  
 5/14/99



-Y1-



SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	42ft RT	43+06	9.3 - 10.0	A-3(0)	23	NP	58.4	39.4	2.2	0.0	97.7	72	3	-	-
S-01	32ft LT	50+50	1.0 - 2.0	A-3(0)	21	NP	40.0	54.1	4.9	1.0	99.5	87	6	-	-



PI = 41+00.00  
 EL = 5.9'  
 VC = 100'  
 K = 387  
 V > 55 MPH

END GRADE  
 -Y1- STA. 48+40.33  
 ELEV. = 47.4'

-Y1- STA. 48+50.50 =  
 -Y3- STA. 42+48.99

BEGIN MILL & RESURFACE  
 -Y1- STA. 48+72.07  
 ELEV. = 45.2'

PI = 49+37.00  
 EL = 4.97'  
 VC = 50'  
 K = 85  
 V = 47 MPH

-Y1- STA. 51+16.52 =  
 -Y5- STA. 42+46.62

PI = 50+59.00  
 EL = 6.54'  
 VC = 32'  
 K = 19  
 V = 21 MPH

END MILL & RESURFACE  
 BEGIN MILL & OVERLAY  
 -Y1- STA. 50+85.00  
 ELEV. = 6.44'

V. LOOSE TO MED. DENSE.  
 BROWN TO GRAY.  
 F. SAND, SAT.  
 (U.C.P.)

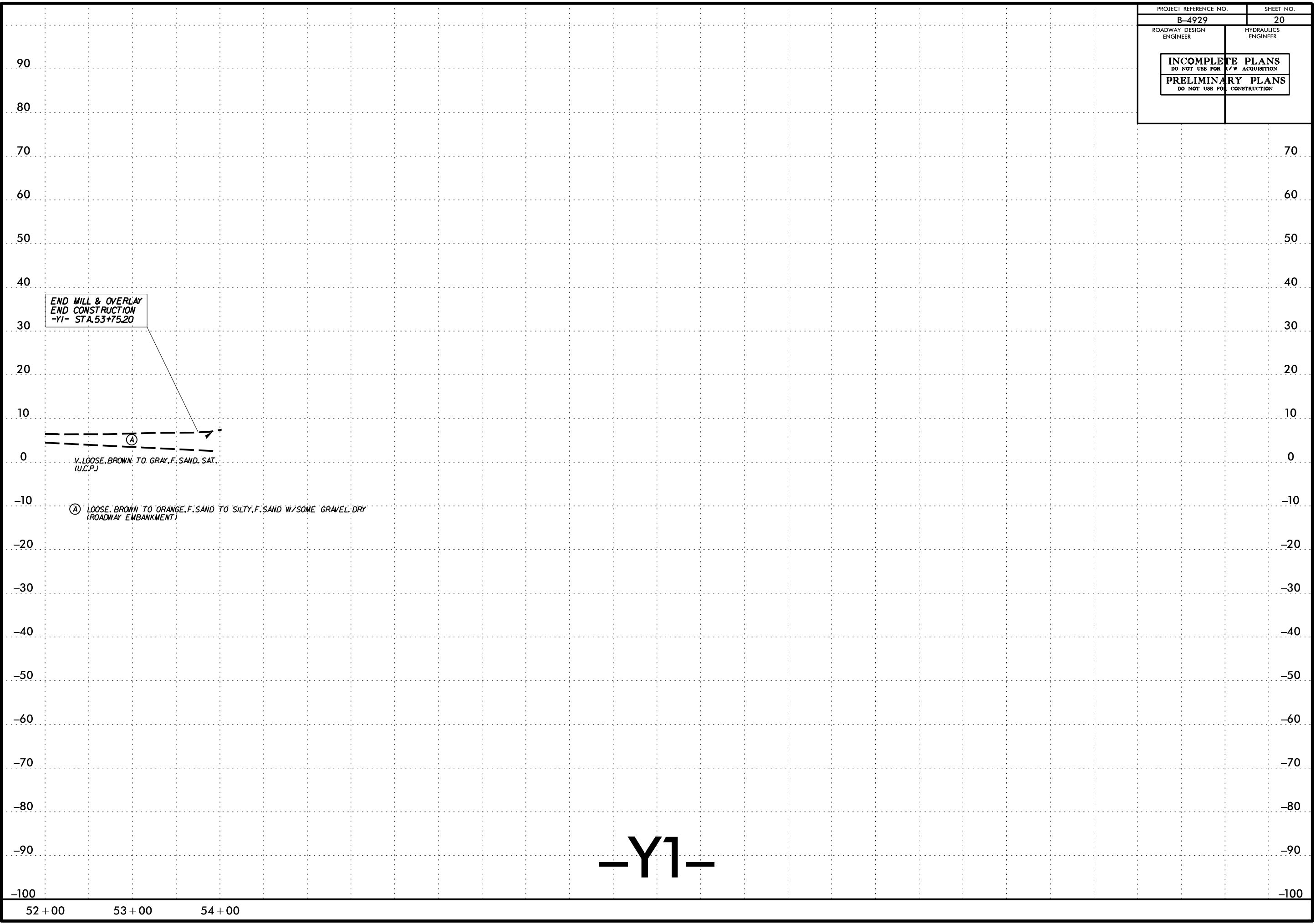
V. LOOSE TO MED. DENSE.  
 BROWN TO GRAY.  
 F. SAND, SAT.  
 (U.C.P.)

- (A) LOOSE, BROWN TO ORANGE, F. SAND TO SILTY, F. SAND W/SOME GRAVEL, DRY (ROADWAY EMBANKMENT)
- (D) V. LOOSE, DARK BROWN, MUCK (ORG. = 12.8%), SAT. (U.C.P.)

5/14/99  
 27-AUG-2015 14:23  
 S:\wpmk\g\PROJECT\2015\215037 NCDOT.B-4929 SURF-CITY BRIDGE ROADWAY\B4929\B4929\_GEO\_PDWY\_CAD\GEO\TECH\Plan\Prof\B4929\_GEO\_pf\_19\_Y1\_3.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-4929	20
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	

27-AUG-2015 10:05  
 S:\pwork\proj\PROJECT\_2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929.GEO.FD.WY.co.tin\CADD.GEOTECH.Plan\Prof\B4929.GEO.pf.20.Y1.4.dgn  
 5/14/99

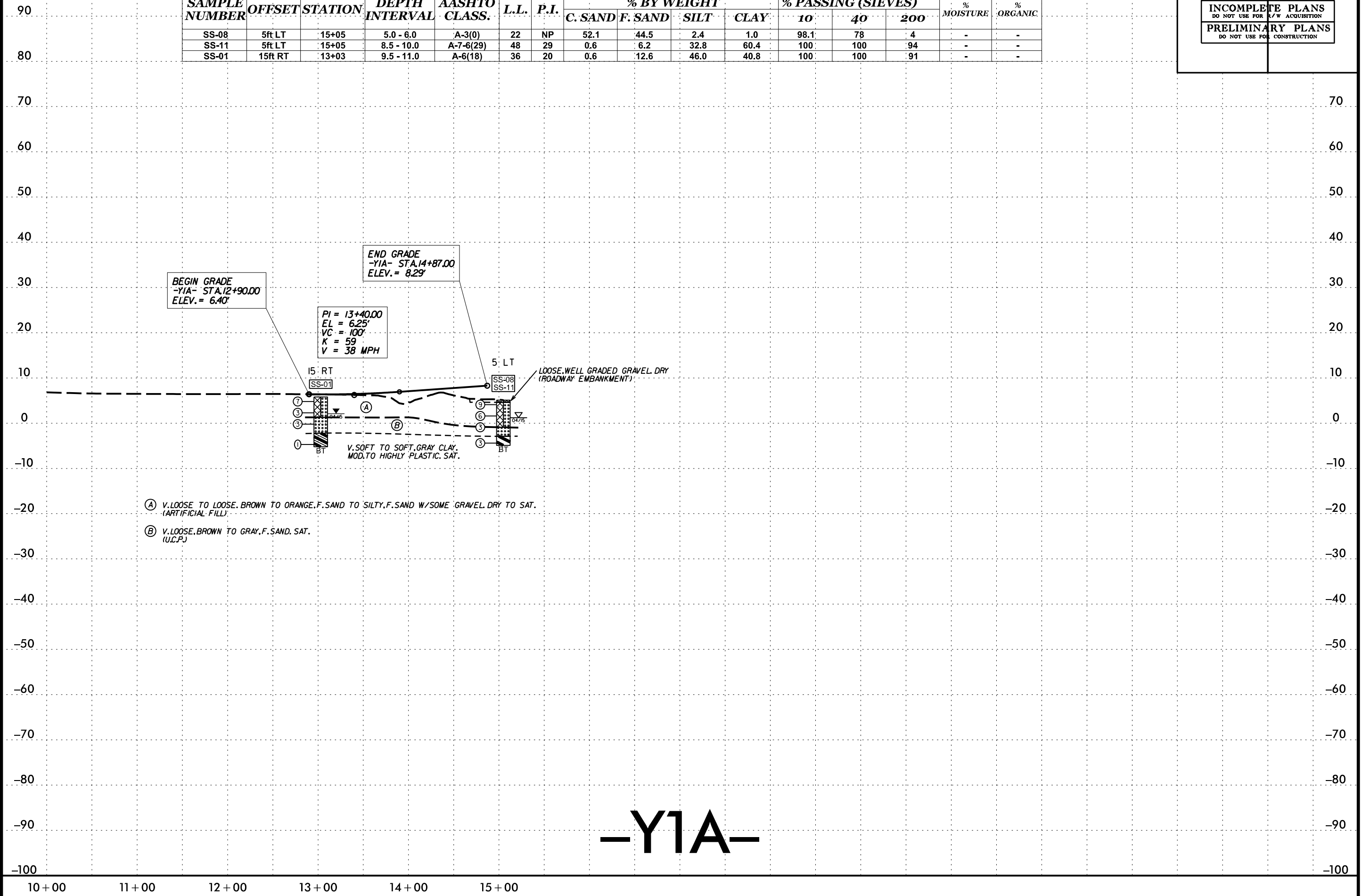


-Y1-

52 + 00      53 + 00      54 + 00



SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-08	5ft LT	15+05	5.0 - 6.0	A-3(0)	22	NP	52.1	44.5	2.4	1.0	98.1	78	4	-	-
SS-11	5ft LT	15+05	8.5 - 10.0	A-7-6(29)	48	29	0.6	6.2	32.8	60.4	100	100	94	-	-
SS-01	15ft RT	13+03	9.5 - 11.0	A-6(18)	36	20	0.6	12.6	46.0	40.8	100	100	91	-	-

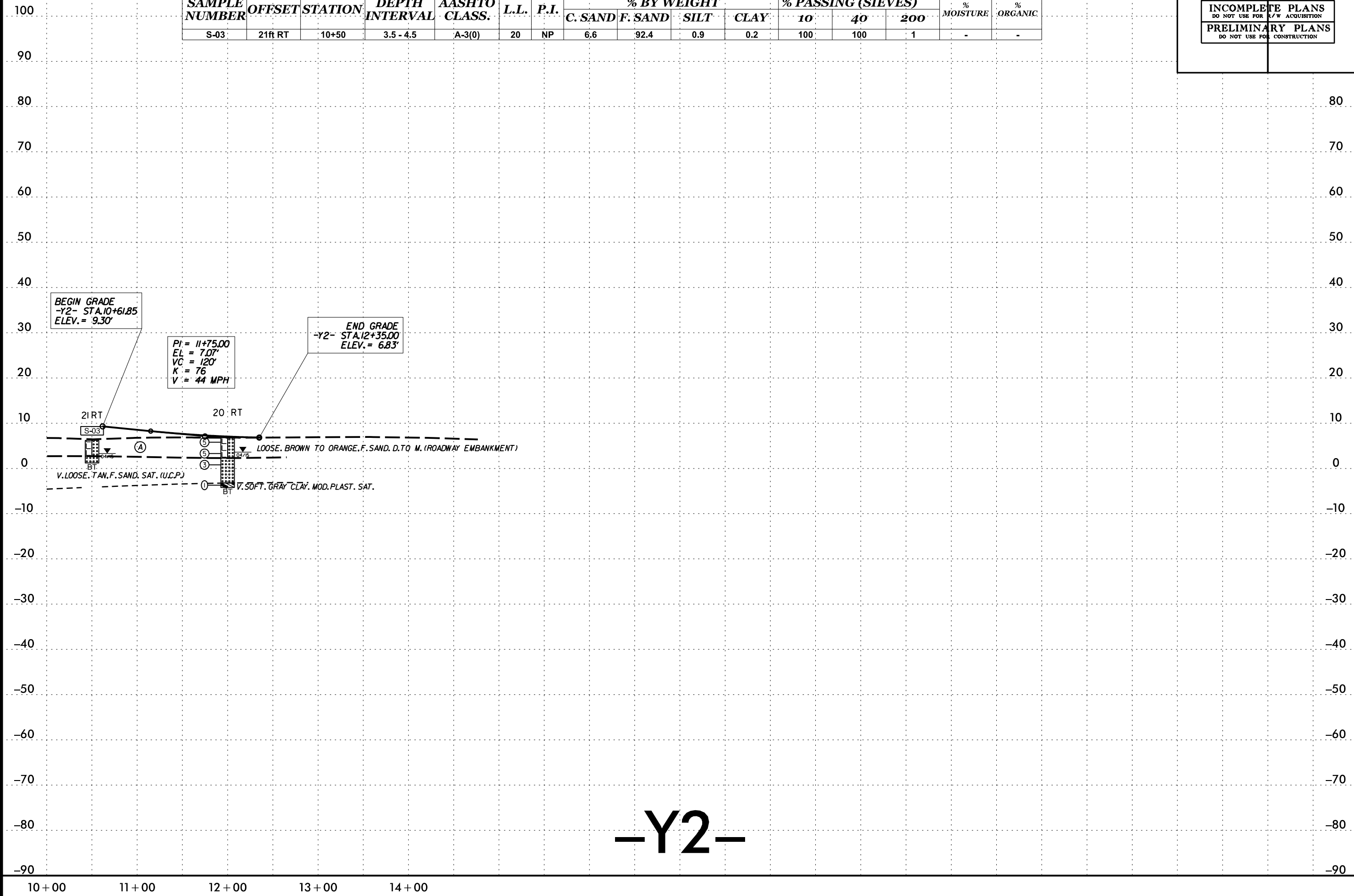


5/14/99  
 26-AUG-2015 17:09  
 S:\wpmk\g\PROJECT\2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929\B4929\_GEO\_PDWY\_CADD\GEO\TECH\Plan\Prof\B4929\_GEO\_p1\_21\_Y1A.dgn

5/14/99  
 26-AUG-2015 17:11  
 S:\pwork\project\2015\215637 NCDOT.B-4929-SURF-CITY BRIDGE ROADWAY\B4929-GEO-FD\WY-CAD\GEO\TECH\Plan\Prof\B4929-GEO-pf-22-Y2.dgn  
 SURF-CITY BRIDGE ROADWAY\B4929-GEO-FD\WY-CAD\GEO\TECH\Plan\Prof\B4929-GEO-pf-22-Y2.dgn

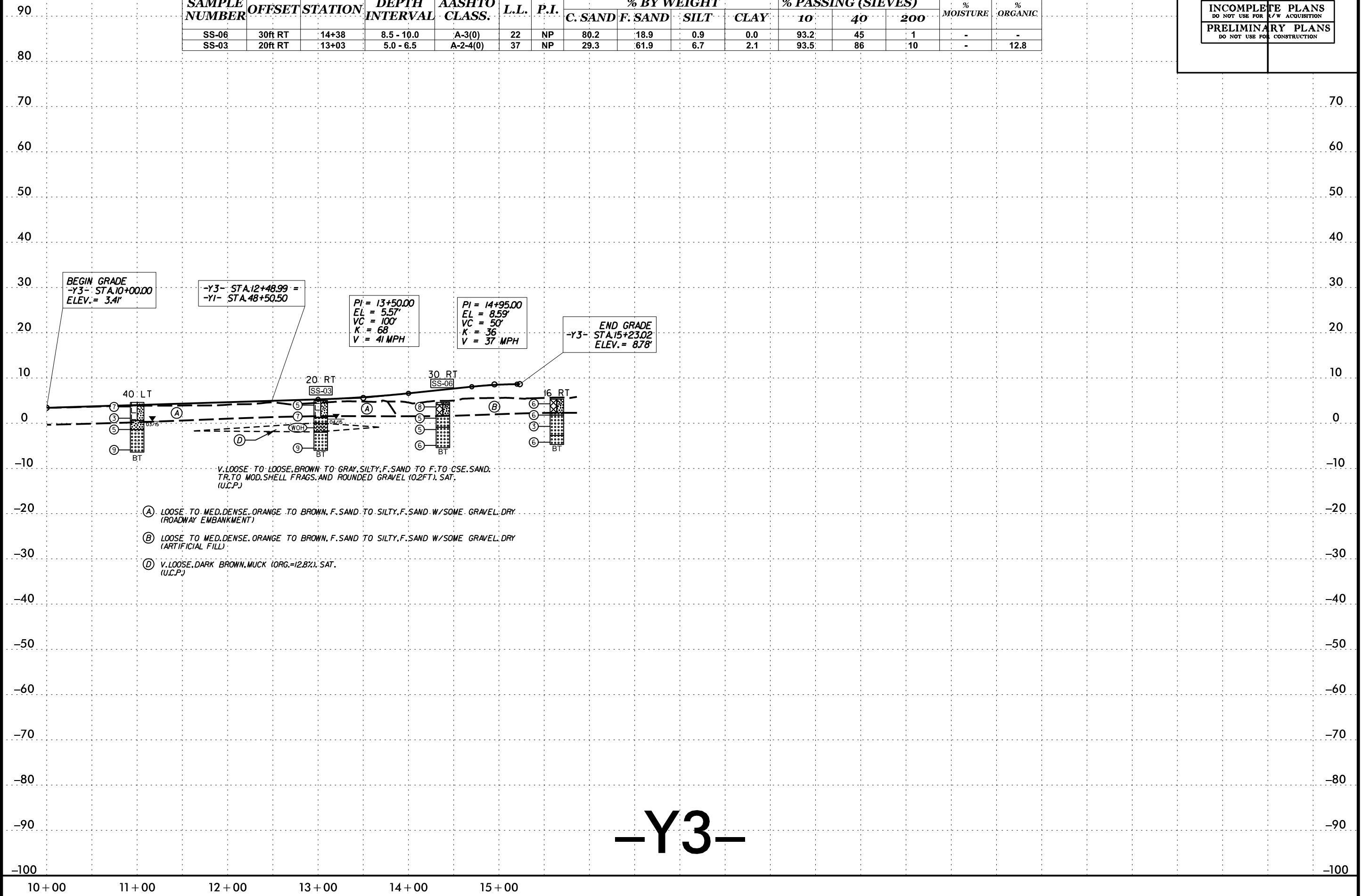
PROJECT REFERENCE NO.	SHEET NO.
B-4929	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

<b>SOIL TEST RESULTS</b>															
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-03	21ft RT	10+50	3.5 - 4.5	A-3(0)	20	NP	6.6	92.4	0.9	0.2	100	100	1	-	-



-Y2-

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-06	30ft RT	14+38	8.5 - 10.0	A-3(0)	22	NP	80.2	18.9	0.9	0.0	93.2	45	1	-	-
SS-03	20ft RT	13+03	5.0 - 6.5	A-2-4(0)	37	NP	29.3	61.9	6.7	2.1	93.5	86	10	-	12.8

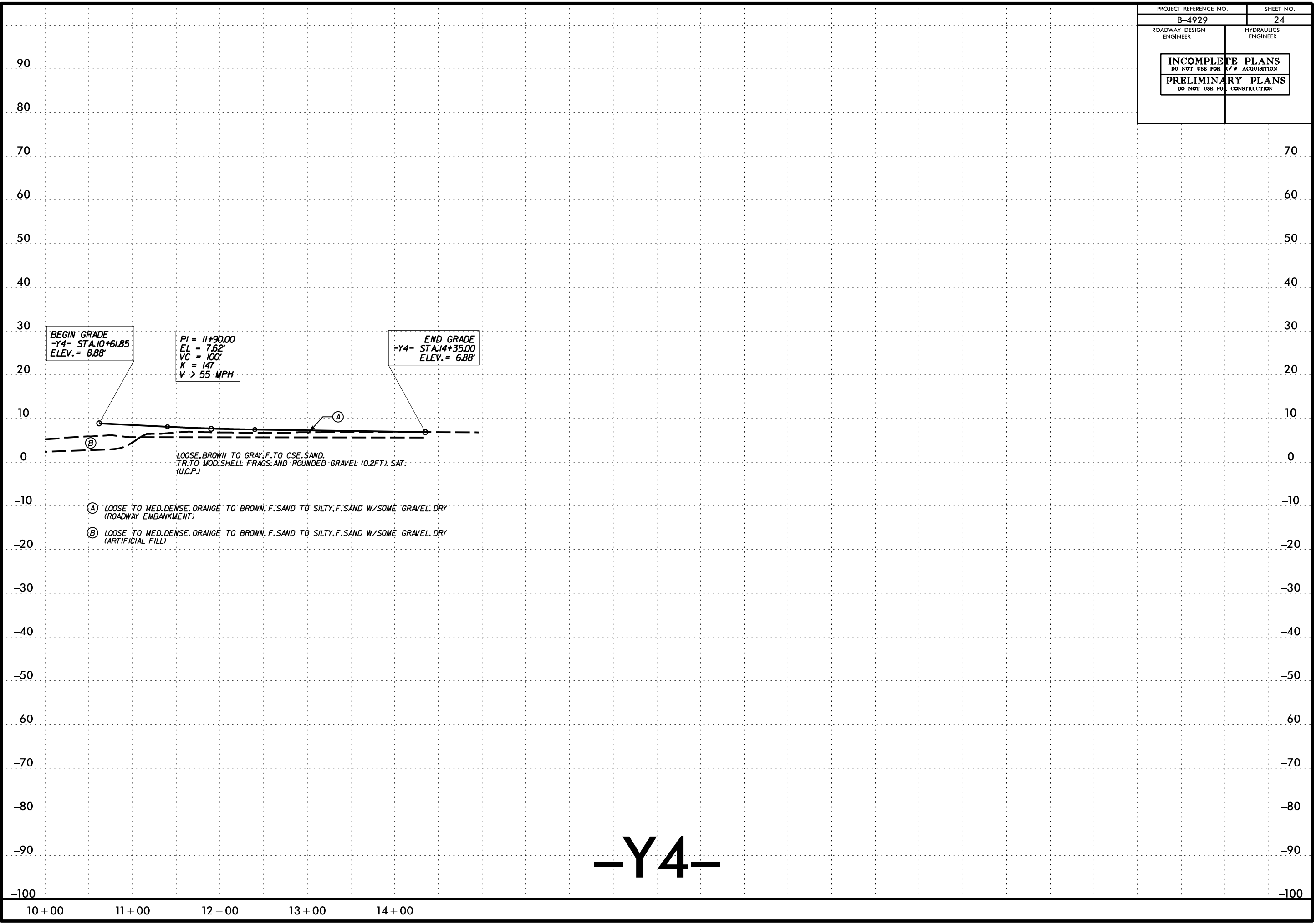


**-Y3-**

26-AUG-2015 17:12  
 S:\wpmk\g\PROJECT\2015\215037 NCDOT.B-4929.SURF-CITY BRIDGE ROADWAY\B4929\B4929.GEO\RDWY.GEOTECN\Plan\B4929\_GEO\_pf\_23\_Y3.dgn  
 5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-4929	24
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	

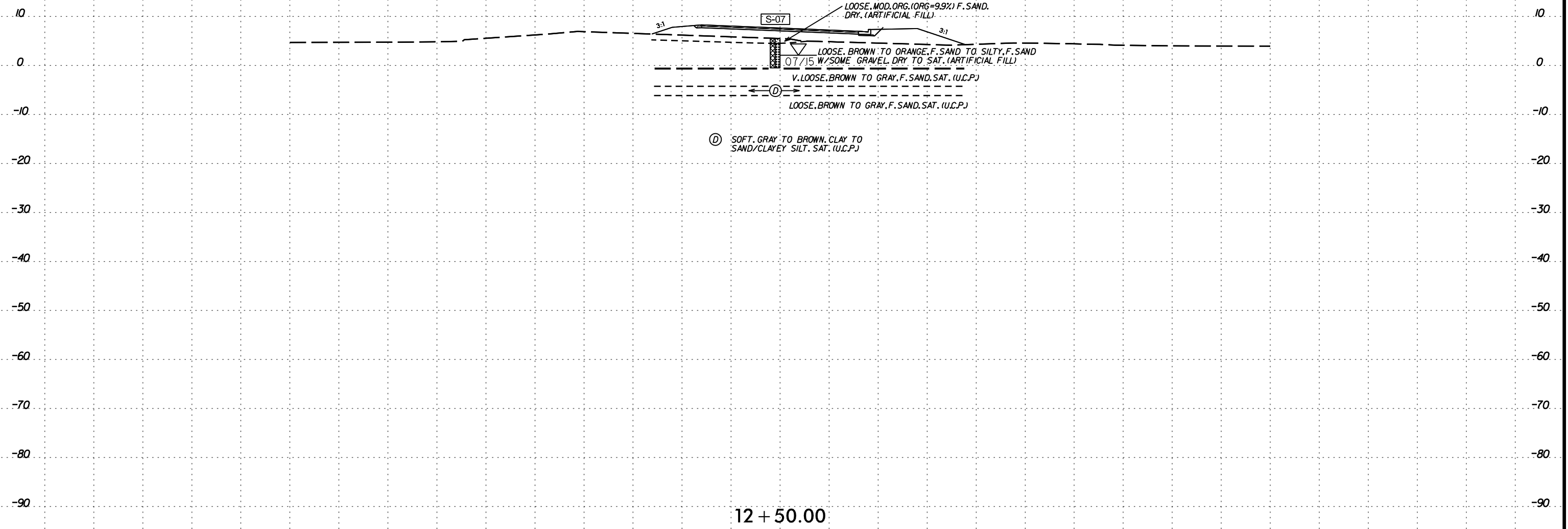
5/14/99  
 26-AUG-2015 17:13  
 S:\work\proj\PROJECT\_2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\_GEO\_PDWY\_cad\cadd\_GEO\TECH\Plan\Prof\B4929\_GEO\_pf\_24\_Y4.dgn  
 SURF-CITY BRIDGE ROADWAY



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

### SOIL TEST RESULTS

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-07	1ft LT	12+50	0.5 - 1.0	A-3(0)	28	NP	32.4	63.0	4.6	0.0	99.7	92	5	-	9.9



LOOSE, MOD. ORG. (ORG=9.9%) F. SAND. DRY. (ARTIFICIAL FILL)

LOOSE, BROWN TO ORANGE, F. SAND TO SILTY, F. SAND W/SOME GRAVEL, DRY TO SAT. (ARTIFICIAL FILL)

V. LOOSE, BROWN TO GRAY, F. SAND, SAT. (U.C.P.)

LOOSE, BROWN TO GRAY, F. SAND, SAT. (U.C.P.)

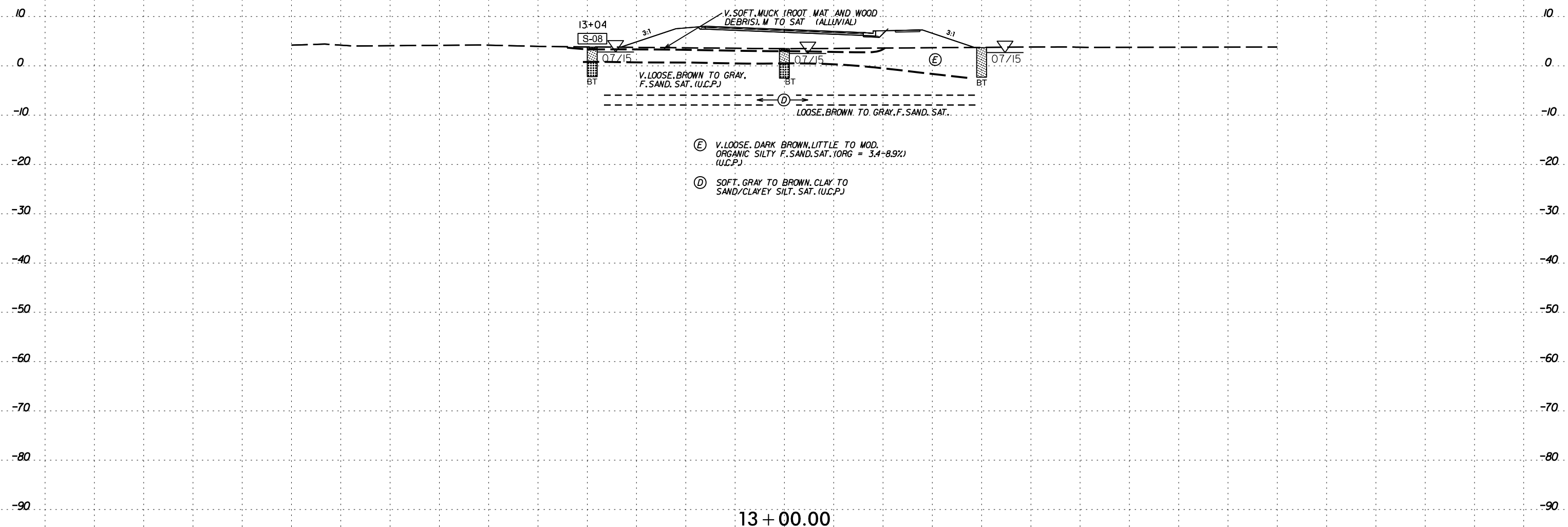
SOFT, GRAY TO BROWN, CLAY TO SAND/CLAYEY SILT, SAT. (U.C.P.)

12 + 50.00

-Y/-

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

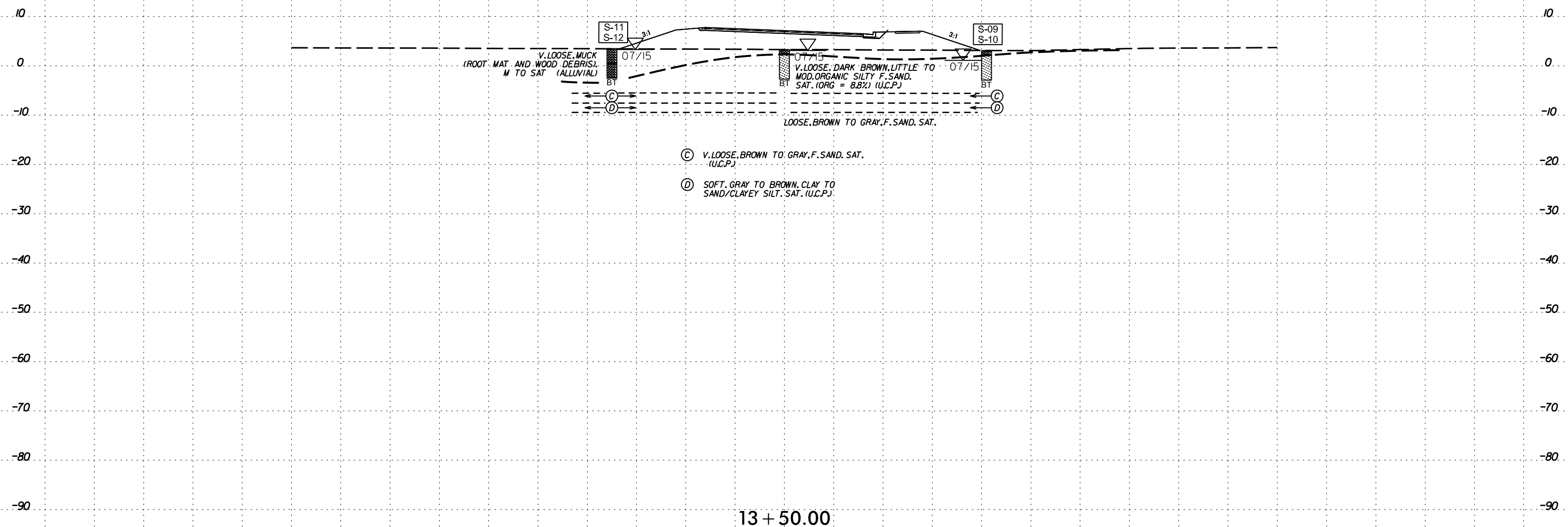
SOIL TEST RESULTS															
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-08	39ft LT	13+04	1.0 - 1.5	A-3(0)	31	NP	31.9	62.8	4.3	1.0	99.0	91	6	-	8.9



26-AUG-2015 17:45  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\_RDW\contlin\CADD\_GEO\TECH\B4929\_GEO\_Rdly\_xst\_11.dgn  
 shudson

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

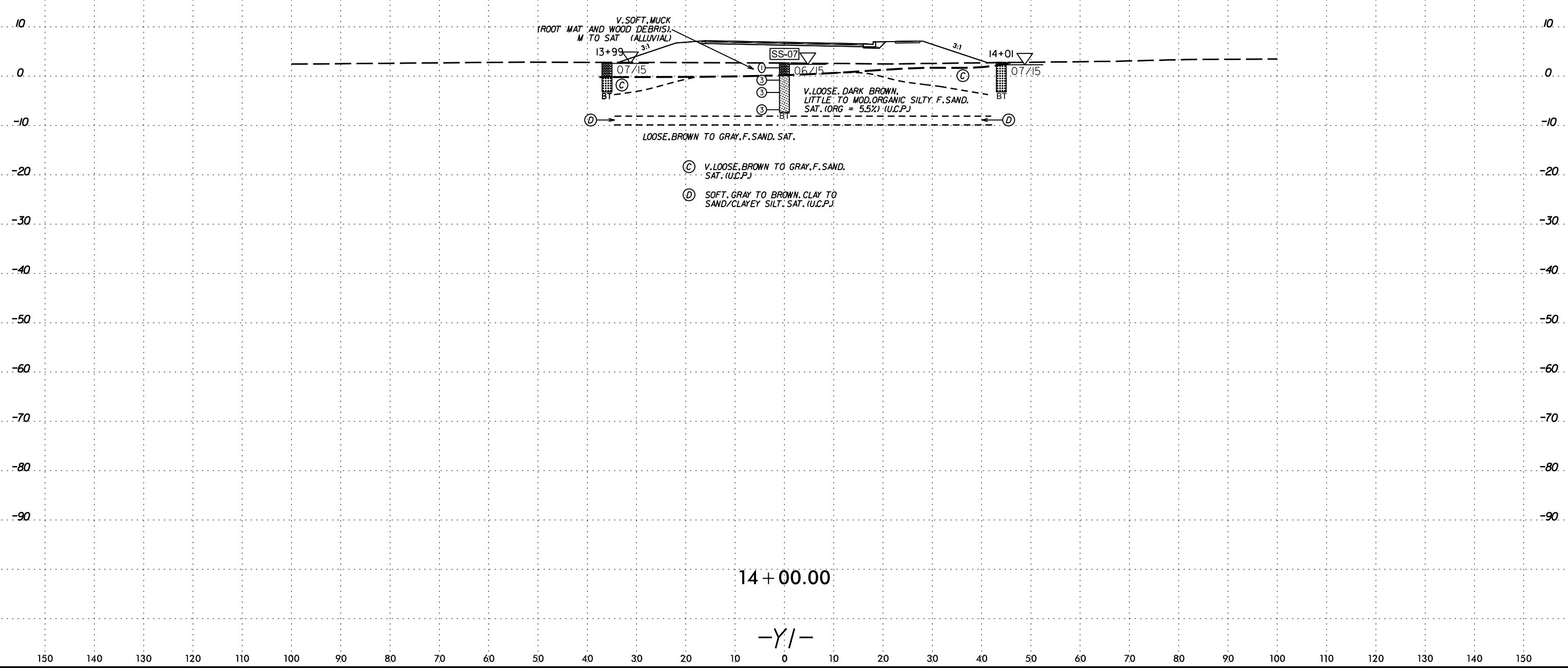
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-11	35ft LT	13+50	1.0 - 3.0	A-2-5(0)	77	NP	33.1	38.8	21.7	6.4	99.8	83	29	-	32.0
S-12	35ft LT	13+50	3.0 - 6.0	A-3(0)	36	NP	39.2	52.2	5.5	3.1	99.8	89	9	-	12.5
S-09	41ft RT	13+50	0.0 - 0.7	-	-	-	-	-	-	-	-	-	-	-	36.1
S-10	41ft RT	13+50	1.5 - 2.0	A-3(0)	37	NP	44.7	46.3	6.1	2.9	94.3	73	10	-	8.8



26-AUG-2015 17:26  
 S:\work\99\PROJECTS\STEVEHUDSON-PC  
 SHUDSON  
 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\_ROW\cont\in\CADD\_GEO\TECH\B4929\_GEO\_Row\_xst\_11.dgn

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

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-07	CL	14+00	2.5 - 4.0	A-3(0)	32	NP	31.2	63.3	4.3	1.2	98.7	94	6	-	5.5



26-AUG-2015 17:45  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\_ROWY\_contin\CADD\_GEO\TECH\B4929\_GEO\_Rowy\_xst\_11.dgn  
 shudson

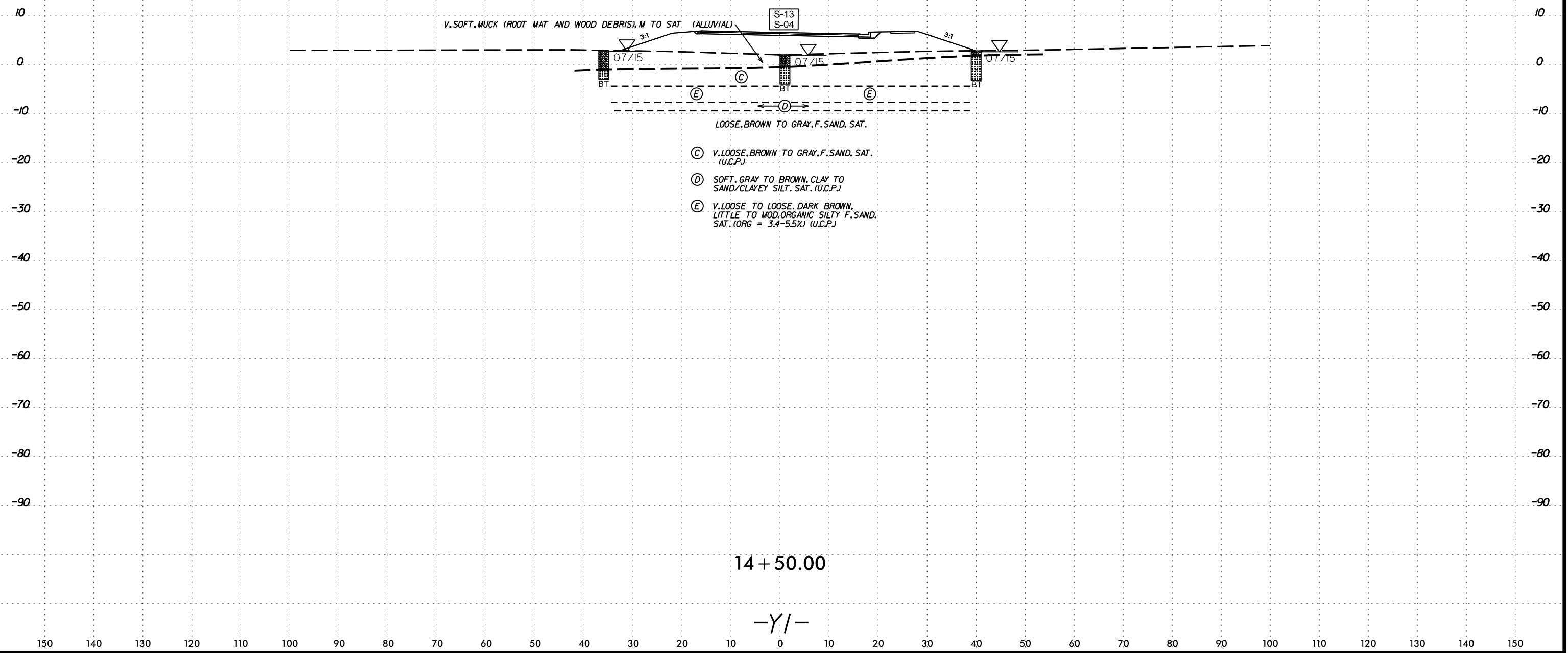


8/23/99  
 26-AUG-2015 17:16  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929 SURF-CITY BRIDGE ROADWAY\B4929\GEO.ROW\cadd\GEO\GEO\B4929\_GEO\_ROW.ctb  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929 SURF-CITY BRIDGE ROADWAY\B4929\GEO.ROW\cadd\GEO\GEO\B4929\_GEO\_ROW.ctb  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929 SURF-CITY BRIDGE ROADWAY\B4929\GEO.ROW\cadd\GEO\GEO\B4929\_GEO\_ROW.ctb

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

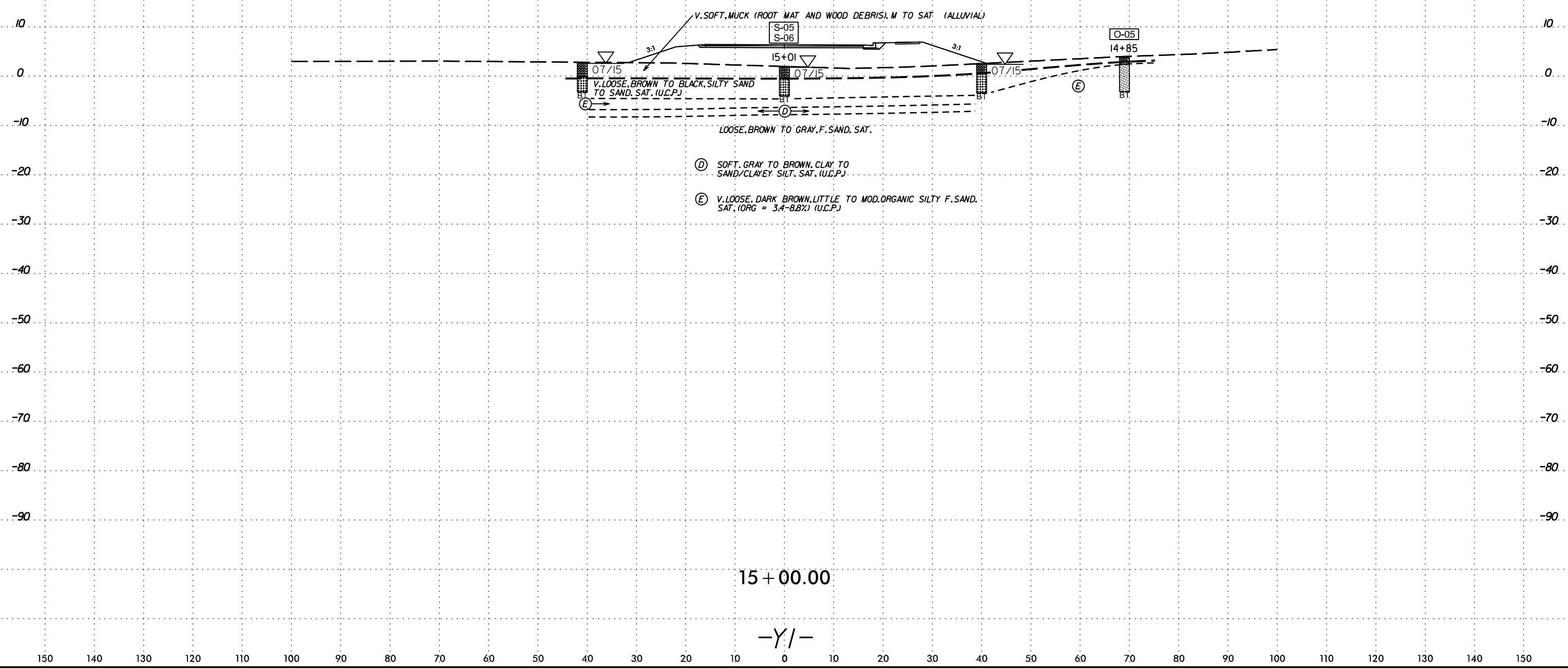
### SOIL TEST RESULTS

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-13	1ft RT	14+49	2.0 - 2.5	A-5(0)	97	NP	32.6	28.4	30.3	8.7	100	84	41	-	49.9
S-04	1ft RT	14+49	2.5 - 3.0	A-3(0)	17	NP	27.3	63.6	4.1	5.0	100	97	9	-	1.5

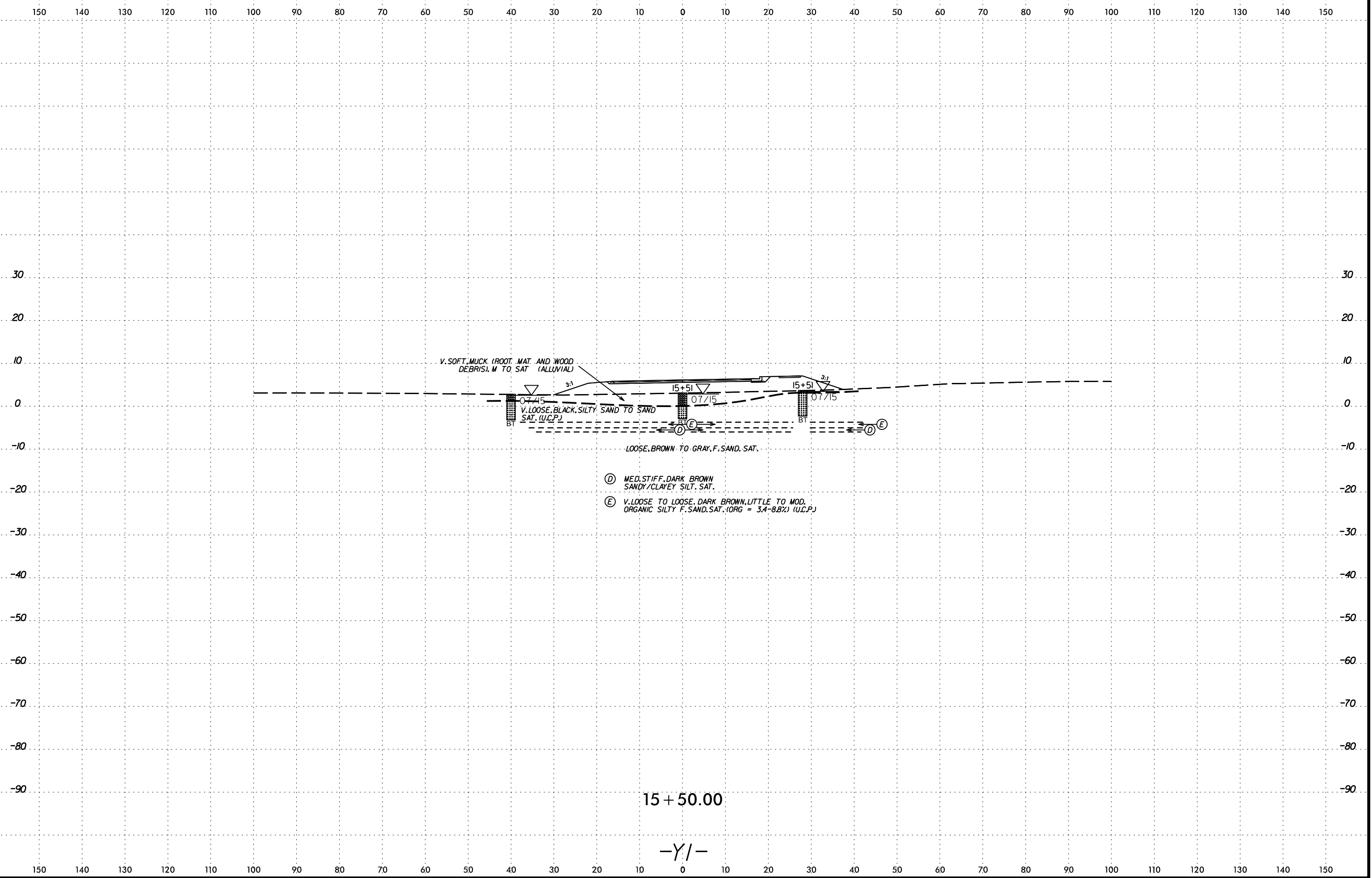


150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
							O-05	69ft RT	14+85	1.0 - 1.5	-	-	-		
S-05	CL	15+01	0.0 - 2.5	A-2-5(0)	49	NP	39.3	41.9	14.7	4.1	99.6	86	20	-	20.0
S-06	CL	15+01	2.5 - 3.0	A-3(0)	17	NP	52.9	43.3	1.8	2.0	99.6	85	4	-	1.9



27-AUG-2015 10:43  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\_ROW\contlin\CADD\_GEO\TECH\B4929\_GEO\_ROW\st.11.dgn  
 shudson

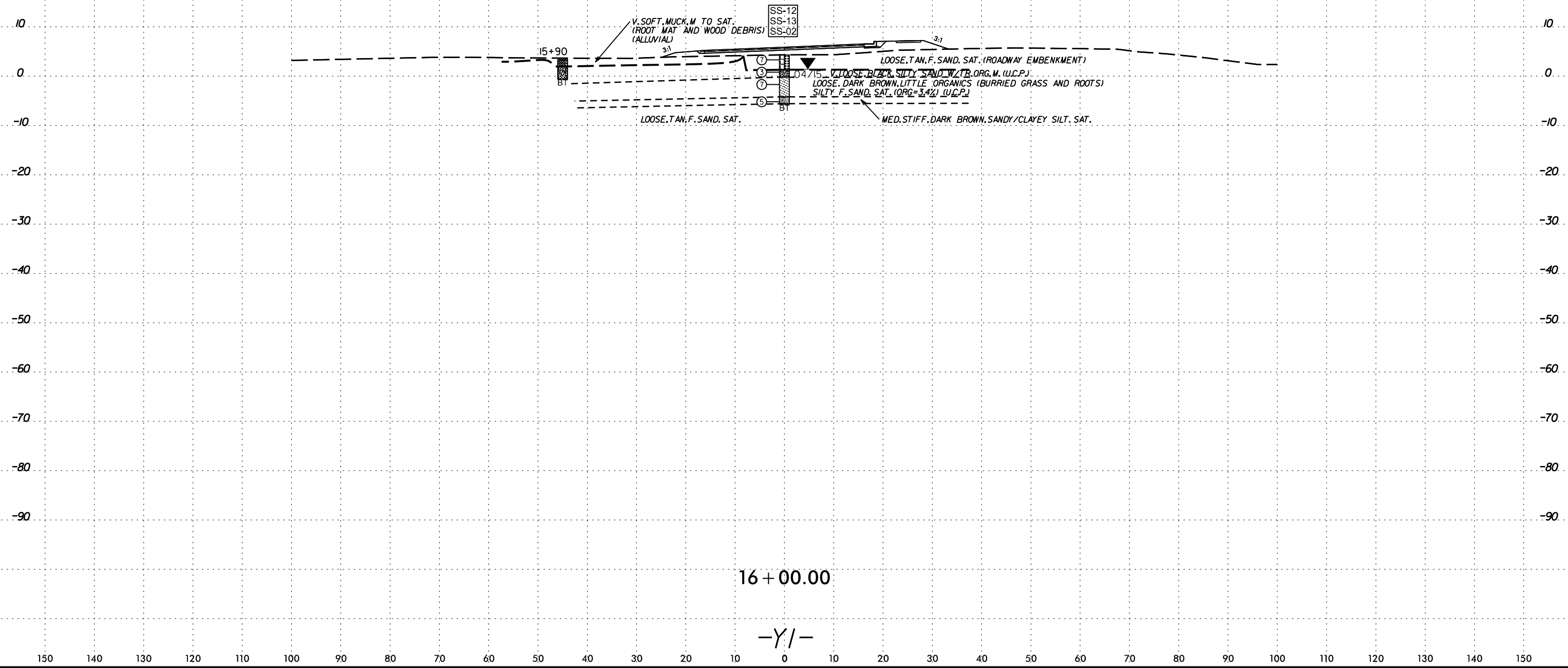


26-AUG-2015 17:17  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\B4929\_GEO\_ROW\cadd\GEO\GEO\B4929\_GEO\_ROW\ss1\_11.dgn  
 shudson

8/23/99

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

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-12	CL	16+00	3.0 - 4.0	-	-	-	-	-	-	-	-	-	-	2.8	
SS-13	CL	16+00	5.0 - 7.5	-	-	-	-	-	-	-	-	-	-	3.4	
SS-02	CL	16+00	8.5 - 9.9	A-4(5)	30	10	6.0	32.1	27.1	34.8	100	99	67	-	

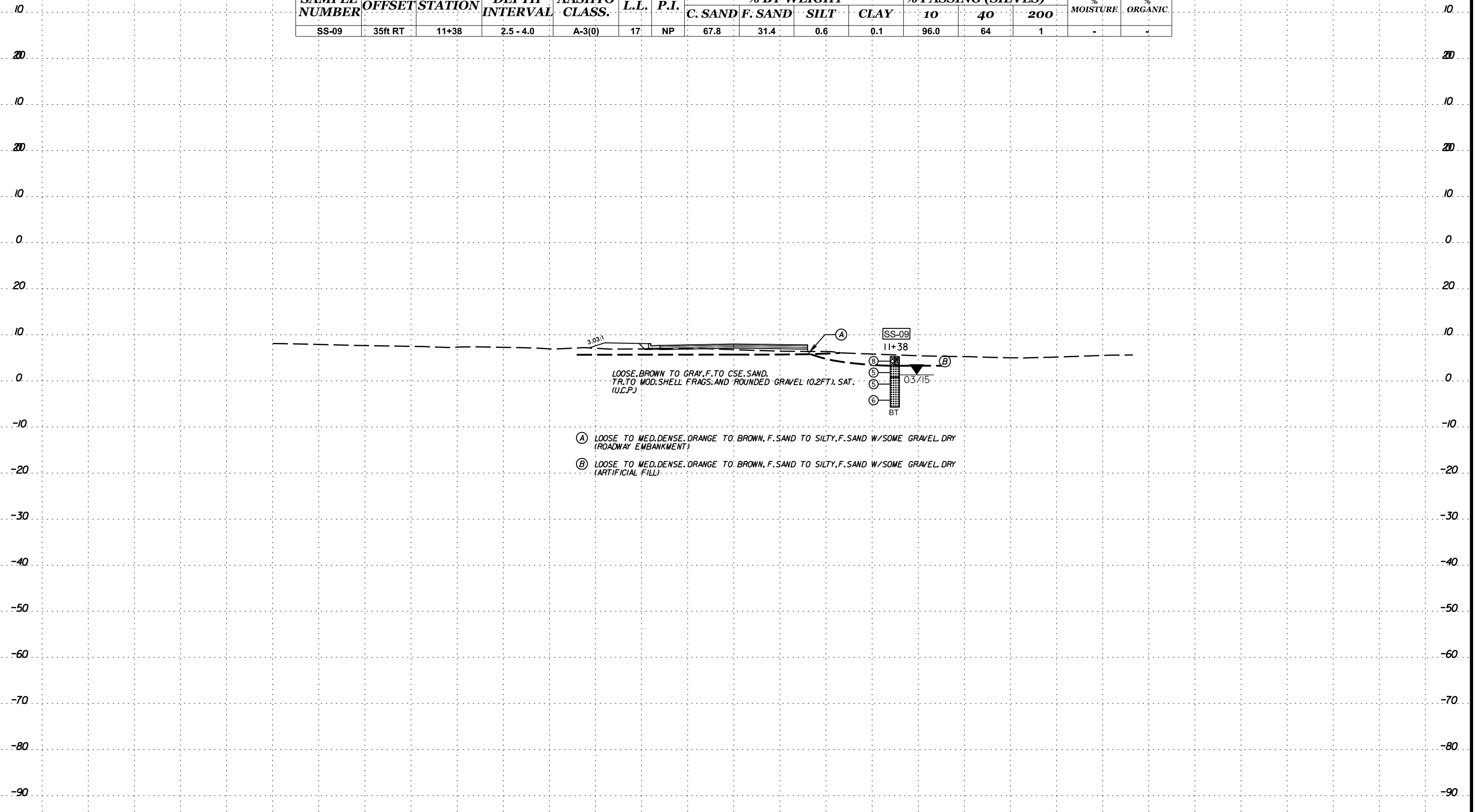


26-AUG-2015 17:17  
 S:\work\99\PROJECT\2015\215037 NCDOT\_B-4929\_SURF-CITY BRIDGE ROADWAY\B4929\GEO\_ROWY.contin\CADD\_GEO\TECH\B4929\_GEO\_ROWY\_xst\_11.dgn  
 shudson

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

### SOIL TEST RESULTS

SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-09	35ft RT	11+38	2.5 - 4.0	A-3(0)	17	NP	67.8	31.4	0.6	0.1	96.0	64	1	-	-



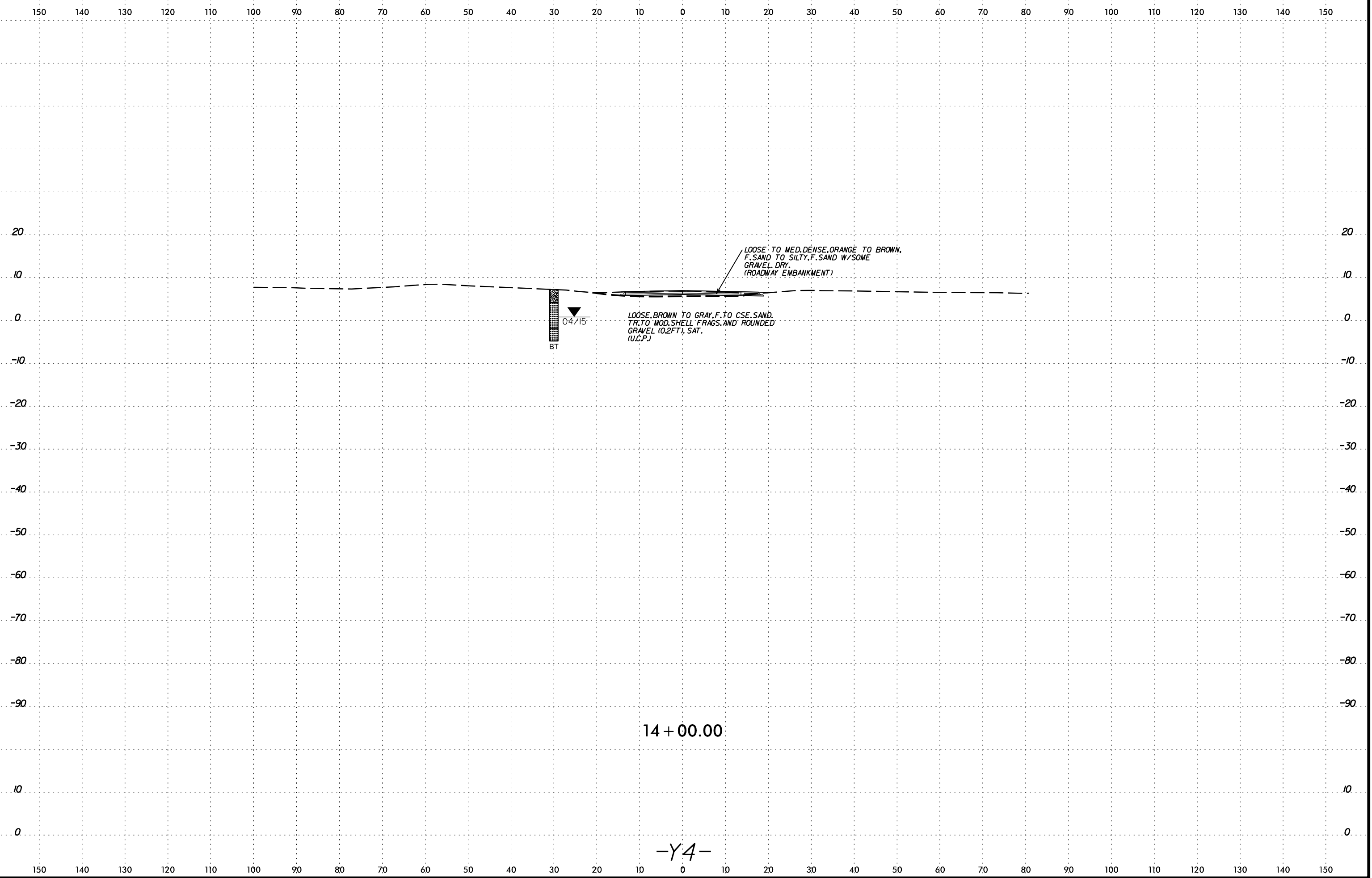
LOOSE, BROWN TO GRAY, F. TO CSE. SAND.  
TR. TO MOD. SHELL FRAGS. AND ROUNDED GRAVEL (0.2 FT). SAT.  
(U.C.P.)

- (A) LOOSE TO MED. DENSE, ORANGE TO BROWN, F. SAND TO SILTY, F. SAND W/SOME GRAVEL DRY (ROADWAY EMBANKMENT)
- (B) LOOSE TO MED. DENSE, ORANGE TO BROWN, F. SAND TO SILTY, F. SAND W/SOME GRAVEL DRY (ARTIFICIAL FILL)

11 + 50.00

-Y4-

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



LOOSE TO MED. DENSE. ORANGE TO BROWN.  
F. SAND TO SILTY. F. SAND W/SOME  
GRAVEL DRY.  
(ROADWAY EMBANKMENT)

LOOSE, BROWN TO GRAY, F. TO CSE. SAND.  
TR. TO MOD. SHELL FRAGS. AND ROUNDED  
GRAVEL (0.2 FT). SAT.  
(U.C.P.)

04/15  
BT

14 + 00.00

-Y4-