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REFERENCE: B-5352

PROJECT: 46066

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-5352	1	18

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	16+07 TO 28+18	4-5	N/A
-LDET-	12+08 TO 20+02	6-7	8

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	21+25 TO 21+75	9-11
-L-	23+00 TO 23+50	12-14

APPENDICES

APPENDIX	TITLE	SHEETS
A	SOIL TEST RESULTS	15-16

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM
PROJECT DESCRIPTION REPLACE BRIDGE NO. 131 ON
US 220 BYPASS OVER NORFOLK SOUTHERN RR

INVENTORY

CAUTION NOTICE

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

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

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

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

PERSONNEL

J. WHITT

J. DANIEL

INVESTIGATED BY J. WHITT

DRAWN BY T. WELLS

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL

DATE APRIL 2016



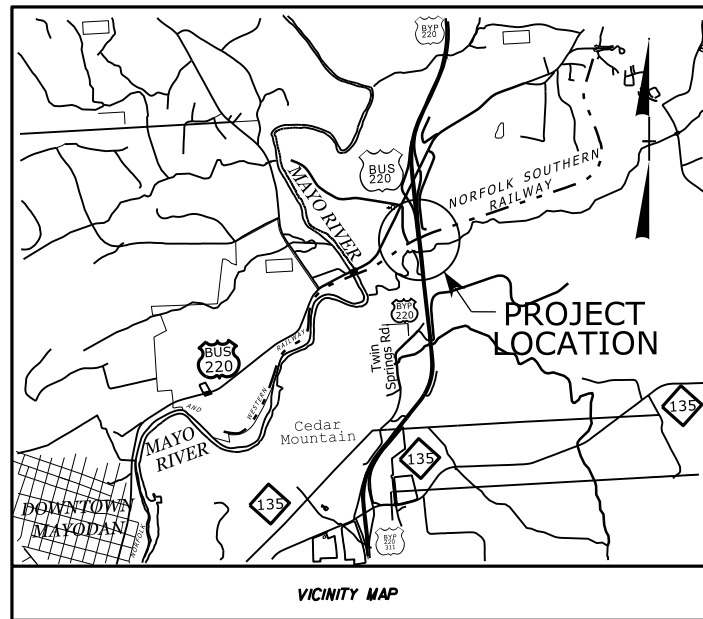
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Mahalingam Bahiradhan 4/26/2016
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**DOCUMENT NOT CONSIDERED FINAL
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 209, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-1-b</th><th>A-3</th><th>A-2</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</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></th><th></th><th></th> </tr> <tr> <th>GROUP CLASS.</th> <td>A-1-a</td><td>A-1-b</td><td></td><td>A-2-4</td><td>A-2-5</td><td>A-2-6</td><td>A-2-7</td><td></td><td></td><td></td><td></td><td>A-1, A-2</td><td>A-3</td><td>A-4, A-5</td><td>A-6, A-7</td><td></td><td></td><td></td> </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></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td><td>50 MX 25 MX</td><td>51 MN 10 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td><td>36 MN 36 MN</td><td>36 MN 36 MN</td><td>36 MN 36 MN</td><td>36 MN 36 MN</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="17"></td> <td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="3">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="17"></td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="17"></td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="10">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">POOR</td> <td colspan="5">UNSATURABLE</td> </tr> <tr> <td colspan="40">PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30</td> </tr> <tr> <td colspan="40"> <p>CONSISTENCY OR DENSENESS</p> <table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>TEXTURE OR GRAIN SIZE</p> <table border="1"> <tr> <th>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> </tr> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> <tr> <th>BOULDER (BLDR.)</th><th>COBBLE (COB.)</th><th>GRAVEL (GR.)</th><th>COARSE SAND (CS.E. SD.)</th><th>FINE SAND (F SD.)</th><th>SILT (SL.)</th><th>CLAY (CL.)</th> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <th>GRAIN SIZE</th><th>MM</th><th>305</th><th>75</th><th>2.0</th><th>0.25</th><th>0.05</th><th>0.005</th> </tr> <tr> <td></td><td>IN.</td><td>12</td><td>3</td><td></td><td></td><td></td><td></td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>PLASTICITY</p> <table border="1"> <tr> <th>NON PLASTIC</th><th>SLIGHTLY PLASTIC</th><th>MODERATELY PLASTIC</th><th>HIGHLY PLASTIC</th> </tr> <tr> <td></td><td>0-5</td><td>6-15</td><td>16-25</td> </tr> <tr> <td></td><td></td><td>26 OR MORE</td><td></td> </tr> <tr> <td></td><td>VERY LOW</td><td>SLIGHT</td><td>MEDIUM</td> </tr> <tr> <td></td><td></td><td></td><td>HIGH</td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>COLOR</p> <p>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.</p> </td> </tr> <tr> <td colspan="40"> <p>GRADATION</p> <p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> <p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p>GROUND WATER</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>MISCELLANEOUS SYMBOLS</p> <table border="1"> <tr> <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></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>RECOMMENDATION SYMBOLS</p> <table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>ABBREVIATIONS</p> <table border="1"> <tr> <td>AR - AUGER REFUSAL</td> <td>BT - BORING TERMINATED</td> <td>CL - CLAY</td> <td>CPT - COARSE PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>W - UNIT WEIGHT</td> <td>W_g - DRY UNIT WEIGHT</td> </tr> <tr> <td colspan="10"></td> <td colspan="10"> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p> </td> </tr> </table> </td> </tr> <tr> <td colspan="40"> <p>EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td></td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input type="checkbox"/> 8" HOLLOW AUGERS</td> <td></td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td></td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * STEEL TEETH</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * TUNG-CARB.</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>FRACATURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> <p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table> <p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table> </td> </tr> </table>										GENERAL CLASS.	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<p>GRADATION</p> <p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> <p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p>GROUND WATER</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>MISCELLANEOUS SYMBOLS</p> <table border="1"> <tr> <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></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>																																								ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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TIP PROJECT: B-5352



REV 25% PLANS (11/23/15)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

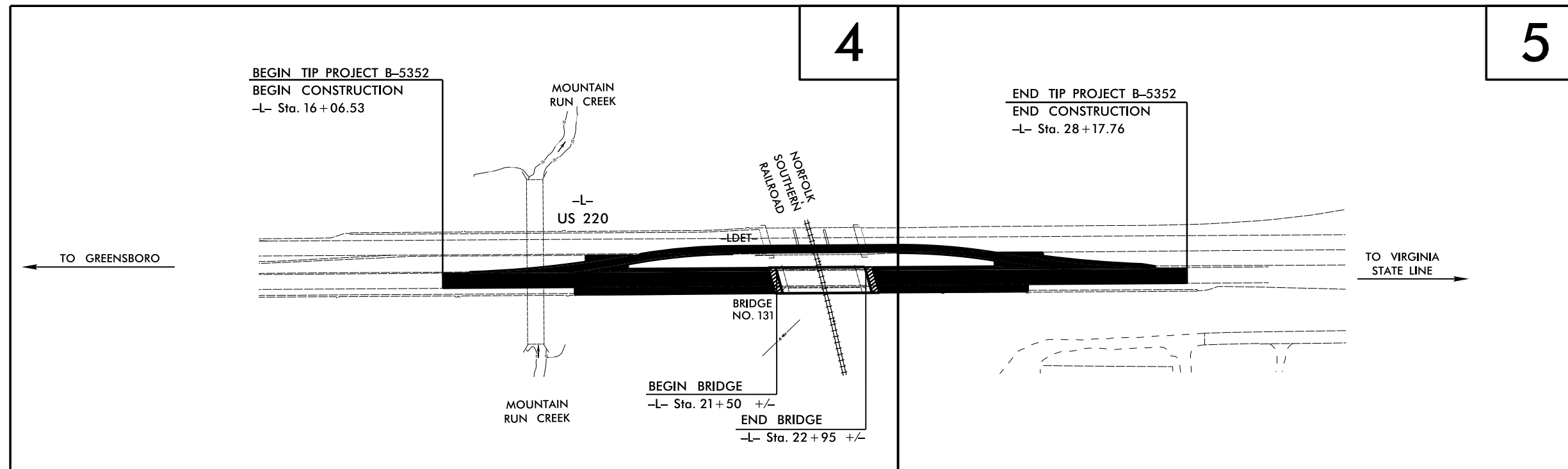
LOCATION: BRIDGE NO. 131 ON US 220 NBL OVER NORFOLK SOUTHERN RAILROAD

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5352	3	18
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46066.1.1	BRNHS-0220(67)	P.E.	

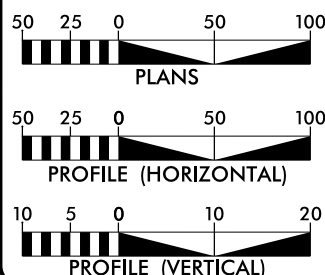
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ____

GRAPHIC SCALES



DESIGN DATA

ADT 2018 = 19336 VPD
ADT 2040 = 30100 VPD
DHV = 11%
D = 55%
T = 23%*
V = 65 MPH
V_{DET} = 55 MPH
* TTST = 14% DUAL = 9%
FUNC CLASS = RURAL ARTERIAL
"STATEWIDE TIER"

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT = 0.202 MILES
LENGTH STRUCTURES F.A. PROJECT = 0.027 MILES
TOTAL LENGTH STATE PROJECT = 0.229 MILES

PLANS PREPARED FOR
THE NCDOT BY:



2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST 19, 2016

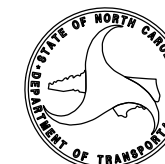
LETTING DATE:
AUGUST 21, 2018

JEFFREY W. MOORE, P.E.
PROJECT ENGINEER
CATHERINE A. MURRELL, P.E.
PROJECT DESIGN ENGINEER
JAMES A. SPEER, P.E.
PROJECT ENGINEER
NCDOT ROADWAY DESIGN

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.
ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



\$DATE\$ \$FILE\$

CONTRACT:



SCHNABEL ENGINEERING SOUTH, P.C.

April 12, 2016

STATE PROJECT: 46066.1.1(B-5352)
 PROJECT ID: 27389
 COUNTY: Rockingham
 DESCRIPTION: Replace Bridge No. 131 on US 220 Bypass Over Southern Railroad
 SUBJECT: Geotechnical Report - Inventory

Project Description

The project consists of replacing the existing northbound bridge on US 220 Bypass and constructing a detour road in the median and onto the southbound lanes to maintain northbound traffic during replacement of existing northbound bridge over the railroad in Stoneville, NC. The length of the proposed detour road is about 785 feet. The proposed grades of the detour road will require fills on the order of 4 feet or less. Minor sliver fills are proposed to widen the existing northbound roadway embankment.

The geotechnical investigation was conducted in February 2016 utilizing hand augers and sounding rods, which were performed at specific locations to provide subsurface information for design and construction of the proposed roadways. Representative soil samples were collected and submitted to a NCDOT approved laboratory for testing.

The following alignments were investigated for this project totaling approximately 0.15 miles. Subsurface profiles and cross sections of these alignments are included in this report.

<u>Line</u>	<u>Station(±)</u>
-LDET-	10+45to 14+16
-LDET-	17+41to 21+57

Areas of Special Geotechnical Interest

1) Loose/soft alluvial soils were present at these locations.

<u>Line</u>	<u>Station(±)</u>	<u>offset</u>
-L-	21+00 to 22+00	125 ft. Rt.
-L-	23+75 to 24+75	107 ft. Rt.

2) Groundwater- The following interval was found to exhibit a high water table at the time of our subsurface exploration. However, it appears to be a perched condition related to a recent rainfall event.

<u>Line</u>	<u>Station(±)</u>
-LDET-	18+50 to 20+50

Physiography, Geology and Surface Water

The project is located in the central portion of the Piedmont Physiographic Province approximately 2 miles southwest of Stoneville in Rockingham County. Topography in the area outside of roadway embankment fills is generally flat with gently rolling hills. The existing roadway embankment is about 20 to 40 feet high. The median between the northbound and southbound lanes is slightly depressed to serve as a ditch line to carry the storm water runoff. The vicinity of the project area is heavily wooded to the east of the existing roadway with some commercial buildings located in the near vicinity of the project. Geologically underlying rock will likely be a Triassic rock of Dan River group.

Soils Properties

Soils encountered along the project corridor are separated into three categories based on their origin. They are roadway embankment, alluvial and residual soils.

Roadway embankment was present along the existing roadway within the project limits. These soils consist of gray sandy silty gravel (A-1), brown and red stiff to very stiff sandy silt (A-4) and clayey silt (A-5). The sandy silt (A-4) layer was non plastic.

Alluvial soils were present at the toe of the existing roadway embankment. Alluvial soils consist of brown, soft to stiff clay (A-7-6). The Plasticity Index (PI) value of the alluvial clay was 18.

Residual soils consist of brown very stiff clay (A-7), clayey silt (A-5), silt (A-4), silty sand (A-2-4) and clayey sand (A-2-6) and sandy silt (A-4).

Rock Properties

Weathered rock/rock was not encountered during the detour roadway investigation. Rock in the project site is a Triassic rock of Dan Rover Group (Stoneville Formation).

Groundwater

Groundwater data was collected during average or slightly above average rainfall conditions. Water levels across the project vary due to topographic relief and soil permeability. The groundwater was within 6 feet of the surface in one boring at Station -LDET- 19+50. (Please refer to the groundwater comment in the Special Interest section above). Since this water table was measured after a very recent rain event, this water table will likely be perched. Groundwater levels may fluctuate with seasonal precipitation.

Respectfully Submitted,
SCHNABEL ENGINEERING SOUTH, P.C.



DocuSigned by:

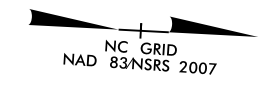
Mahalingam Bahiradhan 4/26/2016

Mahalingam Bahiradhan (Bahi), PE.
Senior Engineer

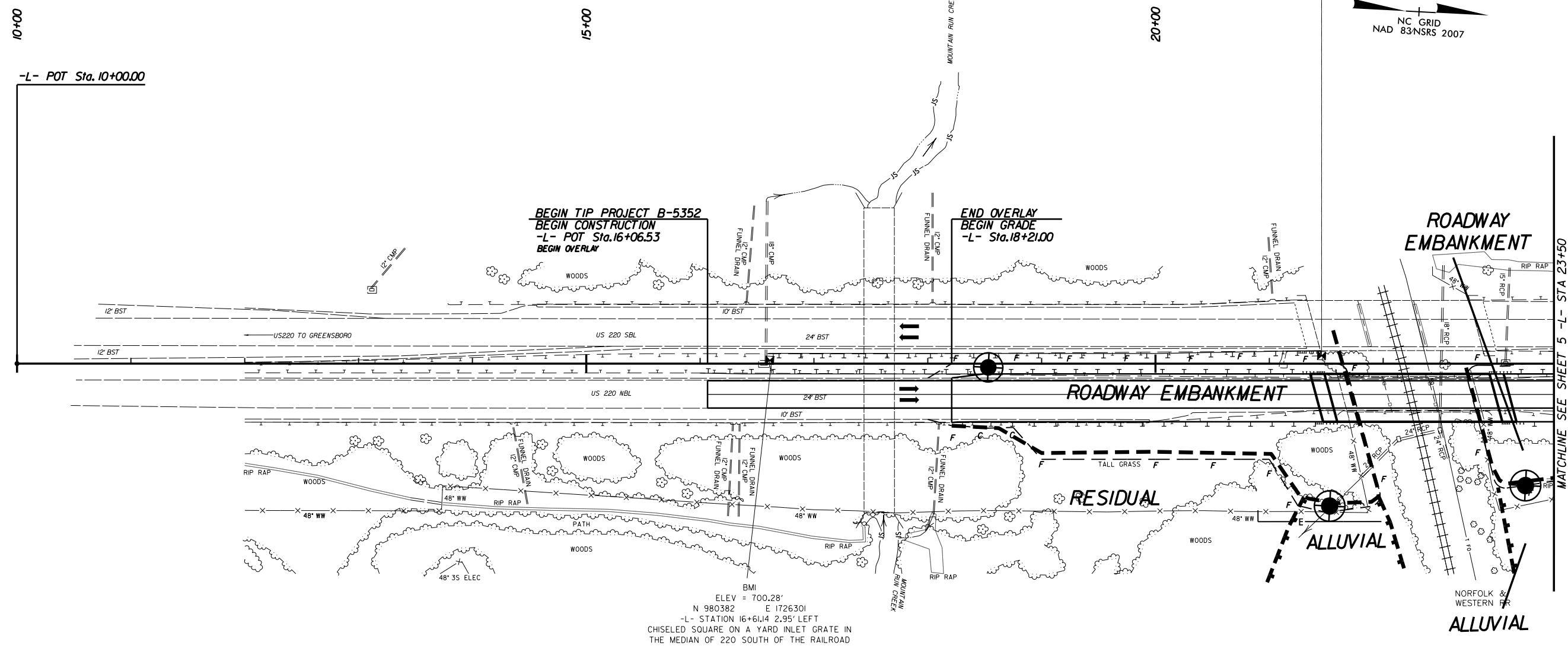
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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BM2
ELEV = 709.40'
N 980866 E 1726272
-L- STATION 21+45.89 6.97' LEFT
CHISELED SQUARE ON SE WW OF SBL BRIDGE



REVISIONS



BEGIN TIP PROJECT B-5352
BEGIN CONSTRUCTION
-L- POT Sta. 16+06.53
BEGIN OVERLAY

END OVERLAY
BEGIN GRADE
-L- Sta. 18+21.00

BM1
ELEV = 700.28'
N 980382 E 1726301
-L- STATION 16+61.14 2.95' LEFT
CHISELED SQUARE ON A YARD INLET GRATE IN
THE MEDIAN OF 220 SOUTH OF THE RAILROAD

MATCHLINE SEE SHEET 5 -L- STA 23+50

NORFOLK &
WESTERN RR

\$DATE\$ \$FILE\$

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

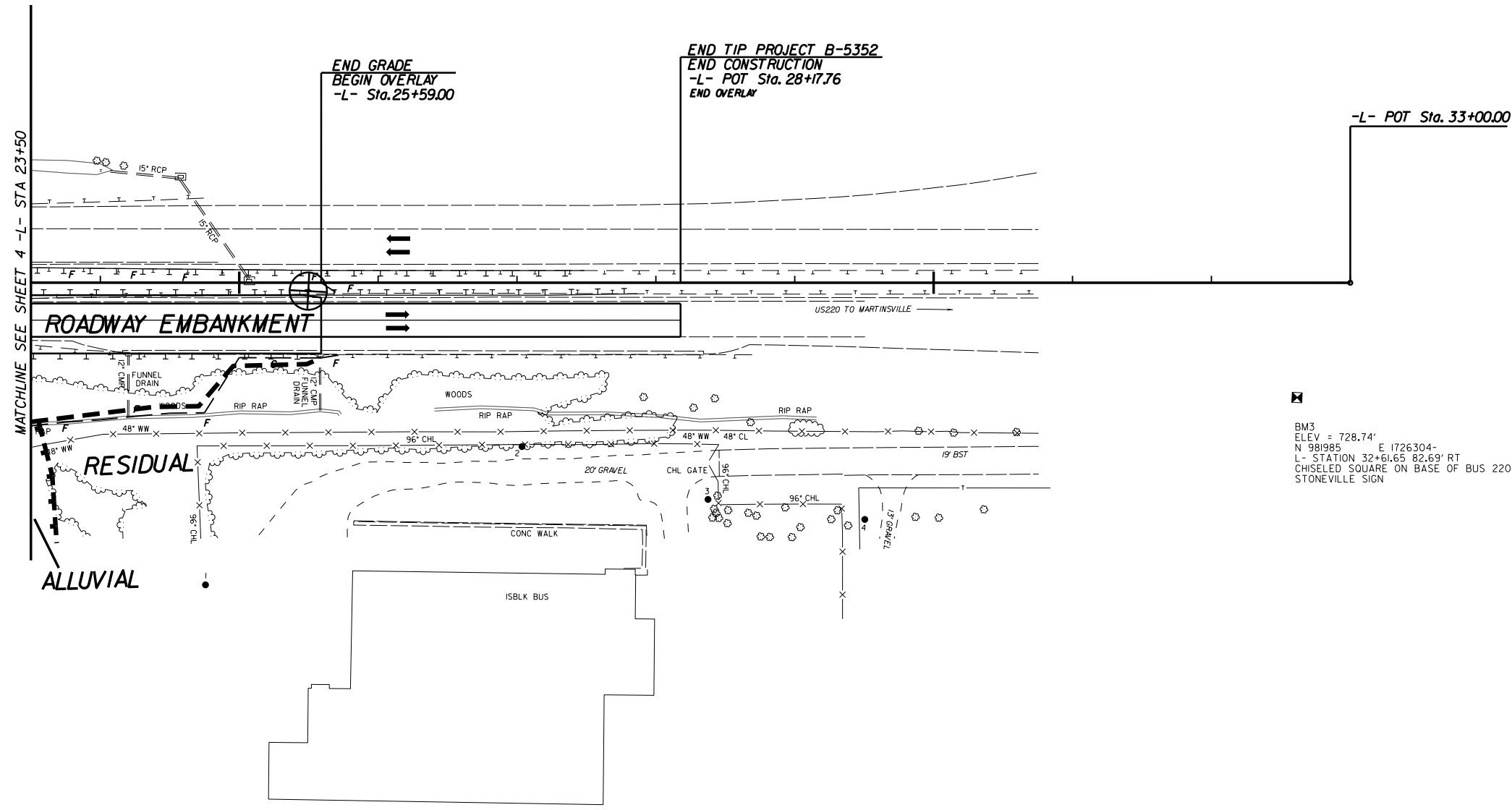
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

25+00

30+00



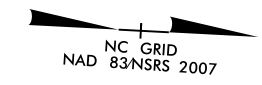
BM3
ELEV = 728.74'
N 981985 E 1726304-
L- STATION 32+61.65 82.69' RT
CHISELED SQUARE ON BASE OF BUS 220
STONEVILLE SIGN

\$DATE\$ \$FILE\$

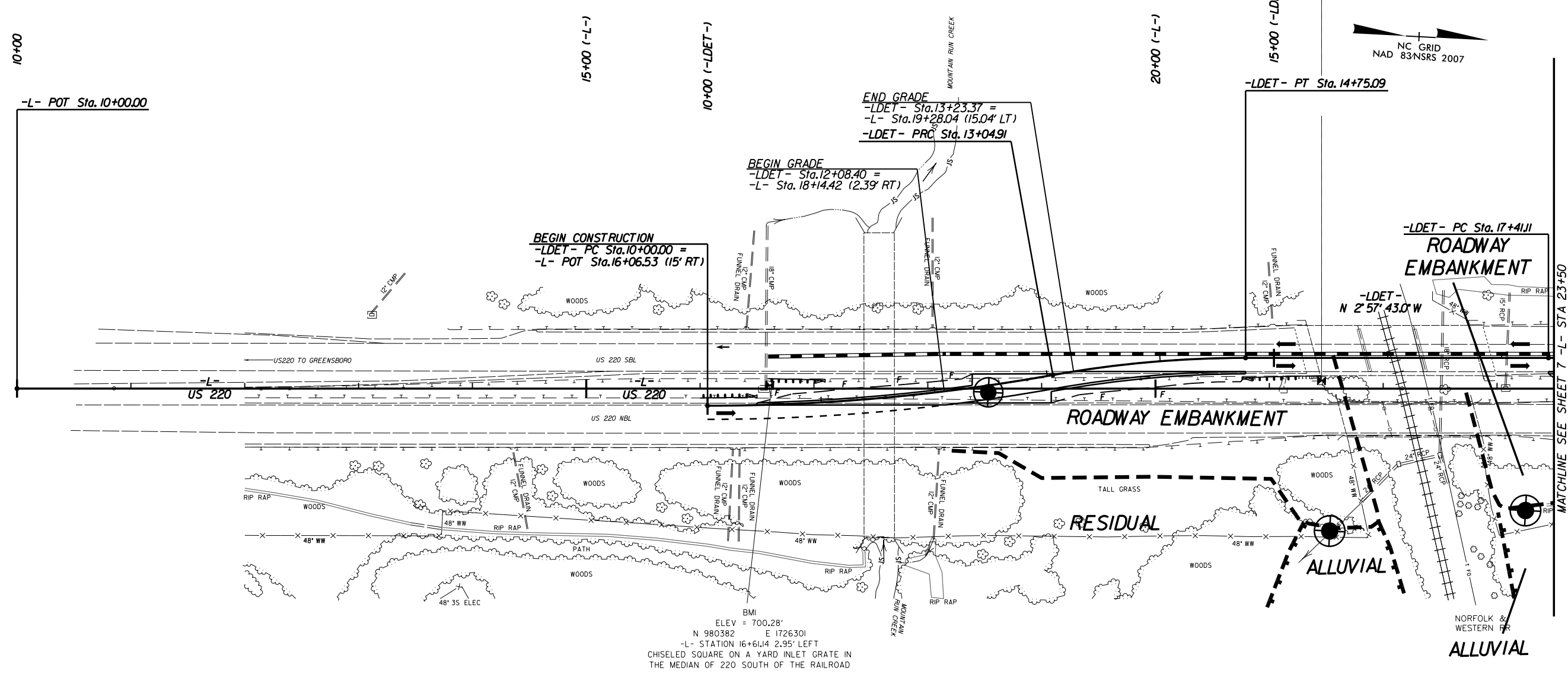
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

BM2
ELEV = 709.40'
N 980866 E 1726272
-L- STATION 21+45.89 6.97' LEFT
CHISELED SQUARE ON SE WW OF SBL BRIDGE



REVISIONS



-L- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-LDET - PC Sta. 10+00.00 =
-L- POT Sta. 16+06.53 (15' RT)

BEGIN GRADE
-LDET - Sta. 12+08.40 =
-L- Sta. 18+14.42 (2.39' RT)

END GRADE
-LDET - Sta. 13+23.37 =
-L- Sta. 19+28.04 (15.04' LT)
-LDET - PRC Sta. 13+04.91

-LDET - PT Sta. 14+75.09

-LDET - PC Sta. 17+41.11
ROADWAY EMBANKMENT

-LDET -
N 2° 57' 43.0\"/>

ROADWAY EMBANKMENT

RESIDUAL

ALLUVIAL

ALLUVIAL

BM1
ELEV = 700.28'
N 980382 E 1726301
-L- STATION 16+61.14 2.95' LEFT
CHISELED SQUARE ON A YARD INLET GRATE IN
THE MEDIAN OF 220 SOUTH OF THE RAILROAD

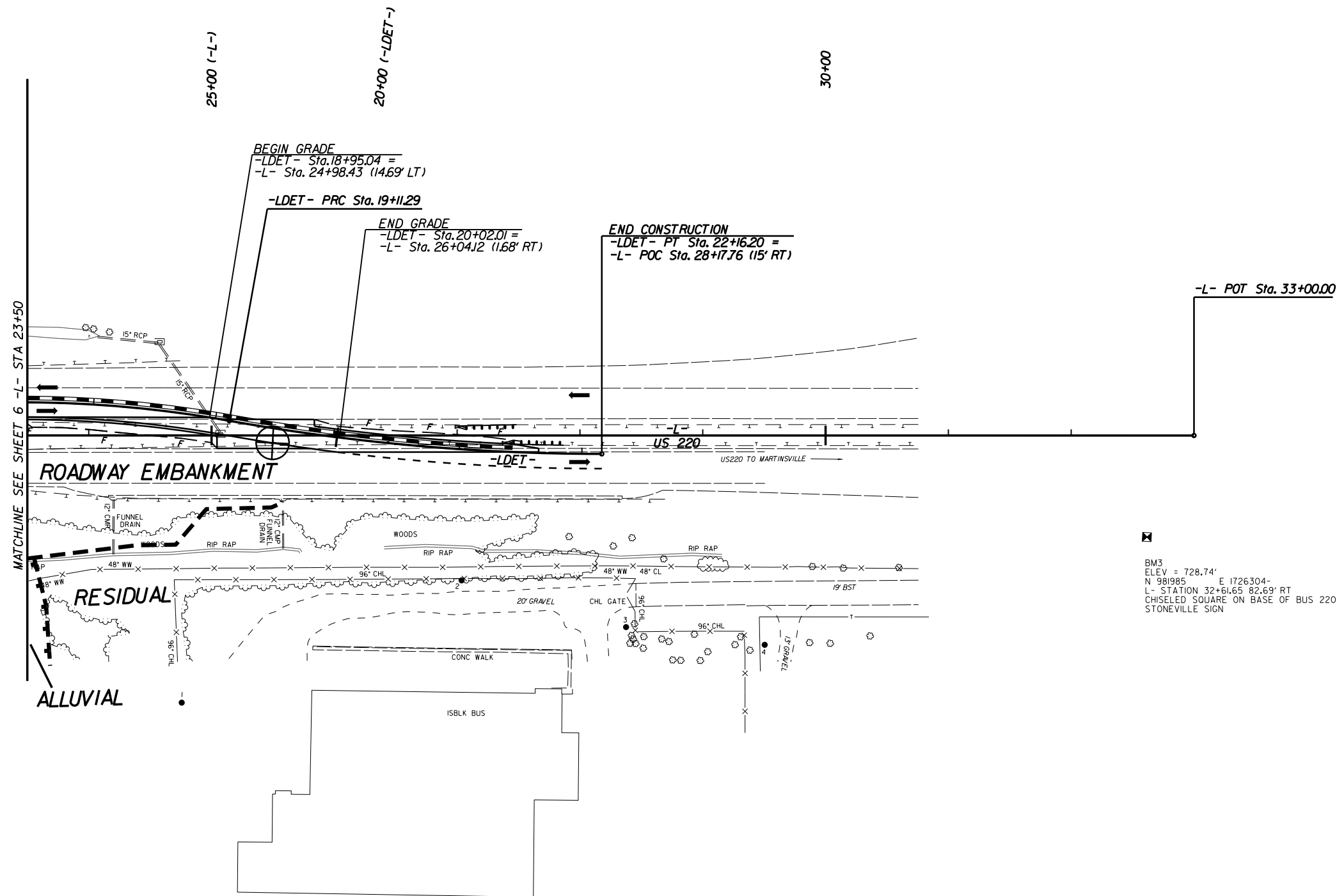
MATCHLINE SEE SHEET 7 -L- STA 23+50

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

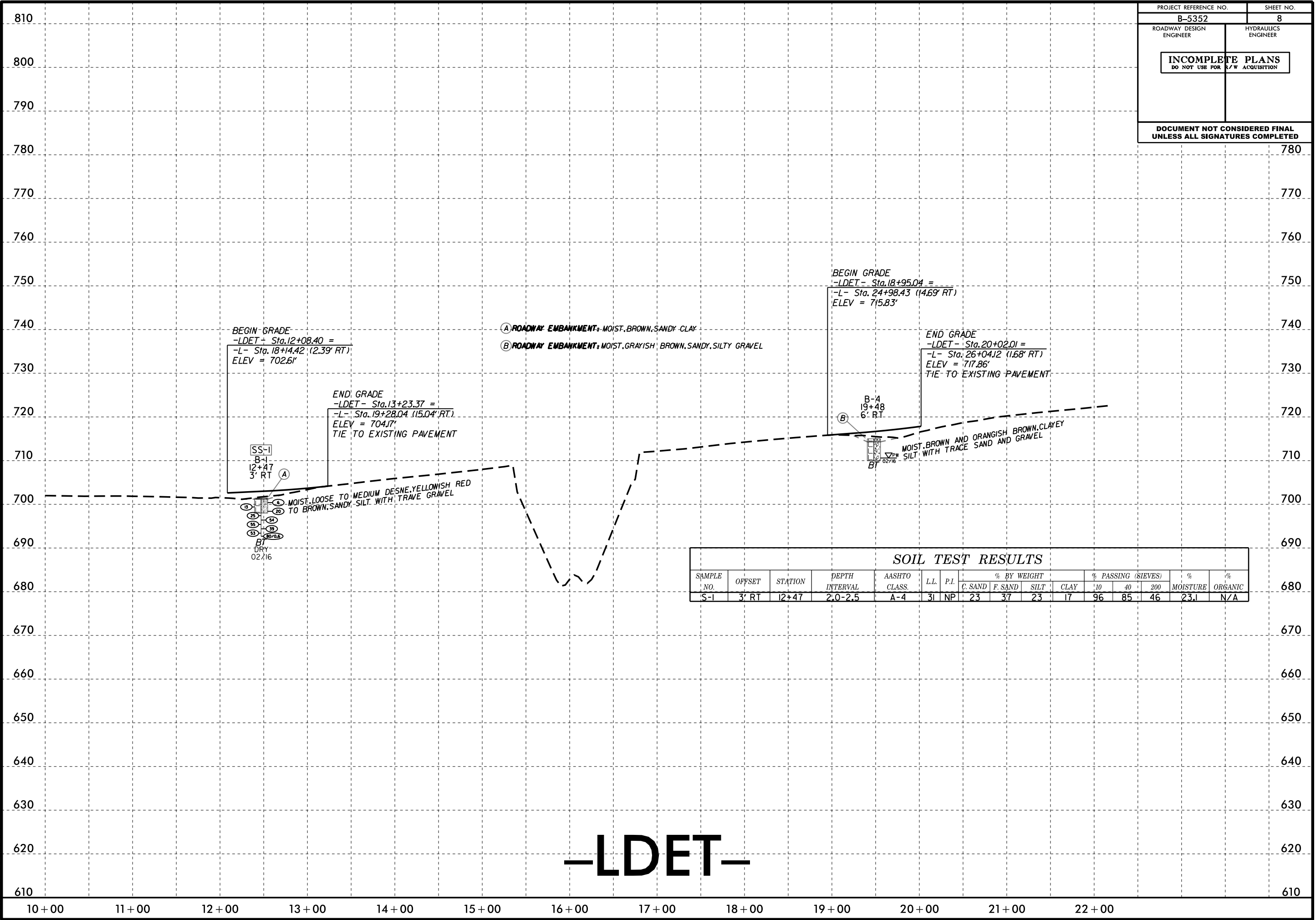


BM3
ELEV = 728.74'
N 981985 E 1726304-
L- STATION 32+61.65 82.69' RT
CHISELED SQUARE ON BASE OF BUS 220
STONEVILLE SIGN

\$DATE\$ \$FILE\$

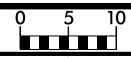
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PROJECT REFERENCE NO. B-5352	SHEET NO. 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



-LDET-

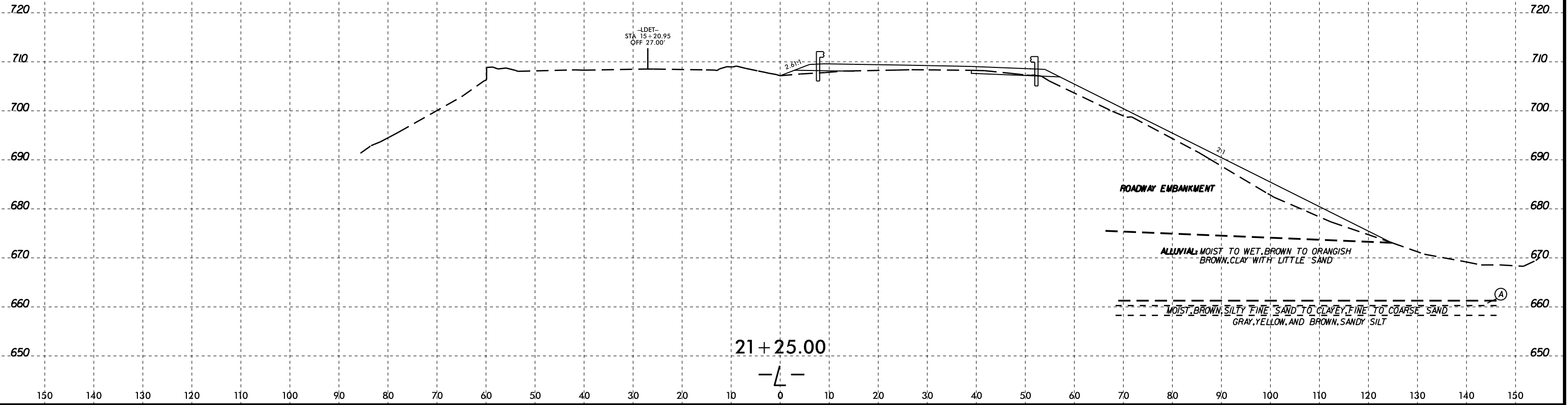
8/23/99



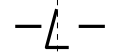
PROJ. REFERENCE NO.	SHEET NO.
B-5352	9

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

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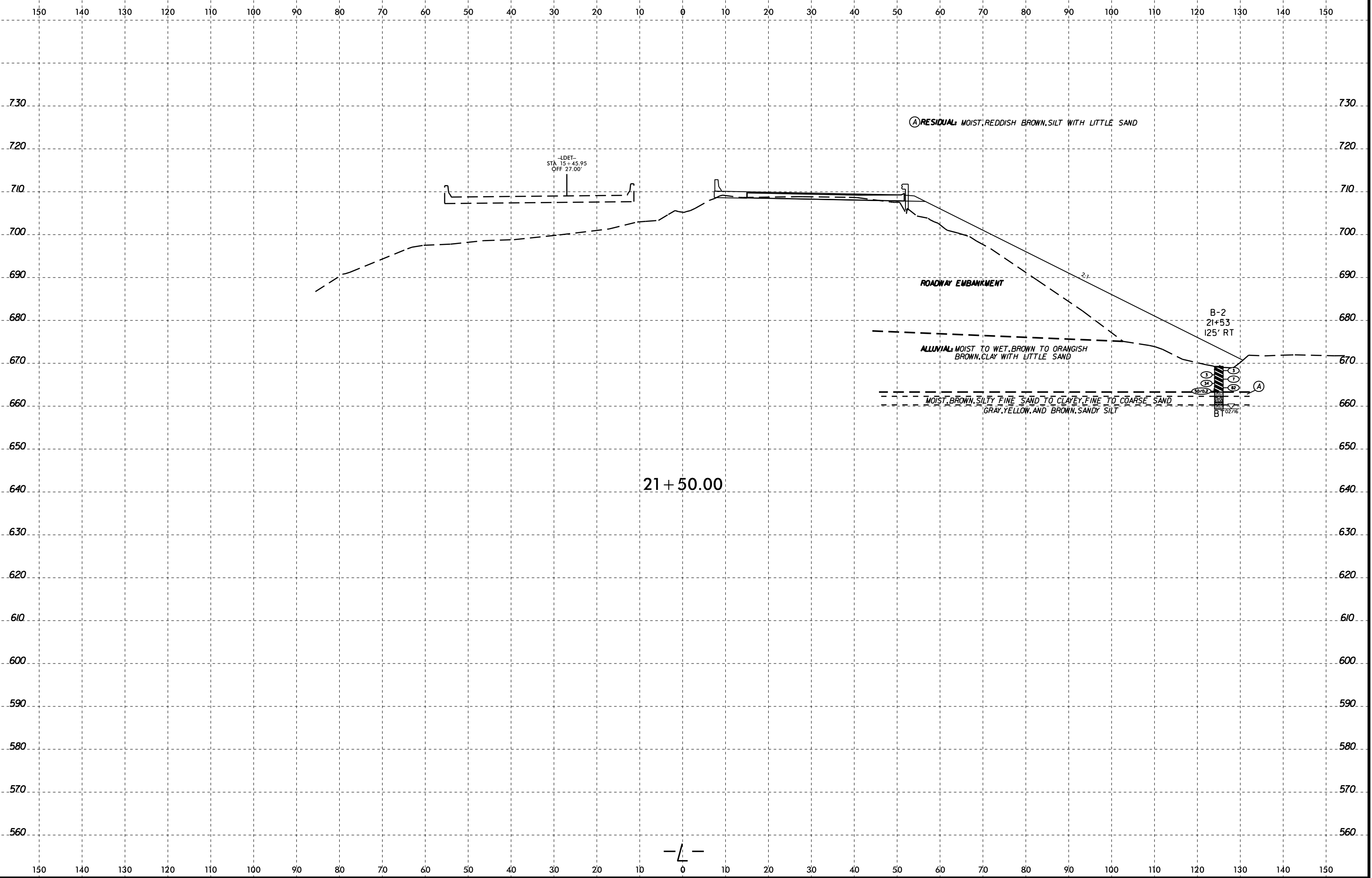


21 + 25.00

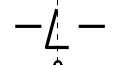


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8/23/99



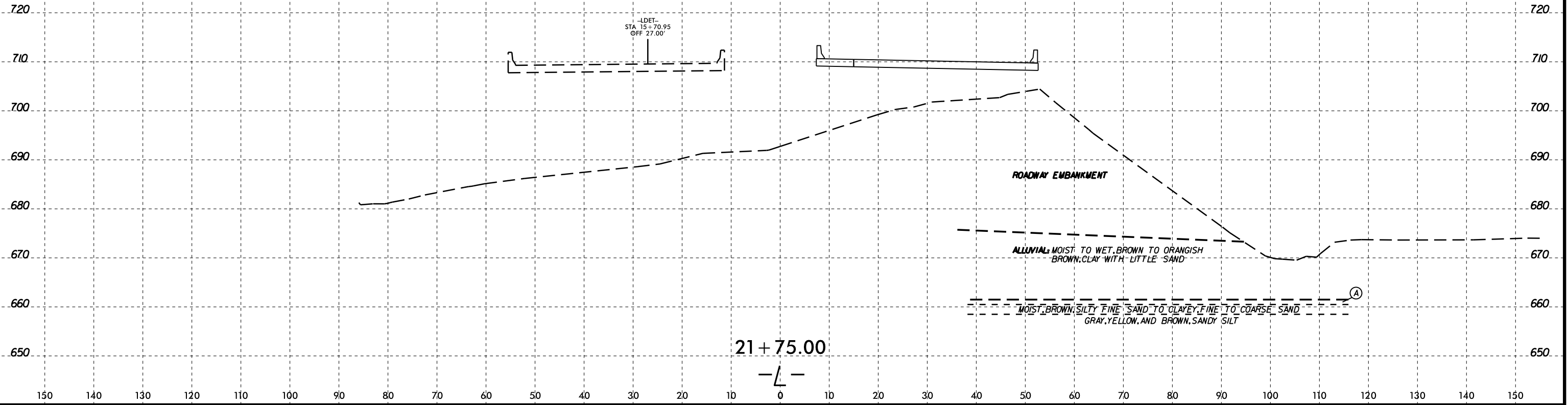
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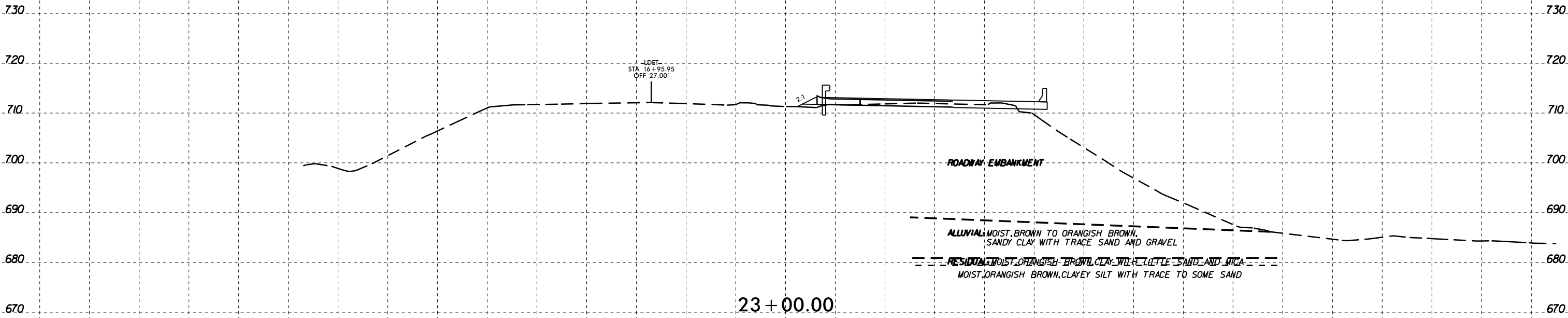
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 wells At 08-21-06



21+75.00
 — L —

8/23/99

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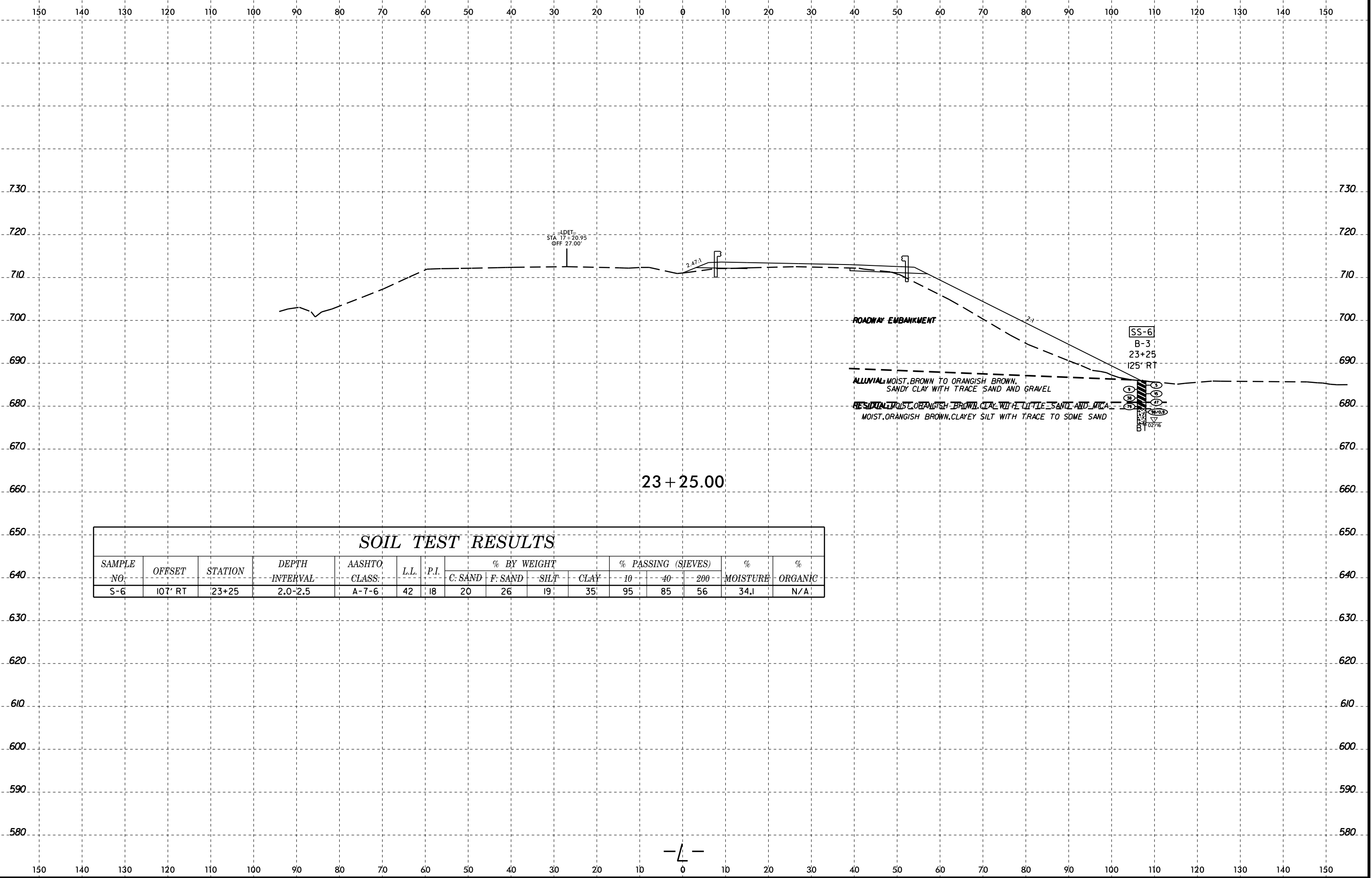
730 720 710 700 690 680 670

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23 + 00.00

— L —

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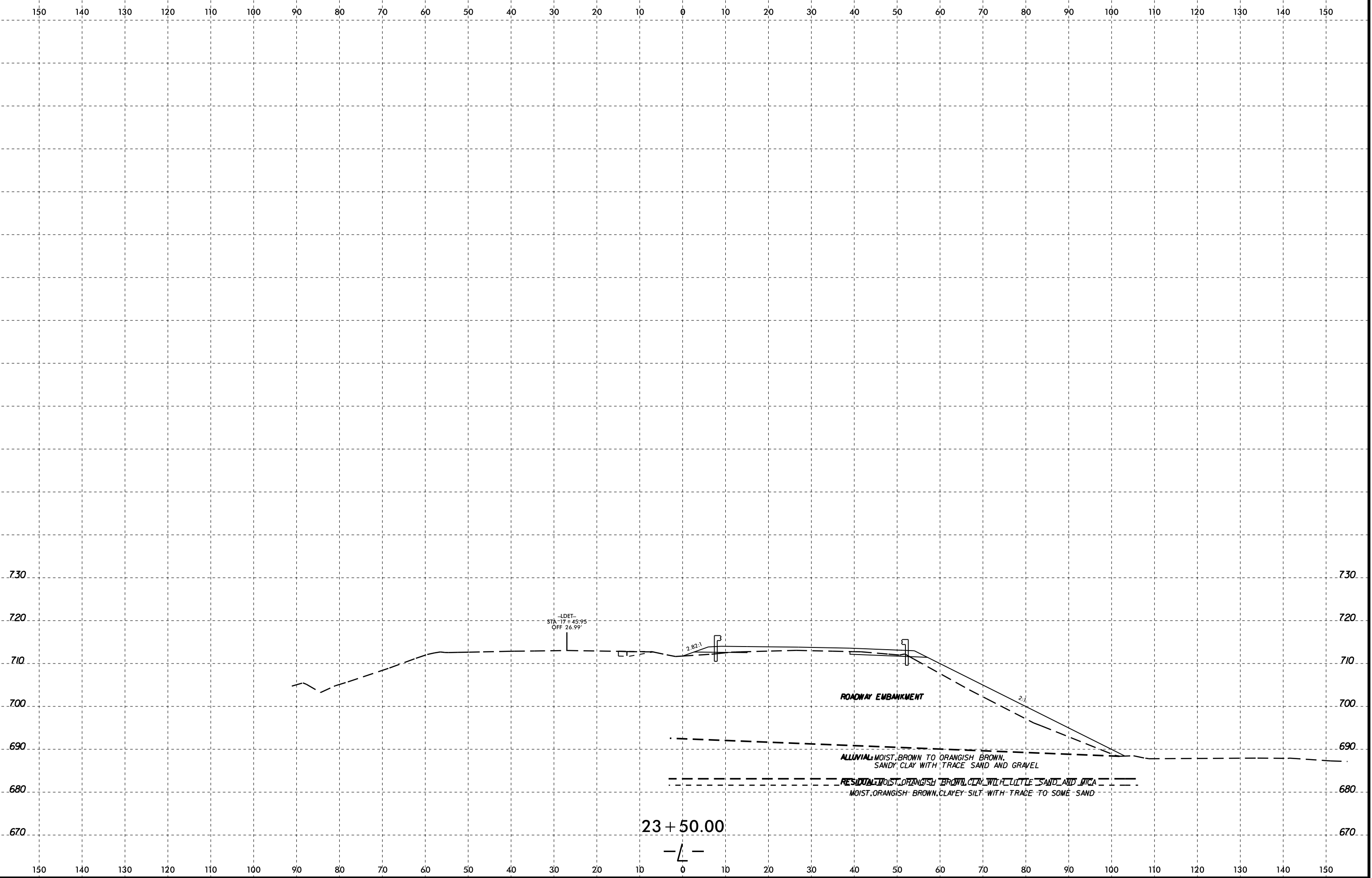


23 + 25.00

SOIL TEST RESULTS

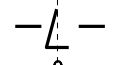
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-6	107' RT	23+25	2.0-2.5	A-7-6	42	18	20	26	19	35	95	85	56	34.1	N/A

8/23/99



11-APR-2016 15:54
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twells At 08:21:06

23 + 50.00



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

REFERENCE: B-5352

PROJECT: 46066

REPLACE BRIDGE NO. 131 ON US 220 BYPASS OVER NORFOLK SOUTHERN RAILROAD

SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL (FEET)	AASHTO CLASS.	LIQUID LIMIT	PLASTICITY INDEX	% BY WEIGHT					% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								GRAVEL	C.SAND	F.SAND	SILT	CLAY	10	40	200		
-	S-1	12+50	CL	2.0 - 2.5	A-4	31.0	NP	0	23	37	23	17	96	85	46	23.1	-
-	S-6	23=25	107' RT.	2.0 - 2.5	A-7-6	42.0	18.0	0	20	26	19	35	95	85	56	34.1	-