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REFERENCE: B-5345

PROJECT: 46059

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-5345	1	13

**CONTENTS**

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>	<u>PROFILE</u>
-LDET-	10+00 TO 17+54	4	5

**CROSS SECTIONS**

<u>LINE</u>	<u>STATION</u>	<u>SHEETS</u>
-L-	13+75 TO 15+00	6-8
-L-	18+75 TO 19+00	9

**APPENDICES**

<u>APPENDIX</u>	<u>TITLE</u>	<u>SHEETS</u>
A	SOIL TEST RESULTS	10-II

**ROADWAY  
SUBSURFACE INVESTIGATION**

COUNTY GUILFORD  
PROJECT DESCRIPTION REPLACE BRIDGE NO. 456 ON  
SR 2136 OVER BRUSH CREEK

**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. CAIN

P. DEWIRE

Z. KIKER

INVESTIGATED BY T. WELLS

DRAWN BY T. WELLS

CHECKED BY \_\_\_\_\_

SUBMITTED BY SCHNABEL

DATE APRIL 2016

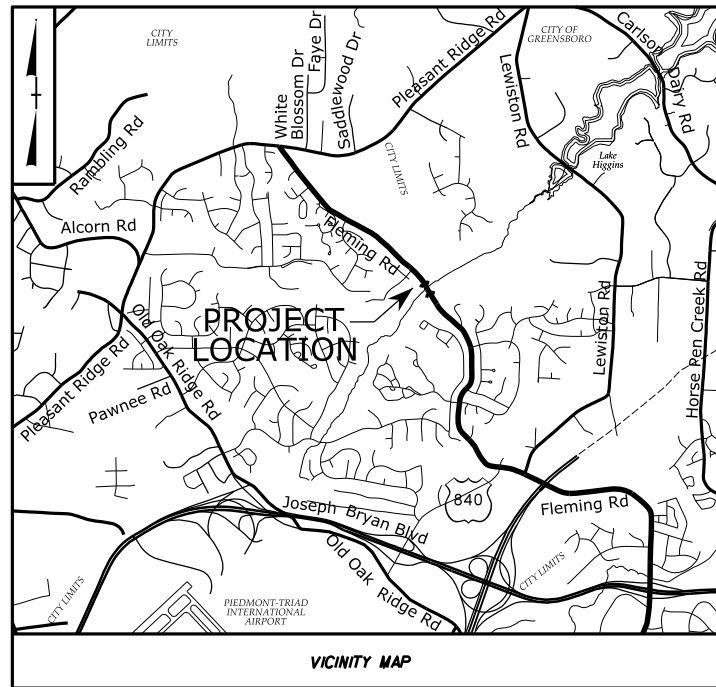


DocuSigned by:  
Mahalingam Bahiradhan 4/26/2016  
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SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



**TIP PROJECT: B-5345**



**CFI PLANS (2/2/16)**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**GUILFORD COUNTY**

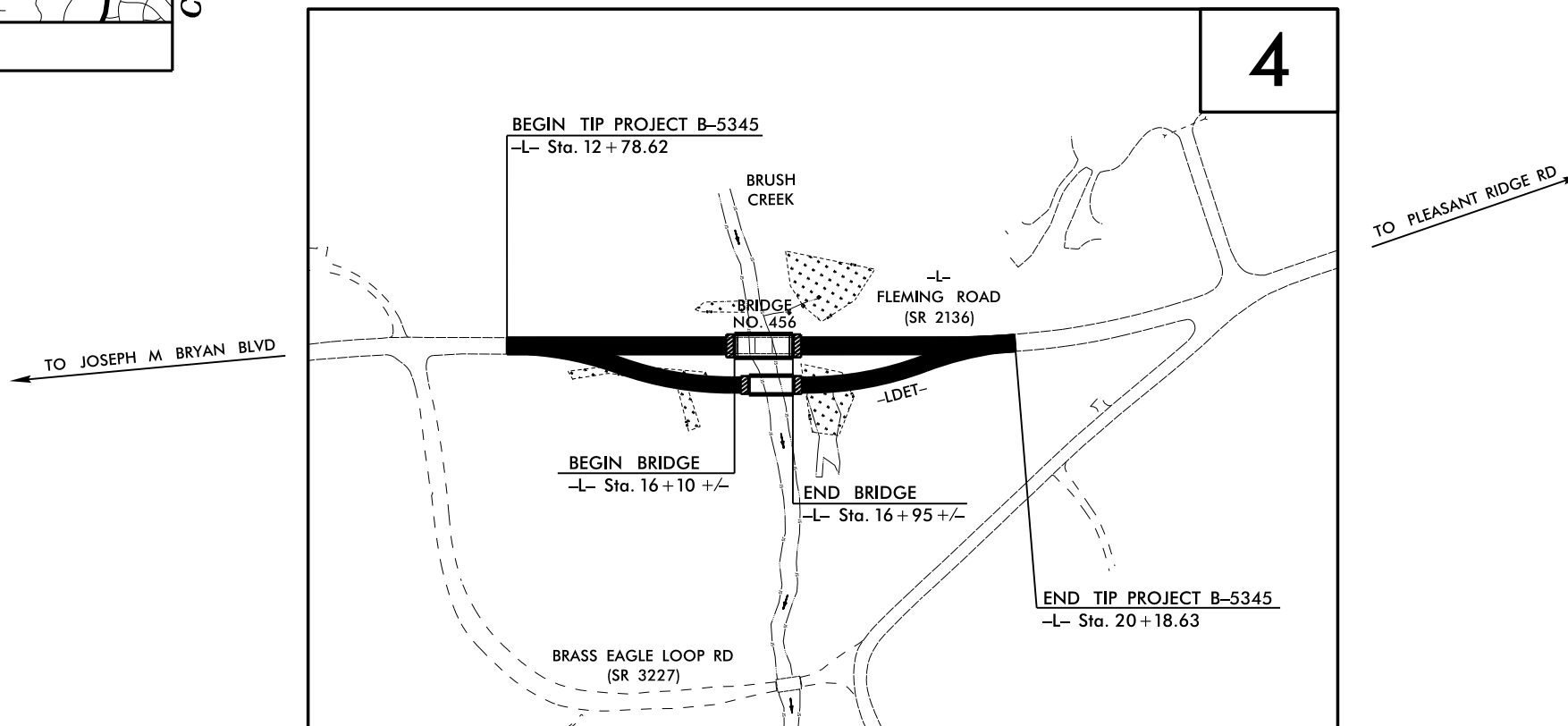
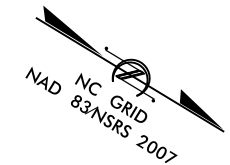
**LOCATION:** BRIDGE NO. 456 OVER BRUSH CREEK  
ON SR 2136 (FLEMING ROAD)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5345	3	13
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46059.1.1	BRSTP-2136(5)	P.E.	

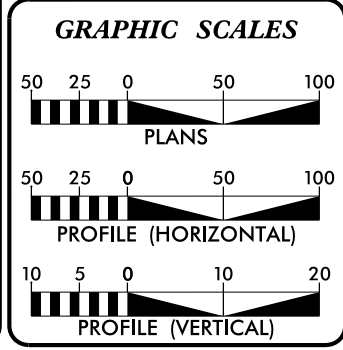
DOCUMENT NOT CONSIDERED FINAL  
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**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO  
\*DESIGN EXCEPTION REQUIRED FOR SAG VERTICAL CURVE AND ASSOCIATED NIGHTTIME STOPPING SIGHT DISTANCE  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD     

**CONTRACT:**



**DESIGN DATA**

ADT 2017	=	6450 vpd
ADT 2040	=	9900 vpd
K	=	11%
D	=	60%
T	=	3%*
V	=	50 MPH
VDET	=	40 MPH
*TTST	=	1% DUAL = 2%
FUNC CLASS	=	RURAL LOCAL "SUBREGIONAL TIER"

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-5345	=	0.124 MILES
LENGTH STRUCTURE TIP PROJECT B-5345	=	0.016 MILES
TOTAL LENGTH TIP PROJECT B-5345	=	0.140 MILES

PLANS PREPARED FOR THE NCDOT BY:

**Kimley»Horn**

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JUNE 17, 2016

LETTING DATE: JUNE 20, 2017

**JEFFREY W. MOORE, P.E.**  
PROJECT ENGINEER

**CATHERINE A. MURRELL, P.E.**  
PROJECT DESIGN ENGINEER

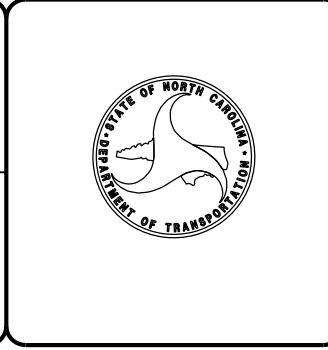
**JAMES A. SPEER, P.E.**  
PROJECT ENGINEER  
NCDOT ROADWAY DESIGN

**HYDRAULICS ENGINEER**

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

**ROADWAY DESIGN ENGINEER**

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



\$DATE\$ \$FILE\$



SCHNABEL ENGINEERING SOUTH, P.C.

April 14, 2016

STATE PROJECT: 46059.1.1(B-5345)  
 PROJECT ID: 27388  
 COUNTY: Guilford  
 DESCRIPTION: Replace Bridge No. 456 on SR 2136 (Fleming Road) Over Brush Creek  
 SUBJECT: Geotechnical Report - Inventory

**Project Description**

The project consists of replacing the existing bridge on SR 2136 and constructing a detour road on the east side of the existing roadway to maintain the traffic during construction. The length of the proposed detour road is approximately 555 feet. Fills and cuts up to 7 feet and one foot, respectively, are anticipated to achieve the proposed roadway grades of the detour.

The geotechnical investigation was conducted in February of 2016. Borings were advanced using a D-50 drill rig equipped with an automatic hammer. Standard Penetration Test borings were performed at specific locations to provide subsurface information for design and construction of the proposed roadway. Representative soil samples were collected and submitted to a NCDOT approved laboratory for testing.

The following alignment was investigated for this project. Subsurface profiles and cross sections of this alignment are included in this report.

<u>Line</u>	<u>Station(±)</u>
-LDET-	10+00 to 17+54

**Areas of Special Geotechnical Interest**

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

<u>Line</u>	<u>Station (±)</u>	<u>Offset</u>
-LDET-	11+15 to 15+25	Lt. to Rt.

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

<u>Line</u>	<u>Station(±)</u>
-LDET-	11+10 to 15+25

3) Surface Water - Standing water was encountered at the following locations shown below. Standing water location will vary depending on the rain events and their durations.

<u>Line</u>	<u>Station(±)</u>	<u>Offset</u>
-LDET-	11+67.00 to 13+00.00	Lt. to Rt.
-LDET-	14+43.00 to 14+95.00	Lt. to Rt.

**Physiography, Geology and Surface Water**

The project corridor is located in the central portion of the Piedmont Physiographic Province in Guilford County. Topography in the area is relatively flat. The proposed detour alignment is located within the Brush Creek flood plain, which is about 600 feet wide and is more prominent on the south side of the river. The project area is comprised of isolated wooded areas on both sides of the SR 2136.

Geologically, the project area generally consists of roadway embankment or alluvial deposits at the surface underlain by residual soils over weathered rock, which is derived from Granite (Intrusive Rocks of Carolina Slate Belt).

**Soils Properties**

Soils encountered during the investigation are separated into three categories based on their geologic origin. These are roadway embankment, alluvial and residual soils.

Roadway embankment soils consist of brown very loose fine to coarse sand and soft slightly plastic sandy silt.

Alluvial soils were present below the roadway embankment or from the surface between -LDET- STA 11+20 and STA 15+25. Alluvial soils consist of slightly plastic to highly plastic red, brown and gray, soft to medium stiff, coarse to fine sandy clay to coarse to fine sandy silty clay(A-6 and A-7-5), clayey fine sandy silt (A-4 & A-5), gray, very loose, sand (A-3), gray to brown, very loose to medium dense, fine to coarse sand to silty coarse to fine sand (A-3 and A-2-4) and gray, soft to stiff, sandy silty clay (A-7-5). The PI value of the alluvial clay (A-6) was 9.

Residual soils were encountered near the end of the proposed detour alignment where it ties into the existing roadway. Residual soils consist of moderately plastic brown soft to very stiff sandy clay (A-6) and, brown very soft to soft sandy silt (A-4 and A-5). The PI value of the clay was 21.

**Rock Properties**

Weathered rock was encountered in two borings near elevations 728 feet and 732 feet. The weathered rock was brown and gray to dark brown and gray and gray granite.

**Groundwater**

Groundwater data was collected after recent rainfall event. Water levels across the project can vary due to topographic relief and soil permeability. The 24-hour groundwater was measured at three locations and varied between elevations 774.3 ft. and 776.6 ft. which indicated the groundwater profile dipping towards the creek. Groundwater levels may fluctuate with seasonal variations in precipitation.

Respectfully Submitted,  
**SCHNABEL ENGINEERING SOUTH, P.C.**



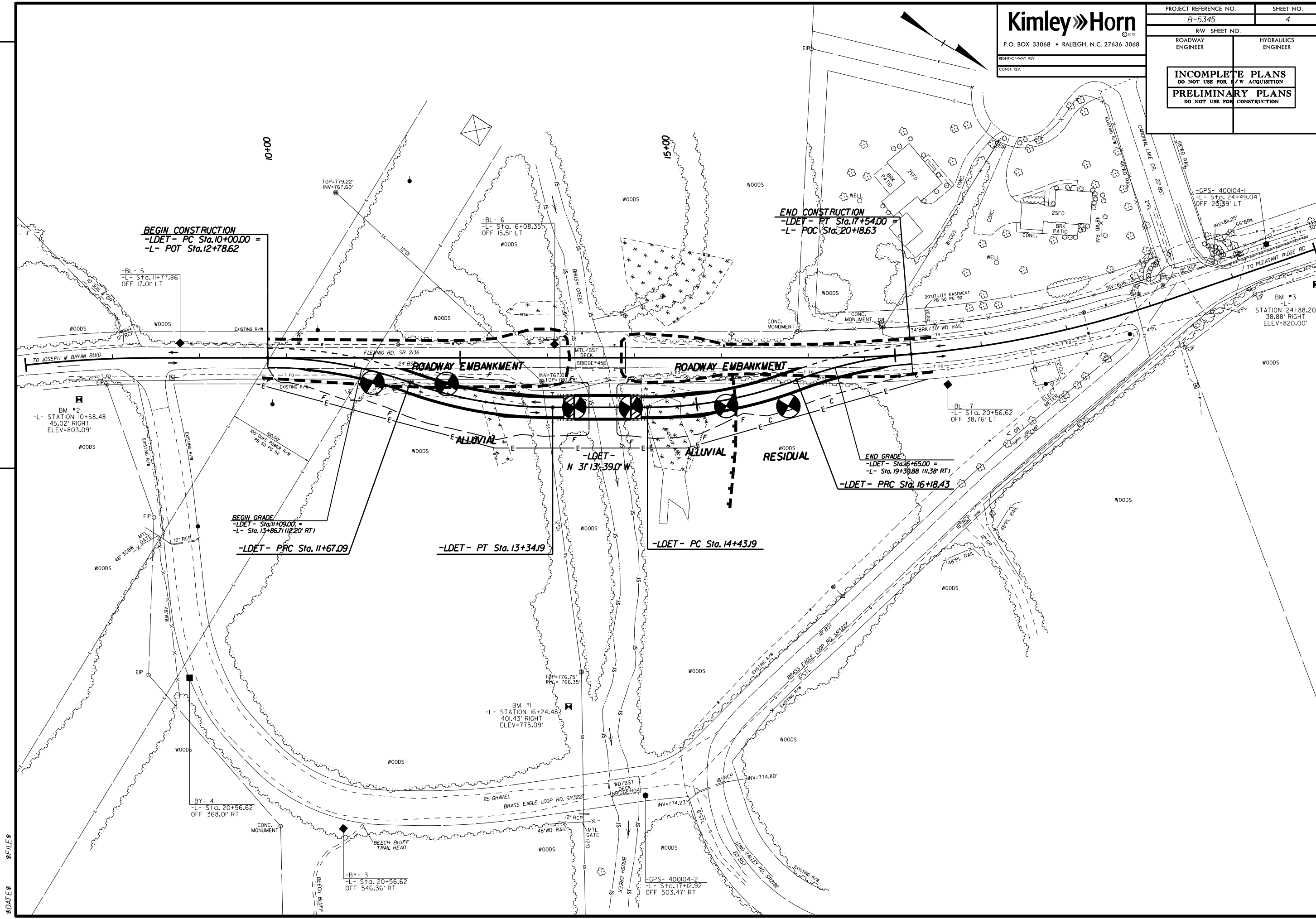
DocuSigned by:  
*Mahalingam Bahiradhan*/26/2016  
4PEAD346C9264A2  
Mahalingam Bahiradhan (Bahi), PE.  
Senior Engineer

PROJECT REFERENCE NO. B-5345	SHEET NO. 4
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY ENGINEER	

**INCOMPLETE PLANS**  
DO NOT USE FOR ACQUISITION

**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

REVISIONS



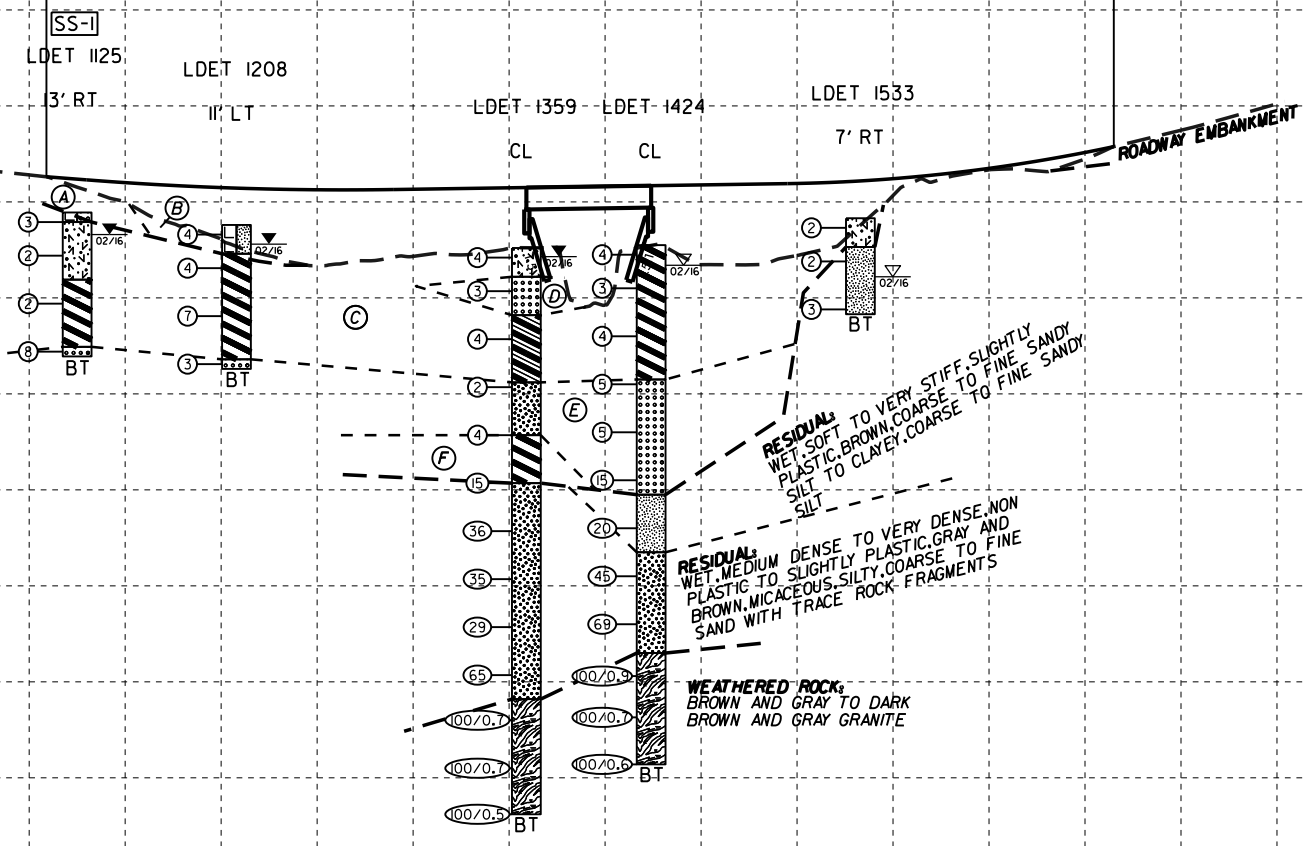
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- (A) ROADWAY EMBANKMENT, MOIST, VERY LOOSE, NON PLASTIC, BROWN, FINE TO COARSE SAND
- (B) ROADWAY EMBANKMENT, WET, SLIGHTLY PLASTIC, SOFT, BROWN, MICACEOUS, COARSE TO FINE SANDY SILT
- (C) ALLUVIAL, WET TO SATURATED, SOFT TO MEDIUM STIFF, SLIGHTLY PLASTIC TO HIGHLY PLASTIC, RED BROWN, BROWN, AND GRAY, MICACEOUS, CLAYEY, FINE SANDY SILT, COARSE TO FINE SANDY CLAY TO COARSE TO FINE SANDY SILTY CLAY
- (D) SATURATED, VERY LOOSE, NON PLASTIC, GRAY AND BROWN, COARSE TO FINE SAND
- (E) WET TO SATURATED, VERY LOOSE TO MEDIUM DENSE, NON PLASTIC TO SLIGHTLY PLASTIC, GRAY AND BROWN, FINE TO COARSE SAND TO MICACEOUS, SILTY, COARSE TO FINE SAND
- (F) WET, SOFT TO STIFF, MODERATELY PLASTIC, GRAY, MICACEOUS, FINE SANDY, SILTY CLAY

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	#10	#40	#200		
SS-1	13' RT	11+25	3.5-5.0	A-5	46	9	16	37	23	24	100	93	53	43.8	N/A

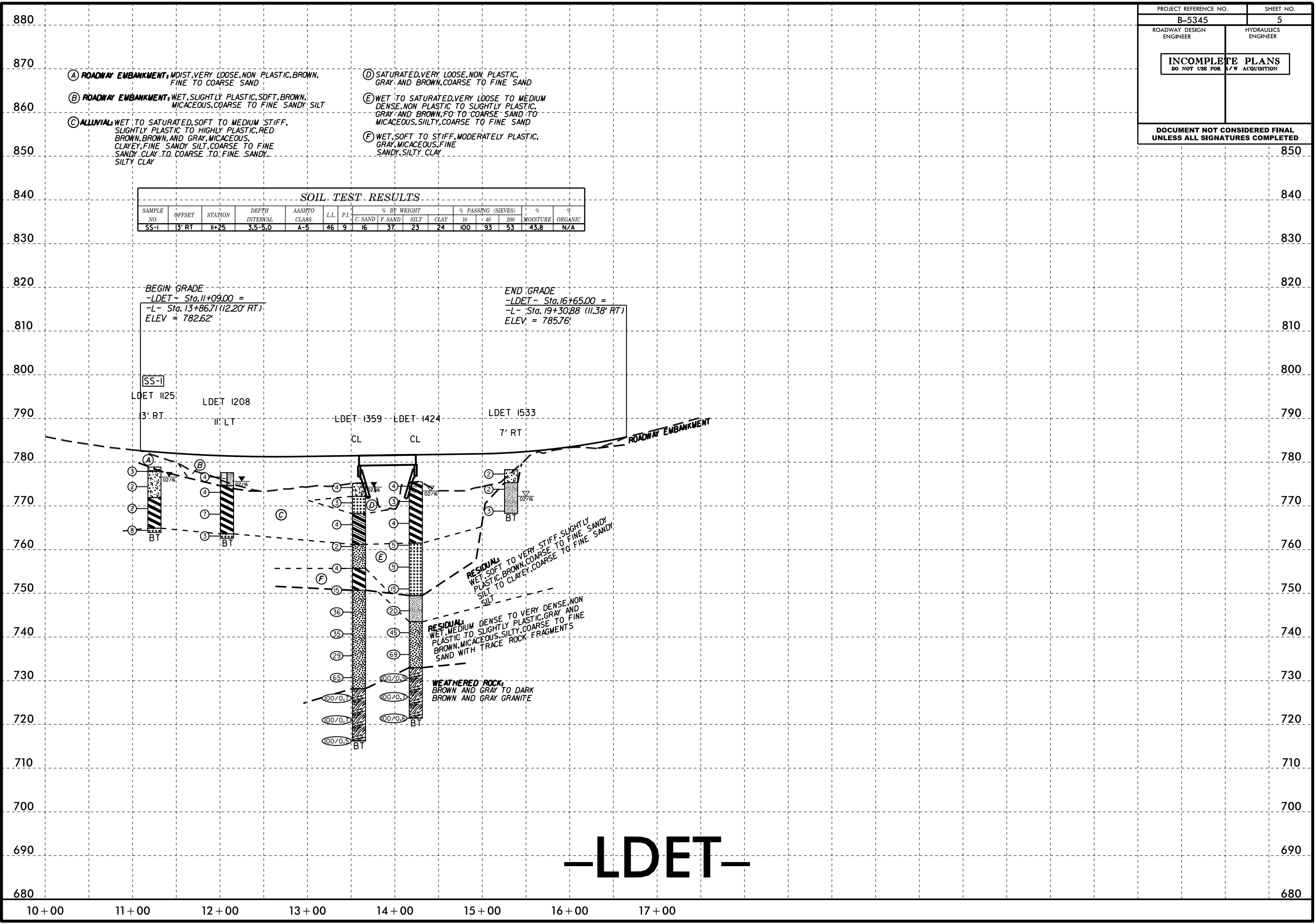
BEGIN GRADE  
 -LDET - Sta. 11+09.00 =  
 -L- Sta. 13+86.71 (12.20' RT)  
 ELEV = 782.62'

END GRADE  
 -LDET - Sta. 16+65.00 =  
 -L- Sta. 19+30.88 (11.38' RT)  
 ELEV = 785.76'

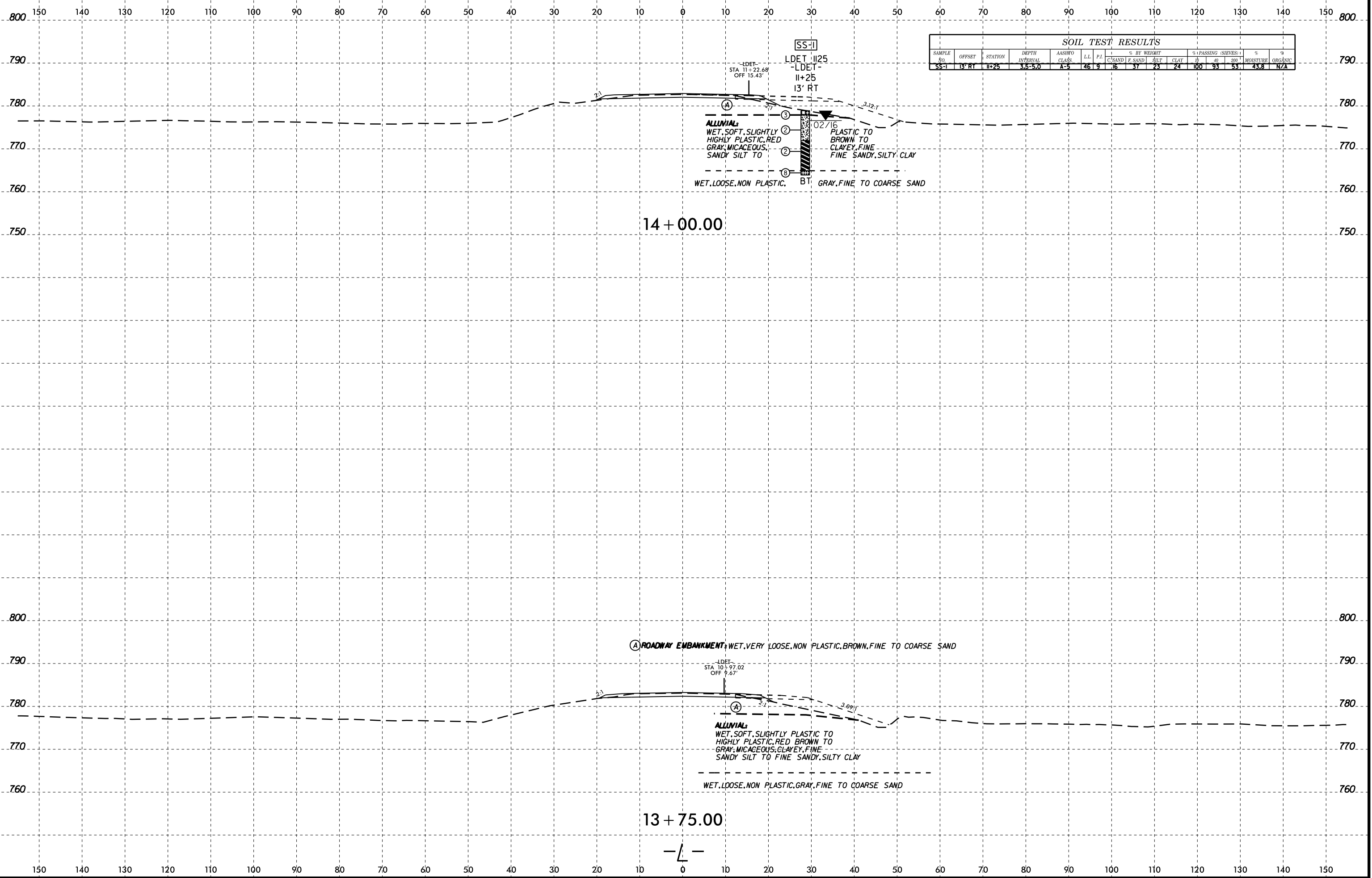


-LDET-

13-APR-2016 11:33  
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 5/14/99







**SOIL TEST RESULTS**

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ASHMO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	#10	#40	#200		
SS-1	13' RT	14+25	3.5-5.0	A-5	46	9	16	37	23	24	100	93	53	43.8	N/A

**SS-1**  
 LDET 1125  
 -LDET-  
 11+25  
 13' RT  
 STA 11+22.68'  
 OFF 15.43'

**(A)**  
 ALLUVIAL  
 WET, SOFT, SLIGHTLY  
 HIGHLY PLASTIC, RED  
 GRAY, MICACEOUS,  
 SANDY SILT TO  
 PLASTIC TO  
 BROWN TO  
 CLAYEY, FINE  
 FINE SANDY, SILTY CLAY

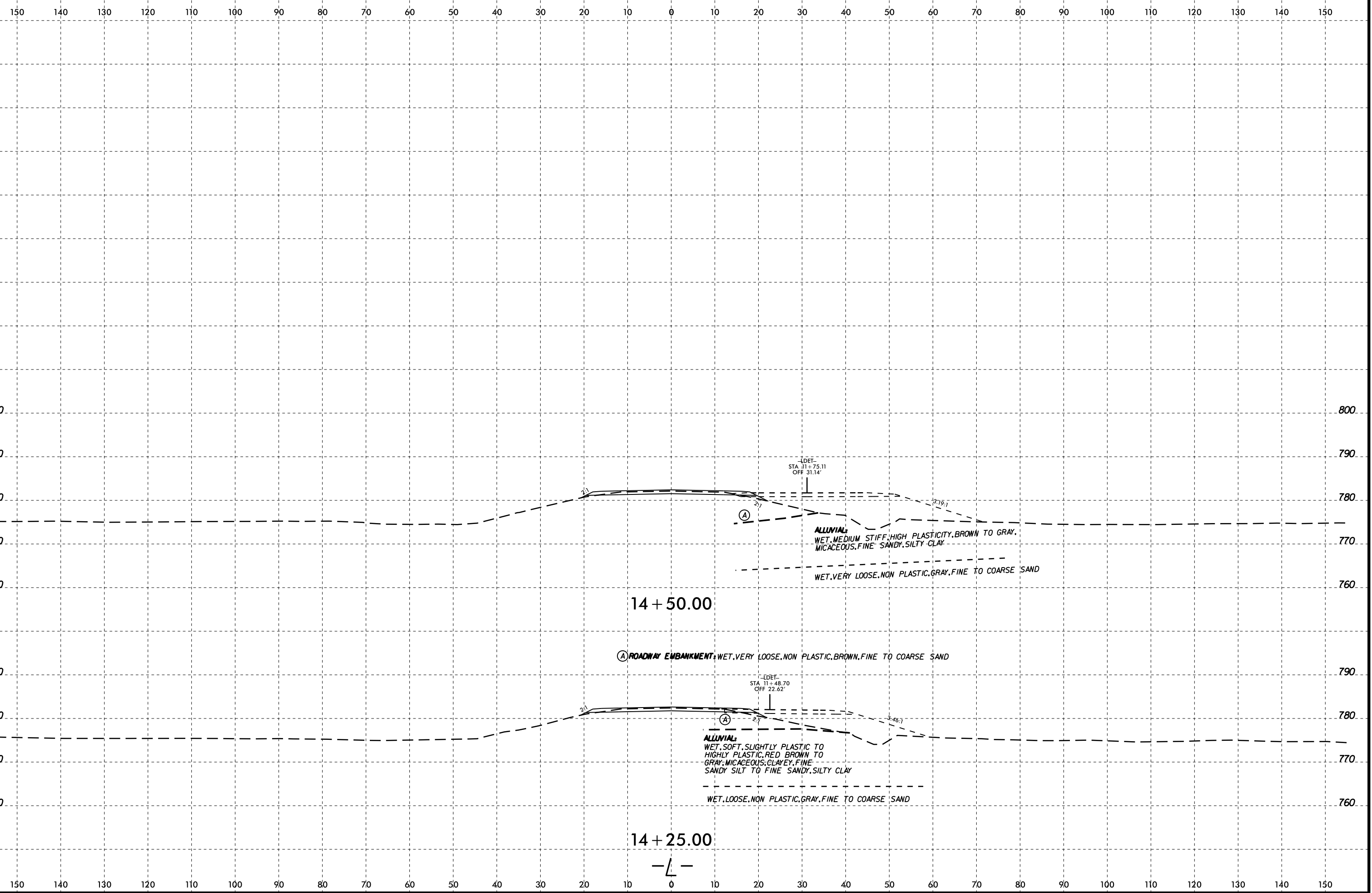
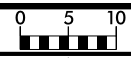
**(B)**  
 WET, LOOSE, NON PLASTIC,  
 BT GRAY, FINE TO COARSE SAND

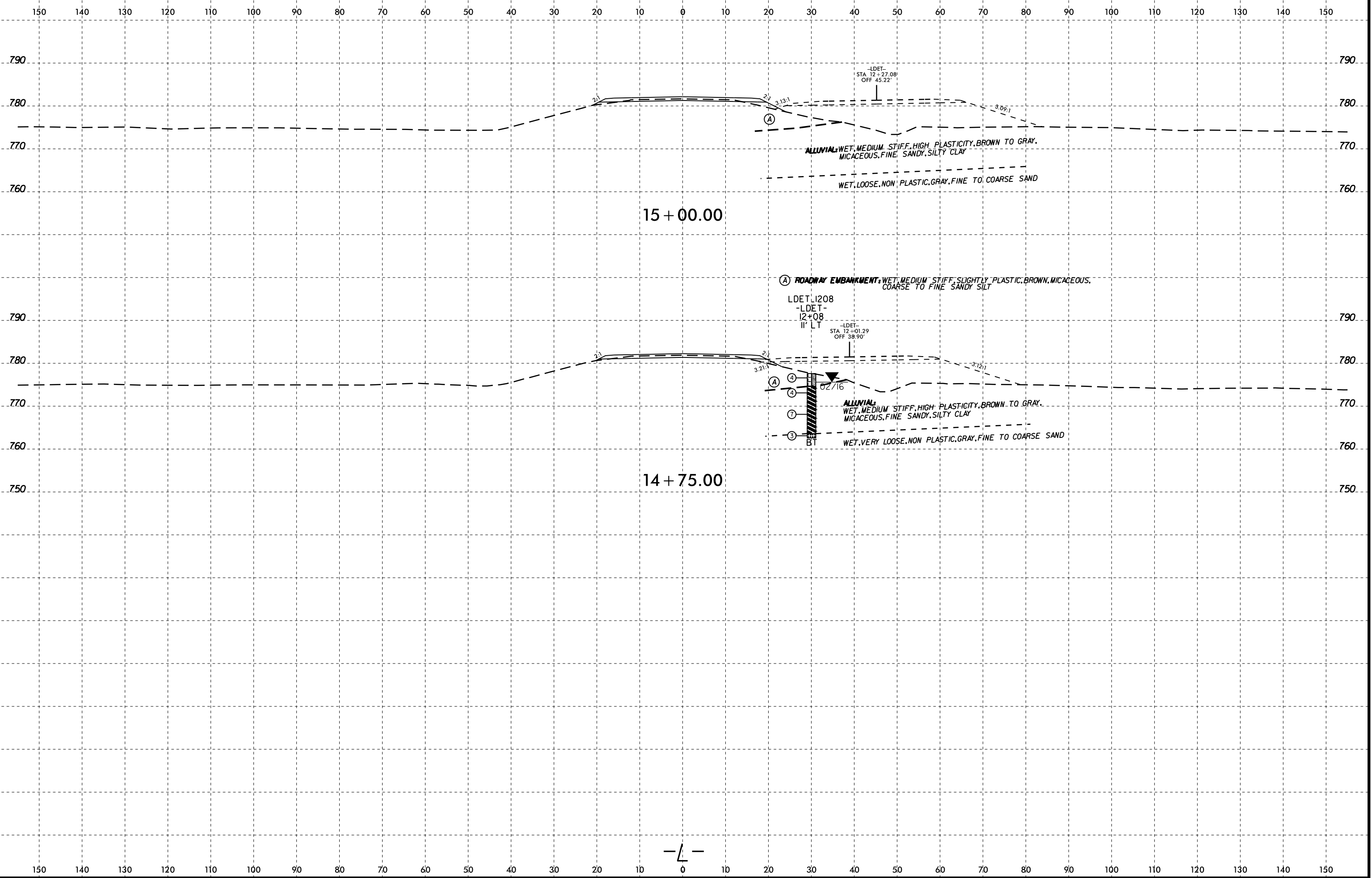
**(A) ROADWAY EMBANKMENT** WET, VERY LOOSE, NON PLASTIC, BROWN, FINE TO COARSE SAND

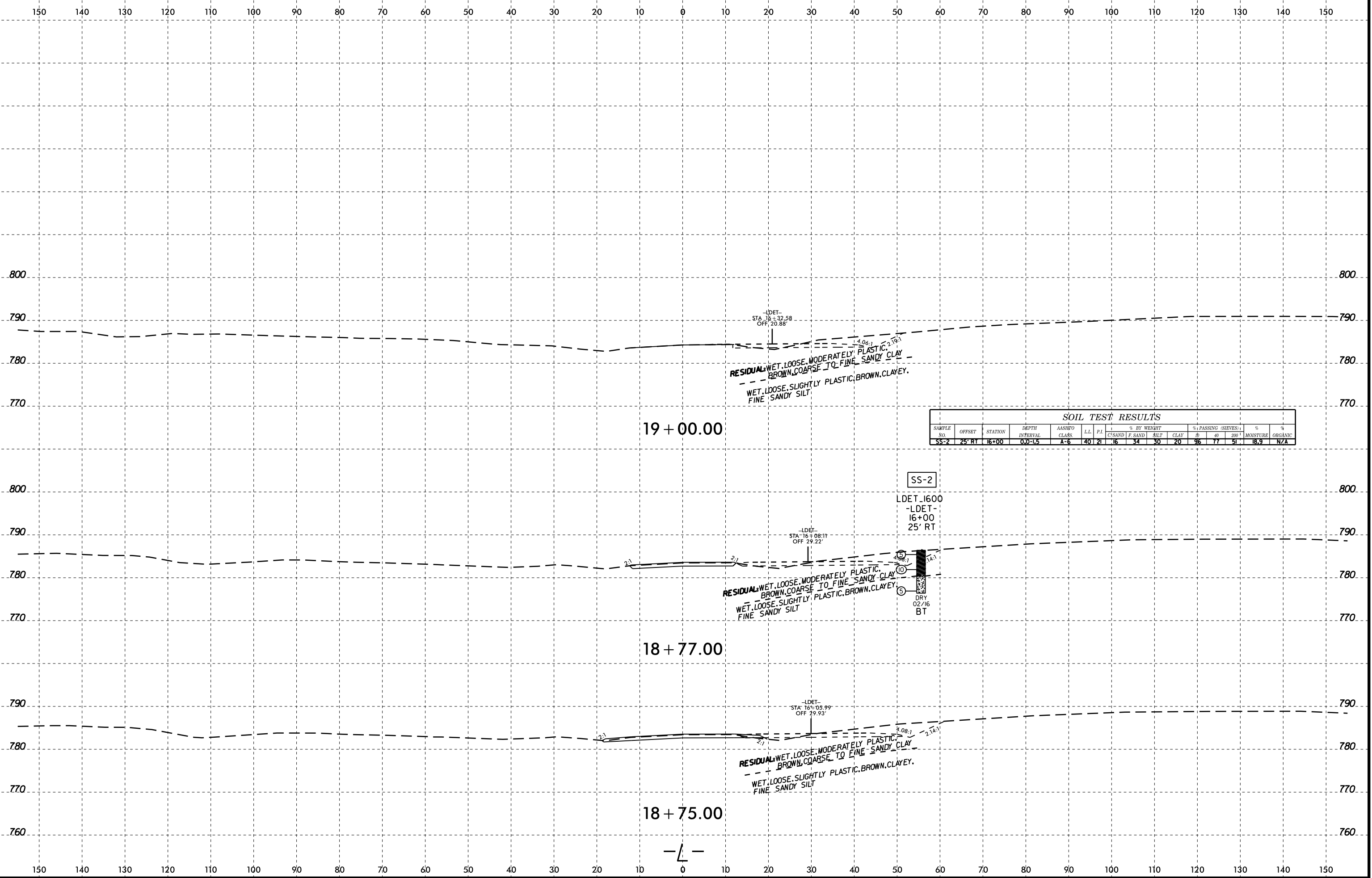
-LDET-  
 STA 10+97.02'  
 OFF 9.67'

**(A)**  
 ALLUVIAL  
 WET, SOFT, SLIGHTLY PLASTIC TO  
 HIGHLY PLASTIC, RED BROWN TO  
 GRAY, MICACEOUS, CLAYEY, FINE  
 SANDY SILT TO FINE SANDY, SILTY CLAY

WET, LOOSE, NON PLASTIC, GRAY, FINE TO COARSE SAND







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

REFERENCE: B-5345

PROJECT: 46059

MB APRIL 2016  
INITIALS DATE

**REPLACE BRIDGE NO. 456 ON SR 2136 OVER BRUSH CREEK**

**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		
LDET_1125	SS-1	11+25	13' RT.	3.5 - 5.0	A-5	46	9	0	16	37	23	24	100	93	53	43.8	-
LDET_1600	SS-2	16+00	25' RT.	0.0 -1.5	A-6	40	21	0	16	34	30	20	96	77	51	18.9	-