

DEPARTMENT OF TRANSPORTATION

STATE OF GEORGIA

INTERDEPARTMENTAL CORRESPONDENCE

FILE NH000-0003-03(053), Clarke County **OFFICE** Materials and Research
SR 10 Loop Interchange Forest Park, GA
PI No. 122890 **DATE** March 1, 2011

FROM *T.M. Geary*
Georgene M. Geary, P.E., State Materials and Research Engineer

TO Bobby Hilliard, P.E., State Program Delivery Engineer,
Attention: Robert Murphy

SUBJECT Final Acceptance of Consultant's Soil Survey Summary Report
US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange

As requested, we have reviewed the Soil Survey Summary Report that was written on January 26, 2011 by Willmer Engineering Inc., of Atlanta, Georgia. This report is acceptable for use in design and during construction. Copies of this report should be forwarded to the appropriate DOT offices.

If additional information is needed, please contact Ian Rish of the Geotechnical Engineering Bureau at 404-608-4726

GMG: IDR

Copy:

Willmer Engineering Inc.,
3772 Pleasantdale Rd
Suite 165
Atlanta, GA 30340-4270
Attention: Sujit K. Bhowmik, PhD, P.E.

SOIL SURVEY REPORT
(Revised January 26, 2011)
US 78/SR 10 (Atlanta Highway)
at SR 10 Loop Interchange
GDOT Project No. NH000-0003-03(053)
PI No. 122890
Clarke County, Georgia

WILLMER ENGINEERING INC.
Willmer Project No. ATL-171-2968

Prepared For
HEATH & LINEBACK ENGINEERS, INC.
Marietta, Georgia

Prepared By
WILLMER ENGINEERING INC.
3772 Pleasantdale Road
Suite 165
Atlanta, Georgia 30340-4270

770.939.0089

October 26, 2009
 (Revised January 26, 2011)

VIA HAND DELIVERY

Shawn Fleet, PE
 Heath & Lineback Engineers, Inc.
 2390 Canton Road
 Building 200
 Marietta, Georgia 30066-5393

SUBJECT: Soil Survey Report

US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053)
 PI No. 122890
 Clarke County, Georgia
 Willmer Project No. ATL- 171-2968

Dear Mr. Fleet:

Willmer Engineering Inc. (Willmer) is pleased to provide this Soil Survey report for the proposed US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange project in Clarke County, Georgia. The soil survey was performed in general accordance with Willmer Proposal No. P04-223A-Rev. dated April 25, 2005, and Georgia Department of Transportation (GDOT) guidance documents for soil surveys for road design. The report was revised to incorporate GDOT review comments of January 21 and April 30, 2010.

The attached summary presents the site and subsurface conditions along the proposed alignment, our conclusions, and recommendations related to project design and construction.

We appreciate the opportunity to be of service on this project. Please call us if you have any questions concerning this report or require further assistance.

Sincerely,

WILLMER ENGINEERING INC.

Duhwan Kim

Duhwan Kim, PhD
 Project Engineer

Sujit K. Bhowmik

Sujit K. Bhowmik, PhD, PE
 Chief Engineer

James L. Willmer

James L. Willmer, PE
 Executive Vice President/Principal Consultant

DK/SKB/JLW:lmh

P:\2968-US 78 SR10 Loop Interchange Clarke County\Report-SS\171-2968 Soil Survey Report (Revised January 2011).doc



Geotechnical Engineering ♦ Environmental Services and Engineering ♦ Construction Services

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Attachments: **Soil Survey Summary**

Figures

Figure 1 – Project Location Map
Figure 2 – Project Alignment Map

Appendix I

Pipe Culvert Material Alternates
Berm Detail for Cuts or Fills over 35 feet
Benching Detail

Appendix II

Boring Record Legend
Unified Soil Classification System Reference Sheet
Record of Soil Survey Borings (Pages 1 through 17)

Appendix III

Laboratory Data Summary (Sheets 1 through 6)

Appendix IV

Bridge Boring Location Plan
End Bent Boring Logs from Bridge Foundation Investigation Report

SOIL SURVEY SUMMARY
For
GDOT Project No. NH000-0003-03(053)
PI No. 122890
US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
Clarke County, Georgia

**1. Location/
Description**

This project involves improvements of the US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange in Clarke County, Georgia. The improvements consist of the widening/reconstruction/realignment of some portions of US 78/SR 10 (Atlanta Highway), SR 10 Loop, five existing ramps (Ramps 1, 2, 3, 4 and 6) and associated side roads, and the construction of a new ramp (Ramp 5).

The construction work for this project extends from Station 25+04.81 to Station 72+14.44 on Atlanta Highway and from Station 125+75.00 to Station 184+35.00 on SR 10 Loop. The mainline length of this project is about 2 miles. A project location map is presented in Figure 1, and a project alignment map is presented in Figure 2. This project includes one bridge and one box culvert.

2. Geology

This project is geologically sited within the Piedmont Physiographic Province of Georgia, and is underlain by Intermediate Gneiss Formation which includes biotite gneiss and feldspathic biotite gneiss.

3. Rock

Rock/boulders, noted as auger refusal, was encountered at a number of boring locations. It is estimated that this material will be encountered above the proposed grade at the following locations:

Station to Station
153+75± to 156+75±
(SR 10 Loop)

Location
Right

In addition, exposed rock was observed on the slope surface at the following locations:

Station to Station
176+25± to 180+50±
(SR 10 Loop)

Location
Left Ditch

The boulders/rock layers will likely be removable by heavy equipment and possibly some light blasting.

4. Removal

Soils with High In-Place Moisture Content:

In some parts of the project alignment, the soils near the proposed grade were found to have in-place moisture contents far above the corresponding optimum moisture contents. This condition has the potential to cause pumping problems during subgrade and base construction. It is recommended that upon completion of any necessary excavation in these areas, 24 inches of subgrade soils from beneath the proposed pavement and shoulders be removed, and either dried out and replaced, or replaced with drier soils. The locations where high in-place moisture contents will likely be encountered are:

<u>Station to Station</u>	<u>Location</u>
119+00± to 119+25± (Ramp 3, N.B. Exit)	Right
119+25± to 121+75± (Ramp 3, N.B. Exit)	Left and Right
121+75± to 127+00± (Ramp 3, N.B. Exit)	Left

This work should be done under the direction of the Engineer and may be eliminated if the subgrade soils are dry and stable at the time of construction.

5. Waste

None of the materials found on this project will require wasting. However, Class IIIC soils, which exhibit high volume change and are considered to have poor load-carrying characteristics, will likely be encountered in the following areas:

<u>Station to Station</u>	<u>Location</u>
35+50± to 40+50± (Atlanta Highway)	Right
138+50± to 143+50± (SR 10 Loop)	Right
143+50± to 148+50± (SR 10 Loop)	Left
148+50± to 152+50± (SR 10 Loop)	Left & Right
152+50± to 159+25± (SR 10 Loop)	Left
501+00± to 502+50± (Arrow Head Road)	Left & Right

(Continued)

**5. Waste
 (Continued)**

<u>Station to Station</u>	<u>Location</u>
259+50± to 264+00± (Ramp 2 N.B. Entrance)	Left and Center
127+50± to 136+25± (Ramp 3 N.B. Exit)	Left and Right
136+25± to 137+50± (Ramp 3 N.B. Exit)	Left
130+50± to 134+50± (Ramp 4 S.B. Exit)	Left and Right
134+50± to 139+50± (Ramp 4 S.B. Exit)	Left and Center
554+00± to 554+25± (Ramp 5 S.B. Entrance)	Left
554+25± to 558+50± (Ramp 5 S.B. Entrance)	Left

Class IIIC soils excavated from the above cut areas and undercut from at grade areas (as described under Section 7. Pavement Design) should not be placed within the upper three feet of subgrade directly beneath the pavement section. These soils may be used in the shoulders, or in the side slopes as directed by the Engineer. This work shall be done in accordance with Special Provision 205.

6. Subgrade Materials

No additional subgrade materials will be required for this project.

7. Pavement Design

The pavement design for this project should include a minimum of 10 inches of graded aggregate base (GAB) except where special treatment is required as described below.

Class IIIC soils, which exhibit high volume change and are considered to have poor load-carrying characteristics, were encountered at the proposed subgrade level at many locations along the project alignment. It is recommended that the pavement design include an additional 4 inches of GAB in the following at-grade and cut areas, at the discretion of the Engineer:

<u>Station to Station</u>	<u>Location</u>
35+50± to 40+50± (Atlanta Highway)	Right
138+50± to 143+50± (SR 10 Loop)	Right

(Continued)

**7. Pavement Design
(Continued)**

<u>Station to Station</u>	<u>Location</u>
143+50± to 148+25± (SR 10 Loop)	Left
148+50± to 151+75± (SR 10 Loop)	Right
151+75± to 152+50± (SR 10 Loop)	Left & Right
152+50± to 159+25± (SR 10 Loop)	Left
501+00± to 502+50± (Arrow Head Road)	Left & Right
259+50± to 264+00± (Ramp 2 N.B. Entrance)	Left and Right
131+00± to 136+75± (Ramp 3 N.B. Exit)	Left and Right
130+50± to 139+50± (Ramp 4 S.B. Exit)	Left and Right
555+25± to 558+50± (Ramp 5 S.B. Entrance)	Left

The additional 4 inches of GAB thickness should be installed by undercutting subgrade soils and replacing with GAB. The Class IIIC soils undercut from these areas should be used as described under "5. Waste".

**8. Pavement Design
Values**

We recommend the following values for use in the pavement design calculations for this project:

Soil Support Value = 3.0
Regional Factor = 1.8
Subgrade Reaction Modulus, k = 150 pci

Graded aggregate base is the only base material recommended for use on this project.

9. Slopes

It is recommended that a maximum of 2:1 slopes be used in the design for the entire length of the project. However, embankment and cut slopes that are greater than 35 feet high will require construction of a berm in accordance with the attached "Berm Detail" (see Appendix I) at the following locations:

<u>Station to Station</u>	<u>Location</u>
167+25± to 174+25± (SR 10 Loop)	Left

10. Bench Detail Where new fills are to be placed on existing slopes steeper than 3:1, the existing slope should be benched in accordance with the attached "Benching Detail" presented in Appendix I.

11. Ground Water Ground water was not encountered at or near the proposed grade at the time of the investigation.

12. Shrinkage We recommend an average shrinkage factor of 20 percent for use in the earthwork calculations for this project.

13. Rock Swell We recommend an average swell factor of 30 percent for materials identified as 'auger refusal' in the 'Record of Soil Survey Borings' in Appendix II.

14. Culverts We recommend that a 12-inch blanket of Type II Foundation Backfill material be placed under the barrel of all culverts and 48-inch diameter and larger cross-drains on this project with the exception of the culverts at the following location:

<u>Station</u>	<u>Culvert Size</u>	<u>Type II Foundation Backfill Required</u>
169+00±	Single, 4' X 4'	24"

This recommendation is based on the loose soil condition encountered at this culvert location. A Dynamic Cone Penetrometer Test was performed at the culvert location and the result is shown in Appendix II

15. Corrosion In selecting culvert material types, reference should be made to the attached (Appendix I) "Pipe Culvert Material Alternates" for materials allowable based on the laboratory corrosion tests.

Corrosion potential tests, consisting of electrical resistivity and pH tests, were performed on a water sample obtained from the culvert location at Station 169+00.

<u>Station</u>	<u>Resistivity</u>	<u>pH</u>
169+00±	1.31 x 10 ⁴ ohm-cm	6.71

16. Special Problems

- A. Several residences and businesses are located very close to the construction limits of the project. Vibrations from construction may cause some concern to the property owners. We recommend that the Project Engineer contact the Geotechnical Engineering Bureau prior to construction to evaluate the need for crack surveys and vibration monitoring.
- B. It is recommended that the bridge approach slabs on this project be constructed in accordance with the notched detail on Georgia Standard 9017-R.
- C. Abandoned bricks, appliances, metal bars, and other miscellaneous trash were found along the proposed alignment of Jennings Mill Road from Station 309+50 to 311+00.

Reported By:

Duhwan Kim, PhD / Sujit K. Bhowmik, PhD, PE

Reviewed By:

James L. Willmer, PE

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

SPECIAL PROVISION

**PROJECT NO. NH000-0003-03(053), CLARKE COUNTY
P.I. NO. 122890**

SECTION 205 – ROADWAY EXCAVATION

Add the following to Sub-section 205.3.05.E:

The soils that will be excavated from the following cut sections are primarily Class IIIC soils with poor load carrying characteristics. Do not place these soils within 3 feet (915 mm) of the subgrade directly beneath the pavement in fill sections. These soils may be placed in the bottom of high fill sections or used to flatten slopes as directed by the Engineer:

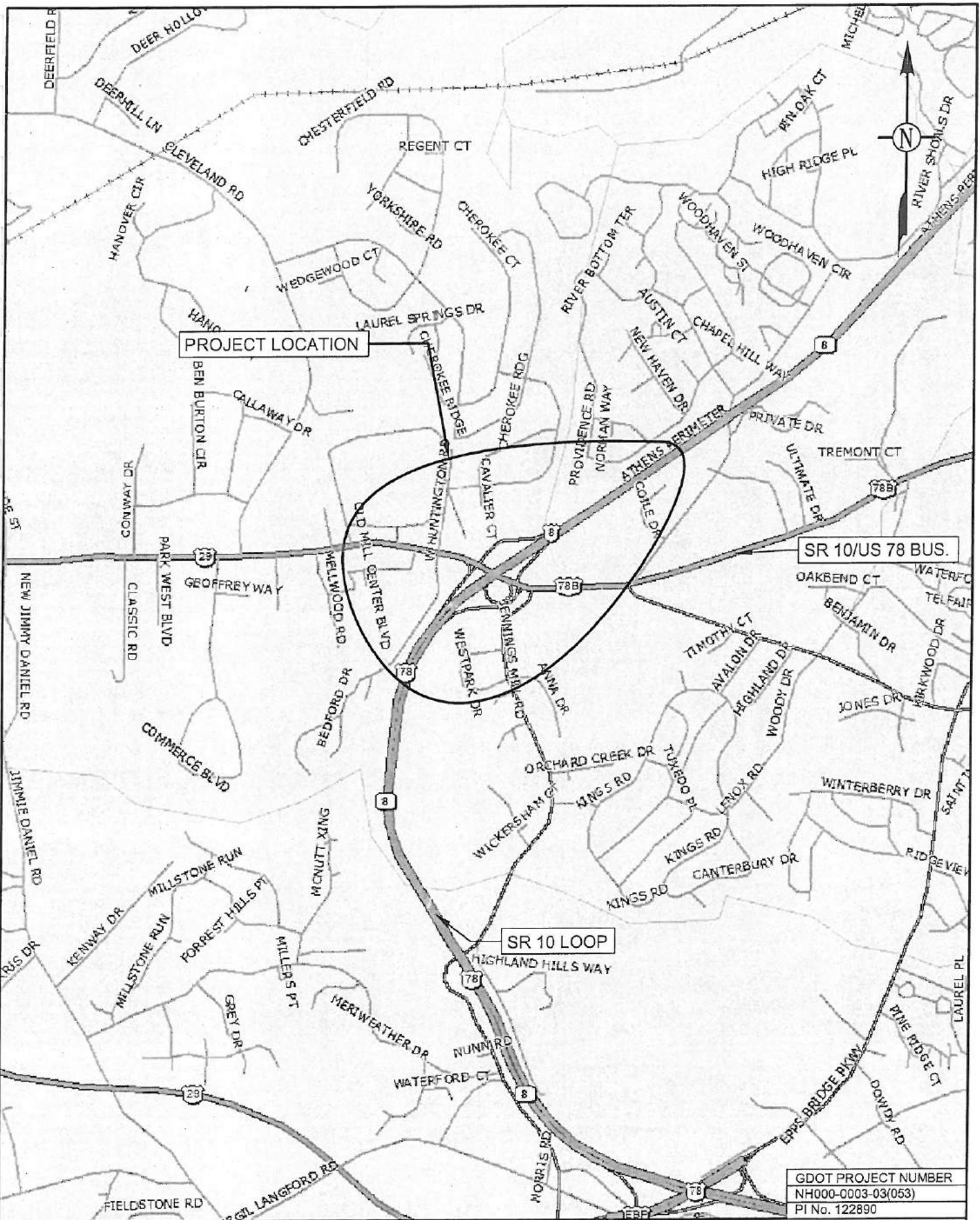
<u>Station to Station</u>	<u>Location</u>
35+50± to 40+50± (Atlanta Highway)	Right
138+50± to 143+50± (SR 10 Loop)	Right
143+50± to 148+50± (SR 10 Loop)	Left
148+50± to 152+50± (SR 10 Loop)	Left and Right
152+50± to 159+25± (SR 10 Loop)	Left
501+00± to 502+50± (Arrow Head Road)	Left & Right
259+50± to 264+00± (Ramp 2 N.B. Entrance)	Left and Center
127+50± to 136+25± (Ramp 3 N.B. Exit)	Left and Right

(Continued)

<u>Station to Station</u>	<u>Location</u>
136+25± to 137+50± (Ramp 3 N.B. Exit)	Left
130+50± to 134+50± (Ramp 4 S.B. Exit)	Left and Right
134+50± to 139+50± (Ramp 4 S.B. Exit)	Left and Center
554+00± to 554+25± (Ramp 5 S.B. Entrance)	Left
554+25± to 558+50± (Ramp 5 S.B. Entrance)	Left

Office of Materials and Research

FIGURES



PROJECT LOCATION

SR 10/US 78 BUS.

SR 10 LOOP

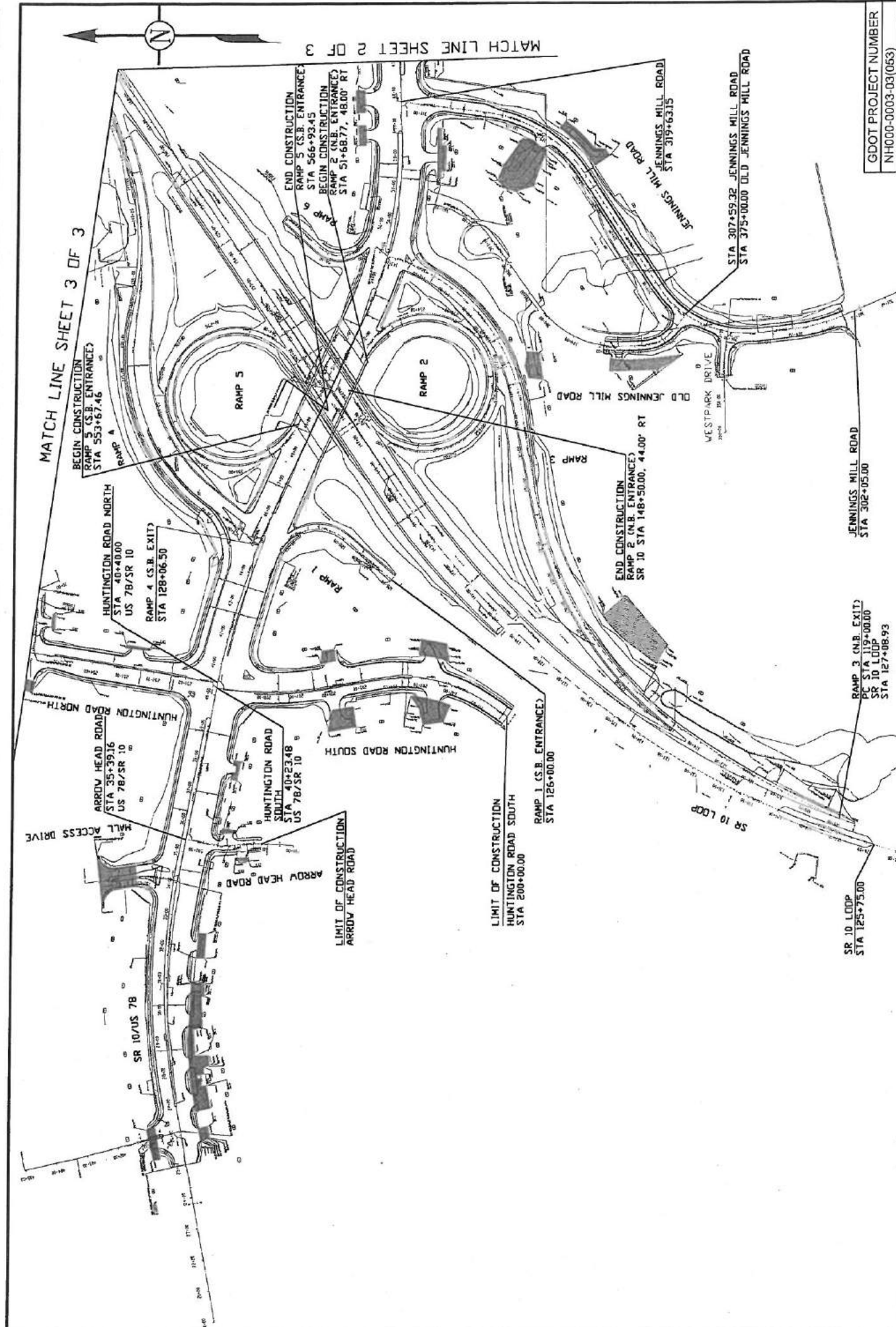
GDOT PROJECT NUMBER
 NH000-0003-03(053)
 PI No. 122890

SCALE: 1" = 2000'
 DATE: 9/2/2009
 DRAWN BY: MJW
 REVIEWED BY: DK



GEOTECHNICAL ENGINEERING
 CONSTRUCTION SERVICES
 ENVIRONMENTAL SERVICES AND ENGINEERING
 3772 PLEASANTDALE ROAD - SUITE 165
 ATLANTA, GA 30340-4270

FIGURE 1
 PROJECT LOCATION MAP
 US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10 LOOP
 INTERCHANGE
 CLARKE COUNTY, GEORGIA
 WILLMER PROJECT No. ATL-171-2968



MATCH LINE SHEET 3 OF 3

MATCH LINE SHEET 2 OF 3

GDOT PROJECT NUMBER	NH000-0003-03(053)
PLN No.	122890

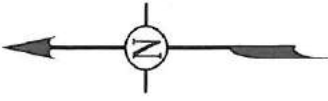
FIGURE 2 (SHEET 1 OF 3)
 PROJECT ALIGNMENT MAP
 US 78/SR 10 (ATLANTA HIGHWAY) AT SR
 10 LOOP INTERCHANGE
 CLARKE COUNTY, GEORGIA
 WILLMER PROJECT No. ATL-171-2968A

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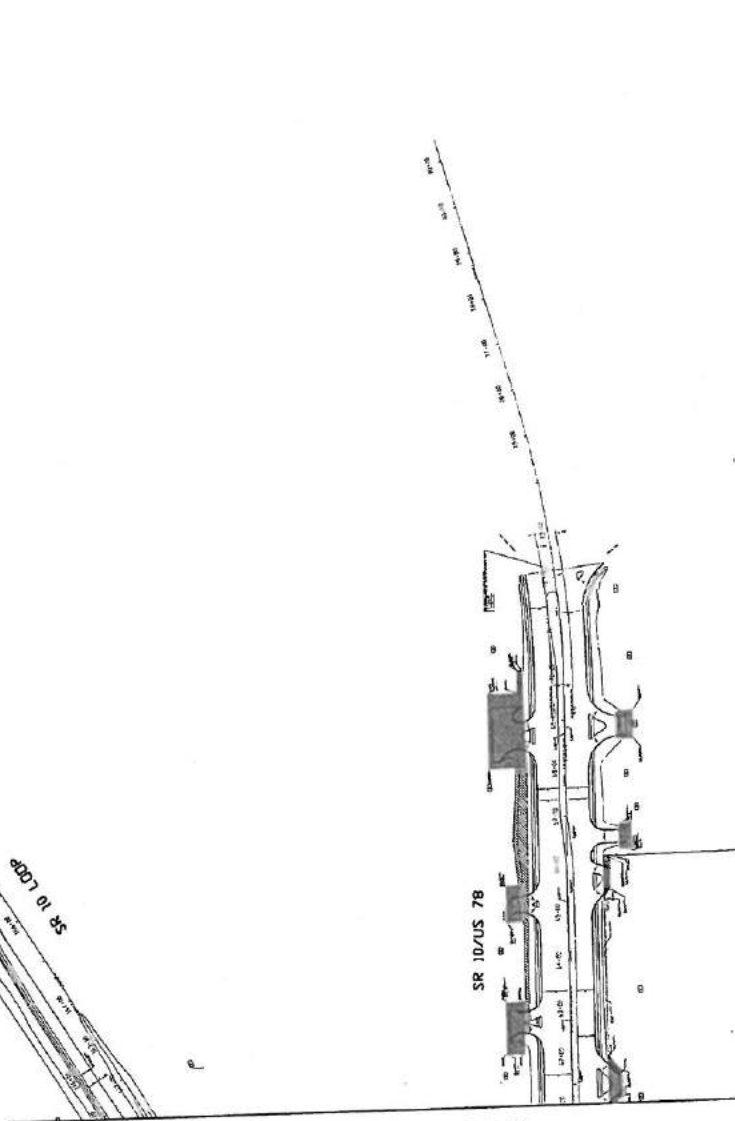


WILLMER ENGINEERING INC.

SCALE:	1" = 400'
DATE:	10/26/2009
DRAWN BY:	MJW
REVIEWED BY:	DK



LIMIT OF CONSTRUCTION
SR10 LOOP
STA 184+35.00



MATCH LINE SHEET 1 OF 3

GDOT PROJECT NUMBER
NH000-0003-03(053)
PI No. 122890

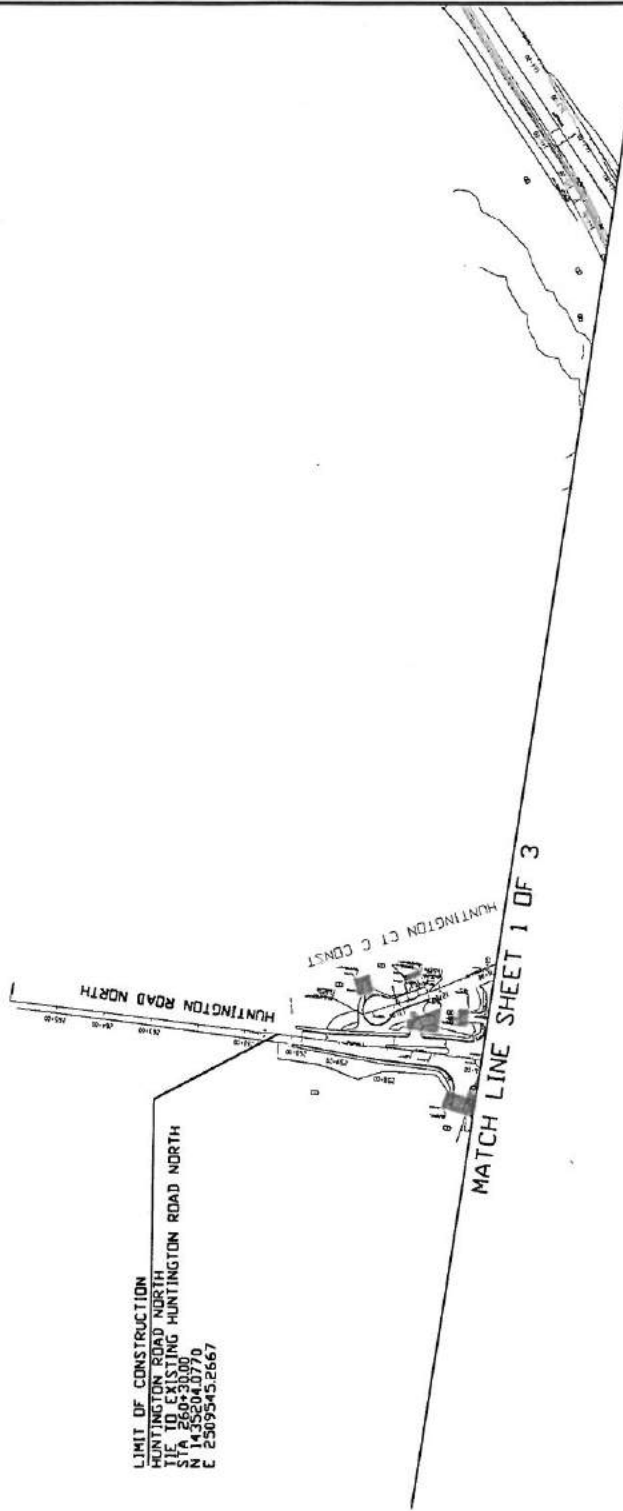
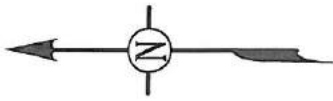
FIGURE 2 (SHEET 2 OF 3)
PROJECT ALIGNMENT MAP
US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10
LOOP INTERCHANGE
CLARKE COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2968A

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ATLANTA, GA 30340-4270



WILLMER ENGINEERING INC.

SCALE: 1" = 400'
DATE: 10/26/2009
DRAWN BY: MJW
REVIEWED BY: DK



LIMIT OF CONSTRUCTION
HUNTINGTON ROAD NORTH
TIE TO EXISTING HUNTINGTON ROAD NORTH
STA 260+30.00
N 14.35204,0.770
E 230.9545,2.667

SCALE: 1" = 400'

DATE: 10/26/2009

DRAWN BY: MJW

REVIEWED BY: DK

WILLMER ENGINEERING INC.



GEOTECHNICAL ENGINEERING - CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

GDOT PROJECT NUMBER
NH-000-0003-03(053)
PI No. 122890

FIGURE 2 (SHEET 3 OF 3)
PROJECT ALIGNMENT MAP
US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10
LOOP INTERCHANGE
CLARKE COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2968A

APPENDIX I

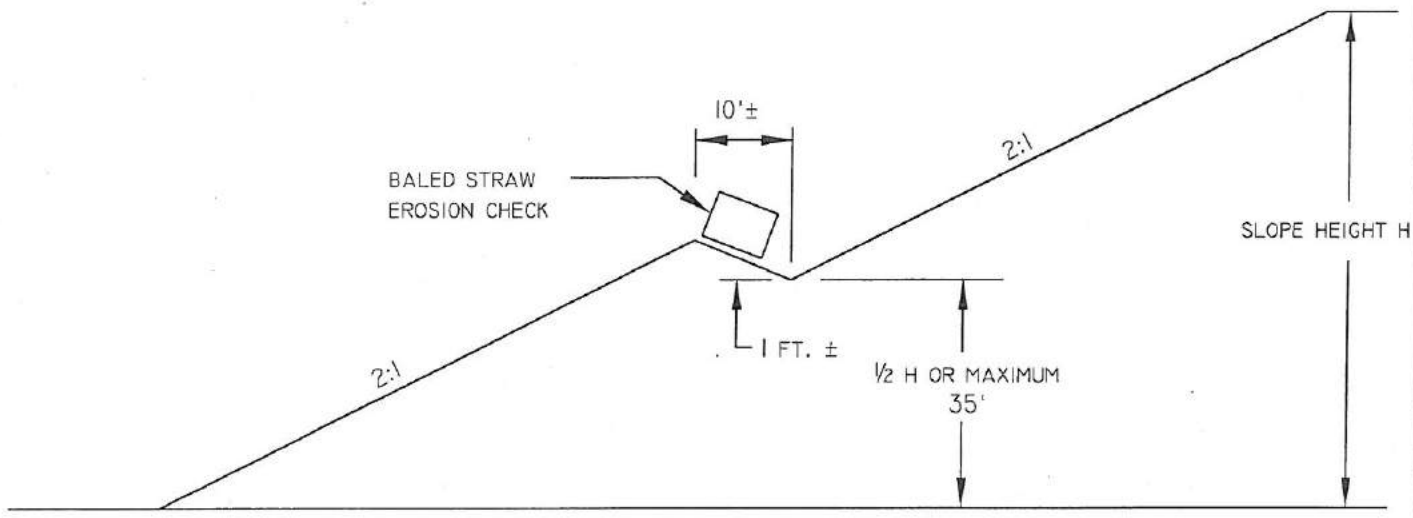
Pipe Culvert Material Alternates For Piedmont/Blue Ridge Region

TYPE OF PIPE INSTALLATION	C O N C R E T E	CORRUGATED STEEL AASHTO M-36		CORRU- GATED ALUMINUM AASHTO M-196	PLASTIC						
		ALUMINUM COATED (TYPE 2) CORR. STEEL	PLAIN ZINC COATED	PLAIN UNCOATED ALUMINUM	CORR. POLY- ETHYLENE AASHTO M-252	CORR. POLY- ETHYLENE SMOOTHED LINED AASHTO M-294 TYPE "S"	POLY VINYL CHLORIDE (PVC) PROFILE WALL AASHTO M-304	POLY VINYL CHLORIDE (PVC) CORRUGATED SMOOTH INTERIOR ASTM F-949			
LONGITUDINAL INTERSTATE AND TRAVEL BEARING	X										
LONGITUDINAL NON- INTERSTATE AND NON- TRAVEL BEARING	X	X		X		X	X	X			
S T O R M D R A I N	C R O S S D R A I N	GRADE ≤ 10%	ADT < 250	X	X	X		X	X	X	
			250 < ADT < 1,500	X	X*		X		X	X	X
			1,500 < ADT < 15,000	X					X	X	X
			ADT > 15,000	X							
	GRADE > 10%	ADT < 250		X	X	X		X	X	X	
		ADT > 250				X		X	X	X	
SIDE DRAIN	X	X	X	X		X	X	X			
PERMANENT SLOPE DRAIN		X	X	X		X	X	X			
PERFORATED UNDERDRAIN		X	X	X	X	X		X			

* This type pipe can be used if the addition of Type "B" Coating (AASHTO M-190, Half Bituminous Coated with Paved Invert) is utilized.

NOTES:

- 1 Allowable materials are indicated by an "X".
- 2 Structural requirements of storm drain pipe will be in accordance with Georgia Standard 1030-D or 1030-P, whichever is applicable, and the Standard Specifications.
- 3 Graded aggregate backfill shall be used in cross drain applications for all plastic pipes (AASHTO M-294, HDPE pipe; AASHTO M-304, PVC pipe; ASTM F-949, PVC pipe).
- 4 The Contractor shall provide additional storm sewer capacity calculations if a pipe material other than concrete is selected.
- 5 Pipe used under mechanically stabilized earth (MSE) walls, within MSE wall backfill, or within five feet of an MSE wall face shall be Class V Concrete Pipe.
- 6 Project specific pH and Resistivity values are entered into the respective boxes above to determine allowable pipe materials.



NOTES:

1. FOR SLOPE HEIGHTS LESS THAN 70 FT. BUT GREATER THAN 35 FT., A BERM SHOULD BE CONSTRUCTED AT APPROX. 1/2 THE SLOPE HEIGHT. FOR SLOPE HEIGHTS GREATER THAN 70 FT., CONSTRUCT A BERM EVERY 35 FT.
2. THE BERM SHOULD BE SLOPED TO DRAIN AND SHOULD BE CONNECTED TO CONCRETE FLUMES TO REMOVE WATER FROM SLOPE.
3. A DRAINAGE DITCH SHOULD BE CONSTRUCTED AT THE TOP OF CUT SLOPES WHERE WATER DRAINS TOWARDS SLOPE.

BERM DETAIL FOR CUTS OR FILLS OVER 35 FEET

GDOT PROJECT NUMBER
NH000-0003-03(053)
PI No. 122890

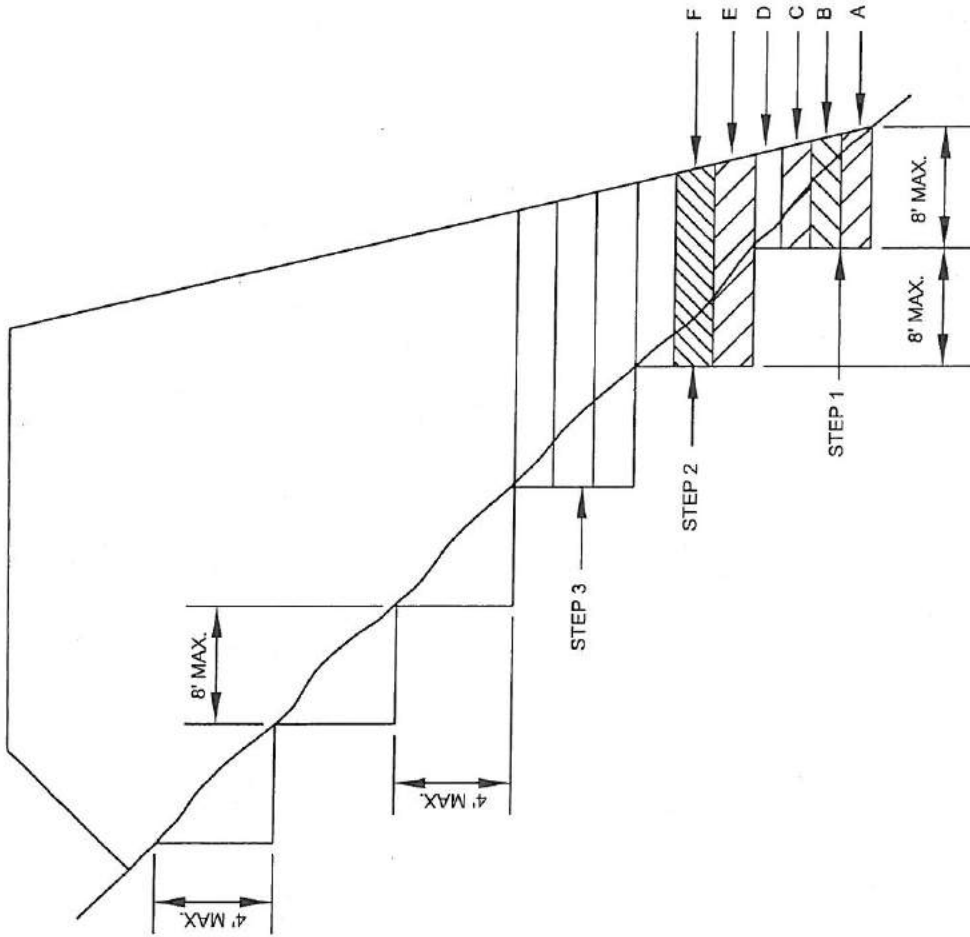
SCALE: NTS
DATE: 2/4/2010
DRAWN BY: MJW
REVIEWED BY: PZ



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BERM DETAIL
US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10 LOOP INTERCHANGE CLARKE COUNTY, GEORGIA WILLMER PROJECT No. ATL-171-2968

REVISED 9/29/2008



1. WHERE THE EMBANKMENT IS TO BE PLACED ON A HILLSIDE OR ANOTHER EXISTING EMBANKMENT HAVING A SLOPE OF 3 TO 1 OR STEEPER, THE FOUNDATION MUST BE BENCHED WHILE THE EMBANKMENT IS BEING CONSTRUCTED. (SEE DIAGRAM AT LEFT)
2. THE DIAGRAM SHOWS THAT BEFORE LAYER "A" IS PLACED, THE FIRST STEP (1) IS TO CUT INTO THE SLOPE A MAXIMUM DISTANCE OF ABOUT 8' (ABOUT 3/4 THE WIDTH OF THE TYPICAL D-8 BULLDOZER BLADE). SUCCESSIVE LAYERS B, C, AND D ARE THEN PLACED. BEFORE LAYER "E" IS PLACED, THE SECOND STEP IS TO CUT 8 FEET INTO THE SLOPE AND SUCCESSIVE LAYERS ARE AGAIN PLACED. IF IT IS ANTICIPATED THAT THE VERTICAL PART OF THE STEP WILL EXCEED 4' IF AN 8' HORIZONTAL CUT IS MADE, THEN THE ACTUAL CUT STOPS WHEN THE VERTICAL PART REACHES A MAXIMUM OF 4' ALLOWING THE HORIZONTAL DISTANCE TO VARY.
3. THE PROCESS OF BENCHING IS CONSIDERED INCIDENTAL TO THE ITEM OF UNCLASSIFIED EXCAVATION AND BORROW OR GRADING COMPLETE IN CONSTRUCTION OF THE EMBANKMENT AND NO ADDITIONAL MEASUREMENT OF QUANTITY OR PAYMENT WILL BE MADE FOR BENCHING.

BENCHING DETAIL

GDOT PROJECT NUMBER
NH000-0003-03(053)
PI No. 122890

BENCHING DETAIL

US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10 LOOP INTERCHANGE
CLARKE COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2968

GEOTECHNICAL ENGINEERING & CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270



WILLMER ENGINEERING INC.

SCALE: NTS
DATE: 9/25/2009
DRAWN BY: MJW
REVIEWED BY: DK

APPENDIX II

BORING RECORD LEGEND

SM, CL, etc. - GROUP SYMBOL based on Unified Soil Classification System.
(Refer to ASTM D-2488 and Table 1 of D-2487)

N-VALUE: BLOWS PER FOOT- Standard Penetration Resistance (SPT) blow count ,
the sum of the second and third 6-inch increments of the SPT test.
(Refer to ASTM D-1586)

CONSISTENCY / RELATIVE DENSITY Correlated with SPT Blow Count, N:

<u>SILTS AND CLAYS</u>		<u>SANDS</u>	
<u>N</u> (blows per foot)	<u>Consistency</u>	<u>N</u> (blows per foot)	<u>Relative Density</u>
0 - 2	Very Soft	0 - 4	Very Loose
3 - 4	Soft	5 - 10	Loose
5 - 8	Firm	11 - 30	Medium Dense
9 - 15	Stiff	31 - 50	Dense
16 - 30	Very Stiff	> 50	Very Dense
31 - 50	Hard		
> 50	Very Hard		

NOTES:

- Groundwater Measurements:
- Water level at time of backfilling
 - Water level at time of boring
 - Caved level at 24 hours

ASPHALT 	CONCRETE 	TOPSOIL 	FILL 	GW 	GP 	GM
GC 	SW 	SP 	SM 	SC 	SANDY SILT 	SANDY CLAY
ML 	MH 	CL-ML 	CL 	CH 	OL 	OH
PEAT 	PWR 	ROCK 				

UNIFIED SOIL CLASSIFICATION SYSTEM REFERENCE SHEET

MAJOR DIVISIONS		LETTER SYMBOL	TYPICAL DESCRIPTIONS
<p>COARSE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS LARGER THAN #200 SIEVE SIZE</p>	<p>GRAVEL AND GRAVELLY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION <u>RETAINED</u> #4 SIEVE</p>	<p>CLEAN GRAVELS LITTLE OR NO FINES</p>	<p>(GW) WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES</p>
		<p>CLEAN SAND LITTLE OR NO FINES</p>	<p>(GP) POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES</p>
		<p>GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES</p>	<p>(GM) SILTY GRAVELS and GRAVEL-SAND-SILT MIXTURES</p>
		<p>GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES</p>	<p>(GC) CLAYEY GRAVELS and GRAVEL-SAND-CLAY MIXTURES</p>
	<p>SAND AND SANDY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION <u>PASSING</u> #4 SIEVE</p>	<p>CLEAN SAND LITTLE OR NO FINES</p>	<p>(SW) WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES</p>
		<p>CLEAN SAND LITTLE OR NO FINES</p>	<p>(SP) POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES</p>
		<p>SANDS WITH FINES APPRECIABLE AMOUNT OF FINES</p>	<p>(SM) SILTY SANDS and SAND-SILT MIXTURES</p>
		<p>SANDS WITH FINES APPRECIABLE AMOUNT OF FINES</p>	<p>(SC) CLAYEY SANDS and SAND-CLAY MIXTURES</p>
<p>FINE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE</p>	<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT <u>LESS</u> THAN 50</p>	<p>(ML) INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR VERY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY</p>	
		<p>(CL) INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS</p>	
		<p>(OL) ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY</p>	
	<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT <u>GREATER</u> THAN 50</p>	<p>(MH) INORGANIC ELASTIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS</p>	
		<p>(CH) INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS</p>	
		<p>(OH) ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS</p>	
<p>HIGHLY ORGANIC SOILS</p>		<p>(PT) PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS</p>	

LIST OF ABBREVIATIONS

1. Abbreviations Used in Boring and Sample Numbering Systems:

SS	Soil Survey
LL	Left Lane
RL	Right Lane
LD	Left Ditch
RD	Right Ditch
SR	Side Road
CL	Center Line or Left End of Culvert
CR	Right End of Culvert

Example: SS-1-LL – Soil Survey Boring No. 1 located on the Left Lane of the proposed roadway.

2. Abbreviations Used in Sample Descriptions and Notes / Comments:

SPT	Standard Penetration Test
MC	Moisture Content
GAB	Graded Aggregate Base

3. Abbreviations Used in Side Road Descriptions:

CR	County Road
SR	State Road

Record of Soil Survey Borings
 US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053), PI No. 122890
 Willmer Engineering Project No. ATL-171-2968

Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
US 78/SR 10 (Atlanta Hwy)											
28+00	F	SS-1-LS	55		0-1"	Topsoil			--	5	
					1"-5'	Brown silty medium to fine SAND (micaceous)	SS-1-LS	II B3			
28+00	C	SS-1-RL		35	0-1"	Topsoil			--	6	
					1"-6'	Brown silty medium to fine SAND (micaceous)		II B3			Subsoil similar to SS-1-LS
33+00	C	SS-2-LL	40		0-1"	Topsoil			--	6	
					1"-6'	Tan, brown and reddish brown clayey medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-5-LL
33+00	C	SS-2-RL		50	0-1"	Topsoil			--	7	
					1"-7'	Tan and reddish brown clayey medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-5-LL
38+00	F	SS-3-LL	60		0-1"	Topsoil			--	5	
					1"-5'	Tan and reddish brown silty medium to fine SAND (micaceous)		II B3			Subsoil similar to SS-1-LS

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			Left	Right							
38+00	C	SS-3-RL		70	0-1"	Topsoil			--	6	MC @ 3'
					1"-6'	Orange brown medium to fine sandy SILT (micaceous)	SS-3-RL	III C2			
43+00	C	SS-4-LS	95		0-5'	Tan and brown silty medium to fine SAND (micaceous)		II B3	--	5	Subsoil similar to SS-1-LS
43+00	F	SS-4-RS		90	0-1"	Topsoil			--	5	
					1"-5'	Orange, tan and reddish brown clayey medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-5-LL
47+75	C	SS-5-LL	50		0-1"	Topsoil			--	5	MC @ 2'
					1"-5'	Brown clayey medium to fine SAND (micaceous)	SS-5-LL	II B4			
47+75	F	SS-5-RL		55	0-3"	Topsoil			--	5	
					3"-5'	Reddish brown medium to fine sandy CLAY (slightly micaceous)		II B4			Subsoil similar to SS-9-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
53+00	F	SS-6-LL	56		0-1" 1"-5'	Topsoil Brown silty medium to fine SAND (micaceous)		II B3	--	5	Subsoil similar to SS-1-LS
53+00	F	SS-6-RS		65	0-1" 1"-5'	Topsoil Tan clayey medium to fine SAND (micaceous)		II B4	--	5	Subsoil similar to SS-5-LL
58+00	F	SS-7-LL	55		0-1" 1"-5'	Topsoil Brown, reddish brown and tan clayey medium to fine SAND (micaceous)		II B4	--	5	Subsoil similar to SS-5-LL
58+20	F	SS-7-RL		65	0-1" 1"-5'	Topsoil Brown clayey medium to fine SAND (micaceous)	SS-7-RL	II B3	--	5	MC @ 2' Rock fragments @ 3'
63+15	C	SS-8-LL	40		0-1" 1"-5'	Topsoil Reddish brown medium to fine sandy CLAY with rock fragments (slightly micaceous)		II B4	--	5	Subsoil similar to SS-9-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
63+00	C	SS-8-RL		40	0-1" 1"-5'	Topsoil Reddish brown medium to fine sandy CLAY (slightly micaceous)		II B4	--	5	Subsoil similar to SS-9-LL
68+00	F	SS-9-LL	65		0-1" 1"-5'	Topsoil Brown medium to fine sandy CLAY (slightly micaceous)	SS-9-LL	II B4	--	5	MC @ 2'
68+00	F	SS-9-RS		75	0-1" 1"-5'	Topsoil Reddish brown medium to fine sandy CLAY (slightly micaceous)		II B4	--	5	Subsoil similar to SS-9-LL
SR 10 Loop											
136+00	C	SS-10-RL		45	0-6'	Reddish brown clayey medium to fine SAND (micaceous)	SS-10-RL	II B3	--	6	MC @ 3'
141+00	C	SS-11-LS	50		0-6'	Reddish brown clayey medium to fine SAND (micaceous)		II B3	--	6	Subsoil similar to SS-10-RL
141+00	C	SS-11-RD		85	0-8'	Tan medium to fine sandy SILT (micaceous)		III C2	--	8	Subsoil similar to SS-12-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
146+00	C	SS-12-LL	50		0-6'	Orange and light brown medium to fine sandy SILT (micaceous)	SS-12-LL	III C2	--	6	MC @ 3'
146+00	C	SS-12-RL		40	0-1"	Topsoil			--	6	
					1"-5'	Pink tan clayey medium to fine SAND (micaceous)		II B3			Subsoil similar to SS-10-RL
					5'-6'	White clayey medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-5-LL
151+10	F	SS-13-LL	50		0-1"	Topsoil			--	5	
					1"-5'	Brown medium to fine sandy SILT with rock fragments (micaceous)		III C2			Subsoil similar to SS-12-LL
151+00	C	SS-13-RL		55	0-1"	Topsoil			--	6	
					1"-6'	Brown medium to fine sandy SILT with rock fragments (micaceous)		III C2			Subsoil similar to SS-12-LL
153+50	C	-		80	0-1"	Topsoil			--	10	Offset boring
					1"-10'	Light brown silty medium to fine SAND	SS-14-RD	II B3			

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
154+00	C	-		100	0-1"	(micaceous) Topsoil			--	1.5	Auger refusal @ 1.5'
					1"-1.5'	Light brown silty medium to fine SAND (micaceous)		II B3			Offset boring similar to SS-14-RD
155+00	C	-		80	0-1"	Topsoil			--	4	Auger refusal @ 4'
					1"-4'	Light brown silty medium to fine SAND (micaceous)		II B3			Offset boring similar to SS-14-RD
155+00	C	-		90	0-1"	Topsoil			--	2	Auger refusal @ 2';
					1"-2'	Light brown silty medium to fine SAND (micaceous)		II B3			Offset boring similar to SS-14-RD
155+50	C	-		80	0-1"	Topsoil			--	1	Auger refusal @ 1'
					1"-1'	Light brown silty medium to fine SAND (micaceous)		II B3			Offset boring similar to SS-14-RD
156+00	C	SS-14-LL	50		0-6'	Tan and reddish brown medium to fine sandy		III C2	--	6	Subsoil similar to SS-12-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
156+00	C	SS-14-RD	90		0-1"	SILT					
					1"-2'	Topsoil			--	2	Auger refusal @ 2'
						Light brown clayey medium to fine SAND (micaceous)		II B3			Subsoil similar to SS-10-RL
156+00	C	SS-14A-RD	70		0-1"	Topsoil				4	Auger refusal @ 4';
					1"-4'	Light brown clayey medium to fine SAND (micaceous)		II B3	--		Subsoil similar to SS-10-RL
											Offset boring
163+00	C	SS-15-LL	60		0-6'	Brown clayey medium to fine SAND (micaceous)				6	Subsoil similar to SS-10-RL
								II B3	--		Offset boring
168+00	F	SS-16-LS	150		0-5'	Brown clayey medium to fine SAND (slightly micaceous)				5	MC @ 2'
								SS-16-LS			
168+00	C	SS-16-LL	55		0-6'	Reddish brown and brown clayey medium to fine SAND (micaceous)				6	Subsoil similar to SS-10-RL
								II B3	--		

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
169+00	F	SS-17-LS	190		0-7'	Tan clayey medium to fine SAND (micaceous)		II B3	--	7	Subsoil similar to SS-10-RL
173+00	F	SS-18-LS	130		0-3.5'	Reddish brown clayey medium to fine SAND (micaceous)		II B3	--	3.5	Subsoil similar to SS-18-LL
173+00	C	SS-18-LL	55		0-6"	Gravel			--	6	AR @ 3.5'
					6"-6'	Brown clayey medium to fine SAND (micaceous)	SS-18-LL	II B3			MC @ 3'
178+00	C	SS-19-LL	50		0-1"	Topsoil			--	4.5	
					1"-4.5'	Reddish brown and tan clayey medium to fine SAND (micaceous)		II B2			Subsoil similar to SS-20-LL
183+00	C	SS-20-LL	55		0-5'	Reddish brown clayey medium to fine SAND (micaceous)	SS-20-LL	II B2	--	5	Auger refusal @ 4.5'
											Rock visible in nearby cut
		Huntington Road South									
201+00	F	SS-21-LS	30		0-5'	Tan and reddish brown clayey medium to fine SAND (micaceous)		II B4	--	5	Subsoil similar to SS-5-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
201+00	F	SS-21-RS		30	0-5'	Brown silty medium to fine SAND (micaceous)	SS-21-RS	II B4	--	5	MC @ 2' Rock fragments @ 3'
206+00	F	SS-22-LL	45		0-1" 1"-5'	Topsoil Tan and reddish brown clayey medium to fine SAND (micaceous)		II B4	--	5	Subsoil similar to SS-5-LL
206+00	F	SS-22-RS		55	0-1" 1"-5'	Topsoil Tan and reddish brown silty coarse to fine SAND (micaceous)		IA2	--	5	Subsoil similar to SS-23-LL
Huntington Road North											
252+00	F	SS-23-LL	25		0-5'	Brown silty coarse to fine SAND (micaceous)	SS-23-LL	IA2	--	5	MC @ 2'
252+00	F	SS-23-RS		50	0-3'	Reddish brown silty coarse to fine SAND (micaceous)		IA2	--	3	Subsoil similar to SS-23-LL Auger refusal @ 3'
255+00	F			50	0-5'	Tan silty coarse to fine SAND		IA2	--	5	Subsoil similar to SS-23-LL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
257+00	F	SS-24-LS	50		0-1'	(slightly micaceous) Brown silty coarse to fine SAND (micaceous)		I A2	--	1	Offset boring Subsoil similar to SS-23-LL Auger refusal @ 1'
257+00	C	SS-24-RL		30	0-3'	Orange and tan silty coarse to fine SAND (micaceous)		I A2	--	3	Subsoil similar to SS-23-LL Auger refusal @ 3'
257+00	C	-		45	0-5'	Tan and reddish brown silty coarse to fine SAND (micaceous)		I A2	--	5	Subsoil similar to SS-23-LL Offset boring
258+00	C	-	25		0-5'	Tan and brown silty coarse to fine SAND (micaceous)		I A2	--	5	Subsoil similar to SS-23-LL Offset boring
258+00	C	-		25	0-5'	Tan and reddish brown silty coarse to fine SAND (micaceous)		I A2	--	5	Subsoil similar to SS-23-LL Offset boring
Jennings Mill Road											
305+00	C	SS-25-LS	30		0-1'	Topsoil					
					1"-6'	Reddish brown silty medium to fine SAND		II B4	--	6	Subsoil similar to SS-25-RS

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			Left	Right							
305+00	F	SS-25-RS		20	0-1"	(micaceous) Topsoil		II B4	--	6	MC @ 3'
					1"-6'	Brown silty medium to fine SAND (micaceous)	SS-25-RS				
307+00	C	SS-26-CL	0		0-6"	Topsoil			--	17	
					6"-17'	Tan and red silty medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-25-RS
312+00	C	SS-27-CL	0		0-6'	Brown medium to fine sandy CLAY (micaceous)	SS-27-CL		--	6	MC @ 3'
											Root fragments @ 4.5'
316+00	C	SS-28-CL	0		0-1"	Topsoil			--	9	
					1"-9'	Brown and reddish brown medium to fine sandy CLAY (slightly micaceous)		II B3			Subsoil similar to SS-27-CL
											Rock fragments @ 6'
											Auger refusal @ 9'
Ramp 1 (S.B. Entrance)											
129+00	F	SS-29-LL	5		0-3"	Topsoil			--	5	
					3"-1'	Brown silty medium to fine SAND		II B4			Subsoil similar to SS-31-CL

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Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
					1'-5'	Reddish brown silty medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-25-RS
Ramp 2 (N.B. Entrance)											
253+00	F	SS-30-CL	0		0-1"	Topsoil			--	5	
					1"-5'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4			Subsoil similar to SS-31-CL
258+00	C	SS-31-CL	0		0-1"	Topsoil				8	MC @ 5'
					1"-8'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4			
261+00	C	SS-32-CL	0		0-1"	Topsoil				7	
					1"-7'	Pink tan silty medium to fine SAND (micaceous)		III C1	--		Subsoil similar to SS-36-LS
261+00	C	SS-32-RD	40		0-1"	Topsoil			--	8	
					1"-8'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4			Subsoil similar to SS-31-CL

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			Left	Right							
Ramp 3 (N.B. Exit)											
120+00	C	SS-33-CL	0		0-1"	Topsoil			--	4.5	
					1"-4.5'	Reddish brown clayey medium to fine SAND with rock and root fragments (micaceous)		II B4			Subsoil similar to SS-34-LL Auger refusal @4.5'
120+00	F	SS-33-RS		60	0-1"	Topsoil			--	5	
					1"-5'	Tan and yellow silty medium to fine SAND (micaceous)		III C1			Subsoil similar to SS-36-LS
125+00	F	SS-34-CL	0		0-1'	Reddish brown silty medium to fine SAND (micaceous)		II B4	--	1	Subsoil similar to SS-25-RS Auger refusal @ 1'
125+00	F	SS-34-LL	5		0-7'	Brown clayey medium to fine SAND (micaceous)	SS-34-LL	II B4	--	7	MC @ 3'
130+00	F	SS-35-CL	0		0-1"	Topsoil			--	5	
					1"-5'	Tan silty medium to fine SAND (micaceous)		III C1			Subsoil similar to SS-36-LS
135+00	C	SS-36-LS	50		0-1"	Topsoil			--	12	MC @ 9'
					1"-12'	Brown silty medium to fine SAND	SS-36-LS	III C1			

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 - (iii) Cut or fill refers to the actual boring location.

Record of Soil Survey Borings
 US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053), PI No. 122890
 Willmer Engineering Project No. ATL-171-2968

Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
135+00	C	SS-36-RS		10	0-1"	(micaceous) Topsoil			--	7	
					1"-7'	Tan and reddish brown silty medium to fine SAND (micaceous)		III C1			Subsoil similar to SS-36-LS
140+00	F	SS-37-LL	25		0-1"	Topsoil			--	5	
					1"-5'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4			Subsoil similar to SS-31-CL
140+00	F	SS-37-RS		20	0-1"	Topsoil			--	4.5	
					1"-4.5'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4			Subsoil similar to SS-31-CL Auger Refusal @4.5'
Ramp 4 (S.B. Exit)											
129+00	C	SS-38-LS	70		0-4.5'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4	--	4.5	Subsoil similar to SS-31-CL Auger refusal @ 4.5'
129+00	C	SS-38-LL	.5		0-5'	Reddish brown medium to fine sandy CLAY (micaceous)		II B4	--	5	Subsoil similar to SS-31-CL Rock fragments @ 2'

Notes:
 (i) All offsets are from proposed construction centerline unless noted otherwise.
 (ii) All depths are from existing ground surface unless noted otherwise.
 (iii) Cut or fill refers to the actual boring location.

Record of Soil Survey Borings
 US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053), PI No. 122890
 Willmer Engineering Project No. ATL-171-2968

Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
132+00	C	SS-39-CL	0		0-13'	Tan, reddish brown and gray silty medium to fine SAND (micaceous)		III C1	--	13	Subsoil similar to SS-36-LS Auger refusal @ 13'
132+00	C	SS-39-LL	5		0-22'	Tan, reddish brown and gray silty medium to fine SAND (slightly micaceous)	SS-39-LL	III C1	--	22	MC @ 19'
137+00	C	SS-40-CL	0		0-6'	Tan silty medium to fine SAND (micaceous)		III C1	--	6	Subsoil similar to SS-39-LL
137+00	C	SS-40-RS		70	0-1" 1"-12'	Topsoil Reddish brown and tan clayey medium to fine SAND (micaceous)		II B3	--	12	Subsoil similar to SS-41-LL
142+00	C	SS-41-LL		10	0-1" 1"-6'	Topsoil Brown clayey medium to fine SAND (micaceous)	SS-41-LL	II B3	--	6	MC @ 3'
Ramp 5 (S.B. Entrance)											
556+00	F	SS-42-RL	0		0-5'	Tan and reddish brown silty medium to fine SAND (slightly micaceous)		III C1	--	5	Subsoil similar to SS-39-LL

Notes:
 (i) All offsets are from proposed construction centerline unless noted otherwise.
 (ii) All depths are from existing ground surface unless noted otherwise.
 (iii) Cut or fill refers to the actual boring location.

Record of Soil Survey Borings
 US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053), PI No. 122890
 Willmer Engineering Project No. ATL-171-2968

Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
556+00	C	SS-42-RD		10	0-10'	Reddish brown silty medium to fine SAND		II B4	--	10	Subsoil similar to SS-43-LD
561+00	C	SS-43-LD	85		0-1"	Topsoil			--	13	MC @ 10'
					1"-13'	Light brown silty medium to fine SAND (micaceous)	SS-43-LD	II B4			
561+00	F	SS-43-RL		10	0-1"	Topsoil			--	5	
					1"-5'	Tan silty medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-43-LD
Ramp 6 (N.B. Entrance)											
58+00	F	SS-44-LL	5		0-1"	Topsoil			--	5	
					1"-5'	Reddish brown clayey medium to fine SAND (micaceous)		II B4			Similar to SS-5-LL
Arrow Head Road											
502+00	C	SS-45-RS		15	0-1"	Topsoil			--	7	
					1"-7'	Reddish brown medium to fine sandy SILT (micaceous)		III C2			Subsoil similar to SS-3-RL

Notes:
 (i) All offsets are from proposed construction centerline unless noted otherwise.
 (ii) All depths are from existing ground surface unless noted otherwise.
 (iii) Cut or fill refers to the actual boring location.

Record of Soil Survey Borings
 US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 GDOT Project No. NH000-0003-03(053), PI No. 122890
 Willmer Engineering Project No. ATL-171-2968

Station	Cut (C) /Fill (F)	Boring No.	Offset (feet)		Depth	Soil Description	Sample No.	Soil Class	Water Table Depth (feet)	Boring Term. Depth (feet)	Notes / Comments
			Left	Right							
OLD Jennings Mill Road											
376+00	C	SS-46-RS		15	0-2"	Topsoil			--	14	
					2"-14'	Reddish brown and tan silty medium to fine SAND (micaceous)		II B4			Subsoil similar to SS-25-RS

- Notes:
- (i) All offsets are from proposed construction centerline unless noted otherwise.
 - (ii) All depths are from existing ground surface unless noted otherwise.
 - (iii) Cut or fill refers to the actual boring location.

Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange				HOLE No. D-1	
Location: Clarke County, Georgia				Sheet 1 of 1	
Project Number: 171-2968; GDOT Proj. # : NH000-0003-03(053); PI #: 122890				Location: Culvert	
Azimuth: --		Angle from Horizontal: 90	Surface Elevation (ft): 663.00	Station: 169+00, 170' Lt of CL (SR 10 Loop)	
Drilling Equipment: Hand Auger			Drilling Method: Manual		
Core Boxes: NA	Samples: 3	Overburden: NA	Rock: NA	Total Depth (ft): 7.0	
Logged By: DK			Date Logged: 8/26/09		

VERTICAL DEPTH	GRAPHIC LOG	SAMPLE TYPE	RCD%	ROD %	MATERIAL DESCRIPTION	ELEVATION (feet)	DYNAMIC CONE PENETRATION TEST DATA (blows/1.75 inch increment)					BLOWS/1.75 IN.
							5	10	20	40	60	
					TOPSOIL = 2 inches	663.0						
					RESIDUUM: Loose brown, tan and gray silty medium to fine SAND (micaceous)	662						
1												
2		DCP										8
3												
4		DCP										7
5												
6												
7		DCP										7
					Boring was terminated at 7 feet below the existing ground surface.							
					Groundwater was encountered at 1 foot below the existing ground surface at the time of boring.							

SAMPLER TYPE SS - Split Spoon NX - Rock Core, 2-1/8" ST - Shelby Tube CU - Cuttings NQ - Rock Core, 1-7/8" CT - Continuous Tube		DRILLING METHOD HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core DC - Driving Casing		Hole No. <p style="text-align: center; font-size: 1.2em;">D-1</p>
--	--	--	--	---

A&PLOG 2968 SS.GPJ 10/26/09

APPENDIX III

LIST OF ABBREVIATIONS

1. Abbreviations Used in Boring and Sample Numbering Systems:

SS	Soil Survey
LL	Left Lane
RL	Right Lane
LD	Left Ditch
RD	Right Ditch
SR	Side Road
CL	Center Line or Left End of Culvert
CR	Right End of Culvert

Example: SS-1-LL – Soil Survey Boring No. 1 located on the Left Lane of the proposed roadway.

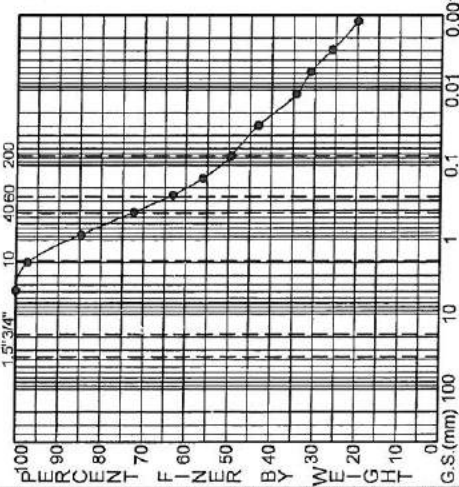
2. Abbreviations Used in Side Road Descriptions:

CR	County Road
SR	State Road

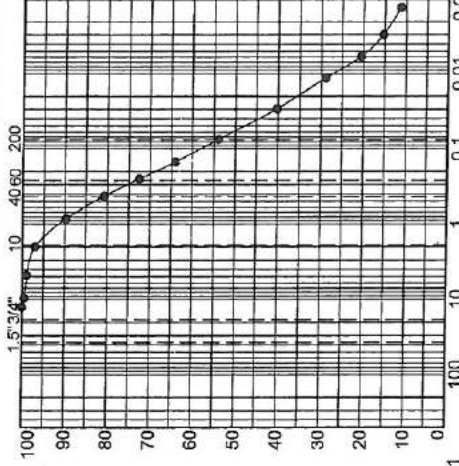
Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 Location: Clarke County, Georgia
 Supervisor: DK
 Prime Consultant: Heath & Lineback Engineers, Inc.
 Willmer Project No.: ATL-171-2968
 GDOT Project No.: NH000-0003-03(053), PI No. 122890



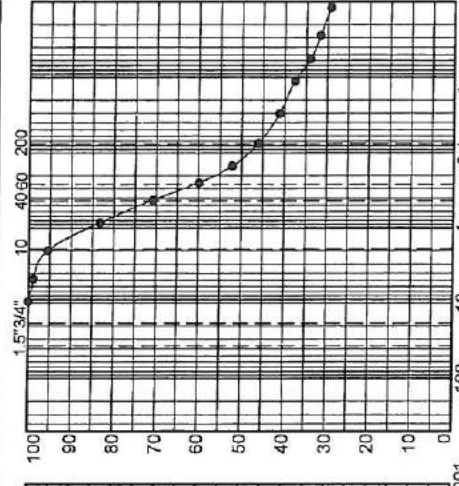
Station: 28+00, 55 ft Left of CL
 US 78/SR 10 (Atlanta Hwy)
 Sample No.: SS-1-LS (0-5 ft)
 Soil Desc.: Brown silty medium to fine SAND (micaceous)
 GDOT Soil Class: II B3



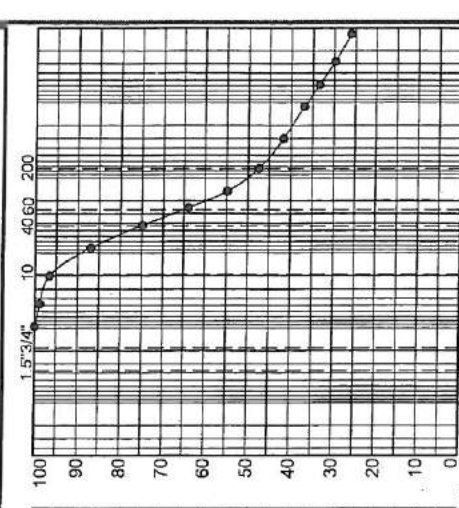
Station: 38+00, 70 ft Right of CL
 US 78/SR 10 (Atlanta Hwy)
 Sample No.: SS-3-RL (1-6 ft)
 Soil Desc.: Orange brown medium to fine sandy SILT (micaceous)
 GDOT Soil Class: III C2



Station: 48+00, 50 ft Left of CL
 US 78/SR 10 (Atlanta Hwy)
 Sample No.: SS-5-LL (0-5 ft)
 Soil Desc.: Brown clayey medium to fine SAND (micaceous)
 GDOT Soil Class: II B4



Station: 58+20, 65 ft Right of CL
 US 78/SR 10 (Atlanta Hwy)
 Sample No.: SS-7-RL (0-5 ft)
 Soil Desc.: Brown clayey medium to fine SAND (micaceous)
 GDOT Soil Class: II B3



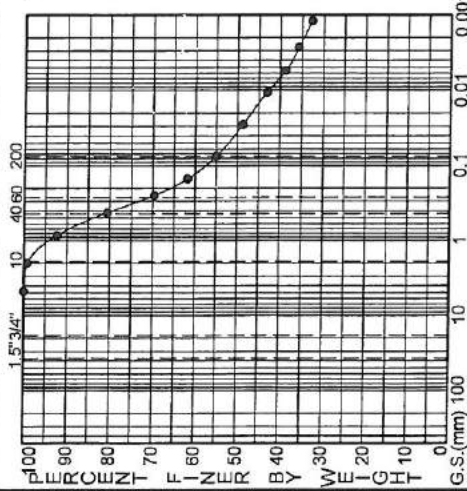
1.5" Sieve	100.0
3/4" Sieve	100.0
No. 10 Sieve	96.6
No. 40 Sieve	74.8
No. 60 Sieve	63.8
No. 200 Sieve	28.3
Clay Content (%)	28.3
Total Volume Change (%)	12.9
Swell (%)	9.8
Shrinkage (%)	3.1
Maximum Dry Density (pcf)	106.2
Opt. Moisture Content (%)	16.5
Nat. Moisture Content (%)	11.1
Liquid Limit (%)	---
Plasticity Index (%)	---
Erosion Index	4.29
Soil Support Value	---

Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 Location: Clarke County, Georgia
 Supervisor: DK
 Prime Consultant: Heath & Lineback Engineers, Inc.
 Willmer Project No.: ATL-171-2968
 GDOT Project No.: NH000-0003-03(053), PI No. 122890



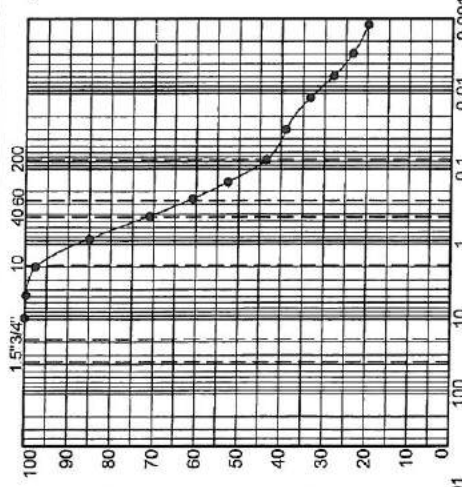
Station: 68+00, 65 ft Left of CL
 US 78/SR 10 (Atlanta Hwy)
 Sample No.: SS-9-LL (0-5 ft)
 Soil Desc.: Brown medium to fine sandy
 CLAY (slightly micaceous)

GDOT Soil Class: II B4



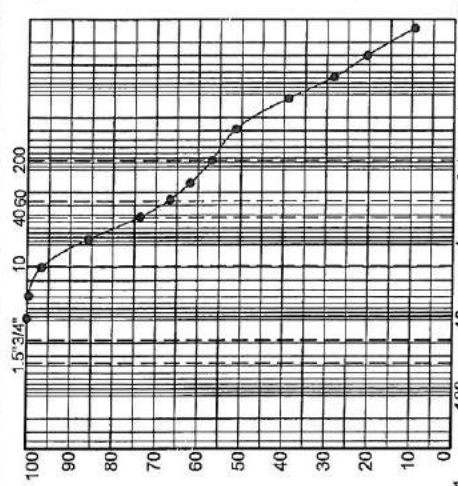
Station: 136+00, 45 ft Right of CL
 SR 10 Loop
 Sample No.: SS-10-RL (1-6 ft)
 Soil Desc.: Reddish brown clayey medium to
 fine SAND (micaceous)

GDOT Soil Class: II B3



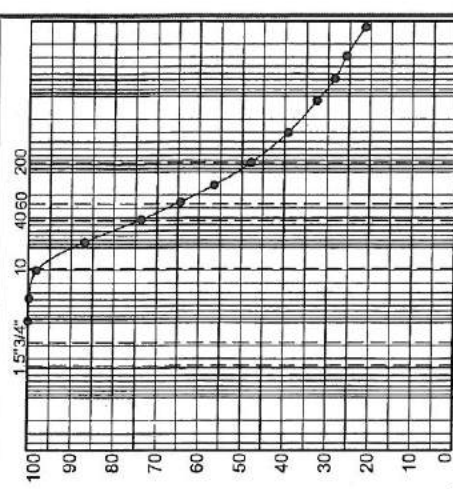
Station: 146+00, 50 ft Left of CL
 SR 10 Loop
 Sample No.: SS-12-LL (1-6 ft)
 Soil Desc.: Orange and light brown medium
 to fine sandy SILT (micaceous)

GDOT Soil Class: III C2



Station: 153+50, 80 ft Right of CL
 SR 10 Loop
 Sample No.: SS-14-RD (5-10 ft)
 Soil Desc.: Light brown silty medium to fine
 SAND (micaceous)

GDOT Soil Class: II B3



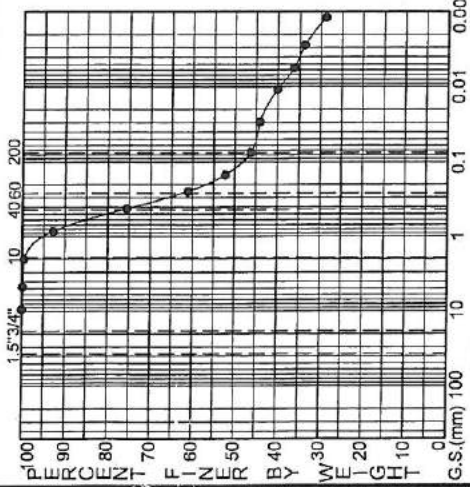
Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 Location: Clarke County, Georgia
 Supervisor: DK
 Prime Consultant: Heath & Lineback Engineers, Inc.
 Willmer Project No.: ATL-171-2968
 GDOT Project No.: NH000-0003-03(053), PI No. 122890



Station: 168+00, 150 ft Left of CL
 SR 10 Loop
 Sample No.: SS-16-LS (0-5 ft)

Soil Desc.: Brown clayey medium to fine SAND (slightly micaceous)

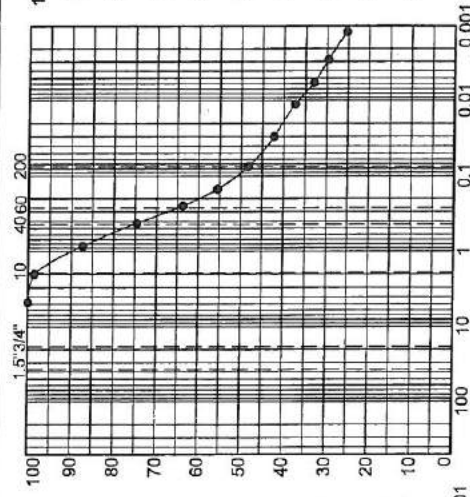
GDOT Soil Class: II B3



Station: 173+00, 55 ft Left of CL
 SR 10 Loop
 Sample No.: SS-18-LL (1-6 ft)

Soil Desc.: Brown clayey medium to fine SAND (micaceous)

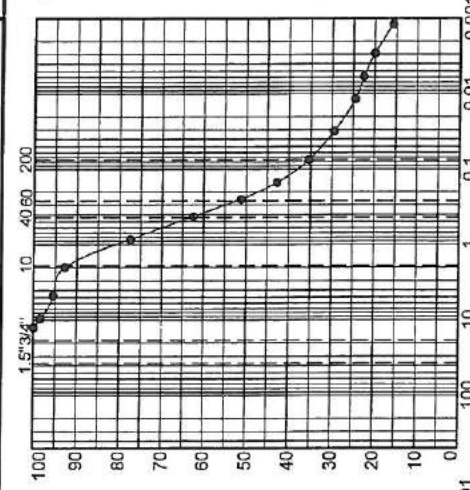
GDOT Soil Class: II B3



Station: 183+00, 55 ft Left of CL
 SR 10 Loop
 Sample No.: SS-20-LL (0-5 ft)

Soil Desc.: Reddish brown clayey medium to fine SAND (micaceous)

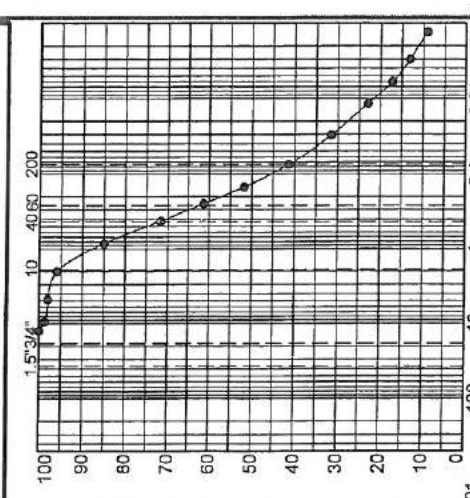
GDOT Soil Class: II B2



Station: 201+00, 30 ft Right of CL
 Huntington Road South
 Sample No.: SS-21-RS (0-5 ft)

Soil Desc.: Brown silty medium to fine SAND (micaceous)

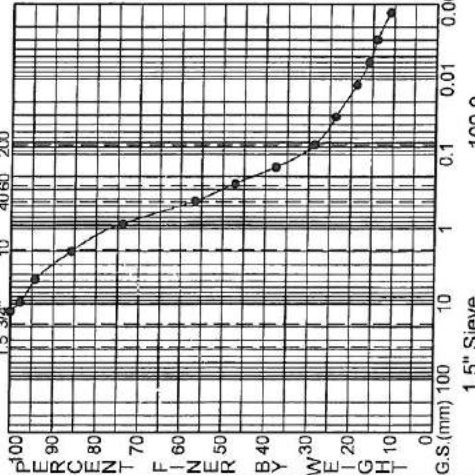
GDOT Soil Class: II B4



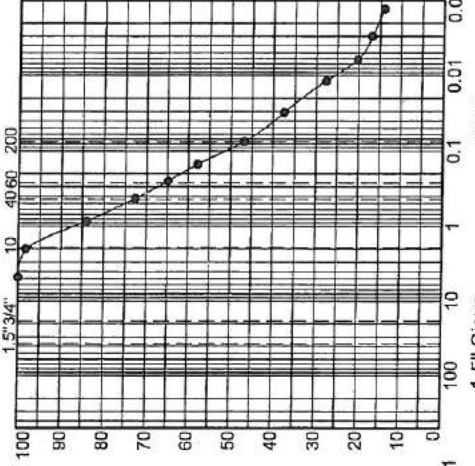
Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 Location: Clarke County, Georgia
 Supervisor: DK
 Prime Consultant: Heath & Lineback Engineers, Inc.
 Willmer Project No.: ATL-171-2968
 GDOT Project No.: NH000-0003-03(053), PI No. 122890



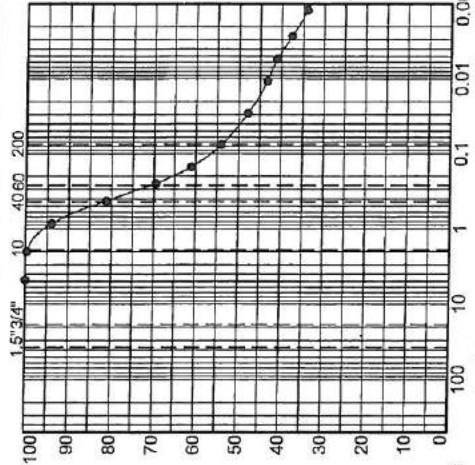
Station: 252+00, CL
 Huntington Road North
 Sample No.: SS-23-LL (0-5 ft)
 Soil Desc.: Brown silty coarse to fine SAND (micaceous)
 GDOT Soil Class: I A2



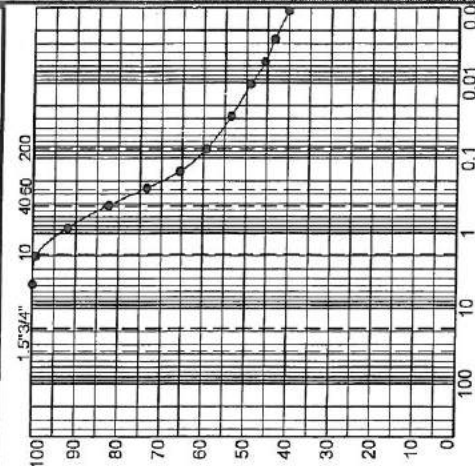
Station: 305+00, 20 ft Right of CL
 Jennings Mill Road
 Sample No.: SS-25-RS (1-6 ft)
 Soil Desc.: Brown silty medium to fine SAND (micaceous)
 GDOT Soil Class: II B4



Station: 312+00, CL
 Jennings Mill Road
 Sample No.: SS-27-CL (1-6 ft)
 Soil Desc.: Brown medium to fine sandy CLAY (micaceous)
 GDOT Soil Class: II B3



Station: 258+00, CL
 Ramp 2 (N.B. Entrance)
 Sample No.: SS-31-CL (3-8 ft)
 Soil Desc.: Reddish brown medium to fine sandy CLAY (micaceous)
 GDOT Soil Class: II B4



Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
 Location: Clarke County, Georgia
 Supervisor: DK

Prime Consultant: Heath & Lineback Engineers, Inc.
 Willmer Project No.: ATL-171-2968
 GDOT Project No.: NH000-0003-03(053), PI No. 122890

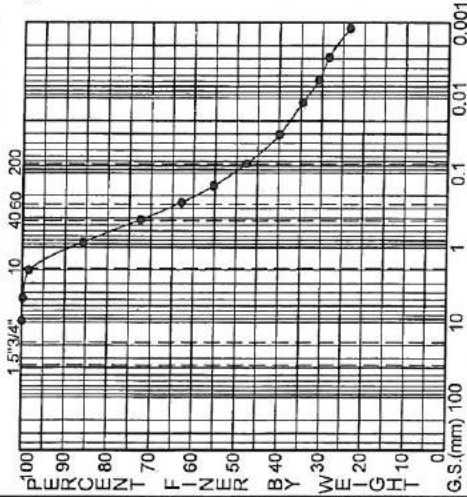


WILLMER ENGINEERING INC.

Station: 125+00, 5 ft Left of CL
 Ramp 3 (N.B Exit)
 Sample No.: SS-34-CL (0-7 ft)

Soil Desc.: Brown clayey medium to fine SAND (micaceous)

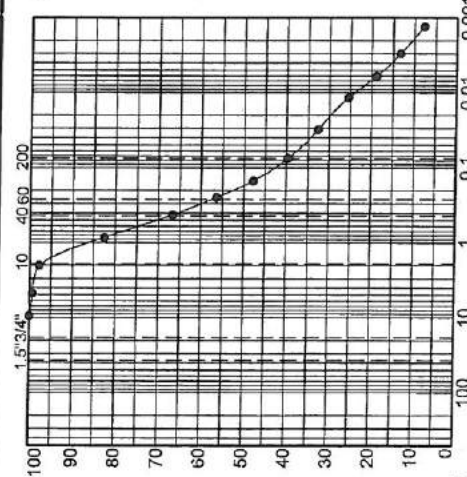
GDOT Soil Class: II B4



Station: 135+00, 45 ft Left of CL
 Ramp 3 (N.B Exit)
 Sample No.: SS-36-LS (7-12 ft)

Soil Desc.: Brown silty medium to fine SAND (micaceous)

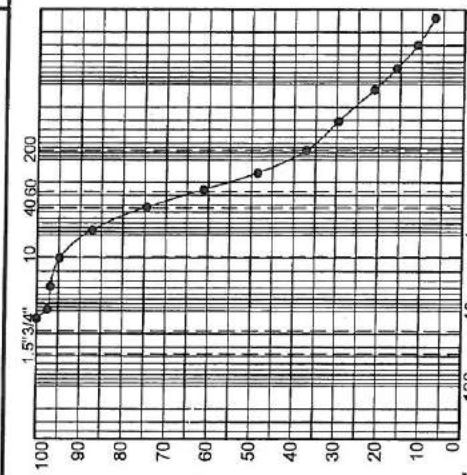
GDOT Soil Class: III C1



Station: 132+00, 5 ft Left of CL
 Ramp 4 (S.B. Exit)
 Sample No.: SS-39-LL (17-22 ft)

Soil Desc.: Light brown silty medium to fine SAND (micaceous)

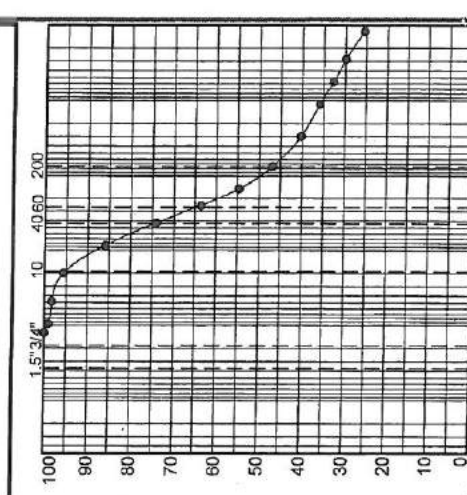
GDOT Soil Class: III C1



Station: 142+00, 10 ft Right of CL
 Ramp 4 (S.B. Exit)
 Sample No.: SS-41-LL (1-6 ft)

Soil Desc.: Brown clayey medium to fine SAND (micaceous)

GDOT Soil Class: II B3



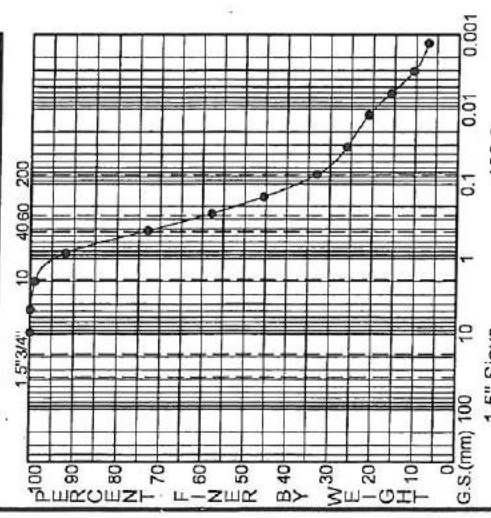


WILLMER ENGINEERING INC.

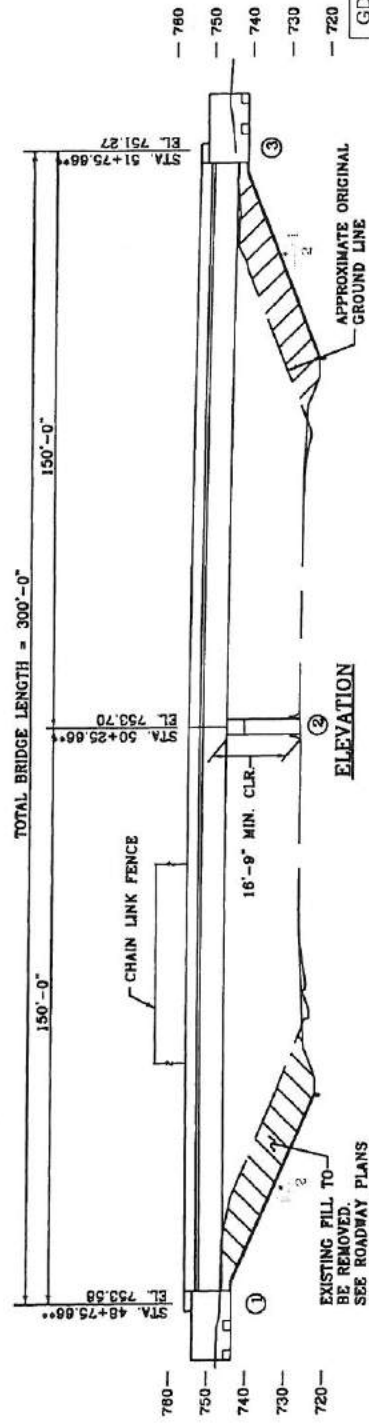
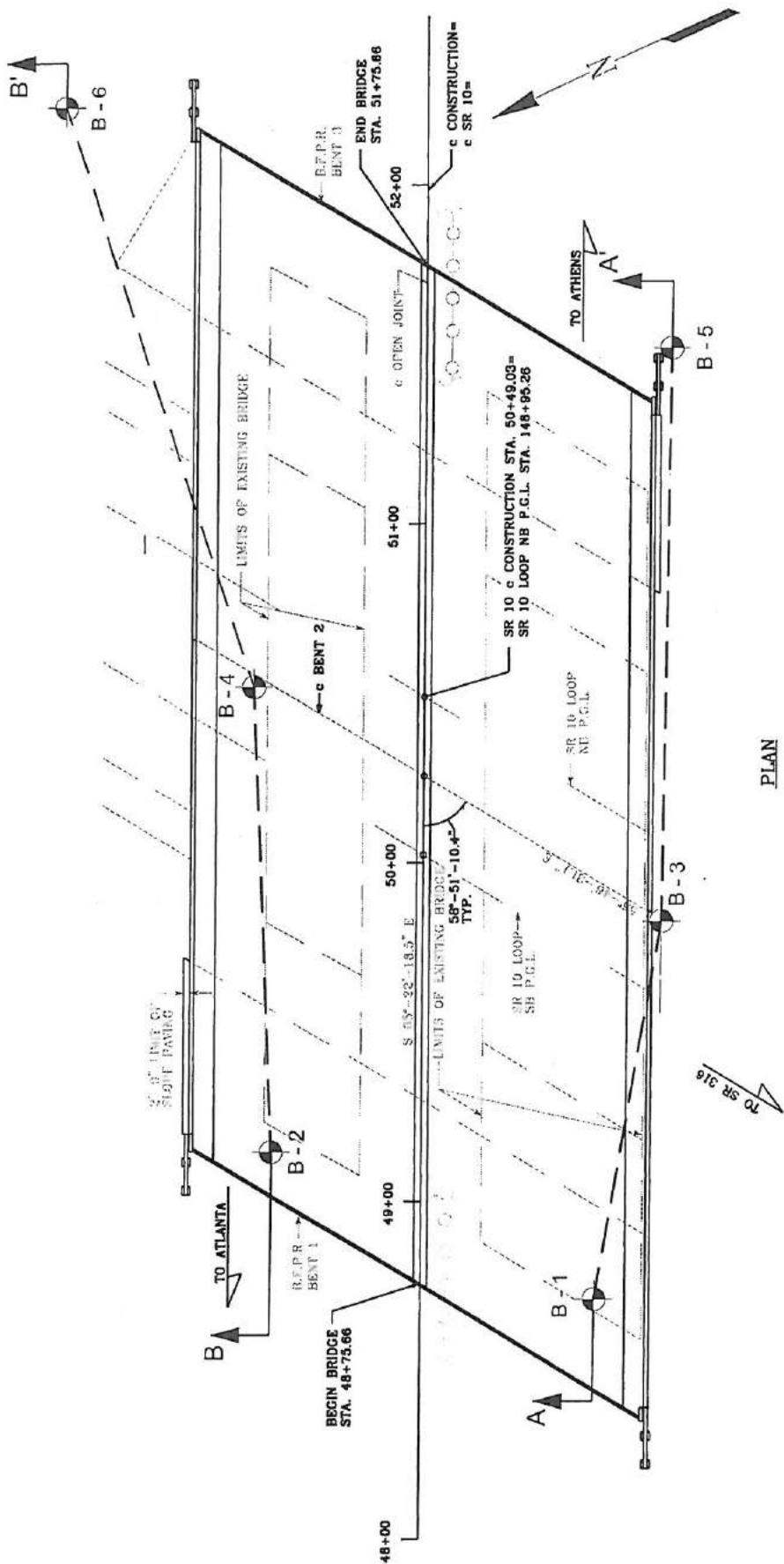
Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange
Location: Clarke County, Georgia
Supervisor: DK
Prime Consultant: Heath & Lineback Engineers, Inc.
Willmer Project No.: ATL-171-2968
GDOT Project No.: NH000-0003-03(053), PI No. 122890

Station: 561+00, 85 ft Left of CL
Ramp 5 (S.B. Entrance)
Sample No.: SS-43-LD (8-13 ft)
Soil Desc.: Light brown silty medium to fine SAND (micaceous)

GDOT Soil Class: II B4



APPENDIX IV



LEGEND:
 B - 1 BORING LOCATION

GDOT PROJECT NUMBER	NH000-0003-03(053)
PI No.	122890

FIGURE 2
 BORING LOCATION PLAN
 US 78/SR 10 (ATLANTA HIGHWAY) AT SR 10
 LOOP INTERCHANGE
 CLARKE COUNTY, GEORGIA
 WILLMER PROJECT No. ATL-171-2968A

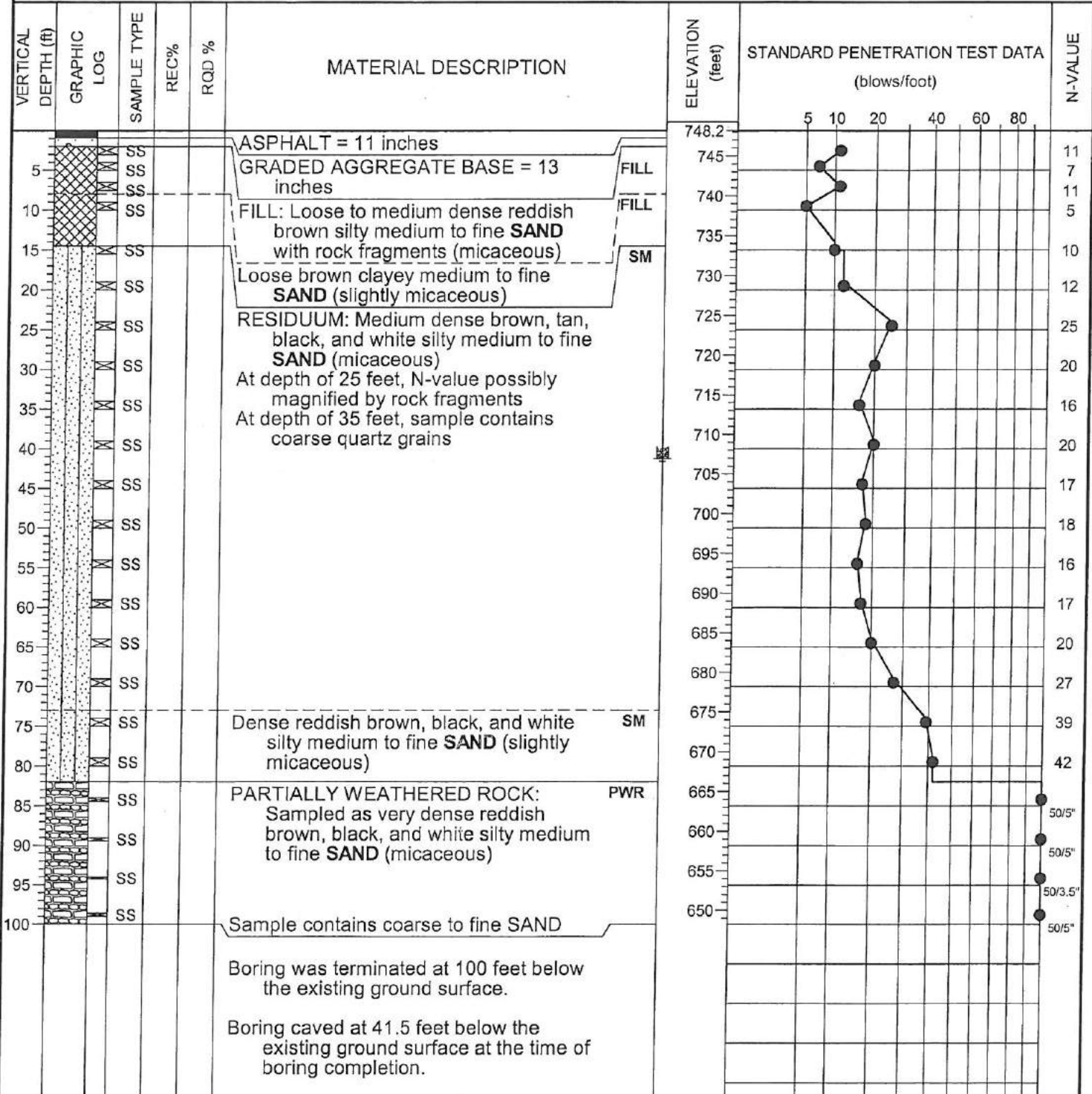
GEOTECHNICAL ENGINEERING - CONSTRUCTION SERVICES
 ENVIRONMENTAL SERVICES AND ENGINEERING
 3172 PLEASANTDALE ROAD - SUITE 165
 ATLANTA, GA 30340-4270



WILLMER ENGINEERING INC.

SCALE:	1" = 50'
DATE:	10/26/2009
DRAWN BY:	MJW
REVIEWED BY:	DK

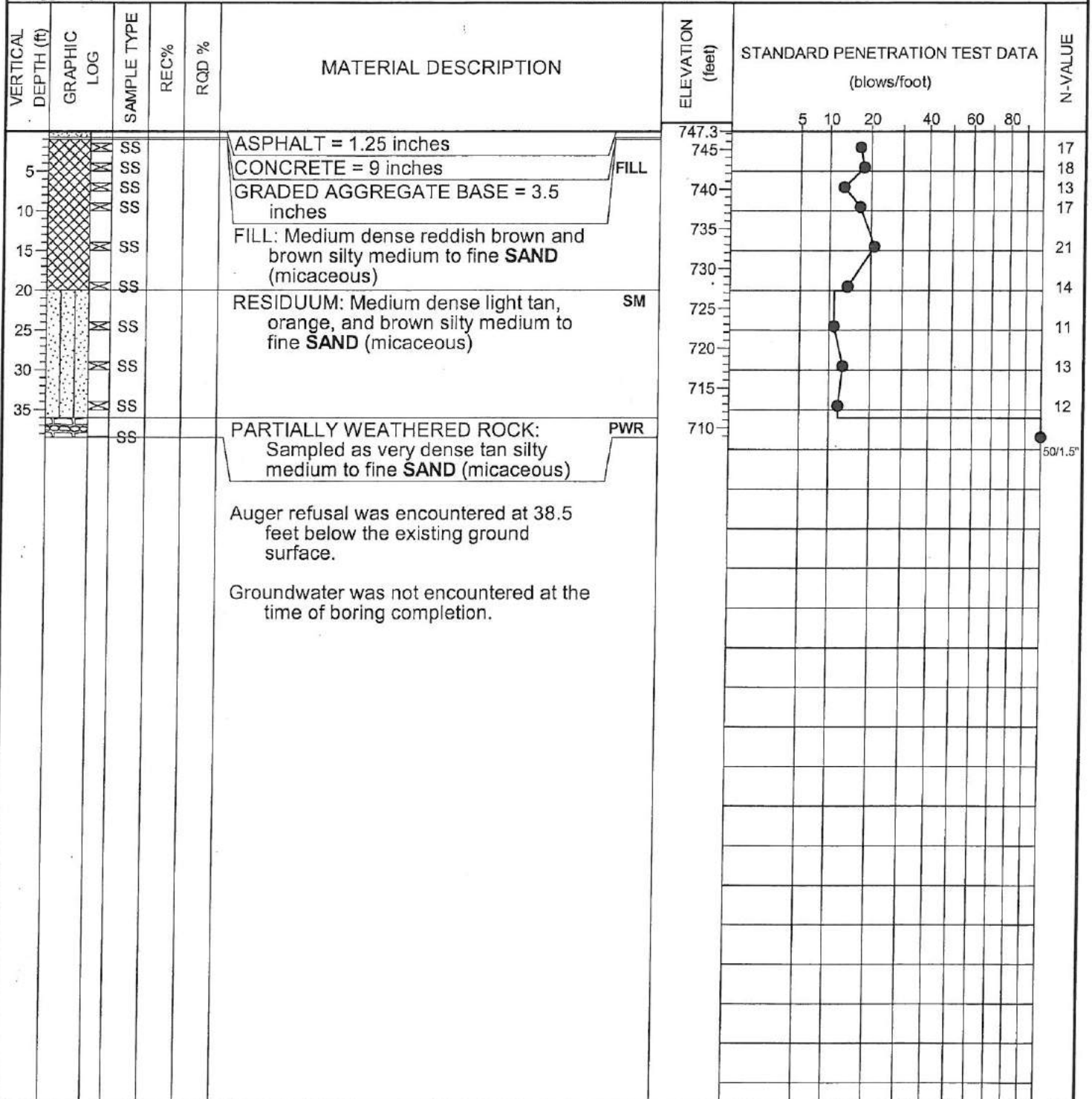
Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange		HOLE No. B-1	
Location: Clarke County, Georgia		Sheet 1 of 1	
Project Number: 171-2968A; GDOT Proj. No. NH000-0003-03-(053), PI No. 122890		Location: Bent 1 (See Figure 2)	
Azimuth: --	Angle from Horizontal: 90	Surface Elevation (ft): 748.20	Station: 48+71, 51' Rt of CL
Drilling Equipment: CME 550		Drilling Method: HSA-Auto Hammer	
Core Boxes: NA	Samples: 22	Overburden (ft): NA	Rock (ft): NA
Logged By: CO		Date Drilled: 7/1/09	
Total Depth (ft): 100.0			



SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	RW - Rotary Wash RC - Rock Core
Boring was terminated at 100 feet below the existing ground surface. Boring caved at 41.5 feet below the existing ground surface at the time of boring completion.			Hole No. B-1

SPTN 171-2968A GPJ 9/25/09

Project: US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange				HOLE No. B-2	
Location: Clarke County, Georgia				Sheet 1 of 1	
Project Number: 171-2968A; GDOT Proj. No. NH000-0003-03-(053), PI No. 122890				Location: Bent 2 (See Figure 2)	
Azimuth: --		Angle from Horizontal: 90	Surface Elevation (ft): 747.3	Station: 49+16, 44' Lt of CL	
Drilling Equipment: CME 550			Drilling Method: HSA-Auto Hammer		
Core Boxes: NA	Samples: 10	Overburden (ft): 38.5	Rock (ft): NA	Total Depth (ft): 38.5	
Logged By: CO			Date Drilled: 7/1/09		



Auger refusal was encountered at 38.5 feet below the existing ground surface.

Groundwater was not encountered at the time of boring completion.

SFTN 171-2968A.GPJ 8/3/09

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	DRILLING METHOD RW - Rotary Wash RC - Rock Core	Hole No. <p style="text-align: center; font-size: 1.2em;">B-2</p>
---	--	--	---

HOLE No. B-5

Sheet 1 of 1

Project: **US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange**

Location: **Clarke County, Georgia**

Project Number: **171-2968A; GDOT Proj. No. NH000-0003-03-(053), PI No. 122890**

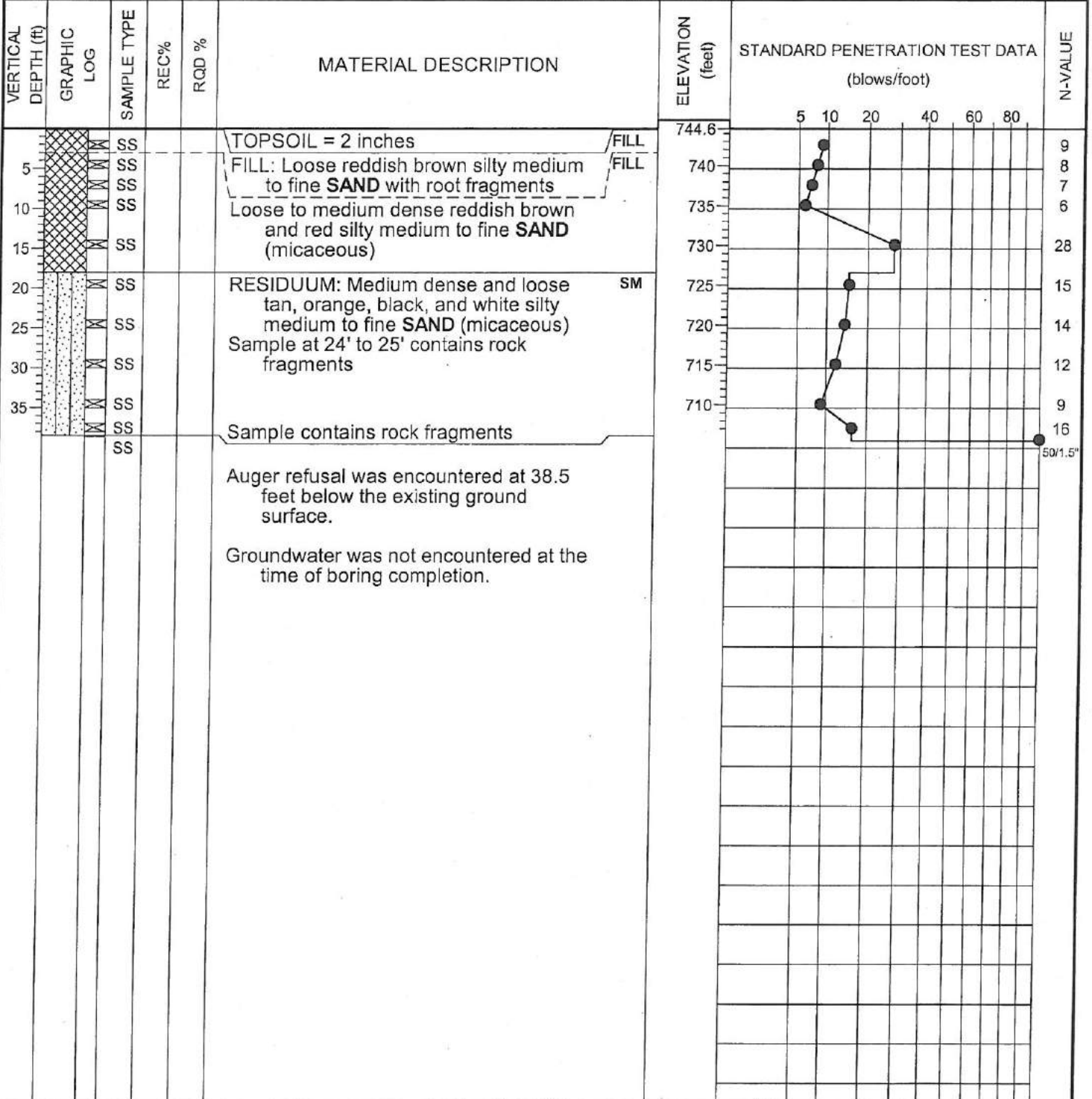
Location: **Bent 5 (See Figure 2)**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **744.60** Station: **51+54, 72' Rt of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA-Auto Hammer**

Core Boxes: **NA** Samples: **11** Overburden (ft): **38.5** Rock (ft): **NA** Total Depth (ft): **38.5**

Logged By: **CO** Date Drilled: **6/25/09**



SPTN 171-2968A.GPJ 9/25/09

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8" NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing RW - Rotary Wash RC - Rock Core		Hole No. <p style="text-align: center;">B-5</p>
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Project: **US 78/SR 10 (Atlanta Highway) at SR 10 Loop Interchange**
 Location: **Clarke County, Georgia**
 Project Number: **171-2968A; GDOT Proj. No. NH000-0003-03-(053), PI No. 122890**

HOLE No. B-6

Sheet 1 of 1

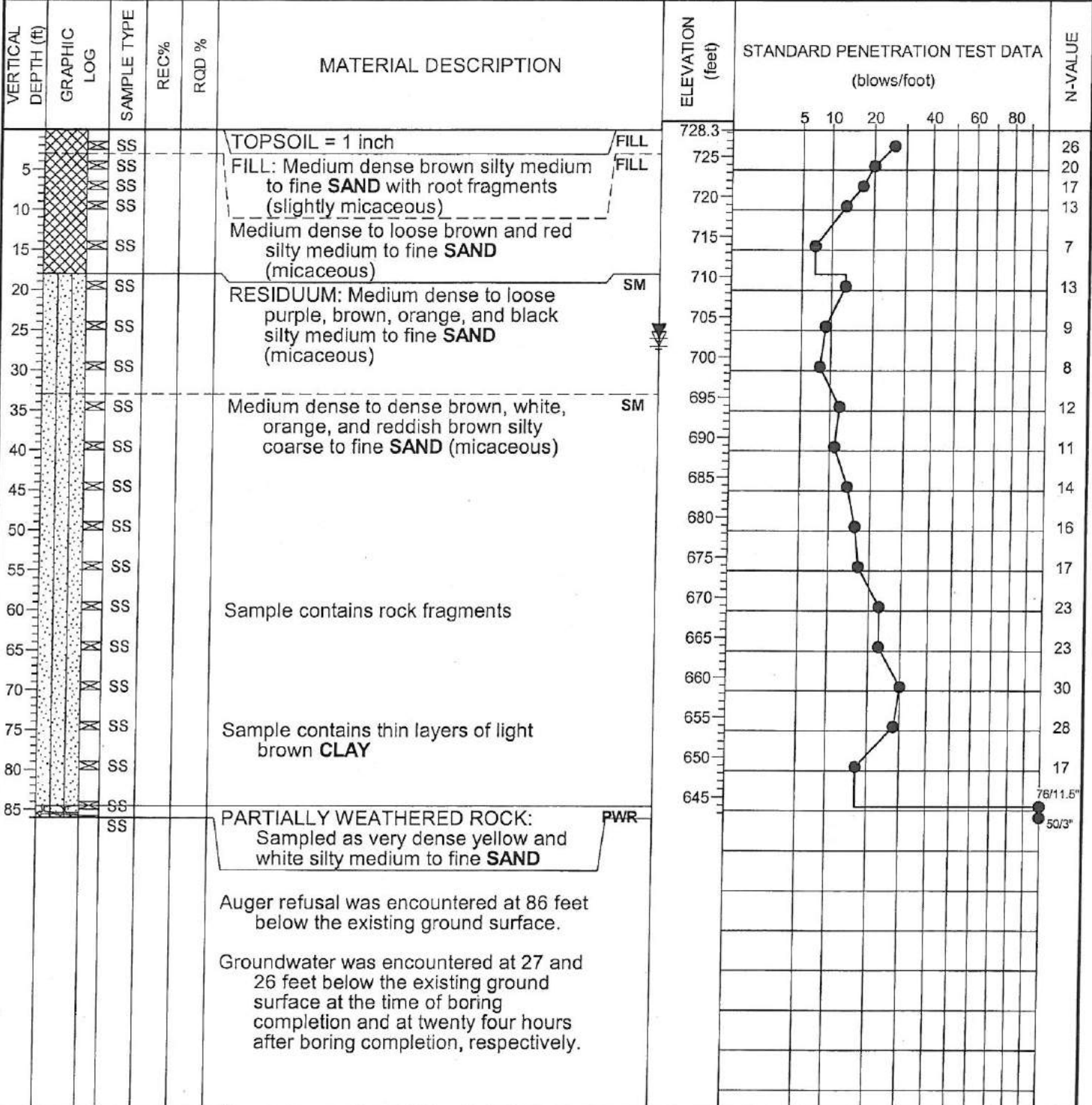
Location: **Bent 6 (See Figure 2)**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **728.30** Station: **52+25, 106' Lt of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA-Auto Hammer**

Core Boxes: **NA** Samples: **20** Overburden (ft): **86** Rock (ft): **NA** Total Depth (ft): **86.0**

Logged By: **CO** Date Drilled: **6/25/09**



SPTN 171-2968A.GPJ 9/25/09

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8" NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube		DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing RW - Rotary Wash RC - Rock Core		Hole No. B-6
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