Moreland Altobelli Associates, Inc.

SOIL SURVEY SUMMARY

Prepared For

Sigman Road Widening and Improvement
(From Lester Road to Irwin Bridge Road)

Rockdale County, Georgia

P.I.No. 0013163

MAAI Project No. ROCK1203/GEO
March 28, 2016
(Revised May 5th, 2016)

SOIL SURVEY SUMMARY

Sigman Road Widening and Improvement
(From Lester Road to Irwin Bridge Road)
Rockdale County, Georgia
P.I.No. 0013163

1. Location / Description

This project is for the widening and improvement construction of Sigman Road. The project begins at Station 1100+00 east of Lester road and continues east to Station 1160+00 at Irwin Bridge road, approximately 1.14 miles in total length. The project lies northwest the city limits of Conyers in Rockdale County.

2. Geology

This project will be geologically sited in the Granitic Gneiss undifferentiated (Precambrian-Paleozoic) Formation of the Georgia Piedmont Region.

3. Rock

Hard rock outcrops were observed above grade at the following locations, blasting may be required to remove.

Station to Station	**Location**
1118+50+/- to 1121+00+/-	Right
1119+00+/- to 1122+00+/-	Left
1128+50+/- to 1131+00+/-	Right

Additionally, rock in the form of boulders and/or rock layers, which may be removed by heavy equipment and/ or light blasting, was encountered on this project. We estimate that this material will be encountered at the following locations:

Station to Station	**Location**
1140+50+/- to 1146+00+/-	Right

4. Removal

The soils near the proposed grade in the following areas were found to have in-place moisture contents far above the optimum moisture contents. This condition has the potential to cause severe pumping problems during subgrade and base construction. After excavation in these areas is complete, we recommend that 24 inches of subgrade soils beneath the pavement and shoulders be removed and either dried out and replaced, or replaced with drier soils:

Station to Station	***Location***
1110+00+/- to 1111+00+/-	Left

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

5. Subgrade Materials

No additional subgrade material will be required for this project.

6. Pavement Design Values

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

Soil Support Value =	2.5
Regional Factor =	1.6
Subgrade Reaction, k =	130 pci

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

7. Ditch Lining

USCS soil classification tests were performed for representative samples at stations 1105+00, 1140+00 and 1155+00, we recommend the following average values for use in the ditch lining calculations for this project:

Plasticity Index, PI =	14
D75 (mm) =	0.585
Unified Soils Classification System (USCS) =	SC

8. Slopes

Maximum 2:1 slopes will be safe for this project.

9. Groundwater

Groundwater was not encountered at locations of subsurface borings on the project at the time of the investigation.

However, a low wet area was encountered on this project. Ditching will be required prior to construction of the embankment in the following areas/area:

Station to Station	**Location**
1115+50+/- to 1118+00+/-	Left

If these areas are inundated and it is not feasible to drain them during construction, a mat of rock embankment should be placed to a height of 18 inches above the water level prior to placing normal fills.

10. Shrinkage

We recommend an average shrinkage factor of 25% for use in the earthwork calculations for this project.

11. Rock Swell

We recommend the use of an average swell factor of 25% for material shown as hard rock.

12. 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.

13. Corrosion

Reference should be made to the attached "Pipe Culvert Material Alternates" chart for materials allowable by the Laboratory corrosion test.

14. 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 detail.

15. Pavement Design

We recommend the use of a minimum 10 inches of graded aggregate base in the pavement section for this project due to subgrade soils of low soil support values. However, this depth of base material may be slightly reduced on side streets with low-volume traffic.

16. Special Problems

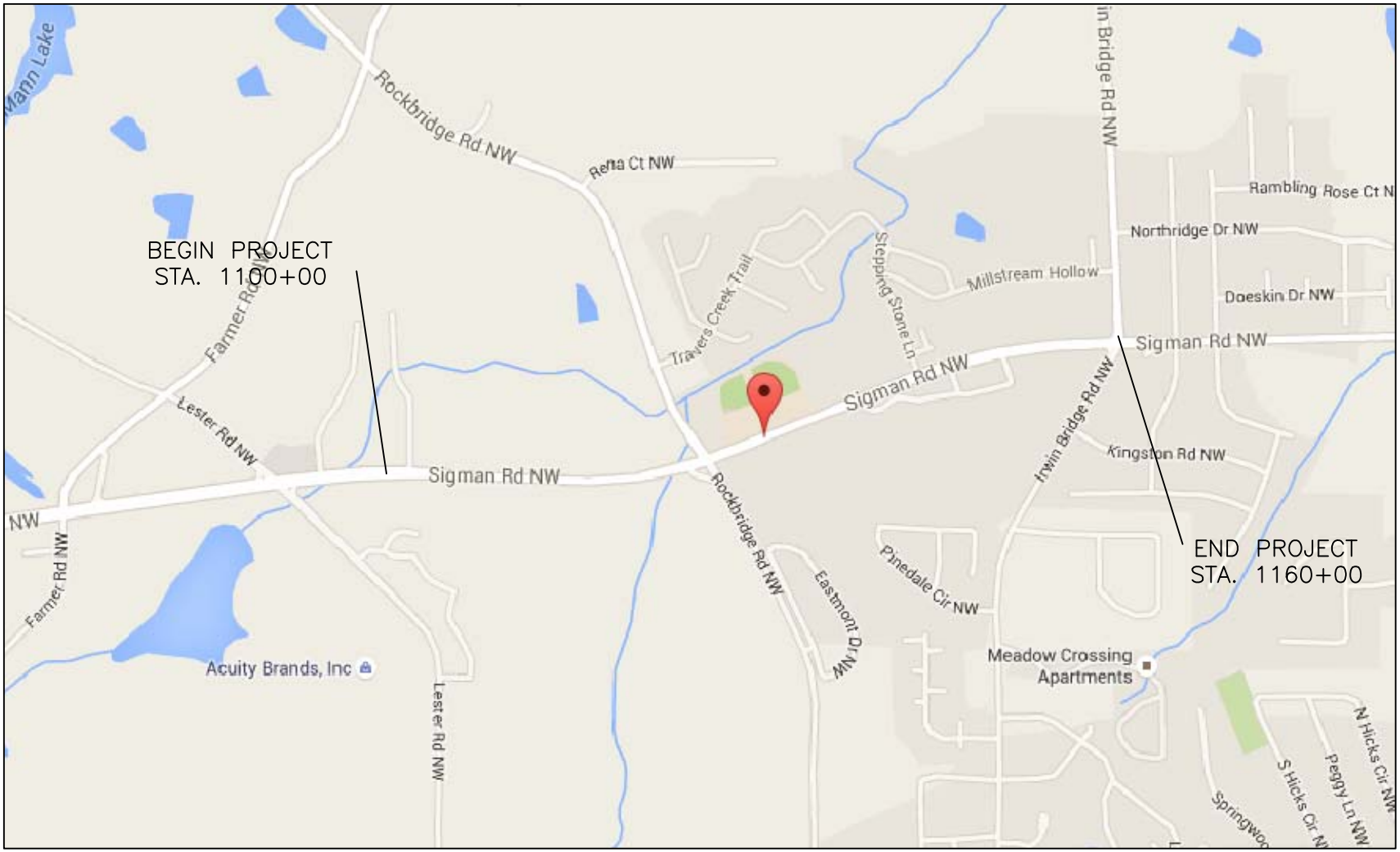
We recommend that all bridge approach slabs on this project be constructed in accordance with the notched detail on Georgia Standard 9017-R.

GEORGIA REGISTERED NO. 26340 PROFESSIONAL ENGINEER YONG C. SHAO

Reported By:

Yong Shao, PhD, PE

Appendix A – FIGURES AND DETAILS



TITLE: SITE LOCATION MAP	PROJECT NO: ROCK1203	MORELAND ALTOBELLI ASSOCIATES, INC.	
PROJECT: SIGMAN ROAD IMPROVEMENTS, PHASE I CONYERS, ROCKDALE COUNTY	DRAWN BY: YCS DATE: 3/22/2016	2211 BEAVER RUIN ROAD, SUITE 190 NORCROSS, GEORGIA 30071 TEL: 770-2635945; FAX: 770-2635954	

pH	7.31
Resistivity	17100

Project Number: **County: Rockdale** **P.I. Number: 0013163**

Pipe Culvert Material Alternates

TYPE OF INSTALLATION				PIPE TYPE									
				CONCRETE	STEEL			ALLUMINUM	THERMOPLASTIC				
				REINFORCED CONCRETE AASHTO M-170	CORRUGATED STEEL ALUMINUM COATED (TYPE 2) AASHTO M-36	CORRUGATED STEEL PLAIN ZINC COATED AASHTO M-36	POLYMER COATED STEEL AASHTO M-245	CORRUGATED ALUMINUM AASHTO M-196	CORRUGATED HDPE AASHTO M-252	CORRUGATED SMOOTHED LINED HDPE TYPE "S" AASHTO M-294	CORRUGATED SMOOTH LINED POLYPROPYLENE AASHTO M 330	PVC CORRUGATED SMOOTH INTERIOR ASTM F-949	PVC Profile Wall Drain Pipe AASHTO M-304
STORM DRAIN	NON-TRAVEL BEARING (OUTSIDE ROADBED)		INTERSTATE	X									
STORM DRAIN	NON-TRAVEL BEARING (OUTSIDE ROADBED)		NON INTERSTATE	X	X		X	X		X	X	X	X
STORM DRAIN	TRAVEL BEARING (INSIDE ROADBED)	GRADE ≤ 10%	ADT < 1,500	X	X		X	X		X	X	X	X
STORM DRAIN	TRAVEL BEARING (INSIDE ROADBED)	GRADE ≤ 10%	1,500 < ADT < 5,000	X	X		X	X		X	X	X	X
STORM DRAIN	TRAVEL BEARING (INSIDE ROADBED)	GRADE ≤ 10%	5,000 < ADT < 15,000	X						X	X	X	X
STORM DRAIN	TRAVEL BEARING (INSIDE ROADBED)	GRADE ≤ 10%	ADT > 15,000 & INTERSTATES	X									
STORM DRAIN	TRAVEL BEARING (INSIDE ROADBED)	GRADE > 10%					X			X	X	X	X
SIDE DRAIN				X	X	X	X	X		X	X	X	X
PERMANENT SLOPE DRAIN					X	X	X	X		X	X	X	X
PERFORATED UNDERDRAIN					X	X		X	X	X	X	X	X

NOTES:

1 Allowable materials are indicated by an "X".

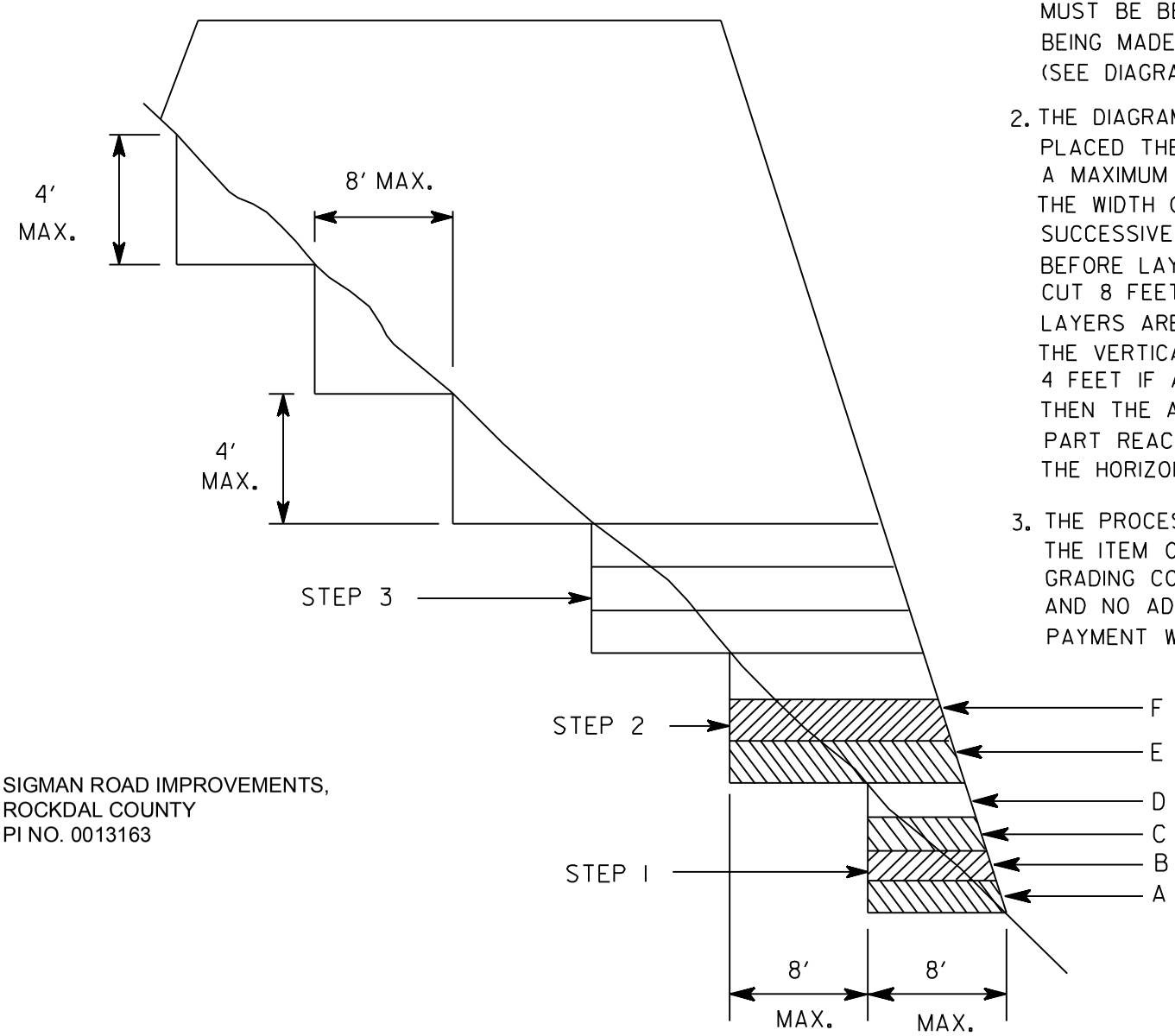
2 Structural, installation, fill height and backfill requirements of storm drain pipe will be in accordance with Georgia Standard 1030-D or 1030-P and the Standard Specifications

3 The Contractor shall provide additional storm sewer capacity calculations if a pipe material other than concrete is selected.

4 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.

Rev. 1-12-16

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 MADE.
(SEE DIAGRAM AT LEFT.)

2. THE DIAGRAM SHOWS THAT BEFORE LAYER "A" IS PLACED THE FIRST STEP (1) IS CUT INTO THE SLOPE A MAXIMUM DISTANCE OF ABOUT 8 FEET (ABOUT ¾ 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 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 FEET IF A 8 FEET HORIZONTAL CUT IS MADE, THEN THE ACTUAL CUT STOPS WHEN THE VERTICAL PART REACHES A MAXIMUM OF 4 FEET 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.

SIGMAN ROAD IMPROVEMENTS,
ROCKDAL COUNTY
PI NO. 0013163

BENCHING DETAIL

4.5.28

NO SCALE

PROJECT PHOTO 1: STATION 1120+00+/-, LEFT

PROJECT PHOTO 2: STATION 1122+00+/-, LEFT

PROJECT PHOTO 3: STATION 1119+00+/-, RIGHT

PROJECT PHOTO 4: STATION 1118+00+/-, RIGHT

Appendix B – SOIL SURVEY FIELD NOTES

GDOT Proj. No.:
GDOT PI: 0013163
MAAI No: ROCK1203

Soil Survey Field Notes

Sigman Road, Phase I

Borings	Line	Station	Distance to centerline	Boring Depth, ft	Ground water table, ft	Lab Number	Field Moisture	GDOT	Field Soil Description and Comments	
S-1	Sigman Road	1105+00	30' Lt	BT at 5'	NE	6352	15.4%	**IIB3**	0.0' to 0.5"	Top Soil
									0.5" to 5.0'	Reddish brown clayey sand
S-2	Sigman Road	1110+00	30' Lt	BT at 5'	NE	6359	20.4%	**IIB3**	0.0' to 0.5"	Top Soil
									0.5" to 5.0'	Yellowish brown clayey sand, moist
S-3	Sigman Road	1115+00	30' Lt	BT at 5'	NE	6360	16.9%	**IIB3**		4.0' below the road
									0.0' to 0.5"	Top Soil
									0.5" to 3.5'	sandy silt, yellowish, moist
									3.5' to 5.0'	clayey silt, reddish, moist
S-4	Sigman Road	1120+00	40' Rt	BT at 5'	NE		16.2%	**IIB3**		Rock outcrop observed at following sta
										1119+00+/- to 1122+00+/-, left
										1118+50+/- to 1121+00+/-, right
S-5	Sigman Road	1125+00	30' Lt	BT at 5'	NE	6355	13.3%	**IIB2**	0.0' to 0.5"	Top Soil
									0.5" to 2.5'	sandy silt, brown, moist
									2.5' to 3.0'	clayey silt, red moist
									3.0' to 5.0'	Sand, white, moist
S-6	Sigman Road	1130+00								Rock outcrop observed at following sta
										1128+50+/- to 1131+00+/-, right
										Proposed retaining wall on left
										from sta. 1123+00+/- to 1125+00+/-

BT - Boring Termination
AR - Auger Refusal
HAR - Hand Auger Refusal
NE - Not Encountered

GDOT Proj. No.:
GDOT PI: 0013163
MAAI No: ROCK1203

Soil Survey Field Notes

Sigman Road, Phase I

Borings	Line	Station	Distance to centerline	Boring Depth, ft	Ground water table, ft	Lab Number	Field Moisture	GDOT	Field Soil Description and Comments	
S-7	Sigman Road	1135+00								Steep slope, MSE wall proposed on
										right side from sta. 1133+50+/- to
										1137+00+/-, portion of pavement on
										MSE wall fill
S-8	Sigman Road	1140+00	40' Rt	HAR at 2.5'	NE	6354	19.3%	**IIB3**		5.0' Higher than the road
									0.0' to 0.5"	Top Soil
									0.5" to 0.7'	silty clay, brown, moist
									0.7' to 1.5'	clayey silt, moist, yellowish brown
									1.5' to 2.5'	White Sand, moist
S-9	Sigman Road	1145+00	40' Rt	HAR at 2.0'	NE		14.4%	**IIB3**		3.5' higher than the road
									0.0' to 0.5"	Top Soil
									0.5" to 1.8'	silty clay, brown, moist
									1.8' to 2.0'	White sand, moist
S-10	Sigman Road	1150+00	40' Lt	BT at 5'	NE	6356	14.3%	**IA2**		1.0' below the road
									0.0' to 0.5"	Top Soil
									0.5" to 5.0'	brown sandy silt, moist
S-11	Sigman Road	1155+00	30' Rt	BT at 5'	NE	6357	14.8%	**IIB2**	0.0' to 0.5"	Top Soil
									0.5" to 5.0'	Silty sand, reddish brown, moist

BT - Boring Termination
AR - Auger Refusal
HAR - Hand Auger Refusal
NE - Not Encountered

Appendix C – SUMMARY OF LAB TESTS

Summary of Soil Laboratory Tests

Project Name:	**Sigman Road (from Lester Road to Irwin Bridge Road)**				
GDOT Project No.:					
GDOT P.I. No.:	**0013163**				
MAAI Project No.:	**ROCK1203/GEO**				
Sample location:	Station 1105+00, 30' Lt	Station 1110+00, 30' Lt	Station 1115+00, 30' Lt	Station 1125+00, 30' Lt	
Sample depth:	1' to 5'	1' to 5'	1' to 5'	1' to 4'	
Lab No.:	6352	6359	6360	6355	
Date sampled:	2/11/2016	2/12/2016	2/12/2016	2/11/2016	
Date tested:	3/4/2016	3/14/2016	3/14/2016	3/4/2016	
Soil description:	Reddish brown clayey sand	Yellowish brown clayey sand	Reddish brown clayey silt	Reddish brown sandy silt	
% Passing No. 10:	100.0	100.0	100.0	100.0	
% Passing No. 20:	87.8	82.1	90.6	84.2	
% Passing No. 40:	70.7	62.9	75.8	64.9	
% Passing No. 60:	60.4	51.7	67.5	54.3	
% Passing No. 100:	50.8	40.6	56.5	43.8	
% Passing No. 200:	41.3	31.7	55.8	35.3	
% Clay:	30.4	21.6	39.0	23.9	
D_{75} (mm)	0.506	0.658	0.404	0.611	
Total volume change:	12.0	10.2	10.9	5.0	
% Swell:	9.8	8.4	8.4	2.7	
% Shrinkage:	2.2	1.8	2.5	2.3	
Max. Dry Density (pcf):	106.3	109.0	107.5	114.8	
% Optimal Moisture:	14.5	15.2	15.8	13.0	
Liquid Limit:	39			32	
Plastic Limit:	25			24	
Plasticity Index:	14			8	
Erosion index	5.09	6.32	3.36	5.83	
CBR					
Resistivity					
In-situ Moist Content, %	15.4%	20.4%	16.9%	13.3%	
Ph					
Organic					
GDOT Class:	**IIB3**	**IIB3**	**IIB3**	**IIB2**	
USCS Class:	**SC**			**SC**	

Remarks: GDOT Methods GDT-4, GDT-6, GDT-67

Moreland Altobelli Associates, Inc.

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Summary of Soil Laboratory Tests

Project Name:	**Sigman Road (from Lester Road to Irwin Bridge Road)**				
GDOT Project No.:					
GDOT P.I. No.:	**0013163**				
MAAI Project No.:	**ROCK1203/GEO**				
Sample location:	Station 1140+00, 40' Rt	Station 1150+00, 40' Lt	Station 1155+00, 30' Rt		
Sample depth:	1' to 2.5'	1' to 4.5'	1' to 5'		
Lab No.:	6354	6356	6357		
Date sampled:	2/11/2016	2/12/2016	2/12/2016		
Date tested:	3/4/2016	3/14/2016	3/14/2016		
Soil description:	Yellowish brown clayey silt	Brown sandy silt	Reddish brown silty sand		
% Passing No. 10:	100.0	100.0	100.0		
% Passing No. 20:	84.4	79.2	88.3		
% Passing No. 40:	65.3	57.1	69.1		
% Passing No. 60:	53.9	44.3	57.2		
% Passing No. 100:	44.9	33.0	45.3		
% Passing No. 200:	38.7	24.3	36.7		
% Clay:	27.3	15.9	26.2		
D_{75} (mm)	0.604	0.745	0.526		
Total volume change:	7.7	3.1	3.8		
% Swell:	4.4	1.1	1.7		
% Shrinkage:	3.3	2.0	2.1		
Max. Dry Density (pcf):	108.2	111.5	112.0		
% Optimal Moisture:	15.6	14.3	14.0		
Liquid Limit:	44		33		
Plastic Limit:	26		22		
Plasticity Index:	18		11		
Erosion index	5.46	7.18	5.71		
CBR					
Resistivity					
In-situ Moist Content, %	19.3%	14.3%	14.8%		
Ph					
Organic					
GDOT Class:	**IIB3**	**IA2**	**IIB2**		
USCS Class:	**SC**		**SM**		

Remarks: GDOT Methods GDT-4, GDT-6, GDT-67

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