



FROEHLING & ROBERTSON, INC.
Engineering Stability Since 1881

6181 Rockfish Gap Turnpike
 Crozet, Virginia 22932
 T 434.823.5154 | F 434.823.4764

F&R Project No. 71U0302

April 27, 2017

Ms. Amanda N. Glover
 Director of Economic Development
 Augusta County
 P.O. Box 590 | 18 Government Center Lane
 Verona, VA 24482-0590

Reference: Centeriew Drive – Augusta County
 Augusta County, Virginia

Dear Ms. Glover:

In accordance with F&R Proposal No. 1771-0358GA dated March 9, 2017, F&R has completed the requested subgrade soil sampling and testing.

It is understood that the project is to include construction of the first 1,000 of Centerview Road, which is reportedly at grade, located within Mill Place. The first 500 feet will be owned by the state, while the remainder of the road will be owned by Augusta County.

F&R was on site on April 7, 2017 to collect the soil sample. The sample location was staked on site by Balzer and Associates, Inc. Laboratory testing was performed on bulk soil sample collected at Station 19+00. The bulk sample was collected and subjected to Standard Proctor (ASTM D 698) testing and California Bearing Ratio (CBR) testing. The results from the laboratory testing are included in the table below and test reports are attached.

Station	Sample Depth (Feet)	Natural Water Content (%)	LL/PI	% Passing No. 200 Sieve	USCS	Maximum Dry Density (pcf)	Opt. Moisture (%)	Soaked CBR	% Swell
19+00	0-2	15.2	42/14	24.0	GM	134.1	8.6	13.1	0.7

F&R recommends using a design CBR value of 8, which is two-thirds of this value.

Subgrade materials were generally found to be very dense at the time of the sampling. In general, the northern portion of the road alignment consists of cut and the southern portion of the road consists of fill. F&R monitored the earthmoving operations to verify compaction during the development for the Shamrock Foods and Sumatoma facilities.



Please contact us if you have any questions regarding this report or if we may be of further service.

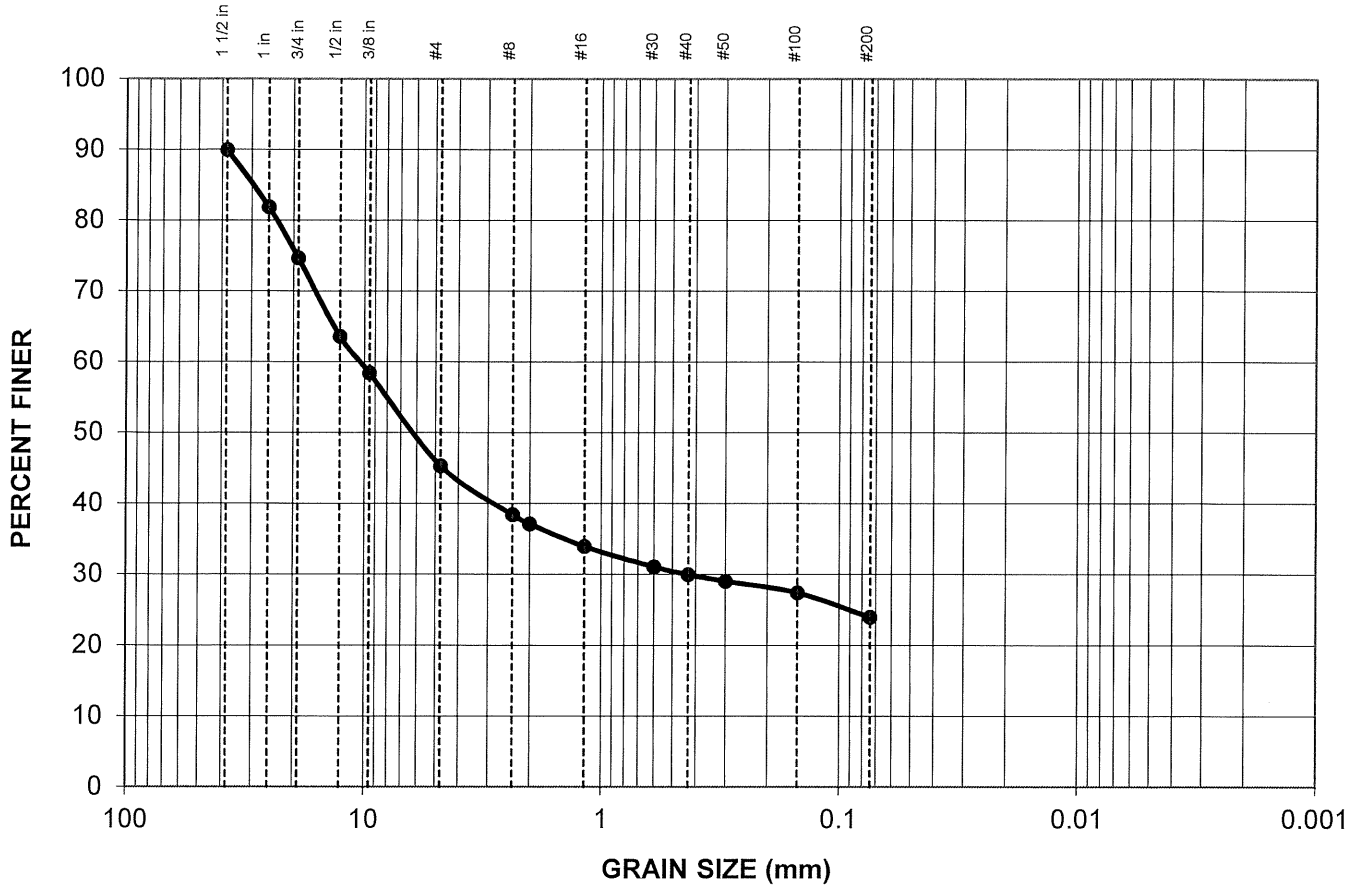
Sincerely,
FROEHLING & ROBERTSON, INC.

A handwritten signature in blue ink, appearing to read 'Clyde A. Simmons III', with a stylized flourish at the end.

Clyde A. Simmons III, P.E.
Senior Engineer/Branch Manager

Attachments: Laboratory Test Results

GRAIN SIZE DISTRIBUTION REPORT



% GRAVEL	% SAND	% SILT/CLAY
54.7	21.4	24.0

SIEVE SIZE	PERCENT FINER	SPEC PERCENT	PASS? (X=NO)
1 1/2 in	90.0		
1 in	81.8		
3/4 in	74.6		
1/2 in	63.6		
3/8 in	58.4		
#4	45.3		
#8	38.4		
#10	37.1		
#16	34.0		
#30	31.1		
#40	30.0		
#50	29.0		
#100	27.4		
#200	24.0		

Soil Description
Light brown, silty GRAVEL

Atterberg Limits
LL= 42 PL= 28 PI= 14

Coefficients
D₈₅= 29.748 D₆₀= 10.404 D₅₀= 6.104
D₃₀= 0.432 D₁₅= D₁₀=
C_u= C_c=

Classification
USCS= GM AASHTO= A-7-2

Remarks
Moisture Content= 15.2 %
Specific Gravity=

Lab No.: 3340
Location: Centerview Drive Station 19+00

Date: 4/26/17
Elev/Depth:

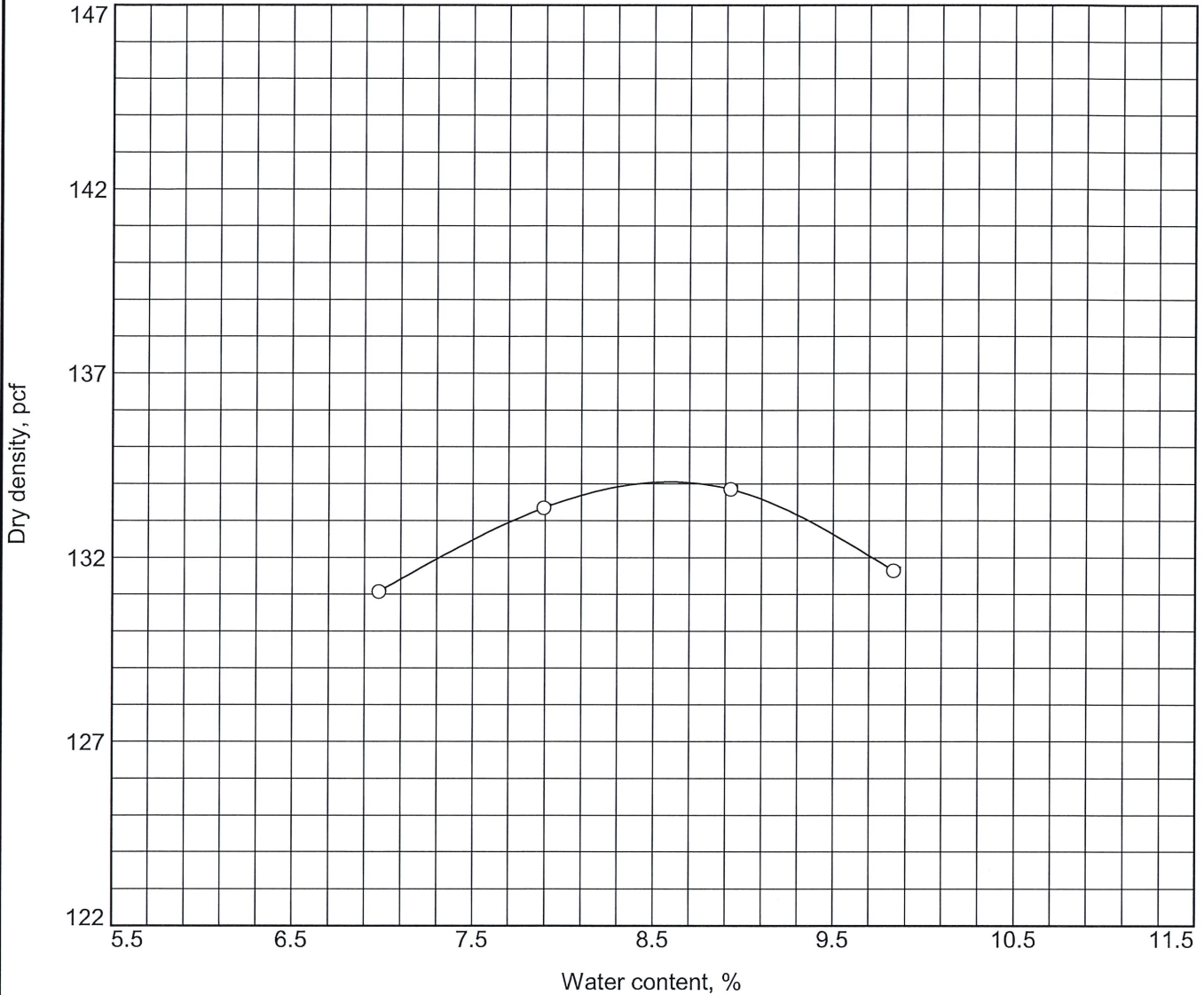


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Client: Augusta County
Project: Centerview Drive- Augusta Co.
Location: Augusta County
Project No.: 71U0302

CAS

MOISTURE-DENSITY RELATIONSHIP



Test specification: VTM-1, Std. VTM correction
 AASHTO T 224-01 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	GM	A-2-7	12.4		42	14	54.7	24.0

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 134.1 pcf	109.1 pcf	Light brown, silty GRAVEL
Optimum moisture = 8.6 %	17.8 %	

Project No. 71U0302 **Client:** Augusta County
Project: Centerview Drive
 Location: Centerview Drive Station 19+00 **Sample Number:** 3340

Remarks:

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Figure CAS

Sp. gr. for ZAV is assumed



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California Bearing Ratio (AASHTO T 193)

Client: Augusta County
 Project: Centerview Drive- Augusta Co.
 Location: Centerview Drive Station 19+00

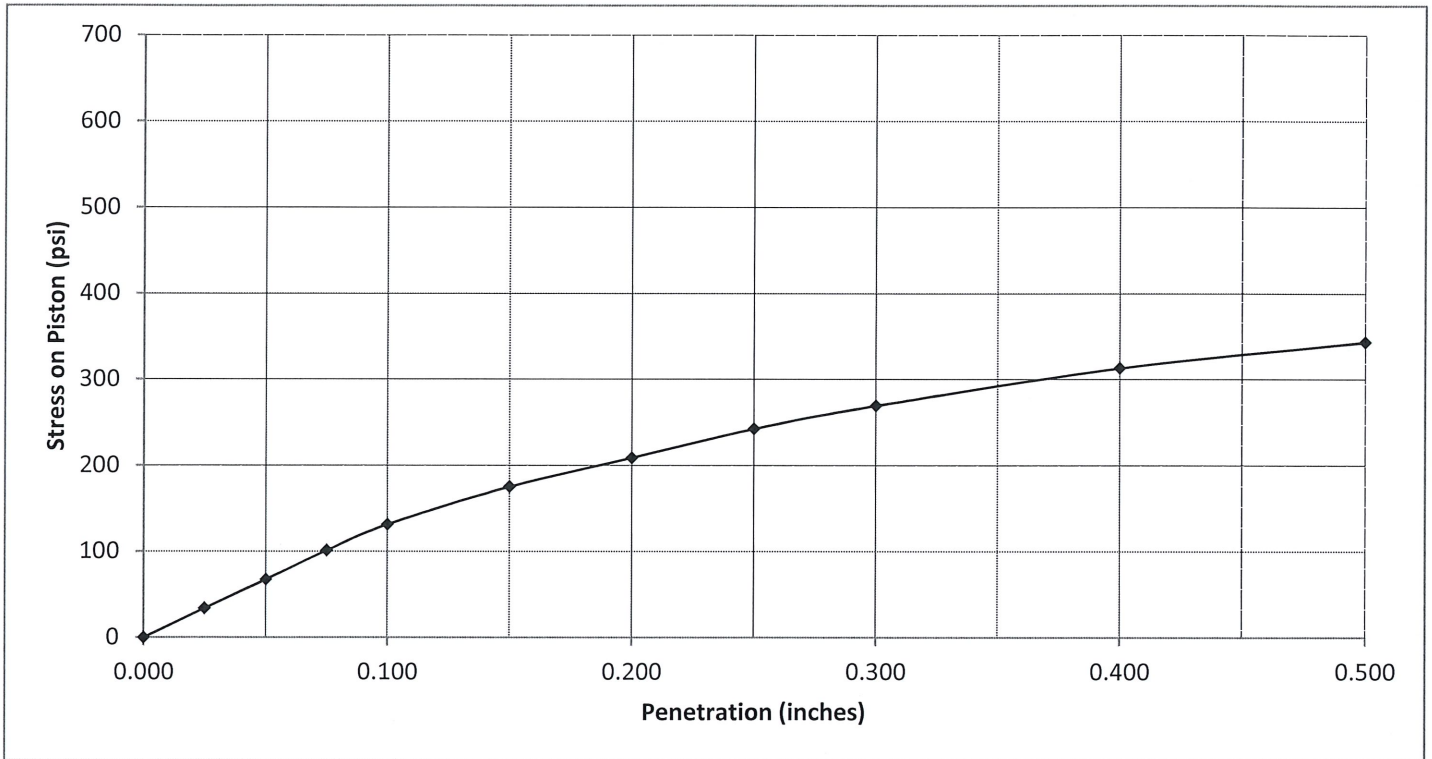
Record #: 71U0302
 F&R Lab No.: 3340
 Test Date: 26-Apr-17

Unsoaked CBR

Soaked CBR

Compaction method: VTM - 1; Surcharge weight - 10 lbs
 Compactive effort: 5 Layers with 45 blows per layer

Sampling Depth: 0 to 1.5 feet



CBR @ 0.1 in. penetration:	<u>13.1</u>
Swell (%):	<u>0.72%</u>
Dry Density Before Soak (pcf):	<u>127.6</u>
Moisture Content Before Soak (%):	<u>8.7%</u>
% Compaction Before Soak:	<u>95.1%</u>
Dry Density After Soak (pcf):	<u>126.7</u>
Moisture Content After Soak, Top in. (%):	<u>12.0%</u>
% Compaction After Soak:	<u>94.4%</u>
Resiliency Factor:	<u>2.0</u>

Proctor Max. Dry Density (pcf):	<u>134.1</u>
Proctor Opt. Moisture Content (%):	<u>8.6</u>
Liquid Limit:	<u>42</u>
Plasticity Index:	<u>14</u>
% Retained No. 4 Sieve:	<u>54.7</u>
% Passing No. 200 Sieve:	<u>24.0</u>
Visual Description:	Light brown, silty GRAVEL
USCS Classification:	<u>GM</u>
AASHTO Classification:	<u>A-7-5 {0}</u>

Tested By: RK

Reviewed By: *[Signature]*
 Froehling and Robertson, Inc.