



FROEHLING & ROBERTSON, INC.

Engineering • Environmental • Geotechnical

18 Woods Lake Road
 Greenville, South Carolina 29607 | USA
 T 864.271.2840 | F 864.271.8124

October 15, 2015

Mr. Trapp Harris, PE
Geotechnical Design Engineer
South Carolina Department of Transportation
Design-Build Section
955 Park Street
Columbia, South Carolina 29202

Reference: Addendum No. 1 - Report of Laboratory Testing
 US Route 176 over Cannons Creek Bridge Replacement
 Newberry County, South Carolina
 F&R Project Number: 65T-0188

Dear Mr. Harris:

Froehling & Robertson, Inc. (F&R) has completed the requested laboratory testing for the above referenced project. Our services were performed in accordance with your verbal request for laboratory testing and your verbal authorization to proceed on October 13, 2015.

SCOPE

Soil test boring samples you obtained from Borings B-01 and B-02, performed by others, were provided to us on October 13, 2015 for soil laboratory testing. The scope of laboratory testing consisted of the following:

Boring B-01				
Sample Depth (ft)	Sample No.	Test Assigned		
		Wash No. 200	Atterberg Limits Tests	Natural Moisture Content
13.5-15	SS-6	X	X	X
18.5-23.5	SS-7	X	X	X
28.5-30.0	SS-8	X	-	X

Note: The bag sample SS-7 was marked as 18.5'-20.0' and SS-8 was marked as 23.5'-25.0'



Boring B-02				
Sample Depth	Sample No.	Test Assigned		
		Wash No. 200	Atterberg Limits Tests	Natural Moisture Content
18.5-20	SS-7	X	X	X
23.5-25	SS-8	X	-	X
28.5-30	SS-9	X	-	X
33.5-35	SS-10	X	-	X
38.5-40	SS-11	X	-	X

LABORATORY TESTING

The wash No. 200 and natural moisture content tests were performed in accordance with ASTM D1140 and ASTM D 2216, respectively. The Atterberg Limit tests were performed in accordance with ASTM D 4318. The laboratory testing results are presented in Appendix I.

F&R greatly appreciates the opportunity to work with you on this project. If there are any questions concerning this data report or if any additional information is required, please do not hesitate to contact us.

Sincerely,
FROEHLING & ROBERTSON, INC.


Benedictus K. Azumah, PE
Geotechnical Services Manager





APENDIX I

Laboratory Test Summary Sheet
Laboratory Test Data Sheets



FROEHLING & ROBERTSON, INC.

LABORATORY TEST SUMMARY SHEET

F&R Project No: 65T-0188
Client: South Carolina Department of Transportation
Project: US Route 176 over Cannons Creek Bridge Replacement
City/State: Newberry County, SC

Boring/Sample No.	Depth (ft)	LL	PL	PI	USCS Classification	Water Content (%)	Percent Passing No. 200 Sieve
B-01	13.5 - 15.0	NP	NP	-	SM	18.9	17.1
B-01	18.5 - 20.0	44	26	18	CL	37.9	78.5
B-01	23.5 - 25.0					32.8	25.4
B-02	18.5 - 20.0	33	21	12	CL	30.0	62.0
B-02	23.5 - 25.0					23.2	13.0
B-02	28.5 - 30.0					27.4	6.2
B-02	33.5 - 35.0					21.2	9.6
B-02	38.5 - 40.0					32.0	16.5

NP: non-plastic

Date: 10/15/15

65T-0188

US 176 → CANNON'S CREEK

*
*
MOISTURE CONTENT (%)

	#1	#2	#3	#4	#5	#6	#7
Sample I.D.	B-1 13.5-15		B-1 18.5-20		B-1 23.5-25		
Wet Soil + Tare	467.78		300.99		508.64		
Dry Soils + Tare	425.84		258.81		419.64		
Tare # & Weight	AE 204.23		SI 23 147.91		59 148.52		
Weight of Water	41.94		42.18		89.0		
Weight of Dry Soils	221.61		111.27		271.12		
Moisture Content	0.189		0.379		0.328		

	#8	#9	#10	#11	#12	#13	#14
Sample I.D.	B-2 18.5-20		B-2 23.5-25		B-2 28.5-30		B-2 33.5-35.0
Wet Soil + Tare	395.14		500.10		624.55		620.02
Dry Soils + Tare	337.97		433.67		522.43		537.24
Tare # & Weight	521 147.64		58 147.90		5 149.39		B 145.89
Weight of Water	57.17		66.43		102.12		82.78
Weight of Dry Soils	190.33		285.77		373.04		391.35
Moisture Content	0.300		0.232		0.274		0.212

	#15	#16	#17	#18	#19	#20	#21
Sample I.D.	B-2 38.5-40						
Wet Soil + Tare	636.92						
Dry Soils + Tare	532.03						
Tare # & Weight	L 204.19						
Weight of Water	104.89						
Weight of Dry Soils	327.84						
Moisture Content	0.320						

	#22	#23	#24	#25	#26	#27	#28
Sample I.D.							
Wet Soil + Tare							
Dry Soils + Tare							
Tare # & Weight							
Weight of Water							
Weight of Dry Soils							
Moisture Content							



WASH 200 (C 117)

CLIENT SCOOT

B-1

TECHNICIAN D. Durham

PROJECT 176 + CANNONS

13.5-15.0 TEST DATE 10-14-15

RECORD NO. 65T-0188

SOIL CLASSIFICATION _____

TARE # A3

TARE WEIGHT 250.03

A	Tare and Dry Soil		<u>472.06</u>
B	Dry Soil	(A-Tare)	<u>222.03</u>
C	Tare and Dry Soil After Wash		<u>434.17</u>
D	Dry Soil After Wash	(C-Tare)	<u>184.14</u>
E	Material Lost	(B-D)	<u>37.89</u>

Percent Passing #200 (B-D)/B x 100= 17.1%



WASH 200 (C 117)

CLIENT SCDOT

B-1

TECHNICIAN D. Durham

PROJECT 176 J CANNONS

185-20.0 TEST DATE 10-14-15

RECORD NO. 65T-0188

SOIL CLASSIFICATION _____

TARE # E

TARE WEIGHT 248.04

A Tare and Dry Soil		<u>359.52</u>
B Dry Soil	(A-Tare)	<u>111.48</u>
C Tare and Dry Soil After Wash		<u>272.01</u>
D Dry Soil After Wash	(C-Tare)	<u>23.97</u>
E Material Lost	(B-D)	<u>87.51</u>

Percent Passing #200 (B-D)/B x 100= 78.5%



WASH 200 (C 117)

CLIENT SCDOT

B-1

TECHNICIAN D. Durham

PROJECT 176 + CANNONS

23.5 - 25.0

TEST DATE 10-14-15

RECORD NO. 65T-0188

SOIL CLASSIFICATION _____

TARE # D3

TARE WEIGHT 250.08

A	Tare and Dry Soil		<u>520.99</u>
B	Dry Soil	(A-Tare)	<u>270.91</u>
C	Tare and Dry Soil After Wash		<u>452.09</u>
D	Dry Soil After Wash	(C-Tare)	<u>202.01</u>
E	Material Lost	(B-D)	<u>68.9</u>

Percent Passing #200 (B-D)/B x 100= 25.4 %



WASH 200 (C 117)

CLIENT SCOOT

B-2

TECHNICIAN D. Durham

PROJECT 176 + CANNONS

18.5-20

TEST DATE 10-14-15

RECORD NO. _____

SOIL CLASSIFICATION _____

TARE # ACC

TARE WEIGHT 255.15

A	Tare and Dry Soil		<u>445.60</u>
B	Dry Soil	(A-Tare)	<u>190.45</u>
C	Tare and Dry Soil After Wash		<u>327.58</u>
D	Dry Soil After Wash	(C-Tare)	<u>72.43</u>
E	Material Lost	(B-D)	<u>118.02</u>

Percent Passing #200

(B-D)/B x 100=

62.0%



WASH 200 (C 117)

CLIENT SCDOT
PROJECT 176 + CANNONS
RECORD NO. 65T-0188

B-2
23.5-25

TECHNICIAN D. Durham
TEST DATE 10-14-15

SOIL CLASSIFICATION _____

TARE # D

TARE WEIGHT 304.24

A	Tare and Dry Soil		<u>590.53</u>
B	Dry Soil	(A-Tare)	<u>286.29</u>
C	Tare and Dry Soil After Wash		<u>553.19</u>
D	Dry Soil After Wash	(C-Tare)	<u>248.95</u>
E	Material Lost	(B-D)	<u>37.34</u>

Percent Passing #200

(B-D)/B x 100=

13.0%



WASH 200 (C 117)

CLIENT SCDOT

B-2

TECHNICIAN D. Durham

PROJECT 176 F CANNONS

TEST DATE 10-14-15

RECORD NO. 65T-0188

28.5-30.0

SOIL CLASSIFICATION _____

TARE # KC

TARE WEIGHT 374.61

A	Tare and Dry Soil		<u>746.81</u>
B	Dry Soil	(A-Tare)	<u>372.20</u>
C	Tare and Dry Soil After Wash		<u>723.83</u>
D	Dry Soil After Wash	(C-Tare)	<u>349.22</u>
E	Material Lost	(B-D)	<u>22.98</u>

Percent Passing #200 (B-D)/B x 100= 6.2%



WASH 200 (C 117)

CLIENT SCOOT

B-2

TECHNICIAN D. Durham

PROJECT 176 + CANNONS

33.5 - 35.0

TEST DATE 10-14-15

RECORD NO. 65T-0188

SOIL CLASSIFICATION _____

TARE # 8A

TARE WEIGHT 337.70

A	Tare and Dry Soil		<u>728.74</u>
B	Dry Soil	(A-Tare)	<u>391.04</u>
C	Tare and Dry Soil After Wash		<u>691.39</u>
D	Dry Soil After Wash	(C-Tare)	<u>353.69</u>
E	Material Lost	(B-D)	<u>37.35</u>

Percent Passing #200

(B-D)/B x 100=

9.6%



WASH 200 (C 117)

CLIENT SCDOT
PROJECT 176 + CANNONS
RECORD NO. 65T-0188

B-2
38.5-40

TECHNICIAN D. Durham
TEST DATE 10-14-15

SOIL CLASSIFICATION _____

TARE # N 2

TARE WEIGHT 319.94

A	Tare and Dry Soil		<u>644.97</u>
B	Dry Soil	(A-Tare)	<u>325.03</u>
C	Tare and Dry Soil After Wash		<u>591.22</u>
D	Dry Soil After Wash	(C-Tare)	<u>271.28</u>
E	Material Lost	(B-D)	<u>53.75</u>

Percent Passing #200 (B-D)/B x 100= 16.5%

Froehling & Robertson, Inc.
Laboratory Sample Analyses

TP

SP3

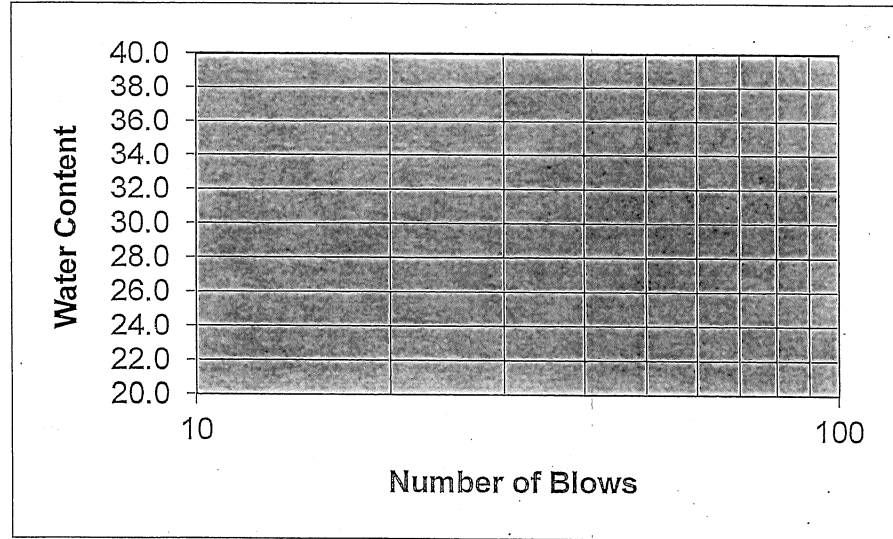
Client: SCDOT
 Project: 176 + CANNONS CR
 F&R Project No.: _____
 Item Code/Use: _____

Material: _____
 Sample No: _____
 Location: B-1 13.5-15.0
 Source: _____

Date Received: 10/13/15
 Date Processed: _____

Liquid Limit				
Tare No.				
Cup & Wet Soil				
Cup & Dry Soil				
Moisture Loss				
Cup Weight				
Dry Soil				
Blows				
Moisture %				
Plastic Limit				
Tare No.				
Cup & Wet Soil				
Cup & Dry Soil				
Moisture Loss				
Cup Weight				
Dry Soil				
Moisture %				

NON-PLASTIC



Laboratory Technician: D. Durham
 Reviewed By: B. Azumah
 Program Administrator

LL = _____
 PL = _____
 PI = _____
 USCS = SM

123 SP1

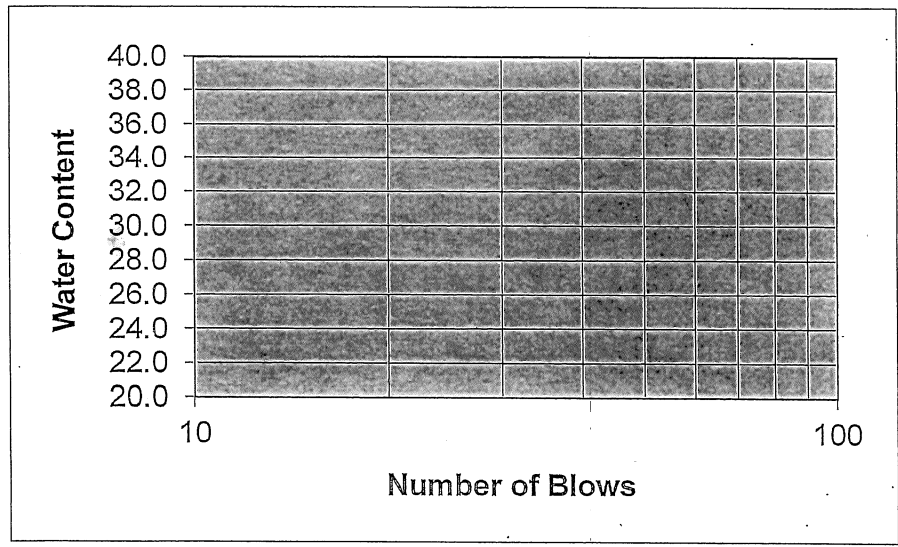
Froehling & Robertson, Inc.
Laboratory Sample Analyses

Client: SCDOT
 Project: US 176 + CANNONS CR
 F&R Project No.: 657-0188
 Item Code/Use: _____

Material: _____
 Sample No.: _____
 Location: B-1 18.5-20.0
 Source: _____

Date Received: 10/13/15
 Date Processed: 10/14/15

Liquid Limit			
Tare No.	D5	M4	108
Cup & Wet Soil	35.58	35.47	34.92
Cup & Dry Soil	31.90	31.74	31.21
Moisture Loss	3.68	3.73	3.71
Cup Weight	23.26	23.29	23.15
Dry Soil	8.64	8.45	8.06
Blows	33	23	16
Moisture %	0.426	0.441	0.460
Plastic Limit			
Tare No.	D11	7A	
Cup & Wet Soil	29.56	30.08	
Cup & Dry Soil	28.18	28.71	
Moisture Loss	1.38	1.37	
Cup Weight	22.92	23.27	
Dry Soil	5.26	5.44	
Moisture %	0.262	0.252	



0.257
 Laboratory Technician: D. Durham
 Reviewed By: B. Azumah
 Program Administrator

LL = 43.7 %
 PL = 25.7 %
 PI = 18.0
 USCS = CL

Froehling & Robertson, Inc.
Laboratory Sample Analyses

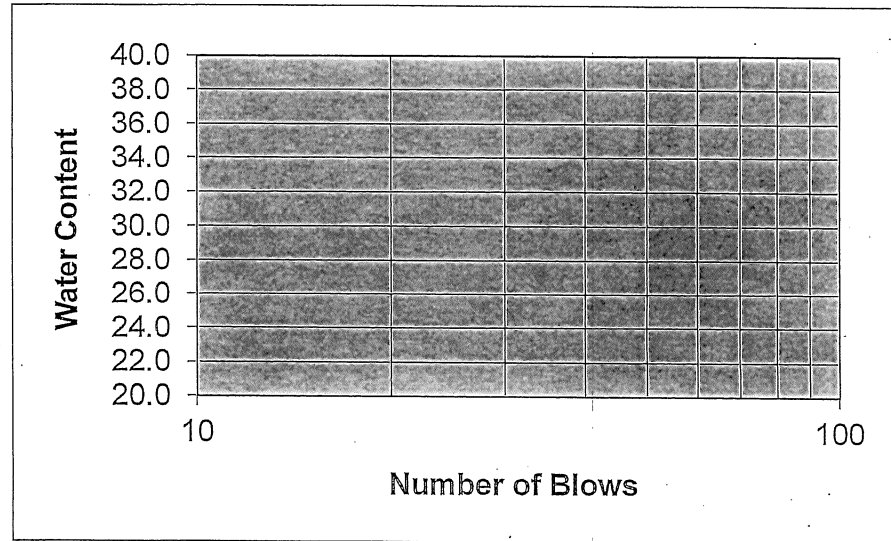
SP5 3

Client: SCDOT
Project: US 176 + CANNONS CK
F&R Project No.: 65T-0188
Item Code/Use: _____

Material: _____
Sample No: _____
Location: B-2 18.5-20
Source: _____

Date Received: 10/13/15
Date Processed: 10/14/15

Liquid Limit			
Tare No.	M1	M2	4A
Cup & Wet Soil	36.46	37.27	36.08
Cup & Dry Soil	33.20	33.82	32.70
Moisture Loss	3.26	3.45	3.38
Cup Weight	23.04	23.30	22.81
Dry Soil	10.16	10.52	9.89
Blows	32	25	17
Moisture %	0.321	0.328	0.342
Plastic Limit			
Tare No.	D6	M3	
Cup & Wet Soil	30.45	29.62	
Cup & Dry Soil	29.16	28.51	
Moisture Loss	1.29	1.11	
Cup Weight	23.02	23.10	
Dry Soil	6.14	5.41	
Moisture %	0.210	0.205	



0.2075

Laboratory Technician: D. Durham
Reviewed By: B. Azumah
Program Administrator

LL = 32.8 %
PL = 20.8 %
PI = 12.0 %
USCS = CL