LD-450
5/12/09

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

DIVISION: MATERIALS

REPORT COVER SHEET

Minor Structure Data Report
November 23, 2010
Authored By: Stephen A. Chaos and Wade H. Pence III, P.G.

COMMONWEALTH OF VIRGINIA
DAVID TYLER LEE
Lic. No. 040299
PROFESSIONAL ENGINEER

David T Lee
2010.11.23 09:04:57 -05'00'

VDOT Materials Division
Salem District
District Materials Engineer

Responsible for Pages: All

Project Description
From: Route 460
To: 0.789 Km East of Christiansburg WCL
Project UPC No.: 8746

VIRGINIA DEPARTMENT OF TRANSPORTATION

SALEM DISTRICT
MATERIALS SECTION

November 23, 2010

Peppers Ferry Road
Project 0114-154-101, PE101
Town of Christiansburg
Montgomery County
UPC# 8746, Ad. Date 09/2011

MEMORANDUM

To : Mr. T. W. DiGiulian, P.E. L.S

Subject: Minor Structures Data Report

DESCRIPTION

Report of data for two retaining walls and two storm water management basins for Peppers Ferry Road project. Data includes boring location diagrams, boring logs, and reports of lab and field testing.

STRUCTURES

Retaining Wall 1

Standard RW-3
47 meters long, 1.7 meters maximum height
Plan Sheet 4
Wall begins left of station 4+11.86 Route 114 Const. BL.

- Attached boring logs RW1-1, RW1-2, RW1-3
- **NOTE**: Fill material and buried topsoil near footing elevation.
- **NOTE**: Residuum described in the bottom of the boring logs has the same engineering properties as listed on CBR #1 (attached test report #52-8041).
- CBR #1 - (AASHTO) A-7-6(25), (ASTM) CH

Retaining Wall 2

Standard RW-2
37.5 meters long, 5.7 meters maximum height
Plan Sheets 8 & 9
Wall begins left of station 13+75.13 Route 114 Const. BL.

- Attached boring logs RW2-1, RW2-2
- Attached dilatometer reports (described as retaining wall #3 on report)

- **NOTE**: Residuum described in the boring logs has the same engineering properties as listed on CBR #3 (attached test report #52-8043).
- CBR #3 - (AASHTO) A-7-6(12), (ASTM) SC

Storm Water Management Basin 1

Plan Sheet 6D

- Attached boring location sketch
- Attached boring logs SWMB1-1, SWMB1-2, SWMB1-3
- Attached Classification Reports #52-8049 and #52-8050
- **NOTE**: Basin is located in *KARST* terrain. Bedrock of the area is shaley dolostone of the Elbrook Formation. Ponding water facilitates the formation of collapse features (sink holes). Use of a liner should be considered in this location.

Storm Water Management Basin 2

Plan Sheet 10B

- Attached boring location sketch
- Attached boring logs SWMB2-1, SWMB2-2, SWMB2-3, SWMB2-4
- Attached Classification Report #52-8051
- Attached Outfall Classification Report #52-8052
- **NOTE**: Basin is located in *KARST* terrain. Bedrock of the area is shaley dolostone of the Elbrook Formation. Ponding water facilitates the formation of collapse features (sink holes). Use of a liner should be considered in this location.

pH WATER

Surface water (of any kind) was not observed within the project limits at the time of this investigation. Inspection of the existing (metal) drainage structures did not reveal substantial acidic water degradation. It can be assumed from field observation that surface water pH should be neutral to slightly acidic for this project.

SUBSURFACE INFORMATION

This subsurface information in this minor structure data report was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions at the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative beyond the limits of the borings; and any such projections by bidders are purely interpretive and altogether speculative.

Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

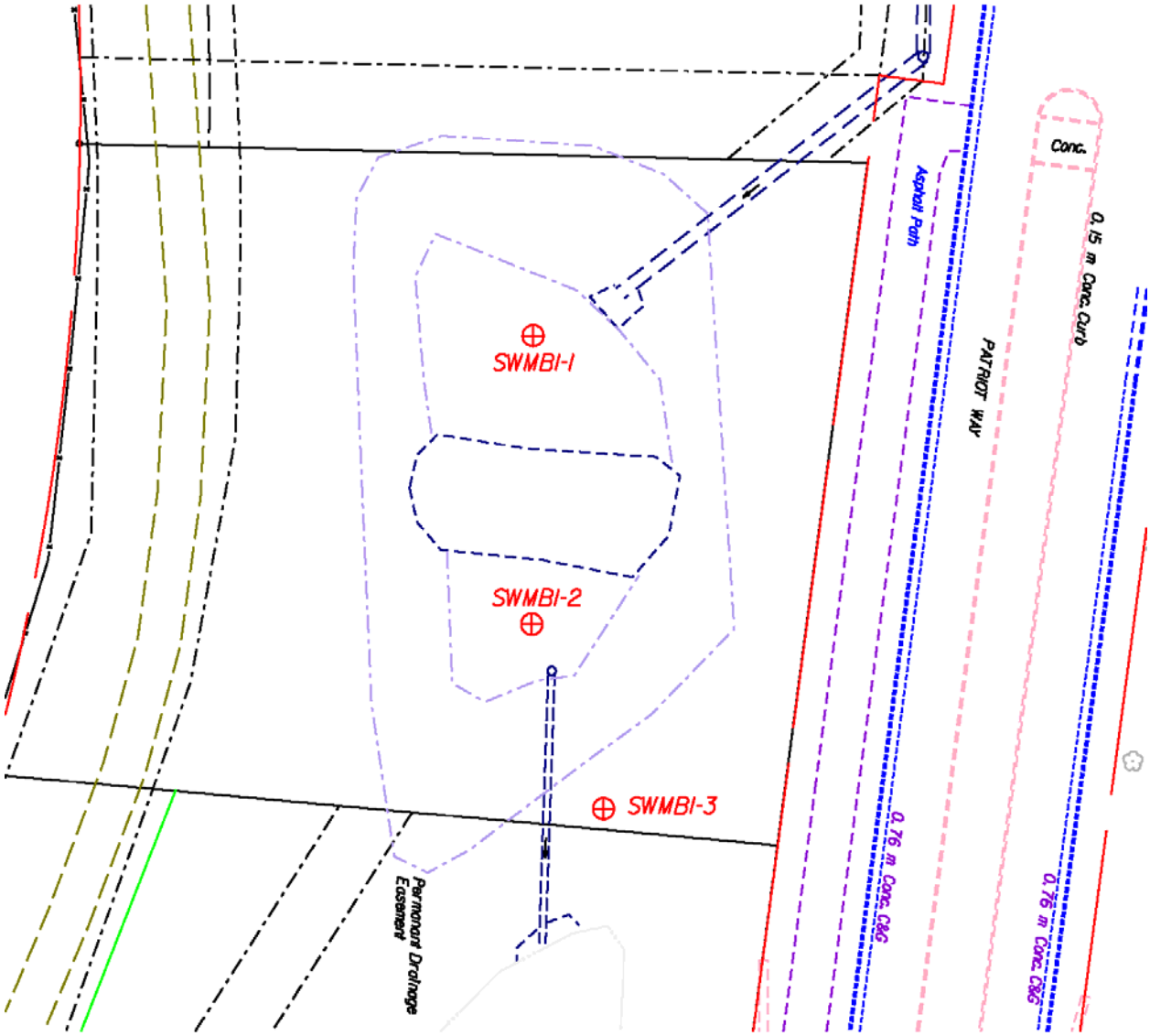
The information is available to bidders (upon request) in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation, and judgment by the bidders.

David T. Lee, PE
District Materials Engineer

Wade H. Pence, PG
District Engineering Geologist

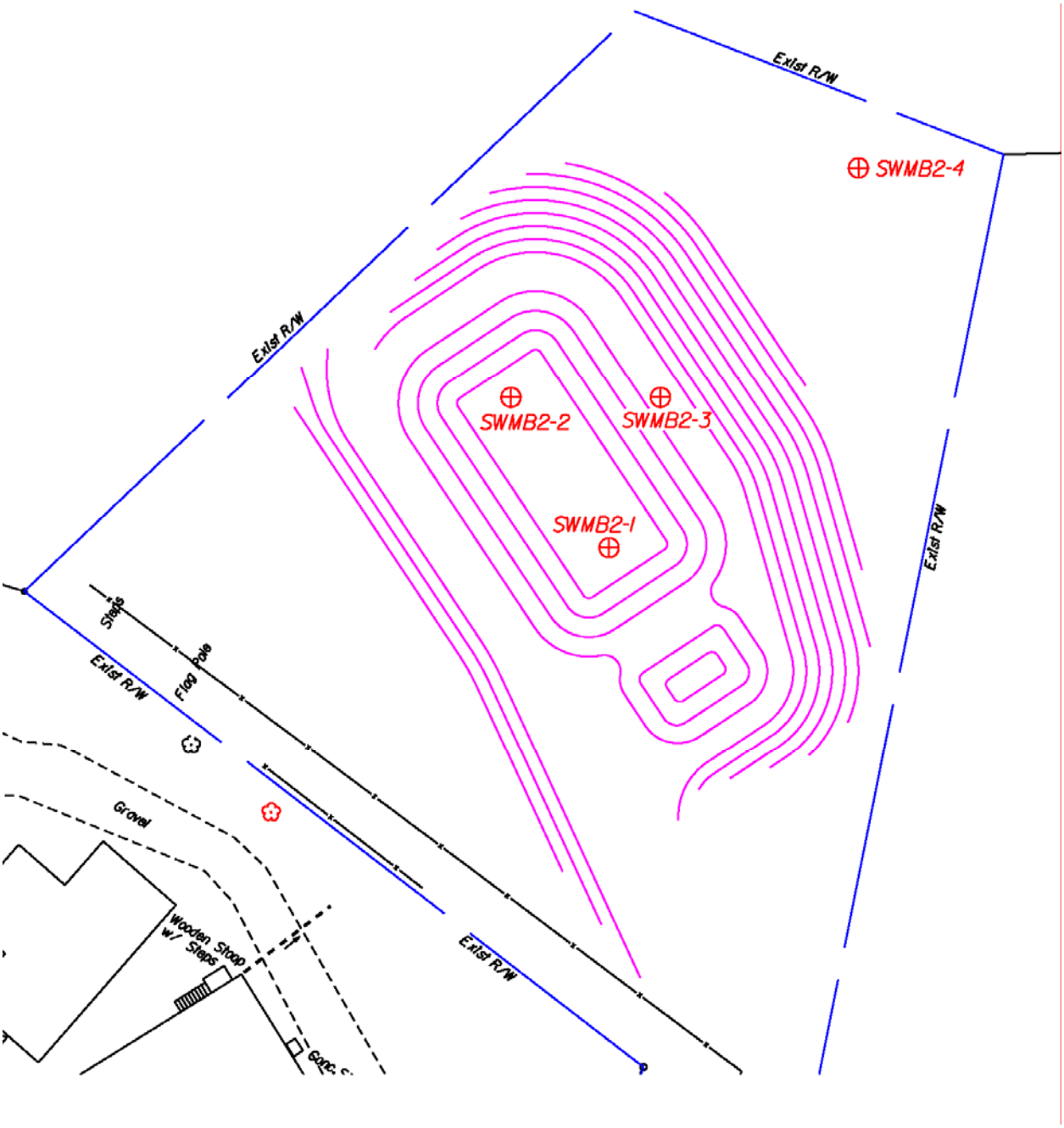
SAC/WHP
cy: Mr. R. P. Williams, PE
Mr. Dean Hackett, PE
Mr. Jay Crumpacker, PE
Mr. T. M. Dowdy
Project File

STORM WATER MANAGEMENT BASIN DETAIL
Plan Sheet 6D
Boring Location Sketch



No scale

STORM WATER MANAGEMENT BASIN DETAIL
Plan Sheet 10B
Boring Location Sketch



No scale

Form TL-32MC

VDOT

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

AASHTO R18

Report No.:	52-8049	Salem, VA	Date:	11/03/2010
Project:	0114-154-101, P101		Route No.:	114
County:	TOWN OF CHRISTIANSBURG		Sample No.:	1 of 2
Subm. By:	SAC		PPMS	8746 / 715
Date Sampled:	10/28/2010		Date Received:	10/29/2010
Location:	SWMB			
Field Description:	Gray-brown sandy Silt w/ organic debris, moist		Depth:	0.00m - 3.05m
ASTM Description:	**Sandy lean CLAY (CL)**			

Particle Size Analysis, VTM-25

Sieve	*% Passing*
2 1/2"	100.0
2"	100.0
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.8
No. 10	99.0
No. 20	97.1
No. 40	94.7
No. 60	90.4
No. 80	85.0
No. 100	81.0
No. 200	65.7

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**0.0%**
Natural Moisture	0.0%

Max Dry Density, AASHTO T 99

Total Soil		lbs/ft^3
-4 Portion	**0.0**	lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	32.0
Plastic Limit	15.4
Plasticity Index	16.6

Soil Classification :

AASHTO M 145	**A-6(8)**
ASTM D 2487	**CL**

CBR Data, AASHTO T 193

	Unsoaked	Before Soaking	After Soaking
CBR Value			**0.0**
% Moisture		#DIV/0!	#DIV/0!
% Density		#DIV/0!	#DIV/0!
Unit Weight (lbs/ft^3)		#DIV/0!	#DIV/0!
% Swell			**0.0**
% Moisture Top Inch			#DIV/0!

Remarks: BH-3; Sheet 6D (Dam)

Reported by: dcl

D.T. Lee, P.E.
District Materials Engineer

Form TL-32MC

VDOT

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

AASHTO R18

Report No.:	52-8050	Salem, VA	Date:	11/03/2010
Project:	0114-154-101, P101		Route No.:	114
County:	TOWN OF CHRISTIANSBURG		Sample No.:	2 of 2
Subm. By:	SAC		PPMS	8746 / 715
Date Sampled:	10/28/2010		Date Received:	10/29/2010
Location:	SWMB			
Field Description:	Tan-yellow fat Clay, trace silt & sand, relict structure, moist to wet		Depth:	3.05m - 4.85m
ASTM Description:	**Fat CLAY, with sand (CH)**			

Particle Size Analysis, VTM-25

Sieve	*% Passing*
2 1/2"	100.0
2"	100.0
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.4
No. 10	99.0
No. 20	97.7
No. 40	94.8
No. 60	90.2
No. 80	84.4
No. 100	80.8
No. 200	71.0

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**0.0%**
Natural Moisture	0.0%

Max Dry Density, AASHTO T 99

Total Soil		lbs/ft^3
-4 Portion	**0.0**	lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	78.3
Plastic Limit	22.6
Plasticity Index	55.7

Soil Classification :

AASHTO M 145	**A-7-6(40)**
ASTM D 2487	**CH**

CBR Data, AASHTO T 193

	Unsoaked	Before Soaking	After Soaking
CBR Value			**0.0**
% Moisture		#DIV/0!	#DIV/0!
% Density		#DIV/0!	#DIV/0!
Unit Weight (lbs/ft^3)		#DIV/0!	#DIV/0!
% Swell			**0.0**
% Moisture Top Inch			#DIV/0!

Remarks: BH-3; Sheet 6D (Dam)

Reported by: dcl

D.T. Lee, P.E.
District Materials Engineer

Form TL-32MC

VDOT

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

AASHTO R18

Report No.:	52-8051	Salem, VA	Date:	11/03/2010
Project:	0114-154-101, P101		Route No.:	114
County:	TOWN OF CHRISTIANSBURG		Sample No.:	1 of 2
Subm. By:	SAC		PPMS	8746 / 715
Date Sampled:	10/28/2010		Date Received:	10/29/2010
Location:	SWMB			
Field Description:	Tan-brown (orange tint) fat Clay, trace silt & sand, relict structure		Depth:	0.00m - 3.45m
ASTM Description:	**Fat CLAY, with sand (CH)**			

Particle Size Analysis, VTM-25

Sieve	*% Passing*
2 1/2"	100.0
2"	100.0
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.9
No. 10	99.1
No. 20	96.8
No. 40	93.5
No. 60	89.5
No. 80	84.9
No. 100	82.1
No. 200	73.9

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**0.0%**
Natural Moisture	0.0%

Max Dry Density, AASHTO T 99

Total Soil		lbs/ft^3
-4 Portion	**0.0**	lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	81.2
Plastic Limit	24.7
Plasticity Index	56.5

Soil Classification :

AASHTO M 145	**A-7-6(43)**
ASTM D 2487	**CH**

CBR Data, AASHTO T 193

	Unsoaked	Before Soaking	After Soaking
CBR Value			**0.0**
% Moisture		#DIV/0!	#DIV/0!
% Density		#DIV/0!	#DIV/0!
Unit Weight (lbs/ft^3)		#DIV/0!	#DIV/0!
% Swell			**0.0**
% Moisture Top Inch			#DIV/0!

Remarks: (1) BH-1; Sheet 10B
(2) BH-4; Sheet 10B Outfall

Reported by: DCL

D.T. Lee, P.E.
District Materials Engineer

Form TL-32MC

VDOT

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

AASHTO R18

Report No.:	52-8052	Salem, VA	Date:	11/03/2010
Project:	0114-154-101, P101		Route No.:	114
County:	TOWN OF CHRISTIANSBURG		Sample No.:	2 of 2
Subm. By:	SAC		PPMS	8746 / 715
Date Sampled:	10/28/2010		Date Received:	10/29/2010
Location:	SWMB			
Field Description:	Tan-brown clayey Silt w/ sand, moist 0		Depth:	0.00m - 2.00m
ASTM Description:	**Sandy fat CLAY (CH)**			

Particle Size Analysis, VTM-25

Sieve	*% Passing*
2 1/2"	100.0
2"	100.0
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	100.0
No. 10	99.5
No. 20	98.3
No. 40	96.2
No. 60	91.8
No. 80	85.5
No. 100	81.5
No. 200	69.8

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**0.0%**
Natural Moisture	0.0%

Max Dry Density, AASHTO T 99

Total Soil		lbs/ft^3
-4 Portion	**0.0**	lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	55.5
Plastic Limit	22.2
Plasticity Index	33.3

Soil Classification :

AASHTO M 145	**A-7-6(23)**
ASTM D 2487	**CH**

CBR Data, AASHTO T 193

	Unsoaked	Before Soaking	After Soaking
CBR Value			**0.0**
% Moisture		#DIV/0!	#DIV/0!
% Density		#DIV/0!	#DIV/0!
Unit Weight (lbs/ft^3)		#DIV/0!	#DIV/0!
% Swell			**0.0**
% Moisture Top Inch			#DIV/0!

Remarks: BH-4; Sheet 10B Outfall

Reported by: DCL

D.T. Lee, P.E.
District Materials Engineer

Form TL-32MC

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

Report No.:	52-8041	Salem, VA	Date:	09/20/2010
Project:	0114-154-101, P101		Route No.:	114
County:	Town of Christiansburg		Sample No.:	1
Subm. By:	SAC		PPMS	8746 / 714
Date Sampled:	08/25/2010		Date Received:	08/26/2010
Location:	22.5m Lt. Sta. 4+20			
Field Description:	Tan-ornage fat Clay w/ silt, trace sand, moist to wet		Depth:	0.0m - 3.0m

ASTM Description: **Sandy fat CLAY (CH)**

Particle Size Analysis, VTM-25

Sieve	*% Passing*
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.3
No. 10	98.7
No. 20	96.7
No. 40	91.1
No. 60	82.3
No. 80	73.7
No. 100	69.0
No. 200	56.7

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**25.2%**
Natural Moisture	34.5%

Max Dry Density, AASHTO T 99

Total Soil	lbs/ft^3
-4 Portion	**95.5** lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	73.9
Plastic Limit	24.6
Plasticity Index	49.3

Soil Classification :

AASHTO M 145	**A-7-6(25)**
ASTM D 2487	**CH**

CBR Data, AASHTO T 193

	Unsoaked	**Before Soaking**	**After Soaking**
CBR Value			**10.7**
% Moisture		25.2	28.7
% Density		101.4	99.4
Unit Weight (lbs/ft^3)		96.8	94.9
% Swell			**0.5**
% Moisture Top Inch			28.8

Remarks: From Sta. 3+00 To Sta. 7+90

Reported by: DCL

David T. Lee, P.E.
District Materials Engineer

Form TL-32MC

VDOT

VIRGINIA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
REPORT ON SAMPLE OF SOIL

AAR AASHTO R18

Report No.:	52-8043	Salem, VA	Date:	09/28/2010
Project:	0114-154-101, P101		Route No.:	114
County:	Town of Christiansburg		Sample No.:	3
Subm. By:	SAC		PPMS	8746 / 714
Date Sampled:	08/30/2010		Date Received:	08/30/2010
Location:	10m Rt. Sta. 11+40			
Field Description:	Tan-orange-red fat Clay, trace silt		Depth:	0.0m - 5.5m

ASTM Description: **Clayey SAND (SC)**

Particle Size Analysis, VTM-25

Sieve	*% Passing*
1 1/2"	100.0
1"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.8
No. 10	96.6
No. 20	83.6
No. 40	68.2
No. 60	56.6
No. 80	49.4
No. 100	45.9
No. 200	37.9

Optimum Moisture, AASHTO T 99

Total Soil	%
-4 Portion	**29.6%**
Natural Moisture	43.9%

Max Dry Density, AASHTO T 99

Total Soil	lbs/ft^3
-4 Portion	**88.7** lbs/ft^3

Atterberg Limits, AASHTO T 89, T 90

Liquid Limit	80.8
Plastic Limit	25.8
Plasticity Index	55.0

Soil Classification :

AASHTO M 145	**A-7-6(12)**
ASTM D 2487	**SC**

CBR Data, AASHTO T 193

	Unsoaked	Before Soaking	After Soaking
CBR Value			**11.4**
% Moisture		30.4	34.2
% Density		101.5	99.0
Unit Weight (lbs/ft^3)		90.0	87.8
% Swell			**0.9**
% Moisture Top Inch			33.0

Remarks: From Sta. 10+50 To Sta. 13+40

Reported by: DCL

David T. Lee, P.E.
District Materials Engineer

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. RW3-1
IN-SITU SOIL TESTING, L.C. PAGE 1
JOB FILE: Pepper's Ferry Road Retaining Wall 3--Proj. 0114-154-101, C501--Christiansburg FILE NO. : IST-0124
LOCATION: AS PLANNED -- Refusal at 8.4 m
SNDG.BY : R. Failmezger SNDG.DATE: 5-23-01
ANAL.BY : R. Failmezger ANAL.DATE: 5-24-01

ANALYSIS PARAMETERS: LO RANGE = 9.90 BARS ROD DIAM. = 3.57 CM BL.THICK. = 14.4 MM SU FACTOR = 1.00
SURF.ELEV. =631.60 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.00 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1.00
WATER DEPTH = 7.50 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.50 KGF/M DELTA-A = 0.21 BARS OCR FACTOR = 1.00
SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA/PHI = 0.50 DELTA-B = 0.18 BARS M FACTOR = 1.00
MAX SU ID = 0.60 SU OPTION = MARCHETTI MIN PHI ID = 1.20 OCR OPTION= MARCHETTI K0 FACTOR = 1.00
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	THRUST (KGF)	A (BAR)	B (BAR)	C (BAR)	DA (BAR)	DB (BAR)	ZMRNG (BAR)	ZMLO (BAR)	ZMHI (BAR)	ZMCAL (BAR)	P0 (BAR)	P1 (BAR)	P2 (BAR)	U0 (BAR)	GAMMA (T/M3)	SVP (BAR)
0.20	690.	0.94	5.10		0.21	0.18	9.90	0.00	0.00	0.00	0.96	4.92		0.000	1.80	0.035
0.40	740.	1.23	4.22		0.21	0.18	9.90	0.00	0.00	0.00	1.31	4.04		0.000	1.80	0.070
0.80	260.	0.26	1.20		0.21	0.18	9.90	0.00	0.00	0.00	0.44	1.02		0.000	1.60	0.137
1.00	520.	0.04	2.07		0.21	0.18	9.90	0.00	0.00	0.00	0.17	1.89		0.000	1.70	0.169
1.20	1000.	3.13	10.60		0.21	0.18	9.90	0.00	0.00	0.00	2.99	10.42		0.000	1.90	0.205
1.40	1860.	7.22	16.60		0.21	0.18	9.90	0.00	0.00	0.00	6.98	16.42		0.000	1.95	0.243
1.60	2210.	9.10	18.25		0.21	0.18	9.90	0.00	0.00	0.00	8.87	18.07		0.000	1.95	0.281
1.80	2130.	11.85	20.05		0.21	0.18	9.90	0.00	0.00	0.00	11.67	19.87		0.000	1.95	0.319
2.00	2220.	12.95	22.60		0.21	0.18	9.90	0.00	0.00	0.00	12.70	22.42		0.000	2.10	0.359
2.20	1560.	8.07	13.80		0.21	0.18	9.90	0.00	0.00	0.00	8.01	13.62		0.000	1.95	0.399
2.40	1040.	5.87	10.00		0.21	0.18	9.90	0.00	0.00	0.00	5.89	9.82		0.000	1.80	0.435
2.60	870.	5.79	9.60		0.21	0.18	9.90	0.00	0.00	0.00	5.83	9.42		0.000	1.80	0.471
2.80	650.	5.67	8.62		0.21	0.18	9.90	0.00	0.00	0.00	5.75	8.44		0.000	1.80	0.506
3.00	580.	4.34	7.23		0.21	0.18	9.90	0.00	0.00	0.00	4.42	7.05		0.000	1.80	0.541
3.20	430.	3.67	6.33		0.21	0.18	9.90	0.00	0.00	0.00	3.77	6.15		0.000	1.80	0.577
3.40	440.	3.89	5.68		0.21	0.18	9.90	0.00	0.00	0.00	4.03	5.50		0.000	1.70	0.611
3.60	460.	4.29	6.43		0.21	0.18	9.90	0.00	0.00	0.00	4.41	6.25		0.000	1.80	0.645
3.80	520.	4.32	6.87		0.21	0.18	9.90	0.00	0.00	0.00	4.42	6.69		0.000	1.80	0.681
4.00	600.	4.81	9.80		0.21	0.18	9.90	0.00	0.00	0.00	4.79	9.62		0.000	1.80	0.716
4.20	780.	3.40	8.78		0.21	0.18	9.90	0.00	0.00	0.00	3.36	8.60		0.000	1.80	0.751
4.40	1260.	7.23	16.60		0.21	0.18	9.90	0.00	0.00	0.00	6.99	16.42		0.000	1.95	0.788
4.60	1200.	3.30	6.82		0.21	0.18	9.90	0.00	0.00	0.00	3.35	6.64		0.000	1.80	0.825
4.80	900.	2.78	6.87		0.21	0.18	9.90	0.00	0.00	0.00	2.80	6.69		0.000	1.80	0.860
5.00	890.	2.42	5.63		0.21	0.18	9.90	0.00	0.00	0.00	2.49	5.45		0.000	1.70	0.895
5.20	810.	2.39	5.89		0.21	0.18	9.90	0.00	0.00	0.00	2.44	5.71		0.000	1.70	0.928
5.40	1410.	5.03	14.50		0.21	0.18	9.90	0.00	0.00	0.00	4.79	14.32		0.000	2.00	0.964
5.60	1660.	4.82	11.70		0.21	0.18	9.90	0.00	0.00	0.00	4.71	11.52		0.000	1.80	1.002
5.80	1480.	3.10	6.82		0.21	0.18	9.90	0.00	0.00	0.00	3.14	6.64		0.000	1.80	1.037
6.00	880.	2.90	4.49		0.21	0.18	9.90	0.00	0.00	0.00	3.05	4.31		0.000	1.70	1.071
6.20	1000.	2.57	9.25		0.21	0.18	9.90	0.00	0.00	0.00	2.47	9.07		0.000	1.90	1.107
6.40	1510.	1.93	5.81		0.21	0.18	9.90	0.00	0.00	0.00	1.97	5.63		0.000	1.80	1.143
6.60	1790.	4.32	19.20		0.21	0.18	9.90	0.00	0.00	0.00	3.81	19.02		0.000	2.00	1.180
6.80	1630.	2.48	5.18		0.21	0.18	9.90	0.00	0.00	0.00	2.57	5.00		0.000	1.70	1.217
7.00	1560.	4.50	18.00		0.21	0.18	9.90	0.00	0.00	0.00	4.05	17.82		0.000	2.00	1.253
7.20	2080.	1.72	12.50		0.21	0.18	9.90	0.00	0.00	0.00	1.41	12.32		0.000	1.90	1.291
7.40	1390.	1.38	4.53		0.21	0.18	9.90	0.00	0.00	0.00	1.45	4.35		0.000	1.80	1.327
7.60	780.	1.46	5.32		0.21	0.18	9.90	0.00	0.00	0.00	1.50	5.14		0.010	1.80	1.353
7.80	490.	0.71	2.77		0.21	0.18	9.90	0.00	0.00	0.00	0.84	2.59		0.029	1.70	1.368
8.00	450.	0.40	1.73		0.21	0.18	9.90	0.00	0.00	0.00	0.56	1.55		0.049	1.70	1.381
8.40	1700.	1.78	12.55		0.21	0.18	9.90	0.00	0.00	0.00	1.47	12.37		0.088	1.90	1.413

END OF SOUNDING (INTERPRETED SOIL PARAMETERS ON NEXT PAGE)

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
IN-SITU SOIL TESTING, L.C.
JOB FILE: Pepper's Ferry Road Retaining Wall 3--Proj. 0114-154-101, C501--Christiansburg
LOCATION: AS PLANNED -- Refusal at 8.4 m
SNDG.BY : R. Failmezger
ANAL.BY : R. Failmezger

SNDG. NO. RW3-1
PAGE 2
FILE NO. : IST-0124

SNDG.DATE: 5-23-01
ANAL.DATE: 5-24-01

ANALYSIS PARAMETERS:
SURF.ELEV. =631.60 M
WATER DEPTH = 7.50 M
SP.GR.WATER = 1.000
MAX SU ID = 0.60

LO RANGE = 9.90 BARS
LO GAGE 0 = 0.00 BARS
HI GAGE 0 = 0.00 BARS
CAL GAGE 0 = 0.00 BARS
SU OPTION = MARCHETTI

ROD DIAM. = 3.57 CM
FR.RED.DIA. = 4.00 CM
LIN.ROD WT. = 6.50 KGF/M
DELTA/PHI = 0.50
MIN PHI ID = 1.20

BL.THICK. = 14.4 MM
BL.WIDTH = 96.0 MM
DELTA-A = 0.21 BARS
DELTA-B = 0.18 BARS
OCR OPTION= MARCHETTI

SU FACTOR = 1.00
PHI FACTOR = 1.00
OCR FACTOR = 1.00
M FACTOR = 1.00
K0 FACTOR = 1.00

UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	KD	ID	UD	ED (BAR)	K0	SU (BAR)	QD (BAR)	PHI (DEG)	SIGFF (BAR)	PHIO (DEG)	PC (BAR)	OCR	M (BAR)	SOIL TYPE
0.20	27.47	4.12		137.									475.	SAND
0.40	18.63	2.08		95.									293.	SILTY SAND
0.80	3.23	1.31		20.	0.54		10.5	39.0	0.22	34.8	0.26	1.9	28.	SANDY SILT
1.00	0.99	10.25		60.									51.	SAND
1.20	14.58	2.49		258.	1.88		29.9	39.9	0.34	36.5	5.15	25.2	737.	SILTY SAND
1.40	28.78	1.35		328.	3.61		46.8	39.1	0.40	36.0	23.85	98.3	1147.	SANDY SILT
1.60	31.59	1.04		319.	3.59						20.81	74.1	1146.	SILT
1.80	36.57	0.70		285.	3.89						29.70	93.1	1061.	CLAYEY SILT
2.00	35.38	0.77		337.	3.82						31.73	88.4	1247.	CLAYEY SILT
2.20	20.10	0.70		195.	2.79						14.59	36.6	615.	CLAYEY SILT
2.40	13.53	0.67		136.	2.21						8.60	19.7	380.	CLAYEY SILT
2.60	12.38	0.62		125.	2.10						8.09	17.2	337.	CLAYEY SILT
2.80	11.37	0.47		93.	1.99	0.98					7.61	15.0	244.	SILTY CLAY
3.00	8.17	0.59		91.	1.62	0.69					4.87	9.0	209.	SILTY CLAY
3.20	6.53	0.63		83.	1.40						3.65	6.3	171.	CLAYEY SILT
3.40	6.60	0.36		51.	1.41	0.60					3.93	6.4	106.	SILTY CLAY
3.60	6.84	0.42		64.	1.44	0.66					4.39	6.8	135.	SILTY CLAY
3.80	6.50	0.51		79.	1.39	0.65					4.28	6.3	162.	SILTY CLAY
4.00	6.69	1.01		168.	1.42						4.71	6.6	352.	SILT
4.20	4.47	1.56		182.	0.87		22.6	31.7	1.15	30.0	3.18	4.2	314.	SANDY SILT
4.40	8.87	1.35		327.	1.40		27.6	31.8	1.20	30.2	10.25	13.0	780.	SANDY SILT
4.60	4.06	0.98		114.	1.00						2.49	3.0	182.	SILT
4.80	3.26	1.39		135.	0.69		30.5	33.3	1.33	31.9	2.22	2.6	190.	SANDY SILT
5.00	2.78	1.19		103.	0.74						1.50	1.7	127.	SILT
5.20	2.63	1.34		113.	0.63		28.6	32.4	1.43	31.2	1.90	2.0	136.	SANDY SILT
5.40	4.96	1.99		331.	0.87		43.7	34.6	1.51	33.5	4.33	4.5	611.	SILTY SAND
5.60	4.70	1.45		236.	0.80		55.0	36.0	1.59	35.0	3.92	3.9	418.	SANDY SILT
5.80	3.03	1.11		121.	0.79						1.98	1.9	160.	SILT
6.00	2.85	0.41		44.	0.75	0.37					1.86	1.7	53.	SILTY CLAY
6.20	2.23	2.68		229.	0.57		37.5	33.2	1.71	32.4	1.81	1.6	267.	SILTY SAND
6.40	1.72	1.86		127.	0.42		63.1	37.0	1.83	36.3	1.12	1.0	108.	SILTY SAND
6.60	3.22	4.00		528.	0.61		66.2	36.6	1.88	35.9	2.59	2.2	801.	SAND
6.80	2.12	0.94		84.	0.58						1.33	1.1	79.	SILT
7.00	3.24	3.40		478.	0.65		55.1	34.8	1.97	34.3	3.00	2.4	726.	SAND
7.20	1.09	7.73		379.	0.28		93.1	39.2	2.11	38.8	0.61	0.5	322.	SAND
7.40	1.09	2.00		101.	0.37		60.9	35.9	2.11	35.4	0.95	0.7	85.	SILTY SAND
7.60	1.10	2.45		126.	0.48		33.0	31.0	2.05	30.4	1.35	1.0	107.	SILTY SAND
7.80	0.59	2.17		61.	0.50		22.9	28.0	2.01	27.4	1.18	0.9	52.	SILTY SAND
8.00	0.37	1.92		34.	0.48		22.3	27.8	2.03	27.1	1.04	0.8	29.	SILTY SAND
8.40	0.98	7.88		378.	0.33		76.0	37.1	2.27	36.8	0.82	0.6	321.	SAND

END OF SOUNDING

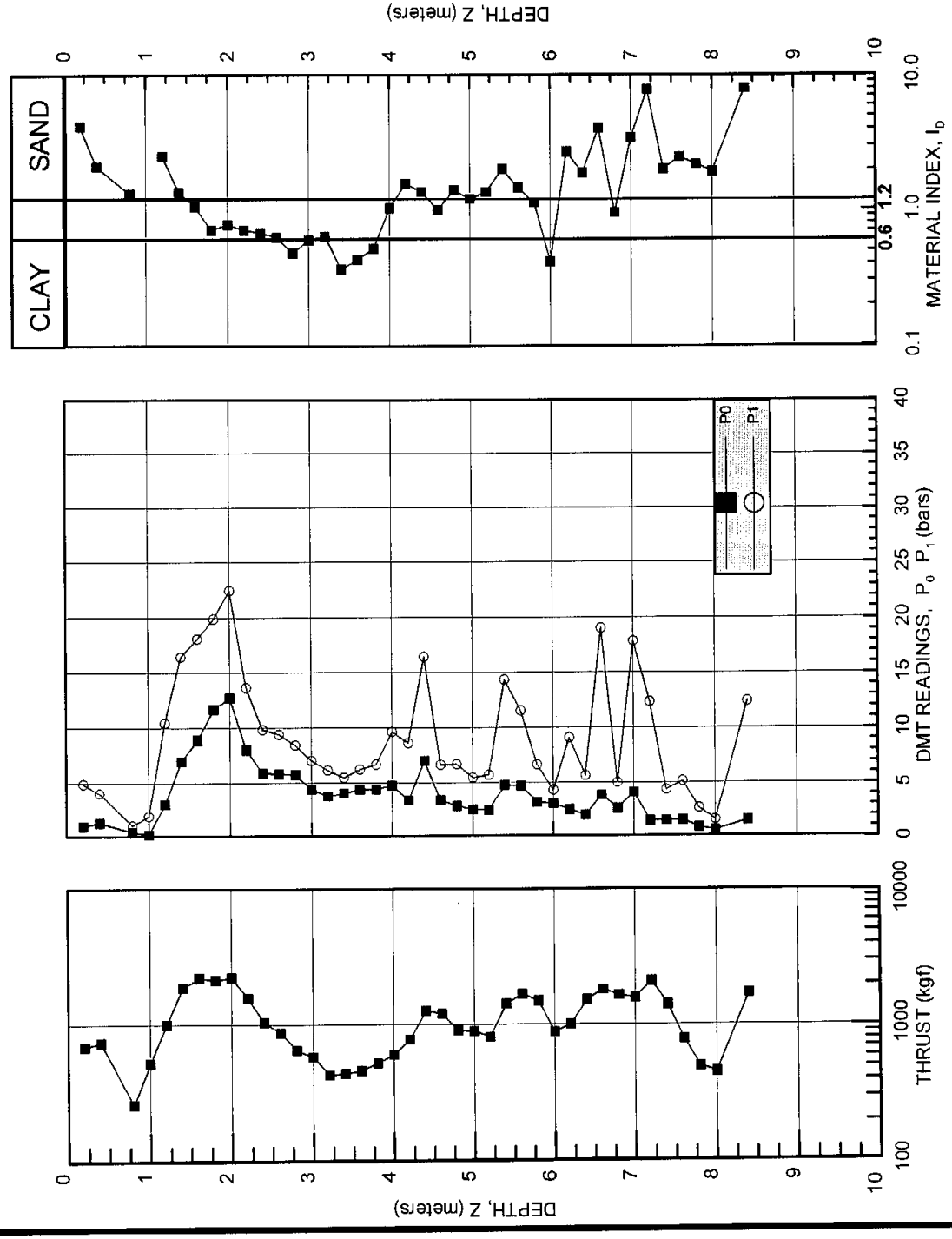
PROJECT: Pepper's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6-23-01

SOUNDING
RW3-1

DILATOMETER RESULTS

Ground Surface Elev.: ~631.6 m
Water Depth: ~7.5 m



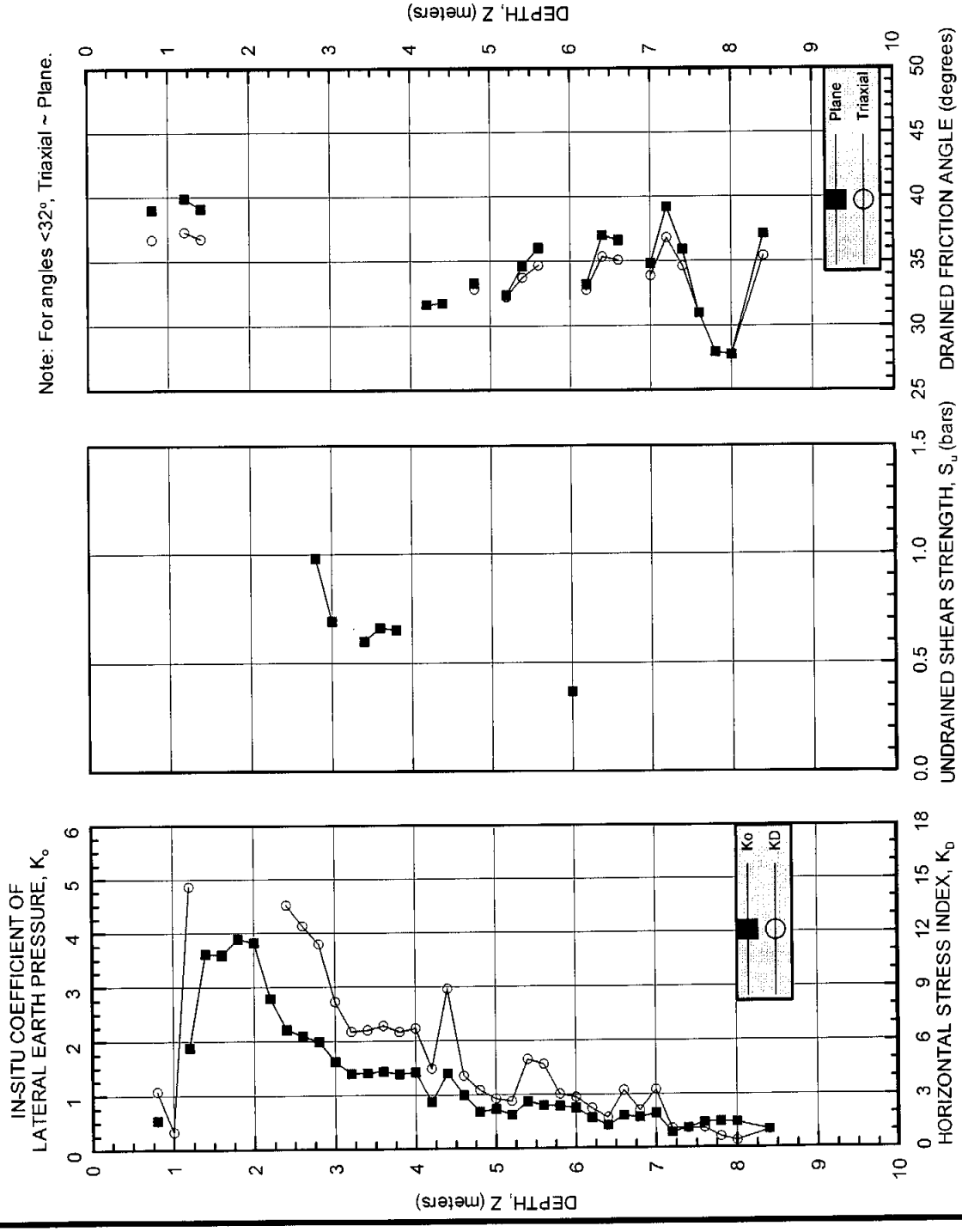
PROJECT: Perry's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmezger
SOUNDING DATE: 6-23-01

SOUNDING
RW3-1

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev.: ~631.6 m
Water Depth: ~7.5 m



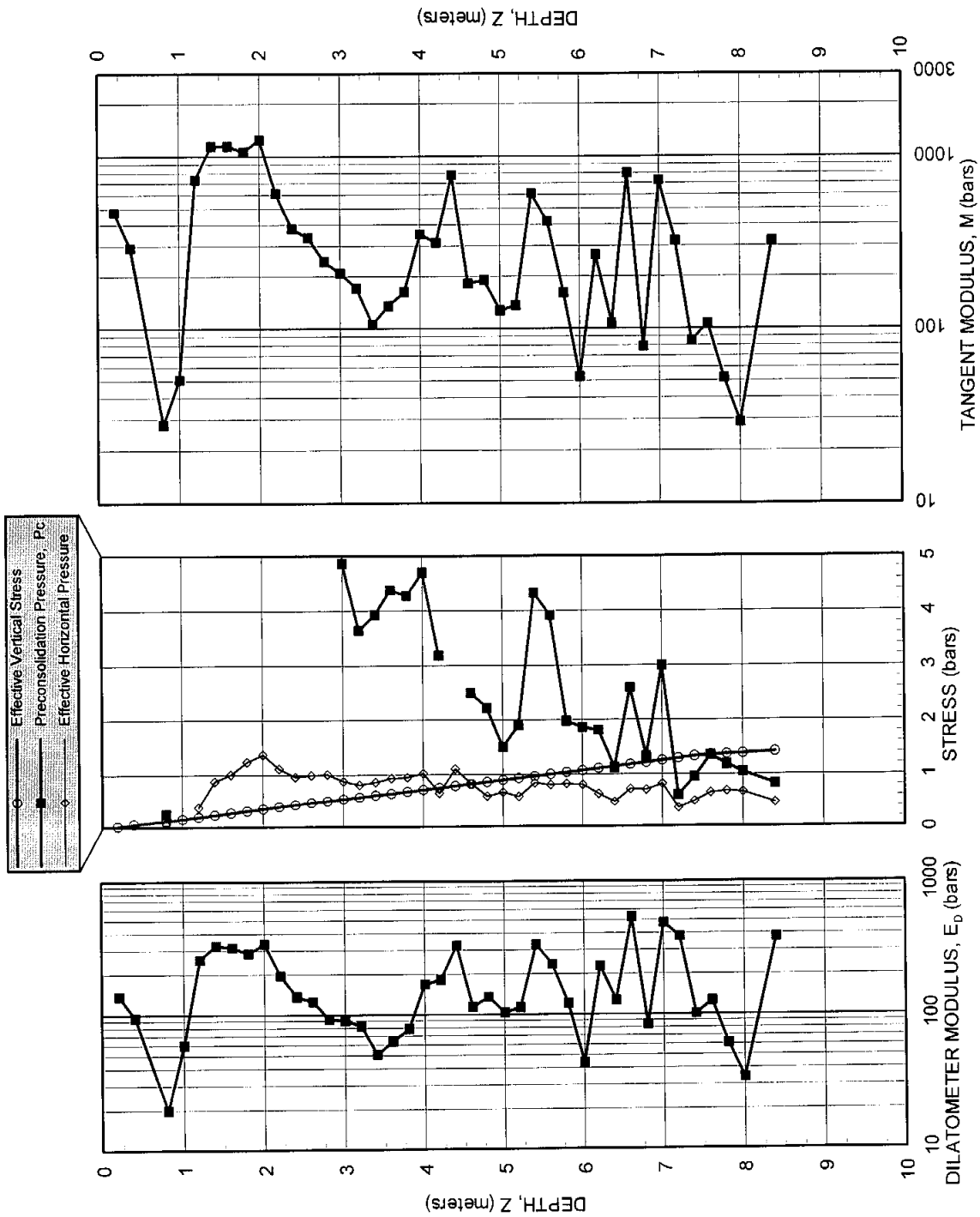
PROJECT: Pepper's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 5-23-01

SOUNDING
RW3-1

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~631.6 m
Water Depth: ~7.5 m



DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. RW3-2
IN-SITU SOIL TESTING, L.C. PAGE 1
JOB FILE: Pepper's Ferry Road Retaining Wall 3--Proj. 0114-154-101, C501--Christiansburg FILE NO. : IST-0124
LOCATION: AS PLANNED -- Refusal at 7.2 m
SNDG.BY : R. Failmezger SNDG.DATE: 5-23-01
ANAL.BY : R. Failmezger ANAL.DATE: 5-24-01

ANALYSIS PARAMETERS: LO RANGE = 9.90 BARS ROD DIAM. = 3.57 CM BL.THICK. = 14.4 MM SU FACTOR = 1.00
SURF.ELEV. =629.90 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.00 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1.00
WATER DEPTH = 6.40 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.50 KGF/M DELTA-A = 0.23 BARS OCR FACTOR = 1.00
SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA/PHI = 0.50 DELTA-B = 0.20 BARS M FACTOR = 1.00
MAX SU ID = 0.60 SU OPTION = MARCHETTI MIN PHI ID = 1.20 OCR OPTION= MARCHETTI K0 FACTOR = 1.00
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	THRUST (KGF)	A (BAR)	B (BAR)	C (BAR)	DA (BAR)	DB (BAR)	ZMRNG (BAR)	ZMLO (BAR)	ZMHI (BAR)	ZMCAL (BAR)	P0 (BAR)	P1 (BAR)	P2 (BAR)	U0 (BAR)	GAMMA (T/M3)	SVP (BAR)
0.20	180.	0.39	1.18		0.23	0.20	9.90	0.00	0.00	0.00	0.60	0.98		0.000	1.60	0.035
0.40	260.	0.33	1.40		0.23	0.20	9.90	0.00	0.00	0.00	0.53	1.20		0.000	1.60	0.066
0.60	380.	1.16	2.62		0.23	0.20	9.90	0.00	0.00	0.00	1.34	2.42		0.000	1.60	0.098
0.80	320.	1.20	2.64		0.23	0.20	9.90	0.00	0.00	0.00	1.38	2.44		0.000	1.60	0.129
1.00	340.	1.47	2.82		0.23	0.20	9.90	0.00	0.00	0.00	1.65	2.62		0.000	1.60	0.161
1.20	270.	1.32	2.12		0.23	0.20	9.90	0.00	0.00	0.00	1.53	1.92		0.000	1.60	0.192
1.40	250.	1.25	2.42		0.23	0.20	9.90	0.00	0.00	0.00	1.44	2.22		0.000	1.60	0.223
1.60	360.	1.24	2.31		0.23	0.20	9.90	0.00	0.00	0.00	1.44	2.11		0.000	1.60	0.255
1.80	530.	2.24	4.25		0.23	0.20	9.90	0.00	0.00	0.00	2.39	4.05		0.000	1.70	0.287
2.00	980.	6.18	11.55		0.23	0.20	9.90	0.00	0.00	0.00	6.16	11.35		0.000	1.95	0.323
2.20	1270.	8.93	14.15		0.23	0.20	9.90	0.00	0.00	0.00	8.92	13.95		0.000	1.90	0.361
2.40	1250.	8.89	13.50		0.23	0.20	9.90	0.00	0.00	0.00	8.91	13.30		0.000	1.90	0.398
2.60	1060.	6.39	9.95		0.23	0.20	9.90	0.00	0.00	0.00	6.46	9.75		0.000	1.80	0.434
2.80	730.	5.25	7.73		0.23	0.20	9.90	0.00	0.00	0.00	5.38	7.53		0.000	1.80	0.470
3.10	860.	5.69	9.13		0.23	0.20	9.90	0.00	0.00	0.00	5.77	8.93		0.000	1.80	0.523
3.20	850.	4.83	7.62		0.23	0.20	9.90	0.00	0.00	0.00	4.94	7.42		0.000	1.80	0.540
3.40	910.	6.68	10.65		0.23	0.20	9.90	0.00	0.00	0.00	6.73	10.45		0.000	1.80	0.576
3.60	940.	6.44	9.08		0.23	0.20	9.90	0.00	0.00	0.00	6.56	8.88		0.000	1.80	0.611
3.80	1180.	3.72	13.85		0.23	0.20	9.90	0.00	0.00	0.00	3.46	13.65		0.000	1.90	0.647
4.00	1180.	6.81	10.80		0.23	0.20	9.90	0.00	0.00	0.00	6.86	10.60		0.000	1.80	0.684
4.20	1400.	7.13	11.75		0.23	0.20	9.90	0.00	0.00	0.00	7.15	11.55		0.000	1.95	0.720
4.40	1440.	6.39	10.75		0.23	0.20	9.90	0.00	0.00	0.00	6.42	10.55		0.000	1.80	0.757
4.60	1550.	6.15	11.45		0.23	0.20	9.90	0.00	0.00	0.00	6.14	11.25		0.000	1.95	0.794
4.80	1520.	5.33	10.75		0.23	0.20	9.90	0.00	0.00	0.00	5.31	10.55		0.000	1.80	0.831
5.00	1470.	5.81	11.05		0.23	0.20	9.90	0.00	0.00	0.00	5.80	10.85		0.000	1.80	0.866
5.20	1150.	4.45	7.70		0.23	0.20	9.90	0.00	0.00	0.00	4.54	7.50		0.000	1.80	0.902
5.40	1190.	3.32	5.72		0.23	0.20	9.90	0.00	0.00	0.00	3.45	5.52		0.000	1.70	0.936
5.60	1240.	3.14	5.38		0.23	0.20	9.90	0.00	0.00	0.00	3.28	5.18		0.000	1.70	0.969
5.80	1050.	4.38	6.98		0.23	0.20	9.90	0.00	0.00	0.00	4.50	6.78		0.000	1.80	1.004
6.00	1150.	4.51	7.27		0.23	0.20	9.90	0.00	0.00	0.00	4.62	7.07		0.000	1.80	1.039
6.20	1220.	4.47	7.39		0.23	0.20	9.90	0.00	0.00	0.00	4.58	7.19		0.000	1.80	1.074
6.40	1210.	4.44	6.72		0.23	0.20	9.90	0.00	0.00	0.00	4.58	6.52		0.000	1.80	1.110
6.60	1220.	4.28	6.95		0.23	0.20	9.90	0.00	0.00	0.00	4.40	6.75		0.020	1.80	1.125
6.80	1150.	4.32	6.64		0.23	0.20	9.90	0.00	0.00	0.00	4.46	6.44		0.039	1.80	1.141
7.00	1030.	3.30	4.73		0.23	0.20	9.90	0.00	0.00	0.00	3.48	4.53		0.059	1.70	1.156
7.20	900.	2.90	4.41		0.23	0.20	9.90	0.00	0.00	0.00	3.08	4.21		0.079	1.70	1.169

END OF SOUNDING (INTERPRETED SOIL PARAMETERS ON NEXT PAGE)

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. RW3-2
IN-SITU SOIL TESTING, L.C. PAGE 2
JOB FILE: Pepper's Ferry Road Retaining Wall 3--Proj. 0114-154-101, C501--Christiansburg FILE NO. : IST-0124
LOCATION: AS PLANNED -- Refusal at 7.2 m
SNDG.BY : R. Failmezger SNDG.DATE: 5-23-01
ANAL.BY : R. Failmezger ANAL.DATE: 5-24-01

ANALYSIS PARAMETERS: LO RANGE = 9.90 BARS ROD DIAM. = 3.57 CM BL.THICK. = 14.4 MM SU FACTOR = 1.00
SURF.ELEV. =629.90 M LO GAGE 0 = 0.00 BARS FR.RED.DIA. = 4.00 CM BL.WIDTH = 96.0 MM PHI FACTOR = 1.00
WATER DEPTH = 6.40 M HI GAGE 0 = 0.00 BARS LIN.ROD WT. = 6.50 KGF/M DELTA-A = 0.23 BARS OCR FACTOR = 1.00
SP.GR.WATER = 1.000 CAL GAGE 0 = 0.00 BARS DELTA/PHI = 0.50 DELTA-B = 0.20 BARS M FACTOR = 1.00
MAX SU ID = 0.60 SU OPTION = MARCHETTI MIN PHI ID = 1.20 OCR OPTION= MARCHETTI K0 FACTOR = 1.00
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (M)	KD	ID	UD	ED (BAR)	K0	SU (BAR)	QD (BAR)	PHI (DEG)	SIGFF (BAR)	PHIO (DEG)	PC (BAR)	OCR	M (BAR)	SOIL TYPE
0.20	17.20	0.63		13.	2.55						1.00	28.7	40.	CLAYEY SILT
0.40	7.95	1.27		23.	0.99		9.6	42.5	0.11	37.6	0.46	7.0	53.	SANDY SILT
0.60	13.69	0.81		38.	2.23						1.96	20.1	105.	CLAYEY SILT
0.80	10.68	0.77		37.	1.92						1.76	13.6	94.	CLAYEY SILT
1.00	10.30	0.58		34.	1.87	0.27					2.07	12.9	85.	SILTY CLAY
1.20	7.98	0.25		13.	1.59	0.24					1.66	8.7	31.	CLAY
1.40	6.46	0.54		27.	1.39	0.21					1.39	6.2	55.	SILTY CLAY
1.60	5.64	0.47		23.	1.26	0.21					1.29	5.0	45.	SILTY CLAY
1.80	8.32	0.69		58.	1.64						2.66	9.3	133.	CLAYEY SILT
2.00	19.08	0.84		180.	2.70						10.90	33.7	560.	CLAYEY SILT
2.20	24.72	0.56		175.	3.13	1.84					18.24	50.5	586.	SILTY CLAY
2.40	22.38	0.49		152.	2.96	1.79					17.23	43.3	497.	SILTY CLAY
2.60	14.88	0.51		114.	2.34	1.17					9.94	22.9	328.	SILTY CLAY
2.80	11.45	0.40		75.	2.00	0.91					7.14	15.2	196.	SILTY CLAY
3.10	11.04	0.55		110.	1.95	0.97					7.51	14.4	284.	SILTY CLAY
3.20	9.15	0.50		86.	1.74	0.79					5.79	10.7	207.	SILTY CLAY
3.40	11.69	0.55		129.	2.03	1.15					9.05	15.7	342.	SILTY CLAY
3.60	10.73	0.35		81.	1.92	1.10					8.40	13.8	207.	SILTY CLAY
3.80	5.35	2.94		353.	0.87		38.4	36.3	1.03	34.6	3.07	4.7	691.	SILTY SAND
4.00	10.04	0.54		130.	1.84	1.13					8.47	12.4	325.	SILTY CLAY
4.20	9.92	0.62		153.	1.83						8.77	12.2	380.	CLAYEY SILT
4.40	8.48	0.64		143.	1.66						7.21	9.5	334.	CLAYEY SILT
4.60	7.73	0.83		177.	1.56						6.54	8.2	397.	CLAYEY SILT
4.80	6.39	0.99		182.	1.38						5.09	6.1	373.	SILT
5.00	6.70	0.87		175.	1.42						5.70	6.6	367.	CLAYEY SILT
5.20	5.03	0.65		103.	1.17						3.81	4.2	185.	CLAYEY SILT
5.40	3.69	0.60		72.	0.93	0.44					2.43	2.6	106.	SILTY CLAY
5.60	3.38	0.58		66.	0.87	0.41					2.20	2.3	92.	SILTY CLAY
5.80	4.49	0.51		79.	1.07	0.61					3.54	3.5	133.	SILTY CLAY
6.00	4.45	0.53		85.	1.07	0.62					3.62	3.5	142.	SILTY CLAY
6.20	4.26	0.57		91.	1.03	0.61					3.49	3.3	147.	SILTY CLAY
6.40	4.13	0.42		67.	1.01	0.60					3.43	3.1	107.	SILTY CLAY
6.60	3.89	0.54		82.	0.97	0.57					3.18	2.8	125.	SILTY CLAY
6.80	3.87	0.45		69.	0.96	0.57					3.20	2.8	105.	SILTY CLAY
7.00	2.96	0.31		36.	0.78	0.42					2.13	1.8	46.	CLAY
7.20	2.56	0.38		39.	0.69	0.35					1.72	1.5	43.	SILTY CLAY

END OF SOUNDING

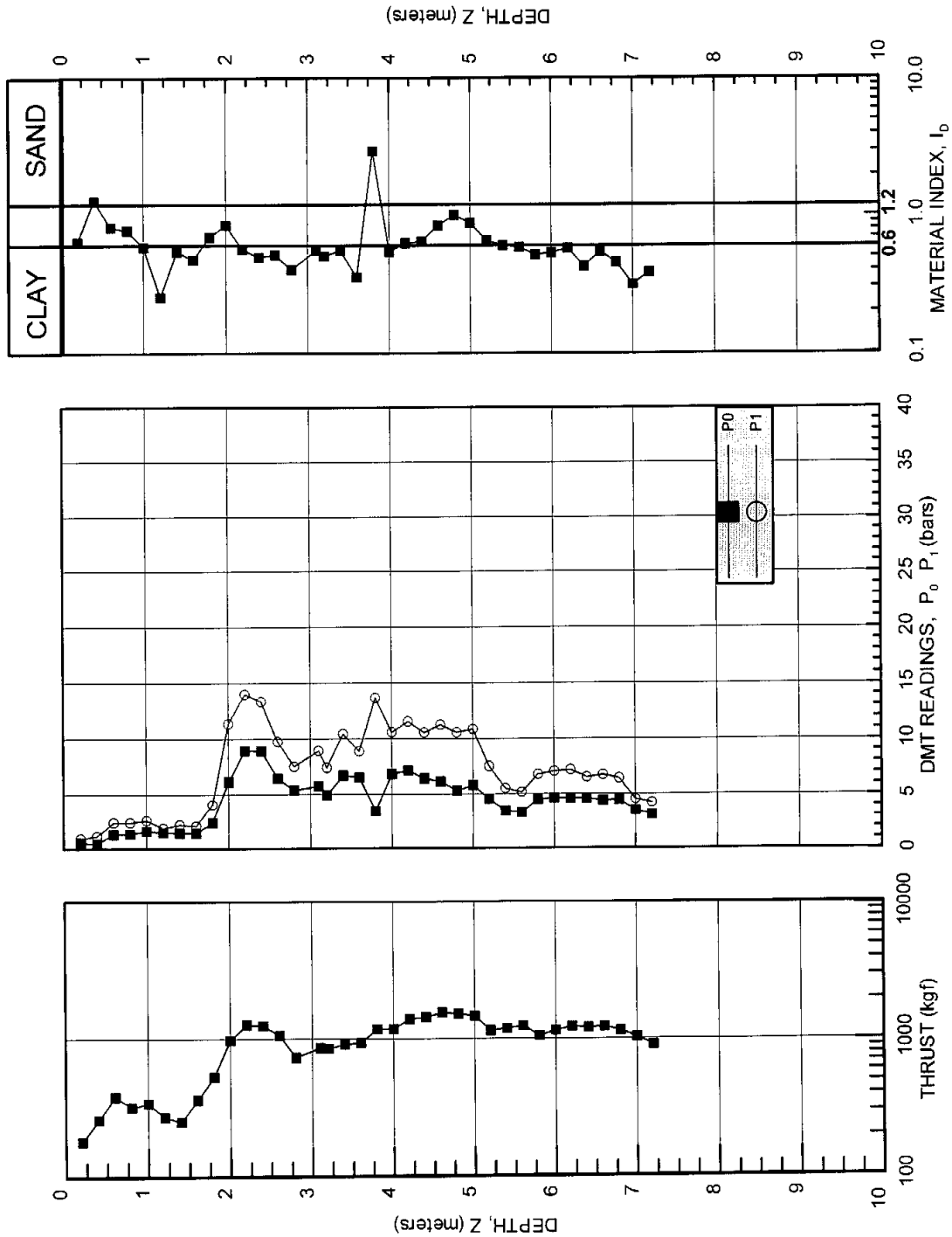
PROJECT: Pepper's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmezger
SOUNDING DATE: 5-23-01

SOUNDING
RW3-2

DILATOMETER RESULTS

Ground Surface Elev.: ~629.9 m
Water Depth: ~6.4 m



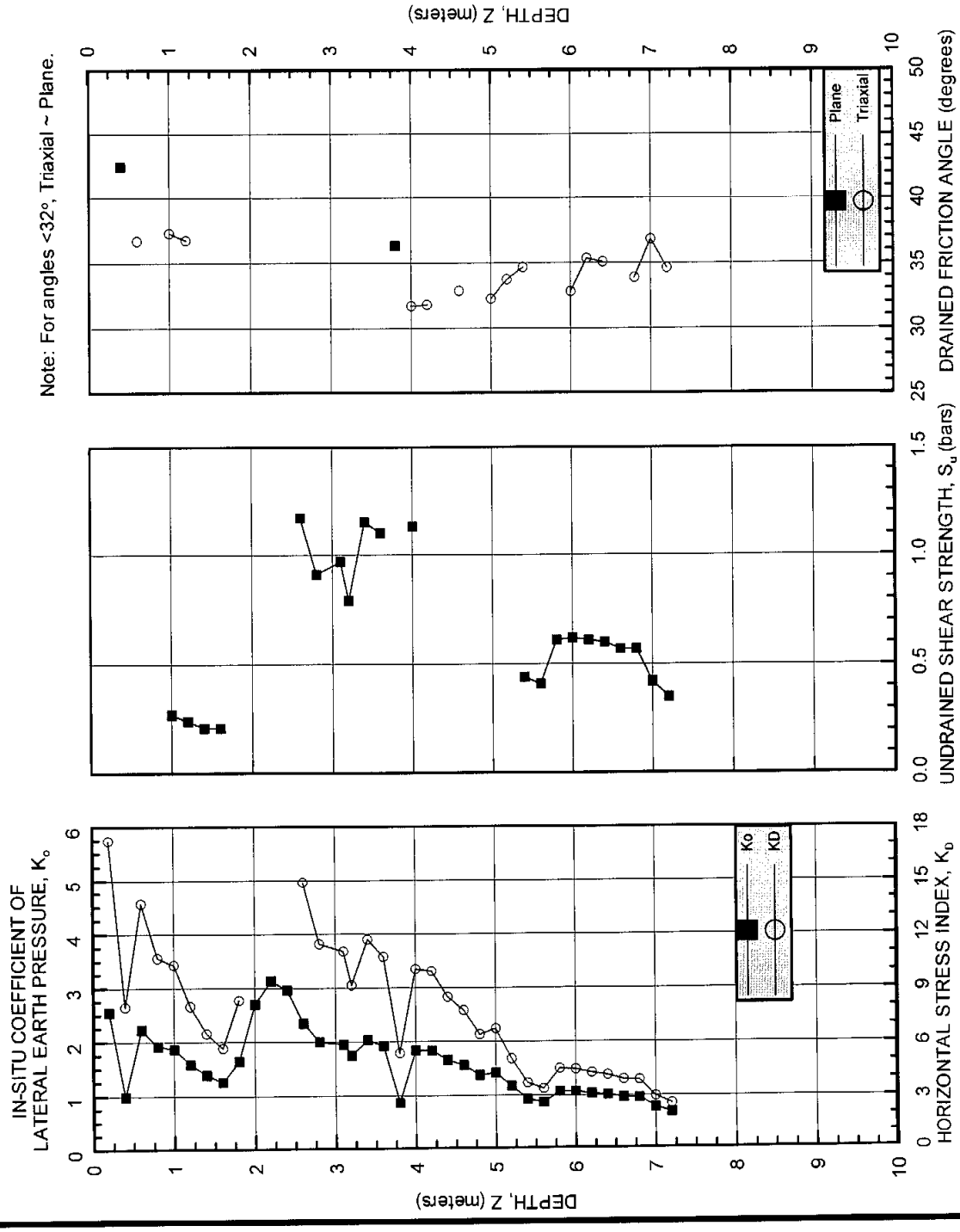
PROJECT: Perry's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 5-23-01

SOUNDING
RW3-2

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev.: ~629.9 m
Water Depth: ~6.4 m



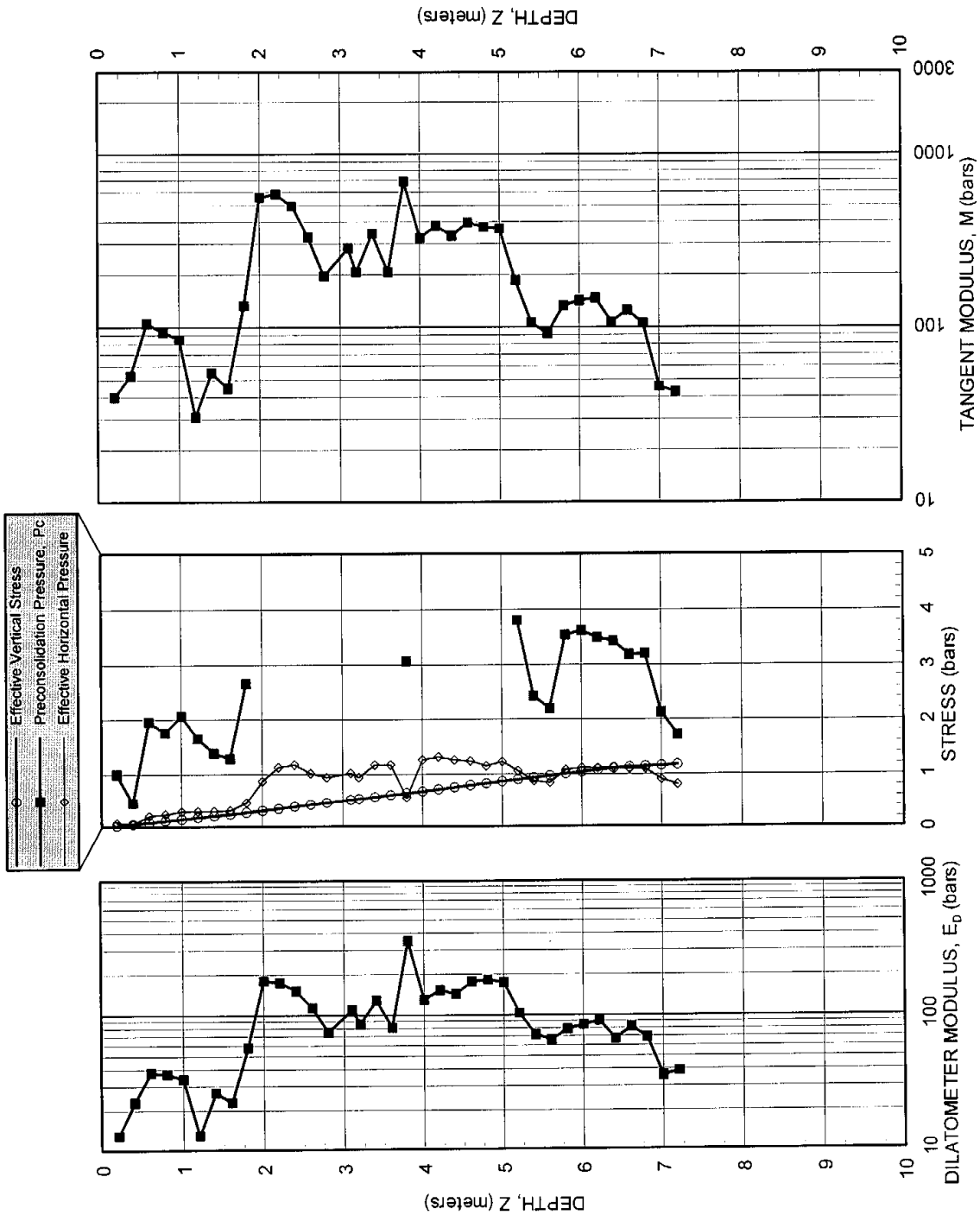
PROJECT: Pepper's Ferry Road Retaining Wall 3 -- 0114-154-101, C501
LOCATION: Christiansburg, Virginia

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Fallmezger
SOUNDING DATE: 5-23-01

SOUNDING
RW3-2

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~629.9 m
Water Depth: ~6.4 m



PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: STANDARD RW-3

RW1-1
PAGE 1 OF 1

STATION: 4+14 Const. BL
OFFSET: 23.5 M left
LATITUDE: 36.163318° N
LONGITUDE: 80.424809° W
SURFACE ELEVATION: 628.81 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/05/98 - 06/05/98
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JAW
Logger: JAW

GROUND WATER

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)
	628.5										0.00 / 628.81 Topsoil & Root Mat			
1	628.0										0.20 / 628.61 Fill Material: Reddish-tan, Silty CLAY with disintegrated rock fragments.			
	627.5	1	2	3	1.5 – 1.95									
2	627.0													
	626.5													
3	626.0	1	2	3	3 – 3.45									
	625.5										3.40 / 625.41 Residuum: Old TOPSOIL, Grayish-brown, CLAY with disintegrated rock fragments, trace organics.			
4	625.0										3.80 / 625.01 Residuum: Reddish-tan to yellow-tan, Silty CLAY with faint relict structure.			
	624.5	5	5	6	4.5 – 4.95									
	624.0										4.95 / 623.86 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

PAGE 1 OF 1
RW1-1

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: STANDARD RW-3

RW1-2
PAGE 1 OF 1

STATION: 4+36.5 Const. BL
OFFSET: 20.5 M left
LATITUDE: 36.163273° N
LONGITUDE: 80.425045° W
SURFACE ELEVATION: 627.93 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/05/98 - 06/05/98
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JAW
Logger: JAW

GROUND WATER

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)
											0.00 / 627.93 Topsoil & Root Mat			
	627.5										0.20 / 627.73 Fill Material: Reddish-tan, Silty CLAY with disintegrated rock fragments.			
1	627.0													
	626.5	2 2 3			1.45 1.9									
2	626.0													
	625.5													
3	625.0	3 3 4			2.8 3.25									
	624.5													
4	624.0													
	623.5	3 7 15			4.3 4.75						4.10 / 623.83 Residuum: Grayish-tan, Clayey Sandy SILT.			
											4.75 / 623.18 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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RW1-2

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: STANDARD RW-3

RW1-3
PAGE 1 OF 1

STATION: 4+51.5 Const. BL
OFFSET: 30.0 M left
LATITUDE: 36.163142° N
LONGITUDE: 80.425190° W
SURFACE ELEVATION: 627.90 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/05/98 - 06/05/98
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JAW
Logger: JAW

GROUND WATER

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
											0.00 / 627.90 Topsoil & Root Mat			
	627.5										0.20 / 627.70 Fill Material: Reddish-brown, Silty CLAY with disintegrated rock fragments.			
1	627.0													
	626.5	3 4	5		1.3 – 1.75									
2	626.0													
	625.5										2.50 / 625.40 Residuum: Old TOPSOIL, Grayish-brown, Silty CLAY with disintegrated rock fragments, trace organics.			
3	625.0	1 2	3		2.8 – 3.25						2.85 / 625.05 Residuum: Reddish-brown, Silty CLAY with trace manganese.			
	624.5													
4	624.0													
	623.5	2 2	3		4.3 – 4.75						4.75 / 623.15 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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RW1-3

SPT_LOG:RTE 114 MS.GPJ:8.2.004:090810:11/16/10

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: STANDARD RW-2

STATION: 13+82.5 Const. BL
OFFSET: 20.5 M left
LATITUDE: 36.162689° N
LONGITUDE: 80.435436° W
SURFACE ELEVATION: 631.61 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/08/98 - 06/08/98
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JAW
Logger: JAW

GROUND WATER

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)
	631.5										0.00 / 631.61 Crushed Aggregate			
	631.0										0.10 / 631.51 Residuum: Reddish-tan to yellow-tan, Silty CLAY.			
1	630.5										1.10 / 630.51 Residuum: GRAVEL Layer			
	630.0	2 3 6			1.4 – 1.85						1.30 / 630.31 Residuum: Yellow-tan to grayish-tan, Clayey SILT with relict structure and disintegrated Shaley rock fragments increasing with depth.			
2	629.5													
	629.0													
3	628.5	1 4 4			2.9 – 3.35									
	628.0													
4	627.5													
	627.0	3 4 3			4.4 – 4.85									
5	626.5													
	626.0													
6	625.5	5 5 3			5.9 – 6.35									
	625.0													
7	624.5													
	624.0	10 17 20			7.4 – 7.85						7.40 / 624.21 Residuum: Grayish-tan disintegrated Shaley DOLOMITE.			
											7.85 / 623.76 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: STANDARD RW-2

RW2-2
PAGE 1 OF 1

STATION: 14+04.5 Const. BL
OFFSET: 23.5 M left
LATITUDE: 36.162745° N
LONGITUDE: 80.435795° W
SURFACE ELEVATION: 629.91 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/08/98 - 06/08/98
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JAW
Logger: JAW

GROUND WATER

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)
											0.00 / 629.91 Topsoil & Root Mat			
	629.5										0.20 / 629.71 Residuum: Reddish-tan, reddish-brown, and grayish- brown, Silty CLAY with sand and gravel sized disintegrated rock fragments, relict structure.			
1	629.0													
	628.5	2			1.5									
		4												
2	628.0		5		1.95									
	627.5													
3	627.0	3			3									
		4												
	626.5		3		3.45									
4	626.0													
	625.5	2			4.5									
		3												
5	625.0		3		4.95									
	624.5													
6	624.0	2			6									
		3												
	623.5		4		6.45									
7	623.0										6.90 / 623.01 Weathered BEDROCK			
	622.5	50R			7.5						7.50 / 622.41 Sampler Refusal - Bottom of Boring			
					7.95									

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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RW2-2

SPT_LOG:RTE 114 MS.GPJ:8.2.004:090810:11/16/10

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 6D

SWMB1-1

STATION: Sketch
OFFSET:
LATITUDE: 37.163900° N
LONGITUDE: 80.430594° W
SURFACE ELEVATION: 611.56 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 0.50M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	611.5										0.00 / 611.56 FILL MATERIAL: Tan-gray, Sandy SILT, contains Clay, trace angular Gravel, firm, moist.			
	611.0	2 3 4	100		0.3 0.75						0.65 / 610.91 RESIDUUM: Tan-yellow, Fat CLAY, trace Silt and Sand, relict structure, firm, moist to wet.			
1	610.5	2 3 3	100		0.9 1.35									
	610.0	1 3 4	100		1.5 1.95						1.95 / 609.61 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 6D

SWMB1-2
PAGE 1 OF 1

STATION: Sketch
OFFSET:
LATITUDE: 37.164072° N
LONGITUDE: 80.430667° W
SURFACE ELEVATION: 611.45 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 0.80M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	611.0	2 3 6	100		0.3 – 0.75						0.00 / 611.45 FILL MATERIAL: Tan-gray, Sandy SILT, contains Clay, trace angular Gravel, firm to stiff, moist.			
1	610.5	2 5 6	100		0.9 – 1.35									
	610.0	2 3 4	100		1.45 – 1.9						1.30 / 610.15 RESIDUUM: Tan-yellow, Fat CLAY, trace Silt and Sand, relict structure, firm, moist to wet.			
											1.90 / 609.55 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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SWMB1-2

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 6D

SWMB1-3

STATION: Sketch
OFFSET:
LATITUDE: 37.164164° N
LONGITUDE: 80.430767° W
SURFACE ELEVATION: 613.56 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 1.75M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	613.5										0.00 / 613.56 FILL MATERIAL: Tan-gray, Lean CLAY, contains Silt, moist.			
	613.0													
1	612.5													
	612.0	4 7 6	100		1.4 – 1.85						1.25 / 612.31 ALLUVIUM: Gray-brown, Sandy SILT with organic debris (roots/sticks), stiff, moist.	32	17	
2	611.5													
	611.0	3 5 4	100		2.3 – 2.75									
3	610.5	3 5 7	100		2.9 – 3.35						3.05 / 610.51 RESIDUUM: Tan-yellow, Fat CLAY, trace Silt and Sand, relict structure, firm, moist to wet.	78	56	31.2
	610.0													
4	609.5													
	609.0	1 2 3	100		4.4 – 4.85						4.85 / 608.71 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 10B

SWMB2-1

STATION: Sketch
OFFSET:
LATITUDE: 37.162394° N
LONGITUDE: 80.438419° W
SURFACE ELEVATION: 623.46 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 1.35M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	623.0	4 4 5	100		0.3 – 0.75						0.00 / 623.46 RESIDUUM: Tan-brown (orange tint), Fat CLAY, trace Silt and Sand, relict structure, firm to stiff, moist to wet.			
1	622.5	3 4 6	100		0.9 – 1.35									
	622.0	3 5 7	100		1.5 – 1.95							81	57	30.3
2	621.5													
	621.0													
3	620.5	1 2 4	100		3 – 3.45						3.45 / 620.01 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 10B

SWMB2-2
PAGE 1 OF 1

STATION: Sketch
OFFSET:
LATITUDE: 37.162325° N
LONGITUDE: 80.438292° W
SURFACE ELEVATION: 623.92 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 1.15M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	623.5	3 4 6	100		0.3 – 0.75						0.00 / 623.92 RESIDUUM: Tan-brown (orange tint), Fat CLAY, trace Silt and Sand, relict structure, firm to stiff, moist to wet.			
1	623.0	4 6 10	100		0.9 – 1.35									
	622.5	6 33R	67		1.5 – 1.95									
2	622.0										1.80 / 622.12 BEDROCK: LIMESTONE Bedrock ledge - deflected boring - unable to sample 2.15 / 621.77 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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SWMB2-2

SPT_LOG:RTE 114 MS.GPJ:8.2.004:090810:11/16/10

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 10B

SWMB2-3
PAGE 1 OF 1

STATION: Sketch
OFFSET:
LATITUDE: 37.162272° N
LONGITUDE: 80.438414° W
SURFACE ELEVATION: 621.61 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 1.05M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	621.5										0.00 / 621.61 RESIDUUM: Tan-brown (orange tint), Fat CLAY, trace Silt and Sand, relict structure, firm to stiff, moist to wet.			
		1 3 4	100		0.3 – 0.75									
	621.0													
1		2 4 5	100		0.9 – 1.35									
	620.5													
		1 3 6	100		1.5 – 1.95									
	620.0													
2	619.5													
	619.0													
3	618.5	1 2 3	100		3 – 3.45						3.45 / 618.16 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

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SWMB2-3

SPT_LOG:RTE 114 MS.GPJ:8.2.004:090810:11/16/10

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PROJECT #: 0114-154-101, P101 **UPC:** 8746
LOCATION: Christiansburg
STRUCTURE: SWMB - SHEET 10B

SWMB2-4
PAGE 1 OF 1

STATION: Sketch
OFFSET:
LATITUDE: 37.162078° N
LONGITUDE: 80.438519° W
SURFACE ELEVATION: 619.82 m
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/28/10 - 10/28/10
Drilling Method(s): Hollow Stem Auger
SPT Method: Automatic Hammer
Other Test(s):
Driller: JLO
Logger: SAC

GROUND WATER

CAVE IN @ 1.25M AFTER 48 HRS

LAB DATA

DEPTH (m)	ELEVATION (m)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
	619.5	1 4 4	100		0.3						0.00 / 619.82 ALLUVIUM: Tan-brown, Clayey SILT with Sand, firm to stiff, moist to wet.			
1	619.0	2 3 7	100		0.75 0.9							56	33	18.8
	618.5	2 5 7	100		1.35 1.5									
2	618.0				1.95						2.00 / 617.82 RESIDUUM: Tan-brown (orange tint), Fat CLAY, trace Silt and Sand, relict structure, firm to stiff, moist to wet.			
	617.5										2.70 / 617.12 Bottom of Boring			

REMARKS: BM: Locations and elevations established by VDOT Geology Crew. Rig Type: CME 550X.

VDOT METRIC

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SWMB2-4

SPT_LOG:RTE 114 MS.GPJ:8.2.004:090810:11/16/10

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