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Engineered Covers for Waste Containment: Changes in Engineering Properties and Implications for Long-Term Performance Assessment – Appendices

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Engineered Covers for Waste Containment: Changes in Engineering Properties and Implications for Long-Term Performance Assessment – Appendices

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ABSTRACT

This peer-reviewed study demonstrates that engineering properties of cover soils change while in service and that long-term engineering properties should be used as input to models employed for performance assessments. Recommendations for appropriate input are made based on the data that were collected. Increases in the saturated hydraulic conductivity, saturated volumetric water content, and the air entry suction (as characterized by van Genuchten's α parameter) occurred due to formation of soil structure, regardless of climate, cover design, or service life. Substantial changes in hydraulic conductivity were observed in some geosynthetic clay liners (GCLs) that did not hydrate completely and underwent cation exchange. Changes in geomembranes and geosynthetic drainage layers were modest or small, and computations based on antioxidant depletion rates suggest that the minimum service life of geomembranes is on the order of 50-125 yrs (the actual service life will be longer). The findings indicate that covers should be monitored to ensure that they are functioning as intended. Monitoring using pan lysimeters combined with secondary measurements collected for interpretive purposes is recommended. Future research investments should include an evaluation of remote sensing technologies for cover monitoring and analog studies to estimate properties of earthen and geosynthetic cover materials corresponding to service lives of 100s to 1000s of years.

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EXECUTIVE SUMMARY

In this peer-reviewed study, final covers at test facilities and operating waste containment facilities were exhumed to evaluate how the properties of the cover materials changed 4.0-8.9 yr after installation (6.3 yr on average). Field tests were conducted, samples were collected, laboratory testing was performed, and data analyses were conducted. The findings demonstrate that engineering properties of cover soils change while in service and that long-term engineering properties should be used as input to models employed for performance assessments. Recommendations for appropriate input are made based on the data that were collected.

Changes in hydraulic properties occurred in all cover soils evaluated due to the formation of soil structure, regardless of climate, cover design, or service life. The saturated hydraulic conductivity and the α parameter for the soil water characteristic curve (SWCC) increased, which reflects formation of larger pores due to pedogenic processes such as wet-dry and freeze-thaw cycling. Larger changes were observed for soils with lower as-built saturated hydraulic conductivity and soils with a greater proportion of clay particles in the fines fraction. Hydraulic properties of the cover soils were similar when exhumed, regardless of the as-built condition. Test scale had a significant effect on the hydraulic properties, with conditions near field-scale obtained using 0.3-m test specimens.

Substantial changes were also observed in some geosynthetic clay liners (GCLs). Analysis showed that GCLs have very low saturated hydraulic conductivity ($< 5 \times 10^{-11}$ m/s) when placed on a moist subgrade (water content > 10%) and covered with a geomembrane and cover soil soon after installation. GCLs installed under other conditions can be much more permeable. GCLs that underwent and maintained complete hydration with osmotic swell retained low hydraulic conductivity even when Na was replaced by Ca and Mg provided they did not dehydrate. GCLs that undergo osmotic swell and are covered with a geomembrane surcharged with cover soils are expected to retain low hydraulic conductivity provided the geomembrane remains intact.

Changes in geomembranes and geosynthetic drainage layers were modest or small. Analysis of antioxidants in geomembranes showed that antioxidant depletion was reasonably consistent with expectations based on first-order kinetics and laboratory-measured depletion rates. Based on antioxidant depletion, the minimum service life of geomembranes is on the order of 50-125 yrs. Actual service lives may be longer but are difficult to predict based on the limited information available today.

Because changes in the engineering properties of cover materials are commonplace, and significant in some cases, monitoring of covers should be conducted to ensure they are functioning as intended. Monitoring using pan lysimeters combined with secondary measurements collected for interpretive purposes (water content, temperature, vegetation surveys, etc.) is recommended. Future research investments should explore how remote sensing technologies can be used for cover monitoring.

This study represents a snap shot in the evolution of final covers approximately 5 to 10 yr after construction. Additional research investments are needed to more accurately and completely define very long-term properties of earthen and geosynthetic cover materials corresponding to 100s or 1000s of years. These research investments should include analog studies of natural environments where earthen and natural polymeric materials exist as well as accelerated laboratory experiments that can be used to develop predictive degradation models.

ACKNOWLEDGEMENT

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The research report was peer reviewed by an expert panel consisting of Charles D. Shackelford, John D. McCartney, and George R. Koerner. The authors of the research report considered and incorporated their comments and suggestions when finalizing the report.

ABBREVIATIONS

Acronyms

ACAP	Alternative Cover Assessment Program
BC	bound cations
CEC	cation exchange capacity
CMH	chilled mirror hygrometer
CMP	common midpoint
D	diameter
DW	deionized water
ET	evapotranspiration
GCL	geosynthetic clay liner
GDL	geosynthetic drainage layer
GM	geomembrane
GPR	ground penetrating radar
H	depth of water in outer ring of SDRI
HDPE	high density polyethylene
H_b	height of water in bubbling tube in BH relative to base of borehole
I	infiltration rate
ICP-OES	inductively coupled plasma – optical emissions spectrometry
I_s	ionic strength
K	hydraulic conductivity
L_f	depth of the wetting front
LLDPE	linear low density polyethylene
MARV	minimum average role value
MDR	charge ratio of monovalent to divalent soluble cations
MFI	melt flow index

MSW municipal solid waste

OIT oxidation induction time

PET potential evapotranspiration

Q volumetric flow rate

RMD ratio of monovalent to divalent cations in a solution

SC soluble cations

SDRI sealed double-ring infiltrometer

SI swell index

SW standard water (0.01 M $CaCl_2$)

SWCC soil water characteristic curve

TDR time domain reflectometry

BH borehole permeameter

TCM total soluble cations charge per mass

USCS Unified Soil Classification System

USEPA US Environmental Protection Agency

Western Symbols

Ca calcium

Cl chlorine

K potassium

K_F field-measured saturated hydraulic conductivity

K_s saturated hydraulic conductivity

K_{sa} as-built saturated hydraulic conductivity

K_{SDRI} field-measured hydraulic conductivity with SDRI

K_{si} in-service saturated hydraulic conductivity

K_{BH} field-measured hydraulic conductivity with BH permeameter

n	shape parameter in van Genuchten's equation
n_{LS}	shape parameter in van Genuchten's equation from large-scale tests
n_{SS}	shape parameter in van Genuchten's equation from small-scale tests
n_a	shape parameter in van Genuchten's equation from as-built test section
Na	sodium
Mg	magnesium
p	p statistic from t-test
t	t statistic from t-test
X_m	mole fraction of monovalent cations

Greek Symbols

α	shape parameter in van Genuchten's equation
α_a	shape parameter in van Genuchten's equation from as-built test section
α_{LS}	shape parameter in van Genuchten's equation from large-scale tests
α_{SS}	shape parameter in van Genuchten's equation from small-scale tests
γ_{dmax}	maximum dry unit weight on compaction curve
θ	volumetric water content
θ_r	residual volumetric water content
θ_s	saturated volumetric water content
Θ	effective saturation
σ	standard deviation

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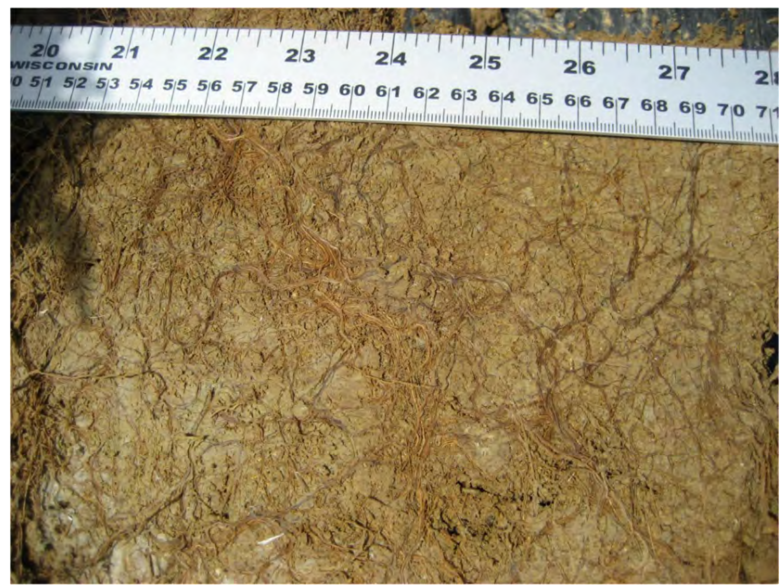

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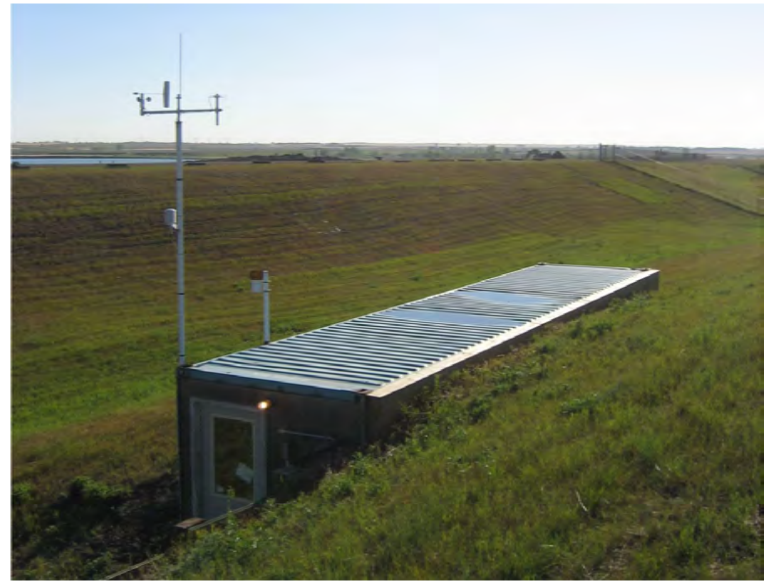
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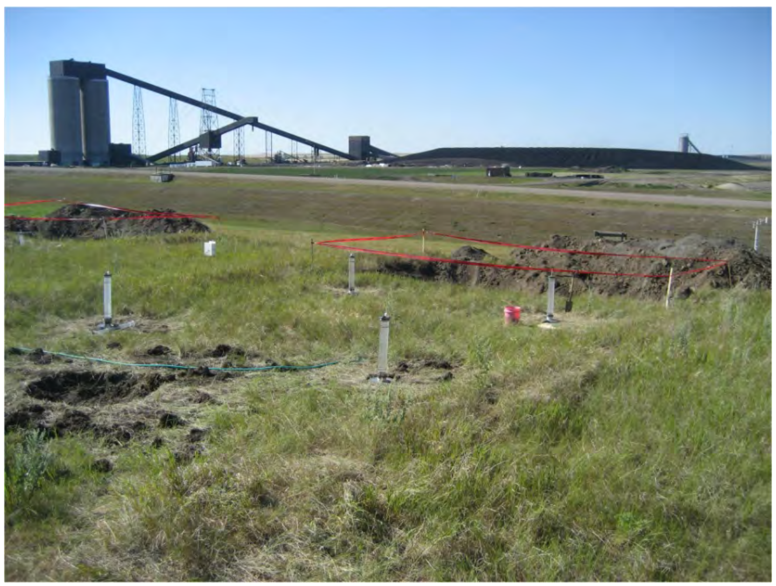
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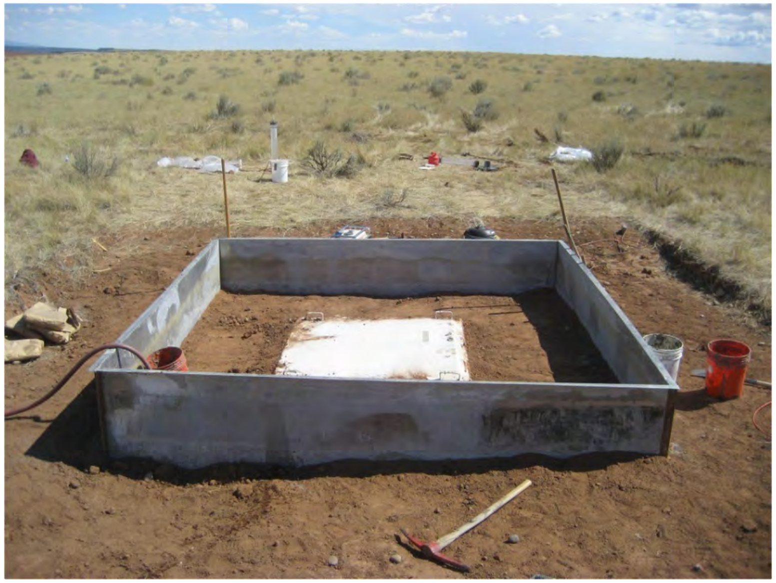

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SDRI Test - Altamont - Composite Cover

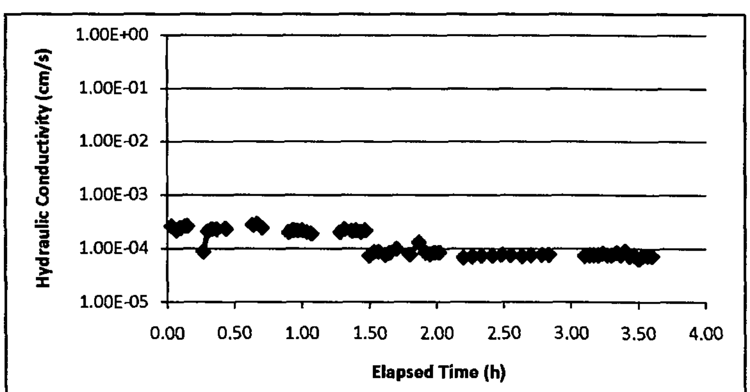
Date:	4/2/2007		**Installer:**	XW
Project:	Altamont		**Analyst:**	CHB

Fixed variables:

L =	150	cm	Assume Unit Gradient in Analysis
A =	22500	cm^2	
a =	77.69	cm^2	
Dp =	30.48	cm	

Temporal Variables:

Time	Reading (cm)	Δ Time (s)	Time (h)	i	I (cm/s)	
4/3/07 16:16	56.5					
4/3/07 16:33	54.0	1020	0.28	1.94	4.35E-06	
4/3/07 16:52	50.8	1140	0.60	1.94	4.98E-06	
4/3/07 17:13	47.3	1260	0.95	1.94	4.93E-06	
4/3/07 17:37	43.4	1440	1.35	1.94	4.81E-06	
4/3/07 17:57	40.1	1200	1.68	1.94	4.88E-06	
4/3/07 18:30	35.4	1980	2.23	1.94	4.21E-06	
4/3/07 18:45	33.7	900	2.48	1.94	3.35E-06	
4/3/07 19:00	31.6	900	2.73	1.94	4.14E-06	
4/3/07 19:15	29.9	900	2.98	1.94	3.35E-06	
4/3/07 19:30	28.0	900	3.23	1.94	3.75E-06	
4/3/07 19:32	56.5	120	3.27	1.94		
4/4/07 9:50	3.0	51480	17.57	1.94	1.85E-06	
4/4/07 9:58	58.0	480	17.70	1.94		
4/4/07 10:32	55.7	2040	18.27	1.94	2.00E-06	
4/4/07 11:34	51.0	3720	19.30	1.94	2.24E-06	
4/4/07 12:19	46.5	2700	20.05	1.94	2.96E-06	
4/4/07 12:37	57.5	1080	20.35	1.94		
4/4/07 13:34	50.7	3420	21.30	1.94	3.53E-06	
4/4/07 14:50	42.0	4560	22.57	1.94	3.39E-06	
4/4/07 15:50	33.0	3600	23.57	1.94	4.44E-06	
4/4/07 16:50	25.0	3600	24.57	1.94	3.95E-06	**K (cm/s)**
4/4/07 17:50	18.0	3600	25.57	1.94	3.45E-06	4.1E-06
4/4/07 18:50	9.4	3600	26.57	1.94	4.24E-06	
4/4/07 19:30	3.0	2400	27.23	1.94	4.73E-06	



SDRI Test - Altamont - Store-and-Release Cover

Date: 4/2/2007 **Installer:** XW
Project: Altamont **Analyst:** CHB

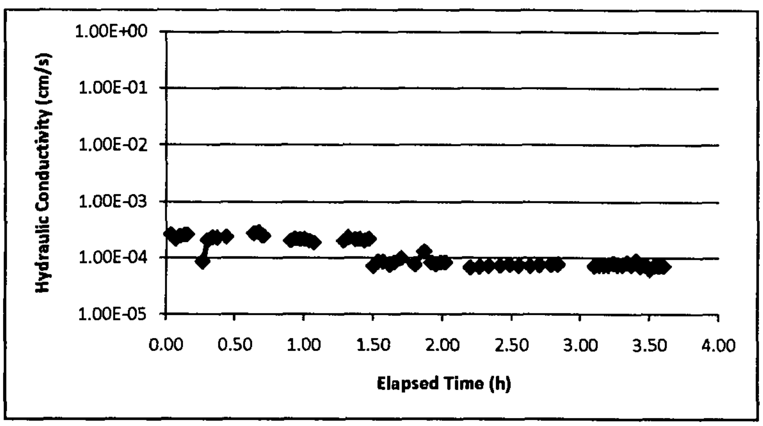
Fixed variables:

L =	150	cm	Assume Unit Gradient in Analysis
A =	22500	cm^2	
a =	77.69	cm^2	
Dp =	22.86	cm	

Temporal Variables:

Time	Reading (cm)	Δ Time (s)	Time (h)	K (cm/s)
15:48	49.0			
15:50	40.0	120	0.03	2.59E-04
15:52	32.5	120	0.07	2.16E-04
15:54	24.0	120	0.10	2.45E-04
15:56	15.0	120	0.13	2.59E-04
15:57	10.5	60	0.15	2.59E-04
16:02	52.0	300	0.23	
16:04	49.0	120	0.27	8.63E-05
16:06	41.8	120	0.30	2.07E-04
16:08	33.8	120	0.33	2.30E-04
16:10	25.8	120	0.37	2.30E-04
16:14	9.5	240	0.43	2.35E-04
16:24	50.0	600	0.60	
16:26	40.5	120	0.63	2.73E-04
16:28	30.5	120	0.67	2.88E-04
16:30	22.0	120	0.70	2.45E-04
16:40	55.0	600	0.87	
16:42	48.0	120	0.90	2.01E-04
16:44	40.4	120	0.93	2.19E-04
16:46	33.0	120	0.97	2.13E-04
16:48	25.5	120	1.00	2.16E-04
16:50	18.5	120	1.03	2.01E-04
16:52	12.0	120	1.07	1.87E-04
17:03	57.0	660	1.25	
17:05	50.0	120	1.28	2.01E-04
17:07	42.0	120	1.32	2.30E-04
17:10	31.0	180	1.37	2.11E-04
17:12	23.5	120	1.40	2.16E-04
17:14	16.5	120	1.43	2.01E-04
17:16	9.0	120	1.47	2.16E-04
9:27	58.5		1.47	
9:29	56.0	120	1.50	7.19E-05
9:31	53.0	120	1.53	8.63E-05
9:33	50.0	120	1.57	8.63E-05
9:36	46.0	180	1.62	7.67E-05
9:38	43.1	120	1.65	8.34E-05
9:41	38.0	180	1.70	9.78E-05
9:47	30.0	360	1.80	7.67E-05
9:51	21.0	240	1.87	1.29E-04
9:54	16.7	180	1.92	8.25E-05
9:56	14.0	120	1.95	7.77E-05
9:58	11.1	120	1.98	8.34E-05
10:00	8.2	120	2.02	8.34E-05
10:08	58.2	480	2.15	
10:11	54.7	180	2.20	6.71E-05
10:15	49.8	240	2.27	7.05E-05
10:19	44.8	240	2.33	7.19E-05
10:24	38.4	300	2.42	7.37E-05
10:28	33.1	240	2.48	7.63E-05

10:32	28.0	240	2.55	7.34E-05	
10:37	21.8	300	2.63	7.14E-05	
10:41	16.6	240	2.70	7.48E-05	
10:46	10.0	300	2.78	7.60E-05	
10:49	6.0	180	2.83	7.67E-05	
11:03	57.2	840	3.07		
11:05	54.7	120	3.10	7.19E-05	
11:07	52.1	120	3.13	7.48E-05	
11:09	49.5	120	3.17	7.48E-05	
11:11	46.9	120	3.20	7.48E-05	
11:13	44.1	120	3.23	8.06E-05	
11:15	41.5	120	3.27	7.48E-05	
11:17	38.9	120	3.30	7.48E-05	
11:19	36.0	120	3.33	8.34E-05	
11:21	33.4	120	3.37	7.48E-05	
11:23	30.3	120	3.40	8.92E-05	
11:25	27.8	120	3.43	7.19E-05	
11:27	25.2	120	3.47	7.48E-05	
11:29	23.0	120	3.50	6.33E-05	**K (cm/s)**
11:31	20.5	120	3.53	7.19E-05	**7.0E-05**
11:33	18.0	120	3.57	7.19E-05	
11:35	15.5	120	3.60	7.19E-05	



SDRI Test - Apple Valley - Clay Cover

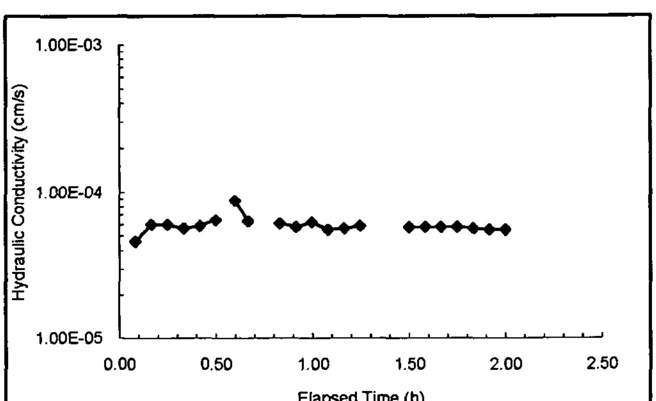
Date:	3/30/2007		**Installer:**	XW
Project:	Apple Valley		**Analyst:**	CHB

Fixed variables:

L =	150	cm
A =	22500	cm^2
a =	77.69	cm^2
Dp =	33.02	cm

Temporal Variables:

Time	Reading (cm)	Δ Time (s)	Time (h)	K (cm/s)	
10:40	41.0				
10:45	37.0	300	0.08	4.60E-05	
10:50	31.8	300	0.17	5.99E-05	
10:55	26.6	300	0.25	5.99E-05	
11:00	21.7	300	0.33	5.64E-05	
11:05	16.6	300	0.42	5.87E-05	
11:10	11.0	300	0.50	6.45E-05	
11:13	55.0	180	0.55	-8.44E-04	
11:16	50.4	180	0.60	8.82E-05	
11:20	46.0	240	0.67	6.33E-05	
11:25	40.3	300			
11:30	35.0	300	0.83	6.10E-05	
11:35	30.0	300	0.91	5.75E-05	
11:40	24.6	300	1.00	6.22E-05	
11:45	19.8	300	1.08	5.52E-05	
11:50	14.9	300	1.16	5.64E-05	
11:55	9.8	300	1.25	5.87E-05	
12:05	49.5	600			
12:10	44.5	300	1.50	5.75E-05	
12:15	39.5	300	1.58	5.75E-05	
12:20	34.5	300	1.67	5.75E-05	
12:25	29.5	300	1.75	5.75E-05	
12:30	24.6	300	1.83	5.64E-05	
12:35	19.8	300	1.92	5.52E-05	**5.56E-05**
12:40	15.0	300	2.00	5.52E-05	

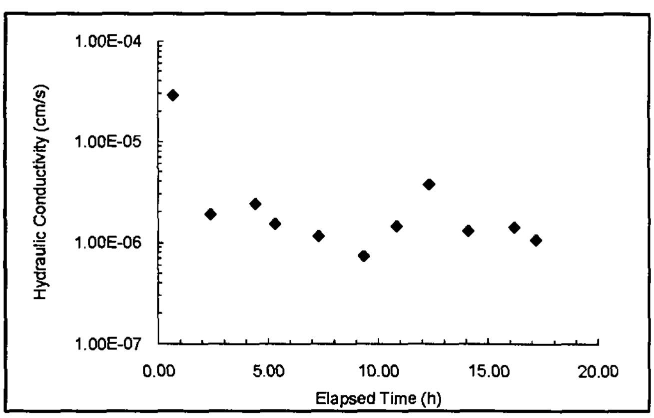


SDRI Test - Cedar Rapids - Clay Cover

L = 610 cm i = 1.04
A = 372100 cm^2
a = 77.69 cm^2
Dp = 25.4 cm

Date	Time	Bag On	Bag Off	Δ Time (s)	Time (h)	I (cm/s)	K (cm/s)
6-Jun-06	15:10	2503.6					
	15:51		828.1	2460	0.68	3.03E-05	2.91E-05
	16:24	2724.4					
	18:07		2450.1	6180	2.40	1.97E-06	1.89E-06
7-Jun-06	8:35	2449.3					
	10:36		2042.2	7260	4.42	2.49E-06	2.39E-06
	10:42	2042.2					
	11:35		1928.3	3180	5.30	1.59E-06	1.53E-06
	11:39	1928.3					
	13:39		1731.3	7200	7.30	1.22E-06	1.17E-06
	13:42	1731.3					
	15:45		1604.3	7380	9.35	7.65E-07	7.34E-07
	15:51	1604.3					
	17:20		1421.9	5340	10.83	1.52E-06	1.46E-06
8-Jun-06	8:29	2448.3					
	9:58		1980.9	5340	12.32	3.89E-06	3.73E-06
	10:04	1980.9					
	11:50		1787.0	6360	14.08	1.35E-06	1.30E-06
	11:52	1787.0					
	13:58		1535.0	7560	16.18	1.48E-06	1.42E-06
	14:05	1535.0					
	15:04		1446.0	3540	17.17	1.12E-06	1.07E-06

Avg K
1.27E-06

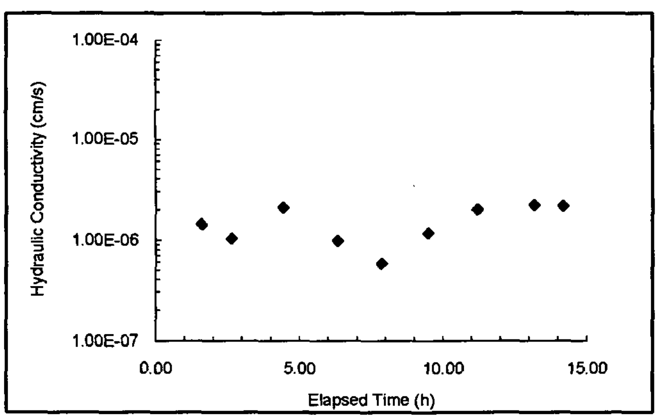


SDRI Test - Cedar Rapids - Composite Cover

L =	610	cm	i =	1.04
A =	372100	cm^2		
a =	77.69	cm^2		
Dp =	25.4 cm			

Date	Time	Bag On	Bag Off	Δ Time (s)	Time (h)	I (cm/s)	K (cm/s)
7-Jun-06	8:40	2508.6					
	10:16		2315.0	5760	1.60	1.49E-06	1.43E-06
	10:33	2315.0					
	11:35		2224.5	3720	2.63	1.08E-06	1.04E-06
	11:39	2224.5					
	13:27		1906.4	6480	4.43	2.18E-06	2.09E-06
	13:37	1906.4					
	15:31		1746.8	6840	6.33	1.04E-06	9.96E-07
	15:46	1746.8					
	17:17		1671.9	5460	7.85	6.10E-07	5.85E-07
8-Jun-06	8:28	2636.7					
	10:06		2474.0	5880	9.48	1.23E-06	1.18E-06
	10:11	2474.0					
	11:53		2187.0	6120	11.18	2.08E-06	2.00E-06
	11:55	2187.0					
	13:54		1815.0	7140	13.17	2.32E-06	2.22E-06
	14:03	1815.0					
	15:03		1631.0	3600	14.17	2.27E-06	2.18E-06

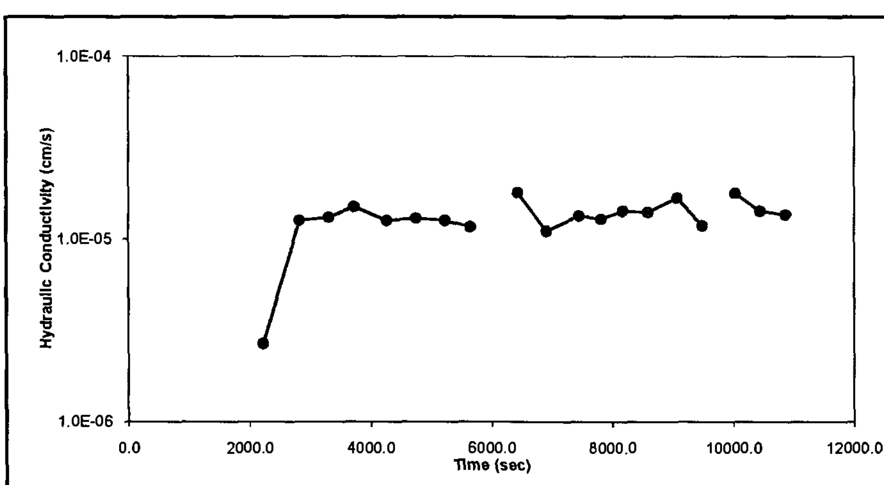
Avg K
2.13E-06



SDRI Hydraulic Conductivity - Helena - Store-and-Release Cover

Inner Ring Side Length (ft)	5.00
Inner Ring Side Lengh (cm)	152.40
Inner Ring Area (cm^2)	**23225.76**
Average Head (in)	14.00
Average Head (cm)	**35.56**
Standpipe Diameter (cm)	5.00
Standpipe Area (cm^2)	**19.63**

Date, Time	Inflow Reading (cm)	Inflow (mL)	Δt (sec)	t (sec)	Q (mL/s)	K (cm/s)
9:15	34		0.0			
9:52	41	137.44468	2220.0	2220.0	0.0619	2.7E-06
10:02	50	176.71459	600.0	2820.0	0.2945	1.3E-05
10:10	57.5	147.26216	480.0	3300.0	0.3068	1.3E-05
10:17	65	147.26216	420.0	3720.0	0.3506	1.5E-05
10:26	73.1	159.04313	540.0	4260.0	0.2945	1.3E-05
10:34	80.5	145.29866	480.0	4740.0	0.3027	1.3E-05
10:42	87.7	141.37167	480.0	5220.0	0.2945	1.3E-05
10:49	93.5	113.88273	420.0	5640.0	0.2711	1.2E-05
10:55	40.5	-1040.6526	360.0	6000.0	-2.8907	-1.2E-04
11:02	49.5	176.71459	420.0	6420.0	0.4207	1.8E-05
11:10	55.8	123.70021	480.0	6900.0	0.2577	1.1E-05
11:19	64.4	168.86061	540.0	7440.0	0.3127	1.3E-05
11:25	69.9	107.99225	360.0	7800.0	0.3000	1.3E-05
11:31	76	119.77322	360.0	8160.0	0.3327	1.4E-05
11:38	83.0	137.44468	420.0	8580.0	0.3272	1.4E-05
11:46	92.6	188.49556	480.0	9060.0	0.3927	1.7E-05
11:53	98.5	115.84623	420.0	9480.0	0.2758	1.2E-05
11:58	29.0	-1364.6293	300.0	9780.0	-4.5488	-2.0E-04
12:02	34.1	100.13827	240.0	10020.0	0.4172	1.8E-05
12:09	41.2	139.40817	420.0	10440.0	0.3319	1.4E-05
12:16	48.0	133.51769	420.0	10860.0	0.3179	1.4E-05
					Average	**1.4E-05**



SDRI Test - Monticello - Store-and-Release Cover

Date:	7/24/2007	**Installer:**	XW
Project:	Monticello	**Analyst:**	CHB

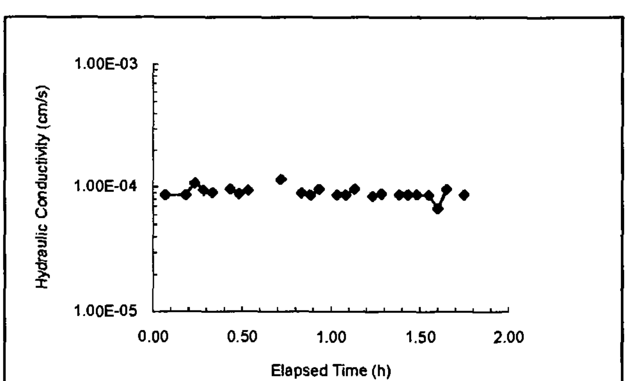
Fixed variables:

L =	150	cm
A =	22500	cm^2
a =	77.69	cm^2
Dp =	35.56	cm

Temporal Variables:

Time	Reading (cm)	Δ Time (s)	Time (h)	K (cm/s)
10:45	57.0			
10:49	51.0	240	0.07	8.63E-05
10:56	40.5	420	0.18	8.63E-05
10:59	34.9	180	0.23	1.07E-04
11:02	30.0	180	0.28	9.40E-05
11:05	25.3	180	0.33	9.02E-05
11:08	20.8	180	0.38	
11:11	15.8	180	0.43	9.59E-05
11:14	11.2	180	0.48	8.82E-05
11:17	6.3	180	0.53	9.40E-05
11:25	53.5	480	0.67	
11:28	47.5	180	0.72	1.15E-04
11:33	39.6	300	0.80	
11:35	36.5	120	0.83	8.92E-05
11:38	32.0	180	0.88	8.63E-05
11:41	27.0	180	0.93	9.59E-05
11:44	22.5	180	0.98	
11:47	18.0	180	1.03	8.63E-05
11:50	13.5	180	1.08	8.63E-05
11:53	8.5	180	1.13	9.59E-05
11:56	56.2	180	1.18	
11:59	51.8	180	1.23	8.44E-05
12:02	47.2	180	1.28	8.82E-05
12:05	43.0	180	1.33	
12:08	38.5	180	1.38	8.63E-05
12:11	34.0	180	1.43	8.63E-05
12:14	29.5	180	1.48	8.63E-05
12:18	23.5	240	1.55	8.63E-05
12:21	20.0	180	1.60	6.71E-05
12:24	15.0	180	1.65	9.59E-05
12:27	10.5	180	1.70	
12:30	6.0	180	1.75	8.63E-05

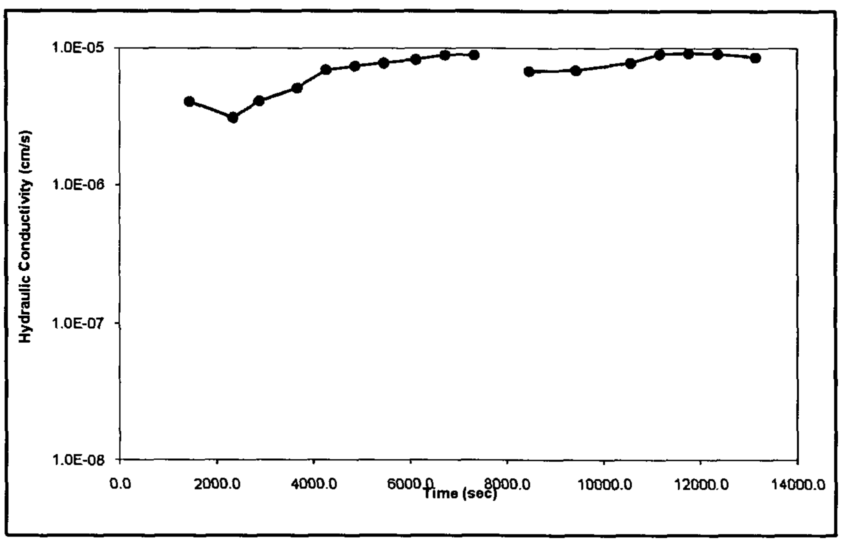
Avg K
8.50E-05



Alt. SDRI Hydraulic Conductivity - Polson - Store-and-Release Cover

Inner Ring Side Length (ft)	5.00
Inner Ring Side Lengh (cm)	152.40
Inner Ring Area (cm^2)	**23225.76**
Average Head (in)	14.00
Average Head (cm)	**35.56**
Standpipe Diameter (cm)	5.00
Standpipe Area (cm^2)	**19.63**

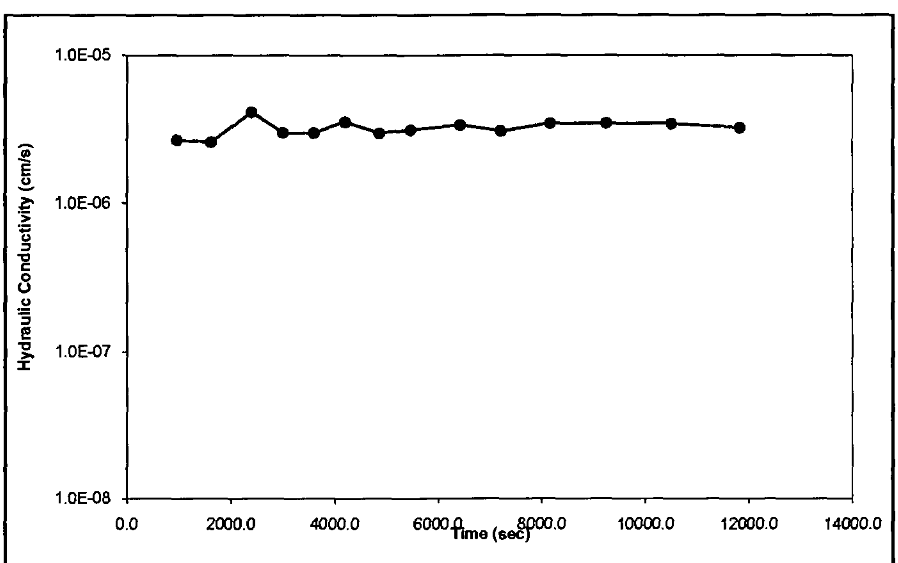
Date, Time	Inflow Reading (cm)	Inflow (mL)	Dt (sec)	t (sec)	Q (mL/s)	K (cm/s)
9:12	59		0.0			
9:36	52.1	135.48118	1440.0	1440.0	0.0941	4.1E-06
9:51	48.8	64.795348	900.0	2340.0	0.0720	3.1E-06
10:00	46.2	51.050881	540.0	2880.0	0.0945	4.1E-06
10:13	41.5	92.284284	780.0	3660.0	0.1183	5.1E-06
10:23	36.6	96.211275	600.0	4260.0	0.1604	6.9E-06
10:33	31.4	102.10176	600.0	4860.0	0.1702	7.3E-06
10:43	25.9	107.99225	600.0	5460.0	0.1800	7.7E-06
10:54	19.5	125.66371	660.0	6120.0	0.1904	8.2E-06
11:04	13.2	123.70021	600.0	6720.0	0.2062	8.9E-06
11:14	6.9	123.70021	600.0	7320.0	0.2062	8.9E-06
11:23	58.5	-1013.1636	540.0	7860.0	-1.8762	-8.1E-05
11:33	53.7	94.24778	600.0	8460.0	0.1571	6.8E-06
11:49	45.9	153.15264	960.0	9420.0	0.1595	6.9E-06
12:08	35.4	206.16702	1140.0	10560.0	0.1808	7.8E-06
12:18	29.0	125.66371	600.0	11160.0	0.2094	9.0E-06
12:28	22.5	127.6272	600.0	11760.0	0.2127	9.2E-06
12:38	16.1	125.66371	600.0	12360.0	0.2094	9.0E-06
12:51	8.2	155.11614	780.0	13140.0	0.1989	8.6E-06
					Average	**8.9E-06**



Conv. SDRI Hydraulic Conductivity - Polson - Composite Cover

Inner Ring Side Length (ft)	5.00
Inner Ring Side Lengh (cm)	152.40
Inner Ring Area (cm^2)	**23225.76**
Average Head (in)	14.00
Average Head (cm)	**35.56**
Standpipe Diameter (cm)	5.00
Standpipe Area (cm^2)	**19.63**

Date, Time	Inflow Reading (cm)	Inflow (mL)	Dt (sec)	t (sec)	Q (mL/s)	K (cm/s)
9:34	55.5		0.0			
9:50	52.5	58.904862	960.0	960.0	0.0614	2.6E-06
10:01	50.5	39.269908	660.0	1620.0	0.0595	2.6E-06
10:14	46.7	74.612826	780.0	2400.0	0.0957	4.1E-06
10:24	44.6	41.233404	600.0	3000.0	0.0687	3.0E-06
10:34	42.5	41.233404	600.0	3600.0	0.0687	3.0E-06
10:44	40	49.087385	600.0	4200.0	0.0818	3.5E-06
10:55	37.7	45.160394	660.0	4860.0	0.0684	2.9E-06
11:05	35.5	43.196899	600.0	5460.0	0.0720	3.1E-06
11:21	31.7	74.612826	960.0	6420.0	0.0777	3.3E-06
11:34	28.9	54.977871	780.0	7200.0	0.0705	3.0E-06
11:50	25	76.576321	960.0	8160.0	0.0798	3.4E-06
12:08	20.6	86.393798	1080.0	9240.0	0.0800	3.4E-06
12:29	15.5	100.13827	1260.0	10500.0	0.0795	3.4E-06
12:51	10.5	98.17477	1320.0	11820.0	0.0744	3.2E-06
					Average	**3.4E-06**



SDRI Test - Sacramento - Thin Store-and-Release Cover

Date:
Project: Sacramento
Installer: XW
Analyst: CHB

Fixed variables:

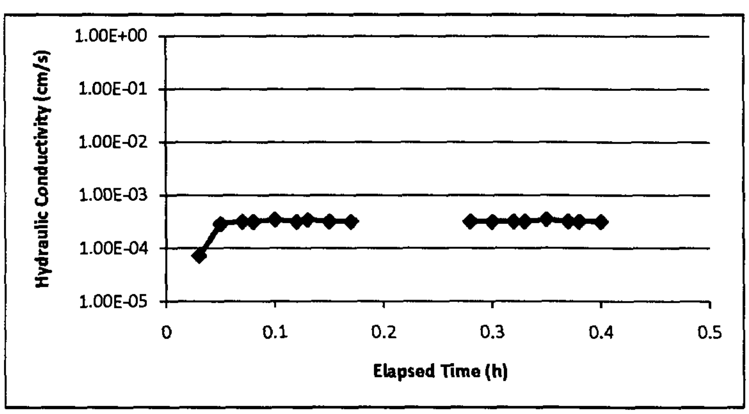
L =	150	cm
A =	22500	cm^2
a =	77.69	cm^2
Dp =		cm

Assume Unit Gradient in Analysis

Temporal Variables:

Time	Reading (cm)	⊿ Time (s)	Time (h)	K (cm/s)
3:50	59			
3:52	56.5	120	0.03	7.19E-05
3:53	51.5	60	0.05	2.88E-04
3:54	46	60	0.07	3.17E-04
3:55	40.5	60	0.08	3.17E-04
3:56	34.5	60	0.1	3.45E-04
3:57	29	60	0.12	3.17E-04
3:58	23	60	0.13	3.45E-04
3:59	17.5	60	0.15	3.17E-04
4:00	12	60	0.17	3.17E-04
4:06	55.5	360	0.27	
4:07	50	60	0.28	3.17E-04
4:08	44.5	60	0.3	3.17E-04
4:09	39	60	0.32	3.17E-04
4:10	33.5	60	0.33	3.17E-04
4:11	27.5	60	0.35	3.45E-04
4:12	22	60	0.37	3.17E-04
4:13	16.5	60	0.38	3.17E-04
4:14	11	60	0.4	3.17E-04

Avg K
3.2E-04



SDRI Test - Sacramento - Thick Store-and-Release Cover

Date: | **Installer:** XW
Project: Sacramento | **Analyst:** CHB

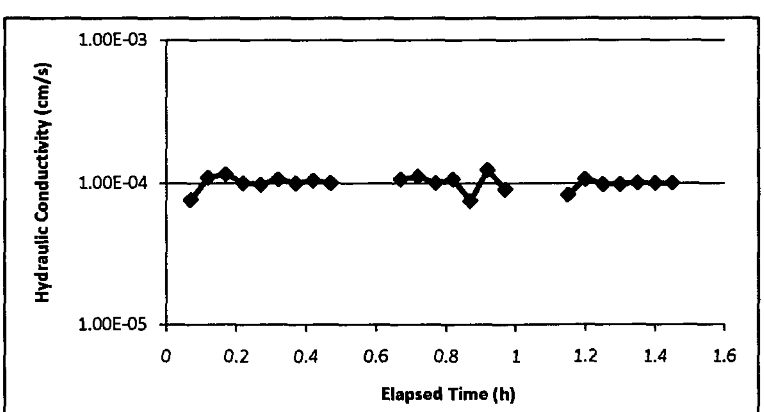
Fixed variables:

L =	150	cm	Assume Unit Gradient in Analysis
A =	22500	cm^2	
a =	77.69	cm^2	
Dp =		cm	

Temporal Variables:

Time	Reading (cm)	Δ Time (s)	Time (h)	K (cm/s)
11:03	56			
11:07	50.7	240	0.07	7.63E-05
11:10	45	180	0.12	1.09E-04
11:13	39	180	0.17	1.15E-04
11:16	33.8	180	0.22	9.98E-05
11:19	28.7	180	0.27	9.78E-05
11:22	23.2	180	0.32	1.06E-04
11:25	18	180	0.37	9.98E-05
11:28	12.6	180	0.42	1.04E-04
11:31	7.4	180	0.47	9.98E-05
11:40	51.5	540	0.62	
11:43	46	180	0.67	1.06E-04
11:46	40.2	180	0.72	1.11E-04
11:49	35	180	0.77	9.98E-05
11:52	29.5	180	0.82	1.06E-04
11:55	25.6	180	0.87	7.48E-05
11:58	19.2	180	0.92	1.23E-04
12:01	14.5	180	0.97	9.02E-05
12:06	53.8	480	1.1	
12:09	49.5	180	1.15	8.25E-05
12:12	44	180	1.2	1.06E-04
12:15	38.9	180	1.25	9.78E-05
12:18	33.8	180	1.3	9.78E-05
12:21	28.6	180	1.35	9.98E-05
12:24	23.4	180	1.4	9.98E-05
12:27	18.2	180	1.45	9.98E-05

Avg K
9.85E-05



APPENDIX C - TSB DATA

Single-Stage Constant Head Borehole Test - Altamont - Composite Cover

Project:	Altamont Decomissioning	**Installer:**	XW
Date:	04/03/07	**Analyst:**	CHB
Test ID:	TSB-C1		

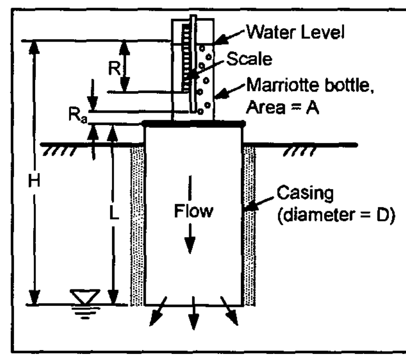
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_e (cm):	10
L (cm):	30.48

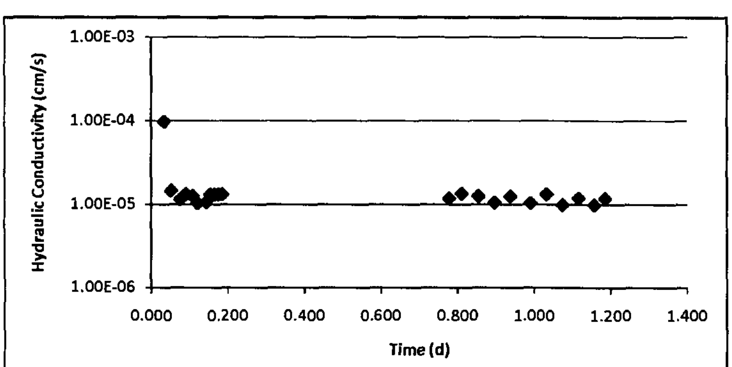
Analysis using Horslev's isotropic constant head solution

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4/3/07 15:03	29.2			
4/3/07 15:51	41.1	3.30E-01	0.033	9.72E-05
4/3/07 16:18	42.1	4.93E-02	0.052	1.45E-05
4/3/07 16:52	43.1	3.91E-02	0.076	1.15E-05
4/3/07 17:13	43.8	4.43E-02	0.090	1.31E-05
4/3/07 17:38	44.6	4.26E-02	0.108	1.25E-05
4/3/07 17:57	45.1	3.50E-02	0.121	1.03E-05
4/3/07 18:30	46.0	3.63E-02	0.144	1.07E-05
4/3/07 18:45	46.5	4.43E-02	0.154	1.31E-05
4/3/07 19:00	47.0	4.43E-02	0.165	1.31E-05
4/3/07 19:15	47.5	4.43E-02	0.175	1.31E-05
4/3/07 19:30	48.0	4.43E-02	0.185	1.31E-05
4/4/07 9:44	73.4	3.96E-02	0.778	1.17E-05
4/4/07 10:31	75.0	4.53E-02	0.811	1.33E-05
4/4/07 11:34	77.0	4.22E-02	0.855	1.24E-05
4/4/07 12:34	78.6	3.55E-02	0.897	1.05E-05
4/4/07 13:34	80.5	4.21E-02	0.938	1.24E-05
4/4/07 14:50	82.5	3.50E-02	0.991	1.03E-05
4/4/07 15:50	84.5	4.43E-02	1.033	1.31E-05
4/4/07 16:50	86.0	3.32E-02	1.074	9.80E-06
4/4/07 17:50	87.8	3.99E-02	1.116	1.18E-05
4/4/07 18:50	89.3	3.33E-02	1.158	9.80E-06
4/4/07 19:30	90.5	3.99E-02	1.185	1.18E-05



K (cm/s)
1.1E-05



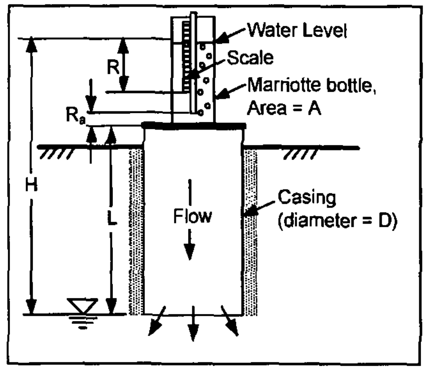
Single-Stage Constant Head Borehole Test - Altamont - Composite Cover

Project:	Altamont Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	TSB-C2		

Fixed Variables:

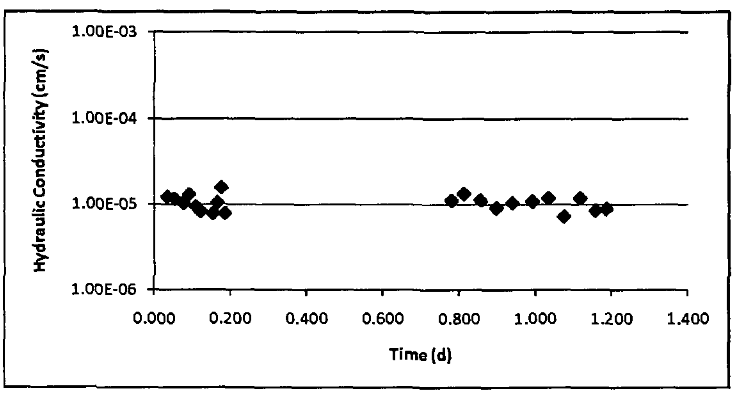
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Analysis using Horslev's isotropic constant head solution



Temporal Variables:		Computations:		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4/3/07 15:03	29.5			
4/3/07 15:51	31.0	4.16E-02	0.033	1.22E-05
4/3/07 16:18	31.8	3.94E-02	0.052	1.16E-05
4/3/07 16:52	32.7	3.52E-02	0.076	1.04E-05
4/3/07 17:13	33.4	4.43E-02	0.090	1.31E-05
4/3/07 17:38	34.0	3.19E-02	0.108	9.41E-06
4/3/07 17:57	34.4	2.80E-02	0.121	8.25E-06
4/3/07 18:30	35.4		0.144	
4/3/07 18:45	35.7	2.66E-02	0.154	7.84E-06
4/3/07 19:00	36.1	3.55E-02	0.165	1.05E-05
4/3/07 19:15	36.7	5.32E-02	0.175	1.57E-05
4/3/07 19:30	37.0	2.66E-02	0.185	7.84E-06
4/4/07 9:44	61.2	3.77E-02	0.778	1.11E-05
4/4/07 10:31	62.8	4.53E-02	0.811	1.33E-05
4/4/07 11:34	64.6	3.80E-02	0.855	1.12E-05
4/4/07 12:34	66.0	3.10E-02	0.897	9.15E-06
4/4/07 13:34	67.6	3.55E-02	0.938	1.05E-05
4/4/07 14:50	69.7	3.68E-02	0.991	1.08E-05
4/4/07 15:50	71.5	3.99E-02	1.033	1.18E-05
4/4/07 16:50	72.6	2.44E-02	1.074	7.19E-06
4/4/07 17:50	74.4	3.99E-02	1.116	1.18E-05
4/4/07 18:50	75.7	2.88E-02	1.158	8.49E-06
4/4/07 19:30	76.6	2.99E-02	1.185	8.82E-06

K (cm/s)
9.1E-06



Single-Stage Constant Head Borehole Test - Altamont - Composite Cover

Project:	Altamont Decomissioning	**Installer:**	XW
Date:	04/03/07	**Analyst:**	CHB
Test ID:	TSB-C3		

Fixed Variables:

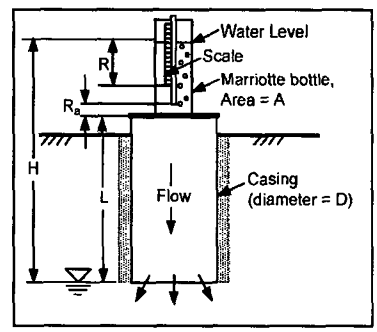
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

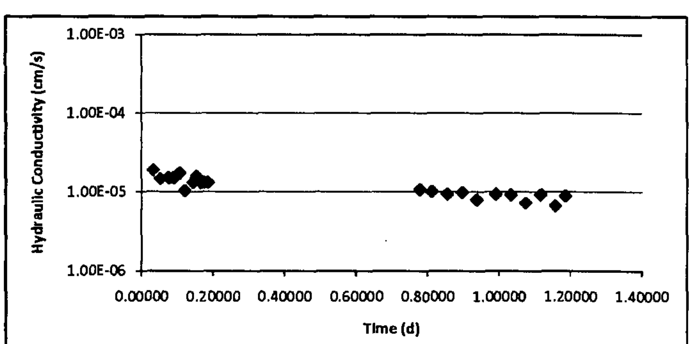
Analysis using Horslev's isotropic constant head solution

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4/3/07 15:03	46.7			
4/3/07 15:51	49.0	6.37E-02	0.03333	1.88E-05
4/3/07 16:18	50.0	4.93E-02	0.05208	1.45E-05
4/3/07 16:52	51.3	5.09E-02	0.07569	1.50E-05
4/3/07 17:13	52.1	5.07E-02	0.09028	1.49E-05
4/3/07 17:38	53.2	5.85E-02	0.10764	1.72E-05
4/3/07 17:57	53.7	3.50E-02	0.12083	1.03E-05
4/3/07 18:30	54.8	4.43E-02	0.14375	1.31E-05
4/3/07 18:45	55.4	5.32E-02	0.15417	1.57E-05
4/3/07 19:00	55.9	4.43E-02	0.16458	1.31E-05
4/3/07 19:15	56.4	4.43E-02	0.17500	1.31E-05
4/3/07 19:30	56.9	4.43E-02	0.18542	1.31E-05
4/4/07 9:44	80.0	3.60E-02	0.77847	1.06E-05
4/4/07 10:31	81.2	3.40E-02	0.81111	1.00E-05
4/4/07 11:34	82.7	3.17E-02	0.85486	9.33E-06
4/4/07 12:34	84.2	3.33E-02	0.89653	9.80E-06
4/4/07 13:34	85.4	2.66E-02	0.93819	7.84E-06
4/4/07 14:50	87.2	3.15E-02	0.99097	9.28E-06
4/4/07 15:50	88.6	3.10E-02	1.03264	9.15E-06
4/4/07 16:50	89.7	2.44E-02	1.07431	7.19E-06
4/4/07 17:50	91.1	3.10E-02	1.11597	9.15E-06
4/4/07 18:50	92.1	2.22E-02	1.15764	6.53E-06
4/4/07 19:30	93.0	2.99E-02	1.18542	8.82E-06

K (cm/s)
7.9E-06





Single-Stage Constant Head Borehole Test - Altamont - Composite Cover

Project:	Altamont Decomissioning	**Installer:**	XW
Date:	04/03/07	**Analyst:**	CHB
Test ID:	TSB-C4		

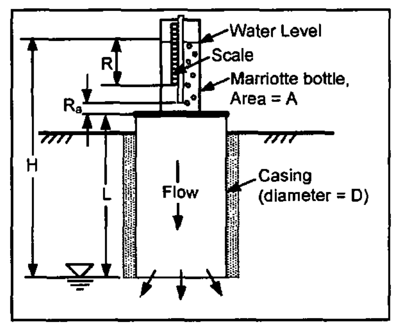
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

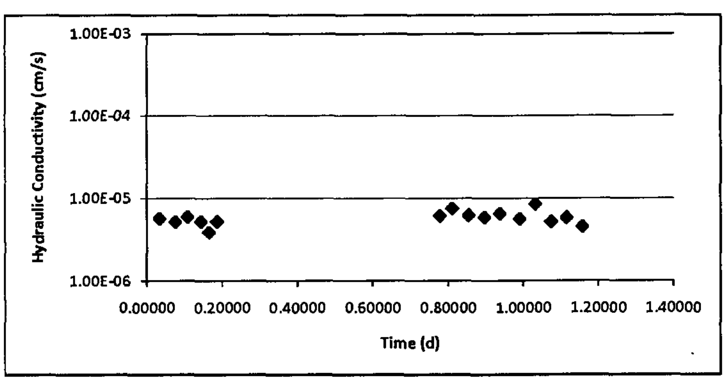
Analysis using Horslev's isotropic constant head solution

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4/3/07 15:03	30.0			
4/3/07 15:51	30.7	1.94E-02	0.03333	5.72E-06
4/3/07 16:52	31.5	1.74E-02	0.07569	5.14E-06
4/3/07 17:38	32.2	2.02E-02	0.10764	5.96E-06
4/3/07 18:30	32.9	1.79E-02	0.14375	5.28E-06
4/3/07 19:00	33.2	1.33E-02	0.16458	3.92E-06
4/3/07 19:30	33.6	1.77E-02	0.18542	5.23E-06
4/4/07 9:44	47.0	2.09E-02	0.77847	6.15E-06
4/4/07 10:31	47.9	2.55E-02	0.81111	7.51E-06
4/4/07 11:34	48.9	2.11E-02	0.85486	6.22E-06
4/4/07 12:34	49.8	2.00E-02	0.89653	5.88E-06
4/4/07 13:34	50.8	2.22E-02	0.93819	6.53E-06
4/4/07 14:50	51.9	1.93E-02	0.99097	5.67E-06
4/4/07 15:50	53.2	2.88E-02	1.03264	8.49E-06
4/4/07 16:50	54.0	1.77E-02	1.07431	5.23E-06
4/4/07 17:50	54.9	2.00E-02	1.11597	5.88E-06
4/4/07 18:50	55.6	1.55E-02	1.15764	4.57E-06



K (cm/s)
5.2E-06



Single-Stage Constant Head Borehole Test - Altamont - Store-and-Release Cover

Project:	Altamont Decomissioning		**Installer:**	XW
Date:	04/02/07		**Analyst:**	CHB
Test ID:	TSB-A1			

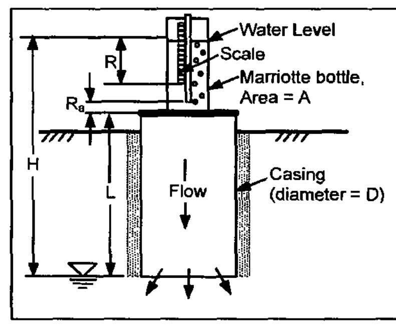
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

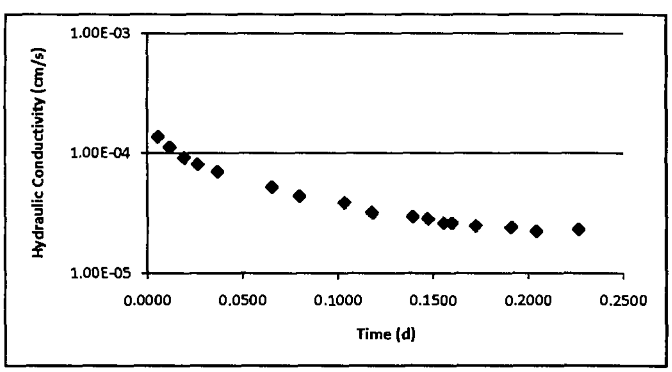
Analysis using Horslev's isotropic constant head solution

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
14:03:00	33.3			
14:11:00	38.2	8.15E-01	0.0056	1.37E-04
14:20:00	42.7	6.65E-01	0.0118	1.12E-04
14:31:00	47.2	5.44E-01	0.0194	9.15E-05
14:41:00	50.8	4.79E-01	0.0264	8.05E-05
14:56:00	55.5	4.17E-01	0.0368	7.01E-05
15:37:00	65.1	3.11E-01	0.0653	5.24E-05
15:58:00	69.2	2.60E-01	0.0799	4.37E-05
16:32:00	75.1	2.31E-01	0.1035	3.88E-05
16:53:00	78.1	1.90E-01	0.1181	3.19E-05
17:24:00	82.2	1.76E-01	0.1396	2.96E-05
17:35:00	83.6	1.69E-01	0.1472	2.85E-05
17:47:00	85.0	1.55E-01	0.1556	2.61E-05
17:53:00	85.7	1.55E-01	0.1597	2.61E-05
18:11:00	87.7	1.48E-01	0.1722	2.48E-05
9:34:00	31.0			
10:01:00	33.9	1.43E-01	0.1910	2.40E-05
10:20:00	35.8	1.33E-01	0.2042	2.24E-05
10:52:00	39.1	1.37E-01	0.2264	2.31E-05



K (cm/s)
2.4E-05



Single-Stage Constant Head Borehole Test - Altamont - Store-and-Release Cover

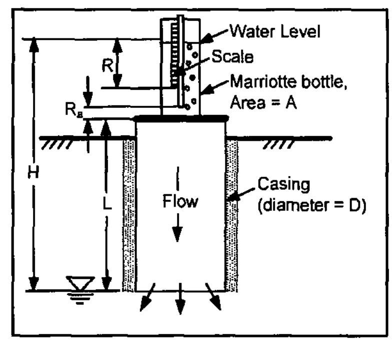
Project:	Altamont Decomissioning	**Installer:**	XW
Date:	04/02/07	**Analyst:**	CHB
Test ID:	TSB-A2		

Fixed Variables:

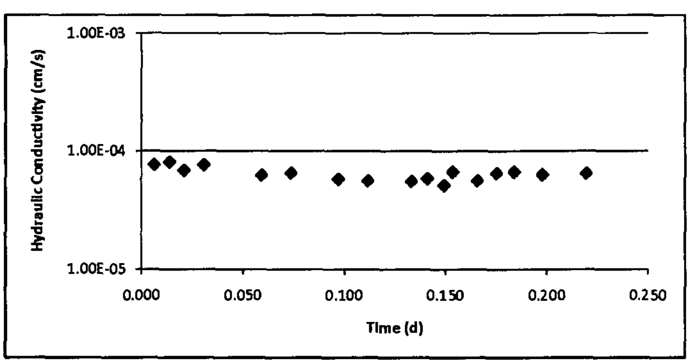
Casing Diameter (cm):	30.48	**Analysis using Horslev's isotropic constant head solution**
Standpipe Area (cm^2):	79.8	
R_s (cm):	10	
L (cm):	60.96	

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
14:12:00	31.0			
14:21:00	34.1	4.58E-01	0.006	7.70E-05
14:32:00	38.1	4.84E-01	0.014	8.13E-05
14:42:00	41.2	4.12E-01	0.021	6.93E-05
14:56:00	46.0	4.56E-01	0.031	7.67E-05
15:37:00	57.5	3.73E-01	0.059	6.27E-05
15:58:00	63.7	3.93E-01	0.074	6.60E-05
16:32:00	72.6	3.48E-01	0.097	5.85E-05
16:53:00	77.9	3.36E-01	0.112	5.64E-05
17:24:00	85.7	3.35E-01	0.133	5.63E-05
17:35:00	88.6	3.51E-01	0.141	5.90E-05
17:47:00	91.4	3.10E-01	0.149	5.22E-05
17:53:00	93.2	3.99E-01	0.153	6.71E-05
18:11:00	97.8	3.40E-01	0.166	5.71E-05
9:35:00	34.0	1.64E-01		2.76E-05
9:48:00	37.8	3.89E-01	0.175	6.54E-05
10:01:00	41.7	3.99E-01	0.184	6.71E-05
10:21:00	47.4	3.79E-01	0.198	6.37E-05
10:52:00	56.4	3.86E-01	0.219	6.49E-05



K (cm/s)
6.5E-05



Single-Stage Constant Head Borehole Test - Altamont - Store-and-Release Cover

Project: Altamont Decomissioning **Installer:** XW
Date: 04/02/07 **Analyst:** CHB
Test ID: TSB-A3

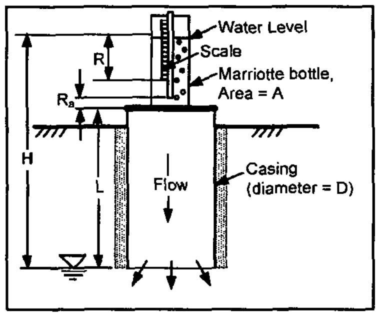
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Analysis using Horslev's isotropic constant head solution

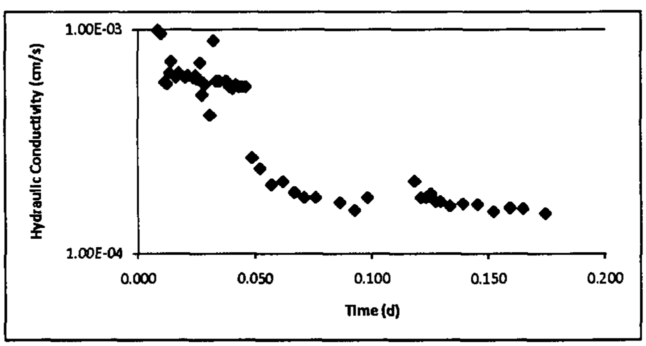
Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
14:25:00	31.5			
14:27:00	41.2	6.45E+00	0.001	1.08E-03
14:30:00	56.1	6.61E+00	0.003	1.11E-03
14:33:00	70.1	6.21E+00	0.006	1.04E-03
14:35:00	79.2	6.05E+00	0.007	1.02E-03
14:37:00	88.1	5.92E+00	0.008	9.95E-04
14:39:00	96.7	5.72E+00	0.010	9.62E-04
15:30:55	30.0		0.011	
15:31:50	32.4	3.48E+00	0.012	5.85E-04
15:33:00	35.4	3.42E+00	0.012	5.75E-04
15:34:40	40.2	3.83E+00	0.014	6.44E-04
15:35:30	42.9	4.31E+00	0.014	7.24E-04
15:38:35	51.4	3.67E+00	0.016	6.16E-04
15:40:15	56.2	3.83E+00	0.017	6.44E-04
15:44:15	67.2	3.66E+00	0.020	6.15E-04
15:46:00	72.1	3.72E+00	0.021	6.26E-04
15:49:15	81.0	3.64E+00	0.024	6.12E-04
15:50:30	84.5	3.72E+00	0.025	6.26E-04
15:51:30	87.2	3.59E+00	0.025	6.04E-04
15:52:30	89.9	3.59E+00	0.026	6.04E-04
15:53:30	93.1	4.26E+00	0.027	7.16E-04
15:54:30	95.4	3.06E+00	0.027	5.14E-04
15:55:30	98.0	3.46E+00	0.028	5.81E-04
15:56:17	100.0	3.40E+00	0.029	5.71E-04
15:27:00	32.0			
15:30:00	37.6	2.48E+00	0.031	4.17E-04
15:32:00	45.6	5.32E+00	0.032	8.94E-04
15:34:00	50.9	3.52E+00	0.033	5.93E-04
15:36:00	56.2	3.52E+00	0.035	5.93E-04
15:40:00	66.8	3.52E+00	0.038	5.93E-04
15:42:00	71.8	3.33E+00	0.039	5.59E-04
15:44:00	76.7	3.26E+00	0.040	5.48E-04
15:46:00	81.8	3.39E+00	0.042	5.70E-04
15:48:00	86.8	3.33E+00	0.043	5.59E-04
15:50:00	91.8	3.33E+00	0.045	5.59E-04
15:52:00	96.8	3.33E+00	0.046	5.59E-04



9:46:00	30.3			
9:50	35.1	1.60E+00	0.049	2.68E-04
9:55	40.5	1.44E+00	0.052	2.41E-04
10:02	46.9	1.22E+00	0.057	2.04E-04
10:09	53.5	1.25E+00	0.062	2.11E-04
10:16	59.4	1.12E+00	0.067	1.88E-04
10:22	64.2	1.06E+00	0.071	1.79E-04
10:29	69.8	1.06E+00	0.076	1.79E-04
10:44	81.2	1.01E+00	0.086	1.70E-04
10:53	87.5	9.31E-01	0.093	1.57E-04
11:01	93.9	1.06E+00	0.098	1.79E-04
11:28	30.0		0.117	
11:30	31.9	1.26E+00	0.118	2.12E-04
11:34	35.1	1.06E+00	0.121	1.79E-04
11:37	37.5	1.06E+00	0.123	1.79E-04
11:40	40.0	1.11E+00	0.125	1.86E-04
11:43	42.3	1.02E+00	0.127	1.71E-04
11:46	44.6	1.02E+00	0.129	1.71E-04
11:52	49.0	9.75E-01	0.133	1.64E-04
12:00	55.0	9.98E-01	0.139	1.68E-04
12:09	61.7	9.90E-01	0.145	1.66E-04
12:19	68.6	9.18E-01	0.152	1.54E-04
12:29	75.8	9.58E-01	0.159	1.61E-04
12:37	81.5	9.48E-01	0.165	1.59E-04
12:51	91.0	9.03E-01	0.174	1.52E-04

K (cm/s)
1.6E-04



Single-Stage Constant Head Borehole Test - Altamont - Store-and-Release Cover

Project:	Altamont Decomissioning	**Installer:**	XW
Date:	04/02/07	**Analyst:**	CHB
Test ID:	TSB-A4		

Fixed Variables:

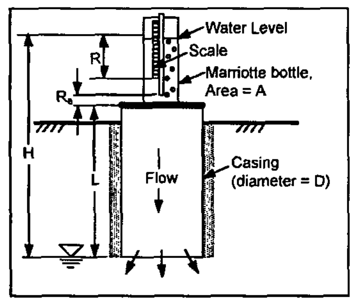
Casing Diameter (cm):	30.48
Standpipe Area (cm²):	79.8
R_s (cm):	10
L (cm):	60.96

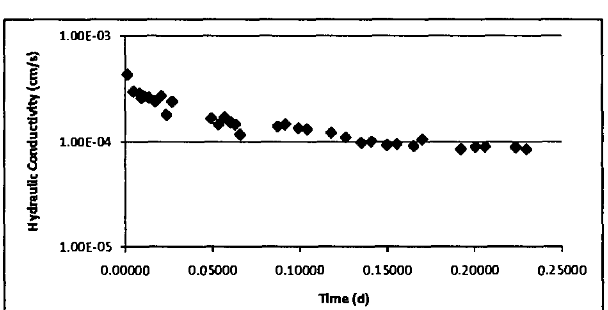
Analysis using Horslev's isotropic constant head solution

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm³/s)	Time (d)	K (cm/s)
14:22:00	32.7			
14:24:00	36.5	2.53E+00	0.00139	4.25E-04
14:29:00	43.1	1.76E+00	0.00486	2.95E-04
14:34:00	49.4	1.68E+00	0.00833	2.82E-04
14:36:00	51.7	1.53E+00	0.00972	2.57E-04
14:38:00	54.1	1.60E+00	0.01111	2.68E-04
14:42:00	58.7	1.53E+00	0.01389	2.57E-04
14:47:00	64.0	1.41E+00	0.01736	2.37E-04
14:52:00	70.0	1.60E+00	0.02083	2.68E-04
14:56:00	73.2	1.06E+00	0.02361	1.79E-04
15:01:00	78.5	1.41E+00	0.02708	2.37E-04
15:28:00	35.4			
15:33:00	39.1	9.84E-01	0.049305556	1.65E-04
15:39:00	43.0	8.65E-01	0.05347	1.45E-04
15:44:00	46.8	1.01E+00	0.05694	1.70E-04
15:49:00	50.2	9.04E-01	0.06042	1.52E-04
15:53:00	52.8	8.65E-01	0.06319	1.45E-04
15:57:00	54.9	6.98E-01	0.06597	1.17E-04
16:28:00	74.2	8.28E-01	0.08750	1.39E-04
16:34:00	78.1	8.64E-01	0.09167	1.45E-04
16:45:00	84.7	7.98E-01	0.09931	1.34E-04
16:52:00	88.8	7.79E-01	0.10417	1.31E-04
17:12:00	99.6	7.18E-01	0.11806	1.21E-04
9:37:00	31.0			
9:49:00	36.9	6.54E-01	0.12639	1.10E-04
10:02:00	42.6	5.83E-01	0.13542	9.80E-05
10:10:00	46.2	5.99E-01	0.14097	1.01E-04
10:23:00	51.6	5.52E-01	0.15000	9.29E-05
10:31:00	55.0	5.65E-01	0.15556	9.50E-05
10:45:00	60.7	5.42E-01	0.16528	9.10E-05
10:52:00	64.0	6.27E-01	0.17014	1.05E-04
11:24:00	76.2	5.07E-01	0.19236	8.53E-05
11:36:00	81.0	5.32E-01	0.20069	8.94E-05
11:44:00	84.2	5.32E-01	0.20625	8.94E-05
12:09:00	94.1	5.27E-01	0.22361	8.85E-05
12:18:00	97.5	5.02E-01	0.22986	8.45E-05

K (cm/s)
8.7E-05





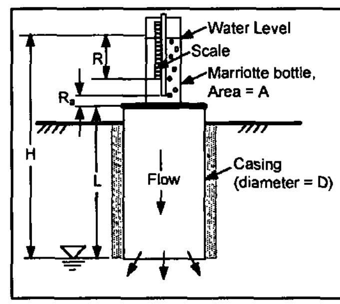
Single-Stage Constant Head Borehole Test - Apple Valley - Clay Cover

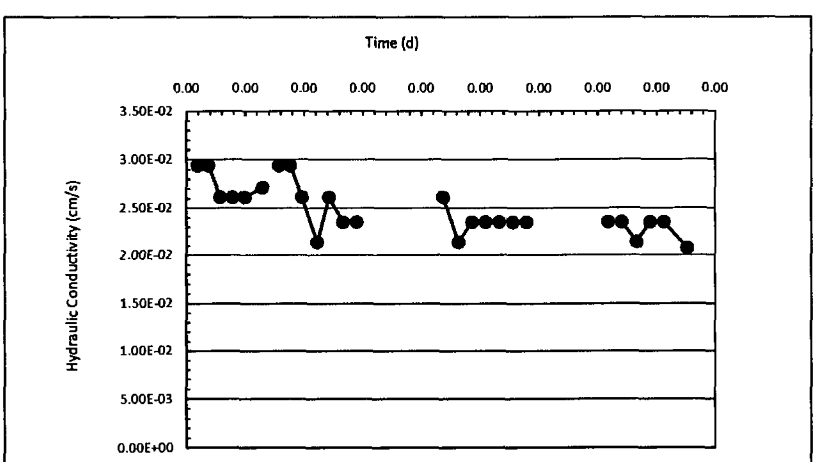
Project:	Apple Valley Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	C-2		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables:		Computations:		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
10:00:00	35.0			
10:00:08	45.0	9.98E+01	0.00009	2.94E-02
10:00:16	55.0	9.98E+01	0.00019	2.94E-02
10:00:25	65.0	8.87E+01	0.00029	2.61E-02
10:00:34	75.0	8.87E+01	0.00039	2.61E-02
10:00:43	85.0	8.87E+01	0.00050	2.61E-02
10:00:56	100.0	9.21E+01	0.00065	2.71E-02
10:01:00	30.0		0.00069	
10:01:08	40.0	9.98E+01	0.00079	2.94E-02
10:01:16	50.0	9.97E+01	0.00088	2.94E-02
10:01:25	60.0	8.87E+01	0.00098	2.61E-02
10:01:36	70.0	7.25E+01	0.00111	2.14E-02
10:01:45	80.0	8.87E+01	0.00122	2.61E-02
10:01:55	90.0	7.98E+01	0.00133	2.35E-02
10:02:05	100.0	7.98E+01	0.00145	2.35E-02
10:03:00	30.0		0.00208	
10:03:09	40.0	8.87E+01	0.00219	2.61E-02
10:03:20	50.0	7.25E+01	0.00231	2.14E-02
10:03:30	60.0	7.98E+01	0.00243	2.35E-02
10:03:40	70.0	7.98E+01	0.00255	2.35E-02
10:03:50	80.0	7.98E+01	0.00266	2.35E-02
10:04:00	90.0	7.98E+01	0.00278	2.35E-02
10:04:10	100.0	7.98E+01	0.00289	2.35E-02
10:05:00	35.0		0.00347	
10:05:10	45.0	7.98E+01	0.00359	2.35E-02
10:05:20	55.0	7.98E+01	0.00370	2.35E-02
10:05:31	65.0	7.25E+01	0.00383	2.14E-02
10:05:41	75.0	7.98E+01	0.00395	2.35E-02
10:05:51	85.0	7.98E+01	0.00406	2.35E-02
10:06:08	100.0	7.04E+01	0.00426	2.08E-02
				AVG
				2.28E-02





Single-Stage Constant Head Borehole Test - Apple Valley - Clay Cover

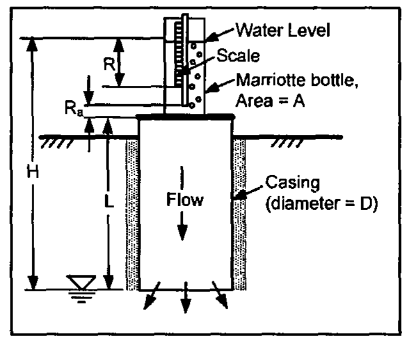
Project:	Apple Valley Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	C-3		

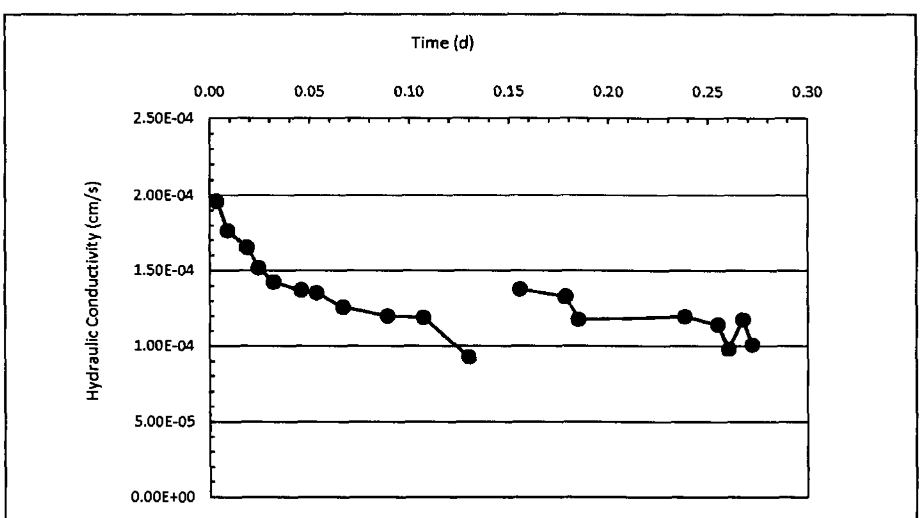
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
11:00:00	39.5			
11:05:00	42.0	6.65E-01	0.003	1.96E-04
11:13:00	45.6	5.99E-01	0.009	1.76E-04
11:27:00	51.5	5.61E-01	0.019	1.65E-04
11:35:00	54.6	5.15E-01	0.024	1.52E-04
11:46:00	58.6	4.84E-01	0.032	1.43E-04
12:06:00	65.6	4.66E-01	0.046	1.37E-04
12:17:00	69.4	4.59E-01	0.053	1.35E-04
12:36:00	75.5	4.27E-01	0.067	1.26E-04
13:08:00	85.3	4.07E-01	0.089	1.20E-04
13:34:00	93.2	4.04E-01	0.107	1.19E-04
14:07:00	101.0	3.14E-01	0.130	9.26E-05
14:11:00	32.0		0.133	
14:44:00	43.6	4.68E-01	0.156	1.38E-04
15:17:00	54.8	4.51E-01	0.178	1.33E-04
15:26:00	57.5	3.99E-01	0.185	1.18E-04
16:43:00	81.0	4.06E-01	0.238	1.20E-04
17:07:00	88.0	3.88E-01	0.255	1.14E-04
17:15:00	90.0	3.33E-01	0.260	9.80E-05
17:25:00	93.0	3.99E-01	0.267	1.18E-04
17:32:00	94.8	3.42E-01	0.272	1.01E-04
			Average	1.22E-04





Single-Stage Constant Head Borehole Test - Apple Valley - Clay Cover

Project: Apple Valley Decomissioning   **Installer:** XW
Date: 03/30/07   **Analyst:** CHB
Test ID: C-4

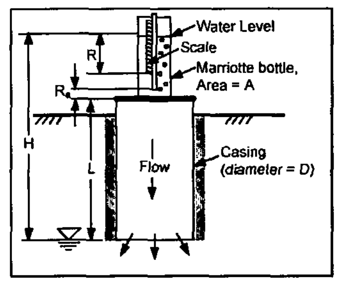
Fixed Variables:

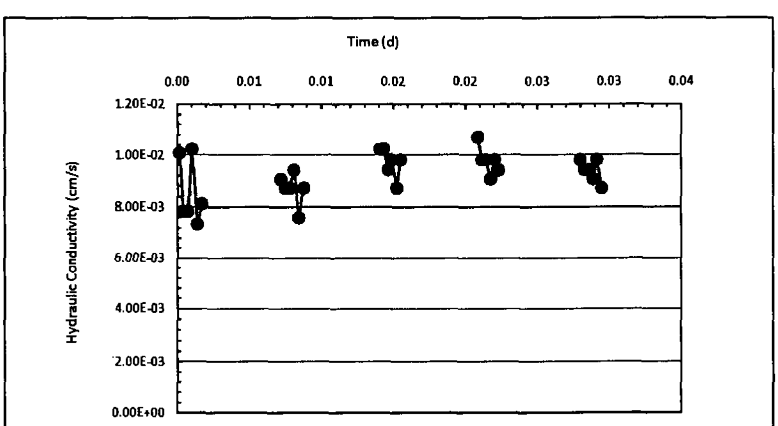
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
10:00:07	37.0			
10:00:21	43.0	3.42E+01	0.000	1.01E-02
10:00:42	50.0	2.66E+01	0.000	7.84E-03
10:01:12	60.0	2.66E+01	0.001	7.84E-03
10:01:35	70.0	3.47E+01	0.001	1.02E-02
10:02:07	80.0	2.49E+01	0.001	7.35E-03
10:02:36	90.0	2.75E+01	0.002	8.11E-03
10:10:00	30.0		0.007	
10:10:26	40.0	3.07E+01	0.007	9.05E-03
10:10:53	50.0	2.96E+01	0.007	8.71E-03
10:11:20	60.0	2.96E+01	0.008	8.71E-03
10:11:45	70.0	3.19E+01	0.008	9.41E-03
10:12:16	80.0	2.57E+01	0.008	7.59E-03
10:12:43	90.0	2.96E+01	0.009	8.71E-03
10:20:00	30.0		0.014	
10:20:23	40.0	3.47E+01	0.014	1.02E-02
10:20:46	50.0	3.47E+01	0.014	1.02E-02
10:21:11	60.0	3.19E+01	0.015	9.41E-03
10:21:35	70.0	3.32E+01	0.015	9.80E-03
10:22:02	80.0	2.96E+01	0.015	8.71E-03
10:22:26	90.0	3.33E+01	0.015	9.80E-03
10:30:00	35.0		0.021	
10:30:11	40.0	3.63E+01	0.021	1.07E-02
10:30:35	50.0	3.32E+01	0.021	9.80E-03
10:30:59	60.0	3.33E+01	0.021	9.80E-03
10:31:25	70.0	3.07E+01	0.022	9.05E-03
10:31:49	80.0	3.32E+01	0.022	9.80E-03
10:32:14	90.0	3.19E+01	0.022	9.41E-03
10:40:00	30.0		0.028	
10:40:24	40.0	3.32E+01	0.028	9.80E-03
10:40:49	50.0	3.19E+01	0.028	9.41E-03
10:41:14	60.0	3.19E+01	0.029	9.41E-03
10:41:40	70.0	3.07E+01	0.029	9.05E-03
10:42:04	80.0	3.33E+01	0.029	9.80E-03
10:42:31	90.0	2.96E+01	0.029	8.71E-03

AVG
9.60E-03





Single-Stage Constant Head Borehole Test - Apple Valley - Clay Cover

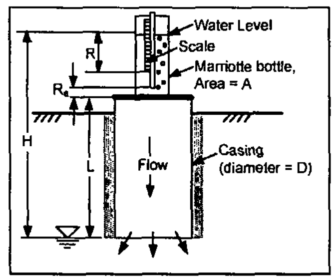
Project:	Apple Valley Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	C-5		

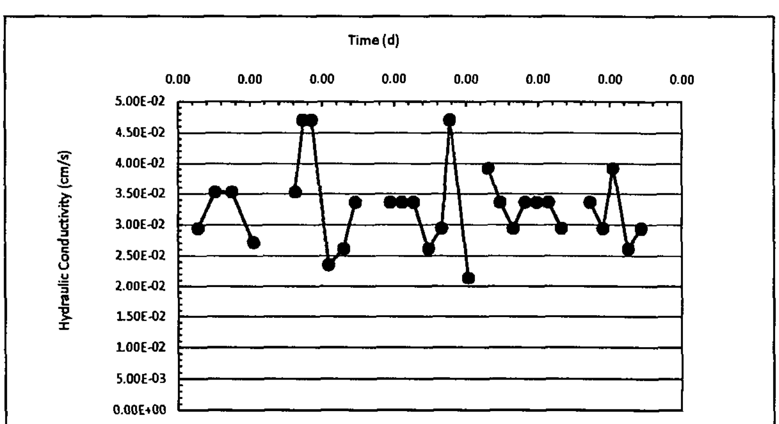
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_e (cm):	10
L (cm):	30.48

Temporal Variables: **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
10:00:00	40.0			
10:00:12	55.0	9.97E+01	0.00014	2.94E-02
10:00:22	70.0	1.20E+02	0.00025	3.53E-02
10:00:32	85.0	1.20E+02	0.00037	3.53E-02
10:00:45	100.0	9.21E+01	0.00052	2.71E-02
10:01:00	35.0		0.00069	
10:01:10	50.0	1.20E+02	0.00081	3.53E-02
10:01:15	60.0	1.60E+02	0.00087	4.70E-02
10:01:20	70.0	1.60E+02	0.00093	4.70E-02
10:01:30	80.0	7.98E+01	0.00104	2.35E-02
10:01:39	90.0	8.87E+01	0.00115	2.61E-02
10:01:46	100.0	1.14E+02	0.00123	3.36E-02
10:02:00	30.0		0.00139	
10:02:07	40.0	1.14E+02	0.00147	3.36E-02
10:02:14	50.0	1.14E+02	0.00155	3.36E-02
10:02:21	60.0	1.14E+02	0.00163	3.36E-02
10:02:30	70.0	8.87E+01	0.00174	2.61E-02
10:02:38	80.0	9.97E+01	0.00183	2.94E-02
10:02:43	90.0	1.60E+02	0.00189	4.70E-02
10:02:54	100.0	7.25E+01	0.00201	2.14E-02
10:03:00	30.0		0.00208	
10:03:06	40.0	1.33E+02	0.00215	3.92E-02
10:03:13	50.0	1.14E+02	0.00223	3.36E-02
10:03:21	60.0	9.97E+01	0.00233	2.94E-02
10:03:28	70.0	1.14E+02	0.00241	3.36E-02
10:03:35	80.0	1.14E+02	0.00249	3.36E-02
10:03:42	90.0	1.14E+02	0.00257	3.36E-02
10:03:50	100.0	9.98E+01	0.00266	2.94E-02
10:04:00	30.0		0.00278	
10:04:07	40.0	1.14E+02	0.00286	3.36E-02
10:04:15	50.0	9.98E+01	0.00295	2.94E-02
10:04:21	60.0	1.33E+02	0.00302	3.92E-02
10:04:30	70.0	8.87E+01	0.00312	2.61E-02
10:04:38	80.0	9.97E+01	0.00322	2.94E-02
				AVG
				3.15E-02





Single-Stage Constant Head Borehole Test - Apple Valley - Clay Cover

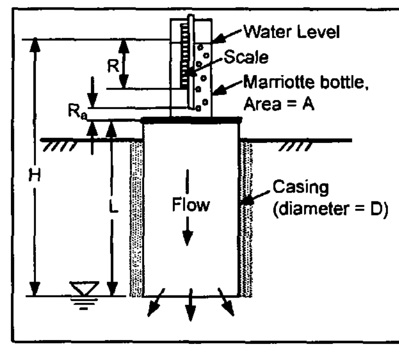
Project:	Apple Valley Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	C-7		

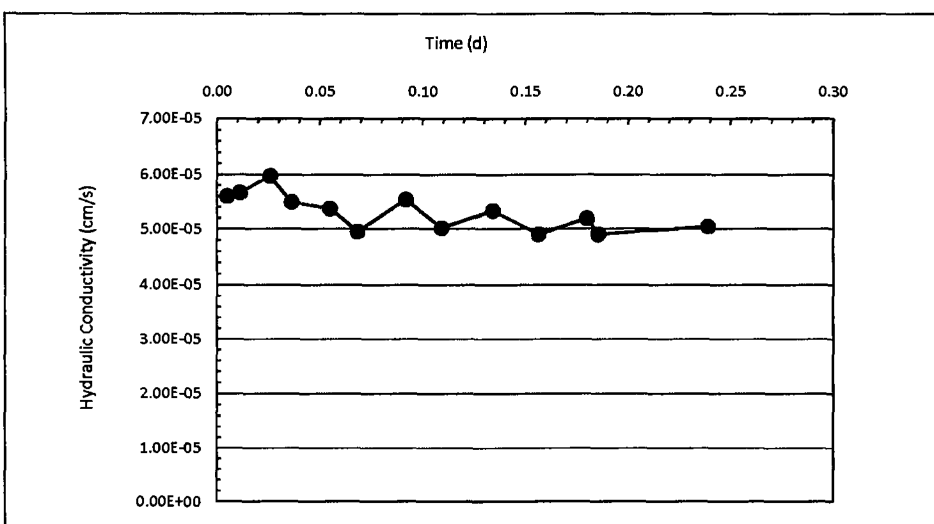
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
10:58:00	35.9			
11:05:00	36.9	1.90E-01	0.005	5.60E-05
11:14:00	38.2	1.92E-01	0.011	5.66E-05
11:35:00	41.4	2.03E-01	0.026	5.97E-05
11:50:00	43.5	1.86E-01	0.036	5.49E-05
12:17:00	47.2	1.82E-01	0.055	5.37E-05
12:36:00	49.6	1.68E-01	0.068	4.95E-05
13:10:00	54.4	1.88E-01	0.092	5.53E-05
13:35:00	57.6	1.70E-01	0.109	5.02E-05
14:11:00	62.5	1.81E-01	0.134	5.34E-05
14:43:00	66.5	1.66E-01	0.156	4.90E-05
15:17:00	71.0	1.76E-01	0.180	5.19E-05
15:25:00	72.0	1.66E-01	0.185	4.90E-05
16:42:00	81.9	1.71E-01	0.239	5.04E-05
			AVG	5.17E-05





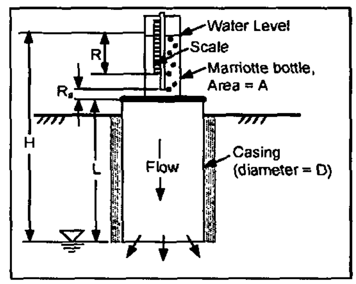
Single-Stage Constant Head Borehole Test - Apple Valley - Store-and-Release Cover

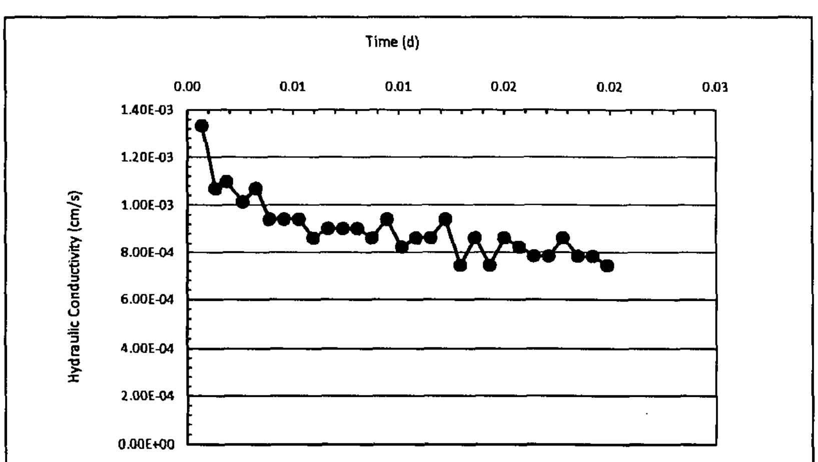
Project:	Apple Valley Decomissioning	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	ALT-1		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_s (cm):	10
L (cm):	30.48

Temporal Variables:		**Computations:**		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
9:29:00	34.0			
9:30:00	37.4	4.52E+00	0.0007	1.33E-03
9:30:55	39.9	3.63E+00	0.0013	1.07E-03
9:31:40	42.0	3.72E+00	0.0019	1.10E-03
9:32:45	44.8	3.44E+00	0.0026	1.01E-03
9:33:40	47.3	3.63E+00	0.0032	1.07E-03
9:34:35	49.5	3.19E+00	0.0039	9.41E-04
9:35:35	51.9	3.19E+00	0.0046	9.41E-04
9:36:35	54.3	3.19E+00	0.0053	9.41E-04
9:37:35	56.5	2.93E+00	0.0060	8.62E-04
9:38:35	58.8	3.06E+00	0.0067	9.02E-04
9:39:35	61.1	3.06E+00	0.0073	9.02E-04
9:40:35	63.4	3.06E+00	0.0080	9.02E-04
9:41:35	65.6	2.93E+00	0.0087	8.62E-04
9:42:35	68.0	3.19E+00	0.0094	9.41E-04
9:43:35	70.1	2.79E+00	0.0101	8.23E-04
9:44:35	72.3	2.93E+00	0.0108	8.62E-04
9:45:35	74.5	2.93E+00	0.0115	8.62E-04
9:46:35	76.9	3.19E+00	0.0122	9.41E-04
9:47:35	78.8	2.53E+00	0.0129	7.45E-04
9:48:35	81.0	2.93E+00	0.0136	8.62E-04
9:49:35	82.9	2.53E+00	0.0143	7.45E-04
9:50:35	85.1	2.93E+00	0.0150	8.62E-04
9:51:35	87.2	2.79E+00	0.0157	8.23E-04
9:52:35	89.2	2.66E+00	0.0164	7.84E-04
9:53:35	91.2	2.66E+00	0.0171	7.84E-04
9:54:35	93.4	2.93E+00	0.0178	8.62E-04
9:55:35	95.4	2.66E+00	0.0185	7.84E-04
9:56:35	97.4	2.66E+00	0.0192	7.84E-04
9:57:35	99.3	2.53E+00	0.0198	7.45E-04
				AVG
				8.10E-04





Single-Stage Constant Head Borehole Test - Apple Valley - Store-and-Release Cover

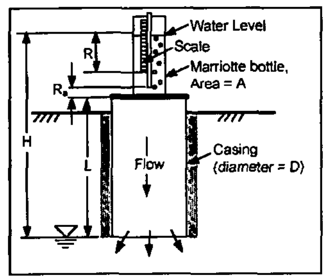
Project: Apple Valley Decomissioning **Installer:** XW
Date: 03/30/07 **Analyst:** CHB
Test ID: ALT-2

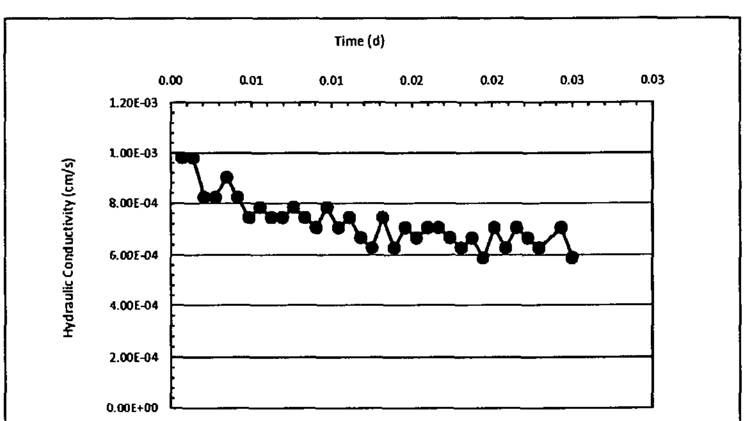
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
10:06:00	32.5			
10:07:00	35.0	3.33E+00	0.001	9.80E-04
10:08:00	37.5	3.33E+00	0.001	9.80E-04
10:09:00	39.6	2.79E+00	0.002	8.23E-04
10:10:00	41.7	2.79E+00	0.003	8.23E-04
10:11:00	44.0	3.06E+00	0.003	9.02E-04
10:12:00	46.1	2.79E+00	0.004	8.23E-04
10:13:00	48.0	2.53E+00	0.005	7.45E-04
10:14:00	50.0	2.66E+00	0.006	7.84E-04
10:15:00	51.9	2.53E+00	0.006	7.45E-04
10:16:00	53.8	2.53E+00	0.007	7.45E-04
10:17:00	55.8	2.66E+00	0.008	7.84E-04
10:18:00	57.7	2.53E+00	0.008	7.45E-04
10:19:00	59.5	2.39E+00	0.009	7.06E-04
10:20:00	61.5	2.66E+00	0.010	7.84E-04
10:21:00	63.3	2.39E+00	0.010	7.06E-04
10:22:00	65.2	2.53E+00	0.011	7.45E-04
10:23:00	66.9	2.26E+00	0.012	6.66E-04
10:24:00	68.5	2.13E+00	0.013	6.27E-04
10:25:00	70.4	2.53E+00	0.013	7.45E-04
10:26:00	72.0	2.13E+00	0.014	6.27E-04
10:27:00	73.8	2.39E+00	0.015	7.06E-04
10:28:00	75.5	2.26E+00	0.015	6.66E-04
10:29:00	77.3	2.39E+00	0.016	7.06E-04
10:30:00	79.1	2.39E+00	0.017	7.06E-04
10:31:00	80.8	2.26E+00	0.017	6.66E-04
10:32:00	82.4	2.13E+00	0.018	6.27E-04
10:33:00	84.1	2.26E+00	0.019	6.66E-04
10:34:00	85.6	2.00E+00	0.019	5.88E-04
10:35:00	87.4	2.39E+00	0.020	7.06E-04
10:36:00	89.0	2.13E+00	0.021	6.27E-04
10:37:00	90.8	2.39E+00	0.022	7.06E-04
10:38:00	92.5	2.26E+00	0.022	6.66E-04
10:39:00	94.1	2.13E+00	0.023	6.27E-04
10:41:00	97.7	2.39E+00	0.024	7.06E-04
10:42:00	99.2	2.00E+00	0.025	5.88E-04
				AVG
				6.27E-04





Single-Stage Constant Head Borehole Test - Boardman - Thin Store-and-Release Cover

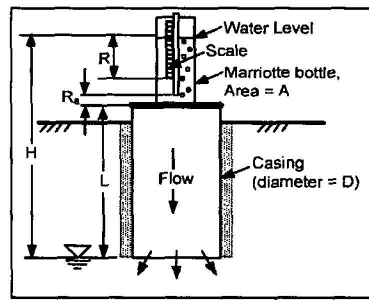
Project:	Boardman	**Installer:**	XW
Date:	08/20/07	**Analyst:**	CHB
Test ID:	TH-1		

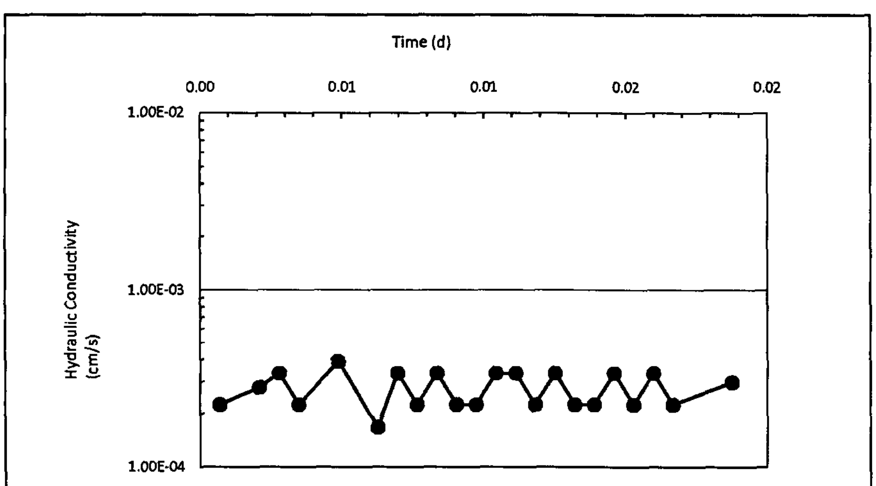
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
2:49:00	32.0			
2:50:00	33.0	1.33E+00	0.0007	2.24E-04
2:52:00	35.5	1.66E+00	0.0021	2.80E-04
2:53:00	37.0	2.00E+00	0.0028	3.35E-04
2:54:00	38.0	1.33E+00	0.0035	2.24E-04
2:56:00	41.5	2.33E+00	0.0049	3.91E-04
2:58:00	43.0	9.98E-01	0.0063	1.68E-04
2:59:00	44.5	2.00E+00	0.0069	3.35E-04
3:00:00	45.5	1.33E+00	0.0076	2.24E-04
3:01:00	47.0	2.00E+00	0.0083	3.35E-04
3:02:00	48.0	1.33E+00	0.0090	2.24E-04
3:03:00	49.0	1.33E+00	0.0097	2.24E-04
3:04:00	50.5	1.99E+00	0.0104	3.35E-04
3:05:00	52.0	2.00E+00	0.0111	3.35E-04
3:06:00	53.0	1.33E+00	0.0118	2.24E-04
3:07:00	54.5	2.00E+00	0.0125	3.35E-04
3:08:00	55.5	1.33E+00	0.0132	2.24E-04
3:09:00	56.5	1.33E+00	0.0139	2.24E-04
3:10:00	58.0	2.00E+00	0.0146	3.35E-04
3:11:00	59.0	1.33E+00	0.0153	2.24E-04
3:12:00	60.5	2.00E+00	0.0160	3.35E-04
3:13:00	61.5	1.33E+00	0.0167	2.24E-04
3:16:00	65.5	1.77E+00	0.0188	2.98E-04
			AVG	2.98E-04





Single-Stage Constant Head Borehole Test - Boardman - Thin Store-and-Release Cover

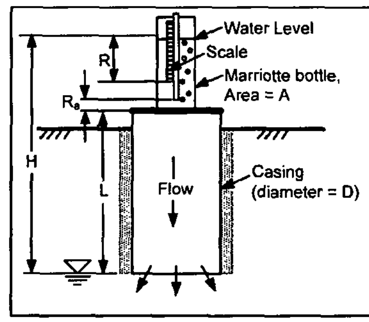
Project: Boardman **Installer:** XW
Date: 08/20/07 **Analyst:** CHB
Test ID: TH-2

Fixed Variables:

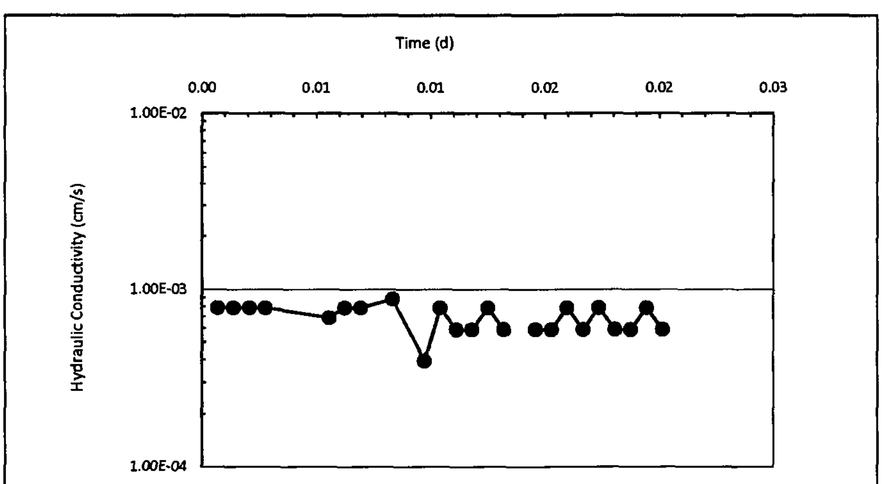
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
2:44:00	33.0			
2:45:00	35.0	2.66E+00	0.001	7.84E-04
2:46:00	37.0	2.66E+00	0.001	7.84E-04
2:47:00	39.0	2.66E+00	0.002	7.84E-04
2:48:00	41.0	2.66E+00	0.003	7.84E-04
2:52:00	48.0	2.33E+00	0.006	6.86E-04
2:53:00	50.0	2.66E+00	0.006	7.84E-04
2:54:00	52.0	2.66E+00	0.007	7.84E-04
2:56:00	56.5	2.99E+00	0.008	8.82E-04
2:58:00	58.5	1.33E+00	0.010	3.92E-04
2:59:00	60.5	2.66E+00	0.010	7.84E-04
3:00:00	62.0	2.00E+00	0.011	5.88E-04
3:01:00	63.5	2.00E+00	0.012	5.88E-04
3:02:00	65.5	2.66E+00	0.013	7.84E-04
3:03:00	67.0	2.00E+00	0.013	5.88E-04
3:04:00	69.0	2.66E+00	0.014	
3:05:00	70.5	2.00E+00	0.015	5.88E-04
3:06:00	72.0	2.00E+00	0.015	5.88E-04
3:07:00	74.0	2.66E+00	0.016	7.84E-04
3:08:00	75.5	2.00E+00	0.017	5.88E-04
3:09:00	77.5	2.66E+00	0.017	7.84E-04
3:10:00	79.0	2.00E+00	0.018	5.88E-04
3:11:00	80.5	2.00E+00	0.019	5.88E-04
3:12:00	82.5	2.66E+00	0.019	7.84E-04
3:13:00	84.0	2.00E+00	0.020	5.88E-04



AVG
6.53E-04



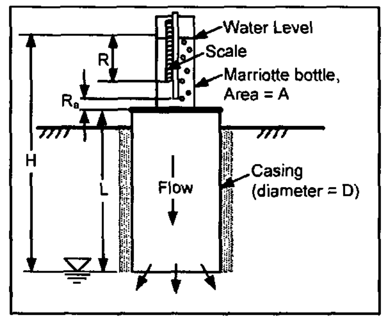
Single-Stage Constant Head Borehole Test - Boardman - Thin Store-and-Release Cover

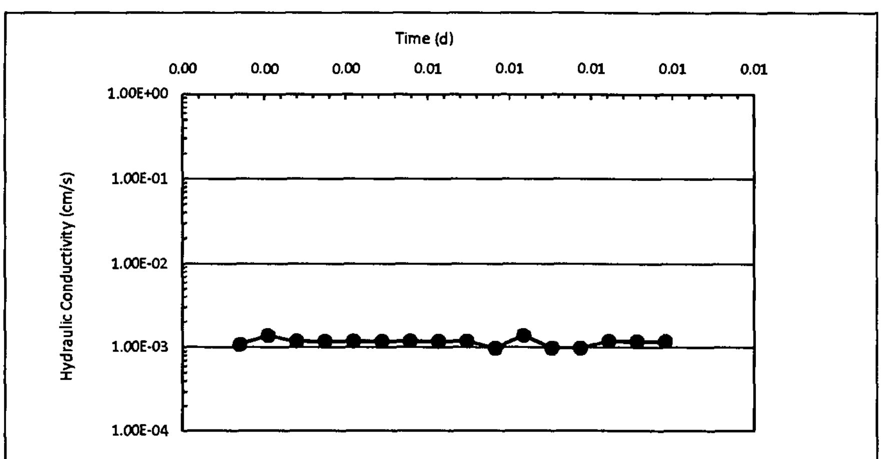
Project:	Boardman	**Installer:**	XW
Date:	08/20/07	**Analyst:**	CHB
Test ID:	TH-3		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: Time	R (cm)	Computations: Q (cm^3/s)	Time (d)	K (cm/s)
2:56:00	34.0			
2:58:00	39.5	3.66E+00	0.001	1.08E-03
2:59:00	43.0	4.66E+00	0.002	1.37E-03
3:00:00	46.0	3.99E+00	0.003	1.18E-03
3:01:00	49.0	3.99E+00	0.003	1.18E-03
3:02:00	52.0	3.99E+00	0.004	1.18E-03
3:03:00	55.0	3.99E+00	0.005	1.18E-03
3:04:00	58.0	3.99E+00	0.006	1.18E-03
3:05:00	61.0	3.99E+00	0.006	1.18E-03
3:06:00	64.0	3.99E+00	0.007	1.18E-03
3:07:00	66.5	3.33E+00	0.008	9.80E-04
3:08:00	70.0	4.66E+00	0.008	1.37E-03
3:09:00	72.5	3.33E+00	0.009	9.80E-04
3:10:00	75.0	3.33E+00	0.010	9.80E-04
3:11:00	78.0	3.99E+00	0.010	1.18E-03
3:12:00	81.0	3.99E+00	0.011	1.18E-03
3:13:00	84.0	3.99E+00	0.012	1.18E-03
				AVG
				1.18E-03



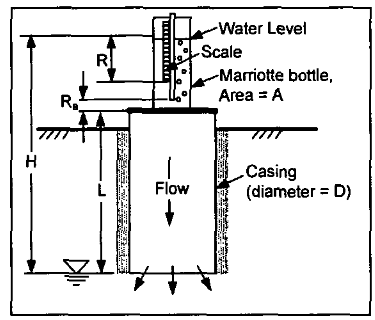


Single-Stage Constant Head Borehole Test - Boardman - Thin Store-and-Release Cover

Project:	Boardman	**Installer:**	XW
Date:	08/20/07	**Analyst:**	CHB
Test ID:	TH-4		

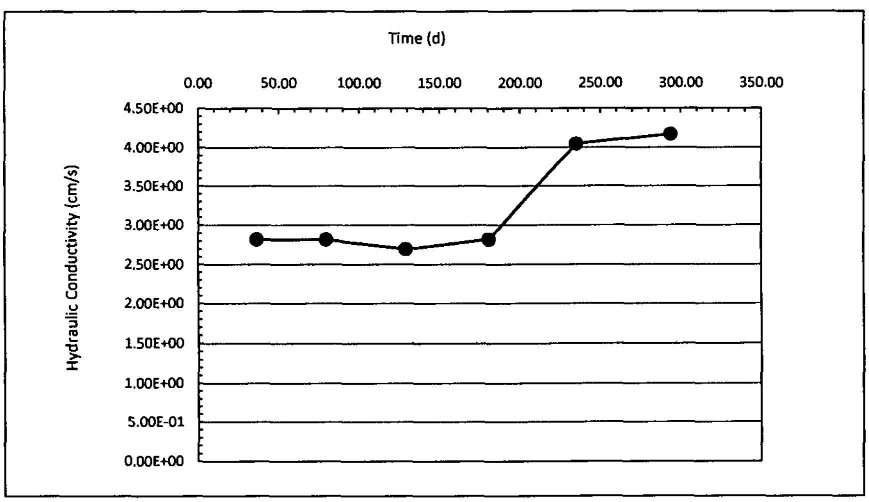
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96



Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
14:22:00	32.7			
14:24:00	36.5	1.68E+04	36.5	2.82E+00
14:29:00	43.1	1.68E+04	79.6	2.82E+00
14:34:00	49.4	1.60E+04	129	2.70E+00
14:36:00	51.7	1.68E+04	180.7	2.82E+00
14:38:00	54.1	2.41E+04	234.8	4.05E+00
14:42:00	58.7	2.48E+04	293.5	4.17E+00
				AVG
				2.79E+00



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

TRIAL 1

Test ID: TK-1 **Installer:** XW
Project: Boardman **Analyst:** CHB

SOLUTION -TRIAL 1

K (m/s) = 8.12E-07 8.12E-05

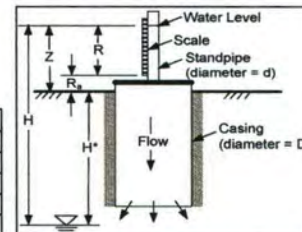
Total Time (d) = 0.07 1.7 hrs

FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1/1/00 10:58:30

FITTED VARIABLES

a (s^{-1}) =	0.0000839
H* (m) =	0.49
H_o (m) =	0.82
MSE (m^2) =	1.33E-06
Bias (m) =	-3.34E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/1/1900 9:17:17	33
1/1/1900 9:22:30	30.9
1/1/1900 9:27:30	28.9
1/1/1900 9:32:30	26.9
1/1/1900 9:37:30	25
1/1/1900 9:42:30	23.1
1/1/1900 9:47:30	21.2
1/1/1900 9:52:30	19.6
1/1/1900 9:57:30	17.8
1/1/1900 10:02:30	16.2
1/1/1900 10:07:30	14.6
1/1/1900 10:12:30	13.1
1/1/1900 10:18:30	11.2
1/1/1900 10:28:30	8.5
1/1/1900 10:38:30	5.6
1/1/1900 10:48:30	2.7
1/1/1900 10:58:30	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
0.33	0.00	0.329	-9.01E-04	8.11E-07
0.31	313	0.308	-1.11E-03	1.23E-06
0.29	613	0.288	-9.24E-04	8.53E-07
0.27	913	0.269	-2.44E-04	5.94E-08
0.25	1213	0.250	-8.34E-05	6.96E-09
0.23	1513	0.232	5.45E-04	2.98E-07
0.21	1813	0.214	1.63E-03	2.66E-06
0.20	2113	0.196	1.62E-04	2.64E-08
0.18	2413	0.179	1.13E-03	1.27E-06
0.16	2713	0.163	5.17E-04	2.68E-07
0.15	3013	0.146	3.20E-04	1.02E-07
0.13	3313	0.131	-4.75E-04	2.26E-07
0.11	3673	0.112	8.86E-05	7.86E-09
0.09	4273	0.083	-2.43E-03	5.89E-06
0.06	4873	0.055	-1.49E-03	2.23E-06
0.03	5473	0.028	8.20E-04	6.73E-07
0.00	6073	0.002	2.44E-03	5.97E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

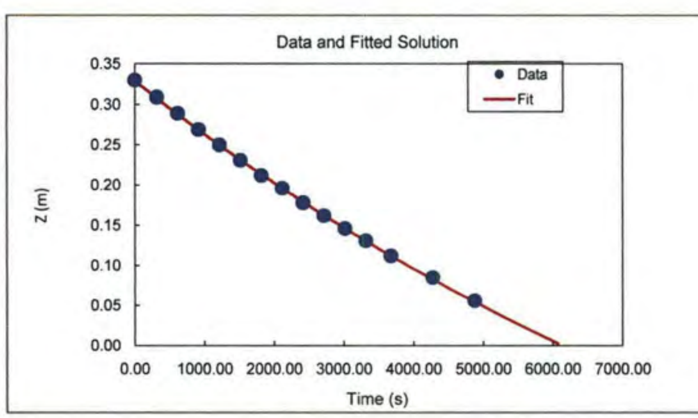
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.329
304	0.309
607	0.288
911	0.269
1215	0.250
1518	0.231
1822	0.213
2126	0.195
2429	0.178
2733	0.161
3037	0.145
3340	0.129
3644	0.114
3947	0.098
4251	0.084
4555	0.069
4858	0.055
5162	0.041
5466	0.028
5769	0.015
6073	0.002

Δt (s) = 304



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

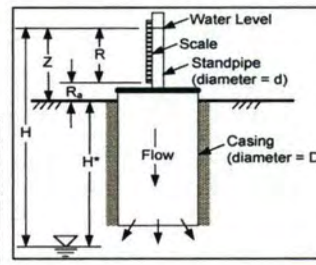
TRIAL 1

Test ID:	TK-2	**Installer:**	XW
Project:	Boardman	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 4.58E-05

Total Time (d) = 0.00 0.0 hrs



FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1/0/00 9:14:37

FITTED VARIABLES

a (s^{-1}) =	0.0047384
H* (m) =	0.92
H_o (m) =	1.50
MSE (m^2) =	7.78E-06
Bias (m) =	-6.04E-08

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/00 9:12:54	58
1/0/00 9:13:02	53
1/0/00 9:13:07	49
1/0/00 9:13:13	45
1/0/00 9:13:21	40
1/0/00 9:13:30	35
1/0/00 9:13:38	30
1/0/00 9:13:47	25
1/0/00 9:13:55	20
1/0/00 9:14:05	15
1/0/00 9:14:15	10
1/0/00 9:14:27	5
1/0/00 9:14:37	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.58	0.00	0.582	1.76E-03	3.10E-06
0.53	8	0.526	-4.19E-03	1.76E-05
0.49	13	0.492	1.90E-03	3.59E-06
0.45	19	0.452	2.25E-03	5.06E-06
0.40	27	0.401	1.11E-03	1.24E-06
0.35	36	0.346	-4.15E-03	1.72E-05
0.30	44	0.299	-1.33E-03	1.76E-06
0.25	53	0.248	-2.31E-03	5.34E-06
0.20	61	0.204	4.16E-03	1.73E-05
0.15	71	0.152	2.02E-03	4.08E-06
0.10	81	0.102	2.29E-03	5.25E-06
0.05	93	0.046	-4.35E-03	1.89E-05
0.00	103	0.001	8.42E-04	7.10E-07

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

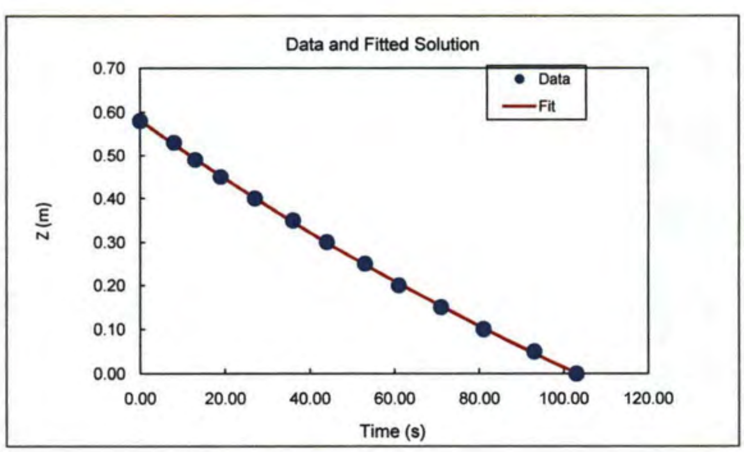
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.582
5	0.545
10	0.510
15	0.476
21	0.442
26	0.409
31	0.377
36	0.346
41	0.315
46	0.285
51	0.256
57	0.228
62	0.200
67	0.173
72	0.146
77	0.121
82	0.096
88	0.071
93	0.047
98	0.024
103	0.001

Δt (s) = 5



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

TRIAL 2

Test ID:	TK-2	**Installer:**	XW
Project:	Boardman	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 1.48E-03

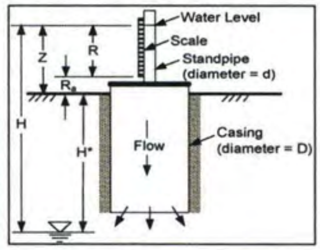
Total Time (d) = 0.00 0.0 hrs

FIXED VARIABLES

d (cm) =	30.48
D (cm) =	10.16
R_a (cm) =	0
Final Time:	1/0/1900 9:16:23

FITTED VARIABLES

a (s^{-1}) =	0.0056544
H* (m) =	0.93
H_o (m) =	1.53
MSE (m^2) =	4.41E-06
Bias (m) =	2.30E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/1900 9:15:08	60
1/0/1900 9:15:14	55
1/0/1900 9:15:20	50
1/0/1900 9:15:26	45
1/0/1900 9:15:33	40
1/0/1900 9:15:40	35
1/0/1900 9:15:46	30
1/0/1900 9:15:54	25
1/0/1900 9:15:59	20
1/0/1900 9:16:08	15
1/0/1900 9:16:16	10
1/0/1900 9:16:23	5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
0.60	0	0.600	4.65E-04	2.16E-07
0.55	6	0.549	-6.84E-04	4.68E-07
0.50	12	0.500	-1.27E-04	1.62E-08
0.45	18	0.452	2.08E-03	4.32E-06
0.40	25	0.398	-1.67E-03	2.78E-06
0.35	32	0.347	-3.33E-03	1.11E-05
0.30	38	0.304	3.99E-03	1.59E-05
0.25	46	0.249	-7.18E-04	5.16E-07
0.20	51	0.216	1.63E-02	2.67E-04
0.15	60	0.159	9.31E-03	8.66E-05
0.10	68	0.111	1.10E-02	1.21E-04
0.05	75	0.070	2.05E-02	4.20E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

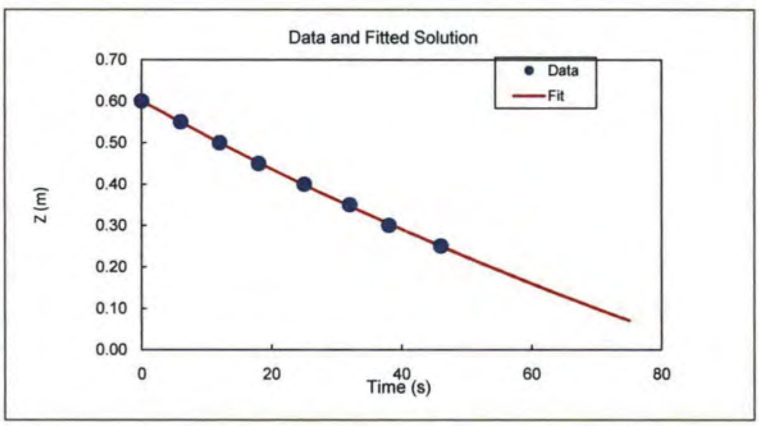
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.600
4	0.568
7	0.537
11	0.506
15	0.476
19	0.446
22	0.417
26	0.389
30	0.361
34	0.334
37	0.307
41	0.281
45	0.256
49	0.231
52	0.207
56	0.183
60	0.159
64	0.136
67	0.114
71	0.092
75	0.070

Δt (s) = 4



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

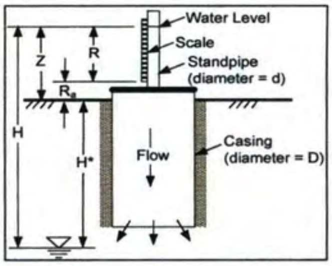
TRIAL 3

Test ID: TK-2 **Installer:** XW
Project: Boardman **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = 1.13E-04
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES
d (cm) = 30.48
D (cm) = 30.48
R_a (cm) = 0
Final Time: 1/0/00 2:56

FITTED VARIABLES
a (s^{-1}) = 0.0012964
H* (m) = 0.05
H_o (m) = 0.35
MSE (m^2) = 6.46E-06
Bias (m) = -1.33E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/00 2:32	30
1/0/00 2:34	25
1/0/00 2:36	20
1/0/00 2:39	15
1/0/00 2:43	10
1/0/00 2:48	5
1/0/00 2:56	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
0.30	0	0.299	-1.16E-03	1.35E-06
0.25	120	0.248	-1.81E-03	3.28E-06
0.20	240	0.205	4.84E-03	2.34E-05
0.15	420	0.151	1.23E-03	1.52E-06
0.10	660	0.097	-3.30E-03	1.09E-05
0.05	960	0.049	-1.44E-03	2.08E-06
0.00	1440	0.002	1.64E-03	2.69E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

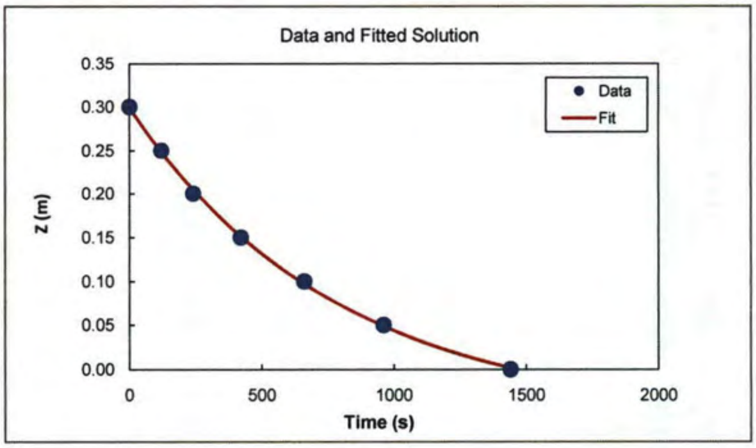
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.299
72	0.268
144	0.239
216	0.213
288	0.189
360	0.168
432	0.148
504	0.130
576	0.114
648	0.099
720	0.086
792	0.073
864	0.062
936	0.052
1008	0.042
1080	0.034
1152	0.026
1224	0.019
1296	0.013
1368	0.007
1440	0.002

Δt (s) = 72



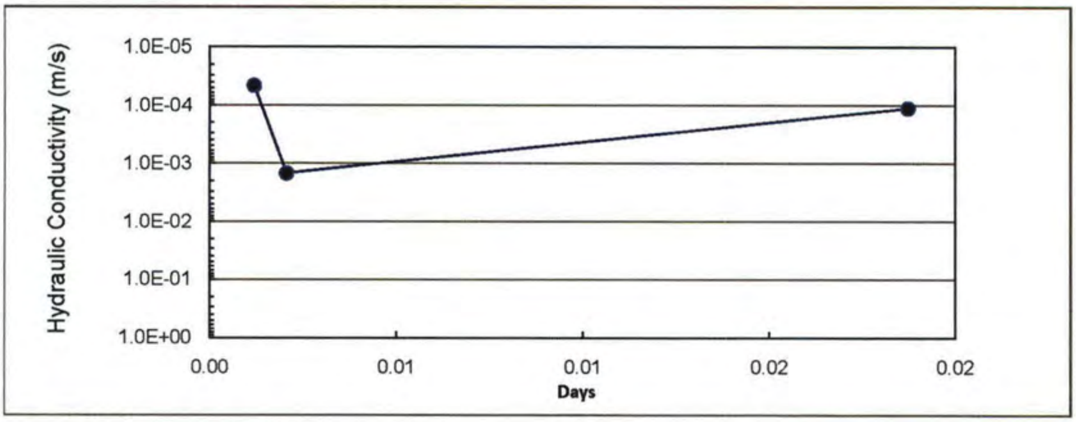
Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

Trial	Time (d)	Total Time (d)	K (m/s)
1	0.001	0.001	4.58E-05
2	0.001	0.002	1.48E-03
3	0.017	0.019	1.13E-04

TK-2

Field Hydraulic Conductivity
5.45E-04 m/s
5.45E-02 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

TRIAL 1

Test ID: TK-3 **Installer:** XW
Project: Boardman **Analyst:** CHB

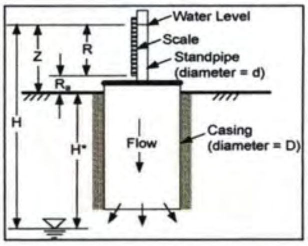
SOLUTION -TRIAL 1
K (m/s) = 2.01E-07 2.01E-05
Total Time (d) = 0.08 2.0 hrs

FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1:58:05

FITTED VARIABLES

a (s^{-1}) =	0.0000208
H* (m) =	3.50
H_o (m) =	4.00
MSE (m^2) =	1.24E-04
Bias (m) =	-1.89E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
0:00:00	48.5
0:04:18	46.3
0:16:57	40.5
0:22:05	38.1
0:27:05	35.8
0:32:05	33.7
0:37:05	31.6
0:42:05	29.4
0:47:05	27.2
0:52:05	25.2
0:57:05	23.2
1:02:05	21.2
1:07:05	19.2
1:12:05	17.2
1:18:05	14.9
1:28:05	11.1
1:38:05	7.5
1:48:05	3.6
1:58:05	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
0.49	0.00	0.500	1.50E-02	2.25E-04
0.46	258	0.479	1.56E-02	2.43E-04
0.41	1017	0.416	1.13E-02	1.27E-04
0.38	1325	0.391	1.02E-02	1.05E-04
0.36	1625	0.367	9.03E-03	8.16E-05
0.34	1925	0.343	5.97E-03	3.57E-05
0.32	2225	0.319	3.06E-03	9.37E-06
0.29	2525	0.295	1.30E-03	1.69E-06
0.27	2825	0.272	-3.14E-04	9.84E-08
0.25	3125	0.248	-3.78E-03	1.43E-05
0.23	3425	0.225	-7.10E-03	5.04E-05
0.21	3725	0.202	-1.03E-02	1.06E-04
0.19	4025	0.179	-1.33E-02	1.77E-04
0.17	4325	0.156	-1.62E-02	2.62E-04
0.15	4685	0.129	-2.05E-02	4.19E-04
0.11	5285	0.084	-2.75E-02	7.56E-04
0.08	5885	0.039	-3.59E-02	1.29E-03
0.04	6485	-0.005	-4.08E-02	1.67E-03
0.00	7085	-0.048	-4.82E-02	2.32E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

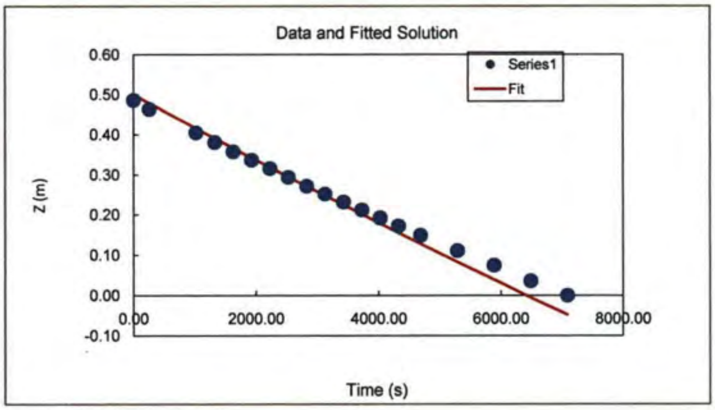
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.500
354	0.471
709	0.441
1063	0.413
1417	0.384
1771	0.355
2126	0.327
2480	0.299
2834	0.271
3188	0.243
3543	0.216
3897	0.189
4251	0.161
4605	0.135
4960	0.108
5314	0.081
5668	0.055
6022	0.029
6377	0.003
6731	-0.023
7085	-0.048

Δt (s) = 354



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

TRIAL 2

Test ID: TK-3 **Installer:** XW
Project: Boardman **Analyst:** CHB

SOLUTION -TRIAL 1

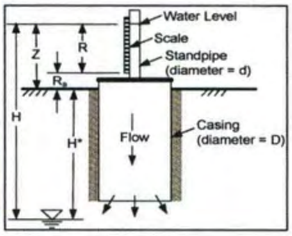
K (m/s) = 4.61E-07 4.61E-05
Total Time (d) = 0.04 1.0 hrs

FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	3:12:30

FITTED VARIABLES

a (s^{-1}) =	0.0000477
H* (m) =	1.12
H_o (m) =	1.34
MSE (m^2) =	2.38E-06
Bias (m) =	6.37E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
2:11:00	21.7
2:45:45	9.3
3:12:30	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.22	0.00	0.218	8.45E-04	7.14E-07
0.09	2085	0.091	-2.16E-03	4.68E-06
0.00	3690	0.001	1.32E-03	1.74E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

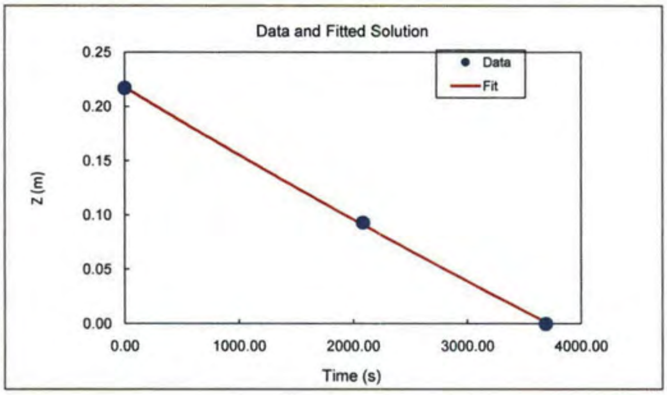
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.218
185	0.206
369	0.194
554	0.183
738	0.171
923	0.160
1107	0.149
1292	0.138
1476	0.127
1661	0.116
1845	0.105
2030	0.094
2214	0.083
2399	0.073
2583	0.062
2768	0.052
2952	0.042
3137	0.031
3321	0.021
3506	0.011
3690	0.001

Δt (s) = 185



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

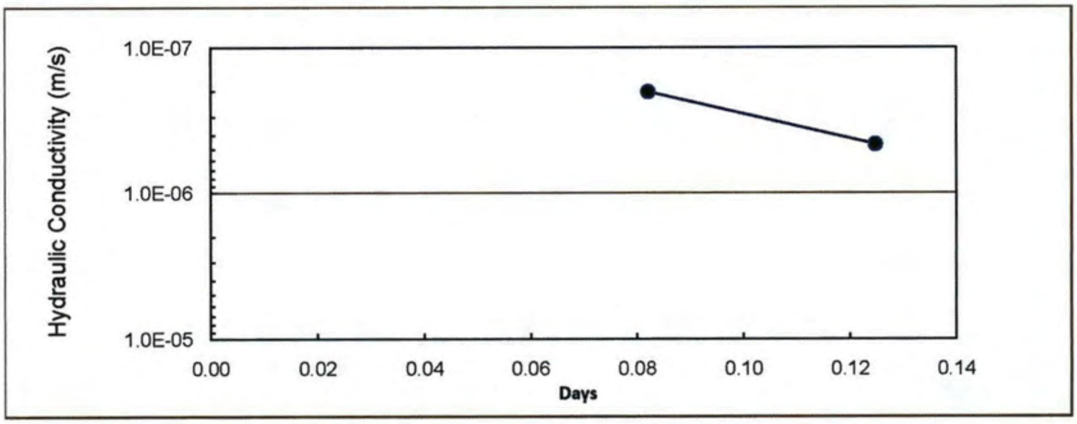
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.082	0.082	2.01E-07
2	0.043	0.125	4.61E-07

TK-3

Field Hydraulic Conductivity

3.31E-07 m/s

3.31E-05 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

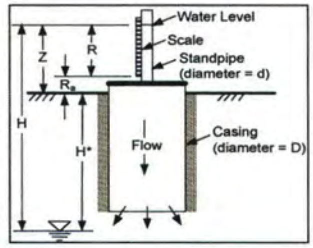
TRIAL 1

Test ID:	TK-4	**Installer:**	XW
Project:	Boardman	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = **1.23E-06** 1.23E-04

Total Time (d) = 0.01 0.3 hrs



FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1:03:00

FITTED VARIABLES

a (s^{-1}) =	0.0001269
H* (m) =	4.08
H_o (m) =	4.57
MSE (m^2) =	8.45E-07
Bias (m) =	3.08E-09

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
0:48:00	49.5
0:49:00	46.1
0:50:30	40.7
0:51:30	37.4
0:53:30	30.7
0:55:30	24.1
0:56:30	20.8
0:58:00	15.9
0:59:30	11.3
1:01:00	6.5
1:03:00	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.50	0.00	0.495	-3.87E-04	1.50E-07
0.46	60	0.460	-1.05E-03	1.11E-06
0.41	150	0.408	1.44E-03	2.07E-06
0.37	210	0.374	4.28E-04	1.83E-07
0.31	330	0.307	1.75E-04	3.07E-08
0.24	450	0.241	-6.08E-05	3.69E-09
0.21	510	0.208	1.98E-04	3.90E-08
0.16	600	0.160	5.50E-04	3.03E-07
0.11	690	0.111	-1.54E-03	2.39E-06
0.07	780	0.064	-1.09E-03	1.20E-06
0.00	900	0.001	1.35E-03	1.82E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

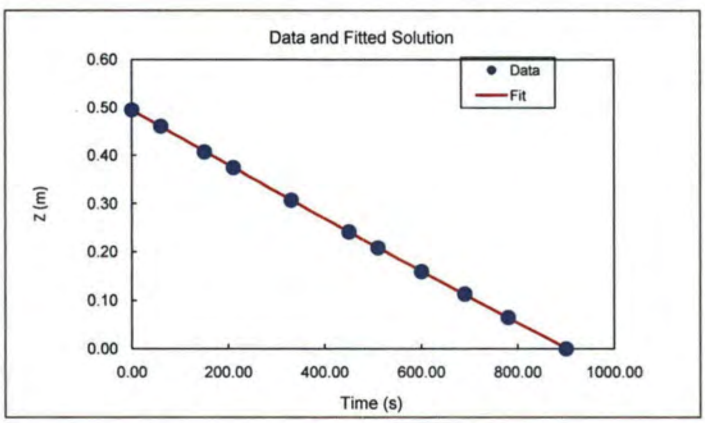
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.495
45	0.469
90	0.443
135	0.417
180	0.391
225	0.366
270	0.341
315	0.316
360	0.291
405	0.266
450	0.241
495	0.216
540	0.192
585	0.168
630	0.143
675	0.119
720	0.096
765	0.072
810	0.048
855	0.025
900	0.001

Δt (s) = 45



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover
TRIAL 2

Test ID: TK-4 **Installer:** XW
Project: Boardman **Analyst:** CHB

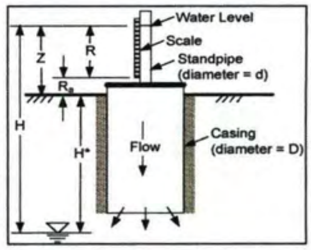
SOLUTION -TRIAL 1
K (m/s) = 1.71E-06 1.71E-04
Total Time (d) = 0.02 0.5 hrs

FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1:36:00

FITTED VARIABLES

a (s^{-1}) =	0.0001768
H* (m) =	1.56
H_o (m) =	2.14
MSE (m^2) =	6.77E-06
Bias (m) =	2.50E-10



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1:06:15	58.1
1:08:00	54
1:10:00	49.2
1:13:00	42.7
1:19:30	29.7
1:21:30	25.9
1:25:30	18.6
1:29:00	12.2
1:32:00	6.2
1:36:00	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.58	0.00	0.578	-2.78E-03	7.75E-06
0.54	105	0.539	-1.15E-03	1.32E-06
0.49	225	0.495	2.75E-03	7.55E-06
0.43	405	0.430	3.32E-03	1.10E-05
0.30	795	0.298	5.69E-04	3.24E-07
0.26	915	0.259	-4.70E-04	2.21E-07
0.19	1155	0.183	-3.11E-03	9.66E-06
0.12	1365	0.119	-2.71E-03	7.34E-06
0.06	1545	0.067	4.62E-03	2.14E-05
0.00	1785	-0.001	-1.04E-03	1.09E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

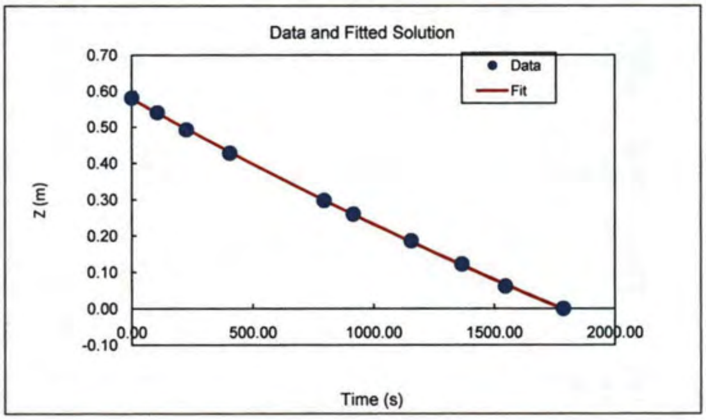
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.578
89	0.545
179	0.512
268	0.479
357	0.447
446	0.416
536	0.385
625	0.354
714	0.324
803	0.295
893	0.266
982	0.237
1071	0.209
1160	0.181
1250	0.154
1339	0.127
1428	0.101
1517	0.075
1607	0.049
1696	0.024
1785	-0.001

Δt (s) = 89



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

TRIAL 3

Test ID: TK-4 **Installer:** XW
Project: Boardman **Analyst:** CHB

SOLUTION -TRIAL 1

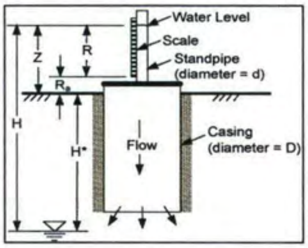
K (m/s) = 5.75E-07 5.75E-05
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) =	10.16
D (cm) =	30.48
R_a (cm) =	0
Final Time:	2:17:30

FITTED VARIABLES

a (s^{-1}) =	0.0000595
H* (m) =	4.49
H_o (m) =	5.13
MSE (m^2) =	2.02E-06
Bias (m) =	2.40E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1:40:30	63.8
1:46:00	53.6
1:51:00	44.8
1:56:00	36
2:02:30	25
2:10:00	12.1
2:17:30	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.64	0.00	0.636	-2.00E-03	4.01E-06
0.54	330	0.536	2.87E-04	8.25E-08
0.45	630	0.447	-6.75E-04	4.56E-07
0.36	930	0.360	-6.39E-05	4.08E-09
0.25	1320	0.249	-1.36E-03	1.86E-06
0.12	1770	0.123	2.38E-03	5.68E-06
0.00	2220	0.001	1.44E-03	2.06E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

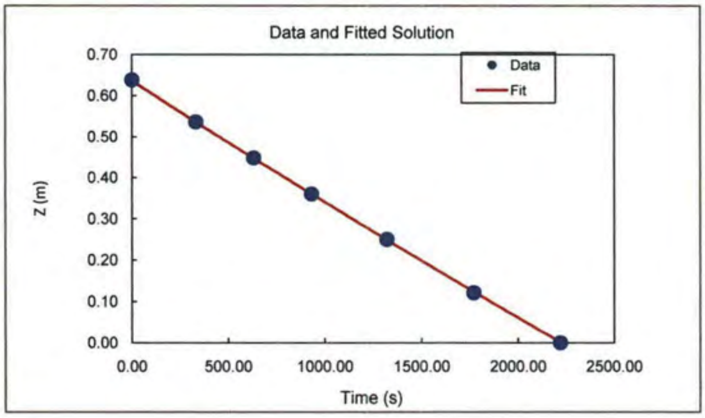
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.636
111	0.602
222	0.569
333	0.535
444	0.502
555	0.469
666	0.437
777	0.404
888	0.372
999	0.340
1110	0.308
1221	0.277
1332	0.245
1443	0.214
1554	0.183
1665	0.152
1776	0.122
1887	0.091
1998	0.061
2109	0.031
2220	0.001

Δt (s) = 111



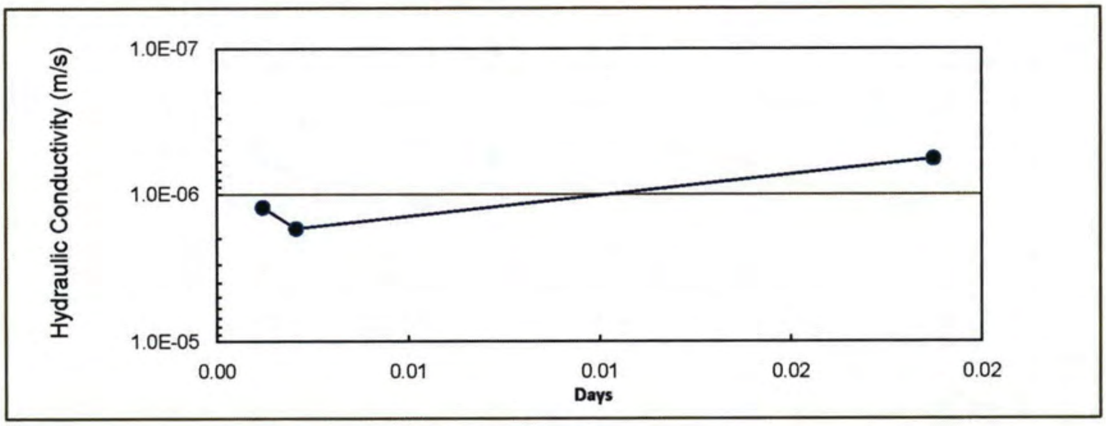
Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Boardman - Thick Store-and-Release Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

Trial	Time (d)	Total Time (d)	K (m/s)
1	0.001	0.001	1.23E-06
2	0.001	0.002	1.71E-06
3	0.017	0.019	5.75E-07

TK-4

Field Hydraulic Conductivity
1.17E-06 m/s
1.17E-04 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 1

Test ID: TSB CR Clay1-NW **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

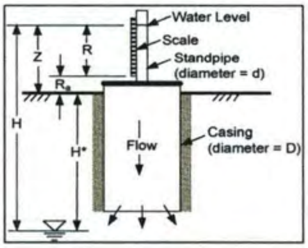
SOLUTION -TRIAL 1
K (m/s) = 1.86E-09
Total Time (d) = 0.25 6.0 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	44.45
Final Time:	16:42:00

FITTED VARIABLES

a (s^{-1}) =	0.0000053
H* (m) =	0.60
H_o (m) =	1.48
MSE (m^2) =	3.73E-04
Bias (m) =	1.29E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
10:41:26	46.8
10:55:11	44.7
11:05:00	41.8
11:48:21	39.4
12:58:00	34.7
13:41:45	32.3
14:03:00	36
15:11:00	32.3
15:27:00	31
16:42:00	29.4

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.91	0.00	0.883	-2.94E-02	8.64E-04
0.89	825	0.877	-1.49E-02	2.22E-04
0.86	1414	0.872	9.46E-03	8.94E-05
0.84	4015	0.852	1.32E-02	1.74E-04
0.79	8194	0.820	2.82E-02	7.94E-04
0.77	10819	0.800	3.24E-02	1.05E-03
0.80	12094	0.790	-1.40E-02	1.97E-04
0.77	16174	0.761	-6.97E-03	4.86E-05
0.75	17134	0.754	-9.17E-04	8.41E-07
0.74	21634	0.721	-1.70E-02	2.89E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

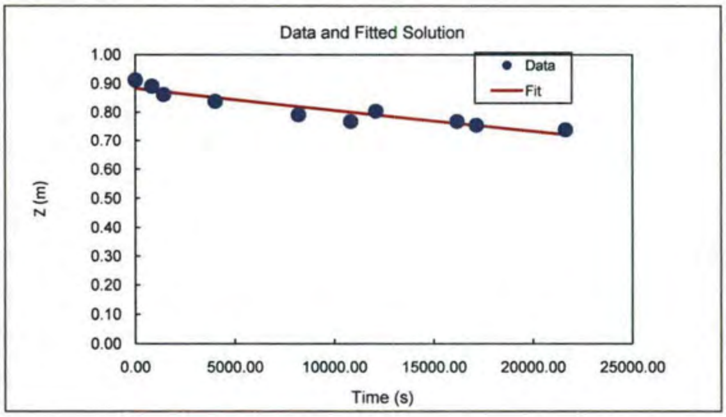
$$K = \frac{a \pi d^2}{11 D}$$

9:16:16

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.883
1082	0.875
2163	0.866
3245	0.858
4327	0.849
5409	0.841
6490	0.833
7572	0.824
8654	0.816
9735	0.808
10817	0.800
11899	0.792
12980	0.784
14062	0.776
15144	0.768
16226	0.760
17307	0.752
18389	0.745
19471	0.737
20552	0.729
21634	0.721

Δt (s) = 1082



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 2

Test ID: Clay1-NW **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

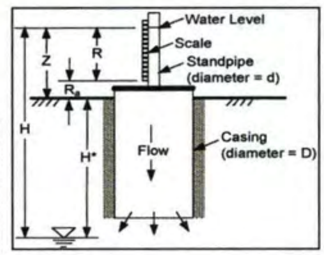
SOLUTION -TRIAL 1
K (m/s) = 4.08E-09
Total Time (d) = 0.19 4.5 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_a (cm) =	44.45
Final Time:	13:46:20

FITTED VARIABLES

a (s^{-1}) =	0.0000117
H* (m) =	0.00
H_o (m) =	1.31
MSE (m^2) =	3.30E-04
Bias (m) =	-9.28E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
9:18:45	90.5
9:26:45	87.1
9:43:00	84.1
9:52:30	82.3
10:23:30	78.6
11:04:20	75.8
11:50:26	72.8
12:53:33	68.5
13:46:20	66.3

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
1.35	0	1.313	-3.66E-02	1.34E-03
1.32	480	1.306	-9.96E-03	9.92E-05
1.29	1455	1.291	5.19E-03	2.69E-05
1.27	2025	1.282	1.46E-02	2.13E-04
1.23	3885	1.254	2.39E-02	5.71E-04
1.20	6335	1.219	1.64E-02	2.67E-04
1.17	9101	1.180	7.42E-03	5.51E-05
1.13	12888	1.129	-8.63E-04	7.45E-07
1.11	16055	1.087	-2.00E-02	4.02E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

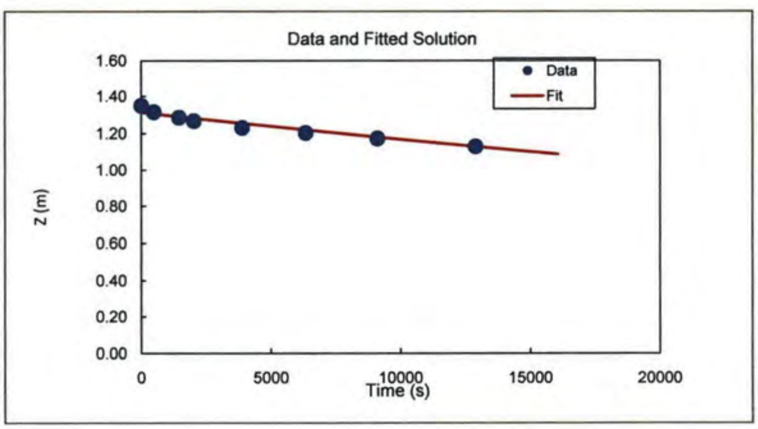
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.313
803	1.301
1606	1.288
2408	1.276
3211	1.264
4014	1.253
4817	1.241
5619	1.229
6422	1.218
7225	1.206
8028	1.195
8830	1.184
9633	1.173
10436	1.162
11239	1.151
12041	1.140
12844	1.129
13647	1.119
14450	1.108
15252	1.098
16055	1.087

Δt (s) = 803



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

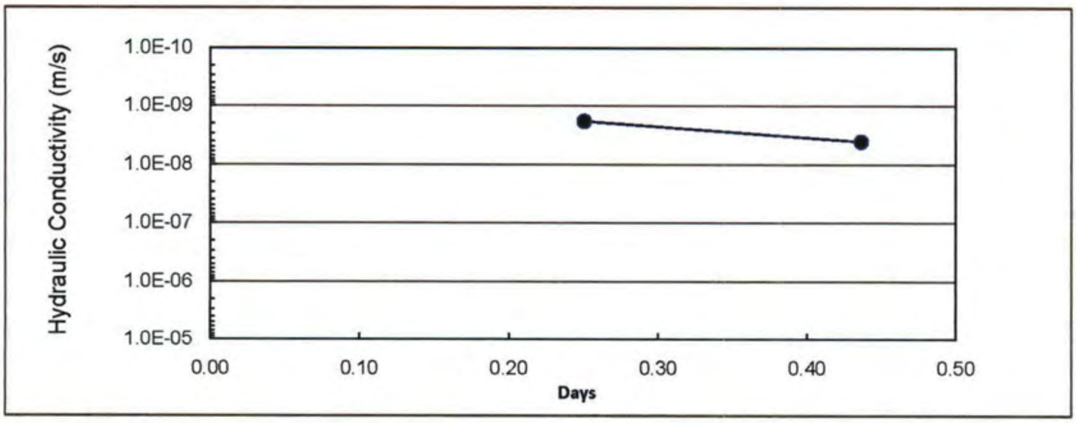
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.250	0.250	1.86E-09
2	0.186	0.436	4.08E-09

Clay1 - NW

Field Hydraulic Conductivity

2.97E-09 m/s

2.97E-07 cm/s



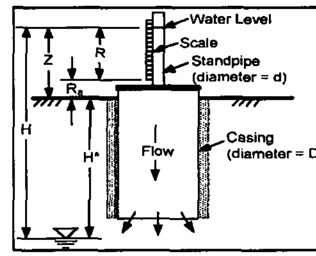
Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 1

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1

K (m/s) = 1.23E-08
Total Time (d) = 0.14 3.3 hrs



FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 14:03:00

FITTED VARIABLES

a (s^{-1}) = 0.0000355
H* (m) = 0.00
H_o (m) = 1.06
MSE (m^2) = 1.62E-03
Bias (m) = -1.26E-08

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

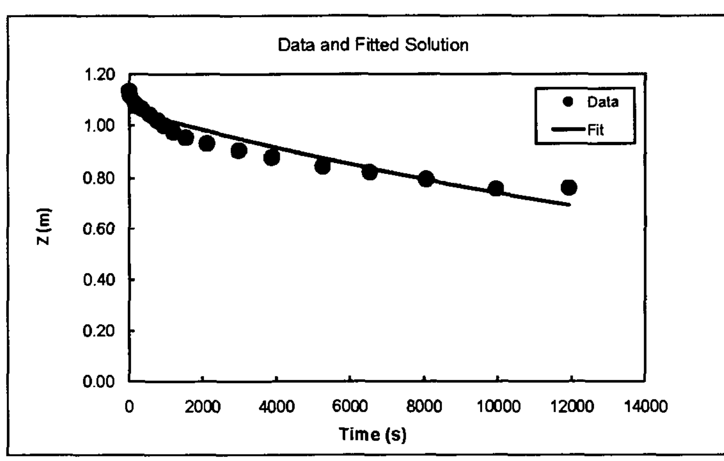
TEMPORAL VARIABLES / **Z-t COMPUTATIONS**

Time (m/d/yr h:m)	R (cm)	Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
10:44:20	69.0	1.13	0	1.055	-7.90E-02	6.25E-03
10:44:47	67.0	1.11	27	1.054	-6.01E-02	3.61E-03
10:47:00	64.0	1.08	160	1.049	-3.50E-02	1.23E-03
10:50:00	61.9	1.06	340	1.043	-2.07E-02	4.30E-04
10:53:30	59.7	1.04	550	1.035	-6.48E-03	4.20E-05
10:57:00	57.5	1.02	760	1.027	7.82E-03	6.11E-05
11:00:02	55.5	1.00	942	1.021	2.12E-02	4.49E-04
11:04:12	53.0	0.97	1192	1.012	3.72E-02	1.38E-03
11:09:45	51.0	0.95	1525	1.000	4.53E-02	2.05E-03
11:19:20	48.8	0.93	2100	0.980	4.70E-02	2.21E-03
11:33:47	46.2	0.91	2967	0.950	4.33E-02	1.87E-03
11:48:50	43.5	0.88	3870	0.920	4.03E-02	1.62E-03
12:11:50	40.0	0.84	5250	0.876	3.13E-02	9.77E-04
12:33:00	37.8	0.82	6520	0.837	1.46E-02	2.13E-04
12:58:30	35.0	0.79	8050	0.793	-1.72E-03	2.94E-06
13:30:00	31.2	0.76	9940	0.741	-1.52E-02	2.32E-04
14:03:00	31.6	0.76	11920	0.691	-6.96E-02	4.85E-03

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.055
596	1.033
1192	1.012
1788	0.990
2384	0.970
2980	0.949
3576	0.929
4172	0.910
4768	0.891
5364	0.872
5960	0.854
6556	0.836
7152	0.819
7748	0.801
8344	0.785
8940	0.768
9536	0.752
10132	0.736
10728	0.721
11324	0.706
11920	0.691

Δt (s) = 596



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 2

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

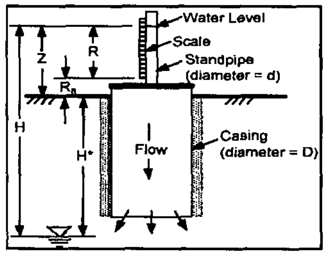
SOLUTION -TRIAL 1
K (m/s) = 8.96E-08
Total Time (d) = 0.04 1.0 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 44.45
Final Time: 9:37:50

FITTED VARIABLES

a (s^{-1}) = 0.0002579
H* (m) = 0.00
H_o (m) = 1.01
MSE (m^2) = 9.78E-04
Bias (m) = 2.80E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
8:39:40	61.6
8:40:40	59.0
8:41:41	56.0
8:43:06	52.5
8:44:35	49.0
8:45:30	47.0
8:47:52	42.5
8:50:00	39.0
8:53:55	33.0
8:56:30	29.6
8:59:59	25.6
9:02:40	23.0
9:06:20	19.5
9:09:53	16.7
9:15:00	13.6
9:20:36	10.5
9:24:28	8.5
9:30:30	5.4
9:37:50	2.7

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.06	0	1.011	-4.97E-02	2.47E-03
1.03	60	0.995	-3.92E-02	1.54E-03
1.00	121	0.980	-2.48E-02	6.14E-04
0.97	206	0.958	-1.10E-02	1.21E-04
0.93	295	0.937	2.23E-03	4.98E-06
0.91	350	0.924	9.04E-03	8.17E-05
0.87	492	0.890	2.08E-02	4.34E-04
0.83	620	0.861	2.69E-02	7.24E-04
0.77	855	0.811	3.63E-02	1.31E-03
0.74	1010	0.779	3.85E-02	1.48E-03
0.70	1219	0.738	3.76E-02	1.41E-03
0.67	1380	0.708	3.36E-02	1.13E-03
0.64	1600	0.669	2.95E-02	8.71E-04
0.61	1813	0.633	2.18E-02	4.73E-04
0.58	2120	0.585	4.55E-03	2.07E-05
0.55	2456	0.536	-1.30E-02	1.69E-04
0.53	2688	0.505	-2.42E-02	5.84E-04
0.50	3050	0.460	-3.82E-02	1.46E-03
0.47	3490	0.411	-6.06E-02	3.67E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

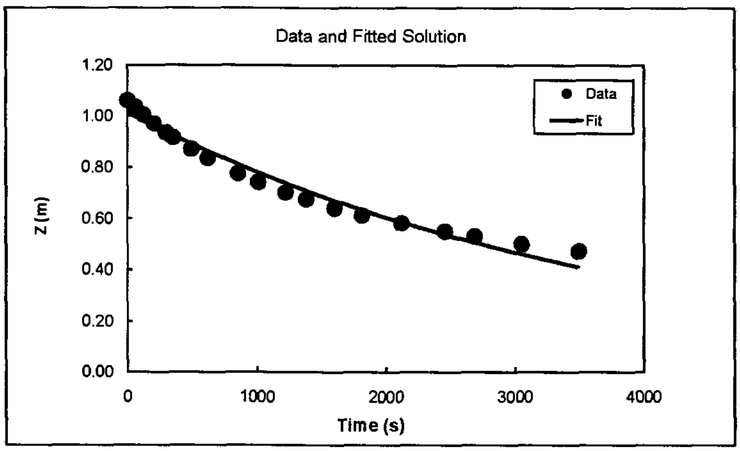
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.011
175	0.966
349	0.924
524	0.883
698	0.844
873	0.807
1047	0.772
1222	0.738
1396	0.705
1571	0.674
1745	0.644
1920	0.616
2094	0.589
2269	0.563
2443	0.538
2618	0.515
2792	0.492
2967	0.470
3141	0.450
3316	0.430
3490	0.411

Δt (s) = 175



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 3

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

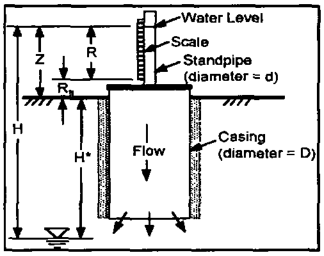
SOLUTION -TRIAL 1
K (m/s) = 9.76E-08
Total Time (d) = 0.02 0.5 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 10:18:14

FITTED VARIABLES

a (s^{-1}) = 0.0002809
H* (m) = 0.00
H_o (m) = 0.87
MSE (m^2) = 1.47E-04
Bias (m) = 2.70E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
9:45:20	44.4
9:47:43	39.6
9:49:30	36.0
9:51:40	32.5
9:56:50	25.0
10:09:41	13.0
10:16:40	7.5
10:18:14	6.4

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.89	0	0.869	-1.93E-02	3.73E-04
0.84	143	0.835	-5.54E-03	3.07E-05
0.80	250	0.810	5.74E-03	3.29E-05
0.77	380	0.781	1.17E-02	1.36E-04
0.69	690	0.716	2.15E-02	4.64E-04
0.57	1461	0.577	2.10E-03	4.42E-06
0.52	1880	0.513	-6.92E-03	4.79E-05
0.51	1974	0.499	-9.28E-03	8.61E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

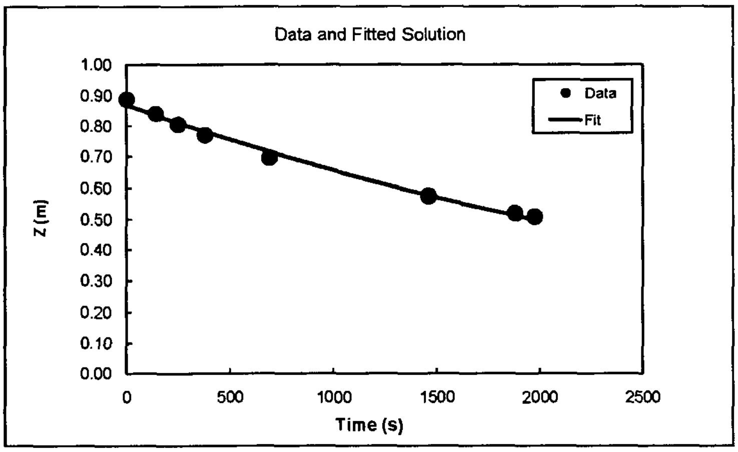
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.869
99	0.845
197	0.822
296	0.800
395	0.778
493	0.757
592	0.736
691	0.716
790	0.696
888	0.677
987	0.659
1086	0.641
1184	0.623
1283	0.606
1382	0.590
1481	0.573
1579	0.558
1678	0.543
1777	0.528
1875	0.513
1974	0.499

Δt (s) = 99



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 4

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

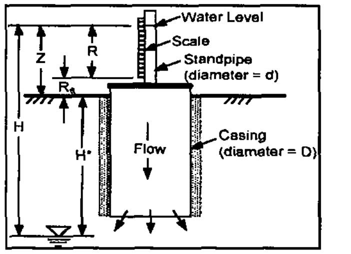
SOLUTION -TRIAL 1
K (m/s) = 1.34E-07
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 44.45
Final Time: 10:55:55

FITTED VARIABLES

a (s^{-1}) = 0.0003852
H* (m) = 0.00
H_o (m) = 0.98
MSE (m^2) = 2.92E-04
Bias (m) = -8.62E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
10:19:55	56.0
10:21:42	50.0
10:24:00	43.5
10:26:30	37.5
10:29:20	32.0
10:33:19	26.0
10:42:15	14.5
10:49:50	6.5
10:55:55	2.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.00	0	0.977	-2.78E-02	7.72E-04
0.94	107	0.937	-7.23E-03	5.23E-05
0.88	245	0.889	9.25E-03	8.56E-05
0.82	395	0.839	1.94E-02	3.75E-04
0.76	565	0.786	2.12E-02	4.49E-04
0.70	804	0.717	1.21E-02	1.46E-04
0.59	1340	0.583	-6.58E-03	4.33E-05
0.51	1795	0.489	-2.03E-02	4.12E-04
0.46	2160	0.425	-3.95E-02	1.56E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

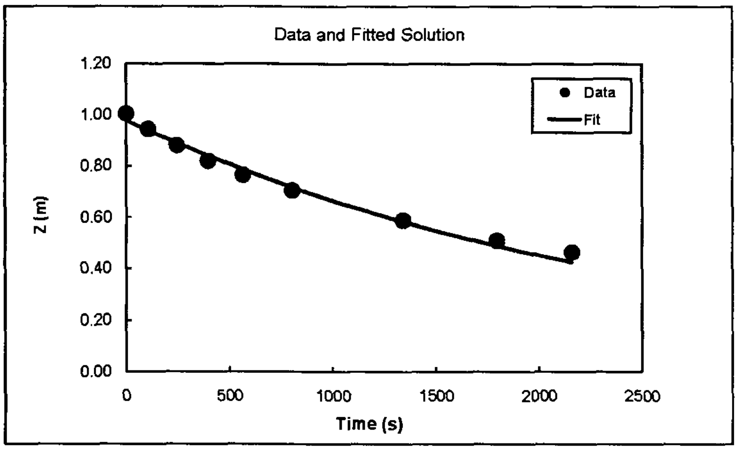
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.977
108	0.937
216	0.899
324	0.862
432	0.827
540	0.793
648	0.761
756	0.730
864	0.700
972	0.672
1080	0.644
1188	0.618
1296	0.593
1404	0.569
1512	0.546
1620	0.523
1728	0.502
1836	0.482
1944	0.462
2052	0.443
2160	0.425

Δt (s) = 108



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 5

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

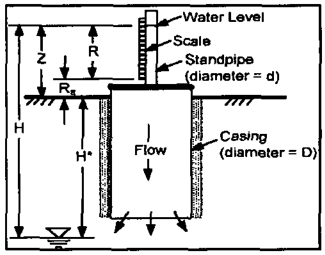
SOLUTION -TRIAL 1
K (m/s) = 1.13E-07
Total Time (d) = 0.03 0.8 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 11:41:50

FITTED VARIABLES

a (s^{-1}) = 0.0003250
H^* (m) = 0.00
H_o (m) = 1.03
MSE (m^2) = 7.45E-04
Bias (m) = 8.53E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
10:56:23	63.0
10:57:20	59.0
10:59:00	54.0
11:01:55	46.5
11:06:30	37.0
11:10:23	31.0
11:14:45	24.3
11:21:40	17.0
11:29:46	10.0
11:36:46	5.0
11:41:50	2.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.07	0	1.033	-4.15E-02	1.72E-03
1.03	57	1.014	-2.05E-02	4.20E-04
0.98	157	0.982	-2.92E-03	8.50E-06
0.91	332	0.927	1.78E-02	3.17E-04
0.81	607	0.848	3.35E-02	1.12E-03
0.75	840	0.786	3.17E-02	1.00E-03
0.69	1102	0.722	3.45E-02	1.19E-03
0.61	1517	0.631	1.64E-02	2.69E-04
0.54	2003	0.539	-5.77E-03	3.33E-05
0.49	2423	0.470	-2.45E-02	6.01E-04
0.46	2727	0.426	-3.87E-02	1.50E-03

Chiasson Solution:

Chiasson, P. (2005), Method of *interpretation of borehole falling-head* tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

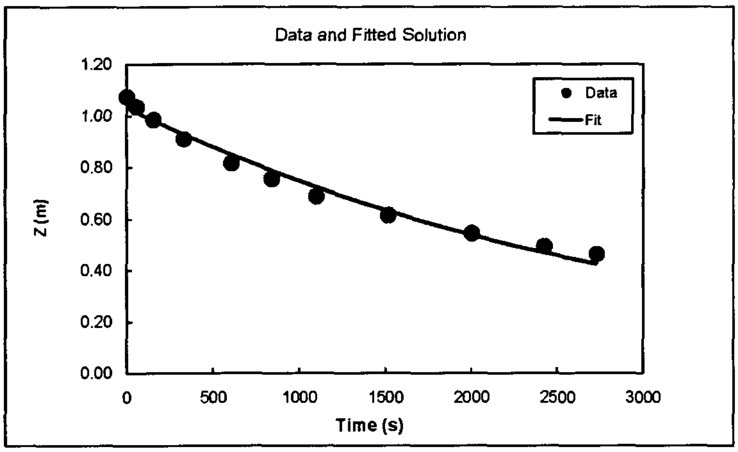
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.033
136	0.988
273	0.945
409	0.904
545	0.865
682	0.828
818	0.792
954	0.757
1091	0.725
1227	0.693
1364	0.663
1500	0.634
1636	0.607
1773	0.581
1909	0.555
2045	0.531
2182	0.508
2318	0.486
2454	0.465
2591	0.445
2727	0.426

Δt (s) = 136



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 6

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

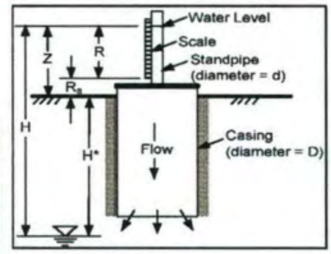
SOLUTION -TRIAL 1
K (m/s) = **6.95E-08**
Total Time (d) = 0.02 0.5 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	44.45
Final Time:	12:14:24

FITTED VARIABLES

a (s^{-1}) =	0.0002001
H* (m) =	0.00
H_o (m) =	0.66
MSE (m^2) =	1.45E-05
Bias (m) =	8.88E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
11:42:48	22.3
11:45:10	20.0
11:48:32	17.0
11:52:15	14.0
11:57:56	10.3
12:03:06	7.6
12:08:21	4.5
12:14:24	1.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
0.67	0	0.662	-5.86E-03	3.43E-05
0.64	142	0.643	-1.39E-03	1.94E-06
0.61	344	0.618	3.13E-03	9.83E-06
0.58	567	0.591	6.18E-03	3.83E-05
0.55	908	0.552	4.23E-03	1.79E-05
0.52	1218	0.519	-1.95E-03	3.80E-06
0.49	1533	0.487	-2.62E-03	6.87E-06
0.45	1896	0.453	-1.73E-03	2.98E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

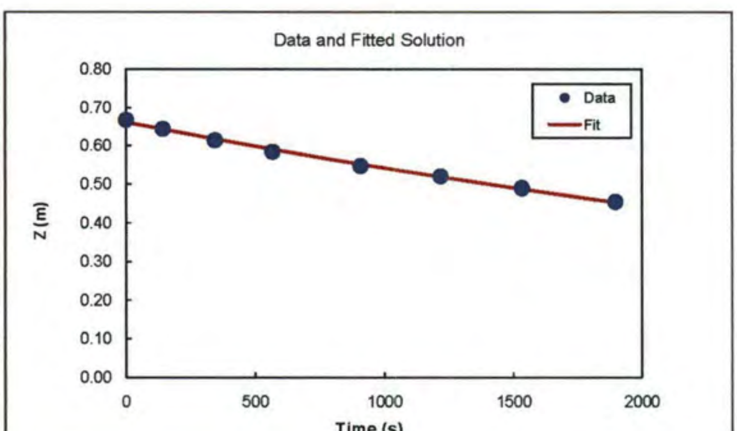
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.662
95	0.649
190	0.637
284	0.625
379	0.613
474	0.602
569	0.590
664	0.579
758	0.568
853	0.558
948	0.547
1043	0.537
1138	0.527
1232	0.517
1327	0.507
1422	0.498
1517	0.488
1612	0.479
1706	0.470
1801	0.461
1896	0.453

Δt (s) = 95



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover
TRIAL 7

Test ID:	Clay2-NE	**Installer:**	XW
Project:	*Cedar Rapids*	***Analyst:***	*CHB*

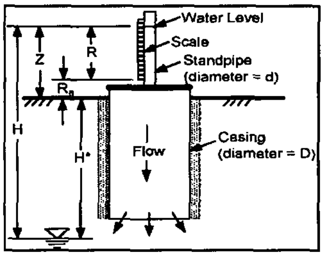
SOLUTION -TRIAL 1
K (m/s) = 6.25E-08
Total Time (d) = 0.02   0.6 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_a (cm) =	44.45
Final Time:	12:50:15

FITTED VARIABLES

a (s^{-1}) =	0.0001799
H* (m) =	0.00
H_o (m) =	0.67
MSE (m^2) =	2.75E-05
Bias (m) =	-9.49E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
12:14:58	23.2
12:19:53	19.5
12:24:58	15.5
12:29:32	12.3
12:35:58	8.5
12:42:24	5.4
12:50:15	2.3

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.68	0	0.672	-5.00E-03	2.50E-05
0.64	295	0.637	-2.70E-03	7.29E-06
0.60	600	0.603	3.30E-03	1.09E-05
0.57	874	0.574	6.31E-03	3.99E-05
0.53	1260	0.535	5.82E-03	3.39E-05
0.50	1646	0.499	9.14E-04	8.35E-07
0.47	2117	0.459	-8.66E-03	7.49E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

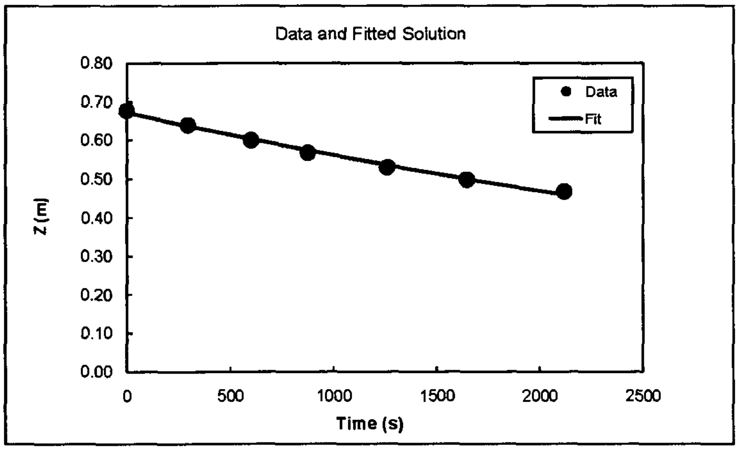
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.672
106	0.659
212	0.646
318	0.634
423	0.622
529	0.611
635	0.599
741	0.588
847	0.577
953	0.566
1059	0.555
1164	0.545
1270	0.534
1376	0.524
1482	0.514
1588	0.505
1694	0.495
1799	0.486
1905	0.477
2011	0.468
2117	0.459

Δt (s) = 106



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

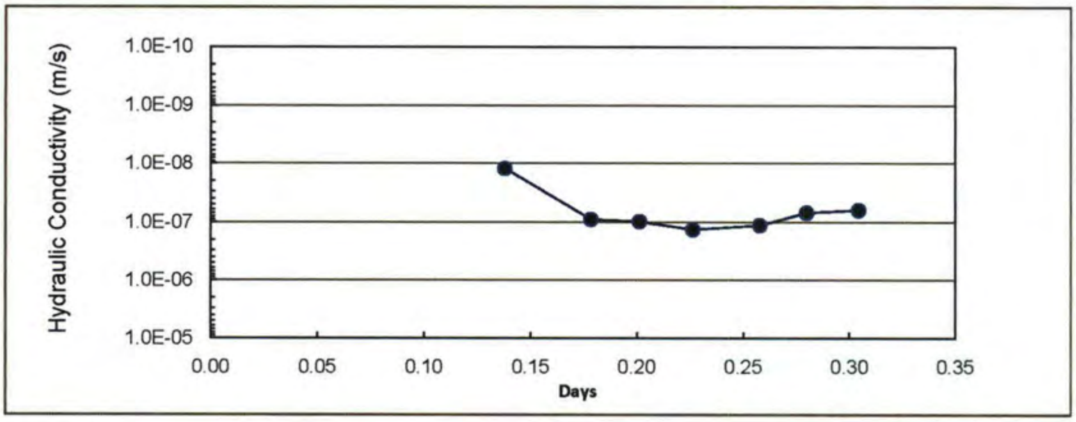
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.138	0.138	1.23E-08
2	0.040	0.178	8.96E-08
3	0.023	0.201	9.76E-08
4	0.025	0.226	1.34E-07
5	0.032	0.258	1.13E-07
6	0.022	0.280	6.95E-08
7	0.025	0.304	6.25E-08

Clay2-NE

Field Hydraulic Conductivity

9.46E-08 m/s

9.46E-06 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 1

Test ID: Clay3-SW **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

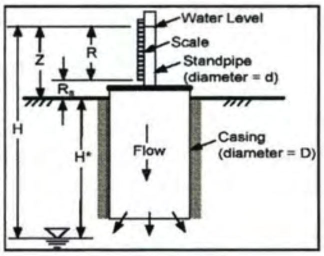
SOLUTION -TRIAL 1
K (m/s) = 5.01E-07
Total Time (d) = 0.00 0.1 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 16:52:00

FITTED VARIABLES

a (s^{-1}) = 0.0014435
H* (m) = 0.00
H_o (m) = 1.29
MSE (m^2) = 2.62E-05
Bias (m) = -2.30E-07



Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
16:47:20	84.0
16:48:06	77.0
16:48:46	70.0
16:49:15	65.0
16:50:08	57.0
16:51:23	47.0
16:52:00	41.0

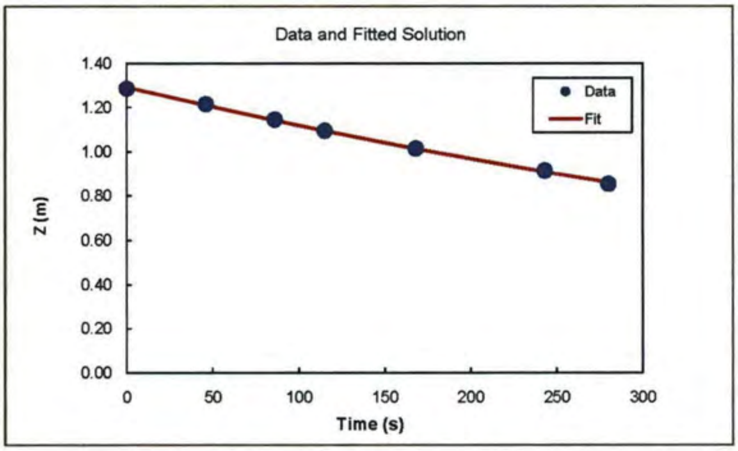
Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.28	0	1.292	7.33E-03	5.37E-05
1.21	46	1.209	-5.67E-03	3.21E-05
1.14	86	1.141	-3.49E-03	1.22E-05
1.09	115	1.094	-2.67E-04	7.12E-08
1.01	168	1.014	-8.61E-04	7.41E-07
0.91	243	0.910	-4.87E-03	2.37E-05
0.85	280	0.862	7.82E-03	6.12E-05

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.292
14	1.266
28	1.241
42	1.216
56	1.192
70	1.168
84	1.144
98	1.121
112	1.099
126	1.077
140	1.055
154	1.034
168	1.014
182	0.993
196	0.973
210	0.954
224	0.935
238	0.916
252	0.898
266	0.880
280	0.862

Δt (s) = 14



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

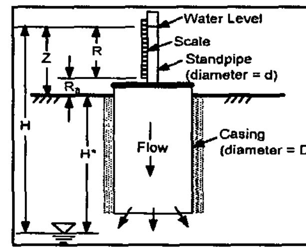
TRIAL 2

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = 5.01E-07
Total Time (d) = 0.00 0.1 hrs

FIXED VARIABLES
d (cm) = 1.905
D (cm) = 29.845
R_3 (cm) = 44.45
Final Time: 16:52:00

FITTED VARIABLES
a (s^{-1}) = 0.0014435
H* (m) = 0.00
H_0 (m) = 1.29
MSE (m^2) = 2.62E-05
Bias (m) = -2.30E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
16:47:20	84.0
16:48:06	77.0
16:48:46	70.0
16:49:15	65.0
16:50:08	57.0
16:51:23	47.0
16:52:00	41.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.28	0	1.292	7.33E-03	5.37E-05
1.21	46	1.209	-5.67E-03	3.21E-05
1.14	86	1.141	-3.49E-03	1.22E-05
1.09	115	1.094	-2.67E-04	7.12E-08
1.01	168	1.014	-8.61E-04	7.41E-07
0.91	243	0.910	-4.87E-03	2.37E-05
0.85	280	0.862	7.82E-03	6.12E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

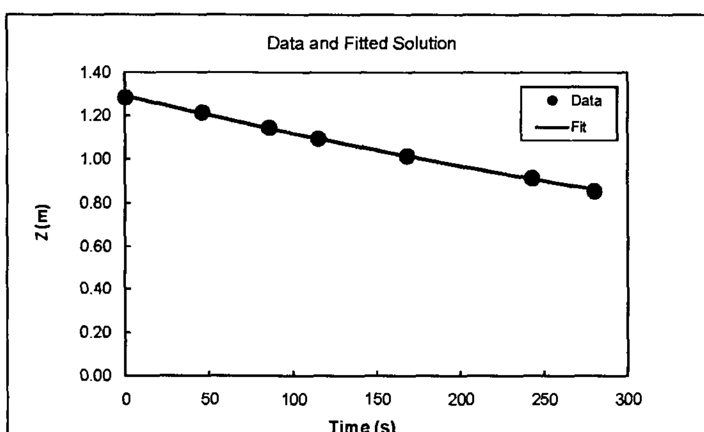
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.292
14	1.266
28	1.241
42	1.216
56	1.192
70	1.168
84	1.144
98	1.121
112	1.099
126	1.077
140	1.055
154	1.034
168	1.014
182	0.993
196	0.973
210	0.954
224	0.935
238	0.916
252	0.898
266	0.880
280	0.862

Δt (s) = 14



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 3

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

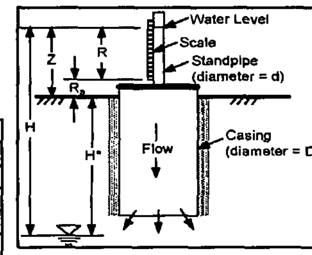
SOLUTION -TRIAL 1
K (m/s) = 2.06E-08
Total Time (d) = 0.03 0.8 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_3 (cm) =	44.45
Final Time:	18:01:10

FITTED VARIABLES

a (s^{-1}) =	0.0000593
H* (m) =	0.00
H_o (m) =	1.36
MSE (m^2) =	2.03E-04
Bias (m) =	-5.85E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
17:13:25	94.0
17:15:15	90.5
17:17:00	89.0
17:20:15	87.0
17:28:40	82.5
17:35:50	79.8
17:45:10	76.6
17:50:45	73.3
18:01:10	72.2

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.38	0	1.357	-2.79E-02	7.80E-04
1.35	110	1.348	-1.74E-03	3.02E-06
1.33	215	1.339	4.90E-03	2.40E-05
1.31	410	1.324	9.50E-03	9.03E-05
1.27	915	1.285	1.54E-02	2.39E-04
1.24	1345	1.253	1.01E-02	1.02E-04
1.21	1905	1.212	1.19E-03	1.43E-06
1.18	2240	1.188	1.04E-02	1.07E-04
1.17	2865	1.145	-2.18E-02	4.77E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

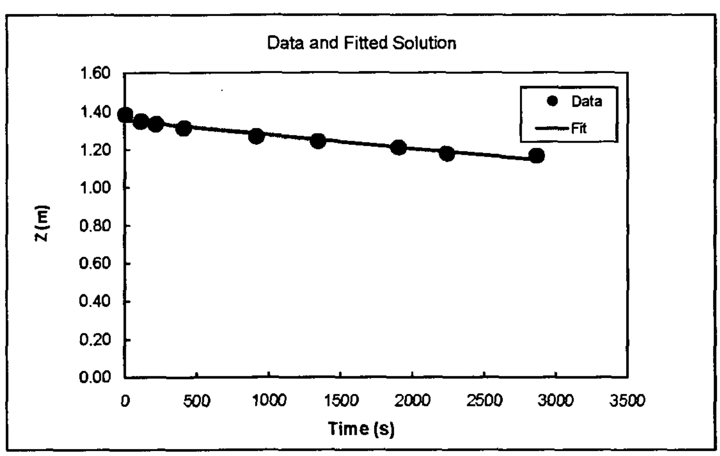
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.357
143	1.345
287	1.334
430	1.322
573	1.311
716	1.300
860	1.289
1003	1.278
1146	1.267
1289	1.257
1433	1.246
1576	1.236
1719	1.225
1862	1.215
2006	1.204
2149	1.194
2292	1.184
2435	1.174
2579	1.164
2722	1.154
2865	1.145

Δt (s) = 143



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 4

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

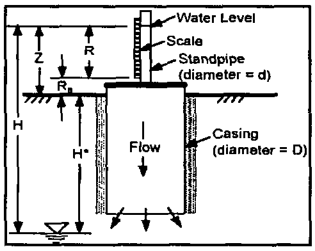
SOLUTION -TRIAL 1
K (m/s) = 6.59E-09
Total Time (d) = 0.29 7.1 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	44.45
Final Time:	16:00:45

FITTED VARIABLES

a (s^{-1}) =	0.0000190
H* (m) =	0.00
H_o (m) =	1.33
MSE (m^2) =	1.43E-03
Bias (m) =	1.21E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
8:57:44	97.0
8:58:40	95.0
9:01:14	92.0
9:04:10	90.0
9:08:46	88.0
9:16:30	85.5
9:26:05	83.0
9:33:10	81.2
9:42:25	79.3
9:55:30	76.8
10:22:41	72.3
10:44:08	69.3
11:06:00	66.3
11:31:50	63.2
11:59:27	60.4
12:17:33	58.7
12:54:16	55.2
13:28:46	52.6
14:15:11	49.4
14:51:10	47.2
15:29:10	45.2
16:00:45	43.7

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.41	0	1.331	-8.33E-02	6.93E-03
1.39	56	1.330	-6.47E-02	4.18E-03
1.36	210	1.326	-3.86E-02	1.49E-03
1.34	386	1.322	-2.30E-02	5.28E-04
1.32	662	1.315	-9.87E-03	9.74E-05
1.30	1126	1.303	3.61E-03	1.30E-05
1.27	1701	1.289	1.45E-02	2.09E-04
1.26	2126	1.279	2.21E-02	4.89E-04
1.24	2681	1.265	2.77E-02	7.69E-04
1.21	3466	1.247	3.40E-02	1.16E-03
1.17	5097	1.209	4.11E-02	1.69E-03
1.14	6384	1.179	4.19E-02	1.76E-03
1.11	7696	1.150	4.29E-02	1.84E-03
1.08	9246	1.117	4.06E-02	1.65E-03
1.05	10903	1.083	3.40E-02	1.16E-03
1.03	11989	1.060	2.89E-02	8.37E-04
1.00	14192	1.017	2.05E-02	4.22E-04
0.97	16262	0.978	7.37E-03	5.44E-05
0.94	19047	0.928	-1.09E-02	1.20E-04
0.92	21206	0.890	-2.62E-02	6.85E-04
0.90	23486	0.853	-4.39E-02	1.92E-03
0.88	25381	0.823	-5.90E-02	3.48E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

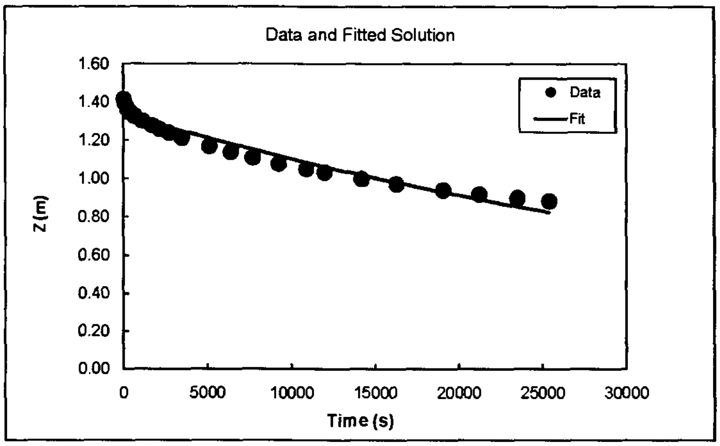
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.331
1269	1.300
2538	1.269
3807	1.238
5076	1.209
6345	1.180
7614	1.152
8883	1.125
10152	1.098
11421	1.072
12691	1.046
13960	1.022
15229	0.997
16498	0.974
17767	0.950
19036	0.928
20305	0.906
21574	0.884
22843	0.863
24112	0.843
25381	0.823

Δt (s) = 1269



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 5

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

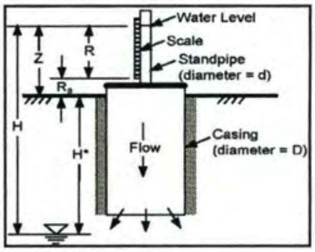
SOLUTION -TRIAL 1
K (m/s) = 3.89E-09
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 1/1/2005 17:12

FITTED VARIABLES

a (s^{-1}) = 0.0000112
H* (m) = 0.00
H_o (m) = 1.09
MSE (m^2) = 1.39E-03
Bias (m) = -8.74E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/1/2005 16:36	70.0
1/1/2005 16:41	67.0
1/1/2005 16:49	64.0
1/1/2005 17:01	60.0
1/1/2005 17:12	57.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.14	0	1.092	-5.23E-02	2.73E-03
1.11	345	1.088	-2.65E-02	7.01E-04
1.08	799	1.083	-2.00E-03	3.99E-06
1.04	1534	1.074	2.91E-02	8.48E-04
1.01	2160	1.066	5.16E-02	2.66E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

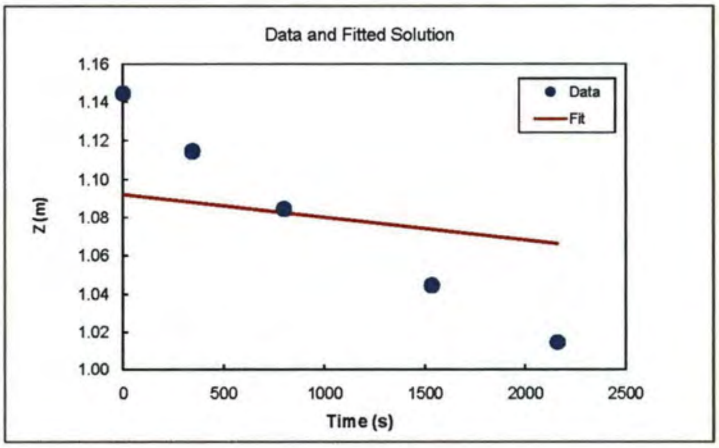
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.092
108	1.091
216	1.090
324	1.088
432	1.087
540	1.086
648	1.084
756	1.083
864	1.082
972	1.080
1080	1.079
1188	1.078
1296	1.076
1404	1.075
1512	1.074
1620	1.073
1728	1.071
1836	1.070
1944	1.069
2052	1.067
2160	1.066

Δt (s) = 108



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 5

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

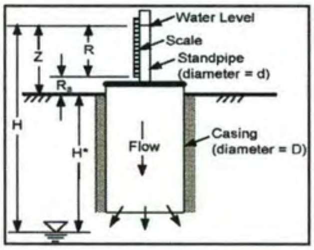
SOLUTION -TRIAL 1
K (m/s) = **8.45E-08**
Total Time (d) = 0.01 0.4 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 1/2/2005 10:18

FITTED VARIABLES

a (s^{-1}) = 0.0002434
H* (m) = 0.00
H_o (m) = 0.69
MSE (m^2) = 3.35E-07
Bias (m) = -9.80E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/2/2005 9:56	25.0
1/2/2005 10:09	13.0
1/2/2005 10:16	7.5
1/2/2005 10:18	6.4

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.69	0	0.694	-2.92E-04	8.55E-08
0.57	771	0.575	8.89E-04	7.90E-07
0.52	1190	0.520	8.02E-05	6.43E-09
0.51	1284	0.508	-6.78E-04	4.59E-07

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

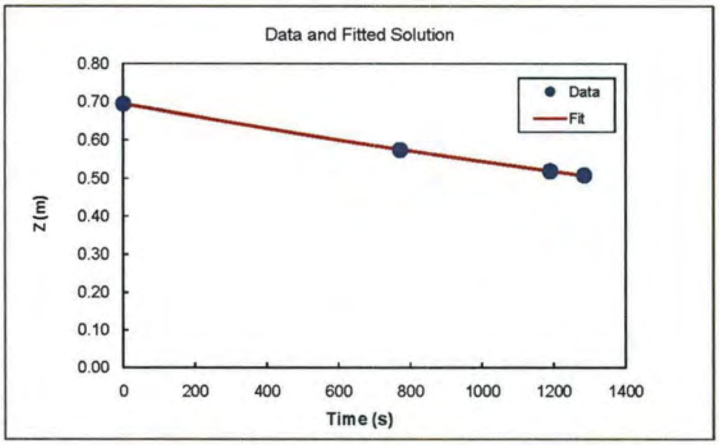
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.694
64	0.683
128	0.673
193	0.662
257	0.652
321	0.642
385	0.632
449	0.622
514	0.613
578	0.603
642	0.594
706	0.585
770	0.575
835	0.567
899	0.558
963	0.549
1027	0.541
1091	0.532
1156	0.524
1220	0.516
1284	0.508

Δt (s) = 64



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 6

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

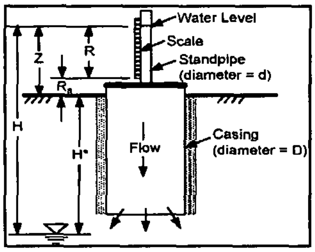
SOLUTION -TRIAL 1
K (m/s) = 1.28E-07
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_3 (cm) = 44.45
Final Time: 10:55:55

FITTED VARIABLES

a (s^{-1}) = 0.0003675
H* (m) = 0.00
H_o (m) = 0.97
MSE (m^2) = 3.74E-04
Bias (m) = -1.87E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
10:19:55	56.0
10:21:42	50.0
10:24:00	43.5
10:26:30	37.5
10:29:20	32.0
10:33:19	26.0
10:42:15	14.5
10:49:50	6.5
10:55:55	2.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
1.00	0	0.971	-3.31E-02	1.10E-03
0.94	107	0.934	-1.06E-02	1.11E-04
0.88	245	0.888	8.26E-03	6.82E-05
0.82	395	0.840	2.06E-02	4.26E-04
0.76	565	0.789	2.48E-02	6.13E-04
0.70	804	0.723	1.84E-02	3.39E-04
0.59	1340	0.594	4.15E-03	1.72E-05
0.51	1795	0.502	-7.26E-03	5.27E-05
0.46	2160	0.439	-2.53E-02	6.40E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

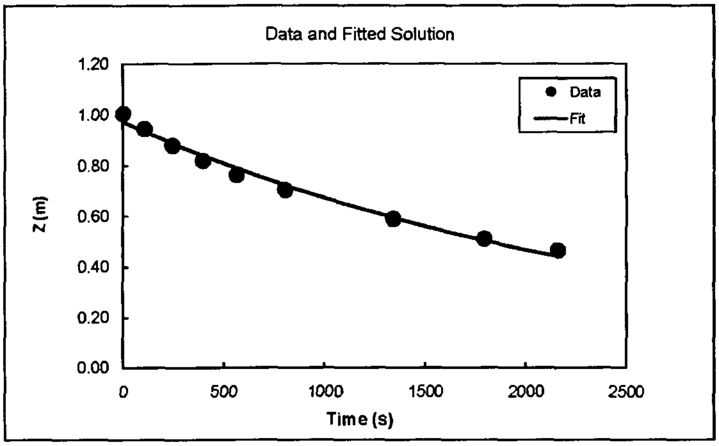
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.971
108	0.934
216	0.897
324	0.862
432	0.829
540	0.797
648	0.766
756	0.736
864	0.707
972	0.680
1080	0.653
1188	0.628
1296	0.603
1404	0.580
1512	0.557
1620	0.536
1728	0.515
1836	0.495
1944	0.475
2052	0.457
2160	0.439

Δt (s) = 108



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

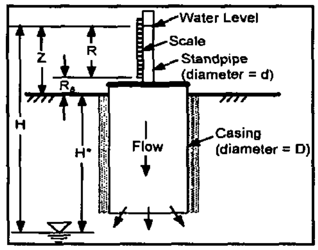
TRIAL 7

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = 1.13E-07
Total Time (d) = 0.03 0.8 hrs

FIXED VARIABLES
d (cm) = 1.905
D (cm) = 29.845
R_0 (cm) = 44.45
Final Time: 11:41:50

FITTED VARIABLES
a (s^{-1}) = 0.0003250
H* (m) = 0.00
H_0 (m) = 1.03
MSE (m^2) = 7.45E-04
Bias (m) = -7.34E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
10:56:23	63.0
10:57:20	59.0
10:59:00	54.0
11:01:55	46.5
11:06:30	37.0
11:10:23	31.0
11:14:45	24.3
11:21:40	17.0
11:29:46	10.0
11:36:46	5.0
11:41:50	2.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.07	0	1.033	-4.15E-02	1.72E-03
1.03	57	1.014	-2.05E-02	4.20E-04
0.98	157	0.982	-2.92E-03	8.50E-06
0.91	332	0.927	1.78E-02	3.17E-04
0.81	607	0.848	3.35E-02	1.12E-03
0.75	840	0.786	3.17E-02	1.00E-03
0.69	1102	0.722	3.45E-02	1.19E-03
0.61	1517	0.631	1.64E-02	2.69E-04
0.54	2003	0.539	-5.77E-03	3.33E-05
0.49	2423	0.470	-2.45E-02	6.01E-04
0.46	2727	0.426	-3.87E-02	1.50E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

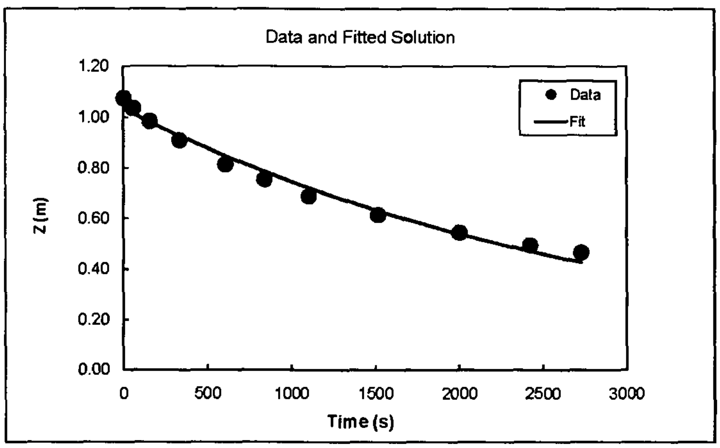
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.033
136	0.988
273	0.945
409	0.904
545	0.865
682	0.828
818	0.792
954	0.757
1091	0.725
1227	0.693
1364	0.663
1500	0.634
1636	0.607
1773	0.581
1909	0.555
2045	0.531
2182	0.508
2318	0.486
2454	0.465
2591	0.445
2727	0.426

Δt (s) = 136

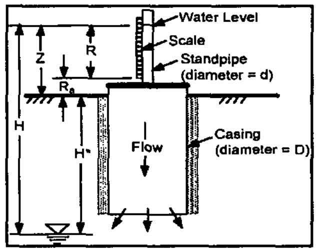


Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 8

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = 6.95E-08
Total Time (d) = 0.02 0.5 hrs



FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 44.45
Final Time: 12:14:24

FITTED VARIABLES

a (s^{-1}) = 0.0002001
H* (m) = 0.00
H_o (m) = 0.66
MSE (m^2) = 1.45E-05
Bias (m) = 9.02E-07

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
11:42:48	22.3
11:45:10	20.0
11:48:32	17.0
11:52:15	14.0
11:57:56	10.3
12:03:06	7.6
12:08:21	4.5
12:14:24	1.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.67	0	0.662	-5.86E-03	3.43E-05
0.64	142	0.643	-1.39E-03	1.94E-06
0.61	344	0.618	3.13E-03	9.83E-06
0.58	567	0.591	6.18E-03	3.83E-05
0.55	908	0.552	4.23E-03	1.79E-05
0.52	1218	0.519	-1.95E-03	3.80E-06
0.49	1533	0.487	-2.62E-03	6.87E-06
0.45	1896	0.453	-1.73E-03	2.98E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

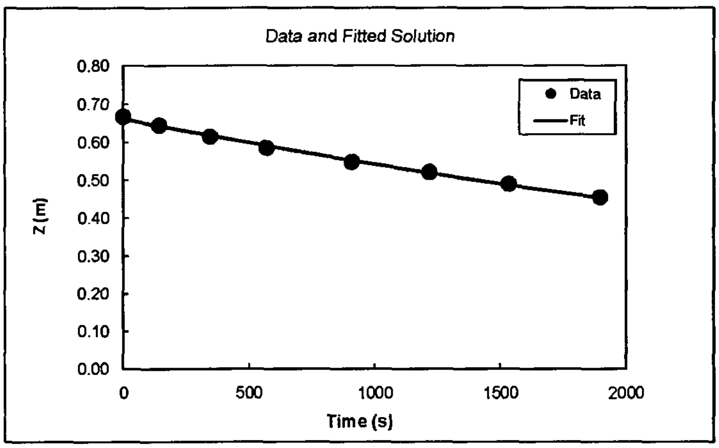
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.662
95	0.649
190	0.637
284	0.625
379	0.613
474	0.602
569	0.590
664	0.579
758	0.568
853	0.558
948	0.547
1043	0.537
1138	0.527
1232	0.517
1327	0.507
1422	0.498
1517	0.488
1612	0.479
1706	0.470
1801	0.461
1896	0.453

Δt (s) = 95



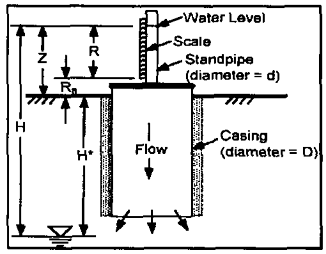
Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover
TRIAL 9

Test ID: Clay2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = 6.25E-08
Total Time (d) = 0.02 0.6 hrs

FIXED VARIABLES
d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 44.45
Final Time: 12:50:15

FITTED VARIABLES
a (s^{-1}) = 0.0001799
H* (m) = 0.00
H_o (m) = 0.67
MSE (m^2) = 2.75E-05
Bias (m) = -9.49E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
12:14:58	23.2
12:19:53	19.5
12:24:58	15.5
12:29:32	12.3
12:35:58	8.5
12:42:24	5.4
12:50:15	2.3

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.68	0	0.672	-5.00E-03	2.50E-05
0.64	295	0.637	-2.70E-03	7.29E-06
0.60	600	0.603	3.30E-03	1.09E-05
0.57	874	0.574	6.31E-03	3.99E-05
0.53	1260	0.535	5.82E-03	3.39E-05
0.50	1646	0.499	9.14E-04	8.35E-07
0.47	2117	0.459	-8.66E-03	7.49E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

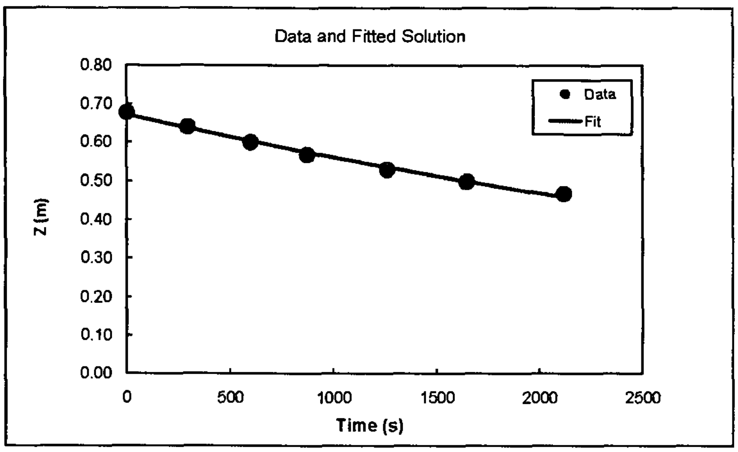
$$\boxed{Z_t = H_o e^{-at} - H^*}$$

$$\boxed{K = \frac{a \pi d^2}{11 D}}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.672
106	0.659
212	0.646
318	0.634
423	0.622
529	0.611
635	0.599
741	0.588
847	0.577
953	0.566
1059	0.555
1164	0.545
1270	0.534
1376	0.524
1482	0.514
1588	0.505
1694	0.495
1799	0.486
1905	0.477
2011	0.468
2117	0.459

Δt (s) = 106



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

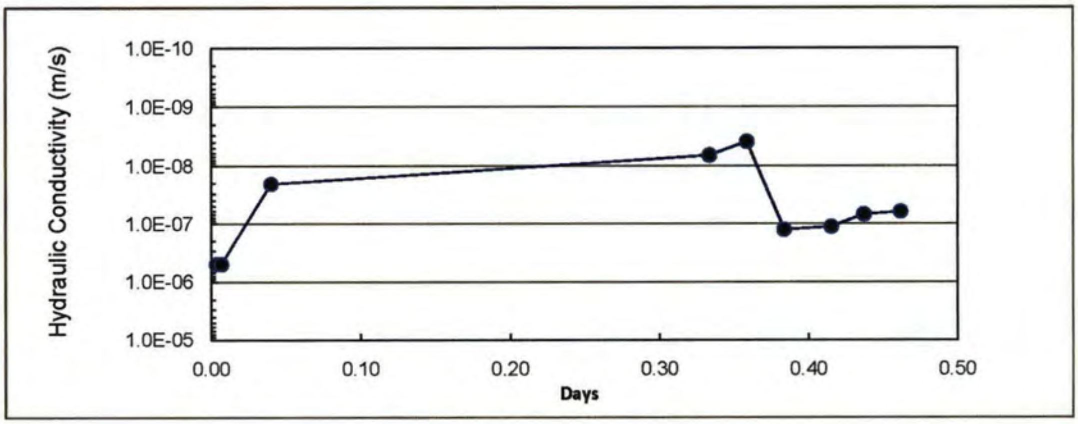
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.003	0.003	5.01E-07
2	0.003	0.006	5.01E-07
3	0.033	0.040	2.06E-08
4	0.294	0.333	6.59E-09
5	0.025	0.358	3.89E-09
6	0.025	0.383	1.28E-07
7	0.032	0.415	1.13E-07
8	0.022	0.437	6.95E-08
9	0.025	0.461	6.25E-08

Clay3-SW

Field Hydraulic Conductivity

9.31E-08 m/s

9.31E-06 cm/s

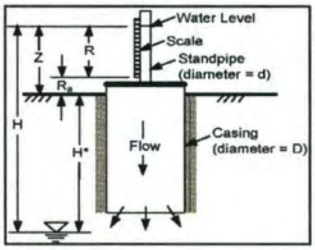


Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 1

Test ID: Clay4-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1
K (m/s) = **7.93E-08**
Total Time (d) = 0.03 0.7 hrs



FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	44.45
Final Time:	18:00:26

FITTED VARIABLES

a (s^{-1}) =	0.0002284
H* (m) =	0.00
H_o (m) =	1.29
MSE (m^2) =	1.22E-02
Bias (m) =	6.16E-07

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
17:21:25	66.3
17:28:00	62.0
17:36:15	57.0
17:44:20	52.5
17:50:10	49.4
17:55:30	46.8
18:00:26	45.6

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
1.11	0	1.292	1.84E-01	3.40E-02
1.06	395	1.180	1.16E-01	1.34E-02
1.01	890	1.054	3.97E-02	1.57E-03
0.97	1375	0.944	-2.59E-02	6.71E-04
0.94	1725	0.871	-6.74E-02	4.54E-03
0.91	2045	0.810	-1.03E-01	1.06E-02
0.90	2341	0.757	-1.44E-01	2.07E-02

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

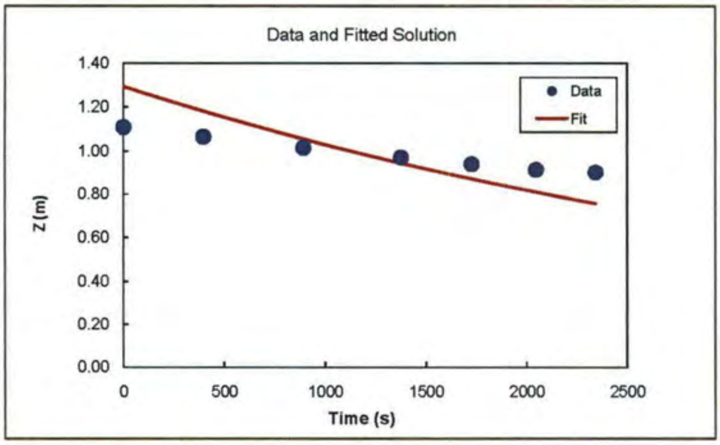
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.292
117	1.258
234	1.225
351	1.192
468	1.161
585	1.130
702	1.100
819	1.071
936	1.043
1053	1.016
1171	0.989
1288	0.963
1405	0.937
1522	0.913
1639	0.888
1756	0.865
1873	0.842
1990	0.820
2107	0.798
2224	0.777
2341	0.757

Δt (s) = 117



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

TRIAL 2

Test ID: Clay4-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

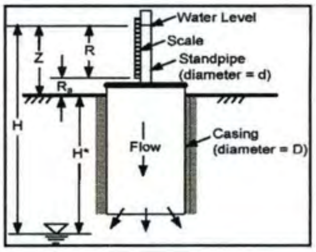
SOLUTION -TRIAL 1
K (m/s) = 3.21E-08
Total Time (d) = 0.15 3.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 44.45
Final Time: 12:30:45

FITTED VARIABLES

a (s^{-1}) = 0.0000925
H* (m) = 0.00
H_o (m) = 1.29
MSE (m^2) = 3.63E-02
Bias (m) = 1.35E-07



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
8:52:00	67.0
8:52:52	65.0
8:54:35	60.7
8:59:15	58.3
9:07:30	55.3
9:15:50	52.9
9:25:30	50.5
9:32:20	48.7
9:41:50	46.7
9:56:00	44.0
10:22:17	39.7
10:44:40	36.5
11:05:35	33.7
11:32:16	31.4
12:01:21	28.5
12:16:50	27.0
12:30:45	25.5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.11	0	1.292	1.77E-01	3.14E-02
1.09	52	1.286	1.91E-01	3.65E-02
1.05	155	1.273	2.22E-01	4.93E-02
1.03	435	1.241	2.13E-01	4.55E-02
1.00	930	1.185	1.88E-01	3.53E-02
0.97	1430	1.132	1.58E-01	2.51E-02
0.95	2010	1.073	1.23E-01	1.52E-02
0.93	2420	1.033	1.01E-01	1.03E-02
0.91	2990	0.980	6.82E-02	4.66E-03
0.88	3840	0.906	2.12E-02	4.49E-04
0.84	5417	0.783	-5.87E-02	3.45E-03
0.81	6760	0.691	-1.18E-01	1.40E-02
0.78	8015	0.616	-1.66E-01	2.75E-02
0.76	9616	0.531	-2.28E-01	5.18E-02
0.73	11361	0.452	-2.78E-01	7.71E-02
0.71	12290	0.415	-3.00E-01	9.00E-02
0.70	13125	0.384	-3.16E-01	9.97E-02

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

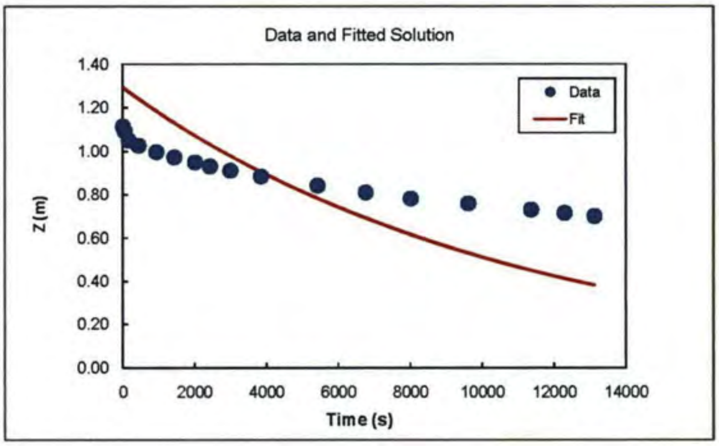
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.292
656	1.216
1313	1.144
1969	1.077
2625	1.013
3281	0.954
3938	0.898
4594	0.845
5250	0.795
5906	0.748
6563	0.704
7219	0.663
7875	0.624
8531	0.587
9188	0.552
9844	0.520
10500	0.489
11156	0.460
11813	0.433
12469	0.408
13125	0.384

Δt (s) = 656



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Clay Cover

Equilibirum Evaluation & Steady Hydraulic Conductivity Determination

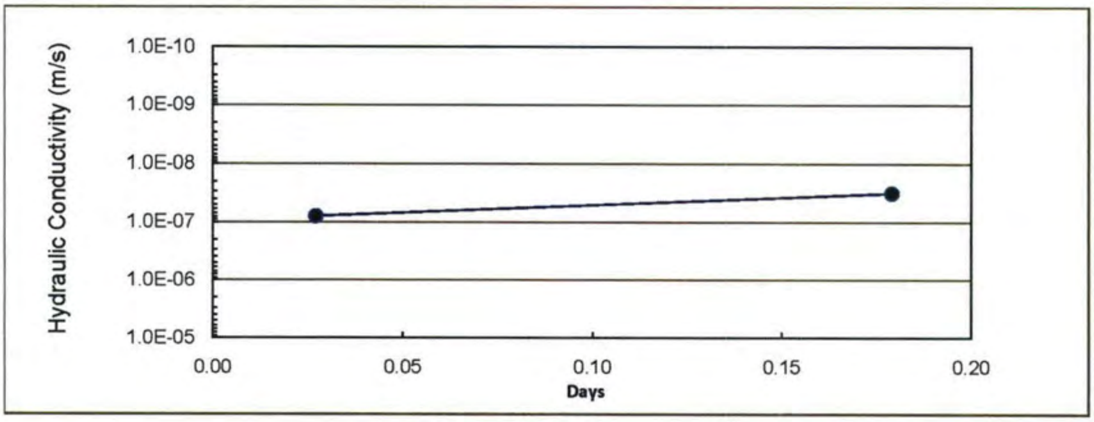
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.027	0.027	7.93E-08
2	0.152	0.179	3.21E-08

Clay4-SE

Field Hydraulic Conductivity

5.57E-08 m/s

5.57E-06 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 1

Test ID: CP2-NE **Installer:** XW
Project: *Cedar Rapids* **Analyst:** *CHB*

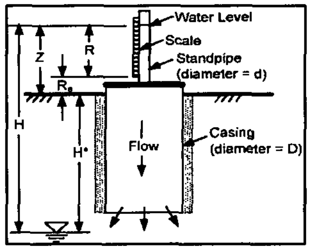
SOLUTION -TRIAL 1
K (m/s) = **1.77E-07**
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	52.07
Final Time:	13:48:00

FITTED VARIABLES

a (s^{-1}) =	0.0005108
H* (m) =	0.00
H_0 (m) =	1.39
MSE (m^2) =	7.33E-04
Bias (m) =	-4.43E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:26:12	92.7
13:27:45	82.7
13:28:30	79.0
13:28:50	77.0
13:29:30	73.5
13:30:30	69.0
13:31:15	65.5
13:32:00	62.0
13:33:30	56.5
13:34:47	52.0
13:35:50	48.5
13:37:06	45.0
13:38:14	42.0
13:39:10	39.5
13:41:00	35.5
13:42:40	32.0
13:45:00	28.5
13:47:10	25.5
13:48:00	24.4

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	e (m)	e^2 (m)
1.45	0.00	1.392	-5.59E-02	3.12E-03
1.35	93	1.327	-2.04E-02	4.18E-04
1.31	138	1.297	-1.36E-02	1.85E-04
1.29	158	1.284	-6.79E-03	4.61E-05
1.26	198	1.258	2.25E-03	5.05E-06
1.21	258	1.220	9.28E-03	8.62E-05
1.18	303	1.192	1.66E-02	2.74E-04
1.14	348	1.165	2.45E-02	5.99E-04
1.09	438	1.113	2.71E-02	7.36E-04
1.04	515	1.070	2.92E-02	8.53E-04
1.01	578	1.036	3.03E-02	9.20E-04
0.97	654	0.997	2.59E-02	6.70E-04
0.94	722	0.963	2.19E-02	4.78E-04
0.92	778	0.935	1.97E-02	3.89E-04
0.88	888	0.884	8.62E-03	7.43E-05
0.84	988	0.840	-4.14E-04	1.72E-07
0.81	1128	0.782	-2.34E-02	5.48E-04
0.78	1258	0.732	-4.37E-02	1.91E-03
0.76	1308	0.714	-5.11E-02	2.61E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

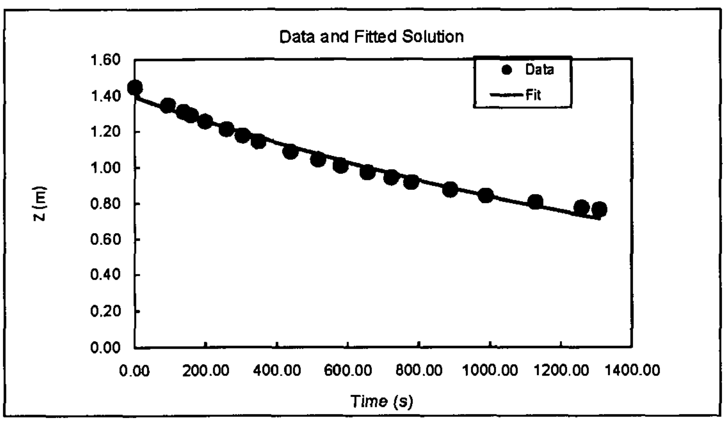
$$K = \frac{a \pi d^2}{11 D}$$

9:16:16

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.392
65	1.346
131	1.302
196	1.259
262	1.218
327	1.178
392	1.139
458	1.102
523	1.065
589	1.030
654	0.997
719	0.964
785	0.932
850	0.902
916	0.872
981	0.843
1046	0.816
1112	0.789
1177	0.763
1243	0.738
1308	0.714

Δt (s) = 65



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 2

Test ID: CP2-NE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

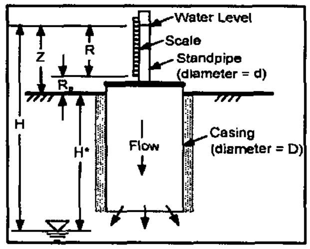
SOLUTION -TRIAL 1
K (m/s) = 1.80E-07
Total Time (d) = 0.01 0.3 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_a (cm) =	52.07
Final Time:	14:04:19

FITTED VARIABLES

a (s^{-1}) =	0.0005177
H* (m) =	0.00
H_o (m) =	1.43
MSE (m^2) =	1.65E-04
Bias (m) =	8.37E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:48:30	93.0
13:49:05	89.0
13:49:35	86.0
13:51:00	79.0
13:53:00	70.5
13:55:24	62.0
13:57:24	55.5
13:59:23	49.5
14:01:04	45.0
14:04:19	37.5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.45	0.00	1.429	-2.17E-02	4.69E-04
1.41	35	1.403	-7.31E-03	5.35E-05
1.38	65	1.382	1.06E-03	1.12E-06
1.31	150	1.322	1.16E-02	1.34E-04
1.23	270	1.243	1.69E-02	2.86E-04
1.14	414	1.153	1.27E-02	1.60E-04
1.08	534	1.084	8.19E-03	6.70E-05
1.02	653	1.019	3.43E-03	1.17E-05
0.97	754	0.967	-3.49E-03	1.22E-05
0.90	949	0.874	-2.14E-02	4.57E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

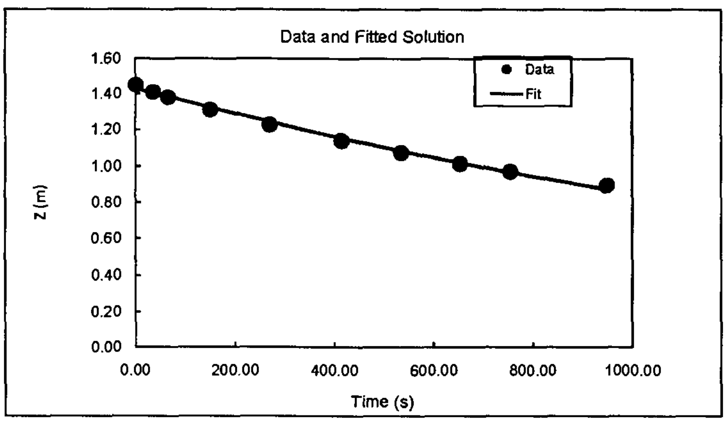
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.429
47	1.394
95	1.361
142	1.328
190	1.295
237	1.264
285	1.233
332	1.203
380	1.174
427	1.146
475	1.118
522	1.091
569	1.064
617	1.038
664	1.013
712	0.989
759	0.965
807	0.941
854	0.918
902	0.896
949	0.874

Δt (s) = 47



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

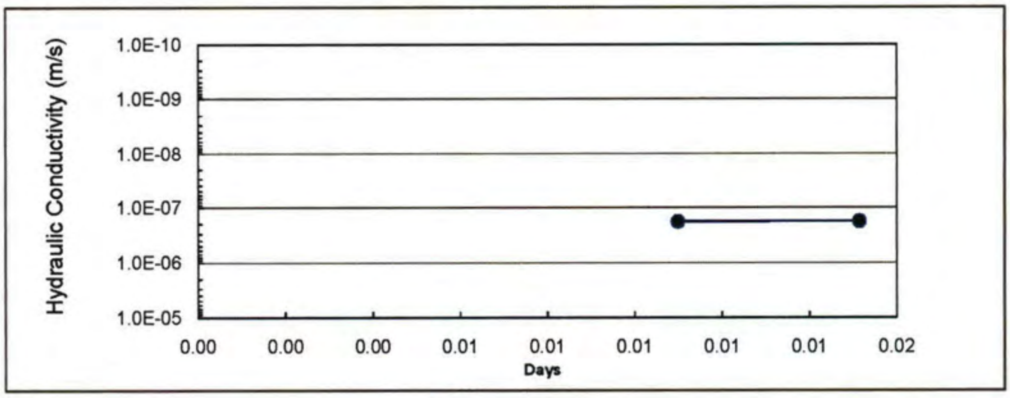
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.015	0.015	1.77E-07
2	0.011	0.011	1.80E-07

CP2-NE

Field Hydraulic Conductivity

1.79E-07 m/s

1.79E-05 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 1

Test ID: CP3-SW **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

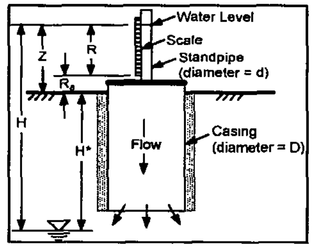
SOLUTION -TRIAL 1
K (m/s) = 6.16E-08
Total Time (d) = 0.05 1.2 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 52.07
Final Time: 15:09:00

FITTED VARIABLES

a (s^{-1}) = 0.0001774
H* (m) = 0.00
H_o (m) = 1.41
MSE (m^2) = 1.44E-03
Bias (m) = -1.06E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:54:10	95.0
13:55:00	91.5
13:56:00	88.0
13:57:47	83.0
13:59:40	78.5
14:01:30	74.5
14:04:35	68.5
15:09:00	14.3

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.47	0.00	1.413	-5.79E-02	3.35E-03
1.44	50	1.400	-3.54E-02	1.25E-03
1.40	110	1.385	-1.52E-02	2.31E-04
1.35	217	1.359	8.73E-03	7.62E-05
1.31	330	1.332	2.67E-02	7.15E-04
1.27	440	1.307	4.10E-02	1.68E-03
1.21	625	1.264	5.88E-02	3.46E-03
0.66	4490	0.637	-2.68E-02	7.16E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

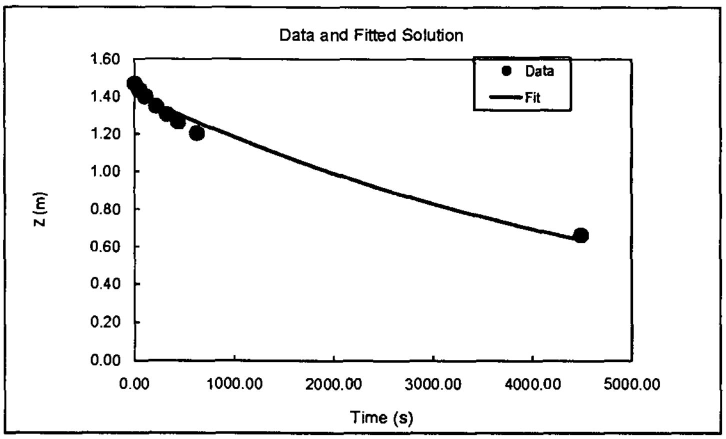
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.413
225	1.358
449	1.305
673	1.254
898	1.205
1123	1.158
1347	1.112
1572	1.069
1796	1.027
2021	0.987
2245	0.949
2470	0.912
2694	0.876
2919	0.842
3143	0.809
3368	0.777
3592	0.747
3817	0.718
4041	0.690
4266	0.663
4490	0.637

Δt (s) = 225



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 2

Test ID: CP3-SW **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

FIXED VARIABLES

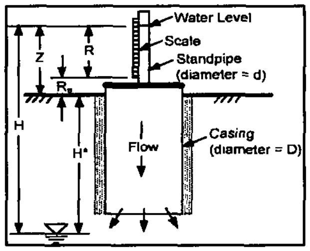
d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	52.07
Final Time:	16:30:00

FITTED VARIABLES

a (s^{-1}) =	0.0001593
H* (m) =	0.00
H_o (m) =	1.28
MSE (m^2) =	3.01E-03
Bias (m) =	1.14E-09

SOLUTION -TRIAL 1

K (m/s) =	5.53E-08	
Total Time (d) =	0.05	1.3 hrs



Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
15:13:40	89.0
15:15:06	85.5
15:16:14	80.5
15:17:25	74.0
15:18:32	68.0
15:19:56	63.5
15:21:00	62.0
15:23:50	58.5
15:25:07	57.0
15:30:11	51.5
15:36:13	46.0
15:40:20	42.5
15:44:16	39.5
15:49:40	35.7
15:53:10	33.5
15:56:15	31.5
16:00:30	29.0
16:04:10	27.0
16:09:36	24.2
16:17:14	21.6
16:24:25	17.5
16:29:40	15.4
16:30:00	14.9

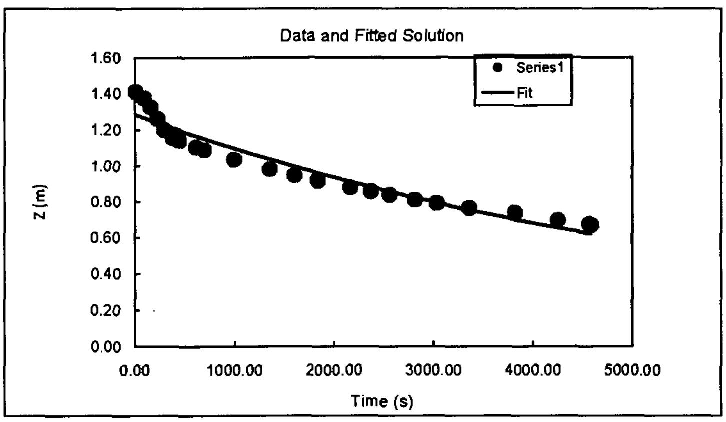
Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.41	0.00	1.283	-1.28E-01	1.64E-02
1.38	86	1.265	-1.11E-01	1.22E-02
1.33	154	1.252	-7.42E-02	5.50E-03
1.26	225	1.237	-2.32E-02	5.40E-04
1.20	292	1.224	2.36E-02	5.58E-04
1.16	376	1.208	5.24E-02	2.74E-03
1.14	440	1.196	5.51E-02	3.04E-03
1.11	610	1.164	5.82E-02	3.38E-03
1.09	687	1.150	5.90E-02	3.48E-03
1.04	991	1.095	5.96E-02	3.55E-03
0.98	1353	1.034	5.33E-02	2.84E-03
0.95	1600	0.994	4.84E-02	2.34E-03
0.92	1836	0.957	4.17E-02	1.74E-03
0.88	2160	0.909	3.15E-02	9.94E-04
0.86	2370	0.879	2.36E-02	5.58E-04
0.84	2555	0.854	1.81E-02	3.27E-04
0.81	2810	0.820	9.10E-03	8.28E-05
0.79	3030	0.792	8.71E-04	7.58E-07
0.76	3356	0.752	-1.12E-02	1.25E-04
0.74	3814	0.699	-3.81E-02	1.45E-03
0.70	4245	0.652	-4.34E-02	1.88E-03
0.67	4560	0.620	-5.43E-02	2.95E-03
0.67	4580	0.618	-5.13E-02	2.63E-03

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.283
229	1.237
458	1.192
687	1.150
916	1.108
1145	1.069
1374	1.030
1603	0.994
1832	0.958
2061	0.924
2290	0.891
2519	0.859
2748	0.828
2977	0.798
3206	0.770
3435	0.742
3664	0.716
3893	0.690
4122	0.665
4351	0.641
4580	0.618

Δt (s) = 229



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 3

Test ID:	CP3-SW	**Installer:**	XW
Project:	Cedar Rapids	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 4.87E-08

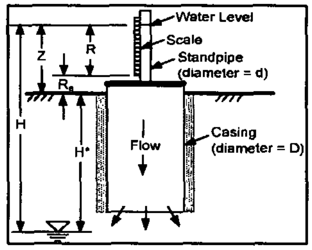
Total Time (d) = 0.06 1.5 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_0 (cm) =	52.07
Final Time:	17:58:55

FITTED VARIABLES

a (s^{-1}) =	0.0001403
H* (m) =	0.00
H_0 (m) =	1.42
MSE (m^2) =	1.20E-03
Bias (m) =	7.30E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
16:31:48	96.0
16:32:30	94.0
16:34:30	89.0
16:37:00	84.5
16:39:45	79.5
16:44:30	72.5
16:50:25	69.5
16:53:30	61.8
16:58:10	57.2
17:00:35	55.0
17:04:50	51.3
17:11:14	46.5
17:16:00	43.2
17:26:00	37.0
17:30:20	34.6
17:39:40	29.8
17:47:05	26.4
17:53:30	23.2
17:58:55	21.5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.48	0.00	1.420	-6.11E-02	3.73E-03
1.46	42	1.411	-4.94E-02	2.44E-03
1.41	162	1.388	-2.30E-02	5.27E-04
1.37	312	1.359	-6.87E-03	4.71E-05
1.32	477	1.328	1.20E-02	1.45E-04
1.25	762	1.276	3.00E-02	9.00E-04
1.22	1117	1.214	-1.98E-03	3.92E-06
1.14	1302	1.183	4.39E-02	1.93E-03
1.09	1582	1.137	4.44E-02	1.97E-03
1.07	1727	1.114	4.35E-02	1.89E-03
1.03	1982	1.075	4.13E-02	1.71E-03
0.99	2366	1.019	3.29E-02	1.08E-03
0.95	2652	0.979	2.59E-02	6.69E-04
0.89	3252	0.900	8.87E-03	7.87E-05
0.87	3512	0.867	6.48E-04	4.19E-07
0.82	4072	0.802	-1.69E-02	2.85E-04
0.78	4517	0.753	-3.14E-02	9.87E-04
0.75	4902	0.714	-3.90E-02	1.52E-03
0.74	5227	0.682	-5.38E-02	2.90E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

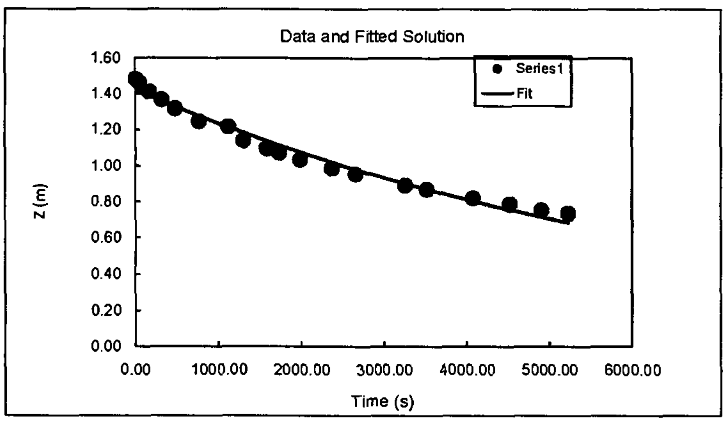
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.420
261	1.369
523	1.319
784	1.272
1045	1.226
1307	1.182
1568	1.139
1829	1.098
2091	1.059
2352	1.021
2614	0.984
2875	0.948
3136	0.914
3398	0.881
3659	0.850
3920	0.819
4182	0.790
4443	0.761
4704	0.734
4966	0.707
5227	0.682

Δt (s) = 261



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 4

Test ID:	CP3-SW	**Installer:**	XW
Project:	Cedar Rapids	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = **4.71E-08**

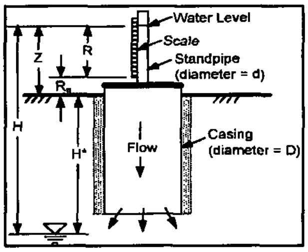
Total Time (d) = 0.05 1.1 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_3 (cm) =	52.07
Final Time:	10:30:23

FITTED VARIABLES

a (s^{-1}) =	0.0001356
H* (m) =	0.00
H_o (m) =	1.45
MSE (m^2) =	7.84E-04
Bias (m) =	-2.08E-11



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
9:25:00	100.0
9:26:00	95.5
9:27:00	92.7
9:30:36	86.7
9:32:50	83.2
9:35:10	80.0
9:37:15	77.3
9:39:13	75.0
9:41:13	72.8
9:44	69.6
9:46:35	67.0
9:52:07	62.0
9:54:27	60.0
9:57:43	57.4
10:02:25	53.7
10:10:18	48.5
10:17:24	44.7
10:21:46	42.4
10:30:23	38.1

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	ε^2 (m)
1.52	0.00	1.452	-6.87E-02	4.72E-03
1.48	60	1.440	-3.55E-02	1.26E-03
1.45	120	1.429	-1.91E-02	3.66E-04
1.39	336	1.387	-3.90E-04	1.52E-07
1.35	470	1.362	9.62E-03	9.26E-05
1.32	610	1.337	1.60E-02	2.56E-04
1.29	735	1.314	2.05E-02	4.21E-04
1.27	853	1.293	2.27E-02	5.13E-04
1.25	973	1.272	2.38E-02	5.65E-04
1.22	1140	1.244	2.73E-02	7.43E-04
1.19	1295	1.218	2.74E-02	7.50E-04
1.14	1627	1.164	2.37E-02	5.64E-04
1.12	1767	1.143	2.18E-02	4.77E-04
1.09	1963	1.113	1.79E-02	3.19E-04
1.06	2245	1.071	1.31E-02	1.72E-04
1.01	2718	1.004	-1.44E-03	2.07E-06
0.97	3144	0.948	-1.98E-02	3.93E-04
0.94	3406	0.915	-2.99E-02	8.95E-04
0.90	3923	0.853	-4.89E-02	2.39E-03

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

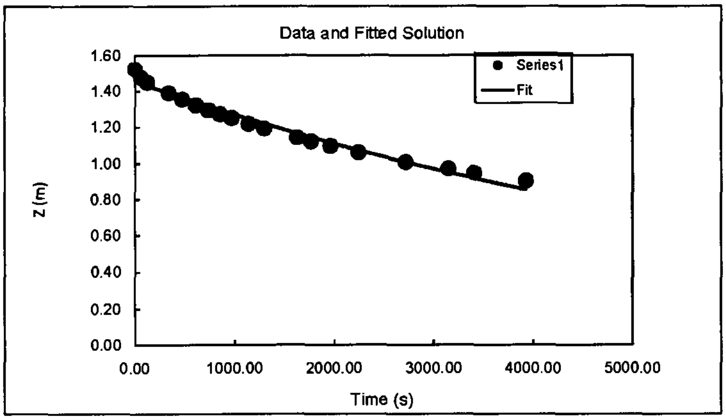
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.452
196	1.414
392	1.377
588	1.341
785	1.305
981	1.271
1177	1.238
1373	1.205
1569	1.174
1765	1.143
1962	1.113
2158	1.084
2354	1.055
2550	1.027
2746	1.000
2942	0.974
3138	0.949
3335	0.924
3531	0.899
3727	0.876
3923	0.853

Δt (s) = 196



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

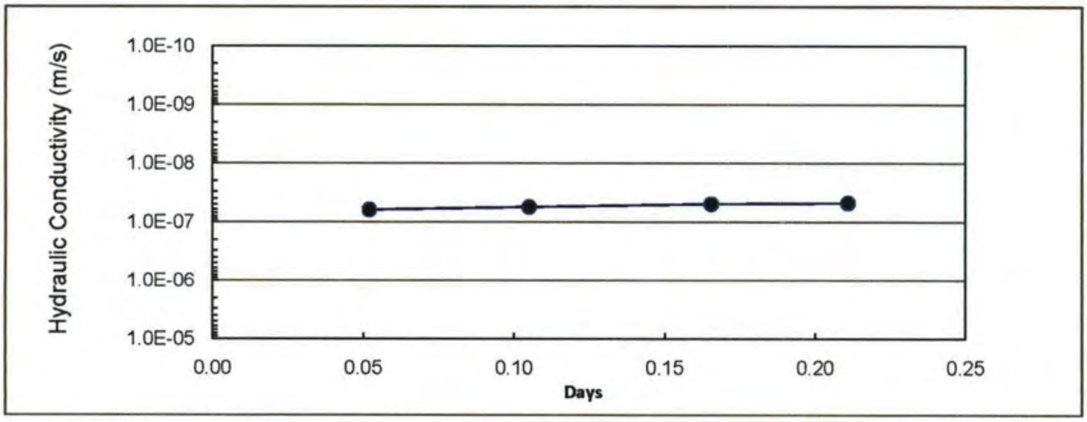
Trial	Time (d)	Total Time (d)	K (m/s)
1	0.052	0.052	6.16E-08
2	0.053	0.105	5.53E-08
3	0.060	0.165	4.87E-08
4	0.045	0.211	4.71E-08

CP3-SW

Field Hydraulic Conductivity

5.32E-08 m/s

5.32E-06 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 1

Test ID:	CP4-SE	**Installer:**	XW
Project:	Cedar Rapids	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 1.77E-07

Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) = 1.905

D (cm) = 29.845

R_a (cm) = 52.07

Final Time: 13:48:00

FITTED VARIABLES

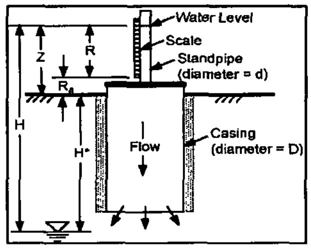
a (s^{-1}) = 0.0005108

H* (m) = 0.00

H_o (m) = 1.39

MSE (m^2) = 7.33E-04

Bias (m) = -1.24E-11



Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:26:12	92.7
13:27:45	82.7
13:28:30	79.0
13:28:50	77.0
13:29:30	73.5
13:30:30	69.0
13:31:15	65.5
13:32:00	62.0
13:33:30	56.5
13:34:47	52.0
13:35:50	48.5
13:37:06	45.0
13:38:14	42.0
13:39:10	39.5
13:41:00	35.5
13:42:40	32.0
13:45:00	28.5
13:47:10	25.5
13:48:00	24.4

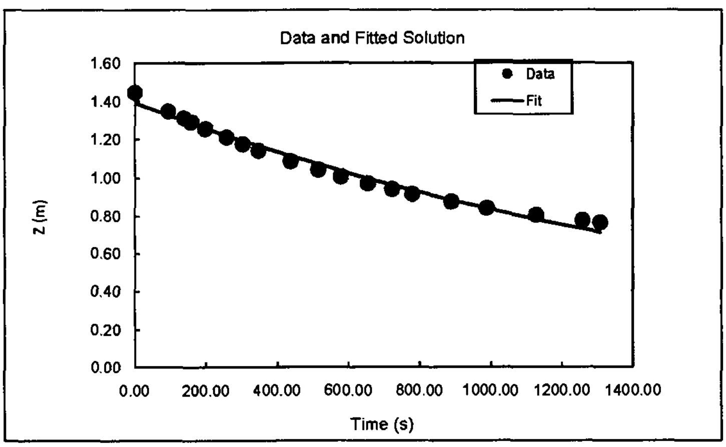
Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.45	0.00	1.392	-5.59E-02	3.12E-03
1.35	93	1.327	-2.04E-02	4.18E-04
1.31	138	1.297	-1.36E-02	1.85E-04
1.29	158	1.284	-6.79E-03	4.61E-05
1.26	198	1.258	2.25E-03	5.05E-06
1.21	258	1.220	9.28E-03	8.62E-05
1.18	303	1.192	1.66E-02	2.74E-04
1.14	348	1.165	2.45E-02	5.99E-04
1.09	438	1.113	2.71E-02	7.36E-04
1.04	515	1.070	2.92E-02	8.53E-04
1.01	578	1.036	3.03E-02	9.20E-04
0.97	654	0.997	2.59E-02	6.70E-04
0.94	722	0.963	2.19E-02	4.78E-04
0.92	778	0.935	1.97E-02	3.89E-04
0.88	888	0.884	8.62E-03	7.43E-05
0.84	988	0.840	-4.14E-04	1.72E-07
0.81	1128	0.782	-2.34E-02	5.48E-04
0.78	1258	0.732	-4.37E-02	1.91E-03
0.76	1308	0.714	-5.11E-02	2.61E-03

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.392
65	1.346
131	1.302
196	1.259
262	1.218
327	1.178
392	1.139
458	1.102
523	1.065
589	1.030
654	0.997
719	0.964
785	0.932
850	0.902
916	0.872
981	0.843
1046	0.816
1112	0.789
1177	0.763
1243	0.738
1308	0.714

Δt (s) = 65



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 2

Test ID: CP4-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

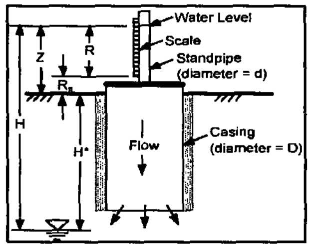
SOLUTION -TRIAL 1
K (m/s) = **1.80E-07**
Total Time (d) = 0.01 0.3 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_a (cm) =	52.07
Final Time:	14:04:19

FITTED VARIABLES

a (s^{-1}) =	0.0005177
H* (m) =	0.00
H_o (m) =	1.43
MSE (m^2) =	1.65E-04
Bias (m) =	-8.32E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:48:30	93.0
13:49:05	89.0
13:49:35	86.0
13:51:00	79.0
13:53:00	70.5
13:55:24	62.0
13:57:24	55.5
13:59:23	49.5
14:01:04	45.0
14:04:19	37.5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.45	0.00	1.429	-2.17E-02	4.69E-04
1.41	35	1.403	-7.31E-03	5.35E-05
1.38	65	1.382	1.06E-03	1.12E-06
1.31	150	1.322	1.16E-02	1.34E-04
1.23	270	1.243	1.69E-02	2.86E-04
1.14	414	1.153	1.27E-02	1.60E-04
1.08	534	1.084	8.19E-03	6.70E-05
1.02	653	1.019	3.43E-03	1.17E-05
0.97	754	0.967	-3.49E-03	1.22E-05
0.90	949	0.874	-2.14E-02	4.57E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

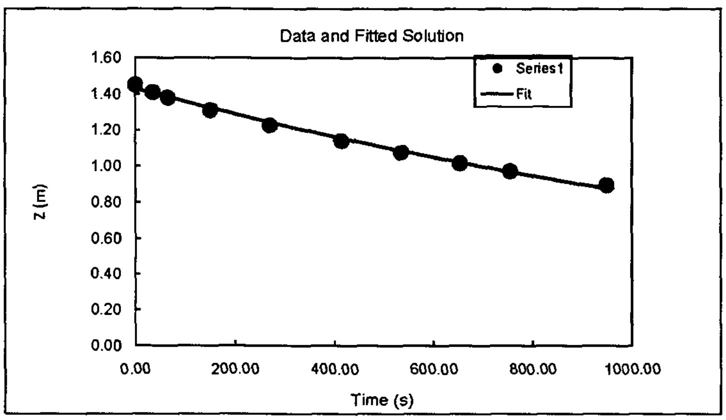
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.429
47	1.394
95	1.361
142	1.328
190	1.295
237	1.264
285	1.233
332	1.203
380	1.174
427	1.146
475	1.118
522	1.091
569	1.064
617	1.038
664	1.013
712	0.989
759	0.965
807	0.941
854	0.918
902	0.896
949	0.874

Δt (s) = 47



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 3

Test ID: CP4-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

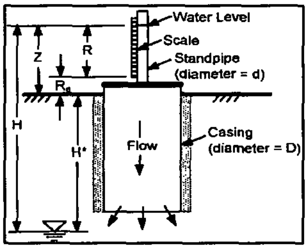
SOLUTION -TRIAL 1
K (m/s) = 1.66E-07
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 52.07
Final Time: 15:35:40

FITTED VARIABLES

a (s^{-1}) = 0.0004771
H* (m) = 0.00
H_o (m) = 1.37
MSE (m^2) = 1.74E-04
Bias (m) = 4.66E-09



Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
15:12:10	88.0
15:13:15	82.0
15:14:15	77.5
15:15:35	72.0
15:16:40	68.0
15:18:00	63.0
15:19:10	59.0
15:20:28	55.0
15:21:48	51.0
15:24:20	44.0
15:25:51	40.0
15:29:30	31.5
15:33:40	23.5
15:35:40	20.5

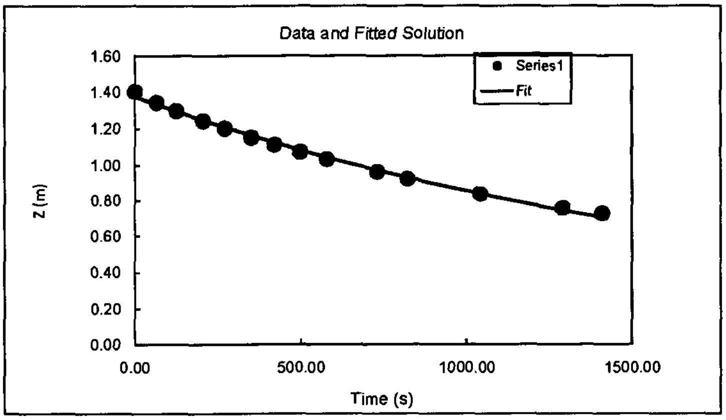
Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.40	0.00	1.373	-2.74E-02	7.48E-04
1.34	65	1.331	-9.29E-03	8.63E-05
1.30	125	1.294	-1.86E-03	3.46E-06
1.24	205	1.245	4.69E-03	2.20E-05
1.20	270	1.207	6.67E-03	4.44E-05
1.15	350	1.162	1.15E-02	1.31E-04
1.11	420	1.124	1.33E-02	1.77E-04
1.07	498	1.083	1.22E-02	1.50E-04
1.03	578	1.042	1.17E-02	1.36E-04
0.96	730	0.969	8.77E-03	7.69E-05
0.92	821	0.928	7.58E-03	5.75E-05
0.84	1040	0.836	4.91E-04	2.41E-07
0.76	1290	0.742	-1.35E-02	1.83E-04
0.73	1410	0.701	-2.48E-02	6.16E-04

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.373
71	1.328
141	1.284
212	1.242
282	1.200
353	1.161
423	1.122
494	1.085
564	1.049
635	1.015
705	0.981
776	0.949
846	0.917
917	0.887
987	0.858
1058	0.829
1128	0.802
1199	0.775
1269	0.750
1340	0.725
1410	0.701

Δt (s) = 71



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 4

Test ID:	CP4-SE	**Installer:**	XW
Project:	Cedar Rapids	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = **1.62E-07**

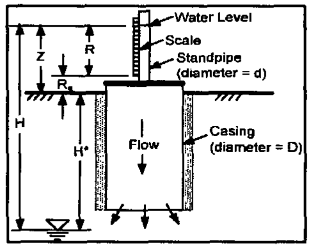
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	52.07
Final Time:	15:57:50

FITTED VARIABLES

a (s^{-1}) =	0.0004660
H* (m) =	0.00
H_0 (m) =	1.36
MSE (m^2) =	7.70E-05
Bias (m) =	-1.16E-09



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
15:35:54	86.0
15:36:34	82.5
15:37:05	80.0
15:39:32	70.5
15:40:50	66.0
15:42:00	62.0
15:43:52	56.0
15:45:14	52.0
15:47:00	47.0
15:48:54	42.0
15:52:00	34.5
15:53:59	30.5
15:55:12	28.0
15:56:45	25.0
15:57:50	23.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.38	0.00	1.363	-1.77E-02	3.12E-04
1.35	40	1.338	-7.84E-03	6.14E-05
1.32	71	1.319	-2.02E-03	4.10E-06
1.23	218	1.231	5.67E-03	3.22E-05
1.18	296	1.187	6.72E-03	4.52E-05
1.14	366	1.149	8.62E-03	7.42E-05
1.08	478	1.091	1.02E-02	1.04E-04
1.04	560	1.050	9.28E-03	8.61E-05
0.99	666	0.999	8.68E-03	7.53E-05
0.94	780	0.948	6.98E-03	4.87E-05
0.87	966	0.869	3.30E-03	1.09E-05
0.83	1085	0.822	-3.58E-03	1.28E-05
0.80	1158	0.795	-6.07E-03	3.68E-05
0.77	1251	0.761	-9.77E-03	9.54E-05
0.75	1316	0.738	-1.25E-02	1.56E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

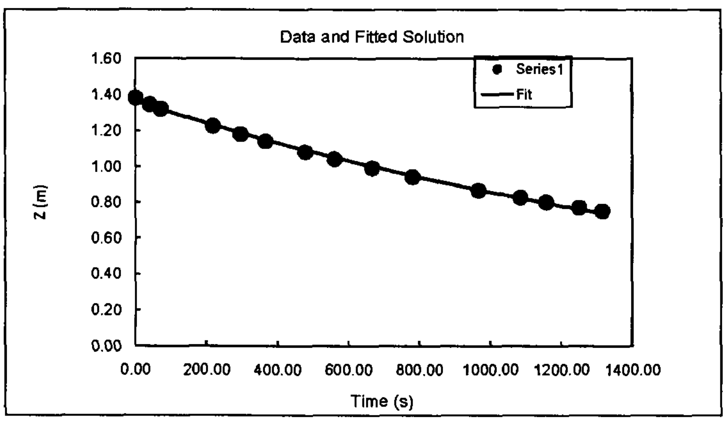
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.363
66	1.322
132	1.282
197	1.243
263	1.206
329	1.169
395	1.134
461	1.100
526	1.067
592	1.034
658	1.003
724	0.973
790	0.943
855	0.915
921	0.887
987	0.861
1053	0.835
1119	0.809
1184	0.785
1250	0.761
1316	0.738

Δt (s) = 66



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 5

Test ID: CP4-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

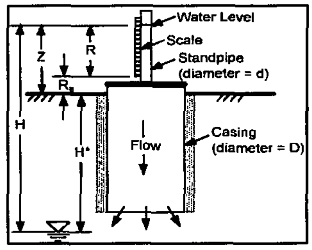
SOLUTION -TRIAL 1
K (m/s) = **1.78E-07**
Total Time (d) = 0.01 0.3 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	52.07
Final Time:	9:44:42

FITTED VARIABLES

a (s^{-1}) =	0.0005118
H* (m) =	0.00
H_o (m) =	1.48
MSE (m^2) =	2.21E-04
Bias (m) =	9.04E-09



Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
9:24:00	100.0
9:25:00	90.5
9:27:00	83.5
9:28:00	76.5
9:29:30	71.7
9:31:23	64.7
9:32:00	62.5
9:34:15	55.0
9:35:40	50.6
9:36:30	48.3
9:38:23	43.5
9:39:47	40.0
9:40:30	37.8
9:41:34	35.3
9:43:42	29.8
9:44:42	27.7

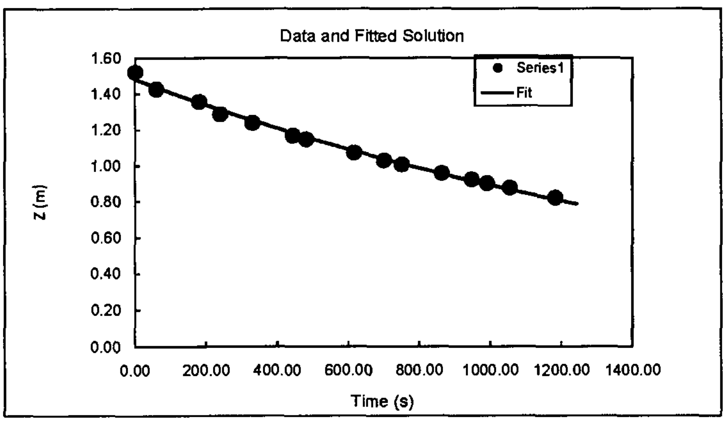
Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.52	0.00	1.480	-4.10E-02	1.68E-03
1.43	60	1.435	9.29E-03	8.63E-05
1.36	180	1.350	-6.19E-03	3.83E-05
1.29	240	1.309	2.30E-02	5.29E-04
1.24	330	1.250	1.21E-02	1.46E-04
1.17	443	1.180	1.19E-02	1.41E-04
1.15	480	1.157	1.17E-02	1.38E-04
1.07	615	1.080	9.48E-03	8.98E-05
1.03	700	1.034	7.50E-03	5.62E-05
1.00	750	1.008	4.37E-03	1.91E-05
0.96	863	0.951	-4.27E-03	1.83E-05
0.92	947	0.911	-9.31E-03	8.66E-05
0.90	990	0.892	-7.15E-03	5.11E-05
0.87	1054	0.863	-1.09E-02	1.18E-04
0.82	1182	0.808	-1.06E-02	1.12E-04

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.480
62	1.433
124	1.389
186	1.345
248	1.303
310	1.262
373	1.223
435	1.185
497	1.148
559	1.112
621	1.077
683	1.043
745	1.011
807	0.979
869	0.946
931	0.919
994	0.890
1056	0.862
1118	0.835
1180	0.809
1242	0.784

Δt (s) = 62



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

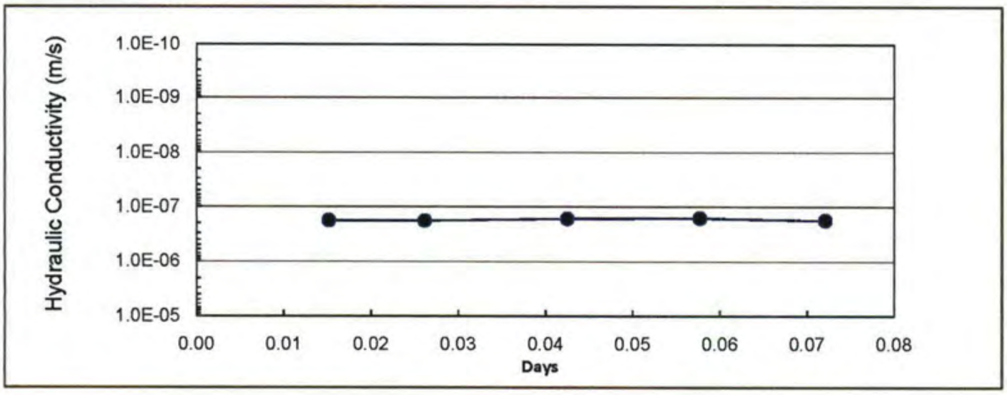
CP4-SE

Trial	Time (d)	Total Time (d)	K (m/s)
1	0.015	0.015	1.77E-07
2	0.011	0.026	1.80E-07
3	0.016	0.042	1.66E-07
4	0.015	0.058	1.62E-07
5	0.014	0.072	1.78E-07

Field Hydraulic Conductivity

1.71E-07 m/s

1.71E-05 cm/s



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 1

Test ID: CP5-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

SOLUTION -TRIAL 1

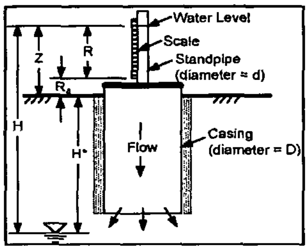
K (m/s) = **1.41E-07**
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 52.07
Final Time: 11:45:10

FITTED VARIABLES

a (s^{-1}) = 0.0004064
H* (m) = 0.00
H_o (m) = 1.48
MSE (m^2) = 3.40E-04
Bias (m) = 5.38E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
11:06:57	100.0
11:09:02	90.0
11:11:28	80.0
11:14:16	70.0
11:17:30	60.0
11:21:48	49.0
11:25:50	40.0
11:29:21	33.0
11:31:08	30.0
11:32:46	27.0
11:35:00	23.0
11:36:48	20.0
11:40:32	15.0
11:45:10	9.5

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.52	0.00	1.484	-3.72E-02	1.38E-03
1.42	125	1.410	-1.07E-02	1.14E-04
1.32	271	1.329	8.11E-03	6.57E-05
1.22	439	1.241	2.04E-02	4.16E-04
1.12	633	1.147	2.63E-02	6.92E-04
1.01	891	1.033	2.21E-02	4.89E-04
0.92	1133	0.936	1.54E-02	2.36E-04
0.85	1344	0.859	8.44E-03	7.13E-05
0.82	1451	0.823	1.88E-03	3.53E-06
0.79	1549	0.790	-2.40E-04	5.76E-08
0.75	1683	0.749	-2.14E-03	4.57E-06
0.72	1791	0.716	-4.29E-03	1.84E-05
0.67	2015	0.654	-1.66E-02	2.76E-04
0.62	2293	0.584	-3.15E-02	9.93E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

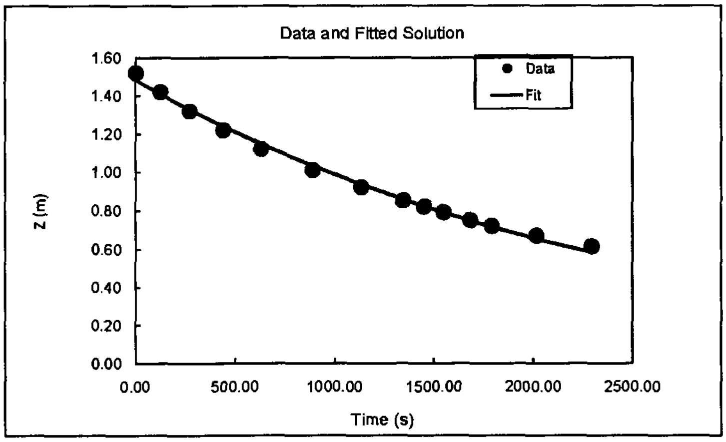
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.484
115	1.416
229	1.352
344	1.290
459	1.231
573	1.175
688	1.122
803	1.071
917	1.022
1032	0.975
1147	0.931
1261	0.889
1376	0.848
1490	0.809
1605	0.773
1720	0.737
1834	0.704
1949	0.672
2064	0.641
2178	0.612
2293	0.584

Δt (s) = 115



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 2

Test ID: CP5-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

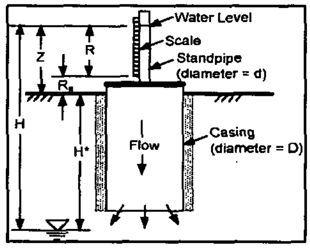
SOLUTION -TRIAL 1
K (m/s) = **1.36E-07**
Total Time (d) = 0.03 0.6 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_a (cm) = 52.07
Final Time: 12:24:33

FITTED VARIABLES

a (s^{-1}) = 0.0003927
H* (m) = 0.00
H_o (m) = 1.49
MSE (m^2) = 3.92E-04
Bias (m) = -4.07E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
11:46:49	100.0
11:49:12	89.0
11:51:37	80.0
11:56:13	65.0
12:01:26	51.0
12:09:14	35.0
12:18:04	20.0
12:24:33	12.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.52	0.00	1.490	-3.03E-02	9.21E-04
1.41	143	1.409	-1.74E-03	3.02E-06
1.32	288	1.331	1.03E-02	1.05E-04
1.17	564	1.194	2.35E-02	5.54E-04
1.03	877	1.056	2.54E-02	6.45E-04
0.87	1345	0.879	8.08E-03	6.54E-05
0.72	1875	0.714	-7.05E-03	4.97E-05
0.64	2264	0.613	-2.82E-02	7.93E-04

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

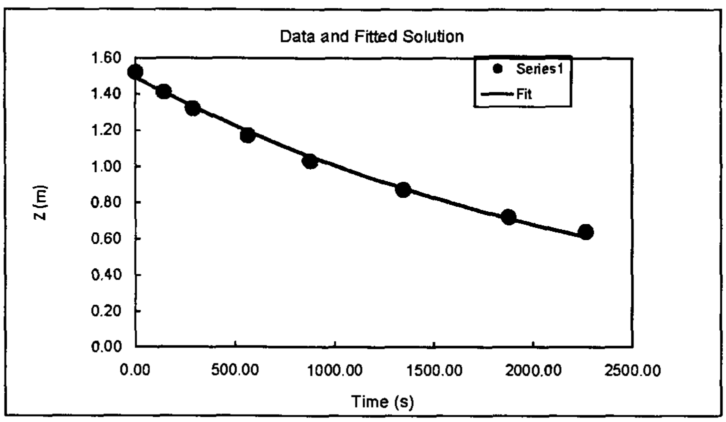
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.490
113	1.426
226	1.364
340	1.304
453	1.248
566	1.193
679	1.141
792	1.092
906	1.044
1019	0.999
1132	0.955
1245	0.914
1358	0.874
1472	0.836
1585	0.800
1698	0.765
1811	0.732
1924	0.700
2038	0.669
2151	0.640
2264	0.613

Δt (s) = 113



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 3

Test ID: CP5-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

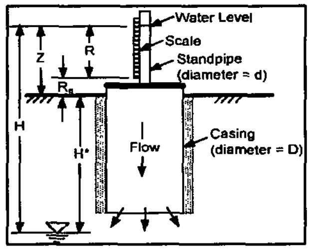
SOLUTION -TRIAL 1
K (m/s) = **1.30E-07**
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 52.07
Final Time: 12:46:47

FITTED VARIABLES

a (s^{-1}) = 0.0003752
H* (m) = 0.00
H_0 (m) = 1.16
MSE (m^2) = 4.31E-05
Bias (m) = 7.91E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
12:24:55	65.0
12:29:45	52.0
12:35:26	39.0
12:40:15	30.0
12:46:47	20.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
1.17	0.00	1.164	-6.42E-03	4.12E-05
1.04	290	1.044	3.55E-03	1.26E-05
0.91	631	0.919	8.15E-03	6.64E-05
0.82	920	0.824	3.73E-03	1.39E-05
0.72	1312	0.712	-9.02E-03	8.13E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

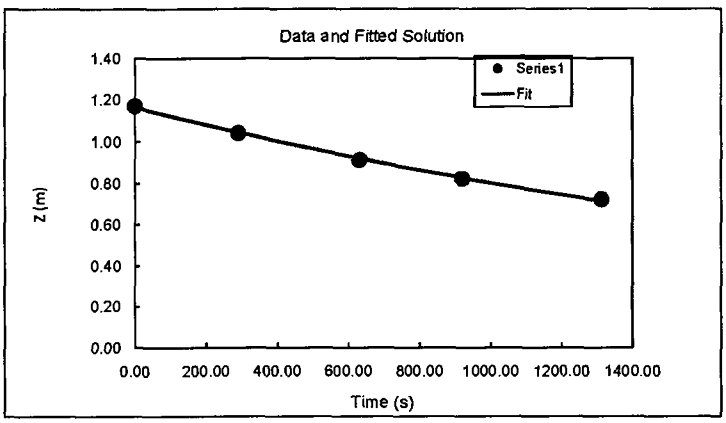
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	1.164
66	1.136
131	1.108
197	1.081
262	1.055
328	1.029
394	1.004
459	0.980
525	0.956
590	0.933
656	0.910
722	0.888
787	0.867
853	0.845
918	0.825
984	0.805
1050	0.785
1115	0.766
1181	0.748
1246	0.729
1312	0.712

Δt (s) = 66



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 4

Test ID: CP5-SE **Installer:** XW
Project: Cedar Rapids **Analyst:** CHB

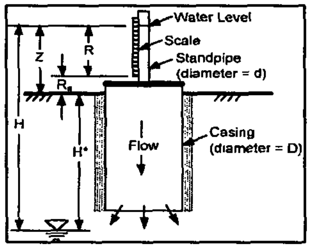
SOLUTION -TRIAL 1
K (m/s) = 9.99E-08
Total Time (d) = 0.01 0.3 hrs

FIXED VARIABLES

d (cm) = 1.905
D (cm) = 29.845
R_s (cm) = 52.07
Final Time: 14:09:05

FITTED VARIABLES

a (s^{-1}) = 0.0002877
H* (m) = 0.00
H_o (m) = 0.72
MSE (m^2) = 6.34E-06
Bias (m) = -1.02E-11



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
13:50:10	20.0
13:52:15	17.0
13:54:45	14.0
13:57:18	11.0
14:00:12	8.0
14:03:08	5.0
14:06:35	2.0
14:09:05	0.0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.72	0.00	0.717	-4.15E-03	1.72E-05
0.69	125	0.691	5.46E-04	2.98E-07
0.66	275	0.662	1.35E-03	1.83E-06
0.63	428	0.634	2.85E-03	8.11E-06
0.60	602	0.603	1.92E-03	3.68E-06
0.57	778	0.573	2.17E-03	4.70E-06
0.54	985	0.540	-9.47E-04	8.97E-07
0.52	1135	0.517	-3.74E-03	1.40E-05

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

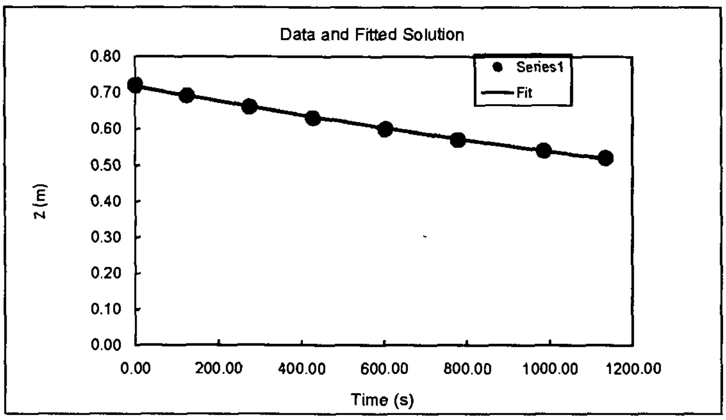
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.717
57	0.705
114	0.694
170	0.682
227	0.671
284	0.660
341	0.650
397	0.639
454	0.629
511	0.619
568	0.609
624	0.599
681	0.589
738	0.580
795	0.570
851	0.561
908	0.552
965	0.543
1022	0.534
1078	0.525
1135	0.517

Δt (s) = 57



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

TRIAL 5

Test ID:	CP5-SE	**Installer:**	XW
Project:	Cedar Rapids	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 1.06E-07

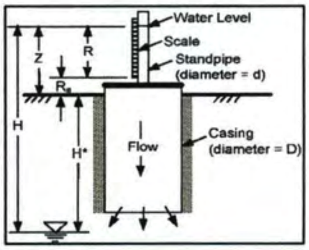
Total Time (d) = 0.01 0.3 hrs

FIXED VARIABLES

d (cm) =	1.905
D (cm) =	29.845
R_s (cm) =	52.07
Final Time:	14:28:48

FITTED VARIABLES

a (s^{-1}) =	0.0003046
H* (m) =	0.00
H_o (m) =	0.80
MSE (m^2) =	2.84E-06
Bias (m) =	6.95E-11



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
14:10:13	28.0
14:12:09	25.0
14:14:22	22.0
14:15:51	20.0
14:20:54	13.5
14:25:53	8.3
14:28:48	4.7

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.80	0.00	0.799	-1.40E-03	1.96E-06
0.77	116	0.772	8.55E-04	7.31E-07
0.74	249	0.741	2.26E-04	5.11E-08
0.72	338	0.721	4.12E-04	1.70E-07
0.66	641	0.658	1.84E-03	3.40E-06
0.60	940	0.600	-3.39E-03	1.15E-05
0.57	1115	0.569	1.45E-03	2.11E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

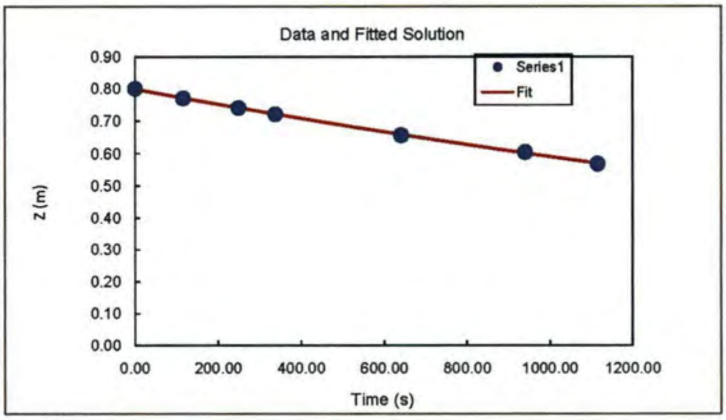
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.799
56	0.786
112	0.773
167	0.760
223	0.747
279	0.734
335	0.722
390	0.710
446	0.698
502	0.686
558	0.674
613	0.663
669	0.652
725	0.641
781	0.630
836	0.620
892	0.609
948	0.599
1004	0.589
1059	0.579
1115	0.569

Δt (s) = 56



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Cedar Rapids - Composite Cover

Equilibirum Evaluation & Steady Hydraulic Conductivity Determination

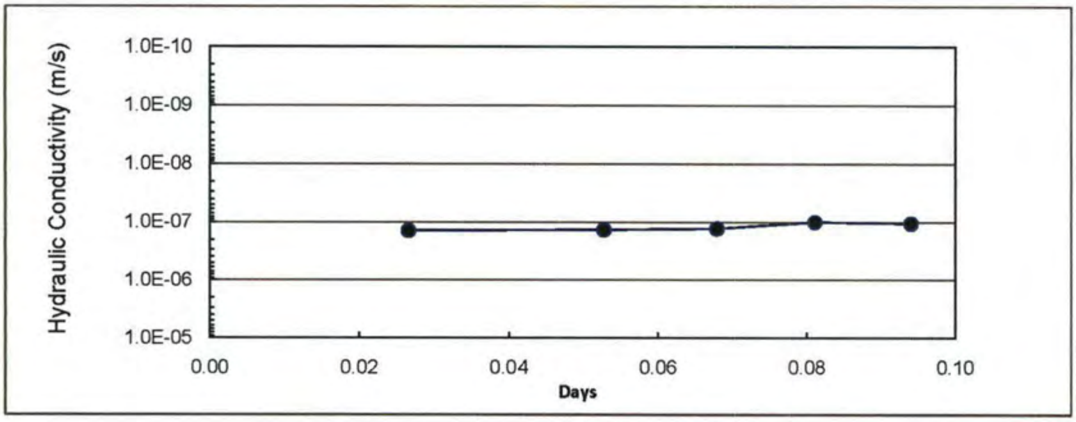
CP5-SE

Trial	Time (d)	Total Time (d)	K (m/s)
1	0.027	0.027	1.41E-07
2	0.026	0.053	1.36E-07
3	0.015	0.068	1.30E-07
4	0.013	0.081	9.99E-08
5	0.013	0.094	1.06E-07

Field Hydraulic Conductivity

1.23E-07 m/s

1.23E-05 cm/s



Single-Stage Constant Head Borehole Test
Helena - Store-and-Release Cover

Project: Helena
Date: 08/19/08
Test ID: 1

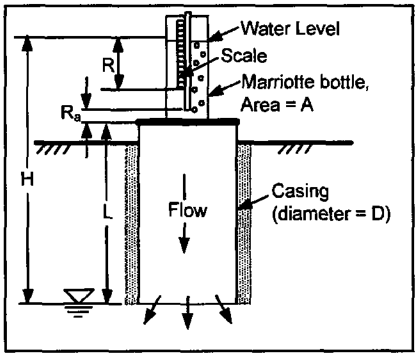
Installer: XW
Analyst: JS

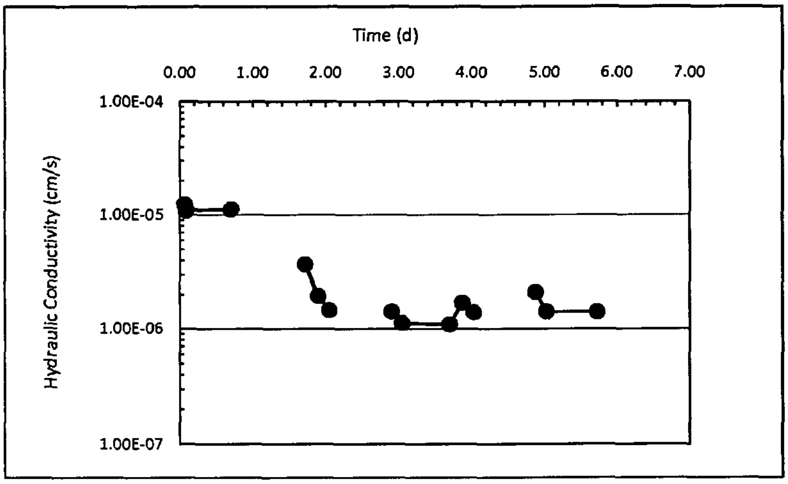
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
8/19/08 15:00	38.5			
8/19/08 16:27	43.3	7.34E-02	0.060	1.23E-05
8/19/08 17:02	45	6.46E-02	0.085	1.09E-05
8/20/08 7:50	89.3	6.64E-02	0.701	1.12E-05
8/20/08 15:00	38.1	-1.58E-01	1.000	
8/21/08 8:05	55	2.19E-02	1.712	3.69E-06
8/21/08 12:30	57.3	1.15E-02	1.896	1.94E-06
8/21/08 16:05	58.7	8.66E-03	2.045	1.46E-06
8/22/08 8:27	40	-2.53E-02	2.727	
8/22/08 12:40	41.6	8.41E-03	2.903	1.41E-06
8/22/08 16:00	42.6	6.65E-03	3.042	1.12E-06
8/23/08 7:46	47.2	6.46E-03	3.699	1.09E-06
8/23/08 11:57	49.1	1.01E-02	3.873	1.69E-06
8/23/08 15:42	50.5	8.29E-03	4.029	1.39E-06
8/24/08 7:55	49	-2.05E-03	4.705	
8/24/08 12:11	51.4	1.25E-02	4.883	2.10E-06
8/24/08 15:37	52.7	8.39E-03	5.026	1.41E-06
8/25/08 8:22	59.0	8.34E-03	5.724	1.40E-06
			Average	1.58E-06





Single-Stage Constant Head Borehole Test
Helena - Store-and-Release Cover

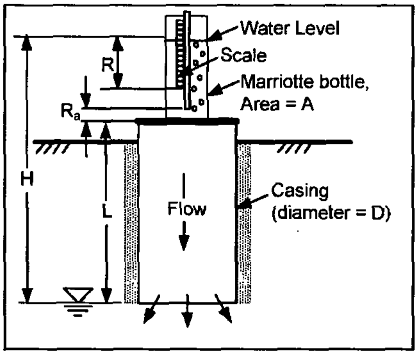
Project:	Helena	**Installer:**	XW
Date:	08/19/08	**Analyst:**	JS
Test ID:	1		

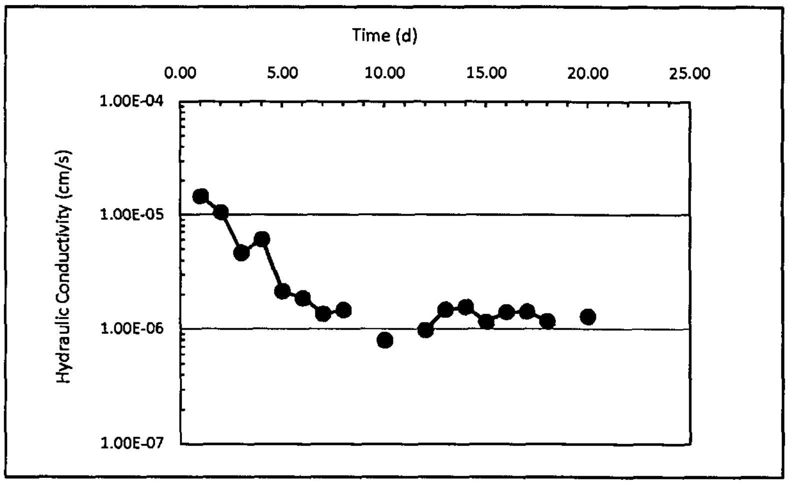
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
8/19/08 14:07	30.5			
8/19/08 15:47	37	8.64E-02	0.069	1.45E-05
8/19/08 17:02	40.5	6.21E-02	0.122	1.04E-05
8/20/08 8:43	60	2.76E-02	0.775	4.63E-06
8/20/08 9:35	61.4	3.58E-02	0.811	6.02E-06
8/20/08 15:00	64.5	1.27E-02	1.037	2.13E-06
8/21/08 8:05	73	1.10E-02	1.749	1.85E-06
8/21/08 12:30	74.6	8.03E-03	1.933	1.35E-06
8/21/08 16:05	76	8.66E-03	2.082	1.46E-06
8/22/08 8:27	40.5	-4.81E-02	2.764	
8/22/08 16:00	42.1	4.70E-03	3.078	7.90E-07
8/22/08 16:00	43	#DIV/0!	3.078	
8/23/08 7:46	47.1	5.76E-03	3.736	9.69E-07
8/23/08 11:57	48.75	8.73E-03	3.910	1.47E-06
8/23/08 15:42	50.3	9.18E-03	4.066	1.54E-06
8/24/08 7:55	55.3	6.83E-03	4.742	1.15E-06
8/24/08 12:11	56.9	8.31E-03	4.920	1.40E-06
8/24/08 15:37	58.2	8.39E-03	5.063	1.41E-06
8/25/08 8:22	63.4	6.88E-03	5.760	1.16E-06
			Average	1.28E-06





Single-Stage Constant Head Borehole Test
Helena - Store-and-Release Cover

Project: Helena
Date: 08/19/08
Test ID: 1

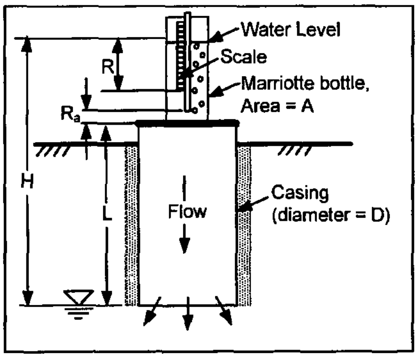
Installer: XW
Analyst: JS

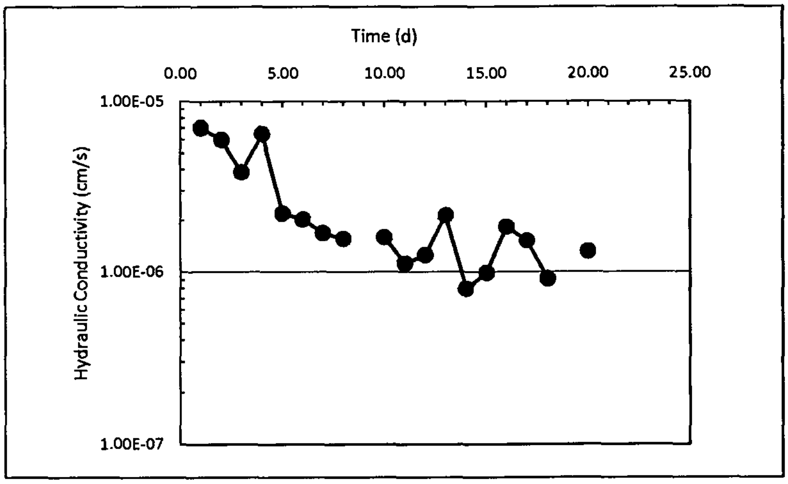
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
8/19/08 14:08	45.7			
8/19/08 15:47	48.8	4.16E-02	0.069	7.00E-06
8/19/08 17:02	50.8	3.55E-02	0.121	5.96E-06
8/20/08 8:43	67	2.29E-02	0.774	3.85E-06
8/20/08 9:35	68.5	3.84E-02	0.810	6.45E-06
8/20/08 15:00	71.7	1.31E-02	1.036	2.20E-06
8/21/08 8:05	81	1.21E-02	1.748	2.03E-06
8/21/08 12:30	83	1.00E-02	1.932	1.69E-06
8/21/08 16:05	84.5	9.28E-03	2.081	1.56E-06
8/22/08 8:27	38.9	-6.18E-02	2.763	
8/22/08 12:40	40.7	9.46E-03	2.939	1.59E-06
8/22/08 16:00	41.7	6.65E-03	3.078	1.12E-06
8/23/08 7:46	47	7.45E-03	3.735	1.25E-06
8/23/08 11:57	49.4	1.27E-02	3.909	2.14E-06
8/23/08 15:42	50.2	4.74E-03	4.065	7.97E-07
8/24/08 7:55	54.5	5.88E-03	4.741	9.88E-07
8/24/08 12:11	56.6	1.09E-02	4.919	1.83E-06
8/24/08 15:37	58.0	9.03E-03	5.062	1.52E-06
8/25/08 8:22	62.1	5.43E-03	5.760	9.13E-07
			Average	1.31E-06



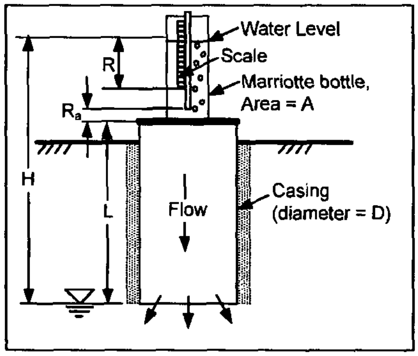


Single-Stage Constant Head Borehole Test
Helena - Store-and-Release Cover

Project:	Helena	**Installer:**	XW
Date:	08/19/08	**Analyst:**	JS
Test ID:	1		

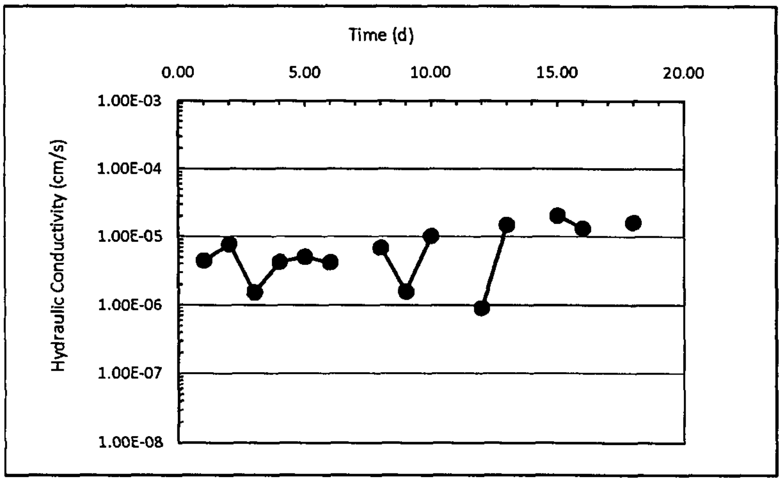
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96



Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
8/19/08 17:50	36.5				
8/20/08 8:43	54.2	2.64E-02	0.620	4.43E-06	
8/20/08 9:35	56	4.60E-02	0.656	7.74E-06	
8/20/08 15:00	58.2	9.00E-03	0.882	1.51E-06	
8/21/08 8:05	77.5	2.50E-02	1.594	4.21E-06	
8/21/08 12:30	83.5	3.01E-02	1.778	5.06E-06	
8/21/08 16:05	87.5	2.47E-02	1.927	4.16E-06	
8/22/08 8:35	36.4	-6.86E-02	2.615		
8/22/08 12:40	43.9	4.07E-02	2.785	6.85E-06	
8/22/08 16:00	45.3	9.31E-03	2.924	1.57E-06	
8/23/08 7:46	88.5	6.07E-02	3.581	1.02E-05	Bottle leaking from coupler
8/23/08 7:47	48.5	-8.63E+01	3.581		
8/23/08 11:57	49.5	5.31E-03	3.755	8.92E-07	
8/23/08 15:42	64.5	8.88E-02	3.911	1.49E-05	Still leaking from coupler
8/24/08 7:55	51	-1.85E-02	4.587		
8/24/08 12:11	74.5	1.22E-01	4.765	2.05E-05	
8/24/08 15:37	86.7	7.87E-02	4.908	1.32E-05	
			Average	1.62E-05	



Single-Stage Constant Head Borehole Test
Monticello - Store-an-Release Cover

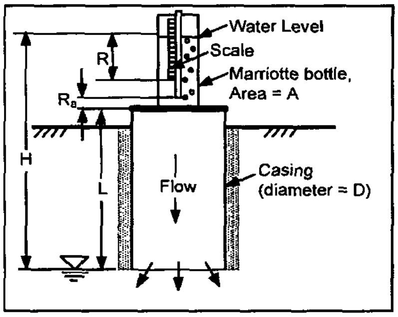
Project:	Monticello	**Installer:**	XW
Date:	07/23/07	**Analyst:**	CHB
Test ID:	MC-1		

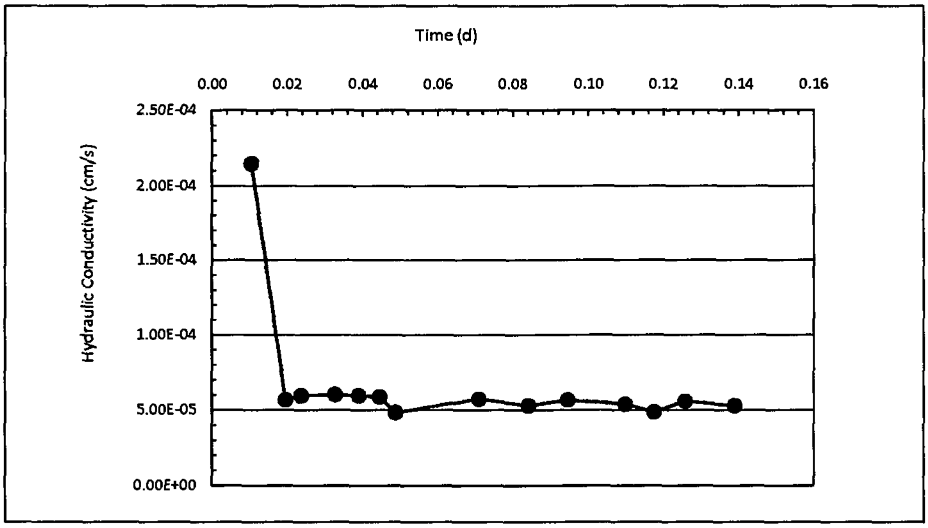
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
8:57:00	22.7			
9:12:00	37.1	1.28E+00	0.0104	2.15E-04
9:25:00	40.4	3.38E-01	0.0194	5.68E-05
9:31:00	42.0	3.55E-01	0.0236	5.96E-05
9:44:00	45.5	3.58E-01	0.0326	6.02E-05
9:53:00	47.9	3.55E-01	0.0389	5.96E-05
10:01:00	50.0	3.49E-01	0.0444	5.87E-05
10:07:00	51.3	2.88E-01	0.0486	4.84E-05
10:39:00	59.5	3.41E-01	0.0708	5.73E-05
10:58:00	64.0	3.15E-01	0.0840	5.30E-05
11:13:00	67.8	3.37E-01	0.0944	5.66E-05
11:35:00	73.1	3.20E-01	0.1097	5.39E-05
11:46:00	75.5	2.90E-01	0.1174	4.88E-05
11:58:00	78.5	3.33E-01	0.1257	5.59E-05
12:17:00	83.0	3.15E-01	0.1389	5.30E-05
12:37:00	87.5			
			AVG	5.26E-05





Single-Stage Constant Head Borehole Test
Monitcello - Store-and-Release Cover

Project: Monticello **Installer:** XW
Date: 07/23/07 **Analyst:** CHB
Test ID: MC-2

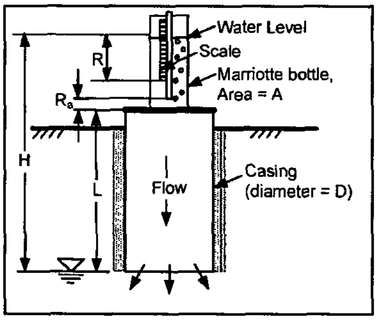
Fixed Variables:

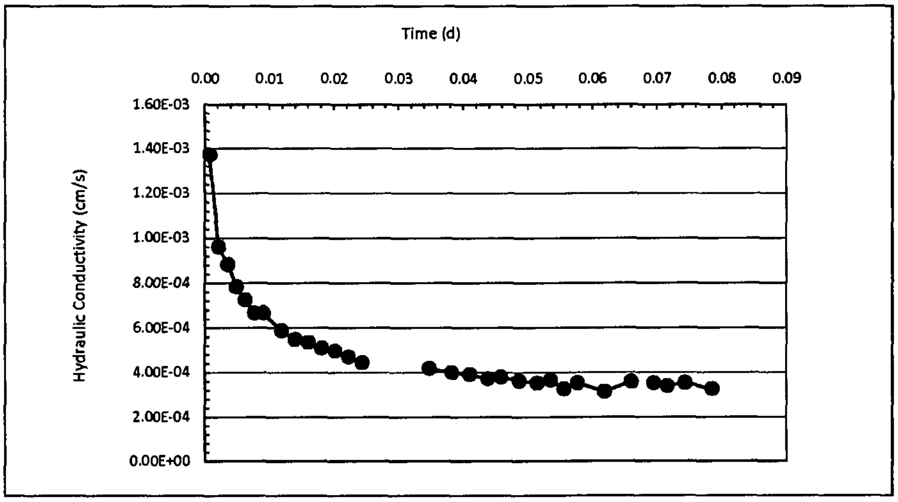
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
12:59:00	38.0			
13:00:00	41.5	4.66E+00	0.001	1.37E-03
13:02:00	46.4	3.26E+00	0.002	9.60E-04
13:04:00	50.9	2.99E+00	0.003	8.82E-04
13:06:00	54.9	2.66E+00	0.005	7.84E-04
13:08:00	58.6	2.46E+00	0.006	7.25E-04
13:10:00	62.0	2.26E+00	0.008	6.66E-04
13:12:00	65.4	2.26E+00	0.009	6.66E-04
13:16:00	71.4	1.99E+00	0.012	5.88E-04
13:19:00	75.6	1.86E+00	0.014	5.49E-04
13:22:00	79.7	1.82E+00	0.016	5.36E-04
13:25:00	83.6	1.73E+00	0.018	5.10E-04
13:28:00	87.4	1.68E+00	0.020	4.97E-04
13:31:00	91.0	1.60E+00	0.022	4.70E-04
13:34:00	94.4	1.51E+00	0.024	4.44E-04
13:38:00	39.3	-1.83E+01	0.027	
13:40:00	41.6	1.53E+00	0.028	
13:43:00	45.1	1.55E+00	0.031	
13:46:00	48.4	1.46E+00	0.033	
13:49:00	51.6	1.42E+00	0.035	4.18E-04
13:54:00	56.7	1.36E+00	0.038	4.00E-04
13:58:00	60.7	1.33E+00	0.041	3.92E-04
14:02:00	64.5	1.26E+00	0.044	3.72E-04
14:05:00	67.4	1.29E+00	0.046	3.79E-04
14:09:00	71.1	1.23E+00	0.049	3.63E-04
14:13:00	74.7	1.20E+00	0.051	3.53E-04
14:16:00	77.5	1.24E+00	0.053	3.66E-04
14:19:00	80.0	1.11E+00	0.056	3.27E-04
14:22:00	82.7	1.20E+00	0.058	3.53E-04
14:28:00	87.5	1.06E+00	0.062	3.14E-04
14:34:00	93.0	1.22E+00	0.066	3.59E-04
14:37:00	36.0		0.068	
14:39:00	37.8	1.20E+00	0.069	3.53E-04
14:42:00	40.4	1.15E+00	0.072	3.40E-04
14:46:00	44.0	1.20E+00	0.074	3.53E-04
14:52:00	49.0	1.11E+00	0.078	3.27E-04
14:58:00	53.9	1.09E+00	0.083	3.20E-04
15:07:00	61.1	1.06E+00	0.089	3.14E-04
15:21:00	72.3	1.06E+00	0.099	3.14E-04
15:31:00	80.0	1.02E+00	0.106	3.02E-04
15:52:00	95.7	9.94E-01	0.120	2.93E-04

AVG
3.08E-04




Time (d)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
1.60E-03
1.40E-03
1.20E-03
1.00E-03
8.00E-04
6.00E-04
4.00E-04
2.00E-04
0.00E+00
Hydraulic Conductivity (cm/s)

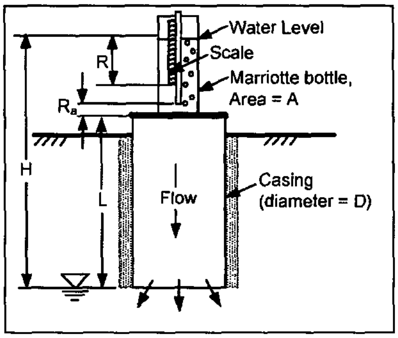
Single-Stage Constant Head Borehole Test
Monitcello - Store-and-Release Cover

Project:	Monticello	**Installer:**	XW
Date:	07/24/07	**Analyst:**	CHB
Test ID:	MC-3		

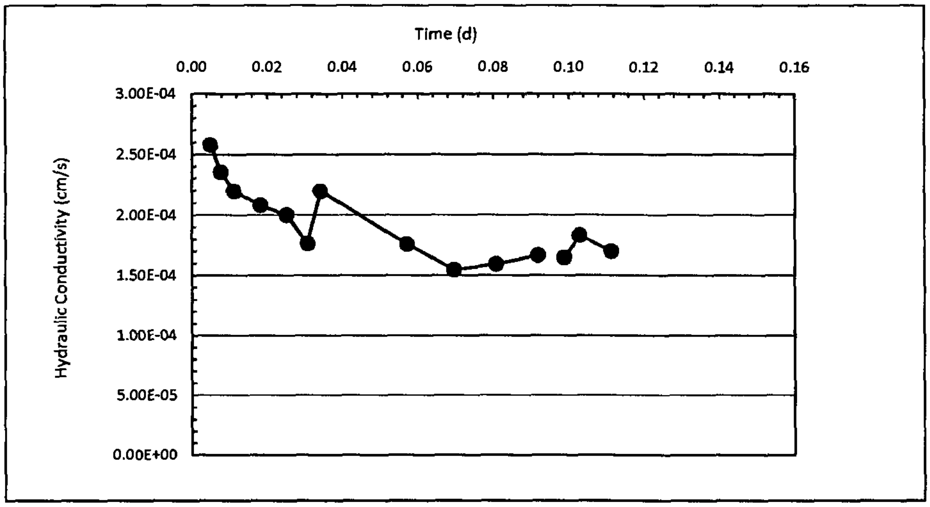
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables:		**Computations:**		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
9:17:00	30.0			
9:24:00	34.6	8.74E-01	0.005	2.58E-04
9:28:00	37.0	7.98E-01	0.008	2.35E-04
9:33:00	39.8	7.45E-01	0.011	2.20E-04
9:43:00	45.1	7.05E-01	0.018	2.08E-04
9:53:00	50.2	6.78E-01	0.025	2.00E-04
10:01:00	53.8	5.98E-01	0.031	1.76E-04
10:06:00	56.6	7.45E-01	0.034	2.20E-04
10:39:00	71.4	5.96E-01	0.057	1.76E-04
10:57:00	78.5	5.25E-01	0.069	1.55E-04
11:13:00	85.0	5.40E-01	0.081	1.59E-04
11:29:00	91.8	5.65E-01	0.092	1.67E-04
11:34:00	36.0	-1.48E+01	0.095	
11:39:00	38.1	5.59E-01	0.099	1.65E-04
11:45:00	40.9	6.21E-01	0.103	1.83E-04
11:57:00	46.1	5.76E-01	0.111	1.70E-04
12:03:00	48.7	5.76E-01	0.115	
12:16:00	54.2	5.63E-01	0.124	
12:36:00	62.5	5.52E-01	0.138	



AVG
1.70E-04

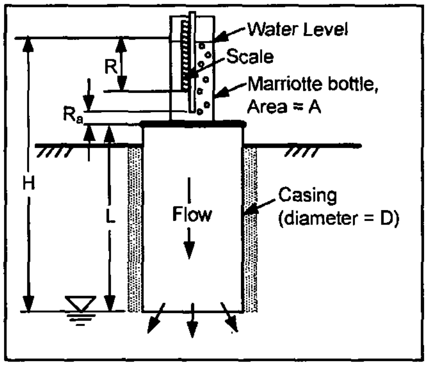


Single-Stage Constant Head Borehole Test
Monitcello - Store-and-Release Cover

Project:	Monticello	**Installer:**	XW
Date:	07/25/07	**Analyst:**	CHB
Test ID:	MC-5		

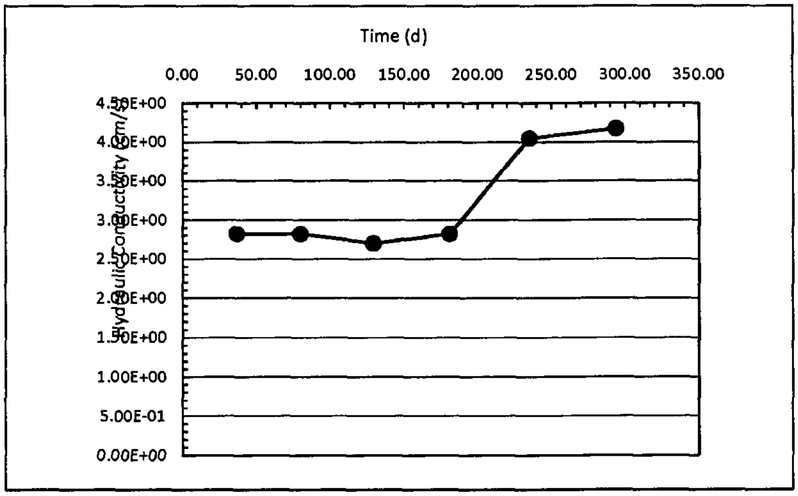
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96



Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
14:22:00	32.7			
14:24:00	36.5	1.68E+04	36.5	2.82E+00
14:29:00	43.1	1.68E+04	79.6	2.82E+00
14:34:00	49.4	1.60E+04	129	2.70E+00
14:36:00	51.7	1.68E+04	180.7	2.82E+00
14:38:00	54.1	2.41E+04	234.8	4.05E+00
14:42:00	58.7	2.48E+04	293.5	4.17E+00
			AVG	2.79E+00

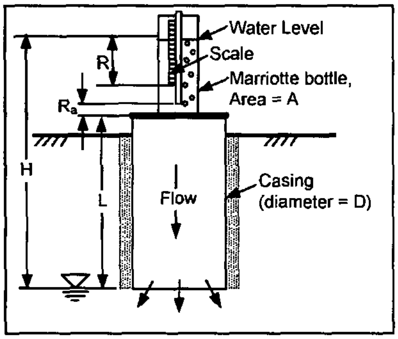


Single-Stage Constant Head Borehole Test
Monitcello - Store-and-Release Cover

Project:	Monticello	**Installer:**	XW
Date:	03/30/07	**Analyst:**	CHB
Test ID:	MC-6		

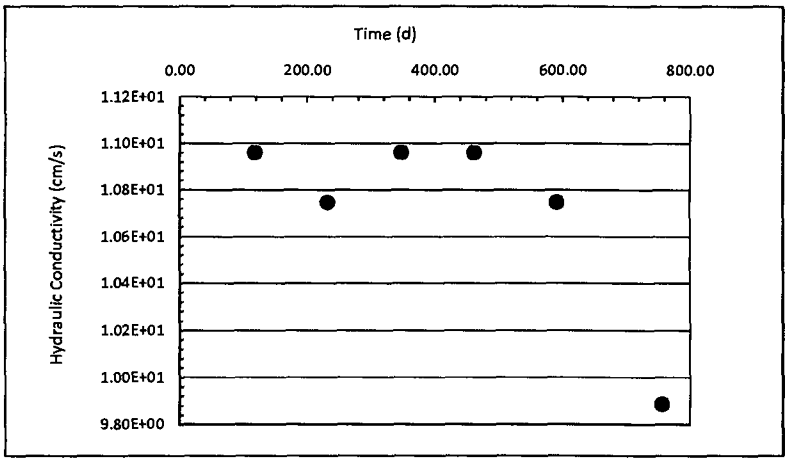
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48



Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4/3/07 15:03	29.5			
4/3/07 15:51	31.0	3.72E+04	118.000	1.10E+01
4/3/07 16:18	31.8	3.65E+04	232.000	1.07E+01
4/3/07 16:52	32.7	3.72E+04	347.000	1.10E+01
4/3/07 17:13	33.4	3.72E+04	461.000	1.10E+01
4/3/07 17:38	34.0	3.65E+04	591.000	1.07E+01
4/3/07 17:57	34.4	3.35E+04	756.000	9.89E+00
			AVG	
				10.9



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Monticello - Store-and-Release Cover

TRIAL 1

Test ID: TSB-4 **Installer:** XW
Project: Monticello **Analyst:** CHB

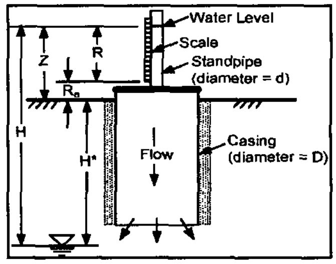
SOLUTION -TRIAL 1
K (m/s) = 7.99E-05
Total Time (d) = 0.01 0.2 hrs

FIXED VARIABLES

d (cm) =	30.48
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1/0/00 2:17

FITTED VARIABLES

a (s^{-1}) =	0.0009182
H* (m) =	0.31
H_o (m) =	0.60
MSE (m^2) =	1.87E-05
Bias (m) =	-2.89E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/00 2:05	29
1/0/00 2:07	23
1/0/00 2:08	19
1/0/00 2:10	15
1/0/00 2:12	10
1/0/00 2:14	5
1/0/00 2:17	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.29	0	0.290	-3.69E-04	1.36E-07
0.23	120	0.227	-3.10E-03	9.61E-06
0.19	180	0.198	8.03E-03	6.45E-05
0.15	300	0.145	-5.14E-03	2.64E-05
0.10	420	0.097	-2.77E-03	7.68E-06
0.05	540	0.055	4.57E-03	2.09E-05
0.00	720	-0.001	-1.22E-03	1.49E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

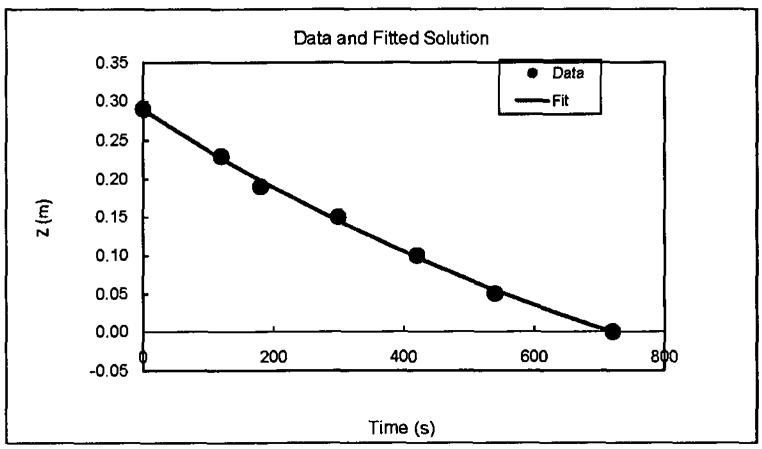
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.290
36	0.270
72	0.251
108	0.233
144	0.215
180	0.198
216	0.181
252	0.165
288	0.150
324	0.135
360	0.120
396	0.106
432	0.093
468	0.080
504	0.067
540	0.055
576	0.043
612	0.031
648	0.020
684	0.009
720	-0.001

Δt (s) = 36



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Monticello - Store-and-Release Cover

TRIAL 2

Test ID:	TSB-4	**Installer:**	XW
Project:	Monticello	**Analyst:**	CHB

SOLUTION -TRIAL 1

K (m/s) = 1.10E-04

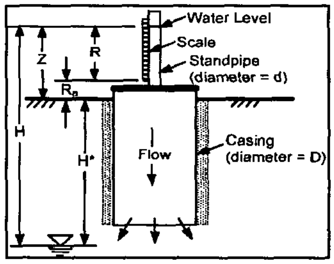
Total Time (d) = 0.01 0.2 hrs

FIXED VARIABLES

d (cm) =	30.48
D (cm) =	30.48
R_a (cm) =	0
Final Time:	1/0/00 2:31

FITTED VARIABLES

a (s^{-1}) =	0.0012648
H* (m) =	0.18
H_o (m) =	0.49
MSE (m^2) =	3.98E-05
Bias (m) =	6.33E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/00 2:18	30
1/0/00 2:20	25
1/0/00 2:21	20
1/0/00 2:23	15
1/0/00 2:25	10
1/0/00 2:28	5
1/0/00 2:31	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.30	0	0.305	4.74E-03	2.24E-05
0.25	120	0.236	-1.36E-02	1.86E-04
0.20	180	0.206	5.89E-03	3.47E-05
0.15	300	0.151	1.45E-03	2.11E-06
0.10	420	0.105	4.68E-03	2.19E-05
0.05	600	0.047	-3.43E-03	1.18E-05
0.00	780	0.000	2.94E-04	8.66E-08

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90.

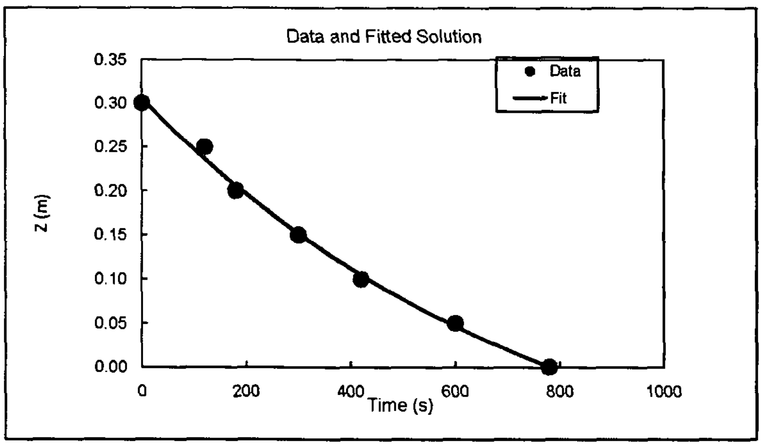
$$\boxed{Z_t = H_o e^{-at} - H^*}$$

$$\boxed{K = \frac{a \pi d^2}{11 D}}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.305
39	0.281
78	0.259
117	0.238
156	0.218
195	0.199
234	0.180
273	0.163
312	0.146
351	0.131
390	0.116
429	0.101
468	0.088
507	0.075
546	0.063
585	0.051
624	0.040
663	0.029
702	0.019
741	0.009
780	0.000

Δt (s) = 39



Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Monticello - Store-and-Release Cover

TRIAL 3

Test ID: TSB-4 **Installer:** XW
Project: Monticello **Analyst:** CHB

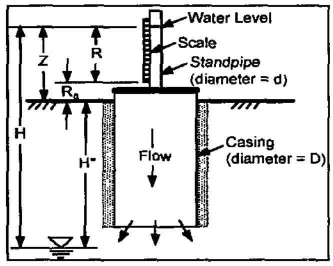
SOLUTION -TRIAL 1
K (m/s) = 1.13E-04
Total Time (d) = 0.02 0.4 hrs

FIXED VARIABLES

d (cm) = 30.48
D (cm) = 30.48
R_a (cm) = 0
Final Time: 1/0/00 2:56

FITTED VARIABLES

a (s^{-1}) = 0.0012964
H* (m) = 0.05
H_o (m) = 0.35
MSE (m^2) = 6.46E-06
Bias (m) = -1.33E-08



TEMPORAL VARIABLES

Time (m/d/yr h:m)	R (cm)
1/0/00 2:32	30
1/0/00 2:34	25
1/0/00 2:36	20
1/0/00 2:39	15
1/0/00 2:43	10
1/0/00 2:48	5
1/0/00 2:56	0

Z-t COMPUTATIONS

Z (m)	t (s)	Fit Z (m)	ε (m)	$ε^2$ (m)
0.30	0	0.299	-1.16E-03	1.35E-06
0.25	120	0.248	-1.81E-03	3.28E-06
0.20	240	0.205	4.84E-03	2.34E-05
0.15	420	0.151	1.23E-03	1.52E-06
0.10	660	0.097	-3.30E-03	1.09E-05
0.05	960	0.049	-1.44E-03	2.08E-06
0.00	1440	0.002	1.64E-03	2.69E-06

Chiasson Solution:

Chiasson, P. (2005), Method of interpretation of borehole falling-head tests performed in compacted clay liners, *Canadian Geotechnical J.*, 42, 79-90

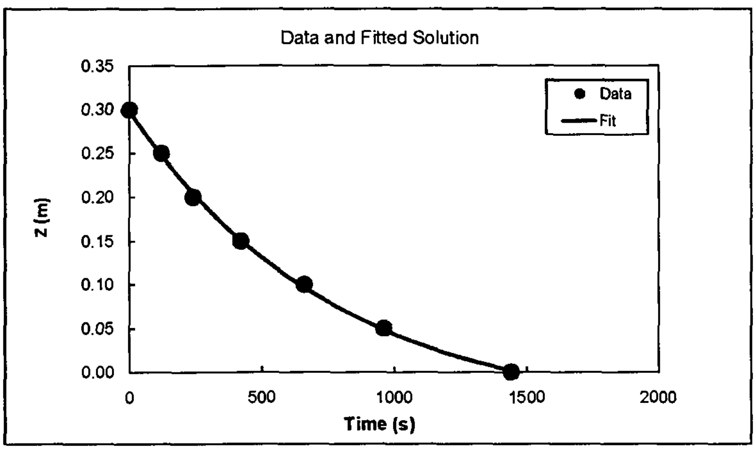
$$Z_t = H_o e^{-at} - H^*$$

$$K = \frac{a \pi d^2}{11 D}$$

SOLUTION FOR GRAPHING

t (s)	Z (m)
0	0.299
72	0.268
144	0.239
216	0.213
288	0.189
360	0.168
432	0.148
504	0.130
576	0.114
648	0.099
720	0.086
792	0.073
864	0.062
936	0.052
1008	0.042
1080	0.034
1152	0.026
1224	0.019
1296	0.013
1368	0.007
1440	0.002

Δt (s) = 72



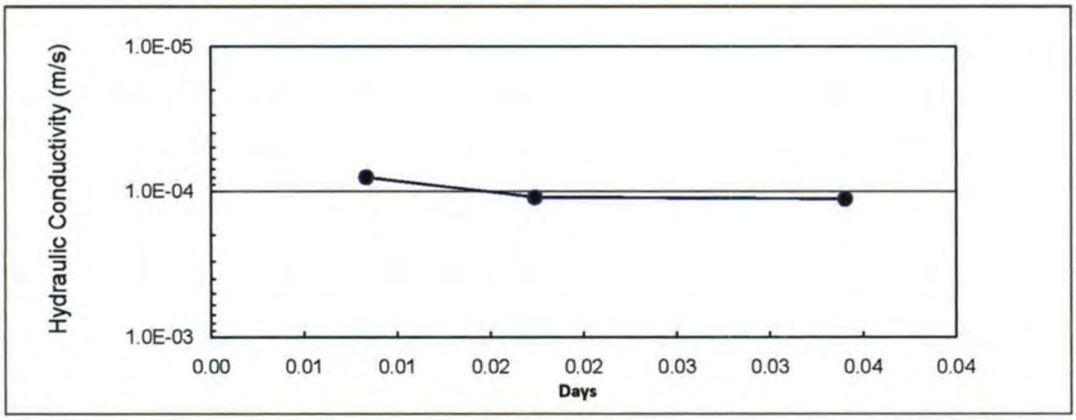
Borehole Hydraulic Conductivity Test Calculator - Isotropic Analysis
Monticello - Store-and-Release Cover

Equilbirum Evaluation & Steady Hydraulic Conductivity Determination

Trial	Time (d)	Total Time (d)	K (m/s)
1	0.008	0.008	7.99E-05
2	0.009	0.017	1.10E-04
3	0.017	0.034	1.13E-04

TSB-4

Field Hydraulic Conductivity
1.13E-04 m/s
1.13E-02 cm/s

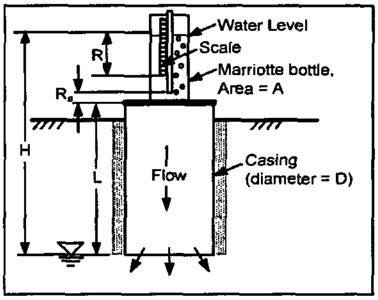


Single-Stage Constant Head Borehole Test
Omaha - Composite Cover

Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB1-composite		

Fixed Variables:

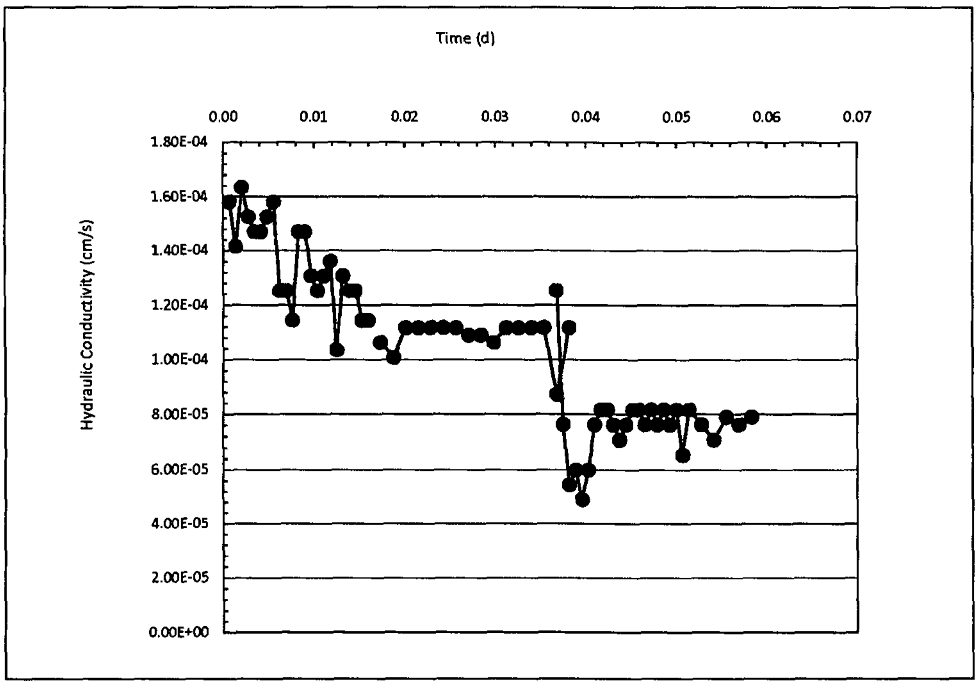
Casing Diameter (cm):	30.48	
Standpipe Area (cm^2):	19.44	(50 mm standpipe)
R_a (cm):	10	
L (cm):	60.96	



Temporal Variables:		Computations:		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
4:05:00	35.5			
4:06:00	38.4	9.40E-01	0.0007	1.58E-04
4:07:00	41.0	8.42E-01	0.0014	1.42E-04
4:08:00	44.0	9.72E-01	0.0021	1.63E-04
4:09:00	46.8	9.07E-01	0.0028	1.53E-04
4:10:00	49.5	8.75E-01	0.0035	1.47E-04
4:11:00	52.2	8.75E-01	0.0042	1.47E-04
4:12:00	55.0	9.07E-01	0.0049	1.53E-04
4:13:00	57.9	9.40E-01	0.0056	1.58E-04
4:14:00	60.2	7.45E-01	0.0063	1.25E-04
4:15:00	62.5	7.45E-01	0.0069	1.25E-04
4:16:00	64.6	6.80E-01	0.0076	1.14E-04
4:17:00	67.3	8.75E-01	0.0083	1.47E-04
4:18:00	70.0	8.75E-01	0.0090	1.47E-04
4:19:00	72.4	7.78E-01	0.0097	1.31E-04
4:20:00	74.7	7.45E-01	0.0104	1.25E-04
4:21:00	77.1	7.78E-01	0.0111	1.31E-04
4:22:00	79.6	8.10E-01	0.0118	1.36E-04
4:23:00	81.5	6.16E-01	0.0125	1.03E-04
4:24:00	83.9	7.78E-01	0.0132	1.31E-04
4:25:00	86.2	7.45E-01	0.0139	1.25E-04
4:26:00	88.5	7.45E-01	0.0146	1.25E-04
4:27:00	90.6	6.80E-01	0.0153	1.14E-04
4:28:00	92.7	6.80E-01	0.0160	1.14E-04
9:16:00	31.5			
9:18:00	35.4	6.32E-01	0.0174	1.06E-04
9:20:00	39.1	5.99E-01	0.0188	1.01E-04
9:22:00	43.2	6.64E-01	0.0201	1.12E-04
9:24:00	47.3	6.64E-01	0.0215	1.12E-04
9:26:00	51.4	6.64E-01	0.0229	1.12E-04
9:28:00	55.5	6.64E-01	0.0243	1.12E-04
9:30:00	59.6	6.64E-01	0.0257	1.12E-04
9:32:00	63.6	6.48E-01	0.0271	1.09E-04
9:34:00	67.6	6.48E-01	0.0285	1.09E-04
9:36:00	71.5	6.32E-01	0.0299	1.06E-04
9:38:00	75.6	6.64E-01	0.0313	1.12E-04
9:40:00	79.7	6.64E-01	0.0326	1.12E-04
9:42:00	83.8	6.64E-01	0.0340	1.12E-04
9:44:00	87.9	6.64E-01	0.0354	1.12E-04
9:46:00	91.1	5.18E-01	0.0368	8.72E-05
9:48:00	95.2	6.64E-01	0.0382	1.12E-04

10:06:00	30.0			
10:08:00	34.6	7.45E-01	0.0368	1.25E-04
10:09:00	36.0	4.54E-01	0.0375	7.63E-05
10:10:00	37.0	3.24E-01	0.0382	5.45E-05
10:11:00	38.1	3.56E-01	0.0389	5.99E-05
10:12:00	39.0	2.92E-01	0.0396	4.90E-05
10:13:00	40.1	3.56E-01	0.0403	5.99E-05
10:14:00	41.5	4.54E-01	0.0410	7.63E-05
10:15:00	43.0	4.86E-01	0.0417	8.17E-05
10:16:00	44.5	4.86E-01	0.0424	8.17E-05
10:17:00	45.9	4.54E-01	0.0431	7.63E-05
10:18:00	47.2	4.21E-01	0.0438	7.08E-05
10:19:00	48.6	4.54E-01	0.0444	7.63E-05
10:20:00	50.1	4.86E-01	0.0451	8.17E-05
10:21:00	51.6	4.86E-01	0.0458	8.17E-05
10:22:00	53.0	4.54E-01	0.0465	7.63E-05
10:23:00	54.5	4.86E-01	0.0472	8.17E-05
10:24:00	55.9	4.54E-01	0.0479	7.63E-05
10:25:00	57.4	4.86E-01	0.0486	8.17E-05
10:26:00	58.8	4.54E-01	0.0493	7.63E-05
10:27:00	60.3	4.86E-01	0.0500	8.17E-05
10:28:00	61.5	3.89E-01	0.0507	6.54E-05
10:29:00	63.0	4.86E-01	0.0514	8.17E-05
10:31:00	65.8	4.54E-01	0.0528	7.63E-05
10:33:00	68.4	4.21E-01	0.0542	7.08E-05
10:35:00	71.3	4.70E-01	0.0556	7.90E-05
10:37:00	74.1	4.54E-01	0.0569	7.63E-05
10:39:00	77.0	4.70E-01	0.0583	7.90E-05

AVG
7.81E-05



Single-Stage Constant Head Borehole Test
Omaha - Composite Cover

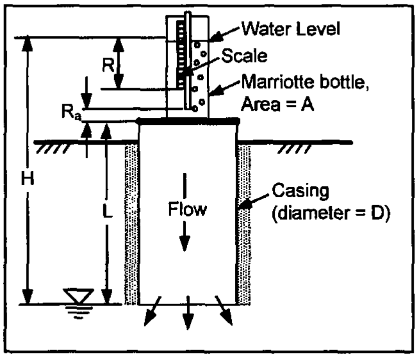
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB2-composite		

Fixed Variables:

Casing Diameter (cm):	30.48	
Standpipe Area (cm^2):	19.44	(50 mm standpipe)
R_a (cm):	10	
L (cm):	60.96	

Temporal Variables: / **Computations:**

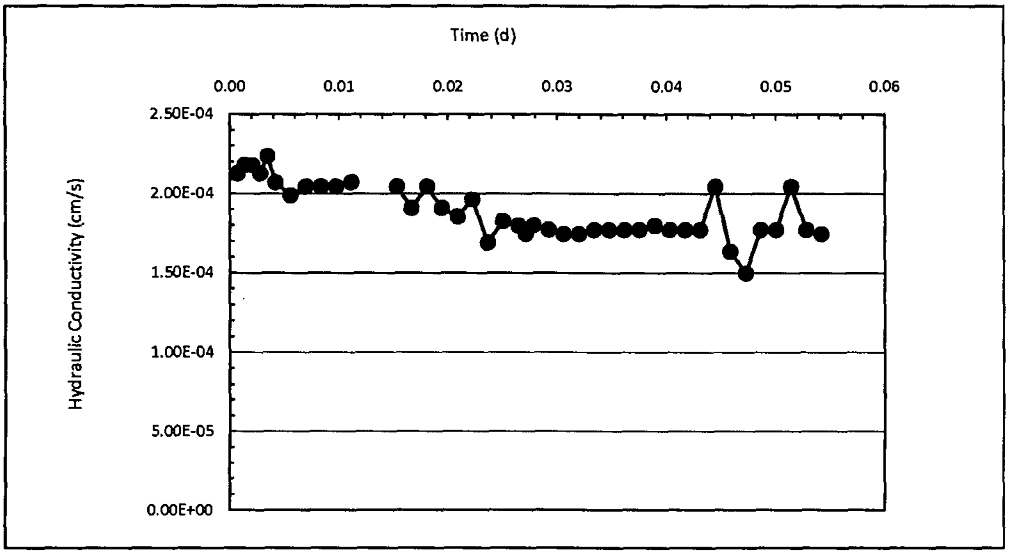
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
3:17:00	32.5			
3:18:00	36.4	1.26E+00	0.001	2.12E-04
3:19:00	40.4	1.30E+00	0.001	2.18E-04
3:20:00	44.4	1.30E+00	0.002	2.18E-04
3:21:00	48.3	1.26E+00	0.003	2.12E-04
3:22:00	52.4	1.33E+00	0.003	2.23E-04
3:23:00	56.2	1.23E+00	0.004	2.07E-04
3:25:00	63.5	1.18E+00	0.006	1.99E-04
3:27:00	71.0	1.21E+00	0.007	2.04E-04
3:29:00	78.5	1.22E+00	0.008	2.04E-04
3:31:00	86.0	1.22E+00	0.010	2.04E-04
3:33:00	93.6	1.23E+00	0.011	2.07E-04
3:37:00	34.5			
3:39:00	42.0	1.22E+00	0.015	2.04E-04
3:41:00	49.0	1.13E+00	0.017	1.91E-04
3:43:00	56.5	1.22E+00	0.018	2.04E-04
3:45:00	63.5	1.13E+00	0.019	1.91E-04
3:47:00	70.3	1.10E+00	0.021	1.85E-04
3:49:00	77.5	1.17E+00	0.022	1.96E-04
3:51:00	83.7	1.00E+00	0.024	1.69E-04
3:53:00	90.4	1.09E+00	0.025	1.82E-04
3:55:00	97.0	1.07E+00	0.026	1.80E-04
9:13:00	31.2			
9:14:00	34.4	1.04E+00	0.027	1.74E-04
9:15:00	37.7	1.07E+00	0.028	1.80E-04
9:17:00	44.2	1.05E+00	0.029	1.77E-04
9:19:00	50.6	1.04E+00	0.031	1.74E-04
9:21:00	57.0	1.04E+00	0.032	1.74E-04
9:23:00	63.5	1.05E+00	0.033	1.77E-04
9:25:00	70.0	1.05E+00	0.035	1.77E-04
9:27:00	76.5	1.05E+00	0.036	1.77E-04
9:29:00	83.0	1.05E+00	0.038	1.77E-04
9:31:00	89.6	1.07E+00	0.039	1.80E-04
9:33:00	96.1	1.05E+00	0.040	1.77E-04



9:37:00	31.0			
9:39:00	37.5	1.05E+00	0.042	1.77E-04
9:41:00	44.0	1.05E+00	0.043	1.77E-04
9:43:00	51.5	1.22E+00	0.044	2.04E-04
9:45:00	57.5	9.72E-01	0.046	1.63E-04
9:47:00	63.0	8.91E-01	0.047	1.50E-04
9:49:00	69.5	1.05E+00	0.049	1.77E-04
9:51:00	76.0	1.05E+00	0.050	1.77E-04
9:53:00	83.5	1.22E+00	0.051	2.04E-04
9:55:00	90.0	1.05E+00	0.053	1.77E-04
9:57:00	96.4	1.04E+00	0.054	1.74E-04

AVG

1.77E-04

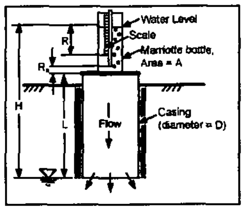


Single-Stage Constant Head Borehole Test
Omaha - Composite Cover

Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB3-composite		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_o (cm):	10
L (cm):	60.96

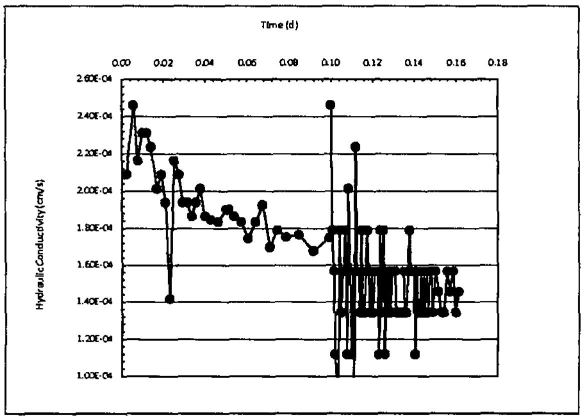


Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
1:54	34.0			
1:57	36.8	1.24E+00	0.002	2.09E-04
2:02	42.3	1.46E+00	0.006	2.46E-04
2:05	45.2	1.29E+00	0.008	2.16E-04
2:08	48.3	1.37E+00	0.010	2.31E-04
2:11	51.4	1.37E+00	0.012	2.31E-04
2:14	54.4	1.33E+00	0.014	2.24E-04
2:18	58.0	1.20E+00	0.017	2.01E-04
2:21	60.8	1.24E+00	0.019	2.09E-04
2:24	63.4	1.15E+00	0.021	1.94E-04
2:27	65.3	8.42E-01	0.023	1.42E-04
2:30	68.2	1.29E+00	0.025	2.16E-04
2:33	71.0	*1.24E+00*	*0.027*	*2.09E-04*
2:36	73.6	1.15E+00	0.029	1.94E-04
2:39	76.2	1.15E+00	0.031	1.94E-04
2:42	78.7	1.11E+00	0.033	1.86E-04
2:45	81.3	1.15E+00	0.035	1.94E-04
2:48	84.0	1.20E+00	0.038	2.01E-04
2:51	86.5	1.11E+00	0.040	1.86E-04
2:55	89.8	1.10E+00	0.042	1.84E-04
3:00	93.9	1.09E+00	0.046	1.83E-04
3:06	99.0	1.13E+00	0.050	1.90E-04
3:10:00	33.3			
3:12:00	35.0	1.13E+00	0.051	1.90E-04
3:15:00	37.5	1.11E+00	0.053	1.86E-04
3:20:00	41.6	1.09E+00	0.057	1.83E-04
3:25:00	45.5	1.04E+00	0.060	1.74E-04
3:30:00	49.6	1.09E+00	0.064	1.83E-04
3:35:00	53.9	1.14E+00	0.067	1.92E-04
3:40:00	57.7	1.01E+00	0.071	1.70E-04
3:45:00	*61.7*	*1.06E+00*	*0.074*	*1.79E-04*
3:51:00	66.4	1.04E+00	0.078	1.75E-04
4:00:00	73.5	1.05E+00	0.085	1.76E-04
4:10:00	81.0	9.97E-01	0.092	1.68E-04
4:21:00	89.6	1.04E+00	0.099	1.75E-04
9:04:00	30.3			
9:05:00	31.4	1.46E+00	0.100	2.46E-04
9:06:00	32.2	1.06E+00	0.101	1.79E-04
9:07:00	32.9	9.31E-01	0.101	1.57E-04
9:08:00	33.4	6.65E-01	0.102	1.12E-04
9:10:00	34.2	5.32E-01	0.103	8.94E-05
9:11:00	35.0	1.06E+00	0.104	1.79E-04
9:12:00	35.6	7.98E-01	0.105	1.34E-04
9:13:00	36.3	9.31E-01	0.106	1.57E-04
9:14:00	37.0	9.31E-01	0.106	1.57E-04
9:15:00	37.8	1.06E+00	0.107	1.79E-04
9:16:00	38.3	6.65E-01	0.108	1.12E-04
9:17:00	39.2	1.20E+00	0.108	2.01E-04
9:18:00	39.9	*9.31E-01*	*0.109*	*1.57E-04*
9:19:00	40.4	6.65E-01	0.110	1.12E-04
9:20:00	41.1	9.31E-01	0.110	1.57E-04
9:21:00	41.5	5.32E-01	0.111	8.94E-05
9:22:00	42.5	1.33E+00	0.112	2.24E-04
9:23:00	43.2	9.31E-01	0.113	1.57E-04
9:24:00	43.9	9.31E-01	0.113	1.57E-04
9:25:00	*44.5*	*7.98E-01*	*0.114*	*1.34E-04*
9:26:00	45.3	1.06E+00	0.115	1.79E-04
9:27:00	45.9	7.98E-01	0.115	1.34E-04
9:28:00	46.5	7.98E-01	0.116	1.34E-04
9:29:00	47.2	9.31E-01	0.117	1.57E-04
9:30:00	48.0	1.06E+00	0.117	1.79E-04
9:31:00	48.7	9.31E-01	0.118	1.57E-04
9:32:00	49.3	7.98E-01	0.119	1.34E-04
9:33:00	50.0	9.31E-01	0.119	1.57E-04
9:34:00	50.6	7.98E-01	0.120	1.34E-04
9:35:00	51.3	9.31E-01	0.121	1.57E-04
9:36:00	*52.0*	*9.31E-01*	*0.122*	*1.57E-04*
9:37:00	52.7	9.31E-01	0.122	1.57E-04
9:38:00	53.2	6.65E-01	0.123	1.12E-04
9:39:00	54.0	1.06E+00	0.124	1.79E-04
9:40:00	54.6	7.98E-01	0.124	1.34E-04
9:41:00	55.4	1.06E+00	0.125	1.79E-04
9:42:00	55.9	6.65E-01	0.126	1.12E-04
9:43:00	56.6	9.31E-01	0.126	1.57E-04
9:44:00	57.2	7.98E-01	0.127	1.34E-04
9:45:00	57.9	9.31E-01	0.128	1.57E-04
9:46:00	58.5	7.98E-01	0.128	1.34E-04
9:47:00	59.2	9.31E-01	0.129	1.57E-04
9:48:00	59.9	9.31E-01	0.130	1.57E-04
9:49:00	60.6	9.31E-01	0.131	1.57E-04
9:50:00	61.2	7.98E-01	0.131	1.34E-04
9:51:00	61.8	7.98E-01	0.132	1.34E-04
9:52:00	62.4	7.98E-01	0.133	1.34E-04
9:53:00	63.0	7.98E-01	0.133	1.34E-04
9:54:00	63.6	7.98E-01	0.134	1.34E-04

10:05:00	40.8			
10:06:00	41.5	9.31E-01	0.135	1.57E-04
10:07:00	42.1	7.98E-01	0.135	1.34E-04
10:08:00	42.7	7.98E-01	0.136	1.34E-04
10:09:00	43.4	9.31E-01	0.137	1.57E-04
10:10:00	44.2	1.06E+00	0.138	1.79E-04
10:11:00	44.9	9.31E-01	0.138	1.57E-04
10:12:00	45.6	9.31E-01	0.139	1.57E-04
10:13:00	46.3	9.31E-01	0.140	1.57E-04
10:14:00	46.8	6.65E-01	0.140	1.12E-04
10:15:00	47.5	9.31E-01	0.141	1.57E-04
10:16:00	48.1	7.98E-01	0.142	1.34E-04
10:17:00	48.7	7.98E-01	0.142	1.34E-04
10:18:00	49.4	9.31E-01	0.143	1.57E-04
10:19:00	50.0	7.98E-01	0.144	1.34E-04
10:20:00	50.7	9.31E-01	0.144	1.57E-04
10:21:00	51.3	7.98E-01	0.145	1.34E-04
10:22:00	52.0	9.31E-01	0.146	1.57E-04
10:23:00	52.6	7.98E-01	0.147	1.34E-04
10:24:00	53.3	9.31E-01	0.147	1.57E-04
10:25:00	54.0	9.31E-01	0.148	1.57E-04
10:26:00	54.6	7.98E-01	0.149	1.34E-04
10:28:00	56.0	9.31E-01	0.150	1.57E-04
10:30:00	57.3	8.65E-01	0.151	1.45E-04
10:32:00	58.5	7.98E-01	0.153	1.34E-04
10:34:00	59.7	7.98E-01	0.154	1.34E-04
10:36:00	61.1	9.31E-01	0.156	1.57E-04
10:38:00	62.4	8.65E-01	0.157	1.45E-04
10:40:00	63.8	9.31E-01	0.158	1.57E-04
10:42:00	65.0	7.98E-01	0.160	1.34E-04
10:44:00	66.3	8.65E-01	0.161	1.45E-04

AVG
1.73E-04

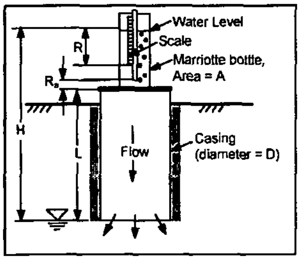


Single-Stage Constant Head Borehole Test
Omaha - Composite Cover

Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB4-composite		

Fixed Variables:

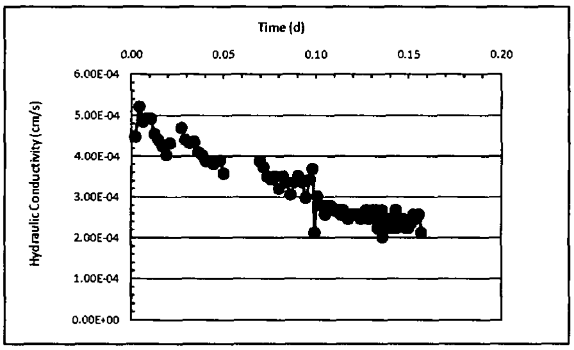
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_o (cm):	10
L (cm):	60.96



Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
1:57:00	30.0			
2:00:00	36.0	2.66E+00	0.002	4.47E-04
2:03:00	43.0	3.10E+00	0.004	5.22E-04
2:06:00	49.5	2.88E+00	0.006	4.84E-04
2:09:00	56.1	2.93E+00	0.008	4.92E-04
2:12:00	62.7	2.93E+00	0.010	4.92E-04
2:15:00	68.8	2.70E+00	0.013	4.55E-04
2:19:00	76.5			
2:22:00	82.4	2.62E+00	0.015	4.40E-04
2:25:00	88.1	2.53E+00	0.017	4.25E-04
2:28:00	93.5	2.39E+00	0.019	4.02E-04
2:31:00	99.3	2.57E+00	0.021	4.32E-04
2:37:00	33.3			
2:40:00	39.6	2.79E+00	0.027	4.70E-04
2:43:00	45.5	2.62E+00	0.029	4.40E-04
2:46:00	51.3	2.57E+00	0.031	4.32E-04
2:50:00	59.1	2.59E+00	0.034	4.36E-04
2:53:00	64.6	2.44E+00	0.036	4.10E-04
2:56:00	70.0	2.39E+00	0.038	4.02E-04
2:59:00	75.2	2.31E+00	0.040	3.88E-04
3:02:00	80.4	2.31E+00	0.042	3.88E-04
3:05:00	85.5	2.26E+00	0.044	3.80E-04
3:10:00	94.2	2.31E+00	0.048	3.89E-04
3:13:00	99.0	2.13E+00	0.050	3.58E-04
3:38:00	32.0			
3:41:00	37.2	2.31E+00	0.069	3.88E-04
3:44:00	42.2	2.22E+00	0.072	3.73E-04
3:47:00	46.9	2.08E+00	0.074	3.50E-04
3:50:00	51.5	2.04E+00	0.076	3.43E-04
3:53:00	56.2	2.08E+00	0.078	3.50E-04
3:56:00	60.5	1.91E+00	0.080	3.21E-04
3:59:00	65.2	2.08E+00	0.082	3.50E-04
4:02:00	69.7	2.00E+00	0.084	3.35E-04
4:05:00	73.8	1.82E+00	0.086	3.06E-04
4:08:00	78.3	1.99E+00	0.088	3.35E-04
4:11:00	83.0	2.08E+00	0.090	3.50E-04
04:14:00	87.5	2.00E+00	0.092	3.35E-04
04:17:00	91.5	1.77E+00	0.094	2.98E-04
04:20:00	96.1	2.04E+00	0.097	3.43E-04
08:57:00	30.3			
08:59:00	33.6	2.19E+00	0.098	3.69E-04
09:01:00	35.5	1.26E+00	0.099	2.12E-04
09:03:00	38.2	1.80E+00	0.101	3.02E-04
09:05:00	40.7	1.66E+00	0.102	2.80E-04
09:07:00	43.2	1.66E+00	0.103	2.80E-04
09:09:00	45.5	1.53E+00	0.105	2.57E-04
09:11:00	48.0	1.66E+00	0.106	2.80E-04
09:13:00	50.5	1.66E+00	0.108	2.80E-04
09:15:00	52.9	1.60E+00	0.109	2.68E-04
09:17:00	55.3	1.60E+00	0.110	2.68E-04
09:19:00	57.7	1.60E+00	0.112	2.68E-04
09:21:00	60.0	1.53E+00	0.113	2.57E-04
09:23:00	62.4	1.60E+00	0.115	2.68E-04
09:25:00	64.7	1.53E+00	0.116	2.57E-04
09:27:00	66.9	1.46E+00	0.117	2.46E-04
09:29:00	69.2	1.53E+00	0.119	2.57E-04
09:31:00	71.5	1.53E+00	0.120	2.57E-04
09:33:00	73.8	1.53E+00	0.122	2.57E-04
09:35:00	76.1	1.53E+00	0.123	2.57E-04
09:37:00	78.3	1.46E+00	0.124	2.46E-04
09:39:00	80.6	1.53E+00	0.126	2.57E-04
09:41:00	83.0	1.60E+00	0.127	2.68E-04
09:43:00	85.2	1.46E+00	0.128	2.46E-04
09:45:00	87.5	1.53E+00	0.130	2.57E-04

10:05:00	42.9			
10:06:00	44.1	1.60E+00	0.131	2.68E-04
10:07:00	45.2	1.46E+00	0.131	2.46E-04
10:08:00	46.3	1.46E+00	0.132	2.46E-04
10:09:00	47.5	1.60E+00	0.133	2.68E-04
10:10:00	48.5	1.33E+00	0.133	2.24E-04
10:11:00	49.6	1.46E+00	0.134	2.46E-04
10:12:00	50.7	1.46E+00	0.135	2.46E-04
10:13:00	51.9	1.60E+00	0.135	2.68E-04
10:14:00	52.8	1.20E+00	0.136	2.01E-04
10:15:00	53.9	1.46E+00	0.137	2.46E-04
10:16:00	54.9	1.33E+00	0.138	2.24E-04
10:17:00	56.0	1.46E+00	0.138	2.46E-04
10:18:00	57.0	1.33E+00	0.139	2.24E-04
10:19:00	58.1	1.46E+00	0.140	2.46E-04
10:20:00	59.1	1.33E+00	0.140	2.24E-04
10:21:00	60.2	1.46E+00	0.141	2.46E-04
10:22:00	61.3	1.46E+00	0.142	2.46E-04
10:23:00	62.3	1.33E+00	0.142	2.24E-04
10:24:00	63.5	1.60E+00	0.143	2.68E-04
10:25:00	64.5	1.33E+00	0.144	2.24E-04
10:26:00	65.6	1.46E+00	0.144	2.46E-04
10:28:00	67.8	1.46E+00	0.146	2.46E-04
10:30:00	70.0	1.46E+00	0.147	2.46E-04
10:32:00	72.0	1.33E+00	0.149	2.24E-04
10:34:00	74.0	1.33E+00	0.150	2.24E-04
10:36:00	76.1	1.40E+00	0.151	2.35E-04
10:38:00	78.4	1.53E+00	0.153	2.57E-04
10:40:00	80.6	1.46E+00	0.154	2.46E-04
10:42:00	82.9	1.53E+00	0.156	2.57E-04
10:44:00	84.8	1.26E+00	0.157	2.12E-04
				AVG
				3.25E-04



Single-Stage Constant Head Borehole Test - Omaha - Thick Store-and-Release Cover

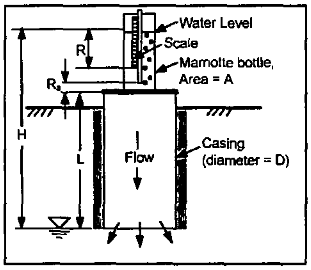
Project: Omaha **Installer:** XW
Date: 05/19/08 **Analyst:** CHB
Test ID: TSB1-thick-deep

Fixed Variables:

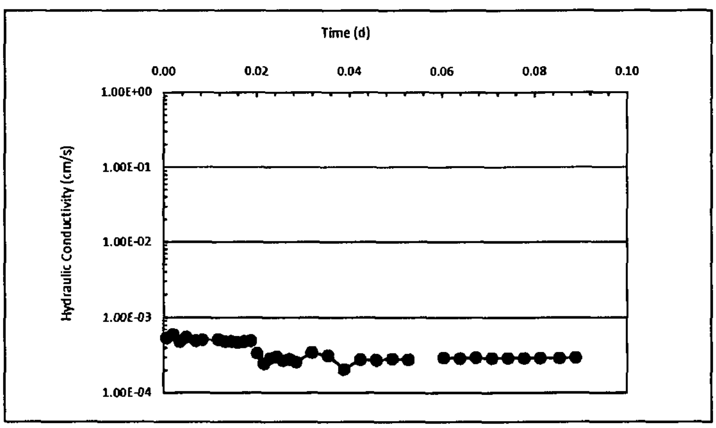
Casing Diameter (cm): 30.48
Standpipe Area (cm^2): 79.8
R_s (cm): 10
L (cm): 60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
5:22:00	30.0			
5:23:00	32.4	3.19E+00	0.001	5.37E-04
5:25:00	37.7	3.52E+00	0.002	5.93E-04
5:27:00	42.0	2.86E+00	0.003	4.81E-04
5:29:00	46.9	3.26E+00	0.005	5.48E-04
5:32:00	53.5	2.93E+00	0.007	4.92E-04
5:34:00	58.0	2.99E+00	0.008	5.03E-04
5:39:00	69.5	3.06E+00	0.012	5.14E-04
5:41:00	73.8	2.86E+00	0.013	4.81E-04
5:43:00	78.1	2.86E+00	0.015	4.81E-04
5:45:00	82.3	2.79E+00	0.016	4.70E-04
5:47:00	86.6	2.86E+00	0.017	4.81E-04
5:49:00	91.0	2.93E+00	0.019	4.92E-04
9:06:00	30.5			
9:08:00	33.5	2.00E+00	0.020	3.35E-04
9:10:00	35.7	1.46E+00	0.022	2.46E-04
9:12:00	38.3	1.73E+00	0.023	2.91E-04
9:14	41.0	1.80E+00	0.024	3.02E-04
9:16:00	43.4	1.60E+00	0.026	2.68E-04
9:18:00	45.9	1.66E+00	0.027	2.80E-04
9:20:00	48.2	1.53E+00	0.028	2.57E-04
9:25:00	55.9	2.05E+00	0.032	3.44E-04
9:30:00	62.9	1.86E+00	0.035	3.13E-04
9:35:00	67.5	1.22E+00	0.039	2.06E-04
9:40:00	73.7	1.65E+00	0.042	2.77E-04
9:45:00	79.8	1.62E+00	0.046	2.73E-04
9:50:00	86.1	1.68E+00	0.049	2.82E-04
9:55:00	92.3	1.65E+00	0.053	2.77E-04
10:00:00	31.0		0.056	
10:06:00	38.9	1.75E+00	0.060	2.94E-04
10:11:00	45.3	1.70E+00	0.064	2.86E-04
10:16:00	51.9	1.76E+00	0.067	2.95E-04
10:21:00	58.4	1.73E+00	0.071	2.91E-04
10:26:00	64.9	1.73E+00	0.074	2.91E-04
10:31:00	71.4	1.73E+00	0.078	2.91E-04
10:36:00	77.9	1.73E+00	0.081	2.91E-04
10:42:00	85.7	1.73E+00	0.085	2.91E-04
10:47:00	92.3	1.76E+00	0.089	2.95E-04



AVG
2.92E-04



Single-Stage Constant Head Borehole Test - Omaha - Thick Store-and-Release Cover

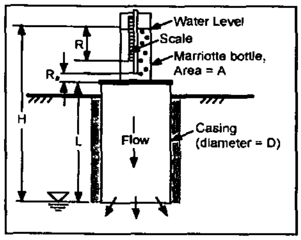
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB2-Thick (Shallow Test)		

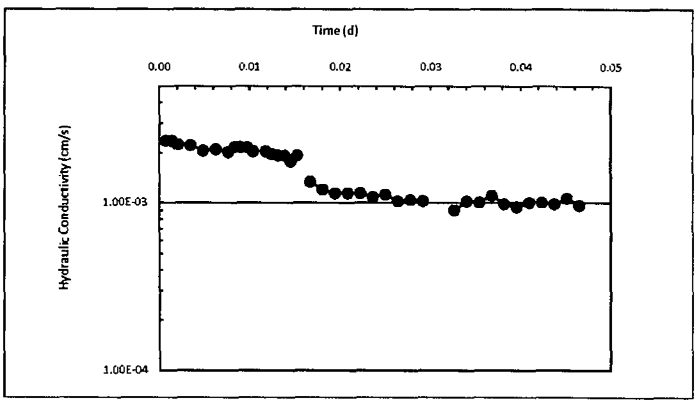
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_o (cm):	10
L (cm):	30.48

Temporal Variables: **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
1:00:00	35.5			
1:01:00	41.5	7.98E+00	0.0007	2.35E-03
1:02:00	47.5	7.98E+00	0.0014	2.35E-03
1:03:00	53.2	7.58E+00	0.0021	2.23E-03
1:05:00	64.5	7.51E+00	0.0035	2.21E-03
1:07:00	75.0	6.98E+00	0.0049	2.06E-03
1:09:00	85.7	7.12E+00	0.0063	2.10E-03
1:11:00	96.0	6.85E+00	0.0076	2.02E-03
2:00:00	31.5	-1.75E+00	0.0076	
2:01:00	37.0	7.32E+00	0.0083	2.16E-03
2:02:00	42.5	7.32E+00	0.0090	2.16E-03
2:03:00	48.0	7.32E+00	0.0097	2.16E-03
2:04:00	53.2	6.92E+00	0.0104	2.04E-03
2:05:00	58.0	6.38E+00	0.0111	
2:06:00	63.2	6.92E+00	0.0118	2.04E-03
2:07:00	68.2	6.65E+00	0.0125	1.96E-03
2:08:00	73.1	6.52E+00	0.0132	1.92E-03
2:09:00	78.0	6.52E+00	0.0139	1.92E-03
2:10:00	82.5	5.99E+00	0.0146	1.76E-03
2:11:00	87.4	6.52E+00	0.0152	1.92E-03
8:58:00	31.0			
9:00:00	37.8	4.52E+00	0.0166	1.33E-03
9:02:00	43.9	4.06E+00	0.0180	1.20E-03
9:04:00	49.7	3.86E+00	0.0194	1.14E-03
9:06:00	55.5	3.86E+00	0.0208	1.14E-03
9:08:00	61.3	3.86E+00	0.0222	1.14E-03
9:10:00	66.8	3.66E+00	0.0236	1.08E-03
9:12:00	72.5	3.79E+00	0.0250	1.12E-03
9:14:00	77.7	3.46E+00	0.0264	1.02E-03
9:16:00	83.0	3.52E+00	0.0277	1.04E-03
9:18:00	88.2	3.46E+00	0.0291	1.02E-03
9:21:00	34.3		0.0312	
9:23:00	38.9	3.06E+00	0.0326	9.02E-04
9:25:00	44.1	3.46E+00	0.0340	1.02E-03
9:27	49.2	3.39E+00	0.0354	1.00E-03
9:29	54.8	3.72E+00	0.0368	1.10E-03
9:31	59.8	3.32E+00	0.0382	9.80E-04
9:33	64.6	3.19E+00	0.0396	9.41E-04
9:35	69.7	3.39E+00	0.0409	1.00E-03
9:37	74.8	3.39E+00	0.0423	1.00E-03
9:39	79.8	3.33E+00	0.0437	9.80E-04
9:41	85.2	3.59E+00	0.0451	1.06E-03
9:43	90.1	3.26E+00	0.0465	9.60E-04
			AVG	**1.00E-03**





Single-Stage Constant Head Borehole Test - Omaha - Thick Store-and-Release Cover

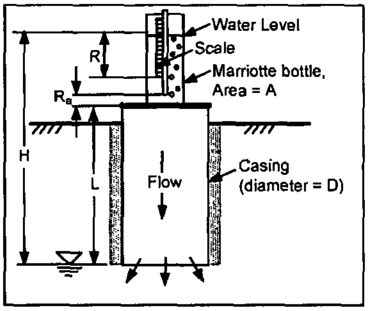
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB3-thin-shallow		

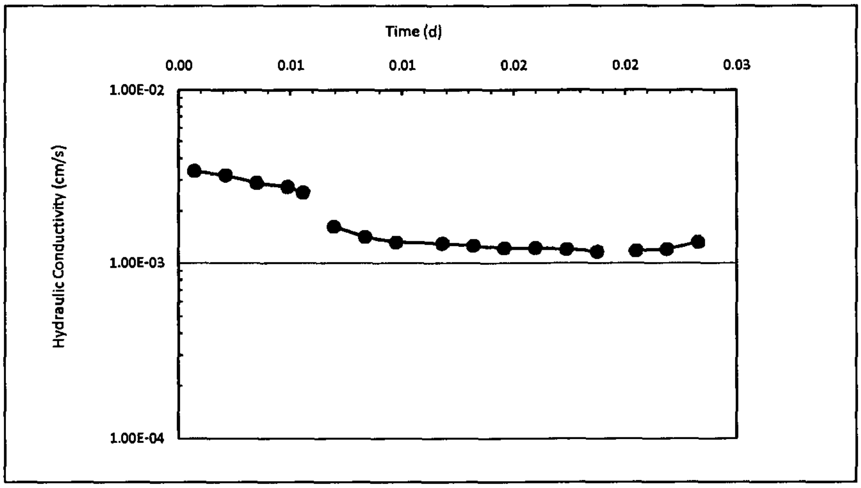
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
5:30:00	35.4			
5:31:00	44.0	1.14E+01	0.001	3.37E-03
5:33:00	60.3	1.08E+01	0.002	3.19E-03
5:35:00	75.0	9.78E+00	0.003	2.88E-03
5:37:00	89.0	9.31E+00	0.005	2.74E-03
5:38:00	95.5	8.65E+00	0.006	2.55E-03
8:02:00	30.6			
8:04:00	38.9	5.52E+00	0.007	1.63E-03
8:06:00	46.1	4.79E+00	0.008	1.41E-03
8:08:00	52.8	4.46E+00	0.010	1.31E-03
8:11:00	62.7	4.39E+00	0.012	1.29E-03
8:13:00	69.1	4.26E+00	0.013	1.25E-03
8:15:00	75.3	4.12E+00	0.015	1.22E-03
8:17:00	81.5	4.12E+00	0.016	1.22E-03
8:19:00	87.6	4.06E+00	0.017	1.20E-03
8:21:00	93.5	3.92E+00	0.019	1.16E-03
8:59:30	30.5			
9:02:00	38.0	3.99E+00	0.020	1.18E-03
9:04:00	44.1	4.06E+00	0.022	1.20E-03
9:06:00	50.8	4.46E+00	0.023	1.31E-03
9:08:00	57.0	4.12E+00	0.025	1.22E-03
9:10:00	62.7	3.79E+00	0.026	1.12E-03
9:12:00	68.5	3.86E+00	0.027	1.14E-03
9:14:00	74.8	4.19E+00	0.029	1.23E-03
9:16:00	80.5	3.79E+00	0.030	1.12E-03
9:18:00	86.5	3.99E+00	0.032	1.18E-03
9:20:00	92.2	3.79E+00	0.033	1.12E-03
9:22:00	98.3	4.06E+00	0.034	1.20E-03
			average	**1.16E-03**





Single-Stage Constant Head Borehole Test - Omaha - Thick Store-and-Release Cover

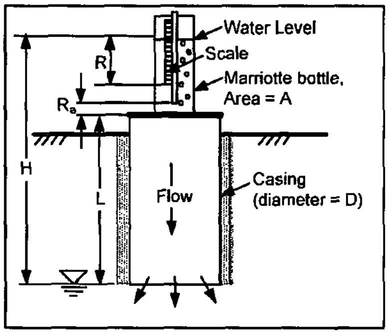
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB4-thin		

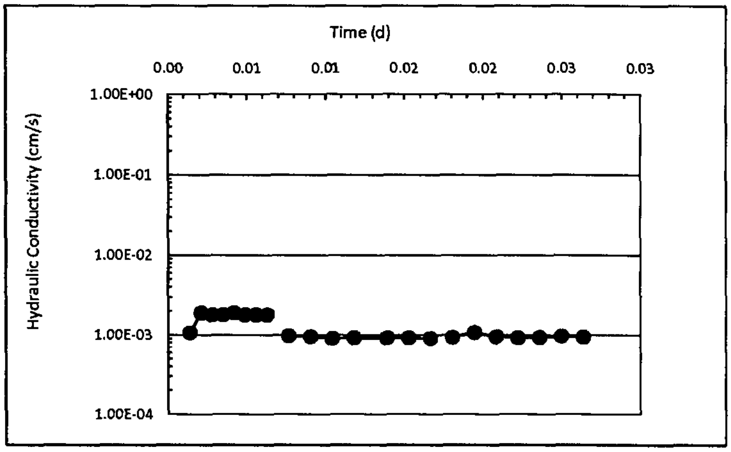
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
5:10:00	32.0			
5:12:00	41.5	6.32E+00	0.001	1.06E-03
5:13:00	50.0	1.13E+01	0.002	1.90E-03
5:14:00	58.0	1.06E+01	0.003	1.79E-03
5:15:00	66.0	1.06E+01	0.003	1.79E-03
5:16:00	74.5	1.13E+01	0.004	1.90E-03
5:17:00	82.5	1.06E+01	0.005	1.79E-03
5:18:00	90.5	1.06E+01	0.006	1.79E-03
5:19:00	98.5	1.06E+01	0.006	1.79E-03
8:00	36.0			
8:02:00	44.7	5.79E+00	0.008	9.73E-04
8:04:00	53.2	5.65E+00	0.009	9.50E-04
8:06:00	61.3	5.39E+00	0.010	9.06E-04
8:08:00	69.5	5.45E+00	0.012	9.17E-04
8:11:00	81.8	5.45E+00	0.014	9.17E-04
8:13:00	90.0	5.45E+00	0.015	9.17E-04
8:15:00	98.1	5.39E+00	0.017	9.06E-04
9:03:00	35.1			
9:05:00	43.4	5.52E+00	0.018	9.28E-04
9:07:00	53.0	6.38E+00	0.019	1.07E-03
9:09:00	61.5	5.65E+00	0.021	9.50E-04
9:11:00	69.7	5.45E+00	0.022	9.17E-04
9:13:00	78.0	5.52E+00	0.024	9.28E-04
9:15:00	86.6	5.72E+00	0.025	9.62E-04
9:17:00	95.0	5.59E+00	0.026	9.39E-04
			avg	**9.43E-04**





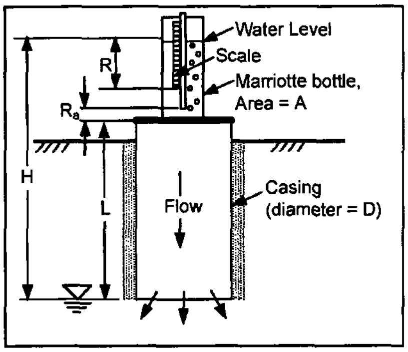
Single-Stage Constant Head Borehole Test
Omaha - Thin Store-and-Release Cover

Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB1-thin		

Fixed Variables:

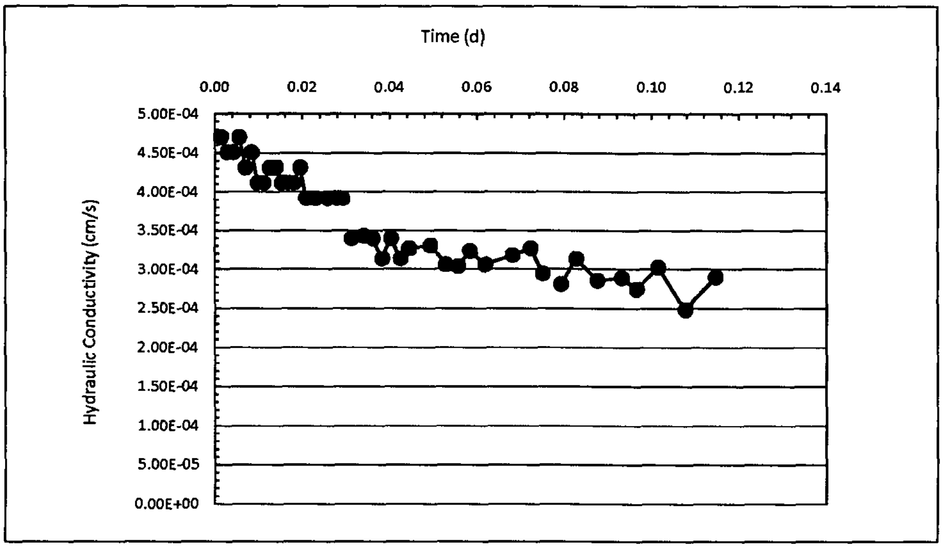
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables:		**Computations:**		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
3:29:00	34.0			
3:31:00	36.4	1.60E+00	0.001	4.70E-04
3:33:00	38.7	1.53E+00	0.003	4.51E-04
3:35:00	41.0	1.53E+00	0.004	4.51E-04
3:37:00	43.4	1.60E+00	0.006	4.70E-04
3:39:00	45.6	1.46E+00	0.007	4.31E-04
3:41:00	47.9	1.53E+00	0.008	4.51E-04
3:43:00	50.0	1.40E+00	0.010	4.12E-04
3:45:00	52.1	1.40E+00	0.011	4.12E-04
3:47:00	54.3	1.46E+00	0.013	4.31E-04
3:49:00	56.5	1.46E+00	0.014	4.31E-04
3:51:00	58.6	1.40E+00	0.015	4.12E-04
3:53:00	60.7	1.40E+00	0.017	4.12E-04
3:55:00	62.8	1.40E+00	0.018	4.12E-04
3:57:00	65.0	1.46E+00	0.019	4.31E-04
3:59:00	67.0	1.33E+00	0.021	3.92E-04
4:02:00	70.0	1.33E+00	0.023	3.92E-04
4:06:00	74.0	1.33E+00	0.026	3.92E-04
4:09:00	77.0	1.33E+00	0.028	3.92E-04
4:11:00	79.0	1.33E+00	0.029	3.92E-04
8:50:00	30.0			
8:53:00	32.6	1.15E+00	0.031	3.40E-04
8:57:00	36.1	1.16E+00	0.034	3.43E-04
9:00:00	38.7	1.15E+00	0.036	3.40E-04
9:03	41.1	1.06E+00	0.038	3.14E-04
9:06:00	43.7	1.15E+00	0.040	3.40E-04
9:09:00	46.1	1.06E+00	0.042	3.14E-04
9:12:00	48.6	1.11E+00	0.044	3.27E-04
9:19:00	54.5	1.12E+00	0.049	3.30E-04
9:24:00	58.4	1.04E+00	0.053	3.06E-04
9:28:00	61.5	1.03E+00	0.056	3.04E-04
9:32:00	64.8	1.10E+00	0.058	3.23E-04
9:37:00	68.7	1.04E+00	0.062	3.06E-04
9:46:00	76.0	1.08E+00	0.068	3.18E-04
9:52:00	81.0	1.11E+00	0.072	3.27E-04
9:56:00	84.0	9.98E-01	0.075	2.94E-04



10:30	50.7			
10:36	55.0	9.53E-01	0.079	2.81E-04
10:41	59.0	1.06E+00	0.083	3.14E-04
10:48	64.1	9.69E-01	0.088	2.86E-04
10:56	70.0	9.81E-01	0.093	2.89E-04
11:01	73.5	9.31E-01	0.097	2.74E-04
11:08	78.9	1.03E+00	0.101	3.02E-04
11:17	84.6	8.42E-01	0.108	2.48E-04
11:27	92.0	9.84E-01	0.115	2.90E-04

AVG
3.13E-04



Single-Stage Constant Head Borehole Test
Omaha - Thin Store-and-Release Cover

Project: Omaha
Date: 05/19/08
Test ID: TSB2-Thin

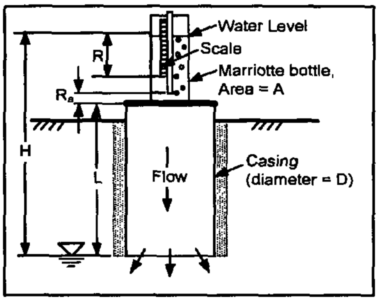
Installer: XW
Analyst: CHB

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

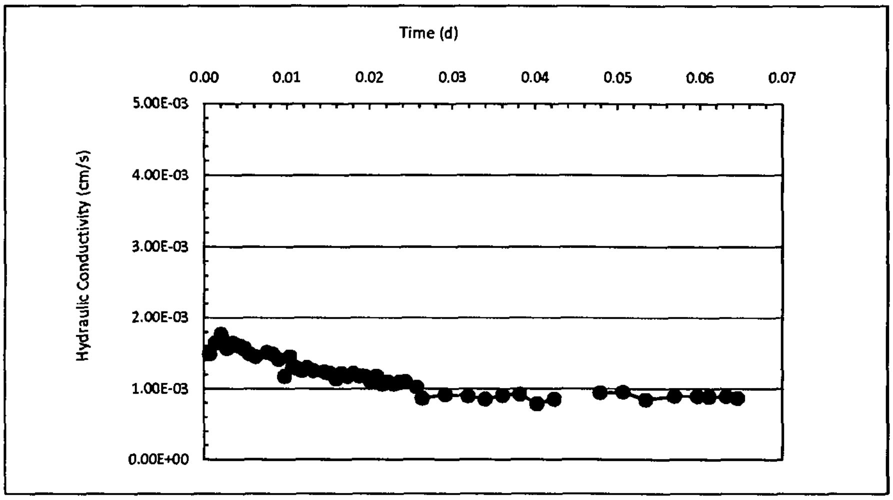
Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
2:34:00	45.0			
2:35:00	48.8	5.05E+00	0.0007	1.49E-03
2:36:00	53.0	5.59E+00	0.0014	1.65E-03
2:37:00	57.5	5.99E+00	0.0021	1.76E-03
2:38:00	61.5	5.32E+00	0.0028	1.57E-03
2:39:00	65.7	5.59E+00	0.0035	1.65E-03
2:40:00	69.8	5.45E+00	0.0042	1.61E-03
2:41:00	73.8	5.32E+00	0.0049	1.57E-03
2:42:00	77.6	5.05E+00	0.0056	1.49E-03
2:43:00	81.3	4.92E+00	0.0063	1.45E-03
2:45:00	89.0	5.12E+00	0.0076	1.51E-03
2:46:00	92.8	5.05E+00	0.0083	1.49E-03
2:47:00	96.4	4.79E+00	0.0090	1.41E-03
3:07:00	32.0			
3:08:00	35.0	3.99E+00	0.0097	1.18E-03
3:09:00	38.7	4.92E+00	0.0104	1.45E-03
3:10:00	42.0	4.39E+00	0.0111	1.29E-03
3:11:00	45.2	4.26E+00	0.0118	1.25E-03
3:12:00	48.5	4.39E+00	0.0125	1.29E-03
3:13:00	51.7	4.26E+00	0.0132	1.25E-03
3:15:00	58.0	4.19E+00	0.0146	1.23E-03
3:16:00	61.1	4.12E+00	0.0153	1.22E-03
3:17:00	64.0	3.86E+00	0.0160	1.14E-03
3:18:00	67.1	4.12E+00	0.0167	1.22E-03
3:19:00	70.1	3.99E+00	0.0174	1.18E-03
3:20:00	73.2	4.12E+00	0.0181	1.22E-03
3:21:00	76.2	3.99E+00	0.0188	1.18E-03
3:22:00	79.2	3.99E+00	0.0194	1.18E-03
3:23:00	82.0	3.72E+00	0.0201	1.10E-03
3:24:00	85.0	3.99E+00	0.0208	1.18E-03
3:25:00	87.7	3.59E+00	0.0215	1.06E-03
3:26:00	90.5	3.72E+00	0.0222	1.10E-03
3:27:00	93.2	3.59E+00	0.0229	1.06E-03
3:28:00	96.0	3.72E+00	0.0236	1.10E-03



8:46:00	34.0			
8:47:00	36.8	3.72E+00	0.0243	1.10E-03
8:49:00	42.0	3.46E+00	0.0257	1.02E-03
8:50:00	44.2	2.93E+00	0.0264	8.62E-04
8:54:00	53.5	3.09E+00	0.0292	9.11E-04
8:58:00	62.6	3.03E+00	0.0319	8.92E-04
9:01:00	69.1	2.88E+00	0.0340	8.49E-04
9:04:00	76.0	3.06E+00	0.0361	9.02E-04
9:07:00	83.0	3.10E+00	0.0382	9.15E-04
9:10:00	89.0	2.66E+00	0.0403	7.84E-04
9:13:00	95.5	2.88E+00	0.0424	8.49E-04
9:19:00	31.5	-1.42E+01	0.0465	
9:21:00	36.3	3.19E+00	0.0479	9.41E-04
9:25	46.0	3.23E+00	0.0507	9.51E-04
9:29	54.6	2.86E+00	0.0535	8.43E-04
9:34	66.0	3.03E+00	0.0569	8.94E-04
9:38	75.1	3.03E+00	0.0597	8.92E-04
9:40	79.6	2.99E+00	0.0611	8.82E-04
9:43	86.4	3.01E+00	0.0632	8.88E-04
9:45	90.8	2.93E+00	0.0646	8.62E-04

AVG
1.08E-03



Single-Stage Constant Head Borehole Test
Omaha - Thin Store-and-Release Cover

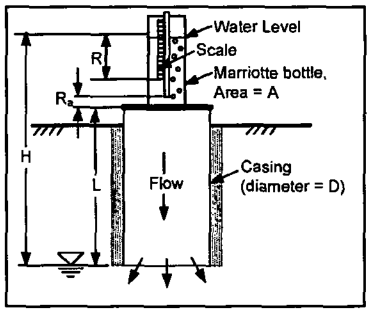
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	TSB3-thin		

Fixed Variables:

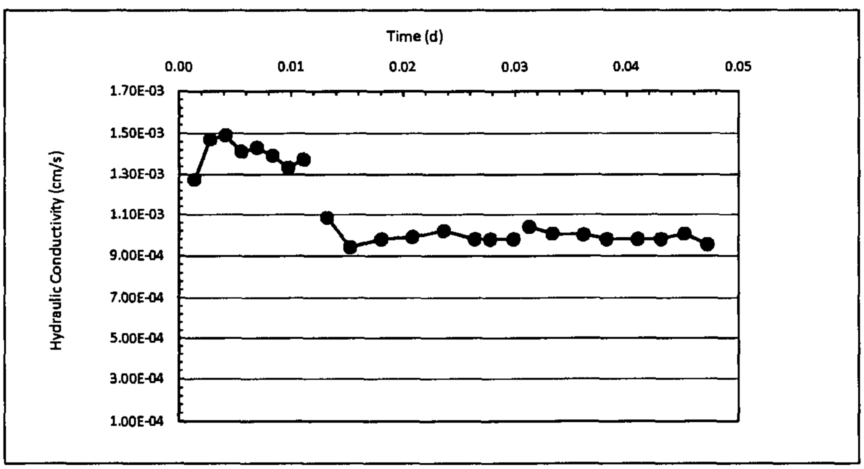
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables: / ***Computations:***

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
5:32:00	37.0			
5:34:00	43.5	4.32E+00	0.001	1.27E-03
5:36:00	51.0	4.99E+00	0.003	1.47E-03
5:38:00	58.6	5.05E+00	0.004	1.49E-03
5:40:00	65.8	4.79E+00	0.006	1.41E-03
5:42:00	73.1	4.85E+00	0.007	1.43E-03
5:44:00	80.2	4.72E+00	0.008	1.39E-03
5:46:00	87.0	4.52E+00	0.010	1.33E-03
5:48:00	94.0	4.66E+00	0.011	1.37E-03
10:17:00	30.5			
10:20:00	38.8	3.68E+00	0.013	1.08E-03
10:23:00	46.0	3.19E+00	0.015	9.41E-04
10:27:00	56.0	3.33E+00	0.018	9.80E-04
10:31:00	66.1	3.36E+00	0.021	9.90E-04
10:35	76.5	3.46E+00	0.024	1.02E-03
10:39	86.5	3.33E+00	0.026	9.80E-04
10:41	91.5	3.33E+00	0.028	9.80E-04
10:44	99.0	3.33E+00	0.030	9.80E-04
11:35	35.8			
11:37	41.1	3.52E+00	0.031	1.04E-03
11:40	48.8	3.41E+00	0.033	1.01E-03
11:44	59.0	3.39E+00	0.036	1.00E-03
11:47	66.5	3.33E+00	0.038	9.80E-04
11:51	76.5	3.33E+00	0.041	9.80E-04
11:54	84.0	3.32E+00	0.043	9.80E-04
11:57	91.7	3.41E+00	0.045	1.01E-03
12:00	99.0	3.24E+00	0.047	9.54E-04



AVG
9.80E-04



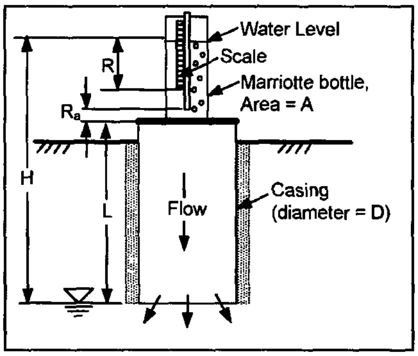
Single-Stage Constant Head Borehole Test
Omaha - Thin Store-and-Release Cover

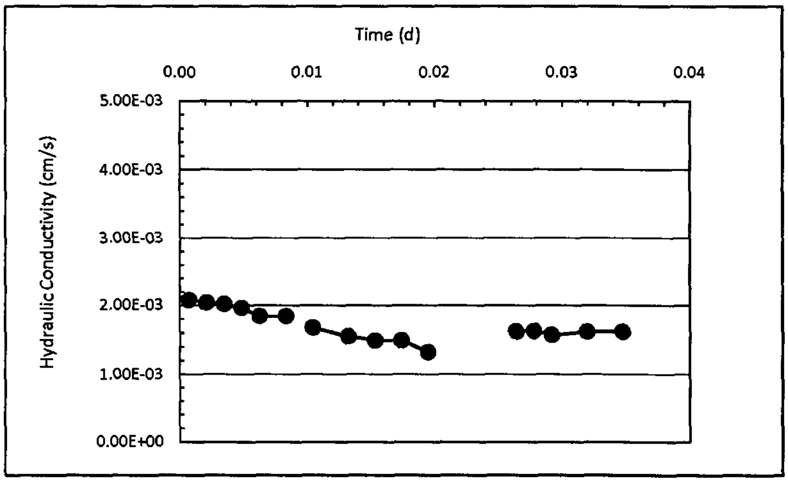
Project:	Omaha	**Installer:**	XW
Date:	05/19/08	**Analyst:**	CHB
Test ID:	T5B4-thin		

Fixed Variables:

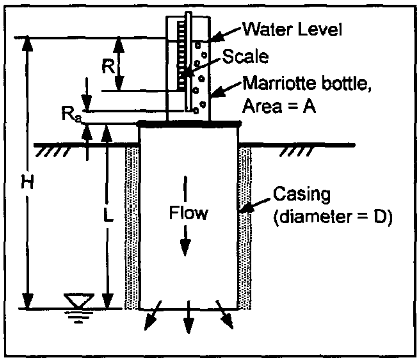
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	30.48

Temporal Variables:		**Computations:**		
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)
3:53:00	37.0			
3:54:00	42.3	7.05E+00	0.001	2.08E-03
3:56:00	52.7	6.92E+00	0.002	2.04E-03
3:58:00	63.0	6.85E+00	0.003	2.02E-03
4:00:00	73.0	6.65E+00	0.005	1.96E-03
4:02:00	82.4	6.25E+00	0.006	1.84E-03
4:05:00	96.5	6.25E+00	0.008	1.84E-03
8:52:00	30.0			
8:55:00	42.8	5.67E+00	0.010	1.67E-03
8:59:00	58.6	5.25E+00	0.013	1.55E-03
9:02:00	70.0	5.05E+00	0.015	1.49E-03
9:05:00	81.4	5.05E+00	0.017	1.49E-03
9:08:00	91.5	4.48E+00	0.019	1.32E-03
9:15:00	32.8	-1.12E+01	0.024	
9:18:00	45.2	5.50E+00	0.026	1.62E-03
9:20:00	53.5	5.52E+00	0.028	1.63E-03
9:22:00	61.5	5.32E+00	0.029	1.57E-03
9:26:00	78.0	5.49E+00	0.032	1.62E-03
9:30:00	94.5	5.49E+00	0.035	1.62E-03
			AVG	**1.60E-03**





Single-Stage Constant Head Borehole Test - Polson - Composite Cover

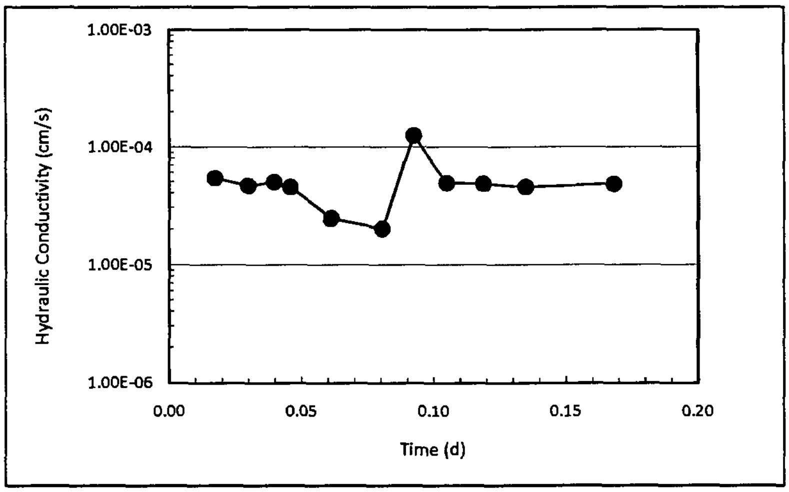


Project:	Polson	**Installer:**	XW
Date:	08/21/08	**Analyst:**	JS
Test ID:	Coventional 1		

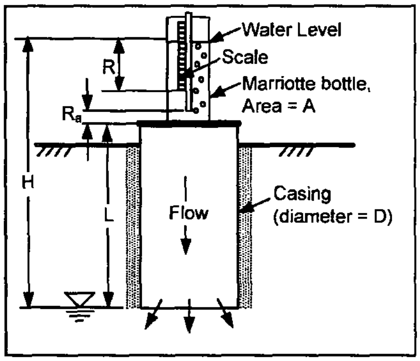
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables:		Computations:			
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
9:38	37				
10:03	43	3.19E-01	0.017	5.37E-05	Allowed to flow without measurments for > 24 hrs
10:21	46.7	2.73E-01	0.030	4.60E-05	
10:35	49.8	2.94E-01	0.040	4.95E-05	
10:44	51.6	2.66E-01	0.046	4.47E-05	
11:06	54	1.45E-01	0.061	2.44E-05	
11:34	56.5	1.19E-01	0.081	2.00E-05	
11:51	66	7.43E-01	0.092	1.25E-04	
12:09	69.9	2.88E-01	0.105	4.84E-05	
12:29	74.2	2.86E-01	0.119	4.81E-05	
12:52	78.8	2.66E-01	0.135	4.47E-05	
13:40	89	2.83E-01	0.168	4.75E-05	
			Average	4.72E-05	



Single-Stage Constant Head Borehole Test - Polson - Composite Cover



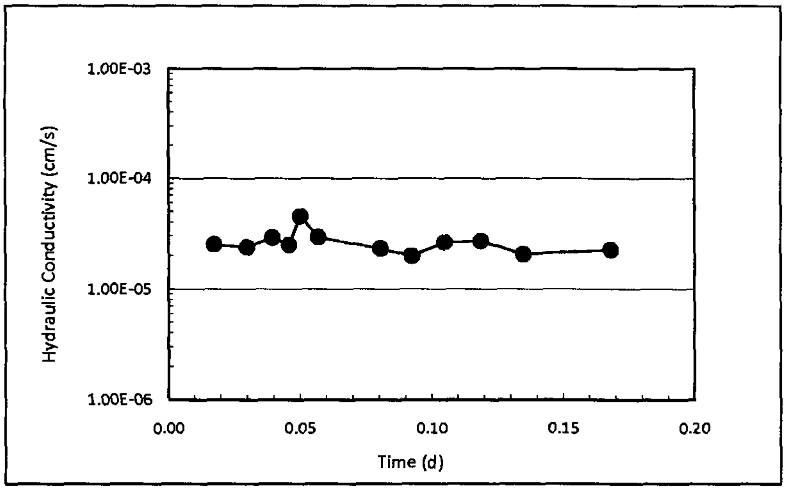
Project:	Polson	**Installer:**	XW
Date:	08/21/08	**Analyst:**	JS
Test ID:	Coventional 2		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: **Computations:**

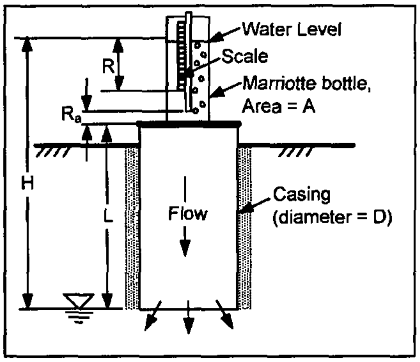
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
9:38	39				
10:03	41.8	1.49E-01	0.017	2.50E-05	Allowed to flow without measurments for > 24 hrs
10:21	43.7	1.40E-01	0.030	2.36E-05	
10:35	45.5	1.71E-01	0.040	2.87E-05	
10:44	46.5	1.48E-01	0.046	2.48E-05	
10:50	47.7	2.66E-01	0.050	4.47E-05	
11:00	49	1.73E-01	0.057	2.91E-05	
11:34	52.5	1.37E-01	0.081	2.30E-05	
11:51	54	1.17E-01	0.092	1.97E-05	
12:09	56.1	1.55E-01	0.105	2.61E-05	
12:29	58.5	1.60E-01	0.119	2.68E-05	
12:52	60.6	1.21E-01	0.135	2.04E-05	
13:40	65.4	1.33E-01	0.168	2.24E-05	
			Average	2.39E-05	



Single-Stage Constant Head Borehole Test - Polson - Composite Cover

Project: Polson
Date: 08/21/08
Test ID: Conventional 3

Installer: XW
Analyst: JS

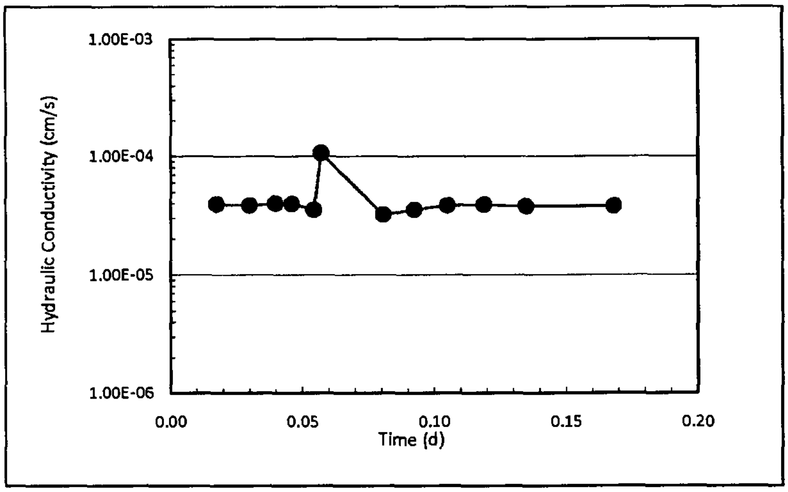


Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

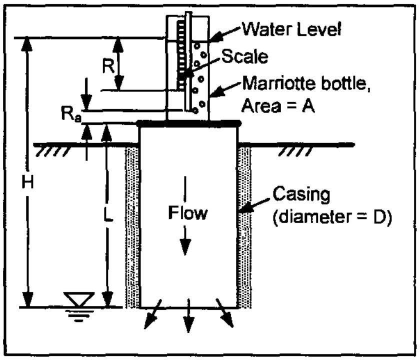
Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
9:38	37.5				
10:03	41.9	2.34E-01	0.017	3.94E-05	Allowed to flow without measurments for > 24 hrs
10:21	45	2.29E-01	0.030	3.85E-05	
10:35	47.5	2.37E-01	0.040	3.99E-05	
10:44	49.1	2.36E-01	0.046	3.98E-05	
10:56	51	2.11E-01	0.054	3.54E-05	
11:00	52.9	6.32E-01	0.057	1.06E-04	
11:34	57.8	1.92E-01	0.081	3.22E-05	
11:51	60.5	2.11E-01	0.092	3.55E-05	
12:09	63.6	2.29E-01	0.105	3.85E-05	
12:29	67.1	2.33E-01	0.119	3.91E-05	
12:52	71	2.26E-01	0.135	3.79E-05	
13:40	79.2	2.27E-01	0.168	3.82E-05	
			Average	3.84E-05	



Single-Stage Constant Head Borehole Test - Polson - Composite Cover

Project:	Polson	**Installer:**	XW
Date:	08/21/08	**Analyst:**	JS
Test ID:	Conventional 4		

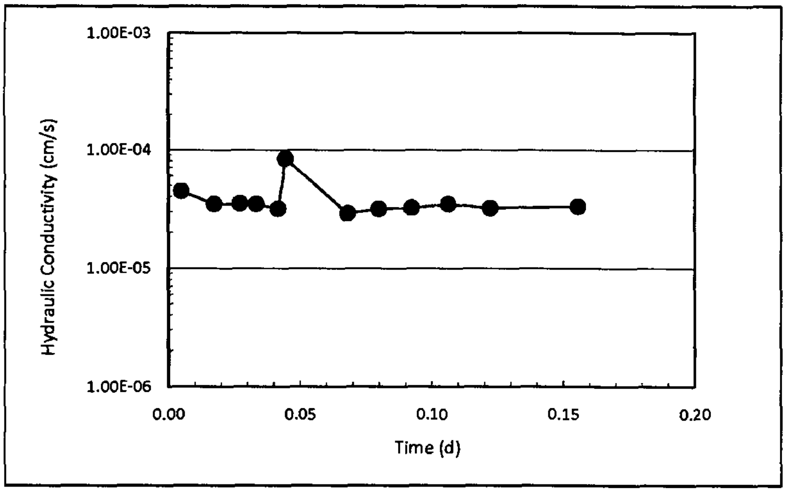


Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

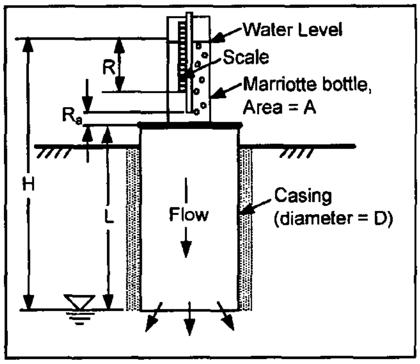
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
9:56	36.1				
10:03	37.5	2.66E-01	0.005	4.47E-05	Allowed to flow without measurments for > 24 hrs
10:21	40.3	2.07E-01	0.017	3.48E-05	
10:35	42.5	2.09E-01	0.027	3.51E-05	
10:44	43.9	2.07E-01	0.033	3.48E-05	
10:56	45.6	1.88E-01	0.042	3.17E-05	
11:00	47.1	4.99E-01	0.044	8.39E-05	
11:34	51.5	1.72E-01	0.068	2.89E-05	
11:51	53.9	1.88E-01	0.080	3.16E-05	
12:09	56.5	1.92E-01	0.092	3.23E-05	
12:29	59.6	2.06E-01	0.106	3.47E-05	
12:52	62.9	1.91E-01	0.122	3.21E-05	
13:40	70	1.97E-01	0.156	3.31E-05	
			Average	3.30E-05	



Single-Stage Constant Head Borehole Test - Polson - Composite Cover

Project: Polson
Date: 08/21/08
Test ID: Conventional 5

Installer: XW
Analyst: JS

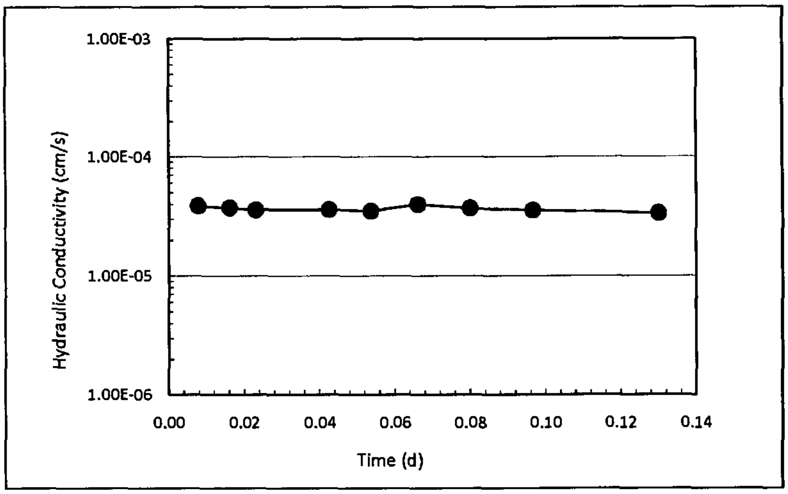


Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

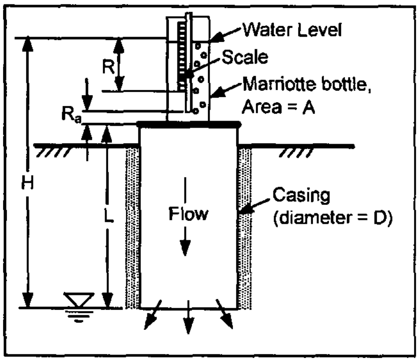
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
10:34	38				
10:45	39.9	2.30E-01	0.008	3.86E-05	Allowed to flow without measurments for > 24 hrs
10:57	41.9	2.22E-01	0.016	3.73E-05	
11:07	43.5	2.13E-01	0.023	3.58E-05	
11:35	48	2.14E-01	0.042	3.59E-05	
11:51	50.5	2.08E-01	0.053	3.49E-05	
12:09	53.7	2.36E-01	0.066	3.98E-05	
12:29	57	2.19E-01	0.080	3.69E-05	
12:53	60.8	2.11E-01	0.097	3.54E-05	
13:41	68	2.00E-01	0.130	3.35E-05	
			Average	3.64E-05	



Single-Stage Constant Head Borehole Test - Polson - Store-and-Release Cover

Project: Polson
Date: 08/21/08
Test ID: Alternative 1

Installer: XW
Analyst: JS

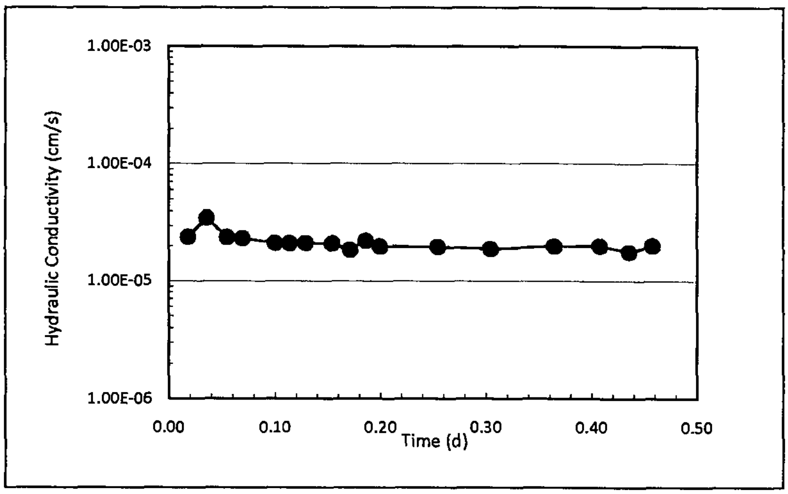


Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

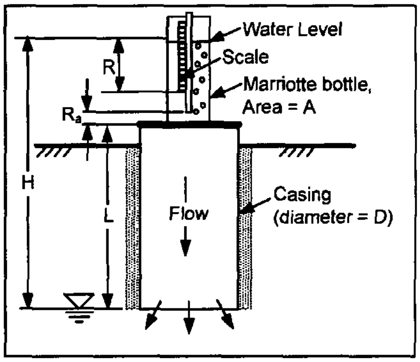
Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
16:30	38.3				
16:56	41.1	1.43E-01	0.018	2.41E-05	Allowed to flow without measurments for > 24 hrs
17:21	45	2.07E-01	0.035	3.49E-05	
17:49	48	1.43E-01	0.055	2.40E-05	
9:13	31.2	4.33E-02			
9:34	33.4	1.39E-01	0.069	2.34E-05	
10:18	37.6	1.27E-01	0.100	2.13E-05	
10:38	39.5	1.26E-01	0.114	2.12E-05	
11:00	41.6	1.27E-01	0.129	2.13E-05	
11:36	45	1.26E-01	0.154	2.11E-05	
12:00	47	1.11E-01	0.171	1.86E-05	
12:22	49.2	1.33E-01	0.186	2.24E-05	
12:41	50.9	1.19E-01	0.199	2.00E-05	
14:00	57.9	1.18E-01	0.254	1.98E-05	
15:12	64	1.13E-01	0.304	1.89E-05	
16:39	71.8	1.19E-01	0.365	2.00E-05	
17:41	77.4	1.20E-01	0.408	2.02E-05	
18:21	80.6	1.06E-01	0.435	1.79E-05	
18:53	83.5	1.21E-01	0.458	2.03E-05	
			Average	1.96E-05	



Single-Stage Constant Head Borehole Test - Polson - Store-and-Release Cover

Project: Polson
Date: 08/21/08
Test ID: Alternative 2

Installer: XW
Analyst: JS

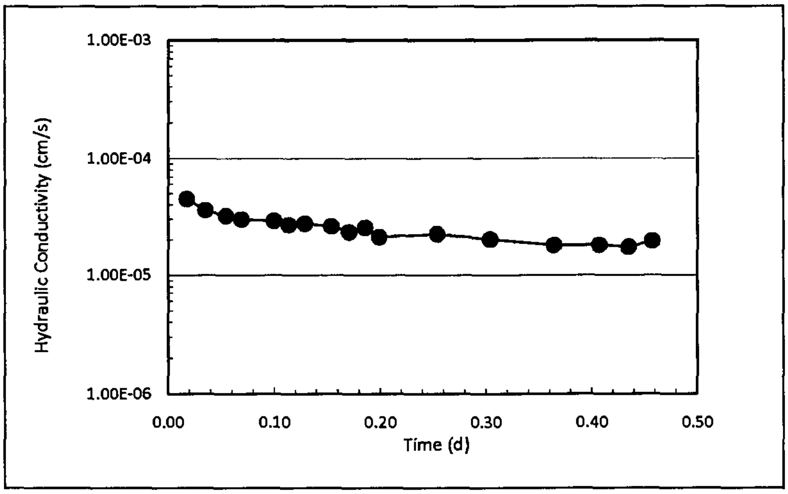


Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

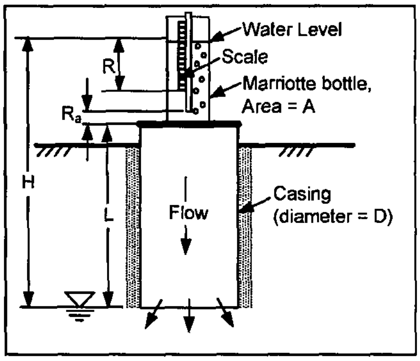
Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
16:31	34.5				
16:56	39.5	2.66E-01	0.017	4.47E-05	Allowed to flow without measurments for > 24 hrs
17:21	43.5	2.13E-01	0.035	3.58E-05	
17:49	47.5	1.90E-01	0.054	3.19E-05	
9:13	33.5	3.61E-02			
9:34	36.3	1.77E-01	0.069	2.98E-05	
10:18	42	1.72E-01	0.099	2.90E-05	
10:38	44.4	1.60E-01	0.113	2.68E-05	
11:00	47.1	1.63E-01	0.128	2.74E-05	
11:36	51.3	1.55E-01	0.153	2.61E-05	
12:00	53.8	1.39E-01	0.170	2.33E-05	
12:22	56.3	1.51E-01	0.185	2.54E-05	
12:41	58.1	1.26E-01	0.199	2.12E-05	
14:00	66	1.33E-01	0.253	2.24E-05	
15:12	72.5	1.20E-01	0.303	2.02E-05	
16:39	79.5	1.07E-01	0.364	1.80E-05	
17:41	84.5	1.07E-01	0.407	1.80E-05	
18:21	87.6	1.03E-01	0.435	1.73E-05	
18:53	90.4	1.16E-01	0.457	1.96E-05	
			Average	1.82E-05	



Single-Stage Constant Head Borehole Test - Polson - Store-and-Release Cover

Project:	Polson	**Installer:**	XW
Date:	08/21/08	**Analyst:**	JS
Test ID:	Alternative 3		

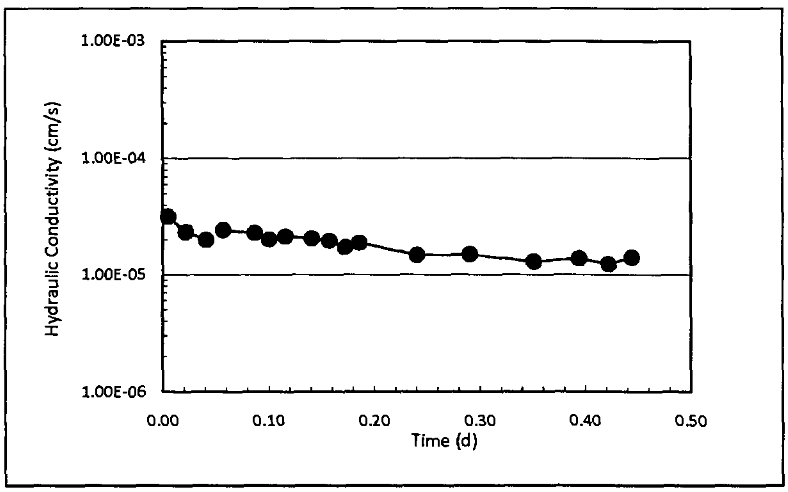


Fixed Variables:

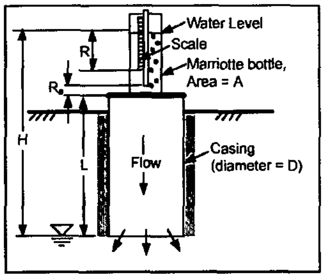
Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: / **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
16:50	46				
16:57	47	1.90E-01	0.005	3.19E-05	Allowed to flow without measurments for > 24 hrs
17:21	49.5	1.39E-01	0.022	2.33E-05	
17:49	52	1.19E-01	0.041	2.00E-05	
9:12	41.5	2.70E-02			
9:35	44	1.45E-01	0.057	2.43E-05	
10:18	48.4	1.36E-01	0.087	2.29E-05	
10:38	50.2	1.20E-01	0.101	2.01E-05	
11:00	52.3	1.27E-01	0.116	2.13E-05	
11:36	55.6	1.22E-01	0.141	2.05E-05	
12:00	57.7	1.16E-01	0.158	1.96E-05	
12:22	59.4	1.03E-01	0.173	1.73E-05	
12:41	61	1.12E-01	0.186	1.88E-05	
14:00	66.2	8.75E-02	0.241	1.47E-05	
15:12	71	8.87E-02	0.291	1.49E-05	
16:39	76.0	7.64E-02	0.351	1.29E-05	
17:41	79.8	8.15E-02	0.394	1.37E-05	
18:21	82.0	7.32E-02	0.422	1.23E-05	
18:53	84.0	8.31E-02	0.444	1.40E-05	
			Average	1.34E-05	



Single-Stage Constant Head Borehole Test - Polson - Store-and-Release Cover



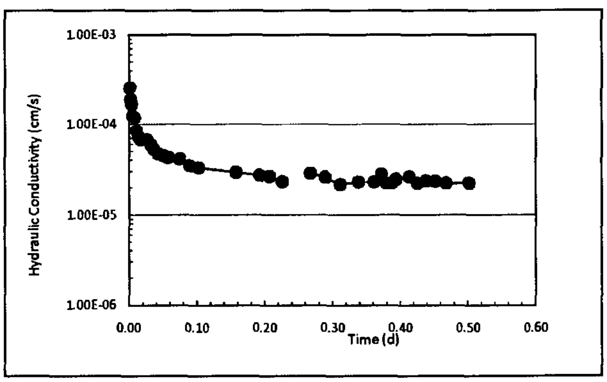
Project:	Polson	**Installer:**	XW
Date:	08/21/08	**Analyst:**	JS
Test ID:	1		

Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_e (cm):	10
L (cm):	60.96

Temporal Variables: **Computations:**

Time	R (cm)	Q (cm^3/s)	Time (d)	K (cm/s)	
10:13	36.5				
10:15	38.8	1.53E+00	0.001	2.57E-04	Allowed to flow without measurments for > 24 hrs
10:17	40.5	1.13E+00	0.003	1.90E-04	
10:19	42	9.98E-01	0.004	1.68E-04	
10:21	43.1	7.32E-01	0.006	1.23E-04	
10:25	45.2	6.98E-01	0.008	1.17E-04	
10:29	46.7	4.99E-01	0.011	8.39E-05	
10:33	48	4.32E-01	0.014	7.27E-05	
10:37	49.2	3.99E-01	0.017	6.71E-05	
10:51	53.4	3.99E-01	0.026	6.71E-05	
10:59	55.5	3.49E-01	0.032	5.87E-05	
11:05	56.9	3.10E-01	0.036	5.22E-05	
11:15	59	2.79E-01	0.043	4.70E-05	
11:26	61.2	2.66E-01	0.051	4.47E-05	
11:36	63.1	2.53E-01	0.058	4.25E-05	
12:00	67.5	2.44E-01	0.074	4.10E-05	
12:22	70.9	2.06E-01	0.090	3.46E-05	
12:41	73.7	1.96E-01	0.103	3.30E-05	
14:00	84.1	1.75E-01	0.158	2.94E-05	
14:50	90.2	1.62E-01	0.192	2.73E-05	
15:11	92.7	1.58E-01	0.207	2.66E-05	
15:38	95.5	1.38E-01	0.226	2.32E-05	
15:45	32.0	-1.21E+01			
16:38	38.8	1.71E-01	0.267	2.87E-05	
17:09	42.4	1.54E-01	0.289	2.60E-05	
17:41	45.5	1.29E-01	0.311	2.17E-05	
18:20	49.5	1.36E-01	0.338	2.29E-05	
18:53	52.9	1.37E-01	0.361	2.30E-05	
10:20	32.5	5.29E-02			
10:36	34.5	1.66E-01	0.372	2.80E-05	
10:46	35.5	1.33E-01	0.379	2.24E-05	
10:57	36.6	1.33E-01	0.387	2.24E-05	
11:07	37.7	1.46E-01	0.394	2.46E-05	
11:35	41.0	1.57E-01	0.413	2.64E-05	
11:52	42.7	1.33E-01	0.425	2.24E-05	
12:10	44.6	1.40E-01	0.438	2.36E-05	
12:30	46.7	1.40E-01	0.451	2.35E-05	
12:53	49.0	1.33E-01	0.467	2.24E-05	
13:42	53.9	1.33E-01	0.501	2.24E-05	
			Average	2.30E-05	



Single-Stage Constant Head Borehole Test - Sacramento - Thin Store-and-Release Cover

Project:	Sacramento	**Installer:**	XW
Date:		**Analyst:**	CB
Test ID:	Thin 1		

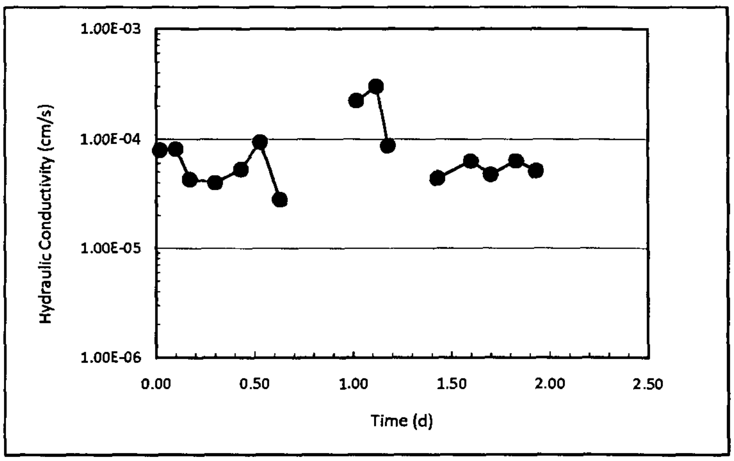
Fixed Variables:

d =	10.16
D =	35.56
Z =	27.94
R =	45.72

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
12:32	72	145.7			
12:33	68	141.7	60	0.02	3.85E-04
12:38	64	137.7	300	0.1	7.92E-05
12:42	60.8	134.5	240	0.17	8.12E-05
12:50	57.5	131.2	480	0.3	4.29E-05
12:58	54.5	128.2	480	0.43	4.00E-05
13:04	51.6	125.3	360	0.53	5.27E-05
13:10	46.6	120.3	360	0.63	9.38E-05
13:36	40.4	114.1	1560	1.07	2.81E-05
13:33	31.2	104.9	-180	1.02	
13:39	21.5	95.2	360	1.12	2.24E-04
13:43	13.5	87.2	240	1.18	3.03E-04
13:52	8.7	82.4	540	1.33	8.70E-05
13:58	83.5	157.2	360	1.43	
14:08	78.6	152.3	600	1.6	4.38E-05
14:14	74.5	148.2	360	1.7	6.29E-05
14:22	70.5	144.2	480	1.83	4.73E-05
14:28	66.6	140.3	360	1.93	6.32E-05
14:35	63	136.7	420	2.05	5.13E-05

AVG
5.62E-05



Single-Stage Constant Head Borehole Test - Sacramento - Thin Store-and-Release Cover

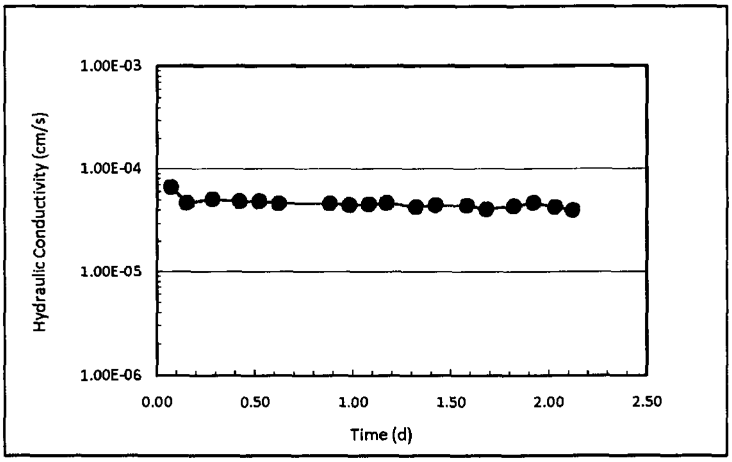
Project:	Sacramento	**Installer:**	XW
Date:		**Analyst:**	CB
Test ID:	Thin 2		

Fixed Variables:

d	=	10.16	cm
D	=	35.56	cm
Z	=	33.02	cm
R	=	43.18	cm

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
12:33	81.6	157.8			
12:37	78.6	154.8	2.40E+02	0.070	6.63E-05
12:42	76	152.2	3.00E+02	0.150	4.68E-05
12:50	71.6	147.8	4.80E+02	0.280	5.07E-05
12:58	67.5	143.7	4.80E+02	0.420	4.86E-05
13:04	64.5	140.7	3.60E+02	0.520	4.86E-05
13:10	61.7	137.9	3.60E+02	0.620	4.63E-05
13:26	54.5	130.7	9.60E+02	0.880	4.63E-05
13:32	52	128.2	3.60E+02	0.980	4.45E-05
13:38	49.5	125.7	3.60E+02	1.080	4.54E-05
13:43	47.4	123.6	3.00E+02	1.170	4.66E-05
13:52	44	120.2	5.40E+02	1.320	4.28E-05
13:58	41.7	117.9	3.60E+02	1.420	4.45E-05
1/0/00 14:08	38	114.2	6.00E+02	1.580	4.41E-05
1/0/00 14:14	36	112.2	3.60E+02	1.680	4.07E-05
1/0/00 14:22	33.2	109.4	4.80E+02	1.820	4.36E-05
1/0/00 14:28	31	107.2	3.60E+02	1.920	4.68E-05
1/0/00 14:35	28.7	104.9	4.20E+02	2.030	4.28E-05
14:40:00	27.2	103.4	3.00E+02	2.120	3.98E-05
					AVG
					4.33E-05



Single-Stage Constant Head Borehole Test - Sacramento - Thin Store-and-Release Cover

Project: Sacramento
Installer: XW
Date:
Analyst: CB
Test ID: Thin 3

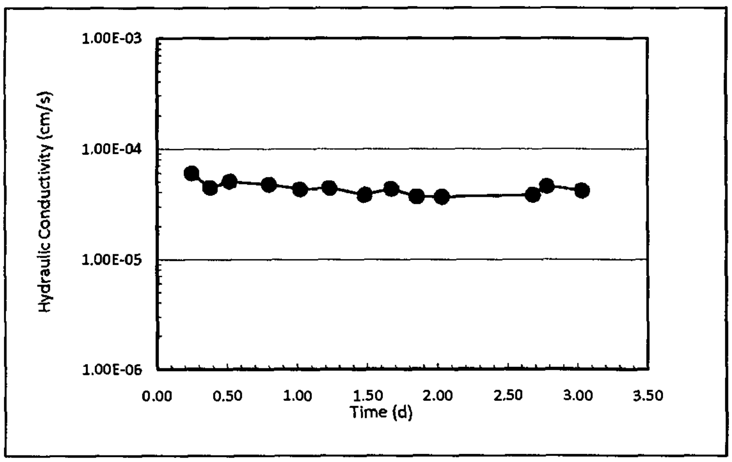
Fixed Variables:

d	=	10.16	cm
D	=	35.56	cm
Z	=	55.88	cm
R	=	22.86	cm

Temporal Variables: / **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
10:08	81.5	160.2			
10:23	71.5	150.2	9.00E+02	0.250	5.94E-05
10:31	67.7	146.4	4.80E+02	0.380	4.42E-05
10:39	63.5	142.2	4.80E+02	0.520	5.03E-05
10:56	55.5	134.2	1.02E+03	0.800	4.71E-05
11:09	50.2	128.9	7.80E+02	1.020	4.28E-05
11:22	45	123.7	7.80E+02	1.230	4.38E-05
11:37	40	118.7	9.00E+02	1.480	3.80E-05
11:48	36	114.7	6.60E+02	1.670	4.30E-05
11:59	32.7	111.4	6.60E+02	1.850	3.67E-05
12:10	29.5	108.2	6.60E+02	2.030	3.66E-05
12:49	18.5	97.2	2.34E+03	2.680	3.80E-05
12:55	16.6	95.3	3.60E+02	2.780	4.54E-05
1/0/00 13:10	12.4	91.1	9.00E+02	3.03	4.15E-05

AVG
4.04E-05



Single-Stage Constant Head Borehole Test - Sacramento - Thin Store-and-Release Cover

Project:	Sacramento	**Installer:**	XW
Date:		**Analyst:**	CB
Test ID:	Thin 4		

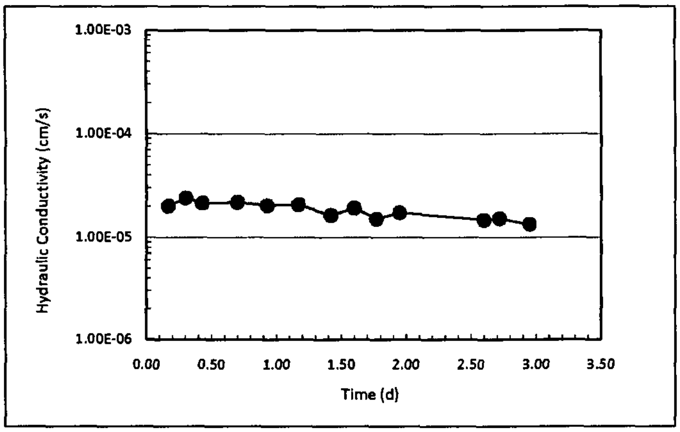
Fixed Variables:

Casing Diameter (cm):	30.48
Standpipe Area (cm^2):	79.8
R_a (cm):	10
L (cm):	60.96

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
10:13	69	145.2			
10:23	67.2	143.4	6.00E+02	0.170	2.01E-05
10:31	65.5	141.7	4.80E+02	0.300	2.40E-05
10:39	64	140.2	4.80E+02	0.430	2.14E-05
10:55	61	137.2	9.60E+02	0.700	2.18E-05
11:09	58.6	134.8	8.40E+02	0.930	2.03E-05
11:23	56.2	132.4	8.40E+02	1.170	2.07E-05
11:38	54.2	130.4	9.00E+02	1.420	1.64E-05
11:49	52.5	128.7	6.60E+02	1.600	1.92E-05
11:59	51.3	127.5	6.00E+02	1.770	1.51E-05
12:10	49.8	126	6.60E+02	1.950	1.73E-05
12:49	45.4	121.6	2.34E+03	2.600	1.47E-05
12:56	44.6	120.8	4.20E+02	2.720	1.52E-05
1/0/00 13:10	43.2	119.4	8.40E+02	2.950	1.34E-05

AVG
1.52E-05



Single-Stage Constant Head Borehole Test - Sacramento - Thick Store-and-Release Cover

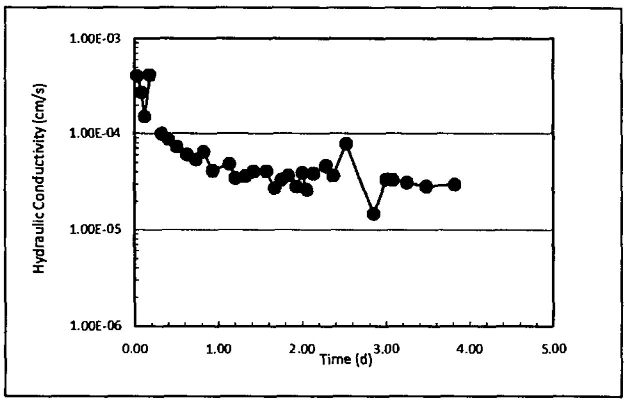
Project:	Sacramento	**Installer:**	XW
Date:		**Analyst:**	CB
Test ID:	Thick 1		

Fixed Variables:

d =	10.16 cm
D =	35.56 cm
Z =	60.96 cm
R =	14.605 cm

Temporal Variables: / **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
12:16	81	156.6			
12:18	72	147.6	1.20E+02	0.030	4.09E-04
12:21	63.5	139.1	1.80E+02	0.080	2.73E-04
12:23	60.5	136.1	1.20E+02	0.120	1.51E-04
12:27	45	120.6	2.40E+02	0.180	4.18E-04
12:30	52	127.6	1.80E+02	0.230	
12:35	47.5	123.1	3.00E+02	0.320	9.92E-05
12:40	43.7	119.3	3.00E+02	0.400	8.67E-05
12:46	40	115.6	3.60E+02	0.500	7.26E-05
12:53	36.5	112.1	4.20E+02	0.620	6.07E-05
13:00	33.5	109.1	4.20E+02	0.730	5.36E-05
13:05	31	106.6	3.00E+02	0.820	6.41E-05
13:12	28.8	104.4	4.20E+02	0.930	4.12E-05
13:24	24.5	100.1	7.20E+02	1.130	4.84E-05
13:28	23.5	99.1	2.40E+02	1.200	3.47E-05
13:35	21.7	97.3	4.20E+02	1.320	3.62E-05
13:41	20.0	95.6	3.60E+02	1.420	4.06E-05
13:50	17.5	93.1	5.40E+02	1.570	4.07E-05
13:56	16.4	92	3.60E+02	1.670	2.74E-05
14:01:00	15.3	90.9	3.00E+02	1.75	3.33E-05
14:06:00	14.1	89.7	3.00E+02	1.830	3.67E-05
14:12:00	13.0	88.6	3.60E+02	1.930	2.84E-05
14:16:00	12.0	87.6	2.40E+02	2.000	3.92E-05
14:19:00	11.5	87.1	1.80E+02	2.050	2.64E-05
14:20:00	50.4	126	6.00E+01	2.070	
14:24:00	49.0	124.6	2.40E+02	2.130	3.86E-05
14:33:00	45.3	120.9	5.40E+02	2.280	4.63E-05
14:38:00	43.7	119.3	3.00E+02	2.370	3.68E-05
14:47:00	37.8	113.4	5.40E+02	2.520	7.79E-05
15:07:00	35.4	111	1.20E+03	2.850	1.48E-05
15:16:00	33.0	108.6	5.40E+02	3.000	3.36E-05
15:21:00	31.7	107.3	3.00E+02	3.080	3.33E-05
15:31:00	29.3	104.9	6.00E+02	3.250	3.13E-05
15:45:00	26.3	101.9	8.40E+02	3.480	2.86E-05
16:05:00	22.0	97.6	1.20E+03	3.820	2.98E-05
					AVG
					3.13E-05



Single-Stage Constant Head Borehole Test - Sacramento - Thick Store-and-Release Cover

Project: Sacramento **Installer:** XW
Date: **Analyst:** CB
Test ID: Thick 2

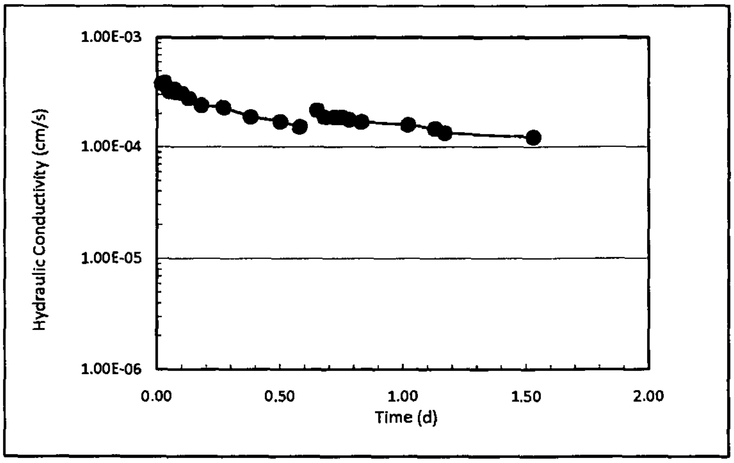
Fixed Variables:

d =	10.16 cm
D =	35.56 cm
Z =	43.18 cm
R =	33.02 cm

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
1:03	72	148.2			
1:04	68	144.2	6.00E+01	0.020	3.78E-04
1:05	64	140.2	6.00E+01	0.030	3.89E-04
1:06	60.8	137	6.00E+01	0.050	3.19E-04
1:07	57.5	133.7	6.00E+01	0.070	3.37E-04
1:08	54.5	130.7	6.00E+01	0.080	3.14E-04
1:09	51.6	127.8	6.00E+01	0.100	3.10E-04
1:11	46.6	122.8	1.20E+02	0.130	2.76E-04
1:14	40.4	116.6	1.80E+02	0.180	2.39E-04
1:19	31.2	107.4	3.00E+02	0.270	2.27E-04
1:26	21.5	97.7	4.20E+02	0.380	1.87E-04
1:33	13.5	89.7	4.20E+02	0.500	1.69E-04
1:38	8.7	84.9	3.00E+02	0.580	1.52E-04
1:40	83.5	159.7	1.20E+02	0.620	
1:42	78.6	154.8	1.20E+02	0.650	2.15E-04
1:44	74.5	150.7	1.20E+02	0.680	1.85E-04
1:46	70.5	146.7	1.20E+02	0.720	1.86E-04
1:48	66.6	142.8	1.20E+02	0.750	1.86E-04
1:50	63.0	139.2	1.20E+02	0.780	1.76E-04
1:53:00	58.0	134.2	1.80E+02	0.83	1.68E-04
2:04:00	42.0	118.2	6.60E+02	1.020	1.59E-04
2:11:00	33.6	109.8	4.20E+02	1.130	1.46E-04
2:13:00	31.5	107.7	1.20E+02	1.170	1.33E-04
2:35:00	12.5	88.7	1.32E+03	1.530	1.22E-04

AVG
1.34E-04



Single-Stage Constant Head Borehole Test - Sacramento - Thick Store-and-Release Cover

Project:	Sacramento	**Installer:**	XW
Date:		**Analyst:**	CB
Test ID:	Thick 3		

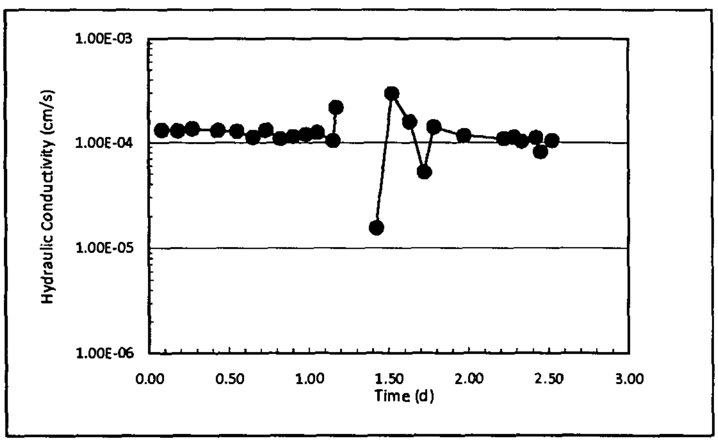
Fixed Variables:

d =	10.16 cm
D =	35.56 cm
Z =	27.94 cm
R =	44.45 cm

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
10:09	82	154.4			
10:14	74.8	147.2	3.00E+02	0.080	1.32E-04
10:20	66.7	139.1	3.60E+02	0.180	1.30E-04
10:25	60	132.4	3.00E+02	0.270	1.36E-04
10:35	48	120.4	6.00E+02	0.430	1.31E-04
10:42	40.4	112.8	4.20E+02	0.550	1.29E-04
10:48	35	107.4	3.60E+02	0.650	1.13E-04
10:53	30	102.4	3.00E+02	0.730	1.32E-04
10:58	26	98.4	3.00E+02	0.820	1.10E-04
11:03	22	94.4	3.00E+02	0.900	1.15E-04
11:08	18	90.4	3.00E+02	0.980	1.20E-04
11:12	14.8	87.2	2.40E+02	1.050	1.25E-04
11:18	10.9	83.3	3.60E+02	1.150	1.05E-04
11:19	9.6	82	6.00E+01	1.170	2.17E-04
11:24	80.4	152.8	3.00E+02	1.250	
11:34	78.7	151.1	6.00E+02	1.420	1.55E-05
11:40	60.5	132.9	3.60E+02	1.520	2.96E-04
11:47	50.3	122.7	4.20E+02	1.630	1.58E-04
11:52	48.0	120.4	3.00E+02	1.720	5.23E-05
11:56:00	43.2	115.6	2.40E+02	1.78	1.41E-04
12:07:00	32.9	105.3	6.60E+02	1.970	1.17E-04
12:22:00	21.0	93.4	9.00E+02	2.220	1.10E-04
12:26:00	18.0	90.4	2.40E+02	2.280	1.13E-04
12:29:00	16.0	88.4	1.80E+02	2.330	1.03E-04
12:34:00	12.5	84.9	3.00E+02	2.420	1.12E-04
12:36:00	11.5	83.9	1.20E+02	2.450	8.19E-05
12:40:00	9.0	81.4	2.40E+02	2.520	1.05E-04

AVG
1.00E-04



Single-Stage Constant Head Borehole Test - Sacramento - Thick Store-and-Release Cover

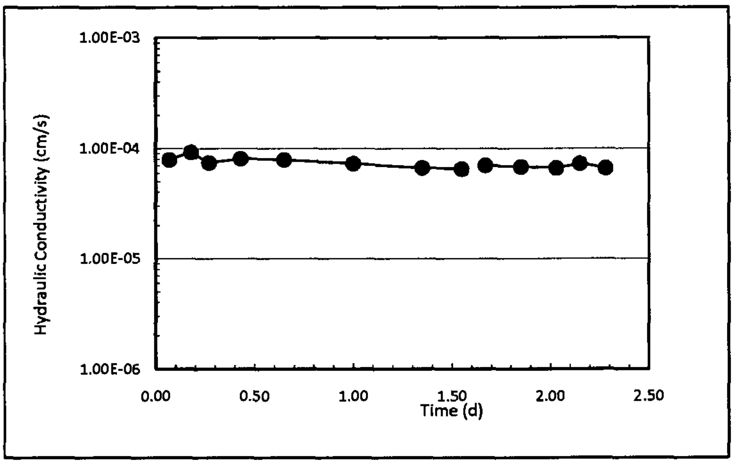
Project: Sacramento **Installer:** XW
Date: **Analyst:** CB
Test ID: Thick 4

Fixed Variables:

d =	10.16 cm
D =	35.56 cm
Z =	60.96 cm
R =	11.43 cm

Temporal Variables: **Computations:**

Time	R (cm)		Q (cm^3/s)	Time (d)	K (cm/s)
3:05	69	141.4			
3:09	65.8	138.2	2.40E+02	0.070	7.91E-05
3:16	59.5	131.9	4.20E+02	0.180	9.21E-05
3:21	56	128.4	3.00E+02	0.270	7.43E-05
3:31	48.7	121.1	6.00E+02	0.430	8.09E-05
3:44	40	112.4	7.80E+02	0.650	7.92E-05
4:05	28.2	100.6	1.26E+03	1.000	7.30E-05
4:26	18.5	90.9	1.26E+03	1.350	6.67E-05
4:38	13.5	85.9	7.20E+02	1.550	6.52E-05
4:39	54.3	126.7	6.00E+01	1.570	
4:45	50.5	122.9	3.60E+02	1.670	7.01E-05
4:56	44	116.4	6.60E+02	1.850	6.83E-05
5:07	38	110.4	6.60E+02	2.030	6.65E-05
5:14	34	106.4	4.20E+02	2.150	7.29E-05
5:22	30	102.4	4.80E+02	2.280	6.62E-05
					AVG
					6.84E-05



APPENDIX D - LABORATORY HYDRAULIC CONDUCTIVITY DATA

Hydraulic Conductivity Test - Altamont - Store-and-Release

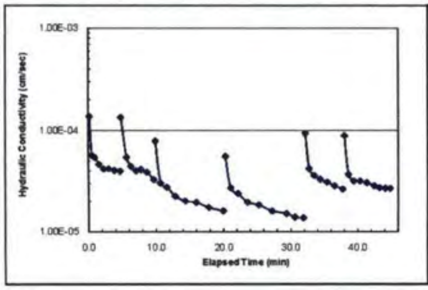
ASTM D 5084 - 00

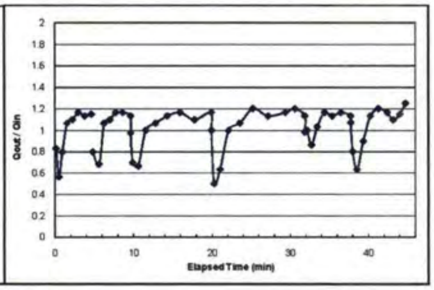
Sample I.D.	305-mm ALT- DL - 5		Test Date :	1/16/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	17.1	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	12510.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	4	cm^2
Hydraulic Gradient, i =	9.8		a_{out} =	4	cm^2
Weight of wet sample =	24580.2	(g)	Sample Water Content =	20.6	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.63	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A^* \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	20.60

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
1/16/2008 12:00	0.0	24.0	0.0	24.0	0.0				
1/16/2008 12:00	3.0	21.5	10.0	18.5	0.2	1.36E-04	0.8	12	10
1/16/2008 12:00	6.0	19.8	21.0	13.8	0.5	5.69E-05	0.6	12	6.8
1/16/2008 12:00	9.0	17.4	26.0	8.4	1.0	5.43E-05	0.8	12	9.6
1/16/2008 12:01	12.0	14.2	36.0	2.2	1.5	4.65E-05	1.1	12	12.8
1/16/2008 12:02	15.0	10.9	42.0	-4.1	2.3	4.20E-05	1.1	12	13.2
1/16/2008 12:03	18.0	7.4	45.0	-10.6	3.0	4.21E-05	1.2	12	14
1/16/2008 12:03	21.0	4.0	48.0	-17.0	3.8	4.04E-05	1.1	12	13.6
1/16/2008 12:04	24.0	0.5	52.0	-23.5	4.7	3.96E-05	1.2	24	27.6
1/16/2008 12:00	0.0	24.0	0.0	24.0	4.7				
1/16/2008 12:00	3.0	21.6	10.0	18.6	4.8	1.34E-04	0.8	12	9.6
1/16/2008 12:00	9.0	17.5	48.0	8.5	5.6	5.42E-05	0.7	24	16.4
1/16/2008 12:01	12.0	14.3	38.0	2.3	6.3	4.40E-05	1.1	12	12.8
1/16/2008 12:02	15.0	11.0	44.0	-4.0	7.0	4.01E-05	1.1	12	13.2
1/16/2008 12:03	18.0	7.5	46.0	-10.5	7.8	4.11E-05	1.2	12	14
1/16/2008 12:03	21.0	4.0	51.0	-17.0	8.6	3.86E-05	1.2	12	14
1/16/2008 12:04	24.0	0.6	62.0	-23.4	9.7	3.27E-05	1.1	12	13.6
1/16/2008 12:00	0.0	24.0	0.0	24.0	9.7				
1/16/2008 12:00	3.0	21.9	16.0	18.9	9.9	7.87E-05	0.7	12	8.4
1/16/2008 12:00	6.0	19.9	42.0	13.9	10.6	3.02E-05	0.7	12	8
1/16/2008 12:01	9.0	16.9	57.0	7.9	11.6	2.75E-05	1.0	12	12
1/16/2008 12:03	12.0	13.7	75.0	1.7	12.8	2.24E-05	1.1	12	12.8
1/16/2008 12:04	15.0	10.3	90.0	-4.7	14.3	2.00E-05	1.1	12	13.6
1/16/2008 12:06	18.0	6.8	98.0	-11.2	15.9	1.94E-05	1.2	12	14
1/16/2008 12:08	21.0	3.5	111.0	-17.5	17.8	1.73E-05	1.1	12	13.2
1/16/2008 12:10	24.0	0.0	129.0	-24.0	20.0	1.60E-05	1.2	12	14
1/16/2008 12:00	0.0	24.0	0.0	24.0	20.0				
1/16/2008 12:00	3.0	22.5	20.0	19.5	20.3	5.55E-05	0.5	12	6
1/16/2008 12:01	6.0	20.6	46.0	14.6	21.0	2.69E-05	0.6	12	7.6
1/16/2008 12:02	9.0	17.6	66.0	8.6	22.2	2.37E-05	1.0	12	12
1/16/2008 12:03	12.0	14.4	86.0	2.4	23.6	1.94E-05	1.1	12	12.8
1/16/2008 12:05	15.0	10.8	101.0	-4.2	25.3	1.83E-05	1.2	12	14.4
1/16/2008 12:07	18.0	7.4	117.0	-10.6	27.2	1.59E-05	1.1	12	13.6
1/16/2008 12:09	21.0	3.9	131.0	-17.1	29.4	1.51E-05	1.2	12	14
1/16/2008 12:10	22.5	2.1	75.0	-20.4	30.6	1.38E-05	1.2	6	7.2
1/16/2008 12:11	24.0	0.4	75.0	-23.6	31.9	1.37E-05	1.1	6	6.8
1/16/2008 12:00	0.0	24.0	0.0	24.0	31.9				
1/16/2008 12:00	3.0	21.0	16.0	18.0	32.2	9.29E-05	1.0	12	12
1/16/2008 12:00	6.0	18.4	34.0	12.4	32.7	4.21E-05	0.9	12	10.4
1/16/2008 12:01	9.0	15.3	45.0	6.3	33.5	3.58E-05	1.0	12	12.4
1/16/2008 12:02	12.0	11.8	54.0	-0.2	34.4	3.29E-05	1.2	12	14
1/16/2008 12:03	15.0	8.4	59.0	-6.6	35.4	3.08E-05	1.1	12	13.6
1/16/2008 12:04	18.0	4.9	68.0	-13.1	36.5	2.83E-05	1.2	12	14
1/16/2008 12:05	21.0	1.5	75.0	-19.5	37.7	2.63E-05	1.1	12	13.6
1/16/2008 12:00	0.0	24.0	0.0	24.0	37.7				
1/16/2008 12:00	3.0	21.6	15.0	18.6	38.0	8.90E-05	0.8	12	9.6
1/16/2008 12:00	6.0	19.7	34.0	13.7	38.6	3.66E-05	0.6	12	7.6
1/16/2008 12:01	9.0	17.0	47.0	8.0	39.3	3.17E-05	0.9	12	10.8
1/16/2008 12:02	12.0	13.6	55.0	1.6	40.3	3.15E-05	1.1	12	13.6
1/16/2008 12:03	15.0	10.0	61.0	-5.0	41.3	3.04E-05	1.2	12	14.4
1/16/2008 12:04	18.0	6.5	67.0	-11.5	42.4	2.84E-05	1.2	12	14
1/16/2008 12:05	20.0	4.3	47.0	-15.7	43.2	2.71E-05	1.1	8	8.8
1/16/2008 12:06	22.0	2.0	50.0	-20.0	44.0	2.68E-05	1.2	8	9.2
1/16/2008 12:06	23.6	0.0	43.0	-23.6	44.7	2.68E-05	1.3	6.4	8





Hydraulic Conductivity Test - Altamont - Store-and-Release

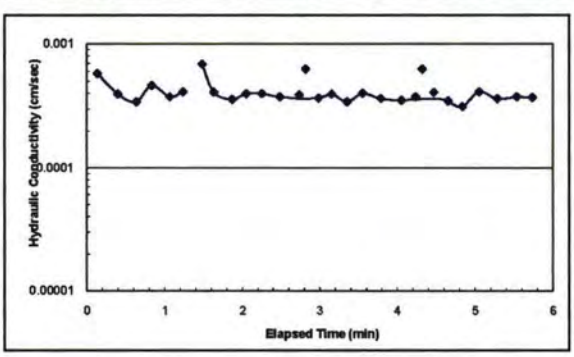
ASTM D 5084 - 00

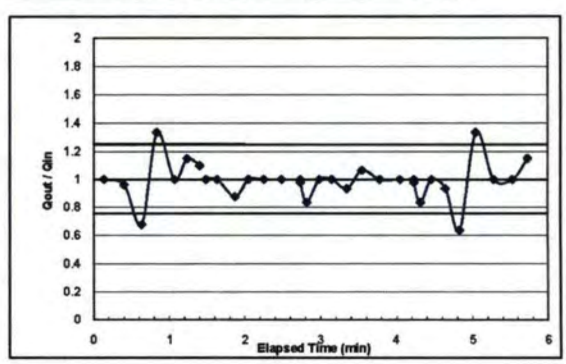
Sample I.D.	305-mm ALT- ML - 4		Test Date :	12/21/07	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	5	cm^2
Weight of wet sample =	21563.8	(g)	Sample Water Content =	20.9	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.60	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	20.87

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/21/2007 12:00	0.0	24.0	0.0	24.0	0.0				
12/21/2007 12:00	4.0	20.0	8.0	16.0	0.1	5.78E-04	1.0	20	20
12/21/2007 12:00	9.0	15.2	16.0	6.2	0.4	3.93E-04	1.0	25	24
12/21/2007 12:00	13.0	12.5	14.0	-0.5	0.6	3.42E-04	0.7	20	13.5
12/21/2007 12:00	16.0	8.5	12.0	-7.5	0.8	4.60E-04	1.3	15	20
12/21/2007 12:01	19.0	5.5	14.0	-13.5	1.1	3.74E-04	1.0	15	15
12/21/2007 12:01	21.0	3.2	10.0	-17.8	1.2	4.11E-04	1.2	10	11.5
12/21/2007 12:01	23.0	1.0	10.0	-22.0	1.4	4.35E-04	1.1	10	11
12/21/2007 12:00	0.0	24.0	0.0	24.0	1.4				
12/21/2007 12:00	3.0	21.0	5.0	18.0	1.5	6.86E-04	1.0	15	15
12/21/2007 12:00	6.0	18.0	9.0	12.0	1.6	4.08E-04	1.0	15	15
12/21/2007 12:00	10.0	14.5	14.0	4.5	1.9	3.56E-04	0.9	20	17.5
12/21/2007 12:00	13.0	11.5	11.0	-1.5	2.0	3.97E-04	1.0	15	15
12/21/2007 12:00	16.0	8.5	12.0	-7.5	2.3	3.97E-04	1.0	15	15
12/21/2007 12:01	19.0	5.5	14.0	-13.5	2.5	3.74E-04	1.0	15	15
12/21/2007 12:01	22.0	2.5	15.0	-19.5	2.7	3.88E-04	1.0	15	15
12/21/2007 12:00	0.0	24.0	0.0	24.0	2.7				
12/21/2007 12:00	3.0	21.5	5.0	18.5	2.8	6.27E-04	0.8	15	12.5
12/21/2007 12:00	6.0	18.5	10.0	12.5	3.0	3.65E-04	1.0	15	15
12/21/2007 12:00	9.0	15.5	10.0	6.5	3.2	3.93E-04	1.0	15	15
12/21/2007 12:00	12.0	12.7	12.0	0.7	3.3	3.42E-04	0.9	15	14
12/21/2007 12:00	15.0	9.5	12.0	-5.5	3.6	3.97E-04	1.1	15	16
12/21/2007 12:01	18.0	6.5	14.0	-11.5	3.8	3.62E-04	1.0	15	15
12/21/2007 12:01	21.0	3.5	16.0	-17.5	4.1	3.51E-04	1.0	15	15
12/21/2007 12:01	23.0	1.5	11.0	-21.5	4.2	3.74E-04	1.0	10	10
12/21/2007 12:00	0.0	24.0	0.0	24.0	4.2				
12/21/2007 12:00	3.0	21.5	5.0	18.5	4.3	6.27E-04	0.8	15	12.5
12/21/2007 12:00	6.0	18.5	9.0	12.5	4.5	4.06E-04	1.0	15	15
12/21/2007 12:00	9.0	15.7	11.0	6.7	4.7	3.45E-04	0.9	15	14
12/21/2007 12:00	12.0	13.8	11.0	1.8	4.8	3.12E-04	0.6	15	9.5
12/21/2007 12:00	15.0	9.8	13.0	-5.2	5.1	4.10E-04	1.3	15	20
12/21/2007 12:01	18.0	6.8	14.0	-11.2	5.3	3.60E-04	1.0	15	15
12/21/2007 12:01	21.0	3.8	15.0	-17.2	5.5	3.72E-04	1.0	15	15
12/21/2007 12:01	23.0	1.5	12.0	-21.5	5.7	3.67E-04	1.2	10	11.5





Hydraulic Conductivity Test - Altamont - Store-and-Release

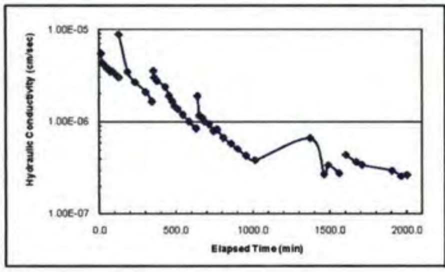
ASTM D 5084 - 00

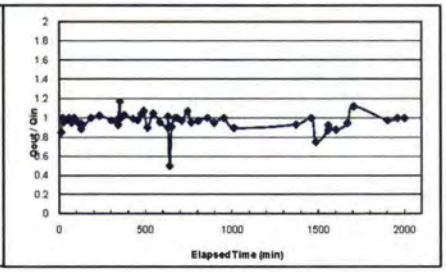
Sample I.D.	150-mm ALT - ML - 4		Test Date :	2/6/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.8	psi	Length of Sample, L =	8.1	cm
Outflow Pressre =	40.3	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1482.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	1	cm^2
Weight of wet sample =	3447.3	(g)	Sample Water Content =	19.3	(%)
Wet Density =	2.3	g/cm^3	Dry Density =	1.95	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	19.32

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/6/2008 12:00	0.0	24.0	0.0	24.0	0.0				
2/6/2008 12:12	5.5	19.3	747.0	13.8	12.4	5.43E-06	0.9	5.5	4.7
2/6/2008 12:19	7.5	17.3	424.0	9.8	19.5	4.29E-06	1.0	2	2
2/6/2008 12:29	9.9	15.0	572.0	5.1	29.1	4.10E-06	1.0	2.4	2.3
2/6/2008 12:49	13.9	11.1	1223.0	-2.8	49.4	3.76E-06	1.0	4	3.9
2/6/2008 12:59	15.5	9.5	588.0	-6.0	59.2	3.69E-06	1.0	1.6	1.6
2/6/2008 13:13	17.5	7.6	865.0	-9.9	73.7	3.43E-06	1.0	2	1.9
2/6/2008 13:27	19.1	6.0	801.0	-13.1	87.0	3.46E-06	1.0	1.6	1.6
2/6/2008 13:48	21.2	4.0	1302.0	-17.2	108.7	3.18E-06	1.0	2.1	2
2/6/2008 14:06	22.6	2.7	1078.0	-19.9	126.7	2.99E-06	0.9	1.4	1.3
2/6/2008 12:00	0.0	24.0	0.0	24.0	126.7				
2/6/2008 12:02	1.8	22.4	145.0	20.6	129.1	8.77E-06	0.9	1.8	1.6
2/6/2008 12:58	13.5	10.7	3388.0	-2.8	185.5	3.41E-06	1.0	11.7	11.7
2/6/2008 13:46	18.4	5.7	2845.0	-12.7	233.0	2.65E-06	1.0	4.9	5
2/6/2008 14:55	22.4	1.8	4161.0	-20.6	302.3	2.08E-06	1.0	4	3.9
2/6/2008 15:35	23.8	0.5	2400.0	-23.3	342.3	1.64E-06	0.9	1.4	1.3
2/6/2008 12:00	0.0	24.0	0.0	24.0	342.3				
2/6/2008 12:09	2.4	21.2	564.0	18.8	351.7	3.50E-06	1.2	2.4	2.8
2/6/2008 12:15	3.7	19.9	357.0	16.2	357.7	2.96E-06	1.0	1.3	1.3
2/6/2008 12:35	7.3	16.2	1203.0	8.9	377.7	2.72E-06	1.0	3.6	3.7
2/6/2008 13:26	13.7	9.9	3060.0	-3.9	428.7	2.35E-06	1.0	6.4	6.35
2/6/2008 13:52	15.8	7.8	1563.0	-8.0	454.8	1.89E-06	1.0	2.1	2.05
2/6/2008 14:13	17.1	6.5	1288.0	-10.7	476.2	1.64E-06	1.0	1.3	1.35
2/6/2008 14:28	17.8	5.7	857.0	-12.1	490.5	1.46E-06	1.1	0.7	0.75
2/6/2008 14:49	18.8	4.8	1287.0	-14.0	512.0	1.36E-06	0.9	1	0.9
2/6/2008 15:21	19.9	3.7	1912.0	-16.3	543.8	1.18E-06	1.0	1.1	1.15
2/6/2008 16:01	21.0	2.6	2406.0	-18.4	583.9	9.99E-07	1.0	1.1	1.05
2/6/2008 16:48	22.0	1.7	2795.0	-20.3	630.5	8.46E-07	0.9	1	0.9
2/6/2008 12:00	0.0	24.0	0.0	24.0	630.5				
2/6/2008 12:08	1.8	23.1	537.0	21.3	639.5	1.87E-06	0.5	1.8	0.9
2/6/2008 12:20	2.9	22.1	705.0	19.2	651.2	1.15E-06	0.9	1.1	1
2/6/2008 12:39	4.4	20.6	1115.0	16.2	669.8	1.09E-06	1.0	1.5	1.5
2/6/2008 12:53	5.4	19.6	850.0	14.2	684.0	9.99E-07	1.0	1	1
2/6/2008 13:21	7.2	17.9	1688.0	10.7	712.1	9.43E-07	1.0	1.8	1.75
2/6/2008 13:52	8.7	16.3	1875.0	7.6	743.4	7.95E-07	1.1	1.5	1.6
2/6/2008 14:14	9.8	15.2	1324.0	5.4	765.4	8.27E-07	1.0	1.1	1.05
2/6/2008 14:57	11.4	13.7	2531.0	2.3	807.6	6.75E-07	1.0	1.6	1.55
2/6/2008 15:47	12.9	12.2	3038.0	-0.8	858.2	5.79E-07	1.0	1.5	1.5
2/6/2008 16:27	13.9	11.2	2394.0	-2.7	898.1	5.11E-07	1.0	1	0.95
2/6/2008 17:24	15.0	10.1	3407.0	-4.9	954.9	4.30E-07	1.0	1.1	1.1
2/6/2008 18:22	16.0	9.2	3493.0	-6.8	1013.1	3.86E-07	0.9	1	0.9
2/7/2008 0:22	23.5	2.2	21586.0	-21.3	1372.9	6.67E-07	0.9	7.5	7
2/7/2008 1:51	24.0	1.7	5347.0	-22.3	1462.0	2.69E-07	1.0	0.5	0.5
2/7/2008 2:17	24.2	1.6	1545.0	-22.7	1487.8	3.41E-07	0.8	0.2	0.15
2/7/2008 3:27	24.6	1.2	4233.0	-23.4	1558.3	2.77E-07	0.9	0.4	0.35
2/7/2008 0:00	0.0	24.0	0.0	24.0	1558.3				
2/7/2008 0:45	1.7	22.5	2729.0	20.8	1603.8	4.38E-07	0.9	1.7	1.5
2/7/2008 1:51	3.6	20.7	3977.0	17.1	1670.1	3.69E-07	0.9	1.9	1.8
2/7/2008 2:28	4.5	19.8	2193.0	15.3	1706.6	3.42E-07	1.1	0.85	0.95
2/7/2008 5:44	8.3	16.0	11774.0	7.7	1902.9	2.95E-07	1.0	3.85	3.75
2/7/2008 6:43	9.2	15.1	3541.0	5.9	1961.9	2.57E-07	1.0	0.9	0.9
2/7/2008 7:22	9.8	14.5	2361.0	4.7	2001.2	2.66E-07	1.0	0.6	0.6





Hydraulic Conductivity Test - Altamont - Store-and-Release

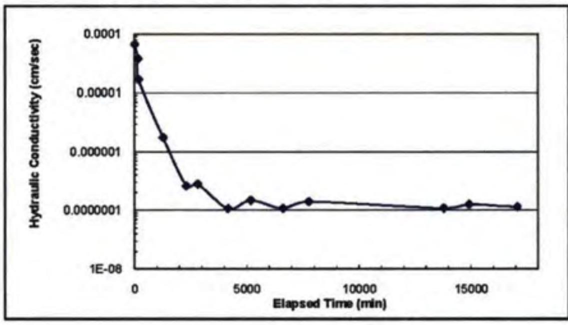
ASTM D 5084 - 00

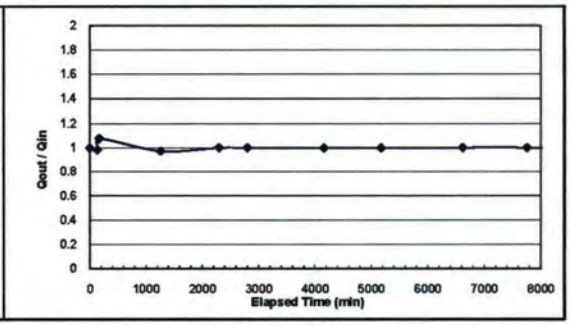
Sample I.D.	75-mm ALT - ML - 4		Test Date :	3/23/08	
Cell Pressure =	42.4	psi	Diameter of Sample, D =	5.6	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	2.8	cm
Outflow Pressre =	40.8	psi	Area of Sample, A =	24.6	cm^2
Pressure Difference =	0.2	psi	Sample Volume, V =	69.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	298.8	(g)	Sample Water Content =	19.3	(%)
Wet Density =	4.3	g/cm^3	Dry Density =	3.63	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	19.29

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
3/23/2008 12:00	0.0	24.0	0.0	24.0	0.0				
3/23/2008 12:03	1.0	23.0	230.0	22.0	3.8	6.67E-05	1.0	5	5
3/23/2008 14:20	13.0	11.2	8204.0	-1.8	140.6	3.74E-05	1.0	60	59
3/23/2008 14:53	13.7	10.5	1966.0	-3.2	173.3	1.69E-05	1.1	3.25	3.5
3/24/2008 9:04	15.5	8.7	65463.0	-6.8	1264.4	1.77E-06	1.0	9.25	9
3/25/2008 2:18	15.7	8.5	62050.0	-7.2	2298.6	2.59E-07	1.0	1	1
3/25/2008 10:42	15.8	8.4	30208.0	-7.4	2802.0	2.78E-07	1.0	0.5	0.5
3/26/2008 9:17	15.9	8.3	81350.0	-7.6	4157.9	1.06E-07	1.0	0.5	0.5
3/27/2008 2:13	16.0	8.2	60926.0	-7.8	5173.3	1.47E-07	1.0	0.5	0.5
3/28/2008 2:14	16.1	8.1	86470.0	-8.0	6614.4	1.07E-07	1.0	0.5	0.5
3/28/2008 21:15	16.2	8.0	68459.0	-8.2	7755.4	1.39E-07	1.0	0.5	0.5
4/2/2008 1:40	16.6	7.7	361478.0	-9.0	13780.1	1.08E-07	0.9	2	1.75
4/2/2008 20:28	16.7	7.6	67717.0	-9.1	14908.7	1.25E-07	0.5	0.5	0.25
4/4/2008 8:26	16.9	7.5	129443.0	-9.4	17066.1	1.13E-07	0.7	0.75	0.5





Hydraulic Conductivity Test - Altamont - Store-and-Release

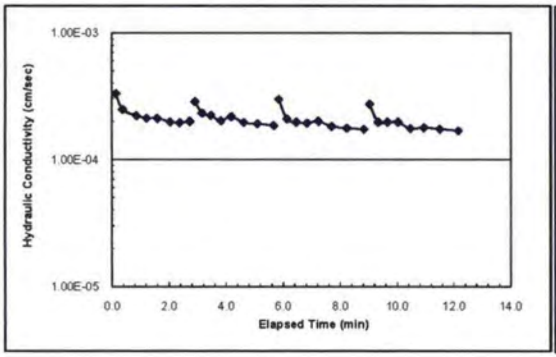
ASTM D 5084 - 00

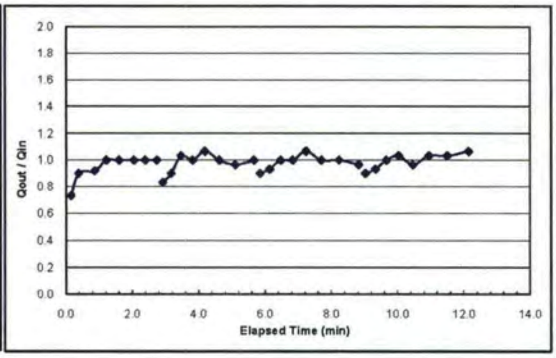
Sample I.D.	**305-mm ALT - ML - 3**		**Test Date :**	**12/27/07**	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	5	cm^2
Weight of wet sample =	22402.9	(g)	Sample Water Content =	18.9	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.69	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	18.90

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/27/2007 12:00	0.0	24.0	0.0	24.0	0.0				
12/27/2007 12:00	3.0	21.8	9.0	18.8	0.2	3.29E-04	0.7	15	11
12/27/2007 12:00	6.0	19.1	14.0	13.1	0.4	2.46E-04	0.9	15	13.5
12/27/2007 12:00	11.0	14.5	29.0	3.5	0.9	2.20E-04	0.9	25	23
12/27/2007 12:01	14.0	11.5	21.0	-2.5	1.2	2.11E-04	1.0	15	15
12/27/2007 12:01	17.0	8.5	23.0	-8.5	1.6	2.10E-04	1.0	15	15
12/27/2007 12:02	20.0	5.5	27.0	-14.5	2.0	1.97E-04	1.0	15	15
12/27/2007 12:02	22.0	3.5	20.0	-18.5	2.4	1.94E-04	1.0	10	10
12/27/2007 12:02	24.0	1.5	21.0	-22.5	2.7	2.00E-04	1.0	20	20
12/27/2007 12:00	0.0	24.0	0.0	24.0	2.7				
12/27/2007 12:00	3.0	21.5	11.0	18.5	2.9	2.85E-04	0.8	15	12.5
12/27/2007 12:00	6.0	18.8	15.0	12.8	3.2	2.31E-04	0.9	15	13.5
12/27/2007 12:00	9.0	15.7	18.0	6.7	3.5	2.21E-04	1.0	15	15.5
12/27/2007 12:01	12.0	12.7	21.0	0.7	3.8	2.02E-04	1.0	15	15
12/27/2007 12:01	15.0	9.5	22.0	-5.5	4.2	2.17E-04	1.1	15	16
12/27/2007 12:01	18.0	6.5	26.0	-11.5	4.6	1.95E-04	1.0	15	15
12/27/2007 12:02	21.0	3.6	29.0	-17.4	5.1	1.90E-04	1.0	15	14.5
12/27/2007 12:02	24.0	0.6	34.0	-23.4	5.7	1.85E-04	1.0	15	15
12/27/2007 12:00	0.0	24.0	0.0	24.0	5.7				
12/27/2007 12:00	3.0	21.3	11.0	18.3	5.9	2.96E-04	0.9	15	13.5
12/27/2007 12:00	6.0	18.5	17.0	12.5	6.1	2.08E-04	0.9	15	14
12/27/2007 12:00	9.0	15.5	20.0	6.5	6.5	1.96E-04	1.0	15	15
12/27/2007 12:01	12.0	12.5	22.0	0.5	6.8	1.93E-04	1.0	15	15
12/27/2007 12:01	15.0	9.3	24.0	-5.7	7.2	1.99E-04	1.1	15	16
12/27/2007 12:02	18.0	6.3	28.0	-11.7	7.7	1.82E-04	1.0	15	15
12/27/2007 12:02	21.0	3.3	32.0	-17.7	8.2	1.76E-04	1.0	15	15
12/27/2007 12:03	24.0	0.4	36.0	-23.6	8.8	1.72E-04	1.0	15	14.5
12/27/2007 12:00	0.0	24.0	0.0	24.0	8.8				
12/27/2007 12:00	3.0	21.3	12.0	18.3	9.0	2.71E-04	0.9	15	13.5
12/27/2007 12:00	6.0	18.5	18.0	12.5	9.3	1.96E-04	0.9	15	14
12/27/2007 12:00	9.0	15.5	20.0	6.5	9.7	1.96E-04	1.0	15	15
12/27/2007 12:01	12.0	12.4	22.0	0.4	10.0	1.96E-04	1.0	15	15.5
12/27/2007 12:01	15.0	9.5	26.0	-5.5	10.5	1.75E-04	1.0	15	14.5
12/27/2007 12:02	18.0	6.4	29.0	-11.6	11.0	1.78E-04	1.0	15	15.5
12/27/2007 12:02	21.0	3.3	33.0	-17.7	11.5	1.74E-04	1.0	15	15.5
12/27/2007 12:03	24.0	0.1	39.0	-23.9	12.2	1.68E-04	1.1	15	16





Hydraulic Conductivity Test - Altamont - Composite

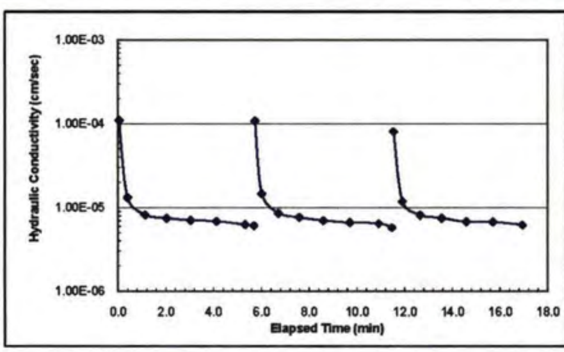
ASTM D 5084 - 00

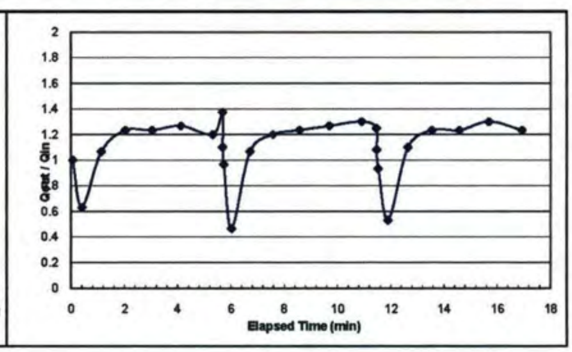
Sample I.D.	305-mm CMP - SDRI		Test Date :	1/29/07	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	24539.3	(g)	Sample Water Content =	16.4	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.90	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	16.40

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out}/Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
1/31/2007 12:00	0.0	24.0	0.0	24.0	0.0				
1/31/2007 12:00	3.0	21.0	3.0	18.0	0.1	1.10E-04	1.0	3	3
1/31/2007 12:00	6.0	19.1	21.0	13.1	0.4	1.32E-05	0.6	3	1.9
1/31/2007 12:01	9.0	15.9	44.0	6.9	1.1	8.23E-06	1.1	3	3.2
1/31/2007 12:02	12.0	12.2	54.0	0.2	2.0	7.52E-06	1.2	3	3.7
1/31/2007 12:03	15.0	8.5	60.0	-6.5	3.0	7.04E-06	1.2	3	3.7
1/31/2007 12:04	18.0	4.7	65.0	-13.3	4.1	6.88E-06	1.3	3	3.8
1/31/2007 12:05	21.0	1.1	72.0	-19.9	5.3	6.29E-06	1.2	3	3.6
1/31/2007 12:05	21.8	0.0	22.0	-21.8	5.7	6.10E-06	1.4	0.8	1.1
1/31/2007 12:00	0.0	24.0	0.0	24.0	5.7				
1/31/2007 12:00	3.0	21.1	3.0	18.1	5.7	1.08E-04	1.0	3	2.9
1/31/2007 12:00	6.0	19.7	17.0	13.7	6.0	1.46E-05	0.5	3	1.4
1/31/2007 12:01	9.0	16.5	42.0	7.5	6.7	8.59E-06	1.1	3	3.2
1/31/2007 12:01	12.0	12.9	52.0	0.9	7.6	7.66E-06	1.2	3	3.6
1/31/2007 12:02	15.0	9.2	60.0	-5.8	8.6	7.01E-06	1.2	3	3.7
1/31/2007 12:04	18.0	5.4	67.0	-12.6	9.7	6.64E-06	1.3	3	3.8
1/31/2007 12:05	21.0	1.5	73.0	-19.5	10.9	6.46E-06	1.3	3	3.9
1/31/2007 12:05	22.2	0.0	33.0	-22.2	11.5	5.78E-06	1.3	1.2	1.5
1/31/2007 12:00	0.0	24.0	0.0	24.0	11.5				
1/31/2007 12:00	3.0	21.2	4.0	18.2	11.5	7.97E-05	0.9	3	2.8
1/31/2007 12:00	6.0	19.6	22.0	13.6	11.9	1.18E-05	0.5	3	1.6
1/31/2007 12:01	9.0	16.3	45.0	7.3	12.7	8.16E-06	1.1	3	3.3
1/31/2007 12:02	12.0	12.6	54.0	0.6	13.6	7.50E-06	1.2	3	3.7
1/31/2007 12:03	15.0	8.9	62.0	-6.1	14.6	6.80E-06	1.2	3	3.7
1/31/2007 12:04	18.0	5.0	67.0	-13.0	15.7	6.75E-06	1.3	3	3.9
1/31/2007 12:05	21.0	1.3	74.0	-19.7	16.9	6.20E-06	1.2	3	3.7





Hydraulic Conductivity Test - Altamont - Composite

ASTM D 5084 - 00

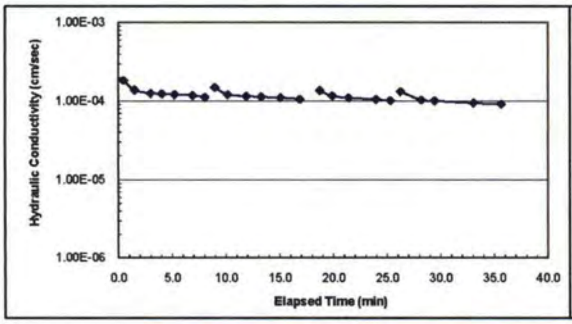
Sample I.D.	150-mm CMP - SDRI		Test Date :	2/20/08	
Cell Pressure =	42.1	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.2	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	3084.4	(g)	Sample Water Content =	17.3	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.89	g/cm^3

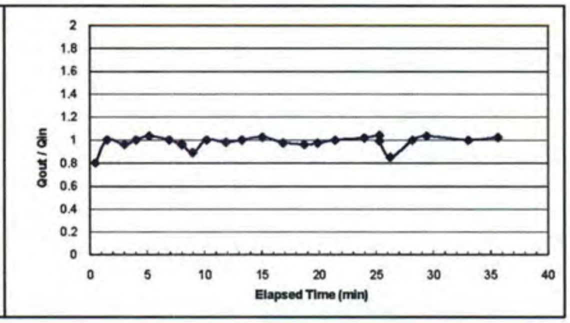
$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	17.33

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/20/2008 12:00	0.0	24.0	0.0	24.0	0.0				
2/20/2008 12:00	3.0	21.6	29.0	18.6	0.5	1.84E-04	0.8	15	12
2/20/2008 12:01	7.0	17.6	61.0	10.6	1.5	1.38E-04	1.0	20	20
2/20/2008 12:03	12.0	12.8	90.0	0.8	3.0	1.26E-04	1.0	25	24
2/20/2008 12:04	15.0	9.8	62.0	-5.2	4.0	1.23E-04	1.0	15	15
2/20/2008 12:05	18.0	6.7	69.0	-11.3	5.2	1.21E-04	1.0	15	15.5
2/20/2008 12:06	22.0	2.7	103.0	-19.3	6.9	1.18E-04	1.0	20	20
2/20/2008 12:08	24.3	0.5	67.0	-23.8	8.0	1.12E-04	1.0	11.5	11
2/20/2008 12:00	0.0	24.0	0.0	24.0	8.0				
2/20/2008 12:00	4.5	20.0	57.0	15.5	9.0	1.50E-04	0.9	22.5	20
2/20/2008 12:02	8.5	16.0	72.0	7.5	10.2	1.21E-04	1.0	20	20
2/20/2008 12:03	13.5	11.1	103.0	-2.4	11.9	1.16E-04	1.0	25	24.5
2/20/2008 12:05	17.0	7.6	83.0	-9.4	13.3	1.12E-04	1.0	17.5	17.5
2/20/2008 12:07	21.0	3.5	108.0	-17.5	15.1	1.11E-04	1.0	20	20.5
2/20/2008 12:08	24.5	0.1	108.0	-24.4	16.9	1.05E-04	1.0	17.5	17
2/20/2008 12:00	0.0	24.0	0.0	24.0	16.9				
2/20/2008 12:01	7.5	16.8	112.0	9.3	18.7	1.36E-04	1.0	37.5	36
2/20/2008 12:03	11.0	13.4	69.0	2.4	19.9	1.16E-04	1.0	17.5	17
2/20/2008 12:04	15.0	9.4	92.0	-5.6	21.4	1.10E-04	1.0	20	20
2/20/2008 12:07	20.5	3.8	152.0	-16.7	24.0	1.04E-04	1.0	27.5	28
2/20/2008 12:08	23.0	1.2	81.0	-21.8	25.3	1.01E-04	1.0	12.5	13
2/20/2008 12:00	0.0	24.0	0.0	24.0	25.3				
2/20/2008 12:00	4.0	20.6	56.0	16.6	26.2	1.32E-04	0.9	20	17
2/20/2008 12:02	9.5	15.1	117.0	5.6	28.2	1.03E-04	1.0	27.5	27.5
2/20/2008 12:04	12.5	12.0	73.0	-0.5	29.4	1.00E-04	1.0	15	15.5
2/20/2008 12:07	20.0	4.5	219.0	-15.5	33.1	9.39E-05	1.0	37.5	37.5
2/20/2008 12:10	24.3	0.1	155.0	-24.2	35.6	9.10E-05	1.0	21.5	22

note: a pre-existing fracture cross cut the diameter of the sample.





Hydraulic Conductivity Test - Altamont - Composite

ASTM D 5084 - 00

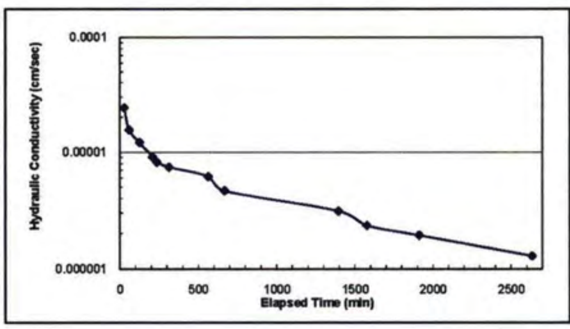
Sample I.D.	75-mm CMP - SDRI	Test Date :	3/11/08

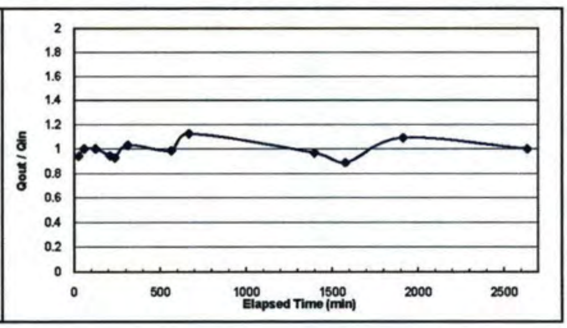
Cell Pressure =	42.4	psi	Diameter of Sample, D =	5.6	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	2.8	cm
Outflow Pressre =	40.7	psi	Area of Sample, A =	24.6	cm^2
Pressure Difference =	0.4	psi	Sample Volume, V =	67.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	10.2		a_{out} =	5	cm^2
Weight of wet sample =	314.1	(g)	Sample Water Content =	19.6	(%)
Wet Density =	4.6	g/cm^3	Dry Density =	3.88	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	19.58

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/11/2008 12:00	0.0	24.0	0.0	24.0	0.0				
3/11/2008 12:26	3.5	20.7	1612.0	17.2	26.9	2.42E-05	0.9	17.5	16.5
3/11/2008 12:58	5.8	18.4	1916.0	12.6	58.8	1.56E-05	1.0	11.5	11.5
3/11/2008 14:04	9.0	15.2	3938.0	6.2	124.4	1.21E-05	1.0	16	16
3/11/2008 15:28	11.7	12.7	5069.0	1.0	208.9	9.14E-06	0.9	13.5	12.75
3/11/2008 15:55	12.4	12.0	1610.0	-0.4	235.7	8.24E-06	0.9	3.5	3.25
3/11/2008 17:13	14.0	10.4	4659.0	-3.7	313.4	7.47E-06	1.0	8	8.25
3/11/2008 21:24	17.5	6.9	15076.0	-10.6	564.7	6.18E-06	1.0	17.5	17.25
3/11/2008 23:06	18.3	6.0	6121.0	-12.3	666.7	4.65E-06	1.1	4	4.5
3/12/2008 11:16	21.4	3.0	43776.0	-18.4	1396.3	3.10E-06	1.0	15.5	15
3/12/2008 14:18	21.9	2.6	10905.0	-19.3	1578.0	2.34E-06	0.9	2.25	2
3/12/2008 19:52	22.4	2.0	20095.0	-20.4	1913.0	1.93E-06	1.1	2.75	3
3/13/2008 7:55	23.1	1.3	43328.0	-21.8	2635.1	1.29E-06	1.0	3.5	3.5





Hydraulic Conductivity Test - Altamont - Composite

ASTM D 5084 - 00

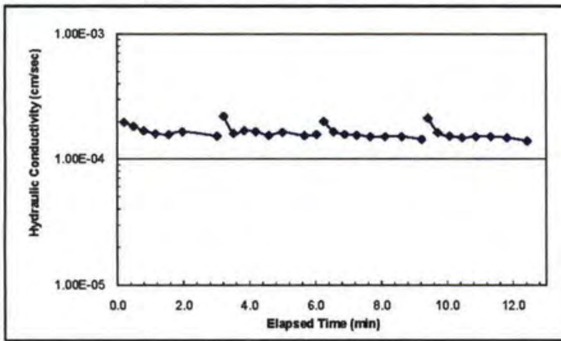
Sample I.D.	305-mm CMP - CL - 1	Test Date :	12/28/07

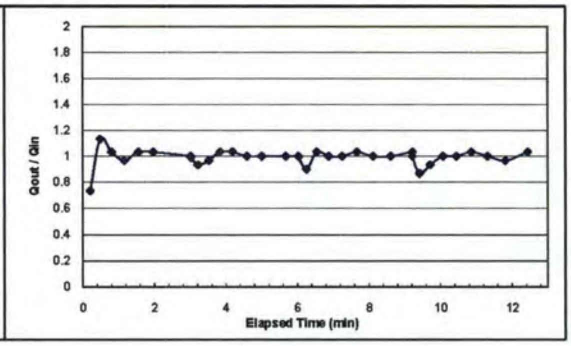
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	4	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	4	cm^2
Weight of wet sample =	21994.7	(g)	Sample Water Content =	16.9	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.69	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	16.90

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/28/2007 12:00	0.0	24.0	0.0	24.0	0.0				
12/28/2007 12:00	3.0	21.8	12.0	18.8	0.2	1.97E-04	0.7	12	8.8
12/28/2007 12:00	6.0	18.4	17.0	12.4	0.5	1.83E-04	1.1	12	13.6
12/28/2007 12:00	9.0	15.3	19.0	6.3	0.8	1.68E-04	1.0	12	12.4
12/28/2007 12:01	12.0	12.4	21.0	0.4	1.1	1.59E-04	1.0	12	11.6
12/28/2007 12:01	15.0	9.3	24.0	-5.7	1.5	1.57E-04	1.0	12	12.4
12/28/2007 12:01	18.0	6.2	25.0	-11.8	2.0	1.66E-04	1.0	12	12.4
12/28/2007 12:03	24.0	0.2	63.0	-23.8	3.0	1.52E-04	1.0	24	24
12/28/2007 12:00	0.0	24.0	0.0	24.0	3.0				
12/28/2007 12:00	3.0	21.2	12.0	18.2	3.2	2.21E-04	0.9	12	11.2
12/28/2007 12:00	6.0	18.3	18.0	12.3	3.5	1.60E-04	1.0	12	11.6
12/28/2007 12:00	9.0	15.2	19.0	6.2	3.8	1.69E-04	1.0	12	12.4
12/28/2007 12:01	12.0	12.1	21.0	0.1	4.2	1.65E-04	1.0	12	12.4
12/28/2007 12:01	15.0	9.1	24.0	-5.9	4.6	1.55E-04	1.0	12	12
12/28/2007 12:01	18.0	6.1	25.0	-11.9	5.0	1.63E-04	1.0	12	12
12/28/2007 12:02	22.0	2.1	40.0	-19.9	5.7	1.54E-04	1.0	16	16
12/28/2007 12:03	24.0	0.1	22.0	-23.9	6.0	1.57E-04	1.0	8	8
12/28/2007 12:00	0.0	24.0	0.0	24.0	6.0				
12/28/2007 12:00	3.0	21.3	13.0	18.3	6.3	2.00E-04	0.9	12	10.8
12/28/2007 12:00	6.0	18.2	18.0	12.2	6.6	1.65E-04	1.0	12	12.4
12/28/2007 12:00	9.0	15.2	20.0	6.2	6.9	1.58E-04	1.0	12	12
12/28/2007 12:01	12.0	12.2	22.0	0.2	7.3	1.55E-04	1.0	12	12
12/28/2007 12:01	15.0	9.1	25.0	-5.9	7.7	1.51E-04	1.0	12	12.4
12/28/2007 12:02	18.0	6.1	27.0	-11.9	8.1	1.51E-04	1.0	12	12
12/28/2007 12:02	21.0	3.1	30.0	-17.9	8.6	1.51E-04	1.0	12	12
12/28/2007 12:03	24.0	0.0	36.0	-24.0	9.2	1.44E-04	1.0	12	12.4
12/28/2007 12:00	0.0	24.0	0.0	24.0	9.2				
12/28/2007 12:00	3.0	21.4	12.0	18.4	9.4	2.13E-04	0.9	12	10.4
12/28/2007 12:00	6.0	18.4	18.0	12.4	9.7	1.62E-04	0.9	24	22.4
12/28/2007 12:00	9.0	15.3	21.0	6.3	10.1	1.52E-04	1.0	12	12.4
12/28/2007 12:01	12.0	12.3	23.0	0.3	10.5	1.48E-04	1.0	12	12
12/28/2007 12:01	15.0	9.2	25.0	-5.8	10.9	1.51E-04	1.0	12	12.4
12/28/2007 12:02	18.0	6.2	27.0	-11.8	11.3	1.51E-04	1.0	12	12
12/28/2007 12:02	21.0	3.3	30.0	-17.7	11.8	1.48E-04	1.0	12	11.6
12/28/2007 12:03	24.0	0.2	37.0	-23.8	12.4	1.39E-04	1.0	12	12.4





Hydraulic Conductivity Test - Altamont - Composite

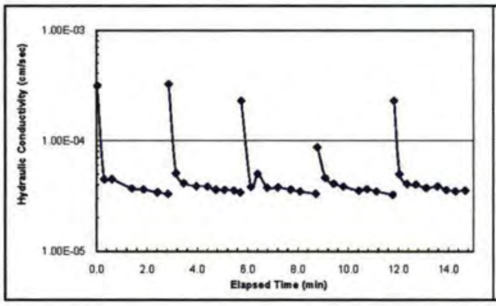
ASTM D 5084 - 00

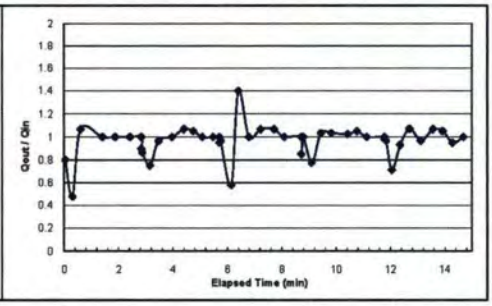
Sample I.D.	305-mm CMP - CL - 2		Test Date :	12/24/07	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	1	cm^2
Weight of wet sample =	25192.5	(g)	Sample Water Content =	16.5	(%)
Wet Density =	2.3	g/cm^3	Dry Density =	1.94	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	16.52

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
12/24/2007 12:00	0.0	24.0	0.0	24.0	0.0				
12/24/2007 12:00	3.0	21.6	2.0	18.6	0.0	3.08E-04	0.8	3	2.4
12/24/2007 12:00	7.0	19.7	16.0	12.7	0.3	4.48E-05	0.5	4	1.9
12/24/2007 12:00	10.0	16.5	18.0	6.5	0.6	4.50E-05	1.1	3	3.2
12/24/2007 12:01	16.0	10.5	48.0	-5.5	1.4	3.69E-05	1.0	6	6
12/24/2007 12:01	19.0	7.5	28.0	-11.5	1.9	3.62E-05	1.0	3	3
12/24/2007 12:02	22.0	4.5	33.0	-17.5	2.4	3.40E-05	1.0	3	3
12/24/2007 12:02	24.0	2.5	25.0	-21.5	2.8	3.29E-05	1.0	2	2
12/24/2007 12:00	0.0	24.0	0.0	24.0	2.8				
12/24/2007 12:00	3.0	21.4	2.0	18.4	2.9	3.20E-04	0.9	3	2.6
12/24/2007 12:00	7.0	18.4	17.0	11.4	3.2	5.05E-05	0.8	4	3
12/24/2007 12:00	10.0	15.5	19.0	5.5	3.5	4.12E-05	1.0	3	2.9
12/24/2007 12:01	14.0	11.5	30.0	-2.5	4.0	3.88E-05	1.0	4	4
12/24/2007 12:01	17.0	8.3	26.0	-8.7	4.4	3.85E-05	1.1	3	3.2
12/24/2007 12:01	19.0	6.2	20.0	-12.8	4.7	3.59E-05	1.1	2	2.1
12/24/2007 12:02	21.0	4.2	21.0	-16.8	5.1	3.58E-05	1.0	2	2
12/24/2007 12:02	23.0	2.2	23.0	-20.8	5.5	3.53E-05	1.0	2	2
12/24/2007 12:02	24.1	1.1	14.0	-23.0	5.7	3.39E-05	1.0	1.1	1.1
12/24/2007 12:00	0.0	24.0	0.0	24.0	5.7				
12/24/2007 12:00	3.0	21.1	3.0	18.1	5.8	2.25E-04	1.0	3	2.9
12/24/2007 12:00	7.5	18.5	23.0	11.0	6.1	3.80E-05	0.6	4.5	2.6
12/24/2007 12:00	10.0	15.0	16.0	5.0	6.4	5.00E-05	1.4	2.5	3.5
12/24/2007 12:01	13.0	12.0	23.0	-1.0	6.8	3.77E-05	1.0	3	3
12/24/2007 12:01	16.0	8.8	26.0	-7.2	7.2	3.76E-05	1.1	3	3.2
12/24/2007 12:02	19.0	5.6	30.0	-13.4	7.7	3.60E-05	1.1	3	3.2
12/24/2007 12:02	21.0	3.6	22.0	-17.4	8.1	3.46E-05	1.0	2	2
12/24/2007 12:03	24.0	0.6	38.0	-23.4	8.7	3.31E-05	1.0	3	3
12/24/2007 12:00	0.0	21.0	0.0	21.0	8.7				
12/24/2007 12:00	3.0	21.0	4.0	18.0	8.8	8.72E-05	1.0	3	0
12/24/2007 12:00	7.0	17.9	19.0	10.9	9.1	4.61E-05	0.8	4	3.1
12/24/2007 12:00	10.0	14.8	20.0	4.8	9.4	4.08E-05	1.0	3	3.1
12/24/2007 12:01	13.0	11.7	23.0	-1.3	9.8	3.84E-05	1.0	3	3.1
12/24/2007 12:01	17.0	7.6	37.0	-9.4	10.4	3.52E-05	1.0	4	4.1
12/24/2007 12:02	19.0	5.5	20.0	-13.5	10.8	3.64E-05	1.1	2	2.1
12/24/2007 12:02	21.0	3.5	22.0	-17.5	11.1	3.46E-05	1.0	2	2
12/24/2007 12:03	24.0	0.5	39.0	-23.5	11.8	3.23E-05	1.0	3	3
12/24/2007 12:00	0.0	24.0	0.0	24.0	11.8				
12/24/2007 12:00	3.0	21.1	3.0	18.1	11.8	2.25E-04	1.0	3	2.9
12/24/2007 12:00	6.1	18.9	13.0	12.8	12.1	4.97E-05	0.7	3.1	2.2
12/24/2007 12:00	9.0	16.2	18.0	7.2	12.4	4.05E-05	0.9	2.9	2.7
12/24/2007 12:00	11.9	13.1	21.0	1.2	12.7	4.01E-05	1.1	2.9	3.1
12/24/2007 12:01	15.0	10.1	25.0	-4.9	13.1	3.72E-05	1.0	3.1	3
12/24/2007 12:01	18.0	6.9	27.0	-11.1	13.6	3.85E-05	1.1	3	3.2
12/24/2007 12:02	20.0	4.8	21.0	-15.2	13.9	3.57E-05	1.1	2	2.1
12/24/2007 12:02	22.0	2.9	22.0	-19.1	14.3	3.48E-05	1.0	2	1.9
12/24/2007 12:02	24.0	0.9	24.0	-23.1	14.7	3.54E-05	1.0	2	2





Hydraulic Conductivity Test - Altamont - Composite

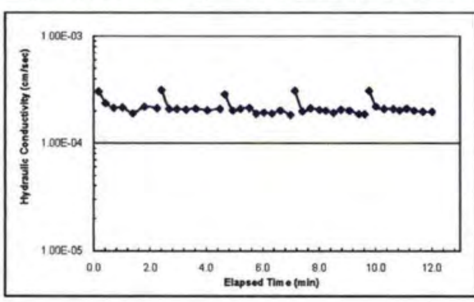
ASTM D 5084 - 00

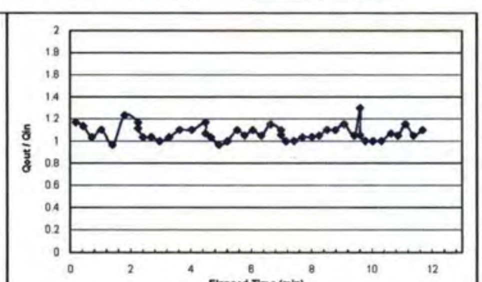
Sample I.D.	305-mm CMP - CL - 3			Test Date :	12/29/07	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	41.0	psi	Length of Sample, L =	17.1	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2	
Pressure Difference =	1.0	psi	Sample Volume, V =	12510.0	cm^3	
Effective Stress =	1.50	psi	a_{in} =	4	cm^2	
Hydraulic Gradient, i =	4.1		a_{out} =	4	cm^2	
Weight of wet sample =	25442.0	(g)	Sample Water Content =	15.8	(%)	
Wet Density =	2.0	g/cm^3	Dry Density =	1.76	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	15.80

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
12/28/2007 12:00	0.0	24.0	0.0	24.0	0.0				
12/28/2007 12:00	3.0	20.5	11.0	17.5	0.2	3.05E-04	1.2	12	14
12/28/2007 12:00	6.0	17.1	15.0	11.1	0.4	2.37E-04	1.1	12	13.6
12/28/2007 12:00	9.0	14.0	17.0	5.0	0.7	2.15E-04	1.0	12	12.4
12/28/2007 12:01	12.0	10.7	19.0	-1.3	1.0	2.16E-04	1.1	12	13.2
12/28/2007 12:01	15.0	7.8	22.0	-7.2	1.4	1.91E-04	1.0	12	11.6
12/28/2007 12:01	18.0	4.1	24.0	-13.9	1.8	2.20E-04	1.2	12	14.8
12/28/2007 12:02	21.0	0.6	27.0	-20.4	2.3	2.13E-04	1.2	12	14
12/28/2007 12:00	0.0	24.0	0.0	24.0	2.3				
12/28/2007 12:00	3.0	20.9	10.0	17.9	2.4	3.14E-04	1.0	12	12.4
12/28/2007 12:00	6.0	17.8	16.0	11.8	2.7	2.10E-04	1.0	12	12.4
12/28/2007 12:00	9.0	14.8	17.0	5.8	3.0	2.10E-04	1.0	12	12
12/28/2007 12:01	12.0	11.7	19.0	-0.3	3.3	2.07E-04	1.0	12	12.4
12/28/2007 12:01	15.0	8.4	21.0	-6.6	3.6	2.11E-04	1.1	12	13.2
12/28/2007 12:01	18.0	5.1	24.0	-12.9	4.0	2.04E-04	1.1	12	13.2
12/28/2007 12:02	21.0	1.6	27.0	-19.4	4.5	2.09E-04	1.2	12	14
12/28/2007 12:00	0.0	24.0	0.0	24.0	4.5				
12/28/2007 12:00	3.0	20.9	11.0	17.9	4.7	2.86E-04	1.0	12	12.4
12/28/2007 12:00	6.0	18.0	16.0	12.0	4.9	2.03E-04	1.0	12	11.6
12/28/2007 12:00	9.0	15.0	17.0	6.0	5.2	2.09E-04	1.0	12	12
12/28/2007 12:01	12.0	11.7	19.0	-0.3	5.5	2.13E-04	1.1	12	13.2
12/28/2007 12:01	14.0	9.6	15.0	-4.4	5.8	1.89E-04	1.1	8	8.4
12/28/2007 12:01	16.0	7.4	16.0	-8.6	6.0	1.93E-04	1.1	8	8.8
12/28/2007 12:01	18.0	5.3	17.0	-12.7	6.3	1.90E-04	1.1	8	8.4
12/28/2007 12:02	20.0	3.0	18.0	-17.0	6.6	2.02E-04	1.2	8	9.2
12/28/2007 12:02	22.0	0.8	21.0	-21.2	7.0	1.84E-04	1.1	8	8.8
12/28/2007 12:00	0.0	24.0	0.0	24.0	7.0				
12/28/2007 12:00	3.0	21.0	10.0	18.0	7.1	3.09E-04	1.0	12	12
12/28/2007 12:00	6.0	18.2	16.0	12.2	7.4	1.99E-04	1.0	12	11.2
12/28/2007 12:00	9.0	15.1	17.0	6.1	7.7	2.12E-04	1.0	12	12.4
12/28/2007 12:01	12.0	12.0	19.0	0.0	8.0	2.06E-04	1.0	12	12.4
12/28/2007 12:01	14.0	9.9	14.0	-4.1	8.3	2.02E-04	1.1	8	8.4
12/28/2007 12:01	16.0	7.7	16.0	-8.3	8.5	1.92E-04	1.1	8	8.8
12/28/2007 12:01	18.0	5.5	16.0	-12.5	8.8	2.06E-04	1.1	8	8.8
12/28/2007 12:02	20.0	3.2	18.0	-16.8	9.1	2.02E-04	1.2	8	9.2
12/28/2007 12:02	22.0	1.1	20.0	-20.9	9.4	1.87E-04	1.1	8	8.4
12/28/2007 12:02	23.0	-0.2	12.0	-23.2	9.6	1.87E-04	1.3	4	5.2
12/28/2007 12:00	0.0	24.0	0.0	24.0	9.6				
12/28/2007 12:00	3.0	21.0	10.0	18.0	9.8	3.09E-04	1.0	12	12
12/28/2007 12:00	6.0	18.0	15.0	12.0	10.0	2.20E-04	1.0	12	12
12/28/2007 12:00	9.0	15.0	17.0	6.0	10.3	2.09E-04	1.0	12	12
12/28/2007 12:01	12.0	11.8	19.0	-0.2	10.6	2.10E-04	1.1	12	12.8
12/28/2007 12:01	14.0	9.7	14.0	-4.3	10.9	2.02E-04	1.1	8	8.4
12/28/2007 12:01	16.0	7.4	15.0	-8.6	11.1	2.11E-04	1.2	8	9.2
12/28/2007 12:01	18.0	5.3	16.0	-12.7	11.4	2.02E-04	1.1	8	8.4
12/28/2007 12:02	20.0	3.1	18.0	-16.9	11.7	1.98E-04	1.1	8	8.8
12/28/2007 12:02	22.0	0.8	20.0	-21.2	12.0	1.97E-04	1.2	8	9.2





Hydraulic Conductivity Test - Altamont - Composite

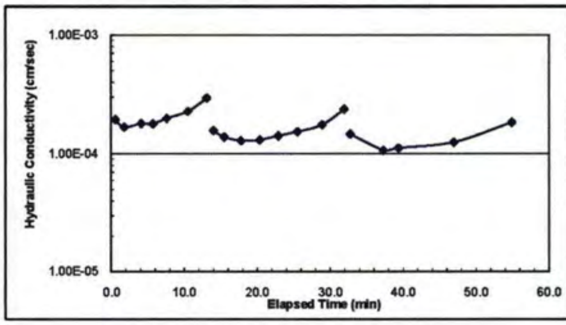
ASTM D 5084 - 00

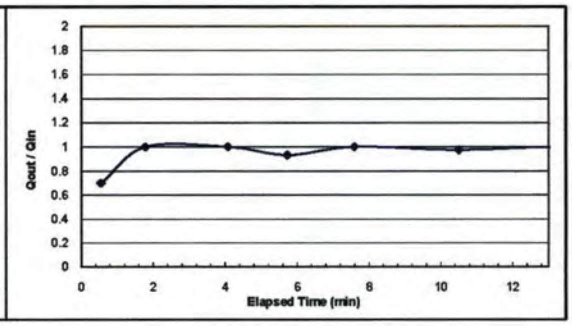
Sample I.D.	150-mm CMP - CL - 3		Test Date :	2/20/08	
Cell Pressure =	42.3	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	7.4	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1343.7	cm^3
Effective Stress =	1.53	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	4.3		a_{out} =	5	cm^2
Weight of wet sample =	2313.3	(g)	Sample Water Content =	19.9	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.44	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	19.86

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/20/2008 12:00	0.0	24.0	0.0	24.0	0.0				
2/20/2008 12:00	2.0	22.6	33.0	20.6	0.6	1.93E-04	0.7	10	7
2/20/2008 12:01	5.0	19.6	74.0	14.6	1.8	1.66E-04	1.0	15	15
2/20/2008 12:04	10.0	14.6	138.0	4.6	4.1	1.78E-04	1.0	25	25
2/20/2008 12:05	13.0	11.8	99.0	-1.2	5.7	1.78E-04	0.9	15	14
2/20/2008 12:07	16.0	8.8	112.0	-7.2	7.6	1.98E-04	1.0	15	15
2/20/2008 12:10	20.0	4.9	174.0	-15.1	10.5	2.26E-04	1.0	20	19.5
2/20/2008 12:13	23.0	1.9	155.0	-21.1	13.1	2.93E-04	1.0	15	15
2/20/2008 12:00	0.0	24.0	0.0	24.0	13.1				
2/20/2008 12:00	2.5	21.9	56.0	19.4	14.0	1.56E-04	0.8	12.5	10.5
2/20/2008 12:02	5.3	19.0	87.0	13.7	15.5	1.37E-04	1.0	14	14.5
2/20/2008 12:04	9.0	15.4	138.0	6.4	17.8	1.28E-04	1.0	18.5	18
2/20/2008 12:07	12.5	12.0	155.0	-0.5	20.4	1.30E-04	1.0	17.5	17
2/20/2008 12:09	15.5	9.0	153.0	-6.5	22.9	1.41E-04	1.0	15	15
2/20/2008 12:12	18.2	6.4	157.0	-11.8	25.5	1.52E-04	1.0	13.5	13
2/20/2008 12:15	21.2	3.5	204.0	-17.7	28.9	1.75E-04	1.0	15	14.5
2/20/2008 12:18	23.5	1.0	180.0	-22.5	31.9	2.37E-04	1.1	11.5	12.5
2/20/2008 12:00	0.0	24.0	0.0	24.0	31.9				
2/20/2008 12:00	2.0	22.2	49.0	20.2	32.7	1.46E-04	0.9	10	9
2/20/2008 12:05	8.5	15.7	273.0	7.2	37.3	1.07E-04	1.0	32.5	32.5
2/20/2008 12:07	11.0	13.2	125.0	2.2	39.4	1.11E-04	1.0	12.5	12.5
2/20/2008 12:15	18.3	5.9	458.0	-12.4	47.0	1.24E-04	1.0	36.5	36.5
2/20/2008 12:23	24.0	0.5	476.0	-23.5	54.9	1.82E-04	0.9	28.5	27





Hydraulic Conductivity Test - Altamont - Composite

ASTM D 5084 - 00

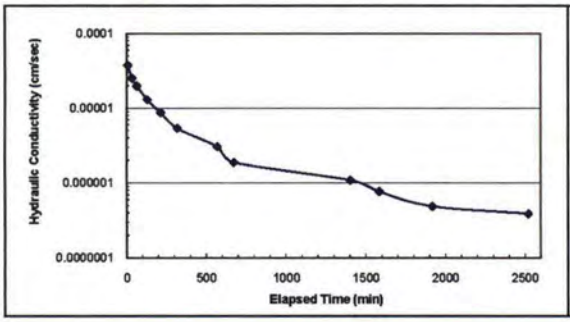
Sample I.D.	75-mm CMP - CL - 3	Test Date :	3/11/08

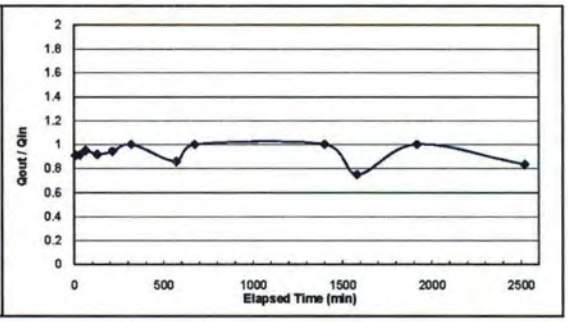
Cell Pressure =	42.4	psi	Diameter of Sample, D =	5.6	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	2.8	cm
Outflow Pressre =	40.8	psi	Area of Sample, A =	24.6	cm^2
Pressure Difference =	0.2	psi	Sample Volume, V =	69.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	318.3	(g)	Sample Water Content =	20.6	(%)
Wet Density =	4.6	g/cm^3	Dry Density =	3.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	20.61

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/11/2008 12:00	0.0	24.0	0.0	24.0	0.0				
3/11/2008 12:07	1.1	23.0	432.0	21.9	7.2	3.73E-05	0.9	5.5	5
3/11/2008 12:32	3.4	20.9	1488.0	17.5	32.0	2.49E-05	0.9	11.5	10.5
3/11/2008 13:03	5.4	19.0	1885.0	13.6	63.4	1.99E-05	0.9	10	9.5
3/11/2008 14:09	7.8	16.8	3972.0	9.0	129.6	1.30E-05	0.9	12	11
3/11/2008 15:33	9.5	15.2	5058.0	5.7	213.9	8.68E-06	0.9	8.5	8
3/11/2008 17:18	10.6	14.1	6284.0	3.5	318.7	5.34E-06	1.0	5.5	5.5
3/11/2008 21:29	12.0	12.9	15066.0	0.9	569.7	3.02E-06	0.9	7	6
3/11/2008 23:13	12.3	12.6	6228.0	0.3	673.5	1.87E-06	1.0	1.5	1.5
3/12/2008 11:21	13.4	11.5	43657.0	-1.9	1401.2	1.08E-06	1.0	5.5	5.5
3/12/2008 14:22	13.6	11.4	10873.0	-2.3	1582.4	7.63E-07	0.8	1	0.75
3/12/2008 19:57	13.8	11.2	20135.0	-2.7	1918.0	4.86E-07	1.0	1	1
3/13/2008 6:00	14.1	10.9	36133.0	-3.2	2520.2	3.88E-07	0.8	1.5	1.25





Hydraulic Conductivity Test - Apple Valley - Clay Cover

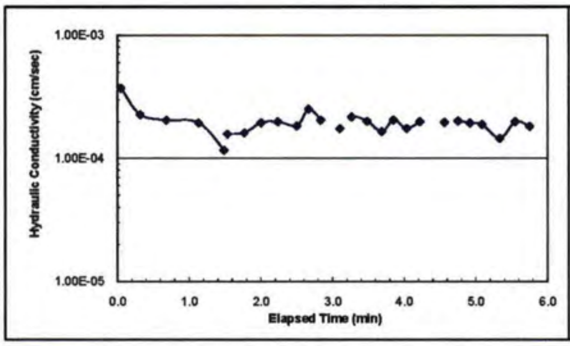
ASTM D 5084 - 00

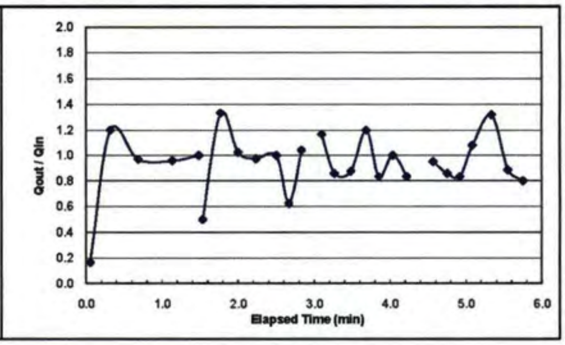
Sample I.D.	305-mm AV - B - 1 - C			Test Date :	8/21/07	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	42.4	psi	Length of Sample, L =	17.8	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2	
Pressure Difference =	2.4	psi	Sample Volume, V =	12973.3	cm^3	
Effective Stress =	1.50	psi	a_{in} =	5	cm^2	
Hydraulic Gradient, i =	9.5		a_{out} =	5	cm^2	
Weight of wet sample =	26172.3	(g)	Sample Water Content =	19.8	(%)	
Wet Density =	2.0	g/cm^3	Dry Density =	1.68	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	19.82

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/21/2007 12:00	0.0	24.0	0.0	24.0	0.0				
8/21/2007 12:00	3.0	23.5	3.0	20.5	0.1	3.72E-04	0.2	15	2.5
8/21/2007 12:00	8.0	17.5	16.0	9.5	0.3	2.28E-04	1.2	25	30
8/21/2007 12:00	14.5	11.2	22.0	-3.3	0.7	2.06E-04	1.0	32.5	31.5
8/21/2007 12:01	21.5	4.5	27.0	-17.0	1.1	1.95E-04	1.0	35	33.5
8/21/2007 12:01	24.5	1.5	21.0	-23.0	1.5	1.17E-04	1.0	15	15
8/21/2007 12:00	0.0	24.0	0.0	24.0	1.5				
8/21/2007 12:00	3.0	22.5	3.0	22.5	1.5	1.59E-04	0.5	15	7.5
8/21/2007 12:00	7.0	18.5	14.0	15.5	1.8	1.62E-04	1.3	15	20
8/21/2007 12:00	11.0	14.4	14.0	7.4	2.0	1.96E-04	1.0	20	20.5
8/21/2007 12:00	15.0	10.5	14.0	-0.5	2.2	2.00E-04	1.0	20	19.5
8/21/2007 12:01	19.0	6.5	16.0	-8.5	2.5	1.85E-04	1.0	20	20
8/21/2007 12:01	21.5	4.0	10.0	-15.0	2.7	2.52E-04	0.6	20	12.5
8/21/2007 12:01	23.7	1.4	10.0	-20.1	2.8	2.05E-04	1.0	12.5	13
8/21/2007 12:00	0.0	24.0	0.0	0.3	2.8				
8/21/2007 12:00	3.0	22.5	4.0	22.5	2.9	-1.88E-03			
8/21/2007 12:00	6.5	19.0	12.0	16.0	3.1	1.75E-04	1.2	15	17.5
8/21/2007 12:00	10.5	16.0	10.0	9.5	3.3	2.18E-04	0.9	17.5	15
8/21/2007 12:00	13.0	12.5	13.0	2.0	3.5	2.01E-04	0.9	20	17.5
8/21/2007 12:00	16.0	9.5	12.0	-3.5	3.7	1.66E-04	1.2	12.5	15
8/21/2007 12:01	18.5	7.0	10.0	-9.0	3.8	2.06E-04	0.8	15	12.5
8/21/2007 12:01	21.5	4.5	11.0	-14.0	4.0	1.76E-04	1.0	12.5	12.5
8/21/2007 12:01	23.5	2.0	11.0	-19.5	4.2	2.00E-04	0.8	15	12.5
8/21/2007 12:00	0.0	24.0	0.0	0.5	4.2				
8/21/2007 12:00	4.0	20.8	8.0	20.8	4.4	-8.62E-04			
8/21/2007 12:00	7.5	17.0	13.0	13.0	4.6	1.97E-04	1.0	20	19
8/21/2007 12:00	10.5	14.0	11.0	6.5	4.7	2.02E-04	0.9	17.5	15
8/21/2007 12:00	13.0	11.5	10.0	1.0	4.9	1.94E-04	0.8	15	12.5
8/21/2007 12:00	15.5	8.8	10.0	-4.2	5.1	1.89E-04	1.1	12.5	13.5
8/21/2007 12:01	19.0	5.5	15.0	-10.0	5.3	1.46E-04	1.3	12.5	16.5
8/21/2007 12:01	22.0	2.4	13.0	-16.6	5.5	1.99E-04	0.9	17.5	15.5
8/21/2007 12:01	24.5	0.0	12.0	-22.0	5.8	1.83E-04	0.8	15	12





Hydraulic Conductivity Test - Apple Valley - Clay Cover

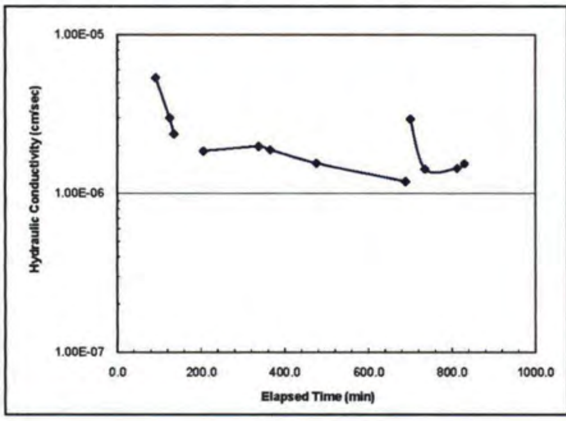
ASTM D 5084 - 00

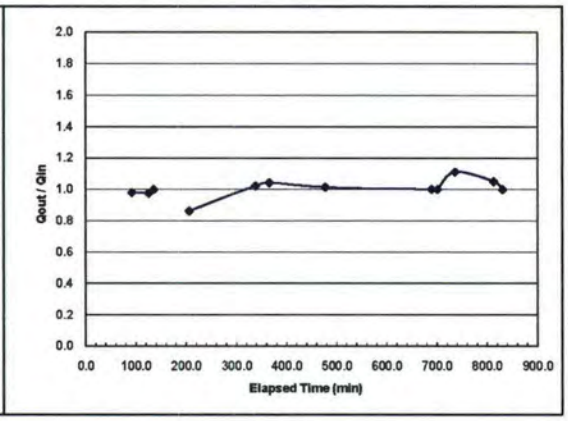
Sample I.D.	150-mm AV - B - 1 - C		Test Date :	8/21/07	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.7	psi	Length of Sample, L =	7.0	cm
Outflow Pressre =	40.7	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	1274.2	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	10.1		a_{out} =	5	cm^2
Weight of wet sample =	2550.0	(g)	Sample Water Content =	17.7	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.70	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
BB	30.39	216.06	188.09	17.74

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
5/19/2008 12:00	0.0	24.0	0.0	24.0	0.0				
5/19/2008 13:32	12.7	11.6	5530.0	-1.2	92.2	5.37E-06	1.0	63.5	62.25
5/19/2008 14:04	14.8	9.5	1968.0	-5.3	125.0	3.01E-06	1.0	10.5	10.25
5/19/2008 14:15	15.3	9.0	623.0	-6.3	135.3	2.38E-06	1.0	2.5	2.5
5/19/2008 12:00	0.0	24.0	0.0	24.0	135.3				
5/19/2008 13:10	4.0	20.6	4244.0	16.6	206.1	1.86E-06	0.9	20	17.25
5/19/2008 15:22	10.5	13.9	7930.0	3.4	338.2	1.98E-06	1.0	32.5	33.25
5/19/2008 15:50	11.7	12.7	1640.0	1.1	365.6	1.89E-06	1.0	5.75	6
5/19/2008 17:41	15.3	9.0	6699.0	-6.3	477.2	1.55E-06	1.0	18.25	18.5
5/19/2008 21:14	20.0	4.3	12751.0	-15.7	689.8	1.19E-06	1.0	23.5	23.5
5/19/2008 12:00	0.0	24.0	0.0	24.0	689.8				
5/19/2008 12:11	1.0	23.0	694.0	22.0	701.3	2.96E-06	1.0	5	5
5/19/2008 12:46	2.4	21.5	2102.0	19.2	736.3	1.43E-06	1.1	6.75	7.5
5/19/2008 14:03	5.3	18.4	4636.0	13.1	813.6	1.45E-06	1.1	14.75	15.5
5/19/2008 14:21	6.0	17.7	1047.0	11.7	831.1	1.55E-06	1.0	3.5	3.5





Hydraulic Conductivity Test - Apple Valley - Clay Cover

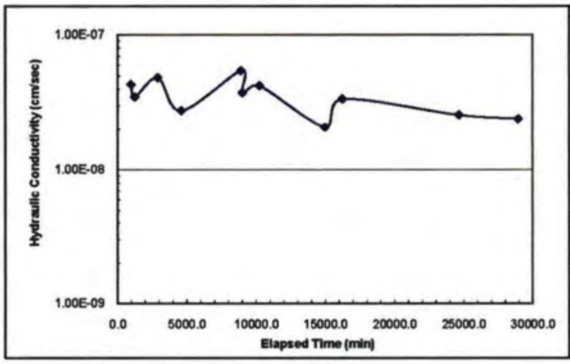
ASTM D 5084 - 00

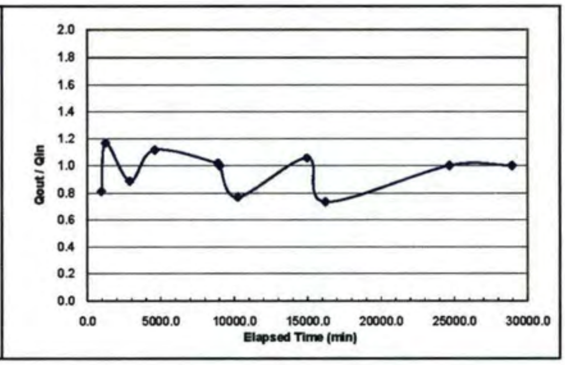
Sample I.D.	75-mm AV - B - 1 - C		Test Date :	6/2/08	
Cell Pressure =	41.8	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.3	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.53	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.5		a_{out} =	1	cm^2
Weight of wet sample =	314.4	(g)	Sample Water Content =	20.1	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.79	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
55	30.8	172	148.32	20.15

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
6/3/2008 12:54	1.0	23.4	0.0	22.4	0.0				
6/4/2008 5:03	2.6	22.1	58128.0	19.5	968.8	4.34E-08	0.8	1.6	1.3
6/4/2008 9:41	2.9	21.8	16647.0	18.9	1246.3	3.51E-08	1.2	0.3	0.35
6/5/2008 13:14	5.6	19.4	99227.0	13.8	2900.0	4.87E-08	0.9	2.7	2.4
6/6/2008 17:33	6.9	17.9	101917.0	11.0	4598.6	2.76E-08	1.1	1.3	1.45
6/9/2008 17:19	12.7	12.0	258332.0	-0.7	8904.2	5.48E-08	1.0	5.8	5.9
6/9/2008 19:23	12.8	11.9	7483.0	-0.9	9028.9	3.75E-08	1.0	0.1	0.1
6/10/2008 15:38	14.0	11.0	72886.0	-3.0	10243.7	4.24E-08	0.8	1.2	0.925
6/13/2008 22:27	15.8	9.1	283708.0	-6.7	14972.1	2.07E-08	1.1	1.8	1.9
6/14/2008 19:28	16.7	8.5	75705.0	-8.2	16233.9	3.37E-08	0.7	0.85	0.625
6/20/2008 15:58	19.9	5.3	505800.0	-14.6	24663.9	2.55E-08	1.0	3.2	3.2
6/23/2008 15:14	21.1	4.0	256548.0	-17.1	28939.7	2.38E-08	1.0	1.25	1.25





Hydraulic Conductivity Test - Apple Valley - Clay Cover

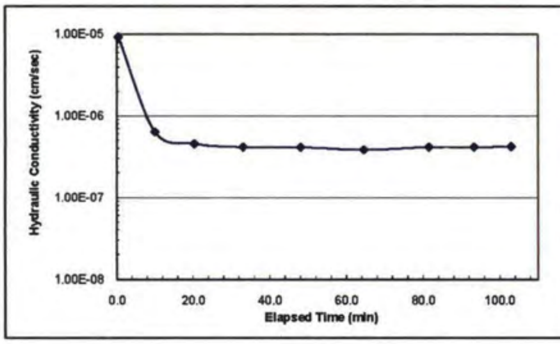
ASTM D 5084 - 00

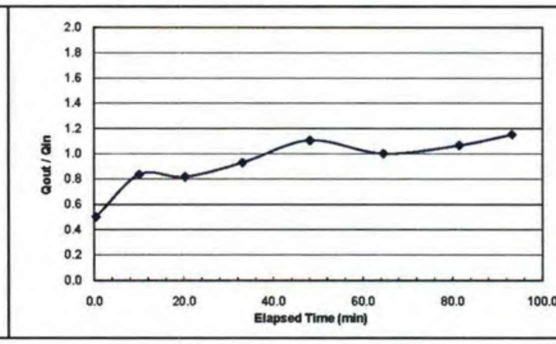
Sample I.D.	305-mm AV - B - 4 - C			Test Date :	8/20/07
Cell Pressure =	42.7	psi	Diameter of Sample, D =	31.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.9	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	779.1	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	12368.4	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	26149.6	(g)	Sample Water Content =	20.5	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.75	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	20.52

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/20/2007 12:00	0.0	23.0	0.0	23.0	0.0				
8/20/2007 12:00	3.0	21.5	26.0	18.5	0.4	9.30E-06	0.5	3	1.5
8/20/2007 12:10	6.6	18.5	575.0	11.9	10.0	6.36E-07	0.8	3.6	3
8/20/2007 12:20	9.3	16.3	616.0	7.0	20.3	4.55E-07	0.8	2.7	2.2
8/20/2007 12:33	12.1	13.7	768.0	1.6	33.1	4.14E-07	0.9	2.8	2.6
8/20/2007 12:48	15.0	10.5	901.0	-4.5	48.1	4.12E-07	1.1	2.9	3.2
8/20/2007 13:04	18.0	7.5	986.0	-10.5	64.5	3.84E-07	1.0	3	3
8/20/2007 13:21	21.1	4.2	1016.0	-16.9	81.5	4.14E-07	1.1	3.1	3.3
8/20/2007 13:33	23.1	1.9	707.0	-21.2	93.2	4.14E-07	1.2	2	2.3
8/20/2007 13:42	24.7	0.0	582.0	-24.7	102.9	4.20E-07	1.2	1.6	1.9





Hydraulic Conductivity Test - Apple Valley - Clay Cover

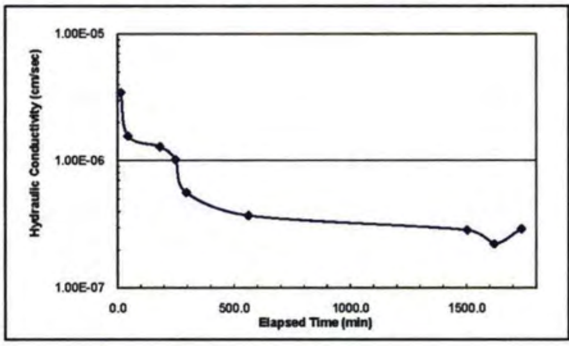
ASTM D 5084 - 00

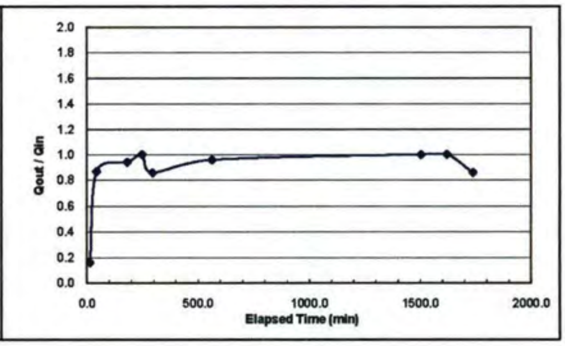
Sample I.D.	150-mm AV - B - 4 - C		Test Date :	5/27/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.7	psi	Length of Sample, L =	7.1	cm
Outflow Pressre =	40.7	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	1297.3	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	5	cm^2
Weight of wet sample =	2505.7	(g)	Sample Water Content =	22.9	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.57	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
144	30.44	222.54	186.7	22.94

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
5/27/2008 12:00	0.0	24.0	0.0	24.0	0.0				
5/27/2008 12:13	2.5	23.6	833.0	21.1	13.9	3.47E-06	0.2	12.5	2
5/27/2008 12:44	4.0	22.3	1831.0	18.3	44.4	1.57E-06	0.9	7.5	6.5
5/27/2008 15:01	9.0	17.6	8252.0	8.6	181.9	1.29E-06	0.9	25	23.5
5/27/2008 16:07	10.7	15.9	3963.0	5.2	248.0	1.02E-06	1.0	8.5	8.5
5/27/2008 16:54	11.4	15.3	2817.0	3.9	294.9	5.63E-07	0.9	3.5	3
5/27/2008 21:22	13.8	13.0	16027.0	-0.8	562.0	3.72E-07	1.0	12	11.5
5/28/2008 13:03	19.5	7.3	56479.0	-12.2	1503.4	2.86E-07	1.0	28.5	28.5
5/28/2008 14:59	20.0	6.8	6979.0	-13.2	1619.7	2.23E-07	1.0	2.5	2.5
5/28/2008 16:56	20.7	6.2	7024.0	-14.5	1736.7	2.93E-07	0.9	3.5	3





Hydraulic Conductivity Test - Apple Valley - Clay Cover

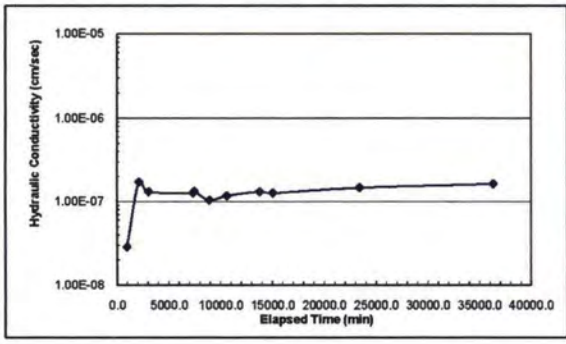
ASTM D 5084 - 00

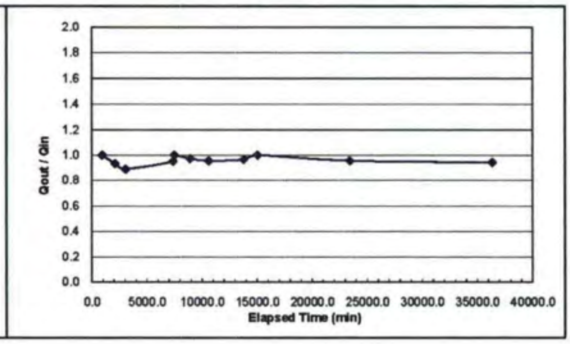
Sample I.D.	75-mm AV - B - 4 - C		Test Date :	6/4/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.9	psi	Area of Sample, A =	38.3	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	5	cm^2
Weight of wet sample =	279.8	(g)	Sample Water Content =	22.1	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.57	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2C	24.64	182.89	154.24	22.11

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
6/4/2008 6:13	1.7	22.9	0.0	21.2	0.0				
6/4/2008 21:50	1.9	22.7	56268.0	20.8	937.8	2.88E-08	1.0	1	1
6/5/2008 17:25	3.4	21.3	70482.0	17.9	2112.5	1.71E-07	0.9	7.5	7
6/6/2008 9:00	4.3	20.5	56065.0	16.2	3046.9	1.31E-07	0.9	4.5	4
6/9/2008 8:44	7.9	17.1	258282.0	9.2	7351.6	1.27E-07	1.0	17.875	17
6/9/2008 10:50	8.0	17.0	7571.0	9.0	7477.8	1.33E-07	1.0	0.5	0.5
6/10/2008 11:01	8.9	16.1	87032.0	7.3	8928.3	1.04E-07	1.0	4.5	4.375
6/11/2008 14:48	10.0	15.1	100040.0	5.1	10595.7	1.17E-07	1.0	5.625	5.375
6/13/2008 19:52	12.2	12.9	191045.0	0.7	13779.8	1.32E-07	1.0	11.125	10.75
6/14/2008 16:53	13.0	12.1	75664.0	-0.9	15040.8	1.26E-07	1.0	3.875	3.875
6/20/2008 12:24	18.2	7.2	502232.0	-11.0	23411.4	1.47E-07	1.0	25.875	24.75
6/29/2008 11:42	24.2	1.5	775086.0	-22.7	36329.5	1.63E-07	0.9	30.125	28.375
7/1/2008 12:40	25.2	0.5	176271.0	-24.8	39267.3	1.74E-07	1.1	5	5.25





Hydraulic Conductivity Test - Apple Valley - Store-and-Release Cover

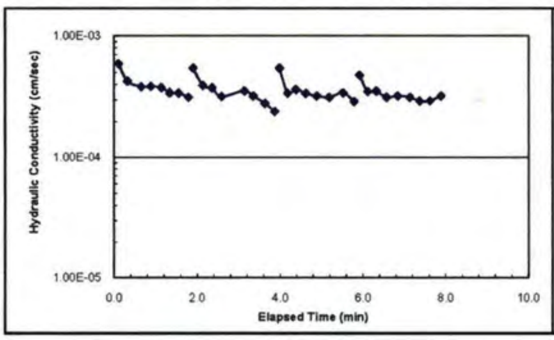
ASTM D 5084 - 00

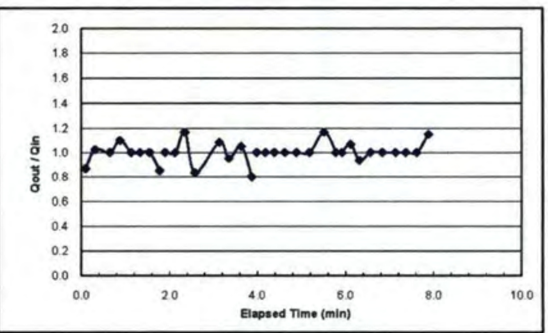
Sample I.D.	305-mm AV - B - 5 - ALT		Test Date :	8/28/07	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	31.9	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	18.5	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	800.6	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	14845.1	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	3.8		a_{out} =	5	cm^2
Weight of wet sample =	26716.6	(g)	Sample Water Content =	8.4	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.66	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	8.41

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
8/28/2007 12:00	0.0	24.0	0.0	24.0	0.0				
8/28/2007 12:00	3.0	21.4	6.0	18.4	0.1	5.91E-04	0.9	15	13
8/28/2007 12:00	7.0	17.3	13.0	10.3	0.3	4.26E-04	1.0	20	20.5
8/28/2007 12:00	12.0	12.3	20.0	0.3	0.6	3.83E-04	1.0	25	25
8/28/2007 12:00	15.0	9.0	14.0	-6.0	0.9	3.86E-04	1.1	15	16.5
8/28/2007 12:01	18.0	6.0	15.0	-12.0	1.1	3.78E-04	1.0	15	15
8/28/2007 12:01	20.0	4.0	12.0	-16.0	1.3	3.43E-04	1.0	10	10
8/28/2007 12:01	22.0	2.0	13.0	-20.0	1.5	3.41E-04	1.0	10	10
8/28/2007 12:01	24.0	0.3	14.0	-23.7	1.8	3.16E-04	0.9	10	8.5
8/28/2007 12:00	0.0	24.0	0.0	24.0	1.8				
8/28/2007 12:00	3.0	21.0	7.0	18.0	1.9	5.44E-04	1.0	15	15
8/28/2007 12:00	7.0	17.0	14.0	10.0	2.1	3.93E-04	1.0	20	20
8/28/2007 12:00	10.0	13.5	13.0	3.5	2.3	3.76E-04	1.2	15	17.5
8/28/2007 12:00	13.0	11.0	14.0	-2.0	2.6	3.20E-04	0.8	15	12.5
8/28/2007 12:01	19.0	4.5	33.0	-14.5	3.1	3.54E-04	1.1	30	32.5
8/28/2007 12:01	21.0	2.6	13.0	-18.4	3.3	3.23E-04	1.0	10	9.5
8/28/2007 12:01	23.0	0.5	17.0	-22.5	3.6	2.80E-04	1.1	10	10.5
8/28/2007 12:02	24.5	-0.7	14.0	-25.2	3.9	2.40E-04	0.8	7.5	6
8/28/2007 12:00	0.0	24.0	0.0	24.0	3.9				
8/28/2007 12:00	3.0	21.0	7.0	18.0	4.0	5.44E-04	1.0	15	15
8/28/2007 12:00	6.0	18.0	12.0	12.0	4.2	3.39E-04	1.0	15	15
8/28/2007 12:00	9.0	15.0	12.0	6.0	4.4	3.65E-04	1.0	15	15
8/28/2007 12:00	12.0	12.0	14.0	0.0	4.6	3.39E-04	1.0	15	15
8/28/2007 12:01	15.0	9.0	16.0	-6.0	4.9	3.23E-04	1.0	15	15
8/28/2007 12:01	18.0	6.0	18.0	-12.0	5.2	3.15E-04	1.0	15	15
8/28/2007 12:01	21.0	2.5	20.0	-18.5	5.5	3.42E-04	1.2	15	17.5
8/28/2007 12:01	23.0	0.5	16.0	-22.5	5.8	2.91E-04	1.0	10	10
8/28/2007 12:00	0.0	24.0	0.0	24.0	5.8				
8/28/2007 12:00	3.0	21.0	8.0	18.0	5.9	4.76E-04	1.0	15	15
8/28/2007 12:00	6.0	17.8	12.0	11.8	6.1	3.51E-04	1.1	15	16
8/28/2007 12:00	9.0	15.0	12.0	6.0	6.3	3.53E-04	0.9	15	14
8/28/2007 12:00	12.0	12.0	15.0	0.0	6.6	3.16E-04	1.0	15	15
8/28/2007 12:01	15.0	9.0	16.0	-6.0	6.8	3.23E-04	1.0	15	15
8/28/2007 12:01	18.0	6.0	18.0	-12.0	7.1	3.15E-04	1.0	15	15
8/28/2007 12:01	20.0	4.0	14.0	-16.0	7.4	2.94E-04	1.0	10	10
8/28/2007 12:01	22.0	2.0	15.0	-20.0	7.6	2.95E-04	1.0	10	10
8/28/2007 12:02	24.0	-0.3	16.0	-24.3	7.9	3.23E-04	1.2	10	11.5





Hydraulic Conductivity Test - Boardman - Thin Store-and-Release

ASTM D 5084 - 00

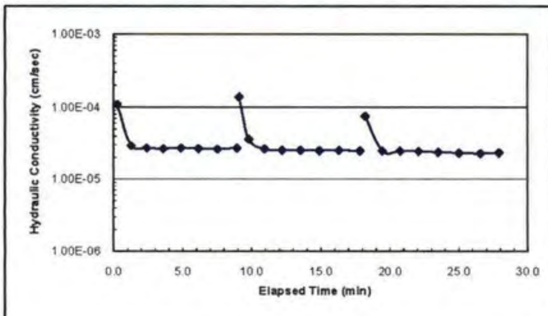
Sample I.D. **305-mm 4' Cover-Upper Slope-Surface** **Test Date :** **2/4/08**

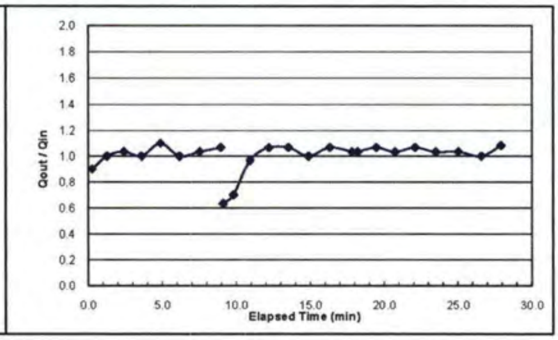
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.9	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11583.3	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	5	cm^2
Weight of wet sample =	21241.6	(g)	Sample Water Content =	29.6%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A3	50.42	418.47	334.31	29.65%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/4/08 12:00 AM	0.0	24.4	0.0	24.4	0.0				
2/4/08 12:00 AM	3.0	21.7	14.9	18.7	0.2	1.09E-04	0.9	15	13.5
2/4/08 12:01 AM	6.0	18.7	60.6	12.7	1.3	2.92E-05	1.0	15	15
2/4/08 12:02 AM	9.0	15.6	68.7	6.6	2.4	2.71E-05	1.0	15	15.5
2/4/08 12:03 AM	12.0	12.6	71.8	0.6	3.6	2.64E-05	1.0	15	15
2/4/08 12:04 AM	15.0	9.3	76.4	-5.7	4.9	2.70E-05	1.1	15	16.5
2/4/08 12:06 AM	18.0	6.3	76.7	-11.7	6.2	2.66E-05	1.0	15	15
2/4/08 12:07 AM	21.0	3.2	82.4	-17.8	7.5	2.61E-05	1.0	15	15.5
2/4/08 12:08 AM	24.0	0.0	84.8	-24.0	8.9	2.69E-05	1.1	15	16
2/4/08 12:00 AM	0.0	24.5	0.0	24.5	8.9				
2/4/08 12:00 AM	3.0	22.6	10.1	19.6	9.1	1.39E-04	0.6	15	9.5
2/4/08 12:00 AM	6.0	20.5	41.5	14.5	9.8	3.60E-05	0.7	15	10.5
2/4/08 12:02 AM	9.0	17.6	68.0	8.6	10.9	2.62E-05	1.0	15	14.5
2/4/08 12:03 AM	12.0	14.4	76.6	2.4	12.2	2.53E-05	1.1	15	16
2/4/08 12:04 AM	15.0	11.2	79.5	-3.8	13.5	2.52E-05	1.1	15	16
2/4/08 12:05 AM	18.0	8.2	81.1	-9.8	14.9	2.48E-05	1.0	15	15
2/4/08 12:07 AM	21.0	5.0	86.5	-16.0	16.3	2.50E-05	1.1	15	16
2/4/08 12:08 AM	24.0	1.9	90.5	-22.1	17.8	2.45E-05	1.0	15	15.5
2/4/08 12:00 AM	0.0	24.4	0.0	24.4	17.8				
2/4/08 12:00 AM	3.0	21.3	23.3	18.3	18.2	7.50E-05	1.0	15	15.5
2/4/08 12:01 AM	6.0	18.1	74.6	12.1	19.5	2.46E-05	1.1	15	16
2/4/08 12:02 AM	9.0	15.0	76.3	6.0	20.7	2.45E-05	1.0	15	15.5
2/4/08 12:04 AM	12.0	11.8	80.9	-0.2	22.1	2.43E-05	1.1	15	16
2/4/08 12:05 AM	15.0	8.7	85.1	-6.3	23.5	2.36E-05	1.0	15	15.5
2/4/08 12:07 AM	18.0	5.6	90.4	-12.4	25.0	2.30E-05	1.0	15	15.5
2/4/08 12:08 AM	21.0	2.6	94.3	-18.4	26.6	2.26E-05	1.0	15	15
2/4/08 12:10 AM	23.4	0.0	79.7	-23.4	27.9	2.31E-05	1.1	12	13





Hydraulic Conductivity Test - Boardman - Thin Store-and-Release

ASTM D 5084 - 00

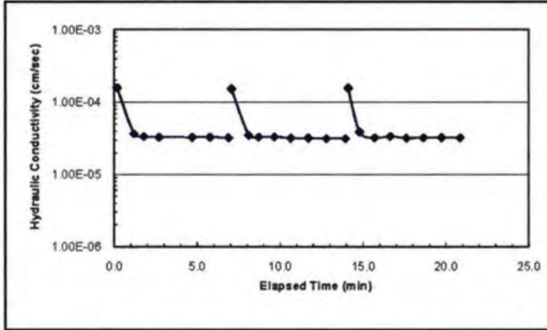
Sample I.D.	305-mm Oregon Boardman- 4'-Upper Slope- 2'-3'	Test Date :	2/20/08

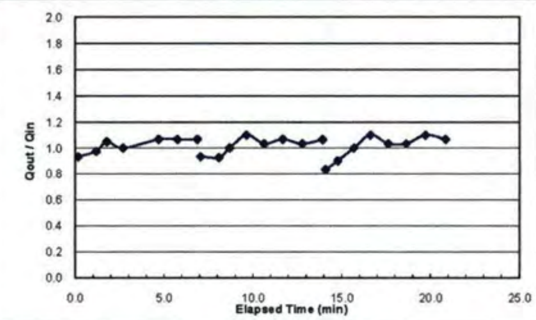
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	22000.0	(g)	Sample Water Content =	24.1%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.97	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35.34	341.48	282.11	24.06%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/20/08 12:00 AM	0.0	24.8	0.0	24.8	0.0				
2/20/08 12:00 AM	3.0	22.0	10.0	19.0	0.2	1.59E-04	0.9	15	14
2/20/08 12:01 AM	7.0	18.1	60.8	11.1	1.2	3.69E-05	1.0	20	19.5
2/20/08 12:01 AM	9.0	16.0	35.7	7.0	1.8	3.38E-05	1.1	10	10.5
2/20/08 12:02 AM	12.0	13.0	54.9	1.0	2.7	3.30E-05	1.0	15	15
2/20/08 12:04 AM	18.0	6.6	120.5	-11.4	4.7	3.29E-05	1.1	30	32
2/20/08 12:05 AM	21.0	3.4	63.7	-17.6	5.8	3.29E-05	1.1	15	16
2/20/08 12:06 AM	24.0	0.2	67.5	-23.8	6.9	3.24E-05	1.1	15	16
2/20/08 12:00 AM	0.0	24.8	0.0	24.8	6.9				
2/20/08 12:00 AM	3.0	22.0	10.4	19.0	7.1	1.53E-04	0.9	15	14
2/20/08 12:01 AM	7.0	18.3	62.5	11.3	8.1	3.50E-05	0.9	20	18.5
2/20/08 12:01 AM	9.0	16.3	35.6	7.3	8.7	3.29E-05	1.0	10	10
2/20/08 12:02 AM	12.0	13.0	57.1	1.0	9.6	3.33E-05	1.1	15	16.5
2/20/08 12:03 AM	15.0	9.9	59.7	-5.1	10.6	3.20E-05	1.0	15	15.5
2/20/08 12:04 AM	18.0	6.7	63.0	-11.3	11.7	3.20E-05	1.1	15	16
2/20/08 12:05 AM	21.0	3.6	65.5	-17.4	12.8	3.15E-05	1.0	15	15.5
2/20/08 12:07 AM	24.0	0.4	69.2	-23.6	13.9	3.16E-05	1.1	15	16
2/20/08 12:00 AM	0.0	24.9	0.0	24.9	13.9				
2/20/08 12:00 AM	3.0	22.4	9.6	19.4	14.1	1.56E-04	0.8	15	12.5
2/20/08 12:00 AM	6.0	19.7	41.4	13.7	14.8	3.88E-05	0.9	15	13.5
2/20/08 12:01 AM	9.0	16.7	54.0	7.7	15.7	3.23E-05	1.0	15	15
2/20/08 12:02 AM	12.0	13.4	56.4	1.4	16.6	3.36E-05	1.1	15	16.5
2/20/08 12:03 AM	15.0	10.3	59.4	-4.7	17.6	3.21E-05	1.0	15	15.5
2/20/08 12:04 AM	18.0	7.2	61.2	-10.8	18.6	3.23E-05	1.0	15	15.5
2/20/08 12:05 AM	21.0	3.9	65.6	-17.1	19.7	3.24E-05	1.1	15	16.5
2/20/08 12:06 AM	24.0	0.7	67.7	-23.3	20.9	3.22E-05	1.1	15	16





Hydraulic Conductivity Test - Boardman - Thin Store-and-Release

ASTM D 5084 - 00

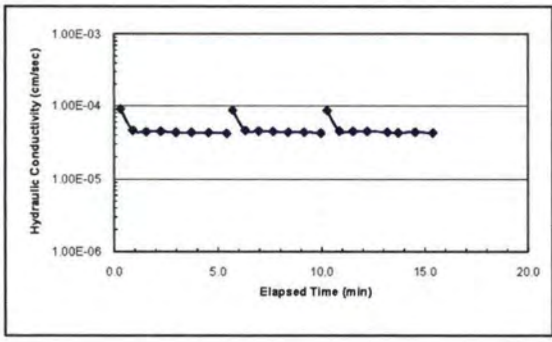
Sample I.D.	305-mm Oregon Boardman- 4' Cover-Lower Slope-Surface	Test Date :	2/6/08

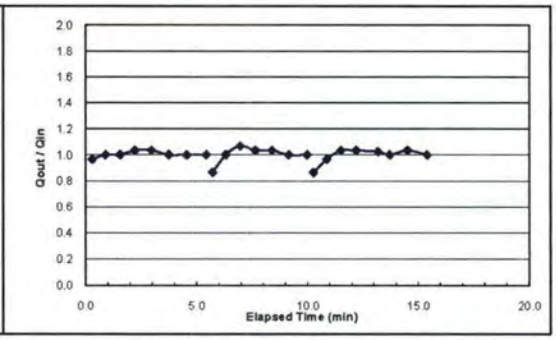
Cell Pressure =	42.4	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	11.4	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	8340.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	16828.2	(g)	Sample Water Content =	26.2%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.01	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35.08	330.07	268.89	26.17%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/6/08 12:00 AM	0.0	24.7	0.0	24.7	0.0				
2/6/08 12:00 AM	3.0	21.8	17.2	18.8	0.3	9.05E-05	1.0	15	14.5
2/6/08 12:00 AM	6.0	18.8	35.8	12.8	0.9	4.61E-05	1.0	15	15
2/6/08 12:01 AM	9.0	15.8	39.2	6.8	1.5	4.40E-05	1.0	15	15
2/6/08 12:02 AM	12.0	12.7	41.1	0.7	2.2	4.46E-05	1.0	15	15.5
2/6/08 12:02 AM	15.0	9.6	44.5	-5.4	3.0	4.32E-05	1.0	15	15.5
2/6/08 12:03 AM	18.0	6.6	46.0	-11.4	3.7	4.32E-05	1.0	15	15
2/6/08 12:04 AM	21.0	3.6	48.9	-17.4	4.5	4.28E-05	1.0	15	15
2/6/08 12:05 AM	24.0	0.6	52.8	-23.4	5.4	4.19E-05	1.0	15	15
2/6/08 12:00 AM	0.0	24.6	0.0	24.6	5.4				
2/6/08 12:00 AM	3.0	22.0	17.0	19.0	5.7	8.68E-05	0.9	15	13
2/6/08 12:00 AM	6.0	19.0	35.8	13.0	6.3	4.61E-05	1.0	15	15
2/6/08 12:01 AM	9.0	15.8	39.6	6.8	7.0	4.50E-05	1.1	15	16
2/6/08 12:02 AM	12.0	12.7	41.3	0.7	7.7	4.44E-05	1.0	15	15.5
2/6/08 12:02 AM	15.0	9.6	44.2	-5.4	8.4	4.35E-05	1.0	15	15.5
2/6/08 12:03 AM	18.0	6.6	45.6	-11.4	9.1	4.36E-05	1.0	15	15
2/6/08 12:04 AM	21.0	3.6	49.6	-17.4	10.0	4.23E-05	1.0	15	15
2/6/08 12:00 AM	0.0	24.5	0.0	24.5	10.0				
2/6/08 12:00 AM	3.0	21.9	17.2	18.9	10.3	8.59E-05	0.9	15	13
2/6/08 12:00 AM	6.0	19.0	35.8	13.0	10.9	4.53E-05	1.0	15	14.5
2/6/08 12:01 AM	9.0	15.9	39.2	6.9	11.5	4.47E-05	1.0	15	15.5
2/6/08 12:02 AM	12.0	12.8	41.1	0.8	12.2	4.46E-05	1.0	15	15.5
2/6/08 12:03 AM	16.0	8.7	59.2	-7.3	13.2	4.35E-05	1.0	20	20.5
2/6/08 12:03 AM	18.0	6.7	31.3	-11.3	13.7	4.27E-05	1.0	10	10
2/6/08 12:04 AM	21.0	3.6	48.9	-17.4	14.5	4.35E-05	1.0	15	15.5
2/6/08 12:05 AM	24.0	0.6	52.3	-23.4	15.4	4.23E-05	1.0	15	15





Hydraulic Conductivity Test - Boardman - Composite Cover

ASTM D 5084 - 00

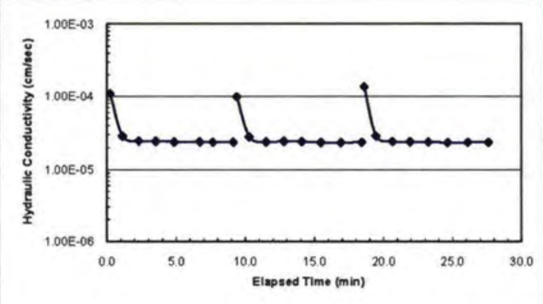
Sample I.D. **305-mm Oregon Boardman- Q3-Upper** **Test Date :** **3/7/08**

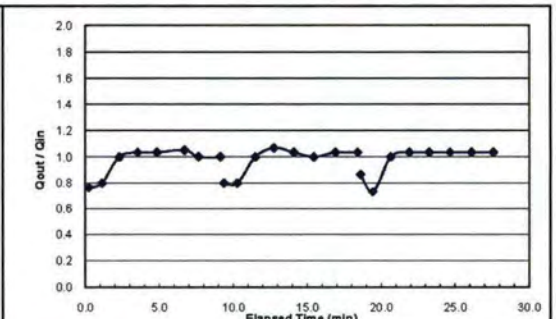
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21550.0	(g)	Sample Water Content =	25.9%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.93	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
Y	30.96	215.75	177.69	25.94%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/7/08 12:00 AM	0.0	24.7	0.0	24.7	0.0				
3/7/08 12:00 AM	3.0	22.4	13.3	19.4	0.2	1.09E-04	0.8	15	11.5
3/7/08 12:01 AM	6.0	20.0	53.1	14.0	1.1	2.86E-05	0.8	15	12
3/7/08 12:02 AM	9.0	17.0	70.7	8.0	2.3	2.47E-05	1.0	15	15
3/7/08 12:03 AM	12.0	13.9	75.0	1.9	3.5	2.44E-05	1.0	15	15.5
3/7/08 12:04 AM	15.0	10.8	79.1	-4.2	4.9	2.40E-05	1.0	15	15.5
3/7/08 12:06 AM	19.0	6.6	111.1	-12.4	6.7	2.40E-05	1.1	20	21
3/7/08 12:07 AM	21.0	4.6	57.0	-16.4	7.7	2.37E-05	1.0	10	10
3/7/08 12:09 AM	24.0	1.6	88.3	-22.4	9.1	2.38E-05	1.0	15	15
3/7/08 12:00 AM	0.0	24.7	0.0	24.7	9.1				
3/7/08 12:00 AM	3.0	22.3	14.9	19.3	9.4	9.94E-05	0.8	15	12
3/7/08 12:01 AM	6.0	19.9	54.4	13.9	10.3	2.80E-05	0.8	15	12
3/7/08 12:02 AM	9.0	16.9	72.7	7.9	11.5	2.40E-05	1.0	15	15
3/7/08 12:03 AM	12.0	13.7	76.6	1.7	12.8	2.43E-05	1.1	15	16
3/7/08 12:04 AM	15.0	10.6	78.6	-4.4	14.1	2.42E-05	1.0	15	15.5
3/7/08 12:06 AM	18.0	7.6	82.4	-10.4	15.5	2.36E-05	1.0	15	15
3/7/08 12:07 AM	21.0	4.5	87.5	-16.5	16.9	2.34E-05	1.0	15	15.5
3/7/08 12:09 AM	24.0	1.4	90.1	-22.6	18.4	2.37E-05	1.0	15	15.5
3/7/08 12:00 AM	0.0	24.6	0.0	24.6	18.4				
3/7/08 12:00 AM	3.0	22.0	11.2	19.0	18.6	1.37E-04	0.9	15	13
3/7/08 12:01 AM	6.0	19.8	51.1	13.8	19.4	2.87E-05	0.7	15	11
3/7/08 12:02 AM	9.0	16.8	71.9	7.8	20.6	2.43E-05	1.0	15	15
3/7/08 12:03 AM	12.0	13.7	76.1	1.7	21.9	2.41E-05	1.0	15	15.5
3/7/08 12:04 AM	15.0	10.6	79.9	-4.4	23.2	2.38E-05	1.0	15	15.5
3/7/08 12:06 AM	18.0	7.5	84.2	-10.5	24.7	2.34E-05	1.0	15	15.5
3/7/08 12:07 AM	21.0	4.4	86.6	-16.6	26.1	2.37E-05	1.0	15	15.5
3/7/08 12:09 AM	24.0	1.3	90.4	-22.7	27.6	2.36E-05	1.0	15	15.5





Hydraulic Conductivity Test - Boardman - Composite Cover

ASTM D 5084 - 00

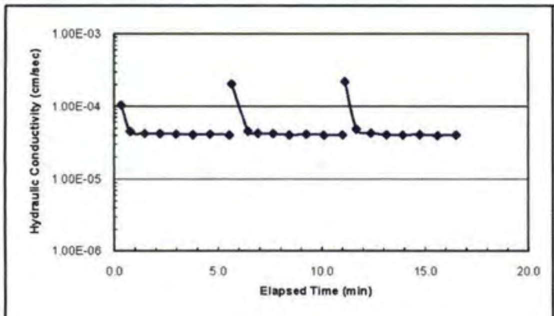
Sample I.D. **305-mm Oregon Boardman- Q3-Lower** **Test Date :** **2/8/08**

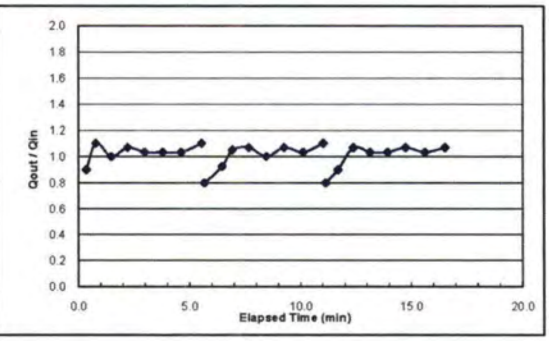
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	22044.5	(g)	Sample Water Content =	24.1%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.98	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
4	50.16	357.96	298.12	24.13%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/8/08 12:00 AM	0.0	24.6	0.0	24.6	0.0				
2/8/08 12:00 AM	4.0	21.0	20.2	17.0	0.3	1.03E-04	0.9	20	18
2/8/08 12:00 AM	6.0	18.8	26.3	12.8	0.8	4.54E-05	1.1	10	11
2/8/08 12:01 AM	9.0	15.8	41.7	6.8	1.5	4.20E-05	1.0	15	15
2/8/08 12:02 AM	12.0	12.6	44.1	0.6	2.2	4.25E-05	1.1	15	16
2/8/08 12:02 AM	15.0	9.5	46.3	-5.5	3.0	4.13E-05	1.0	15	15.5
2/8/08 12:03 AM	18.0	6.4	48.7	-11.6	3.8	4.09E-05	1.0	15	15.5
2/8/08 12:04 AM	21.0	3.3	49.9	-17.7	4.6	4.14E-05	1.0	15	15.5
2/8/08 12:05 AM	24.0	0.0	55.3	-24.0	5.5	4.02E-05	1.1	15	16.5
2/8/08 12:00 AM	0.0	24.7	0.0	24.7	5.5				
2/8/08 12:00 AM	3.0	22.3	7.2	19.3	5.7	2.04E-04	0.8	15	12
2/8/08 12:00 AM	7.0	18.6	47.9	11.6	6.5	4.55E-05	0.9	20	18.5
2/8/08 12:01 AM	9.0	16.5	28.1	7.5	6.9	4.27E-05	1.1	10	10.5
2/8/08 12:02 AM	12.0	13.3	44.5	1.3	7.7	4.20E-05	1.1	15	16
2/8/08 12:02 AM	15.0	10.3	46.5	-4.7	8.4	4.03E-05	1.0	15	15
2/8/08 12:03 AM	18.0	7.1	48.8	-10.9	9.3	4.12E-05	1.1	15	16
2/8/08 12:04 AM	21.0	4.0	51.1	-17.0	10.1	4.03E-05	1.0	15	15.5
2/8/08 12:05 AM	24.0	0.7	54.6	-23.3	11.0	4.06E-05	1.1	15	16.5
2/8/08 12:00 AM	0.0	24.7	0.0	24.7	11.0				
2/8/08 12:00 AM	3.0	22.3	6.7	19.3	11.1	2.21E-04	0.8	15	12
2/8/08 12:00 AM	6.0	19.6	33.0	13.6	11.7	4.86E-05	0.9	15	13.5
2/8/08 12:01 AM	9.0	16.4	42.0	7.4	12.4	4.30E-05	1.1	15	16
2/8/08 12:02 AM	12.0	13.3	45.2	1.3	13.1	4.07E-05	1.0	15	15.5
2/8/08 12:02 AM	15.0	10.2	47.3	-4.8	13.9	4.03E-05	1.0	15	15.5
2/8/08 12:03 AM	18.0	7.0	49.3	-11.0	14.7	4.08E-05	1.1	15	16
2/8/08 12:04 AM	21.0	3.9	52.0	-17.1	15.6	3.96E-05	1.0	15	15.5
2/8/08 12:05 AM	24.0	0.7	54.0	-23.3	16.5	4.03E-05	1.1	15	16





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

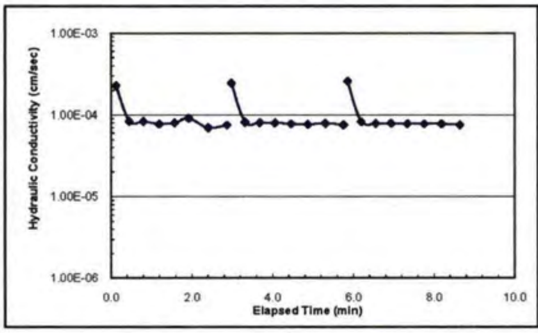
Sample I.D.	305-mm Oregon Boardman- 6'-Upper Slope- Surface	Test Date :	2/13/08

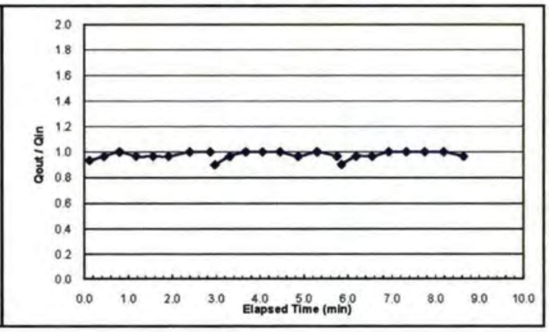
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21636.2	(g)	Sample Water Content =	25.9%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.94	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35.12	393.89	320.05	25.92%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/13/08 12:00 AM	0.0	24.5	0.0	24.5	0.0				
2/13/08 12:00 AM	3.0	21.7	7.0	18.7	0.1	2.27E-04	0.9	15	14
2/13/08 12:00 AM	6.0	18.8	20.0	12.8	0.5	8.35E-05	1.0	15	14.5
2/13/08 12:00 AM	9.0	15.8	21.0	6.8	0.8	8.35E-05	1.0	15	15
2/13/08 12:01 AM	12.0	12.9	23.0	0.9	1.2	7.76E-05	1.0	15	14.5
2/13/08 12:01 AM	15.0	10.0	23.0	-5.0	1.6	8.03E-05	1.0	15	14.5
2/13/08 12:01 AM	18.0	7.1	21.0	-10.9	1.9	9.12E-05	1.0	15	14.5
2/13/08 12:02 AM	21.0	4.1	29.0	-16.9	2.4	6.98E-05	1.0	15	15
2/13/08 12:02 AM	24.0	1.1	28.0	-22.9	2.9	7.52E-05	1.0	15	15
2/13/08 12:00 AM	0.0	24.7	0.0	24.7	2.9				
2/13/08 12:00 AM	3.0	22.0	6.4	19.0	3.0	2.45E-04	0.9	15	13.5
2/13/08 12:00 AM	6.0	19.1	20.4	13.1	3.3	8.18E-05	1.0	15	14.5
2/13/08 12:00 AM	9.0	16.1	21.8	7.1	3.7	8.05E-05	1.0	15	15
2/13/08 12:01 AM	12.0	13.1	22.7	1.1	4.1	8.00E-05	1.0	15	15
2/13/08 12:01 AM	15.0	10.1	24.1	-4.9	4.5	7.80E-05	1.0	15	15
2/13/08 12:02 AM	18.0	7.2	24.9	-10.8	4.9	7.68E-05	1.0	15	14.5
2/13/08 12:02 AM	21.0	4.2	25.6	-16.8	5.3	7.88E-05	1.0	15	15
2/13/08 12:02 AM	24.0	1.3	27.2	-22.7	5.8	7.59E-05	1.0	15	14.5
2/13/08 12:00 AM	0.0	24.8	0.0	24.8	5.8				
2/13/08 12:00 AM	3.0	22.1	6.1	19.1	5.9	2.58E-04	0.9	15	13.5
2/13/08 12:00 AM	6.0	19.2	20.1	13.2	6.2	8.29E-05	1.0	15	14.5
2/13/08 12:00 AM	9.0	16.3	21.9	7.3	6.6	7.87E-05	1.0	15	14.5
2/13/08 12:01 AM	12.0	13.3	22.8	1.3	6.9	7.92E-05	1.0	15	15
2/13/08 12:01 AM	15.0	10.3	24.0	-4.7	7.3	7.80E-05	1.0	15	15
2/13/08 12:02 AM	18.0	7.3	25.0	-10.7	7.7	7.77E-05	1.0	15	15
2/13/08 12:02 AM	21.0	4.3	25.9	-16.7	8.2	7.80E-05	1.0	15	15
2/13/08 12:02 AM	24.0	1.4	27.3	-22.6	8.6	7.57E-05	1.0	15	14.5





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

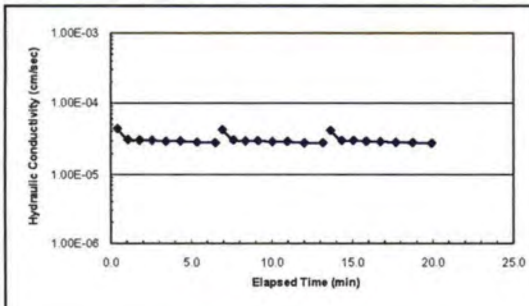
Sample I.D.	150-mm Oregon Boardman- 6'-Upper Slope- Surface	Test Date :	3/14/08

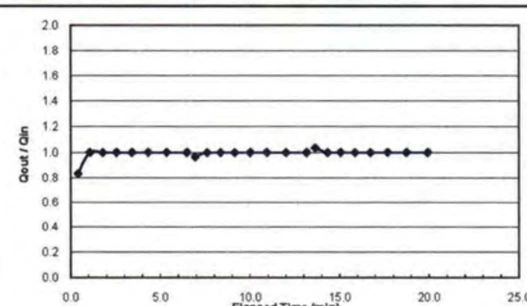
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	2593.1	(g)	Sample Water Content =	25.1%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2C	24.63	202.94	167.14	25.12%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/14/08 00:00.00	0.0	24.7	0.0	24.7	0.0				
3/14/08 00:24.34	3.0	22.2	24.3	19.2	0.4	4.43E-05	0.8	3	2.5
3/14/08 01:04.11	6.0	19.2	39.8	13.2	1.1	3.13E-05	1.0	3	3
3/14/08 01:47.34	9.0	16.2	43.2	7.2	1.8	3.06E-05	1.0	3	3
3/14/08 02:33.45	12.0	13.2	46.1	1.2	2.6	3.06E-05	1.0	3	3
3/14/08 03:24.61	15.0	10.2	51.2	-4.8	3.4	2.96E-05	1.0	3	3
3/14/08 04:19.42	18.0	7.2	54.8	-10.8	4.3	2.98E-05	1.0	3	3
3/14/08 05:20.68	21.0	4.2	61.3	-16.8	5.3	2.89E-05	1.0	3	3
3/14/08 06:28.84	24.0	1.2	68.2	-22.8	6.5	2.84E-05	1.0	3	3
3/14/08 00:00.00	0.0	24.6	0.0	24.6	6.5				
3/14/08 00:27.11	3.0	21.7	27.1	18.7	6.9	4.28E-05	1.0	3	2.9
3/14/08 01:07.65	6.0	18.7	40.5	12.7	7.6	3.08E-05	1.0	3	3
3/14/08 01:52.06	9.0	15.7	44.4	6.7	8.3	2.99E-05	1.0	3	3
3/14/08 02:39.37	12.0	12.7	47.3	0.7	9.1	3.00E-05	1.0	3	3
3/14/08 03:31.55	15.0	9.7	52.2	-5.3	10.0	2.92E-05	1.0	3	3
3/14/08 04:27.56	18.0	6.7	56.0	-11.3	10.9	2.93E-05	1.0	3	3
3/14/08 05:31.42	21.0	3.7	63.9	-17.3	12.0	2.79E-05	1.0	3	3
3/14/08 06:40.68	24.0	0.7	69.3	-23.3	13.2	2.82E-05	1.0	3	3
3/14/08 00:00.00	0.0	24.8	0.0	24.8	13.2				
3/14/08 00:28.73	3.0	21.7	28.7	18.7	13.6	4.17E-05	1.0	3	3.1
3/14/08 01:10.03	6.0	18.7	41.3	12.7	14.3	3.03E-05	1.0	3	3
3/14/08 01:53.73	9.0	15.7	43.7	6.7	15.1	3.04E-05	1.0	3	3
3/14/08 02:41.95	12.0	12.7	48.2	0.7	15.9	2.95E-05	1.0	3	3
3/14/08 03:34.03	15.0	9.7	52.1	-5.3	16.7	2.93E-05	1.0	3	3
3/14/08 04:31.83	18.0	6.7	57.8	-11.3	17.7	2.84E-05	1.0	3	3
3/14/08 05:35.05	21.0	3.7	63.2	-17.3	18.7	2.82E-05	1.0	3	3
3/14/08 06:45.78	24.0	0.7	70.7	-23.3	19.9	2.76E-05	1.0	3	3





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

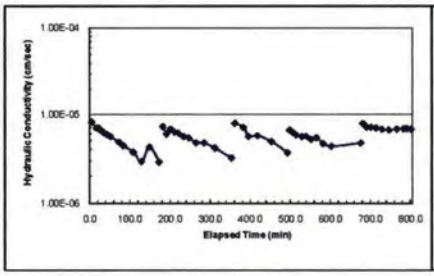
Sample I.D.	75-mm Oregon Boardman- 6'-Upper Slope- Surface	Test Date :	4/21/08

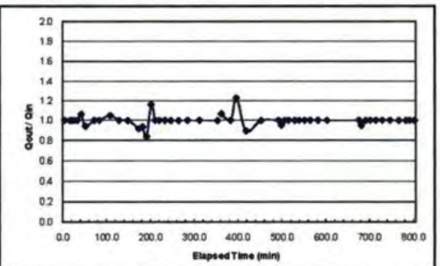
Cell Pressure =	42.7	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.9	psi	Area of Sample, A =	45.6	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	173.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	294.8	(g)	Sample Water Content =	15.6%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.69	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2	30.8	163.2	145.34	15.59%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
4/23/08 00:00:00	0.0	24.6	0.0	24.6	0.0				
4/23/08 00:05:15	2.0	22.6	315.3	20.6	5.3	8.17E-06	1.0	2	2
4/23/08 00:16:46	5.4	19.2	690.2	13.8	16.8	6.93E-06	1.0	3.4	3.4
4/23/08 00:22:16	6.9	17.7	330.5	10.8	22.3	6.95E-06	1.0	1.5	1.5
4/23/08 00:26:46	8.0	16.6	269.8	8.6	26.8	6.55E-06	1.0	1.1	1.1
4/23/08 00:33:30	9.5	15.1	404.4	5.6	33.5	6.28E-06	1.0	1.5	1.5
4/23/08 00:41:55	11.1	13.4	504.7	2.3	41.9	5.91E-06	1.1	1.6	1.7
4/23/08 00:51:35	12.8	11.8	579.9	-1.0	51.6	5.54E-06	0.9	1.7	1.6
4/23/08 01:12:41	15.6	9.0	1265.9	-6.6	72.7	4.81E-06	1.0	2.8	2.8
4/23/08 01:23:50	16.8	7.8	669.7	-9.0	83.8	4.34E-06	1.0	1.2	1.2
4/23/08 01:48:35	18.8	5.7	1484.1	-13.1	108.6	3.70E-06	1.1	2	2.1
4/23/08 02:09:11	20.0	4.5	1236.5	-15.5	129.2	2.90E-06	1.0	1.2	1.2
4/23/08 02:28:48	21.5	3.0	1176.9	-18.5	148.8	4.22E-06	1.0	1.5	1.5
4/23/08 02:53:36	22.7	1.9	1487.8	-20.8	173.6	2.85E-06	0.9	1.2	1.1
4/23/08 00:00:00	0.0	24.8	0.0	24.8	173.6				
4/23/08 00:08:43	3.0	22.0	522.6	19.0	182.3	7.23E-06	0.9	3	2.8
4/23/08 00:17:50	5.5	19.9	547.4	14.4	191.4	5.95E-06	0.8	2.5	2.1
4/23/08 00:28:08	8.0	17.0	618.3	9.0	201.7	6.76E-06	1.2	2.5	2.9
4/23/08 00:37:08	10.0	15.0	540.1	5.0	210.7	6.28E-06	1.0	2	2
4/23/08 00:47:14	12.0	13.0	606.0	1.0	220.8	6.09E-06	1.0	2	2
4/23/08 01:00:03	14.1	10.9	768.5	-3.2	233.6	5.55E-06	1.0	2.1	2.1
4/23/08 01:13:18	16.0	9.0	794.9	-7.0	246.9	5.37E-06	1.0	1.9	1.9
4/23/08 01:31:05	18.0	7.0	1067.0	-11.0	264.7	4.71E-06	1.0	2	2
4/23/08 01:51:17	20.0	5.0	1212.6	-15.0	284.9	4.71E-06	1.0	2	2
4/23/08 02:18:16	22.0	3.0	1618.9	-19.0	311.9	4.09E-06	1.0	2	2
4/23/08 02:59:21	24.0	1.0	2465.0	-23.0	353.0	3.19E-06	1.0	2	2
4/23/08 00:00:00	0.0	24.9	0.0	24.9	353.0				
4/23/08 00:08:33	3.0	21.7	513.0	18.7	361.5	7.88E-06	1.1	3	3.2
4/23/08 00:30:08	9.0	15.7	1294.6	6.7	383.1	7.07E-06	1.0	6	6
4/23/08 00:43:15	11.2	13.0	787.6	1.8	396.2	5.59E-06	1.2	2.2	2.7
4/23/08 01:05:02	15.0	9.6	1306.9	-5.4	418.0	5.70E-06	0.9	3.8	3.4
4/23/08 01:40:08	19.0	5.6	2105.8	-13.4	453.1	4.85E-06	1.0	4	4
4/23/08 02:19:38	21.7	2.9	2369.9	-18.8	492.6	3.65E-06	1.0	2.7	2.7
4/23/08 00:00:00	0.0	25.0	0.0	25.0	492.6				
4/23/08 00:06:19	2.0	23.1	379.4	21.1	498.9	6.57E-06	0.9	2	1.9
4/23/08 00:13:40	4.0	21.1	440.2	17.1	506.2	6.19E-06	1.0	2	2
4/23/08 00:21:59	6.0	19.1	499.8	13.1	514.6	5.83E-06	1.0	2	2
4/23/08 00:36:28	9.0	16.1	868.5	7.1	529.0	5.51E-06	1.0	3	3
4/23/08 00:46:58	11.0	14.1	629.8	3.1	539.5	5.60E-06	1.0	2	2
4/23/08 00:59:20	13.0	12.1	742.8	-0.9	551.9	5.19E-06	1.0	2	2
4/23/08 01:12:27	15.0	10.1	786.7	-4.9	565.0	5.40E-06	1.0	2	2
4/23/08 01:29:32	17.0	8.1	1024.6	-8.9	582.1	4.61E-06	1.0	2	2
4/23/08 01:50:13	19.0	6.1	1241.6	-12.9	602.8	4.29E-06	1.0	2	2
4/23/08 03:03:17	24.7	0.4	4383.1	-24.3	675.9	4.68E-06	1.0	5.7	5.7
4/23/08 00:00:00	0.0	24.9		24.9	675.9				
4/23/08 00:05:18	2.0	23.0	318.1	21.0	681.2	7.85E-06	0.9	2	1.9
4/23/08 00:14:59	5.0	20.0	580.7	15.0	690.8	7.17E-06	1.0	3	3
4/23/08 00:25:47	8.0	17.0	647.9	9.0	701.6	7.13E-06	1.0	3	3
4/23/08 00:38:16	11.0	14.0	749.8	3.0	714.1	6.93E-06	1.0	3	3
4/23/08 00:52:55	14.0	11.0	878.7	-3.0	728.8	6.76E-06	1.0	3	3
4/23/08 01:10:19	17.0	8.0	1044.3	-9.0	746.2	6.63E-06	1.0	3	3
4/23/08 01:30:47	20.0	5.0	1227.8	-15.0	766.6	6.76E-06	1.0	3	3
4/23/08 01:46:56	22.0	3.0	968.4	-19.0	782.8	6.84E-06	1.0	2	2
4/23/08 01:56:00	23.0	2.0	544.1	-21.0	791.8	6.89E-06	1.0	1	1
4/23/08 02:06:09	24.0	1.0	609.0	-23.0	802.0	6.77E-06	1.0	1	1





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

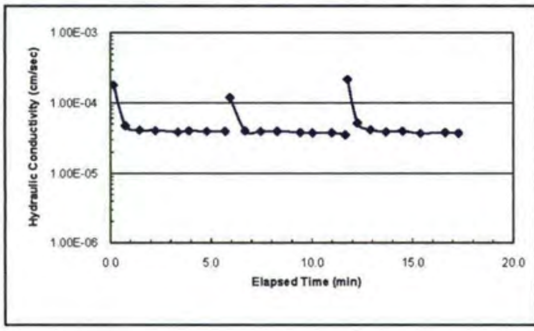
Sample I.D.	305-mm Oregon Boardman- 6'-Upper Slope- 3'-4'	Test Date :	2/11/08

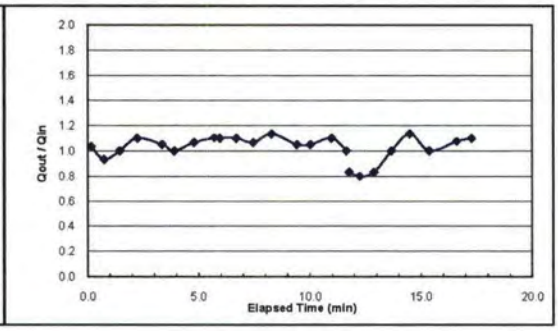
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21182.7	(g)	Sample Water Content =	24.0%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.90	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35.13	298.29	247.41	23.97%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/11/08 12:00 AM	0.0	24.8	0.0	24.8	0.0				
2/11/08 12:00 AM	3.0	21.7	9.3	18.7	0.2	1.79E-04	1.0	15	15.5
2/11/08 12:00 AM	6.0	18.9	34.7	12.9	0.7	4.73E-05	0.9	15	14
2/11/08 12:01 AM	9.0	15.9	42.7	6.9	1.4	4.11E-05	1.0	15	15
2/11/08 12:02 AM	12.0	12.6	46.9	0.6	2.2	4.07E-05	1.1	15	16.5
2/11/08 12:03 AM	16.0	8.4	67.2	-7.6	3.3	3.85E-05	1.1	20	21
2/11/08 12:03 AM	18.0	6.4	32.7	-11.6	3.9	4.01E-05	1.0	10	10
2/11/08 12:04 AM	21.0	3.2	53.7	-17.8	4.8	3.91E-05	1.1	15	16
2/11/08 12:05 AM	23.9	0.0	54.3	-23.9	5.7	3.96E-05	1.1	14.5	16
2/11/08 12:00 AM	0.0	24.8	0.0	24.8	5.7				
2/11/08 12:00 AM	3.0	21.5	14.6	18.5	5.9	1.19E-04	1.1	15	16.5
2/11/08 12:00 AM	6.0	18.2	44.7	12.2	6.7	4.00E-05	1.1	15	16.5
2/11/08 12:01 AM	9.0	15.0	46.2	6.0	7.4	3.94E-05	1.1	15	16
2/11/08 12:02 AM	12.0	11.6	49.4	-0.4	8.3	3.94E-05	1.1	15	17
2/11/08 12:03 AM	16.0	7.4	68.6	-8.6	9.4	3.80E-05	1.1	20	21
2/11/08 12:04 AM	18.0	5.3	36.1	-12.7	10.0	3.75E-05	1.1	10	10.5
2/11/08 12:05 AM	21.0	2.0	57.3	-19.0	11.0	3.76E-05	1.1	15	16.5
2/11/08 12:05 AM	23.0	0.0	40.2	-23.0	11.6	3.51E-05	1.0	10	10
2/11/08 12:00 AM	0.0	24.8	0.0	24.8	11.6				
2/11/08 12:00 AM	3.0	22.3	6.9	19.3	11.8	2.17E-04	0.8	15	12.5
2/11/08 12:00 AM	6.0	19.9	29.4	13.9	12.2	5.17E-05	0.8	15	12
2/11/08 12:01 AM	9.0	17.4	38.5	8.4	12.9	4.14E-05	0.8	15	12.5
2/11/08 12:02 AM	12.0	14.4	46.4	2.4	13.7	3.88E-05	1.0	15	15
2/11/08 12:02 AM	15.0	11.0	50.1	-4.0	14.5	3.97E-05	1.1	15	17
2/11/08 12:03 AM	18.0	8.0	52.6	-10.0	15.4	3.68E-05	1.0	15	15
2/11/08 12:04 AM	22.0	3.7	73.9	-18.3	16.6	3.79E-05	1.1	20	21.5
2/11/08 12:05 AM	24.0	1.5	40.0	-22.5	17.3	3.70E-05	1.1	10	11





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

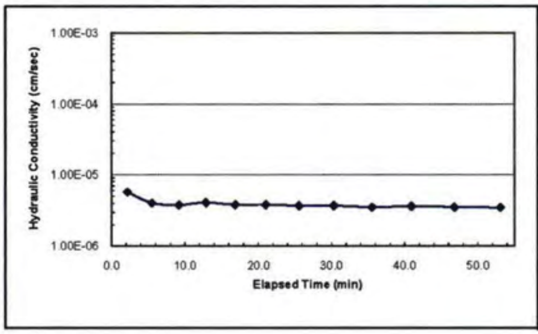
Sample I.D.	150-mm Oregon Boardman- 6'-Upper Slope- 3'-4'	Test Date :	3/20/08

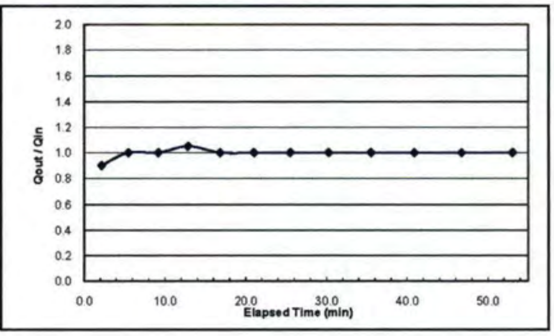
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	2593.1	(g)	Sample Water Content =	26.7%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2A	31.08	199	163.63	26.68%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/20/08 00:00.00	0.0	24.7	0.0	24.7	0.0				
3/20/08 02:09.28	2.0	22.9	129.3	20.9	2.2	5.72E-06	0.9	2	1.8
3/20/08 05:29.21	4.0	20.9	199.9	16.9	5.5	4.04E-06	1.0	2	2
3/20/08 09:11.05	6.0	18.9	221.8	12.9	9.2	3.79E-06	1.0	2	2
3/20/08 12:50.84	8.0	16.8	219.8	8.8	12.8	4.08E-06	1.1	2	2.1
3/20/08 16:50.84	10.0	14.8	240.0	4.8	16.8	3.81E-06	1.0	2	2
3/20/08 21:01.05	12.0	12.8	250.2	0.8	21.0	3.82E-06	1.0	2	2
3/20/08 25:32.21	14.0	10.8	271.2	-3.2	25.5	3.70E-06	1.0	2	2
3/20/08 30:16.75	16.0	8.8	284.5	-7.2	30.3	3.70E-06	1.0	2	2
3/20/08 35:32.21	18.0	6.8	315.5	-11.2	35.5	3.51E-06	1.0	2	2
3/20/08 40:54.34	20.0	4.8	322.1	-15.2	40.9	3.63E-06	1.0	2	2
3/20/08 46:45.42	22.0	2.8	351.1	-19.2	46.8	3.53E-06	1.0	2	2
3/20/08 53:03.42	24.0	0.8	378.0	-23.2	53.1	3.49E-06	1.0	2	2





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

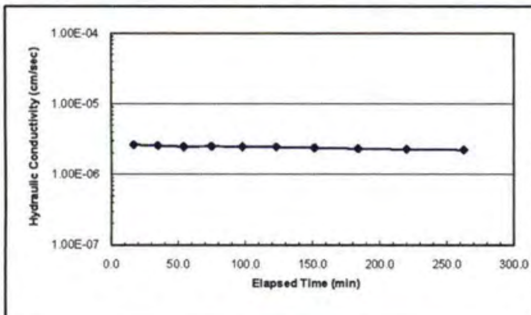
ASTM D 5084 - 00

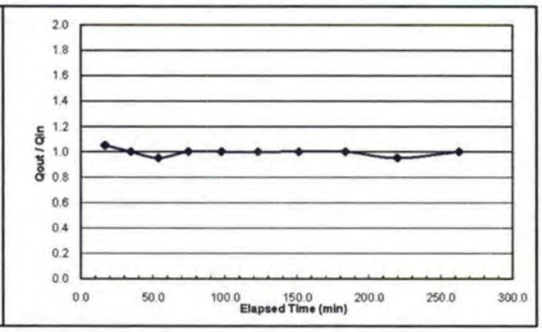
Sample I.D.	75-mm Oregon Boardman- 6'-Upper Slope- 3'-4'		Test Date :	3/20/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.9	psi	Area of Sample, A =	45.6	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	173.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	333.2	(g)	Sample Water Content =	11.3%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.92	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
H3	24.4	131.79	120.91	11.27%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
5/2/08 00:00:00	0.0	25.0	0.0	25.0	0.0				
5/2/08 00:16:39	2.0	22.9	999.4	20.9	16.7	2.63E-06	1.1	2	2.1
5/2/08 00:34:30	4.0	20.9	1070.9	16.9	34.5	2.55E-06	1.0	2	2
5/2/08 00:53:44	6.0	19.0	1153.3	13.0	53.7	2.47E-06	0.9	2	1.9
5/2/08 01:14:37	8.0	17.0	1253.4	9.0	74.6	2.51E-06	1.0	2	2
5/2/08 01:37:35	10.0	15.0	1377.8	5.0	97.6	2.47E-06	1.0	2	2
5/2/08 02:02:53	12.0	13.0	1518.0	1.0	122.9	2.44E-06	1.0	2	2
5/2/08 02:31:20	14.0	11.0	1707.2	-3.0	151.3	2.38E-06	1.0	2	2
5/2/08 03:03:48	16.0	9.0	1947.8	-7.0	183.8	2.31E-06	1.0	2	2
5/2/08 03:39:57	18.0	7.1	2168.7	-10.9	219.9	2.26E-06	1.0	2	1.9
5/2/08 04:22:47	20.0	5.1	2570.9	-14.9	262.8	2.22E-06	1.0	2	2





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

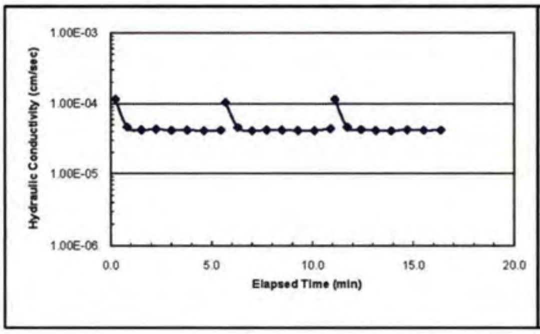
Sample I.D.	305-mm Oregon Boardman- 6'-Upper Slope- 5'-6'	Test Date :	2/20/08

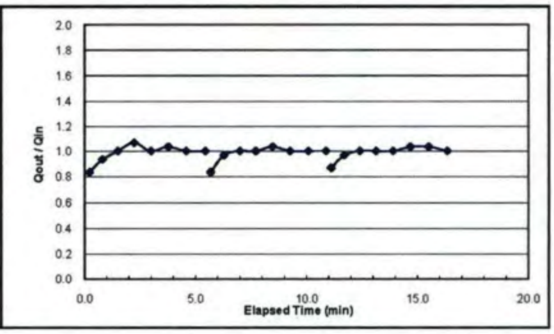
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21450.0	(g)	Sample Water Content =	26.9%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.92	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
H2	30.84	234.97	191.66	26.93%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/20/08 12:00 AM	0.0	24.5	0.0	24.5	0.0				
2/20/08 12:00 AM	3.0	22.0	13.1	19.0	0.2	1.16E-04	0.8	15	12.5
2/20/08 12:00 AM	6.0	19.2	35.3	13.2	0.8	4.64E-05	0.9	15	14
2/20/08 12:01 AM	9.0	16.2	41.8	7.2	1.5	4.19E-05	1.0	15	15
2/20/08 12:02 AM	12.0	13.0	43.5	1.0	2.2	4.31E-05	1.1	15	16
2/20/08 12:02 AM	15.0	10.0	45.3	-5.0	3.0	4.15E-05	1.0	15	15
2/20/08 12:03 AM	18.0	6.9	47.3	-11.1	3.8	4.19E-05	1.0	15	15.5
2/20/08 12:04 AM	21.0	3.9	49.4	-17.1	4.6	4.10E-05	1.0	15	15
2/20/08 12:05 AM	24.0	0.9	50.6	-23.1	5.4	4.16E-05	1.0	15	15
2/20/08 12:00 AM	0.0	24.7	0.0	24.7	5.4				
2/20/08 12:00 AM	3.0	22.2	14.5	19.2	5.7	1.04E-04	0.8	15	12.5
2/20/08 12:00 AM	6.0	19.3	36.4	13.3	6.3	4.57E-05	1.0	15	14.5
2/20/08 12:01 AM	9.0	16.3	42.4	7.3	7.0	4.13E-05	1.0	15	15
2/20/08 12:02 AM	12.0	13.3	43.3	1.3	7.7	4.18E-05	1.0	15	15
2/20/08 12:03 AM	15.0	10.2	45.6	-4.8	8.5	4.18E-05	1.0	15	15.5
2/20/08 12:03 AM	18.0	7.2	47.3	-10.8	9.3	4.12E-05	1.0	15	15
2/20/08 12:04 AM	21.0	4.2	49.2	-16.8	10.1	4.11E-05	1.0	15	15
2/20/08 12:05 AM	24.0	1.2	48.0	-22.8	10.9	4.38E-05	1.0	15	15
2/20/08 12:00 AM	0.0	24.7	0.0	24.7	10.9				
2/20/08 12:00 AM	3.0	22.1	13.4	19.1	11.1	1.14E-04	0.9	15	13
2/20/08 12:00 AM	6.0	19.2	36.2	13.2	11.7	4.60E-05	1.0	15	14.5
2/20/08 12:01 AM	9.0	16.2	41.2	7.2	12.4	4.25E-05	1.0	15	15
2/20/08 12:02 AM	12.0	13.2	43.9	1.2	13.1	4.12E-05	1.0	15	15
2/20/08 12:03 AM	15.0	10.2	46.1	-4.8	13.9	4.07E-05	1.0	15	15
2/20/08 12:03 AM	18.0	7.1	46.9	-10.9	14.7	4.22E-05	1.0	15	15.5
2/20/08 12:04 AM	21.0	4.0	49.8	-17.0	15.5	4.13E-05	1.0	15	15.5
2/20/08 12:05 AM	24.0	1.0	50.5	-23.0	16.3	4.17E-05	1.0	15	15





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

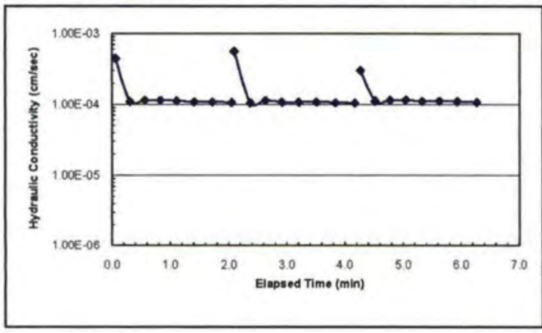
Sample I.D.	305-mm Oregon Boardman- 6'-Lower Slope- Surface	Test Date :	3/10/08

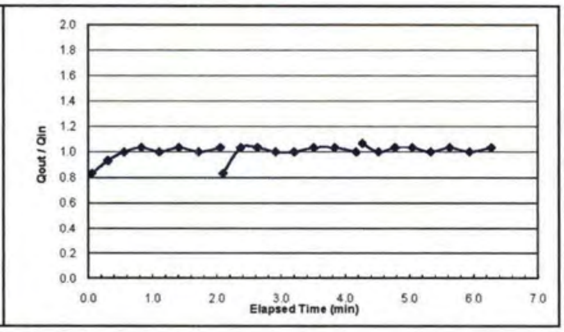
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21350.0	(g)	Sample Water Content =	26.5%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.91	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2C	24.62	235.41	191.25	26.50%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/10/08 12:00 AM	0.0	24.8	0.0	24.8	0.0				
3/10/08 12:00 AM	3.0	22.3	3.4	19.3	0.1	4.47E-04	0.8	15	12.5
3/10/08 12:00 AM	6.0	19.5	14.9	13.5	0.3	1.10E-04	0.9	15	14
3/10/08 12:00 AM	9.0	16.5	15.3	7.5	0.6	1.14E-04	1.0	15	15
3/10/08 12:00 AM	12.0	13.4	16.1	1.4	0.8	1.14E-04	1.0	15	15.5
3/10/08 12:01 AM	15.0	10.4	16.7	-4.6	1.1	1.12E-04	1.0	15	15
3/10/08 12:01 AM	18.0	7.3	18.2	-10.7	1.4	1.09E-04	1.0	15	15.5
3/10/08 12:01 AM	21.0	4.3	18.6	-16.7	1.7	1.09E-04	1.0	15	15
3/10/08 12:02 AM	24.0	1.2	20.0	-22.8	2.1	1.07E-04	1.0	15	15.5
3/10/08 12:00 AM	0.0	24.7	0.0	24.7	2.1				
3/10/08 12:00 AM	3.0	22.2	2.7	19.2	2.1	5.62E-04	0.8	15	12.5
3/10/08 12:00 AM	6.0	19.1	16.4	13.1	2.4	1.05E-04	1.0	15	15.5
3/10/08 12:00 AM	9.0	16.0	15.7	7.0	2.6	1.14E-04	1.0	15	15.5
3/10/08 12:00 AM	12.0	13.0	16.9	1.0	2.9	1.08E-04	1.0	15	15
3/10/08 12:01 AM	15.0	10.0	17.5	-5.0	3.2	1.08E-04	1.0	15	15
3/10/08 12:01 AM	18.0	6.9	18.4	-11.1	3.5	1.08E-04	1.0	15	15.5
3/10/08 12:01 AM	21.0	3.8	19.4	-17.2	3.8	1.06E-04	1.0	15	15.5
3/10/08 12:02 AM	24.0	0.8	20.2	-23.2	4.2	1.05E-04	1.0	15	15
3/10/08 12:00 AM	0.0	24.7	0.0	24.7	4.2				
3/10/08 12:00 AM	3.0	21.5	5.6	18.5	4.3	3.02E-04	1.1	15	16
3/10/08 12:00 AM	6.0	18.5	15.2	12.5	4.5	1.12E-04	1.0	15	15
3/10/08 12:00 AM	9.0	15.4	15.6	6.4	4.8	1.15E-04	1.0	15	15.5
3/10/08 12:00 AM	12.0	12.3	16.1	0.3	5.0	1.15E-04	1.0	15	15.5
3/10/08 12:01 AM	15.0	9.3	17.0	-5.7	5.3	1.11E-04	1.0	15	15
3/10/08 12:01 AM	18.0	6.2	17.9	-11.8	5.6	1.11E-04	1.0	15	15.5
3/10/08 12:01 AM	21.0	3.2	18.5	-17.8	5.9	1.10E-04	1.0	15	15
3/10/08 12:02 AM	24.0	0.1	20.2	-23.9	6.3	1.07E-04	1.0	15	15.5





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

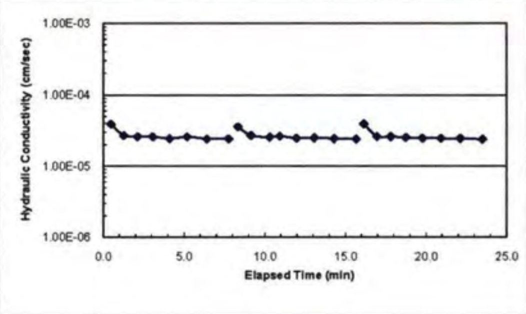
Sample I.D.	150-mm Oregon Boardman- 6'-Lower Slope- Surface	Test Date :	3/31/08

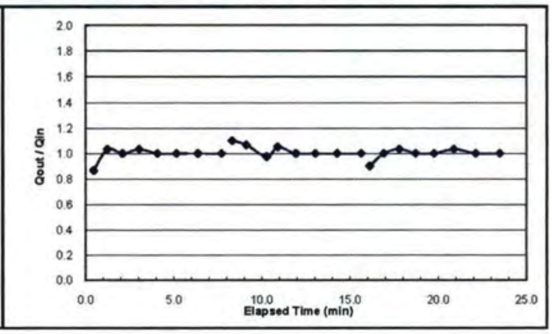
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	2305.6	(g)	Sample Water Content =	24.2%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.65	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
H1	30.85	191.54	160.26	24.17%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/31/08 00:00.00	0.0	24.8	0.0	24.8	0.0				
3/31/08 00:28.07	3.0	22.2	28.1	19.2	0.5	3.91E-05	0.9	3	2.6
3/31/08 01:15.35	6.0	19.1	47.3	13.1	1.3	2.68E-05	1.0	3	3.1
3/31/08 02:06.86	9.0	16.1	51.5	7.1	2.1	2.57E-05	1.0	3	3
3/31/08 03:02.83	12.0	13.0	56.0	1.0	3.0	2.57E-05	1.0	3	3.1
3/31/08 04:05.67	15.0	10.0	62.8	-5.0	4.1	2.42E-05	1.0	3	3
3/31/08 05:09.76	18.0	7.0	64.1	-11.0	5.2	2.55E-05	1.0	3	3
3/31/08 06:23.73	21.0	4.0	74.0	-17.0	6.4	2.40E-05	1.0	3	3
3/31/08 07:44.76	24.0	1.0	81.0	-23.0	7.7	2.40E-05	1.0	3	3
3/31/08 00:00.00	0.0	25.0	0.0	25.0	7.7				
3/31/08 00:34.71	3.0	21.7	34.7	18.7	8.3	3.56E-05	1.1	3	3.3
3/31/08 01:22.87	6.0	18.5	48.2	12.5	9.1	2.68E-05	1.1	3	3.2
3/31/08 02:32.71	10.0	14.6	69.8	4.6	10.3	2.54E-05	1.0	4	3.9
3/31/08 03:10.30	12.0	12.5	37.6	0.5	10.9	2.62E-05	1.1	2	2.1
3/31/08 04:12.43	15.0	9.5	62.1	-5.5	12.0	2.46E-05	1.0	3	3
3/31/08 05:18.71	18.0	6.5	66.3	-11.5	13.1	2.49E-05	1.0	3	3
3/31/08 06:32.37	21.0	3.5	73.7	-17.5	14.3	2.43E-05	1.0	3	3
3/31/08 07:54.59	24.0	0.5	82.2	-23.5	15.7	2.38E-05	1.0	3	3
3/31/08 00:00.00	0.0	24.9	0.0	24.9	15.7				
3/31/08 00:28.34	3.0	22.2	28.3	19.2	16.1	3.94E-05	0.9	3	2.7
3/31/08 01:16.31	6.0	19.2	48.0	13.2	16.9	2.59E-05	1.0	3	3
3/31/08 02:08.41	9.0	16.1	52.1	7.1	17.8	2.58E-05	1.0	3	3.1
3/31/08 03:04.57	12.0	13.1	56.2	1.1	18.7	2.52E-05	1.0	3	3
3/31/08 04:06.44	15.0	10.1	61.9	-4.9	19.8	2.45E-05	1.0	3	3
3/31/08 05:14.78	18.0	7.0	68.3	-11.0	20.9	2.43E-05	1.0	3	3.1
3/31/08 06:27.91	21.0	4.0	73.1	-17.0	22.1	2.43E-05	1.0	3	3
3/31/08 07:50.16	24.0	1.0	82.3	-23.0	23.5	2.36E-05	1.0	3	3





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

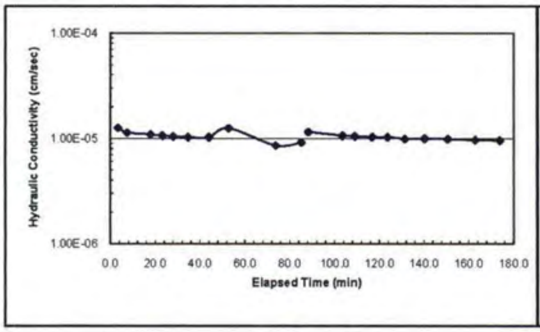
Sample I.D.	75-mm Oregon Boardman- 6'-Lower Slope- Surface	Test Date :	4/21/08

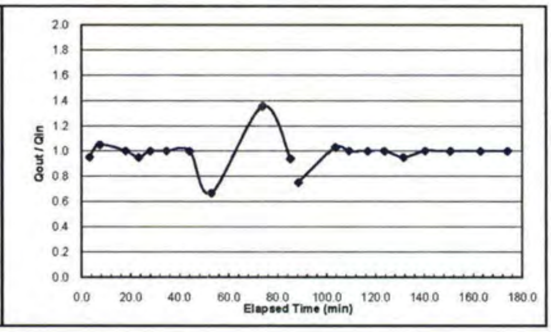
Cell Pressure =	42.7	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.9	psi	Area of Sample, A =	45.6	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	173.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	279.4	(g)	Sample Water Content =	9.2%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.61	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2	30.76	162.61	151.48	9.22%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
4/21/08 00:00:00	0.0	24.8	0.0	24.8	0.0				
4/21/08 00:03:18	2.0	22.9	198.1	20.9	3.3	1.26E-05	1.0	2	1.9
4/21/08 00:07:25	4.0	20.8	246.8	16.8	7.4	1.14E-05	1.1	2	2.1
4/21/08 00:17:58	8.5	16.3	632.7	7.8	18.0	1.09E-05	1.0	4.5	4.5
4/21/08 00:23:16	10.5	14.4	318.7	3.9	23.3	1.06E-05	1.0	2	1.9
4/21/08 00:28:04	12.1	12.8	287.8	0.7	28.1	1.04E-05	1.0	1.6	1.6
4/21/08 00:34:40	14.1	10.8	396.3	-3.3	34.7	1.03E-05	1.0	2	2
4/21/08 00:44:00	16.6	8.3	559.5	-8.3	44.0	1.02E-05	1.0	2.5	2.5
4/21/08 00:52:52	19.6	6.3	531.7	-13.3	52.9	1.25E-05	0.7	3	2
4/21/08 01:13:53	22.4	2.5	1261.8	-19.9	73.9	8.55E-06	1.4	2.8	3.8
4/21/08 01:25:13	24.0	1.0	679.2	-23.0	85.2	9.17E-06	0.9	1.6	1.5
4/23/08 00:00:00	0.0	24.8	0.0	24.8	85.2				
4/23/08 00:03:14	2.0	23.3	194.0	21.3	88.4	1.15E-05	0.8	2	1.5
4/23/08 00:18:27	8.5	16.6	912.8	8.1	103.7	1.06E-05	1.0	6.5	6.7
4/23/08 00:23:57	10.5	14.6	329.9	4.1	109.2	1.05E-05	1.0	2	2
4/23/08 00:31:38	13.0	12.1	461.6	-0.9	116.8	1.03E-05	1.0	2.5	2.5
4/23/08 00:38:31	15.0	10.1	412.7	-4.9	123.7	1.03E-05	1.0	2	2
4/23/08 00:46:15	17.0	8.2	463.6	-8.8	131.5	9.93E-06	1.0	2	1.9
4/23/08 00:55:07	19.0	6.2	532.6	-12.8	140.3	9.98E-06	1.0	2	2
4/23/08 01:05:24	21.0	4.2	616.6	-16.8	150.6	9.87E-06	1.0	2	2
4/23/08 01:17:43	23.0	2.2	738.7	-20.8	162.9	9.65E-06	1.0	2	2
4/23/08 01:28:40	24.5	0.7	657.2	-23.8	173.9	9.56E-06	1.0	1.5	1.5





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

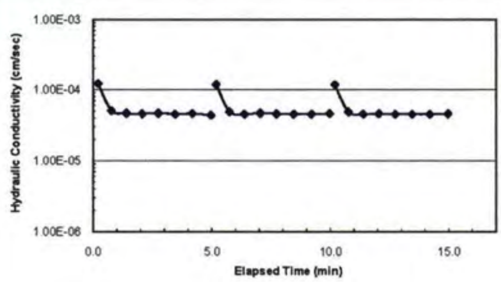
Sample I.D.	**305-mm Oregon Boardman- 6'-Lower Slope- 3'-4'**	**Test Date :**	**2/29/08**

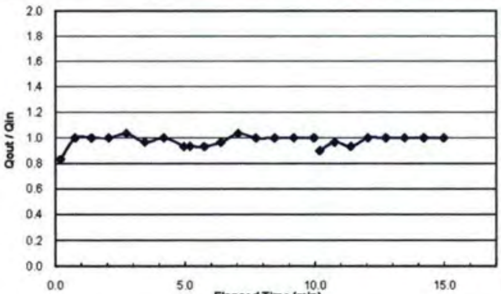
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21100.0	(g)	Sample Water Content =	23.0%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.89	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
MC6	31.13	163.44	138.68	23.02%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/29/08 12:00 AM	0.0	24.5	0.0	24.5	0.0				
2/29/08 12:00 AM	3.0	22.0	12.4	19.0	0.2	1.21E-04	0.8	15	12.5
2/29/08 12:00 AM	6.0	19.0	33.6	13.0	0.8	5.05E-05	1.0	15	15
2/29/08 12:01 AM	9.0	16.0	37.7	7.0	1.4	4.65E-05	1.0	15	15
2/29/08 12:02 AM	12.0	13.0	39.7	1.0	2.1	4.57E-05	1.0	15	15
2/29/08 12:02 AM	15.0	9.9	41.1	-5.1	2.7	4.65E-05	1.0	15	15.5
2/29/08 12:03 AM	18.0	7.0	42.3	-11.0	3.4	4.53E-05	1.0	15	14.5
2/29/08 12:04 AM	21.0	4.0	44.1	-17.0	4.2	4.59E-05	1.0	15	15
2/29/08 12:04 AM	24.0	1.2	46.5	-22.8	5.0	4.37E-05	0.9	15	14
2/29/08 12:00 AM	0.0	24.5	0.0	24.5	5.0				
2/29/08 12:00 AM	3.0	21.7	13.6	18.7	5.2	1.17E-04	0.9	15	14
2/29/08 12:00 AM	6.0	18.9	33.6	12.9	5.7	4.88E-05	0.9	15	14
2/29/08 12:01 AM	9.0	16.0	38.1	7.0	6.4	4.53E-05	1.0	15	14.5
2/29/08 12:02 AM	12.0	12.9	39.6	0.9	7.0	4.66E-05	1.0	15	15.5
2/29/08 12:02 AM	15.0	9.9	41.3	-5.1	7.7	4.55E-05	1.0	15	15
2/29/08 12:03 AM	18.0	6.9	43.0	-11.1	8.4	4.53E-05	1.0	15	15
2/29/08 12:04 AM	21.0	3.9	44.9	-17.1	9.2	4.51E-05	1.0	15	15
2/29/08 12:05 AM	24.0	0.9	46.0	-23.1	10.0	4.58E-05	1.0	15	15
2/29/08 12:00 AM	0.0	24.6	0.0	24.6	10.0				
2/29/08 12:00 AM	3.0	21.9	13.4	18.9	10.2	1.16E-04	0.9	15	13.5
2/29/08 12:00 AM	6.0	19.0	34.3	13.0	10.8	4.87E-05	1.0	15	14.5
2/29/08 12:01 AM	9.0	16.2	37.6	7.2	11.4	4.51E-05	0.9	15	14
2/29/08 12:02 AM	12.0	13.2	39.5	1.2	12.0	4.59E-05	1.0	15	15
2/29/08 12:02 AM	15.0	10.2	41.6	-4.8	12.7	4.51E-05	1.0	15	15
2/29/08 12:03 AM	18.0	7.2	43.2	-10.8	13.5	4.51E-05	1.0	15	15
2/29/08 12:04 AM	21.0	4.2	44.9	-16.8	14.2	4.51E-05	1.0	15	15
2/29/08 12:05 AM	24.0	1.2	46.1	-22.8	15.0	4.56E-05	1.0	15	15





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

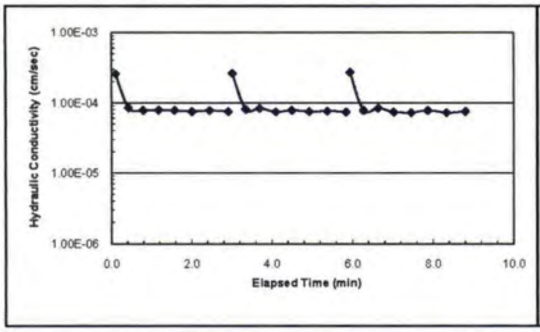
Sample I.D.	305-mm Oregon Boardman- 6'-Lower Slope- 5'-6'	Test Date :	2/25/08

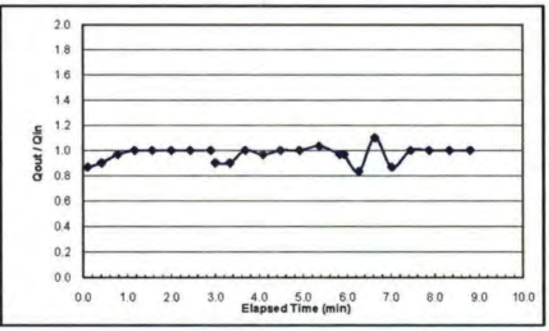
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21050.0	(g)	Sample Water Content =	25.3%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.89	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
MC6	31.08	197.58	164.01	25.25%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
2/25/08 12:00 AM	0.0	24.6	0.0	24.6	0.0				
2/25/08 12:00 AM	3.0	22.0	6.0	19.0	0.1	2.56E-04	0.9	15	13
2/25/08 12:00 AM	6.0	19.3	19.0	13.3	0.4	8.47E-05	0.9	15	13.5
2/25/08 12:00 AM	9.0	16.4	22.0	7.4	0.8	7.82E-05	1.0	15	14.5
2/25/08 12:01 AM	12.0	13.4	23.0	1.4	1.2	7.87E-05	1.0	15	15
2/25/08 12:01 AM	15.0	10.4	24.0	-4.6	1.6	7.81E-05	1.0	15	15
2/25/08 12:02 AM	18.0	7.4	26.0	-10.6	2.0	7.48E-05	1.0	15	15
2/25/08 12:02 AM	21.0	4.4	26.0	-16.6	2.4	7.77E-05	1.0	15	15
2/25/08 12:02 AM	24.0	1.4	28.0	-22.6	2.9	7.50E-05	1.0	15	15
2/25/08 12:00 AM	0.0	24.7	0.0	24.7	2.9				
2/25/08 12:00 AM	3.0	22.0	6.0	19.0	3.0	2.60E-04	0.9	15	13.5
2/25/08 12:00 AM	6.0	19.3	20.0	13.3	3.3	8.05E-05	0.9	15	13.5
2/25/08 12:00 AM	9.0	16.3	21.0	7.3	3.7	8.33E-05	1.0	15	15
2/25/08 12:01 AM	12.0	13.4	24.0	1.4	4.1	7.41E-05	1.0	15	14.5
2/25/08 12:01 AM	15.0	10.4	24.0	-4.6	4.5	7.81E-05	1.0	15	15
2/25/08 12:02 AM	18.0	7.4	26.0	-10.6	4.9	7.48E-05	1.0	15	15
2/25/08 12:02 AM	21.0	4.3	27.0	-16.7	5.4	7.60E-05	1.0	15	15.5
2/25/08 12:02 AM	24.0	1.4	28.0	-22.6	5.8	7.38E-05	1.0	15	14.5
2/25/08 12:00 AM	0.0	24.6	0.0	24.6	5.8				
2/25/08 12:00 AM	3.0	21.7	6.0	18.7	5.9	2.70E-04	1.0	15	14.5
2/25/08 12:00 AM	6.0	19.2	20.0	13.2	6.3	7.77E-05	0.8	15	12.5
2/25/08 12:00 AM	9.0	15.9	22.0	6.9	6.6	8.36E-05	1.1	15	16.5
2/25/08 12:01 AM	12.0	13.3	23.0	1.3	7.0	7.35E-05	0.9	15	13
2/25/08 12:01 AM	15.0	10.3	26.0	-4.7	7.5	7.21E-05	1.0	15	15
2/25/08 12:02 AM	18.0	7.3	25.0	-10.7	7.9	7.78E-05	1.0	15	15
2/25/08 12:02 AM	21.0	4.3	28.0	-16.7	8.3	7.22E-05	1.0	15	15
2/25/08 12:02 AM	24.0	1.3	28.0	-22.7	8.8	7.51E-05	1.0	15	15





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

ASTM D 5084 - 00

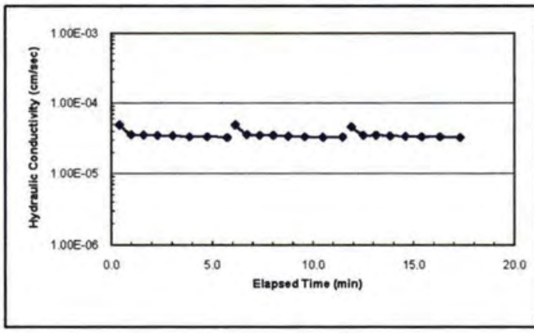
Sample I.D.	150-mm Oregon Boardman- 6'-Lower Slope- 5'-6'	Test Date :	3/26/08

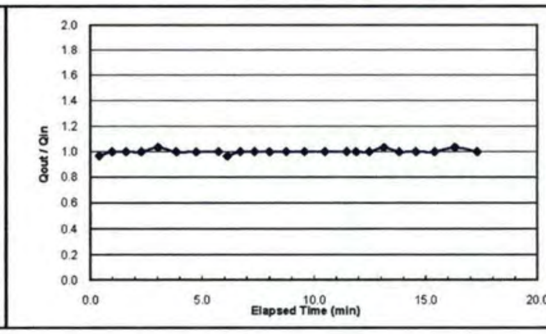
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	2612.4	(g)	Sample Water Content =	23.8%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.87	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
55	30.91	211.66	176.96	23.76%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
3/26/08 00:00.00	0.0	24.7	0.0	24.7	0.0				
3/26/08 00:23.66	3.0	21.8	23.7	18.8	0.4	4.90E-05	1.0	3	2.9
3/26/08 00:58.58	6.0	18.8	34.9	12.8	1.0	3.58E-05	1.0	3	3
3/26/08 01:36.12	9.0	15.8	37.5	6.8	1.6	3.54E-05	1.0	3	3
3/26/08 02:16.72	12.0	12.8	40.6	0.8	2.3	3.49E-05	1.0	3	3
3/26/08 03:01.64	15.0	9.7	44.9	-5.3	3.0	3.45E-05	1.0	3	3.1
3/26/08 03:50.80	18.0	6.7	49.2	-11.3	3.8	3.34E-05	1.0	3	3
3/26/08 04:43.99	21.0	3.7	53.2	-17.3	4.7	3.35E-05	1.0	3	3
3/26/08 05:43.74	24.0	0.7	59.8	-23.3	5.7	3.27E-05	1.0	3	3
3/26/08 00:00.00	0.0	24.7	0.0	24.7	5.7				
3/26/08 00:23.66	3.0	21.8	23.7	18.8	6.1	4.90E-05	1.0	3	2.9
3/26/08 00:58.36	6.0	18.8	34.7	12.8	6.7	3.60E-05	1.0	3	3
3/26/08 01:36.12	9.0	15.8	37.8	6.8	7.3	3.52E-05	1.0	3	3
3/26/08 02:16.72	12.0	12.8	40.6	0.8	8.0	3.49E-05	1.0	3	3
3/26/08 03:01.64	15.0	9.8	44.9	-5.2	8.8	3.39E-05	1.0	3	3
3/26/08 03:50.80	18.0	6.8	49.2	-11.2	9.6	3.34E-05	1.0	3	3
3/26/08 04:45.00	21.0	3.8	54.2	-17.2	10.5	3.29E-05	1.0	3	3
3/26/08 05:43.74	24.0	0.8	58.7	-23.2	11.5	3.32E-05	1.0	3	3
3/26/08 00:00.00	0.0	24.7	0.0	24.7	11.5				
3/26/08 00:25.56	3.0	21.7	25.6	18.7	11.9	4.61E-05	1.0	3	3
3/26/08 01:01.16	6.0	18.7	35.6	12.7	12.5	3.51E-05	1.0	3	3
3/26/08 01:39.63	9.0	15.6	38.5	6.6	13.1	3.52E-05	1.0	3	3.1
3/26/08 02:21.06	12.0	12.6	41.4	0.6	13.8	3.43E-05	1.0	3	3
3/26/08 03:06.20	15.0	9.6	45.1	-5.4	14.6	3.38E-05	1.0	3	3
3/26/08 03:55.80	18.0	6.6	49.6	-11.4	15.4	3.32E-05	1.0	3	3
3/26/08 04:50.24	21.0	3.5	54.4	-17.5	16.3	3.34E-05	1.0	3	3.1
3/26/08 05:50.56	24.0	0.5	60.3	-23.5	17.3	3.24E-05	1.0	3	3





Hydraulic Conductivity Test - Boardman - Thick Store-and-Release Cover

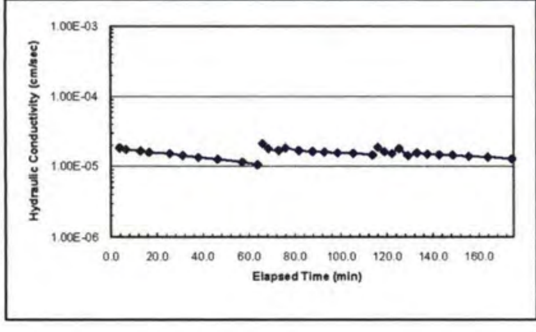
ASTM D 5084 - 00

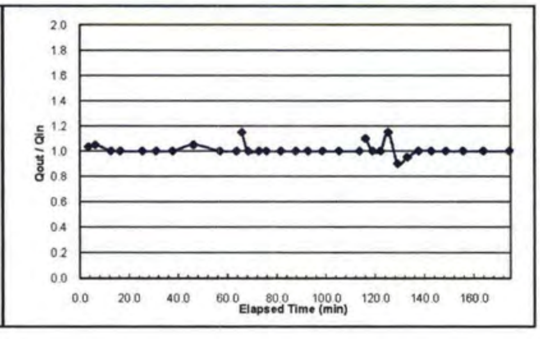
Sample I.D.	75-mm Oregon Boardman- 6'-Lower Slope- 5'-6'		Test Date :	3/26/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.9	psi	Area of Sample, A =	45.6	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	173.7	cm^3
Effective Stress =	1.50	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	376.2	(g)	Sample Water Content =	14.4%	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	2.16	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	50.78	265.61	238.5	14.44%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
5/2/08 00:00:00	0.0	24.9	0.0	24.9	0.0				
5/2/08 00:03:35	3.0	21.8	215.3	18.8	3.6	1.85E-05	1.0	3	3.1
5/2/08 00:06:23	5.0	19.7	167.4	14.7	6.4	1.74E-05	1.1	2	2.1
5/2/08 00:12:43	9.0	15.7	380.7	6.7	12.7	1.66E-05	1.0	4	4
5/2/08 00:16:28	11.0	13.7	224.5	2.7	16.5	1.59E-05	1.0	2	2
5/2/08 00:25:27	15.0	9.7	539.0	-5.3	25.4	1.52E-05	1.0	4	4
5/2/08 00:31:02	17.0	7.7	335.3	-9.3	31.0	1.43E-05	1.0	2	2
5/2/08 00:37:47	19.0	5.7	404.6	-13.3	37.8	1.34E-05	1.0	2	2
5/2/08 00:46:15	21.0	3.6	508.2	-17.4	46.3	1.26E-05	1.1	2	2.1
5/2/08 00:56:58	23.0	1.6	643.2	-21.4	57.0	1.14E-05	1.0	2	2
5/2/08 01:03:39	24.0	0.6	400.5	-23.4	63.6	1.05E-05	1.0	1	1
5/2/08 00:00:00	0.0	25.0	0.0	25.0	63.6				
5/2/08 00:02:11	2.0	22.7	131.4	20.7	65.8	2.10E-05	1.2	2	2.3
5/2/08 00:04:44	4.0	20.7	153.0	16.7	68.4	1.79E-05	1.0	2	2
5/2/08 00:09:11	7.0	17.7	266.3	10.7	72.8	1.69E-05	1.0	3	3
5/2/08 00:12:11	9.0	15.7	180.0	6.7	75.8	1.82E-05	1.0	2	2
5/2/08 00:18:00	12.2	12.5	348.9	0.3	81.6	1.68E-05	1.0	3.2	3.2
5/2/08 00:24:03	15.0	9.7	363.4	-5.3	87.7	1.62E-05	1.0	2.8	2.8
5/2/08 00:29:03	17.0	7.7	300.2	-9.3	92.7	1.60E-05	1.0	2	2
5/2/08 00:34:53	19.0	5.7	349.7	-13.3	98.5	1.55E-05	1.0	2	2
5/2/08 00:41:38	21.0	3.7	404.8	-17.3	105.3	1.54E-05	1.0	2	2
5/2/08 00:50:01	23.0	1.7	503.2	-21.3	113.7	1.45E-05	1.0	2	2
5/2/08 00:00:00	0.0	24.9	0.0	24.9	113.7				
5/2/08 00:02:25	2.0	22.7	145.1	20.7	116.1	1.86E-05	1.1	2	2.2
5/2/08 00:05:15	4.0	20.7	169.5	16.7	118.9	1.62E-05	1.0	2	2
5/2/08 00:08:28	6.0	18.7	193.2	12.7	122.1	1.52E-05	1.0	2	2
5/2/08 00:11:37	8.0	16.4	189.7	8.4	125.3	1.80E-05	1.2	2	2.3
5/2/08 00:15:27	10.0	14.6	229.6	4.6	129.1	1.42E-05	0.9	2	1.8
5/2/08 00:19:21	12.0	12.7	234.0	0.7	133.0	1.55E-05	1.0	2	1.9
5/2/08 00:23:56	14.0	10.7	274.9	-3.3	137.6	1.49E-05	1.0	2	2
5/2/08 00:29:04	16.0	8.7	308.4	-7.3	142.7	1.47E-05	1.0	2	2
5/2/08 00:34:57	18.0	6.7	352.6	-11.3	148.6	1.44E-05	1.0	2	2
5/2/08 00:41:56	20.0	4.7	419.3	-15.3	155.6	1.38E-05	1.0	2	2
5/2/08 00:50:11	22.0	2.7	495.1	-19.3	163.9	1.36E-05	1.0	2	2
5/2/08 01:00:40	24.0	0.7	628.6	-23.3	174.3	1.28E-05	1.0	2	2





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

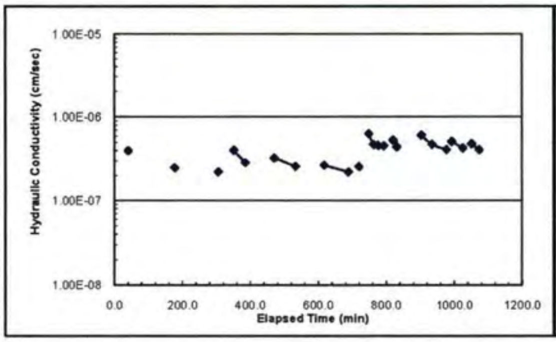
ASTM D 5084 - 00

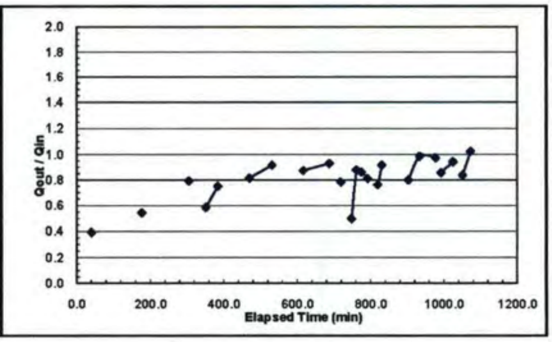
Sample I.D.	**305-mm ICYRU**		**Test Date :**	**7/10/06**	
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	24222.2	(g)	Sample Water Content =	13.8	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.91	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2	50.1	401.9	359.2	13.81

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/12/2006 11:51	2.5	23.7	0.0	21.2	0.0				
7/12/2006 12:31	14.0	19.2	2400.0	5.2	40.0	3.98E-07	0.4	11.5	4.5
7/12/2006 12:31	1.8	23.9	0.0	22.1	40.0				
7/12/2006 14:48	23.0	12.4	8220.0	-10.6	177.0	2.49E-07	0.5	21.2	11.5
7/12/2006 14:48	1.0	23.0	0.0	22.0	177.0				
7/12/2006 16:56	16.4	10.8	7680.0	-5.6	305.0	2.21E-07	0.8	15.4	12.2
7/14/2006 9:59	7.9	23.0	0.0	15.1	305.0				
7/14/2006 10:45	19.2	16.4	2760.0	-2.8	351.0	4.04E-07	0.6	11.3	6.6
7/14/2006 11:18	24.0	12.8	1980.0	-11.2	384.0	2.86E-07	0.7	4.8	3.6
7/14/2006 11:20	1.5	23.7	0.0	22.2	384.0				
7/14/2006 12:46	16.6	11.4	5160.0	-5.2	470.0	3.26E-07	0.8	15.1	12.3
7/14/2006 13:48	23.8	4.8	3720.0	-19.0	532.0	2.59E-07	0.9	7.2	6.6
7/14/2006 13:49	1.6	23.8	0.0	22.2	532.0				
7/14/2006 15:14	13.6	13.3	5100.0	-0.3	617.0	2.67E-07	0.9	12	10.5
7/14/2006 16:25	20.8	6.6	4260.0	-14.2	688.0	2.21E-07	0.9	7.2	6.7
7/14/2006 16:25	1.6	24.0	0.0	22.4	688.0				
7/14/2006 16:56	6.2	20.4	1860.0	14.2	719.0	2.56E-07	0.8	4.6	3.6
7/20/2006 9:38	1.3	24.3	0.0	23.0	719.0				
7/20/2006 10:07	13.6	18.2	1740.0	4.6	748.0	6.30E-07	0.5	12.3	6.1
7/20/2006 10:21	16.9	15.3	840.0	-1.6	762.0	4.72E-07	0.9	3.3	2.9
7/20/2006 10:34	19.8	12.8	780.0	-7.0	775.0	4.59E-07	0.9	2.9	2.5
7/20/2006 10:51	23.5	9.8	1020.0	-13.7	792.0	4.53E-07	0.8	3.7	3
7/20/2006 10:52	4.0	24.2	0.0	20.2	792.0				
7/20/2006 11:20	12.4	17.8	1680.0	5.4	820.0	5.27E-07	0.8	8.4	6.4
7/20/2006 11:31	14.8	15.6	660.0	0.8	831.0	4.42E-07	0.9	2.4	2.2
7/20/2006 11:52	19.1	11.6	0.0	-7.5	831.0				
7/20/2006 12:48	3.7	23.5	3360.0	19.8	887.0				
7/20/2006 13:04	9.2	19.1	960.0	9.9	903.0	6.10E-07	0.8	5.5	4.4
7/20/2006 13:35	16.2	12.2	1860.0	-4.0	934.0	4.74E-07	1.0	7	6.9
7/20/2006 14:18	23.9	4.7	2580.0	-19.2	977.0	4.10E-07	1.0	7.7	7.5
7/20/2006 14:19	4.0	23.6	0.0	19.6	977.0				
7/20/2006 14:34	8.2	20.0	900.0	11.8	992.0	5.10E-07	0.9	4.2	3.6
7/20/2006 15:07	15.2	13.4	1980.0	-1.8	1025.0	4.30E-07	0.9	7	6.6
7/20/2006 16:17	25.0	1.5	0.0	-23.5	1025.0				
7/20/2006 16:19	4.0	23.8	0.0	19.8	1025.0				
7/20/2006 16:45	10.8	18.1	1560.0	7.3	1051.0	4.78E-07	0.8	6.8	5.7
7/20/2006 17:07	15.0	13.8	1320.0	-1.2	1073.0	4.08E-07	1.0	4.2	4.3





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

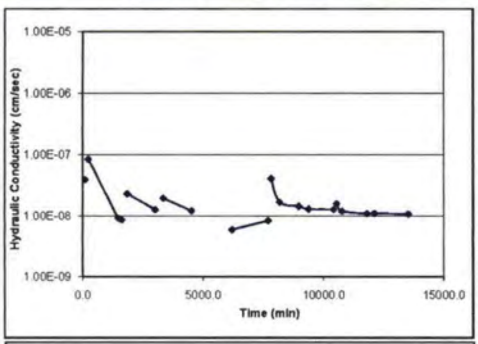
ASTM D 5084 - 00

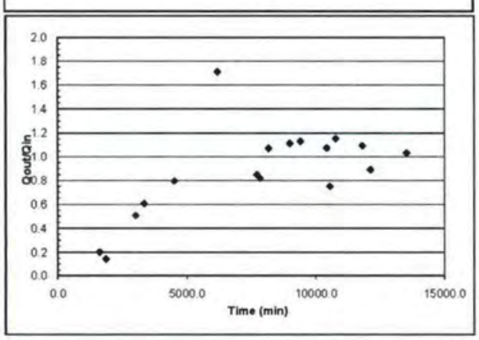
Sample I.D.		305-mm ICY1L		Test Date :	10/2/06	
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2	
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3	
Effective Stress =	2.0	psi	a_{in} =	1	cm^2	
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2	
Weight of wet sample =	24131.5	(g)	Sample Water Content =	13.6	(%)	
Wet Density =	2.2	g/cm^3	Dry Density =	1.91	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A^* \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
CL1	50.36	460.6	411.57	13.57

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
11/2/2006 12:32	0.5	22.5	0.0	22.0	0.0				
11/2/2006 14:22	6.8	24.3	6600.0	17.5	110.0	3.92E-08	-0.3	6.3	-1.8
11/2/2006 14:23	0.8	20.2	0.0	19.4	110.0				
11/2/2006 15:20	3.3	20.9	3420.0	22.9	167.0				
11/2/2006 16:30	4.8	21.5	4200.0	16.7	237.0	8.49E-08	-0.4	1.5	-0.6
11/3/2006 13:12	18.3	23.6	74520.0	5.3	1479.0	9.25E-09	-0.2	13.5	-2.1
11/3/2006 15:36	19.3	23.4	8640.0	4.1	1623.0	8.71E-09	0.2	1	0.2
11/6/2006 12:22	3.4	22.6	0.0	19.2	1623.0				
11/6/2006 16:19	8.3	21.9	14220.0	13.6	1860.0	2.31E-08	0.1	4.9	0.7
11/7/2006 11:33	17.8	17.1	69240.0	-0.7	3014.0	1.28E-08	0.5	9.5	4.8
11/9/2006 11:50	0.8	23.8	0.0	23.0	3014.0			-17	-6.7
11/9/2006 17:29	5.1	21.2	20340.0	16.1	3353.0	1.95E-08	0.6	4.3	2.6
11/10/2006 12:57	12.9	15.0	70080.0	2.1	4521.0	1.22E-08	0.8	7.8	6.2
11/13/2006 12:02	1.4	23.3	0.0	21.9	4521.0				
11/14/2006 16:01	5.2	16.8	100740.0	11.6	6200.0	5.98E-09	1.7	3.8	6.5
11/15/2006 17:11	11.8	11.2	90600.0	-0.6	7710.0	8.41E-09	0.8	6.6	5.6
11/28/2006 13:42	1.9	21.6	0.0	19.7	7710.0				
11/28/2006 15:43	4.7	19.3	7260.0	14.6	7831.0	4.10E-08	0.8	2.8	2.3
11/28/2006 21:25	7.5	16.3	20520.0	8.8	8173.0	1.70E-08	1.1	2.8	3
11/29/2006 10:58	12.8	10.4	48780.0	-2.4	8986.0	1.45E-08	1.1	5.3	5.9
11/29/2006 17:53	15.1	7.8	24900.0	-7.3	9401.0	1.31E-08	1.1	2.3	2.6
11/30/2006 10:54	20.5	2.0	61260.0	-18.5	10422.0	1.28E-08	1.1	5.4	5.8
11/30/2006 10:59	2.8	24.2	0.0	21.4	10422.0				
11/30/2006 13:04	4	23.3	7500.0	19.3	10547.0	1.61E-08	0.7	1.2	0.9
11/30/2006 16:47	5.3	21.8	13380.0	16.5	10770.0	1.22E-08	1.2	1.3	1.5
12/1/2006 10:06	10.7	15.9	62340.0	5.2	11809.0	1.10E-08	1.1	5.4	5.9
12/1/2006 15:28	12.5	14.3	19320.0	1.8	12131.0	1.11E-08	0.9	1.8	1.6
12/2/2006 14:48	19.2	7.4	84000.0	-11.8	13531.0	1.08E-08	1.0	6.7	6.9





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

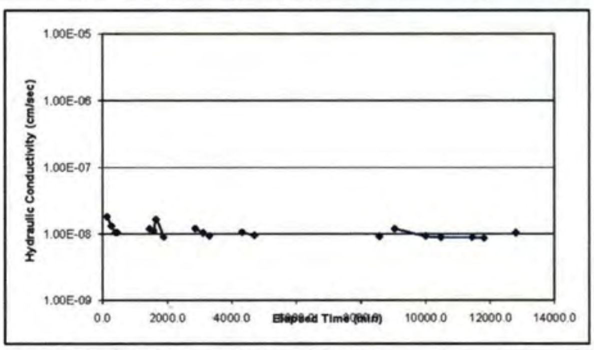
ASTM D 5084 - 00

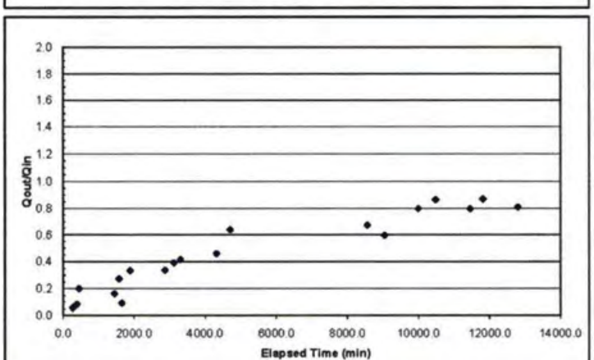
Sample I.D.	305-mm ICY2L			Test Date :		
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2	
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3	
Effective Stress =	2.0	psi	a_{in} =	1	cm^2	
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2	
Weight of wet sample =	22362.5	(g)	Sample Water Content =	12.0	(%)	
Wet Density =	2.0	g/cm^3	Dry Density =	1.80	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
44	50.92	525.78	468.57	13.70

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
8/1/2006 9:13	4.3	22.6	0.0	18.3	0.0				
8/1/2006 11:33	7.0	22.7	8400.0	15.7	140.0	1.81E-08	0.0	2.7	-0.1
8/1/2006 13:48	8.7	22.6	8100.0	13.9	275.0	1.31E-08	0.1	1.7	0.1
8/1/2006 15:52	9.9	22.5	7440.0	12.6	399.0	1.04E-08	0.1	1.2	0.1
8/1/2006 16:49	10.4	22.4	3420.0	12.0	456.0	1.05E-08	0.2	0.5	0.1
8/1/2006 16:53	1.5	22.6	0.0	21.1	456.0				
8/2/2006 9:29	11.9	20.9	59760.0	9.0	1452.0	1.20E-08	0.2	10.4	1.7
8/2/2006 11:39	13.0	20.6	7800.0	7.6	1582.0	1.10E-08	0.3	1.1	0.3
8/2/2006 12:55	14.1	20.5	4560.0	6.4	1658.0	1.63E-08	0.1	1.1	0.1
8/2/2006 16:45	15.6	20.0	13800.0	4.4	1888.0	9.05E-09	0.3	1.5	0.5
8/2/2006 16:53	2.0	22.4	0.0	20.4	1888.0				
8/3/2006 9:18	10.9	19.4	59100.0	8.5	2873.0	1.19E-08	0.3	8.9	3
8/3/2006 13:26	12.7	18.7	14880.0	6.0	3121.0	1.04E-08	0.4	1.8	0.7
8/3/2006 16:35	13.9	18.2	11340.0	4.3	3310.0	9.38E-09	0.4	1.2	0.5
8/3/2006 16:41	1.8	22.8	0.0	21.0	3310.0				
8/4/2006 9:27	9.2	19.4	60360.0	10.2	4316.0	1.05E-08	0.5	7.4	3.4
8/4/2006 15:51	11.4	18.0	23040.0	6.6	4700.0	9.59E-09	0.6	2.2	1.4
8/4/2006 16:44	1.4	24.6	0.0	23.2	4700.0				
8/7/2006 9:07	21.8	10.9	231780.0	-10.9	8563.0	9.18E-09	0.7	20.4	13.7
8/7/2006 9:09	2.6	23.8	0.0	21.2	8563.0				
8/7/2006 17:08	6.3	21.6	28740.0	15.3	9042.0	1.19E-08	0.6	3.7	2.2
8/8/2006 9:07	11.2	17.7	57540.0	6.5	10001.0	9.25E-09	0.8	4.9	3.9
8/8/2006 17:10	13.4	15.8	28980.0	2.4	10484.0	8.89E-09	0.9	2.2	1.9
8/9/2006 9:18	17.8	12.3	58080.0	-5.5	11452.0	8.87E-09	0.8	4.4	3.5
8/9/2006 15:23	19.3	11.0	21900.0	-8.3	11817.0	8.62E-09	0.9	1.5	1.3
8/9/2006 17:00	4.1	23.3	0.0	19.2	11817.0				
8/10/2006 9:22	9.8	18.7	58920.0	8.9	12799.0	1.04E-08	0.8	5.7	4.6





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

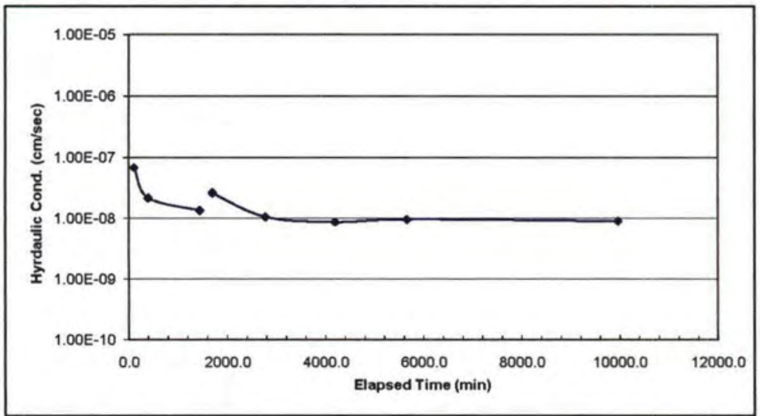
ASTM D 5084 - 00

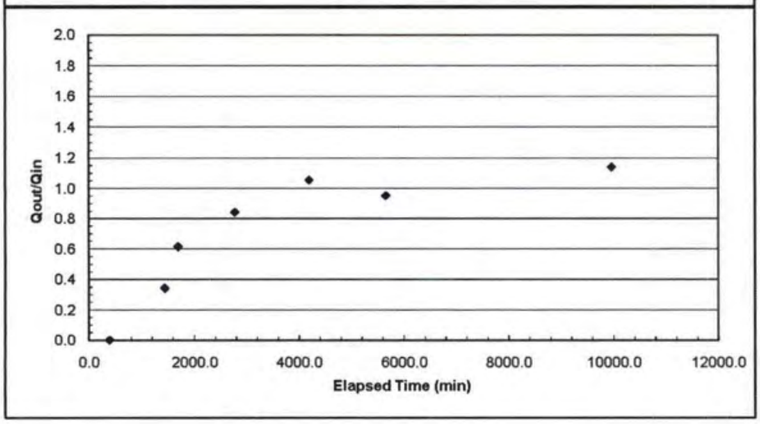
Sample I.D.	150-mm ICY2L		Test Date :	8/15/06	
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	4082.1	(g)	Sample Water Content =	14.4	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.92	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	50.19	508.24	450.46	14.44

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/15/2006 10:01	0.8	21.1	0.0	20.3	0.0				
8/15/2006 11:48	3.6	21.6	6420.0	18.0	107.0	6.85E-08	-0.2	2.8	-0.5
8/15/2006 16:31	5.5	21.6	16980.0	16.1	390.0	2.17E-08	0.0	1.9	0
8/16/2006 10:00	8.7	20.5	62940.0	11.8	1439.0	1.35E-08	0.3	3.2	1.1
8/22/2006 11:27	1.8	22.0	0.0	20.2	1439.0				
8/22/2006 15:43	3.1	21.2	15360.0	18.1	1695.0	2.61E-08	0.6	1.3	0.8
8/23/2006 9:40	5.0	19.6	64620.0	14.6	2772.0	1.06E-08	0.8	1.9	1.6
8/24/2006 9:20	6.8	17.7	85200.0	10.9	4192.0	8.68E-09	1.1	1.8	1.9
8/25/2006 9:42	8.9	15.7	87720.0	6.8	5654.0	9.61E-09	1.0	2.1	2
8/28/2006 9:31	13.9	10.0	258540.0	-3.9	9963.0	9.01E-09	1.1	5	5.7





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

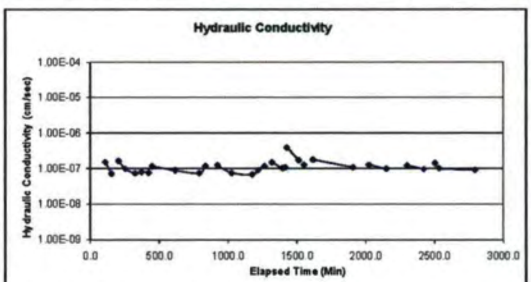
ASTM D 5084 - 00

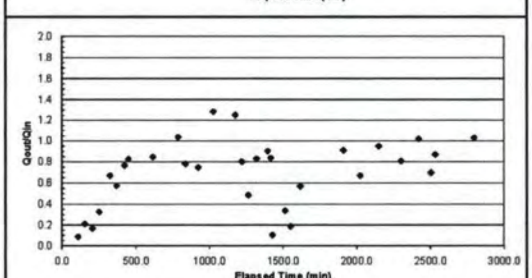
Sample I.D.	305-mm ICY2U		Test Date :	8/30/06	
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	24630.5	(g)	Sample Water Content =	15.0	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.93	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
9	195.1	930.75	834.65	15.03

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
8/30/2006 12:35	5.4	17.5	0.0	12.1	0.0				
8/30/2006 14:24	19.6	16.3	6540.0	-3.3	109.0	1.48E-07	0.1	14.2	1.2
8/30/2006 15:09	22.0	15.8	2700.0	-8.2	154.0	7.14E-08	0.2	2.4	0.5
9/5/2006 12:45	3.5	21.7	0.0	18.2	154.0				
9/5/2006 13:37	10.8	20.5	3120.0	9.7	206.0	1.62E-07	0.2	7.3	1.2
9/5/2006 14:24	14.2	19.4	2820.0	5.2	253.0	9.85E-08	0.3	3.4	1.1
9/5/2006 15:36	17.2	17.4	4320.0	0.2	325.0	7.35E-08	0.7	3	2
9/5/2006 16:21	19.3	16.2	2700.0	-3.1	370.0	7.96E-08	0.6	2.1	1.2
9/5/2006 17:15	21.4	14.8	3240.0	-6.8	424.0	7.61E-08	0.8	2.1	1.6
9/6/2006 9:41	2.1	21.1	0.0	19.0	424.0				
9/6/2006 10:07	3.8	19.7	1560.0	15.9	450.0	1.16E-07	0.8	1.7	1.4
9/6/2006 12:52	11.5	13.2	9900.0	1.7	615.0	8.79E-08	0.8	7.7	6.5
9/6/2006 15:45	17.2	7.3	10380.0	-9.9	788.0	7.41E-08	1.0	5.7	5.9
9/6/2006 16:32	19.9	5.2	2820.0	-14.7	835.0	1.19E-07	0.8	2.7	2.1
9/7/2006 9:24	1.6	18.9	0.0	17.3	835.0				
9/7/2006 10:52	7.8	14.3	5280.0	6.5	923.0	1.23E-07	0.7	6.2	4.6
9/7/2006 12:35	11.0	10.2	6180.0	-0.8	1026.0	7.50E-08	1.3	3.2	4.1
9/7/2006 15:03	15.0	5.2	8880.0	-9.8	1174.0	6.77E-08	1.3	4	5
9/7/2006 15:49	17.0	3.6	2760.0	-13.4	1220.0	9.07E-08	0.8	2	1.6
9/7/2006 16:33	19.9	2.2	2640.0	-17.7	1264.0	1.16E-07	0.5	2.9	1.4
9/8/2006 10:43	1.6	23.3	0.0	21.7	1264.0				
9/8/2006 11:38	6.2	19.5	3300.0	13.3	1319.0	1.48E-07	0.8	4.6	3.8
9/8/2006 12:54	10.2	15.9	4560.0	5.7	1395.0	1.02E-07	0.9	4	3.6
9/8/2006 13:15	11.4	14.9	1260.0	3.5	1416.0	1.10E-07	0.8	1.2	1
9/12/2006 14:27	4.1	22.2	0.0	18.1	1416.0				
9/12/2006 14:38	8.1	21.8	660.0	13.7	1427.0	3.92E-07	0.1	4	0.4
9/12/2006 16:03	18.5	18.3	5100.0	-0.2	1512.0	1.69E-07	0.3	10.4	3.5
9/12/2006 16:16	1.2	21.9	0.0	20.7	1512.0				
9/12/2006 16:55	5.5	21.1	2340.0	15.6	1551.0	1.27E-07	0.2	4.3	0.8
9/13/2006 10:55	1.4	18.5	0.0	17.1	1551.0				
9/13/2006 12:01	8.8	14.3	3960.0	5.5	1617.0	1.77E-07	0.8	7.4	4.2
9/13/2006 16:53	23.1	1.3	17520.0	-21.8	1909.0	1.06E-07	0.9	14.3	13
9/14/2006 11:31	2.7	19.0	0.0	16.3	1909.0				
9/14/2006 13:26	11.1	13.4	6900.0	2.3	2024.0	1.24E-07	0.7	8.4	5.6
9/14/2006 15:31	16.8	8.0	7500.0	-8.8	2149.0	9.75E-08	0.9	5.7	5.4
9/15/2006 12:44	1.3	23.1	0.0	21.8	2149.0				
9/15/2006 15:16	11.6	14.8	9120.0	3.2	2301.0	1.22E-07	0.8	10.3	8.3
9/15/2006 17:16	16.8	9.5	7200.0	-7.3	2421.0	9.54E-08	1.0	5.2	5.3
9/18/2006 10:33	1.4	19.1	0.0	17.7	2421.0				
9/18/2006 11:56	8.3	14.3	4980.0	6.0	2504.0	1.41E-07	0.7	6.9	4.8
9/18/2006 12:25	9.8	13.0	1740.0	3.2	2533.0	1.01E-07	0.9	1.5	1.3
9/18/2006 16:47	20.2	2.3	15720.0	-17.9	2795.0	9.09E-08	1.0	10.4	10.7
9/19/2006 13:49	4.5	17.7	75720.0	13.2	4057.0	-2.70E-08	1.0	-15.7	-15.4





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

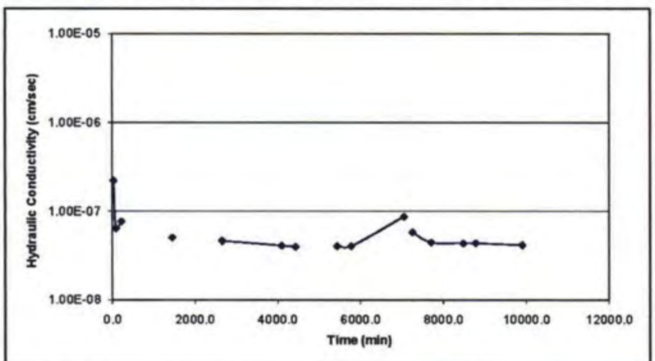
ASTM D 5084 - 00

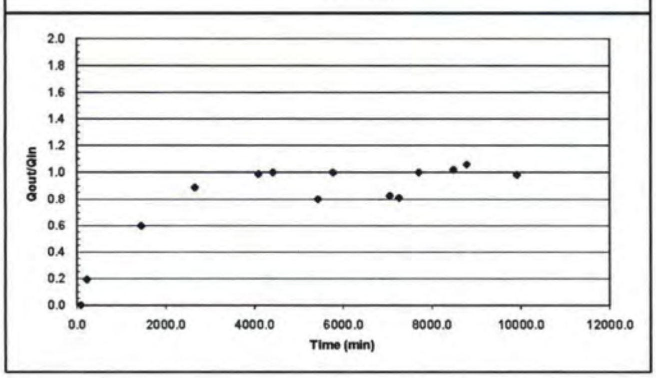
Sample I.D.	**150-mm ICY2U**		**Test Date :**	**10/12/06**	
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	3970.3	(g)	Sample Water Content =	15.0	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
90	195.1	930.75	834.65	15.03

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/12/2006 12:19	2.7	23.6	0.0	20.9	0.0				
10/12/2006 12:49	4.9	23.7	1800.0	18.8	30.0	2.22E-07	0.0	2.2	-0.1
10/12/2006 13:44	6.0	23.7	3300.0	17.7	85.0	6.41E-08	0.0	1.1	0
10/12/2006 15:55	8.6	23.2	7860.0	14.6	216.0	7.69E-08	0.2	2.6	0.5
10/12/2006 15:58	0.8	23.0	0.0	22.2	216.0				
10/13/2006 12:31	12.5	16.0	73980.0	3.5	1449.0	5.06E-08	0.6	11.7	7
10/16/2006 16:01	1.5	23.5	0.0	22.0	1449.0				
10/17/2006 12:03	10.4	15.6	72120.0	5.2	2651.0	4.63E-08	0.9	8.9	7.9
10/18/2006 12:02	18.3	7.8	86340.0	-10.5	4090.0	4.09E-08	1.0	7.9	7.8
10/18/2006 17:29	19.9	6.2	19620.0	-13.7	4417.0	3.97E-08	1.0	1.6	1.6
10/18/2006 18:05	0.5	23.2	0.0	22.7	4417.0				
10/19/2006 10:58	7.5	17.6	60780.0	10.1	5430.0	4.04E-08	0.8	7	5.6
10/19/2006 16:40	9.5	15.6	20520.0	6.1	5772.0	4.03E-08	1.0	2	2
10/20/2006 13:57	25.0	2.8	76620.0	-22.2	7049.0	8.72E-08	0.8	15.5	12.8
10/23/2006 12:11	0.9	21.4	0.0	20.5	7049.0				
10/23/2006 15:41	3.0	19.7	12600.0	16.7	7259.0	5.78E-08	0.8	2.1	1.7
10/23/2006 23:08	6.0	16.7	26820.0	10.7	7706.0	4.44E-08	1.0	3	3
10/24/2006 12:07	10.8	11.8	46740.0	1.0	8485.0	4.37E-08	1.0	4.8	4.9
10/24/2006 17:04	12.5	10.0	17820.0	-2.5	8782.0	4.35E-08	1.1	1.7	1.8
10/25/2006 11:50	18.5	4.1	67560.0	-14.4	9908.0	4.16E-08	1.0	6	5.9





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

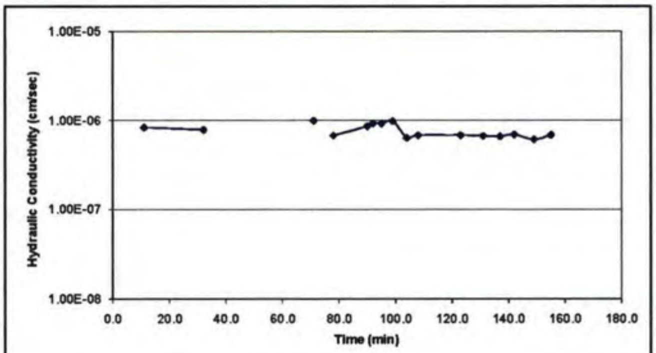
ASTM D 5084 - 00

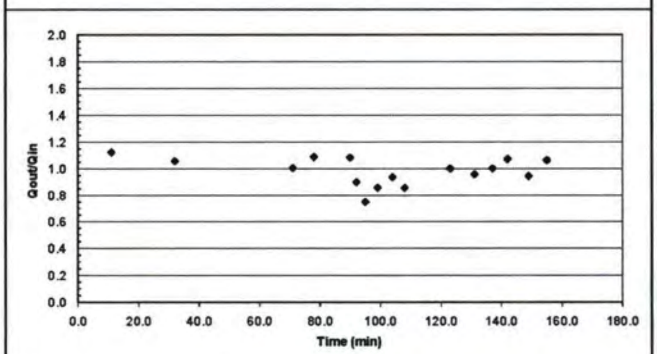
Sample I.D.		305-mm ICY1U		Test Date :	10/2/06	
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2	
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3	
Effective Stress =	2.0	psi	a_{in} =	1	cm^2	
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2	
Weight of wet sample =	25265.5	(g)	Sample Water Content =	12.3	(%)	
Wet Density =	2.3	g/cm^3	Dry Density =	2.02	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
4	50.09	511.3	460.68	12.33

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/2/2006 16:05	11.7	16.3	0.0	4.6	0.0				
10/2/2006 16:16	15.7	11.8	660.0	-3.9	11.0	8.30E-07	1.1	4	4.5
10/2/2006 16:37	22.6	4.5	1260.0	-18.1	32.0	7.81E-07	1.1	6.9	7.3
10/6/2006 14:27	3.3	22.9	0.0	22.9	32.0			-19.3	-18.4
10/6/2006 15:06	19.9	6.2	2340.0	-13.7	71.0	9.86E-07	1.0	16.6	16.7
10/6/2006 15:30	4.3	22.6	0.0	18.3	71.0			-15.6	-16.4
10/6/2006 15:37	6.6	20.1	420.0	13.5	78.0	6.72E-07	1.1	2.3	2.5
10/6/2006 15:49	11.4	14.9	720.0	3.5	90.0	8.52E-07	1.1	4.8	5.2
10/12/2006 12:15	3.0	21.5	0.0	18.5	90.0			-8.4	-6.6
10/12/2006 12:17	4.0	20.6	120.0	16.6	92.0	9.22E-07	0.9	1	0.9
10/12/2006 12:20	5.6	19.4	180.0	13.8	95.0	9.18E-07	0.8	1.6	1.2
10/12/2006 12:24	7.7	17.6	240.0	9.9	99.0	9.78E-07	0.9	2.1	1.8
10/12/2006 12:29	9.3	16.1	300.0	6.8	104.0	6.34E-07	0.9	1.6	1.5
10/12/2006 12:33	10.7	14.9	240.0	4.2	108.0	6.76E-07	0.9	1.4	1.2
10/12/2006 12:48	15.4	10.2	900.0	-5.2	123.0	6.77E-07	1.0	4.7	4.7
10/12/2006 12:56	17.8	7.9	480.0	-9.9	131.0	6.63E-07	1.0	2.4	2.3
10/12/2006 13:02	19.5	6.2	360.0	-13.3	137.0	6.57E-07	1.0	1.7	1.7
10/12/2006 13:07	20.9	4.7	300.0	-16.2	142.0	6.87E-07	1.1	1.4	1.5
10/12/2006 13:14	22.7	3.0	420.0	-19.7	149.0	6.05E-07	0.9	1.8	1.7
10/12/2006 13:20	24.3	1.3	360.0	-23.0	155.0	6.82E-07	1.1	1.6	1.7





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

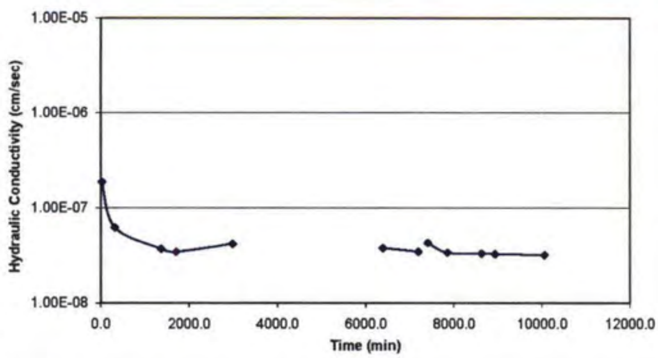
ASTM D 5084 - 00

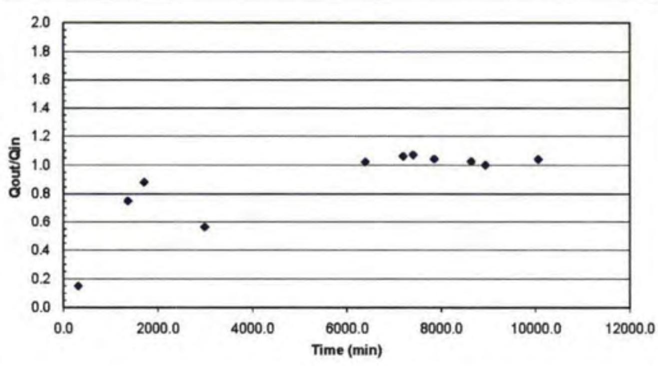
Sample I.D.	150-mm ICY1U	Test Date :	
Cell Pressure =	43.5 psi	Diameter of Sample, D =	15.2 cm
Inflow Pressure =	42.4 psi	Length of Sample, L =	10.2 cm
Outflow Pressre =	40.6 psi	Area of Sample, A =	182.4 cm^2
Pressure Difference =	1.8 psi	Sample Volume, V =	1853.3 cm^3
Effective Stress =	2.0 psi	a_{in} =	1 cm^2
Hydraulic Gradient, i =	12.5	a_{out} =	1 cm^2
Weight of wet sample =	3708.7 (g)	Sample Water Content =	16.4 (%)
Wet Density =	2.0 g/cm^3	Dry Density =	1.72 g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
7	49.43	454.37	397.26	16.42

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/18/2006 12:14	1.1	21.3	0.0	20.2	0.0				
10/18/2006 12:43	3.5	22.0	1740.0	18.5	29.0	1.86E-07	-0.3	2.4	-0.7
10/18/2006 17:28	8.2	21.3	17100.0	13.1	314.0	6.18E-08	0.1	4.7	0.7
10/19/2006 10:57	14.6	16.5	62940.0	1.9	1363.0	3.70E-08	0.8	6.4	4.8
10/19/2006 16:38	16.3	15.0	20460.0	-1.3	1704.0	3.43E-08	0.9	1.7	1.5
10/20/2006 13:59	25.0	10.1	76860.0	-14.9	2985.0	4.16E-08	0.6	8.7	4.9
10/20/2006 14:00	1.1	24.7	0.0	23.6	2985.0				
10/22/2006 22:45	19.0	6.4	204300.0	-12.6	6390.0	3.76E-08	1.0	17.9	18.3
10/23/2006 12:06	22.2	3.0	48060.0	-19.2	7191.0	3.46E-08	1.1	3.2	3.4
10/23/2006 12:08	0.3	24.1	0.0	23.8	7191.0				
10/23/2006 15:40	1.7	22.6	12720.0	20.9	7403.0	4.26E-08	1.1	1.4	1.5
10/23/2006 23:07	4.0	20.2	26820.0	16.2	7850.0	3.36E-08	1.0	2.3	2.4
10/24/2006 12:07	7.8	16.3	46800.0	8.5	8630.0	3.30E-08	1.0	3.8	3.9
10/24/2006 17:05	9.2	14.9	17880.0	5.7	8928.0	3.26E-08	1.0	1.4	1.4
10/25/2006 11:49	14.0	9.9	67440.0	-4.1	10052.0	3.18E-08	1.0	4.8	5





Hydraulic Conductivity Test - Cedar Rapids - Clay Cover

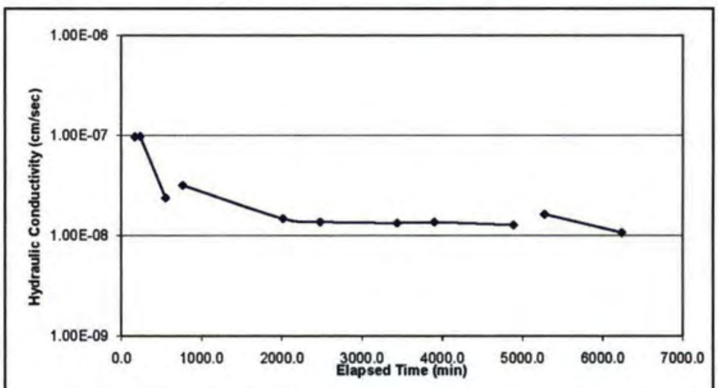
ASTM D 5084 - 00

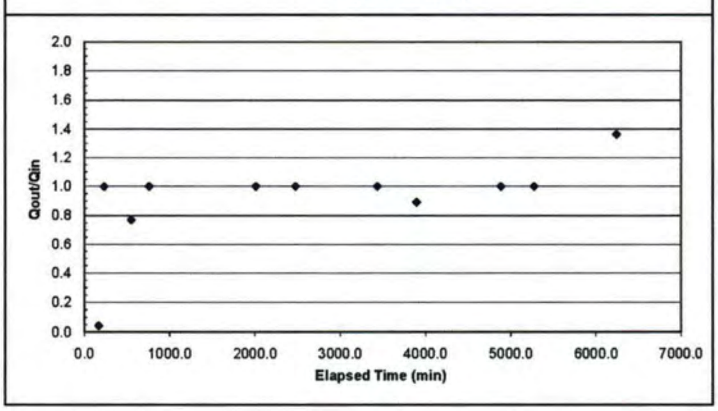
Sample I.D.	150-mm ICYRL		Test Date :		
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	3883.9	(g)	Sample Water Content =	12.9	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
10	50.98	507	454.72	12.95

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
7/28/2006 9:52	4.0	25.0	0.0	21.0	0.0				
7/28/2006 12:40	8.9	24.8	10080.0	15.9	168.0	9.72E-08	0.0	4.9	0.2
7/31/2006 9:39	1.4	23.6	0.0	22.2	168.0				
7/31/2006 10:43	2.4	22.6	3840.0	20.2	232.0	9.81E-08	1.0	1	1
7/31/2006 16:00	3.7	21.6	19020.0	17.9	549.0	2.31E-08	0.8	1.3	1
8/1/2006 9:08	4.5	20.9	0.0	16.4	549.0				
8/1/2006 12:39	5.5	19.9	12660.0	14.4	760.0	3.10E-08	1.0	1	1
8/2/2006 9:31	8.2	17.2	75120.0	9.0	2012.0	1.45E-08	1.0	2.7	2.7
8/2/2006 17:11	9.1	16.3	27600.0	7.2	2472.0	1.35E-08	1.0	0.9	0.9
8/3/2006 9:16	10.9	14.5	57900.0	3.6	3437.0	1.31E-08	1.0	1.8	1.8
8/3/2006 16:53	11.8	13.7	27420.0	1.9	3894.0	1.33E-08	0.9	0.9	0.8
8/4/2006 9:26	13.5	12.0	59580.0	-1.5	4887.0	1.25E-08	1.0	1.7	1.7
8/8/2006 10:44	15.4	10.0	0.0	-5.4	4887.0				
8/8/2006 17:09	16.2	9.2	23100.0	-7.0	5272.0	1.60E-08	1.0	0.8	0.8
8/9/2006 9:17	17.3	7.7	58080.0	-9.6	6240.0	1.05E-08	1.4	1.1	1.5





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

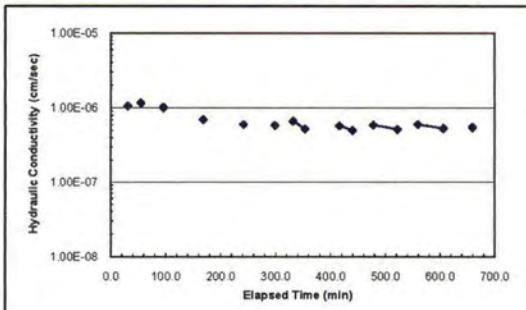
ASTM D 5084 - 00

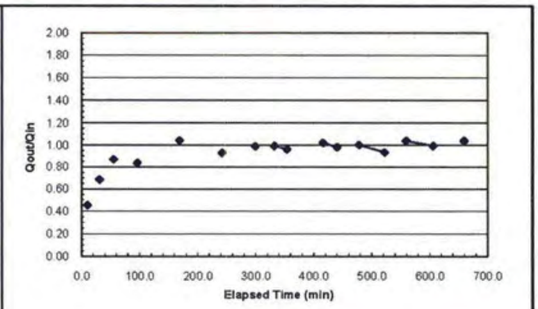
Sample I.D.		305-mm IOYRL	Test Date :		
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	23269.7	(g)	Sample Water Content =	15.2	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.82	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
6	51.3	491.8	433.6	15.22

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/12/06 11:57	1.9	25.0	0.0	23.1	0.0				
7/12/06 12:07	10.9	20.9	600.0	10.0	10.0		0.46	9	4.1
7/12/06 12:07	12.9	20.4	0.0	7.5	10.0			2	0.5
7/12/06 12:28	24.9	12.2	1260.0	-12.7	31.0	1.05E-06	0.68	12	8.2
7/12/06 12:28	3.8	23.0	0.0	19.2	31.0				
7/12/06 12:52	18.1	10.6	1440.0	-7.5	55.0	1.16E-06	0.87	14.3	12.4
7/12/06 12:52	2.9	23.8	0.0	20.9	55.0				
7/12/06 13:33	24.0	6.2	2460.0	-17.8	96.0	1.01E-06	0.83	21.1	17.6
7/12/06 13:33	1.3	28.8	0.0	27.5	96.0				
7/12/06 14:46	24.9	4.3	4380.0	-20.6	169.0	6.99E-07	1.04	23.6	24.5
7/12/06 14:46	3.0	22.7	0.0	19.7	169.0				
7/12/06 15:59	24.0	3.2	4380.0	-20.8	242.0	6.02E-07	0.93	21	19.5
7/12/06 15:59	3.3	23.0	0.0	19.7	242.0			-20.7	-19.8
7/12/06 16:56	19.2	7.3	3420.0	-11.9	299.0	5.84E-07	0.99	15.9	15.7
7/14/06 10:47	8.9	20.7	0.0	11.8	299.0				
7/14/06 11:20	19.3	10.4	1980.0	-8.9	332.0	6.70E-07	0.99	10.4	10.3
7/14/06 11:42	24.3	5.6	1320.0	-18.7	354.0	5.24E-07	0.96	5	4.8
7/14/06 11:44	3.0	23.1	0.0	20.1	354.0			-21.3	-17.5
7/14/06 12:46	19.8	6.0	3720.0	-13.8	416.0	5.79E-07	1.02	16.8	17.1
7/14/2006 13:10	24.8	1.1	1440.0	-23.7	440.0	5.02E-07	0.98	5	4.9
7/14/2006 13:12	2.5	23.6	0.0	21.1	440.0				
7/14/2006 13:50	13.6	12.5	2280.0	-1.1	478.0	5.93E-07	1.00	11.1	11.1
7/14/2006 14:34	23.8	3.0	2640.0	-20.8	522.0	5.17E-07	0.93	10.2	9.5
7/14/2006 14:36	2.4	23.4	0.0	21.0	522.0				
7/14/2006 15:13	13.2	12.2	2220.0	-1.0	559.0	6.03E-07	1.04	10.8	11.2
7/14/2006 16:00	24.0	1.5	2820.0	-22.5	606.0	5.32E-07	0.99	10.8	10.7
7/14/06 16:01	2.5	23.4	0.0	20.9	606.0				
7/14/2006 16:54	16.4	9.0	3180.0	-7.4	659.0	5.53E-07	1.04	13.9	14.4





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

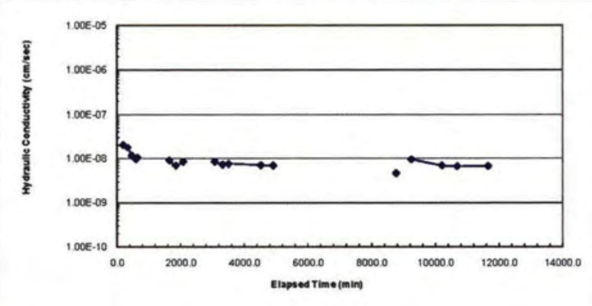
ASTM D 5084 - 00

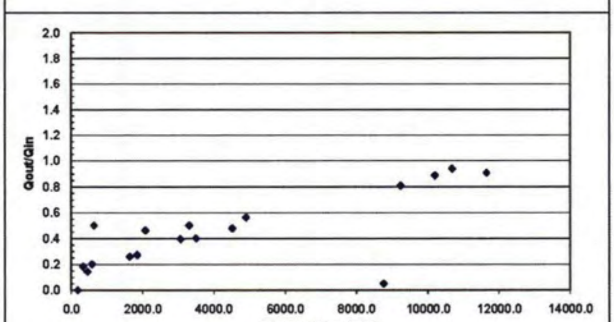
Sample I.D.	305-mm IOYRU		Test Date :		
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	25310.9	(g)	Sample Water Content =	14.6	(%)
Wet Density =	2.3	g/cm^3	Dry Density =	1.99	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
44	50.92	523.47	463.44	14.55

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/31/06 9:35	7.5	24.5	0.0	17.0	0.0				
7/31/06 10:40	3.5	19.7	0.0	16.2	0.0				
7/31/06 13:45	7.3	19.7	11100.0	12.4	185.0	2.03E-08	0.0	3.8	0
8/1/06 9:11	3.0	22.5	0.0	19.5	185.0				
8/1/06 11:33	5.2	22.1	8520.0	16.9	327.0	1.77E-08	0.2	2.2	0.4
8/1/06 13:47	6.6	21.9	8040.0	15.3	461.0	1.17E-08	0.1	1.4	0.2
8/1/06 15:51	7.6	21.7	7440.0	14.1	585.0	9.55E-09	0.2	1	0.2
8/1/06 16:48	8.0	21.5	3420.0	13.5	642.0	1.04E-08	0.5	0.4	0.2
8/1/06 16:49	1.6	22.2	0.0	20.6	642.0				
8/2/06 9:30	8.9	20.3	60060.0	11.4	1643.0	9.00E-09	0.3	7.3	1.9
8/2/2006 12:55	10.0	20.0	12300.0	10.0	1848.0	6.89E-09	0.3	1.1	0.3
8/2/2006 16:45	11.3	19.4	13800.0	8.1	2078.0	8.42E-09	0.5	1.3	0.6
8/2/2006 16:50	2.1	23.3	0.0	21.2	2078.0				
8/3/2006 9:17	8.2	20.9	59220.0	12.7	3065.0	8.39E-09	0.4	6.1	2.4
8/3/2006 13:26	9.4	20.3	14940.0	10.9	3314.0	7.25E-09	0.5	1.2	0.6
8/3/2006 16:34	10.4	19.9	11280.0	9.5	3502.0	7.54E-09	0.4	1	0.4
8/4/2006 9:26	15.0	17.7	60720.0	2.7	4514.0	6.97E-09	0.5	4.6	2.2
8/4/2006 15:51	16.6	16.8	23100.0	0.2	4899.0	6.93E-09	0.6	1.6	0.9
8/4/2006 16:43	2.7	14.5	0.0	11.8	4899.0				
8/7/2006 9:06	18.8	13.7	231780.0	-5.1	8762.0	4.62E-09	0.0	16.1	0.8
8/7/2006 9:08	2.1	23.4	0.0	21.3	8762.0				
8/7/2006 17:08	4.7	21.3	28800.0	16.6	9242.0	9.43E-09	0.8	2.6	2.1
8/8/2006 9:06	8.2	18.2	57480.0	10.0	10200.0	6.85E-09	0.9	3.5	3.1
8/8/2006 17:09	9.8	16.7	28980.0	6.9	10683.0	6.56E-09	0.9	1.6	1.5
8/9/2006 9:17	13.0	13.8	58080.0	0.8	11651.0	6.62E-09	0.9	3.2	2.9





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

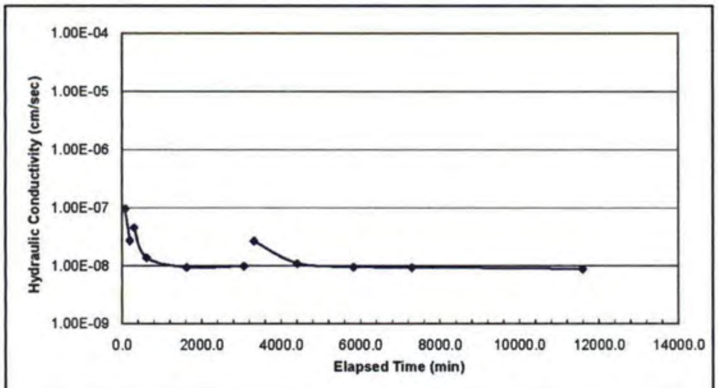
ASTM D 5084 - 00

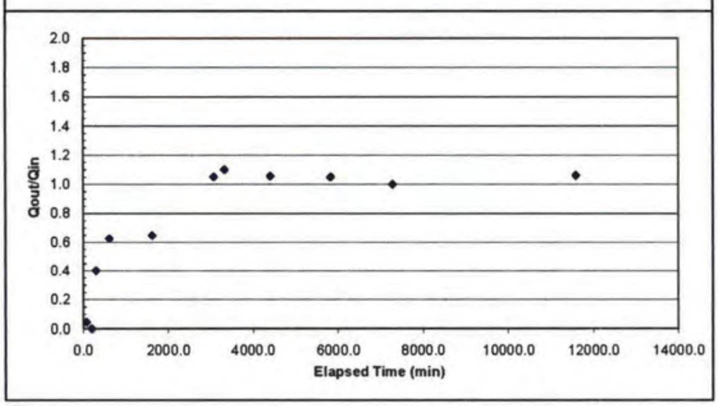
Sample I.D.	**150-mm IOYRU**		**Test Date :**	**8/11/06**	
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	4105.9	(g)	Sample Water Content =	12.7	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.97	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	50.82	520	467.29	12.66

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out}/Q_{in}	Q_{in}	Q_{out}
8/11/2006 9:42	3.6	23.3	0.0	19.7	0.0				
8/11/2006 10:58	5.8	23.2	4560.0	17.4	76.0	9.68E-08	0.0	2.2	0.1
8/11/2006 12:58	6.8	23.2	7200.0	16.4	196.0	2.70E-08	0.0	1	0
8/14/2006 10:06	8.6	23.0	0.0	14.4	196.0				
8/14/2006 11:50	9.6	22.6	6240.0	13.0	300.0	4.45E-08	0.4	1	0.4
8/14/2006 17:05	10.4	22.1	18900.0	11.7	615.0	1.38E-08	0.6	0.8	0.5
8/15/2006 9:53	12.1	21.0	60480.0	8.9	1623.0	9.42E-09	0.6	1.7	1.1
8/16/2006 9:59	14.1	18.9	86760.0	4.8	3069.0	9.86E-09	1.1	2	2.1
8/22/2006 11:24	1.2	22.6	0.0	21.4	3069.0				
8/22/2006 15:35	2.2	21.5	15060.0	19.3	3320.0	2.64E-08	1.1	1	1.1
8/23/2006 9:38	4.0	19.6	64980.0	15.6	4403.0	1.10E-08	1.1	1.8	1.9
8/24/2006 9:19	6.0	17.5	85260.0	11.5	5824.0	9.56E-09	1.1	2	2.1
8/25/2006 9:41	8.0	15.5	87720.0	7.5	7286.0	9.33E-09	1.0	2	2
8/28/2006 9:30	13.1	10.1	258540.0	-3.0	11595.0	8.78E-09	1.1	5.1	5.4





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

ASTM D 5084 - 00

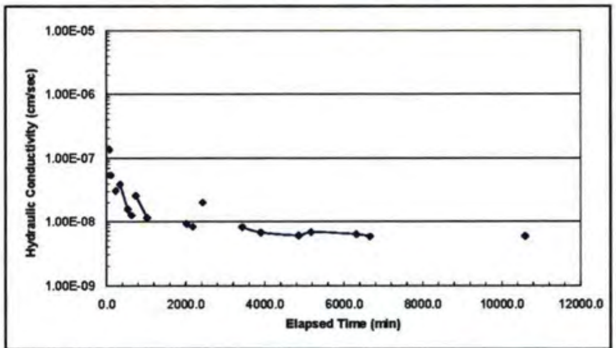
Sample I.D.	305-mm IOY2U	Test Date :	8/11/06

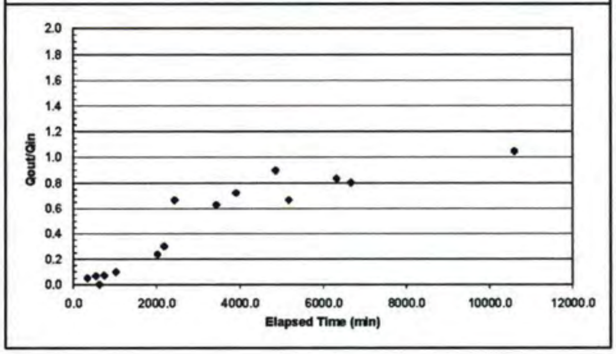
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	25084.1	(g)	Sample Water Content =	13.4	(%)
Wet Density =	2.3	g/cm^3	Dry Density =	1.99	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
6	51.3	579.36	516.79	13.44

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/11/2006 9:48	5.2	21.1	0.0	15.9	0.0				
8/11/2006 10:58	16.0	22.4	4200.0	6.4	70.0	1.37E-07	-0.1	10.8	-1.3
8/11/2006 12:28	3.8	22.7	0.0	18.9	70.0				
8/11/2006 13:00	7.2	24.3	1920.0	17.1	102.0	5.45E-08	-0.5	3.4	-1.6
8/11/2006 13:01	1.4	18.3	0.0	16.9	102.0			-5.8	6
8/11/2006 15:12	6.6	19.4	7860.0	12.8	233.0	3.08E-08	-0.2	5.2	-1.1
8/14/2006 10:05	1.8	21.3	0.0	19.5	233.0				
8/14/2006 11:50	5.8	21.1	6300.0	15.3	338.0	3.89E-08	0.0	4	0.2
8/14/2006 15:12	8.8	20.9	12120.0	12.1	540.0	1.57E-08	0.1	3	0.2
8/14/2006 16:40	9.9	20.9	5280.0	11.0	628.0	1.26E-08	0.0	1.1	0
8/15/2006 9:55	1.6	22.9	0.0	21.3	628.0				
8/15/2006 11:47	4.4	22.7	6720.0	18.3	740.0	2.57E-08	0.1	2.8	0.2
8/15/2006 16:30	7.4	22.4	16980.0	15.0	1023.0	1.14E-08	0.1	3	0.3
8/15/2006 17:22	1.5	22.3	0.0	20.8	1023.0				
8/16/2006 9:58	9.1	20.5	59760.0	11.4	2019.0	9.24E-09	0.2	7.6	1.8
8/16/2006 12:37	10.1	20.2	9540.0	10.1	2178.0	8.25E-09	0.3	1	0.3
8/22/2006 11:25	5.8	19.4	0.0	13.6	2178.0				
8/22/2006 15:36	8.8	17.4	15060.0	8.6	2429.0	2.01E-08	0.7	3	2
8/22/2006 16:56	2.1	23.1	0.0	21.0	2429.0				
8/23/2006 9:38	7.2	19.9	60120.0	12.7	3431.0	8.07E-09	0.6	5.1	3.2
8/23/2006 17:27	9.0	18.6	28140.0	9.6	3900.0	6.65E-09	0.7	1.8	1.3
8/24/2006 9:19	11.9	16.0	57120.0	4.1	4852.0	5.96E-09	0.9	2.9	2.6
8/24/2006 14:32	13.1	15.2	18780.0	2.1	5165.0	6.75E-09	0.7	1.2	0.8
8/25/2006 9:41	16.7	12.2	68940.0	-4.5	6314.0	6.23E-09	0.8	3.6	3
8/25/2006 15:31	17.7	11.4	21000.0	-6.3	6664.0	5.72E-09	0.8	1	0.8
8/25/2006 16:00	1.1	23.4	0.0	22.3	6664.0				
8/28/2006 9:30	12.1	11.9	235800.0	-0.2	10594.0	5.77E-09	1.0	11	11.5





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

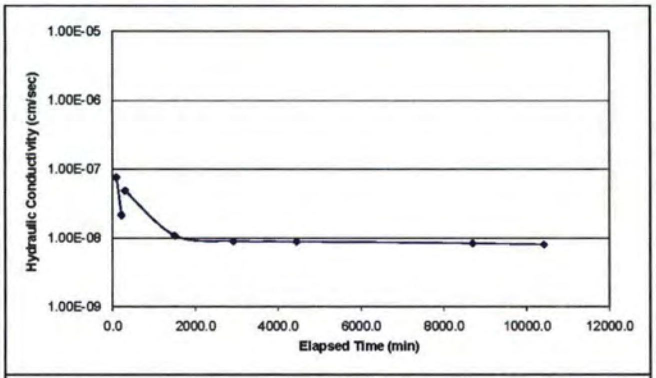
ASTM D 5084 - 00

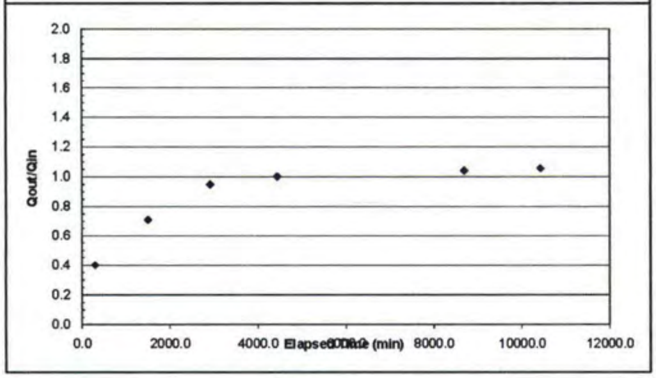
Sample I.D.	150-mm IOY2U		Test Date :	8/30/06	
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	3997.1	(g)	Sample Water Content =	15.8	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	50.89	550.47	482.24	15.82

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/30/2006 11:05	2.8	22.0	0.0	19.2	0.0				
8/30/2006 12:37	5.9	22.9	5520.0	17.0	92.0	7.67E-08	-0.3	3.1	-0.9
8/30/2006 14:36	7.0	23.2	7140.0	16.2	211.0	2.18E-08	-0.3	1.1	-0.3
9/5/2006 12:09	1.2	23.6	0.0	22.4	211.0				
9/5/2006 13:38	2.2	23.2	5340.0	21.0	300.0	4.92E-08	0.4	1	0.4
9/6/2006 9:37	4.6	21.5	71940.0	16.9	1499.0	1.09E-08	0.7	2.4	1.7
9/7/2006 9:20	6.6	19.6	85380.0	13.0	2922.0	8.99E-09	0.9	2	1.9
9/8/2006 10:40	8.6	17.6	91200.0	9.0	4442.0	8.88E-09	1.0	2	2
9/11/2006 9:31	13.5	12.5	255060.0	-1.0	8693.0	8.36E-09	1.0	4.9	5.1
9/12/2006 14:24	15.3	10.6	103980.0	-4.7	10426.0	8.01E-09	1.1	1.8	1.9





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

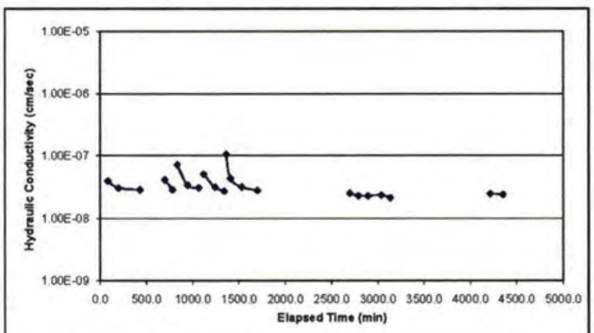
ASTM D 5084 - 00

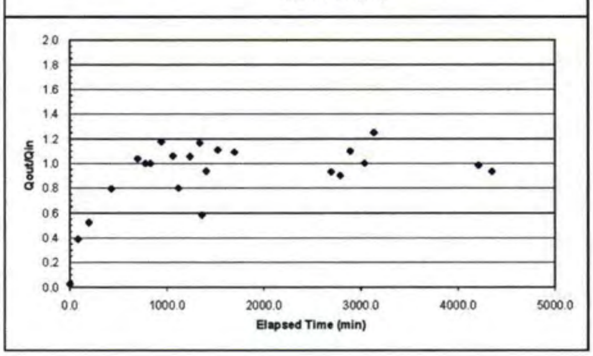
Sample I.D.	305-mm IOY1U		Test Date :	8/25/06	
Cell Pressure =	43.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.3	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.7	cm^2
Pressure Difference =	2.3	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	10.6		a_{out} =	1	cm^2
Weight of wet sample =	24539.8	(g)	Sample Water Content =	13.6	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.94	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
K9	211.15	1028.2	930.1	13.64

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
8/25/2006 12:57	2.8	19.0	0.0	16.2	0.0				
8/28/2006 10:16	10.6	18.8	0.0	8.2	0.0		0.0	7.8	0.2
8/28/2006 11:40	12.9	17.9	5040.0	5.0	84.0	3.94E-08	0.4	2.3	0.9
8/28/2006 13:31	15.0	16.8	6660.0	1.8	195.0	3.04E-08	0.5	2.1	1.1
8/28/2006 17:25	18.4	14.1	14040.0	-4.3	429.0	2.83E-08	0.8	3.4	2.7
8/29/2006 11:20	6.4	21.0	0.0	14.6	429.0				
8/29/2006 15:49	11.7	15.5	16140.0	3.8	698.0	4.09E-08	1.0	5.3	5.5
8/29/2006 17:11	12.8	14.4	4920.0	1.6	780.0	2.84E-08	1.0	1.1	1.1
8/30/2006 9:52	6.8	21.3	0.0	14.5	780.0				
8/30/2006 10:43	8.6	19.5	3060.0	10.9	831.0	7.04E-08	1.0	1.8	1.8
8/30/2006 12:36	10.3	17.5	6780.0	7.2	944.0	3.34E-08	1.2	1.7	2
8/30/2006 14:36	12.0	15.7	7200.0	3.7	1064.0	3.04E-08	1.1	1.7	1.8
9/5/2006 12:42	5.2	19.5	0.0	14.3	1064.0				
9/5/2006 13:36	6.7	18.3	3240.0	11.6	1118.0	4.98E-08	0.8	1.5	1.2
9/5/2006 15:37	8.5	16.4	7260.0	7.9	1239.0	3.10E-08	1.1	1.8	1.9
9/5/2006 17:16	9.7	15.0	5940.0	5.3	1338.0	2.72E-08	1.2	1.2	1.4
9/6/2006 9:44	4.0	20.7	0.0	16.7	1338.0				
9/6/2006 10:07	5.5	19.8	1380.0	14.3	1361.0	1.04E-07	0.6	1.54	0.9
9/6/2006 10:50	6.5	18.9	2580.0	12.4	1404.0	4.30E-08	0.9	0.96	0.9
9/6/2006 12:52	8.3	16.9	7320.0	8.6	1526.0	3.15E-08	1.1	1.8	2
9/6/2006 15:44	10.5	14.5	10320.0	4.0	1698.0	2.77E-08	1.1	2.2	2.4
9/6/2006 16:42	2.0	24.1	0.0	22.1	1698.0				
9/7/2006 9:21	14.7	12.3	59940.0	-2.4	2697.0	2.49E-08	0.9	12.7	11.8
9/7/2006 10:53	15.7	11.4	5520.0	-4.3	2789.0	2.27E-08	0.9	1	0.9
9/7/2006 12:36	16.7	10.3	6180.0	-6.4	2892.0	2.27E-08	1.1	1	1.1
9/7/2006 15:02	18.2	8.8	8760.0	-9.4	3038.0	2.32E-08	1.0	1.5	1.5
9/7/2006 16:40	19.0	7.8	5880.0	-11.2	3136.0	2.11E-08	1.3	0.8	1
9/7/2006 16:41	0.6	23.7	0.0	23.1	3136.0				
9/8/2006 10:39	13.8	10.7	64680.0	-3.1	4214.0	2.47E-08	1.0	13.2	13
9/8/2006 12:54	15.3	9.3	8100.0	-6.0	4349.0	2.38E-08	0.9	1.5	1.4





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

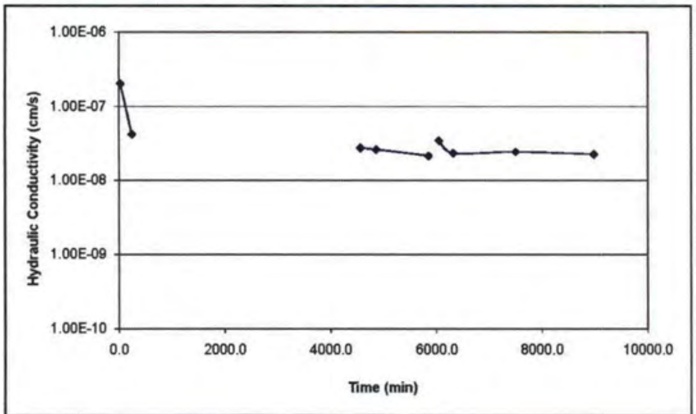
ASTM D 5084 - 00

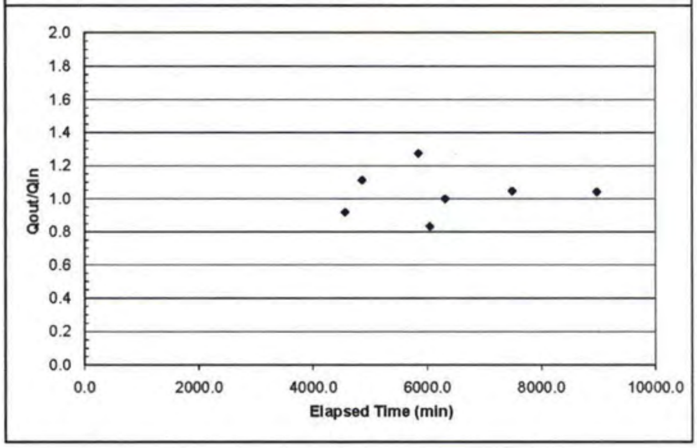
Sample I.D.		150-mm IOY1U		Test Date :	9/21/06
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	3852.0	(g)	Sample Water Content =	14.2	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.82	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
27	50.19	563.89	499.92	14.22

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out}/Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
9/21/2006 13:06	0.5	21.4	0.0	20.9	0.0				
9/21/2006 13:33	2.5	21.7	1620.0	19.2	27.0	1.99E-07	-0.2	2	-0.3
9/21/2006 17:06	5.5	21.9	12780.0	16.4	240.0	4.23E-08	-0.1	3	-0.2
9/22/2006 11:57	1.8	21.5	0.0	19.7	240.0				
9/25/2006 11:57	19.1	5.6	259200.0	-13.5	4560.0	2.77E-08	0.9	17.3	15.9
9/25/2006 16:56	20.0	4.6	17940.0	-15.4	4859.0	2.63E-08	1.1	0.9	1
9/26/2006 9:24	22.2	1.8	59280.0	-20.4	5847.0	2.16E-08	1.3	2.2	2.8
9/26/2006 9:25	0.8	24.3	0.0	23.5	5847.0				
9/26/2006 12:44	2.0	23.3	11940.0	21.3	6046.0	3.44E-08	0.8	1.2	1
9/26/2006 17:14	3.0	22.3	16200.0	19.3	6316.0	2.34E-08	1.0	1	1
9/27/2006 12:54	7.3	17.8	70800.0	10.5	7496.0	2.45E-08	1.0	4.3	4.5
9/28/2006 13:37	12.0	12.9	88980.0	0.9	8979.0	2.27E-08	1.0	4.7	4.9





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

ASTM D 5084 - 00

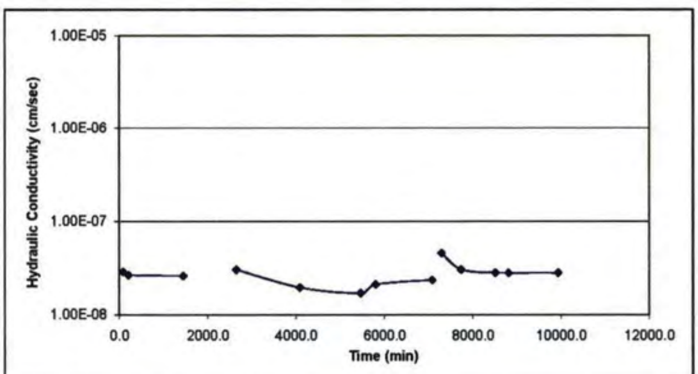
Sample I.D.	150-mm IOY2L	Test Date :	

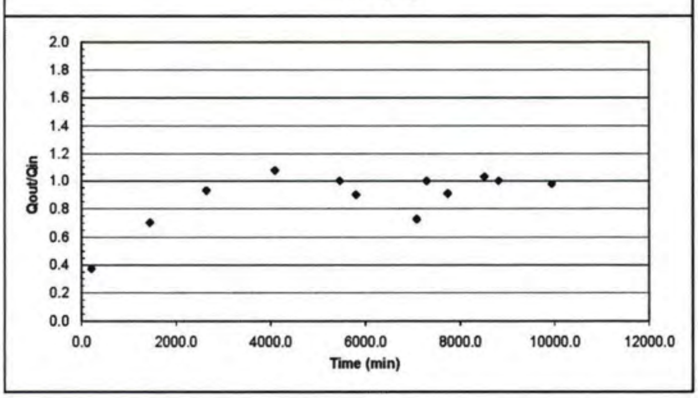
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	3708.7	(g)	Sample Water Content =	16.4	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.72	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
7	49.43	454.37	397.26	16.42

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/12/2006 12:27	3.2	23.7	0.0	20.5	0.0				
10/12/2006 13:44	4.4	24.2	4620.0	19.8	77.0	2.88E-08	-0.4	1.2	-0.5
10/12/2006 15:56	5.2	23.9	7920.0	18.7	209.0	2.65E-08	0.4	0.8	0.3
10/13/2006 12:32	10.9	19.9	74160.0	9.0	1445.0	2.59E-08	0.7	5.7	4
10/16/2006 16:06	0.8	23.5	0.0	22.7	1445.0			-10.1	-3.6
10/17/2006 12:03	6.6	18.1	71820.0	11.5	2642.0	3.02E-08	0.9	5.8	5.4
10/18/2006 12:02	10.5	13.9	86340.0	3.4	4081.0	1.95E-08	1.1	3.9	4.2
10/19/2006 10:59	13.7	10.7	82620.0	-3.0	5458.0	1.70E-08	1.0	3.2	3.2
10/19/2006 16:40	14.7	9.8	20460.0	-4.9	5799.0	2.11E-08	0.9	1	0.9
10/20/2006 14:01	19.1	6.6	76860.0	-12.5	7080.0	2.34E-08	0.7	4.4	3.2
10/23/2006 12:15	1.3	24.2	0.0	22.9	7080.0			-17.8	-17.6
10/23/2006 15:42	2.8	22.7	12420.0	19.9	7287.0	4.55E-08	1.0	1.5	1.5
10/23/2006 23:09	5.0	20.7	26820.0	15.7	7734.0	3.02E-08	0.9	2.2	2
10/24/2006 12:06	8.2	17.4	46620.0	9.2	8511.0	2.79E-08	1.0	3.2	3.3
10/24/2006 17:03	9.4	16.2	17820.0	6.8	8808.0	2.79E-08	1.0	1.2	1.2
10/25/2006 11:50	13.8	11.9	67620.0	-1.9	9935.0	2.78E-08	1.0	4.4	4.3





Hydraulic Conductivity Test - Cedar Rapids - Composite Cover

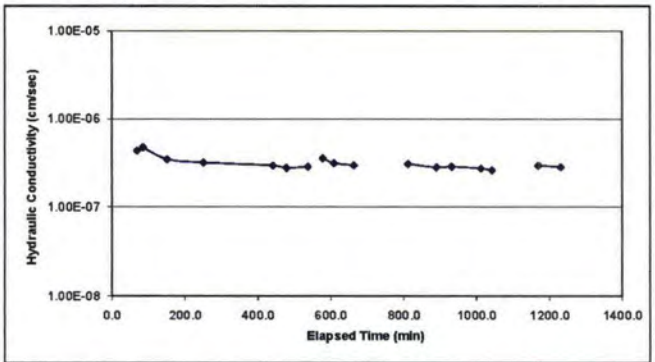
ASTM D 5084 - 00

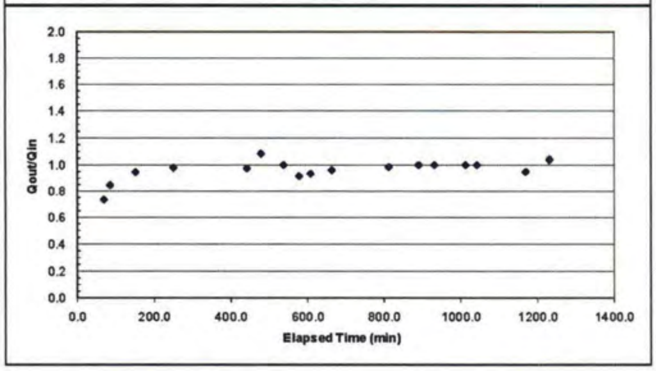
Sample I.D.	150-mm IOY1L			Test Date :	8/22/06
Cell Pressure =	43.5	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.8	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	2.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.5		a_{out} =	1	cm^2
Weight of wet sample =	4037.5	(g)	Sample Water Content =	16.5	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	1.87	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
27	50.11	533.5	465	16.51

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/22/2006 15:43	1.1	21.8	0.0	20.7	0.0				
8/22/2006 16:52	6.4	17.9	4140.0	11.5	69.0	4.34E-07	0.7	5.3	3.9
8/23/2006 9:39	1.0	22.8	0.0	21.8	69.0				
8/23/2006 9:55	2.3	21.7	960.0	19.4	85.0	4.73E-07	0.8	1.3	1.1
8/23/2006 11:01	5.9	18.3	3960.0	12.4	151.0	3.46E-07	0.9	3.6	3.4
8/23/2006 12:40	10.5	13.8	5940.0	3.3	250.0	3.17E-07	1.0	4.6	4.5
8/23/2006 15:51	18.0	6.5	11460.0	-11.5	441.0	2.94E-07	1.0	7.5	7.3
8/23/2006 16:28	19.2	5.2	2220.0	-14.0	478.0	2.75E-07	1.1	1.2	1.3
8/23/2006 17:27	21.2	3.2	3540.0	-18.0	537.0	2.85E-07	1.0	2	2
8/24/2006 14:47	0.8	23.5	0.0	22.7	537.0				
8/24/2006 15:28	3.2	21.3	2460.0	18.1	578.0	3.54E-07	0.9	2.4	2.2
8/24/2006 15:58	4.7	19.9	1800.0	15.2	608.0	3.13E-07	0.9	1.5	1.4
8/24/2006 16:53	7.2	17.5	3300.0	10.3	663.0	2.97E-07	1.0	2.5	2.4
8/25/2006 9:43	1.0	23.0	0.0	22.0	663.0				
8/25/2006 12:12	8.0	16.1	8940.0	8.1	812.0	3.06E-07	1.0	7	6.9
8/25/2006 13:30	11.1	13.0	4680.0	1.9	890.0	2.80E-07	1.0	3.1	3.1
8/25/2006 14:11	12.7	11.4	2460.0	-1.3	931.0	2.85E-07	1.0	1.6	1.6
8/25/2006 15:32	15.6	8.5	4860.0	-7.1	1012.0	2.72E-07	1.0	2.9	2.9
8/25/2006 16:02	16.6	7.5	1800.0	-9.1	1042.0	2.61E-07	1.0	1	1
8/28/2006 9:34	0.9	23.2	0.0	22.3	1042.0				
8/28/2006 11:41	6.8	17.6	7620.0	10.8	1169.0	2.94E-07	0.9	5.9	5.6
8/28/2006 12:43	9.3	15.0	3720.0	5.7	1231.0	2.83E-07	1.0	2.5	2.6





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

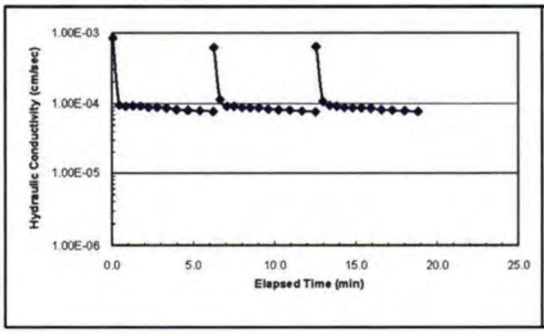
ASTM D 5084 - 00

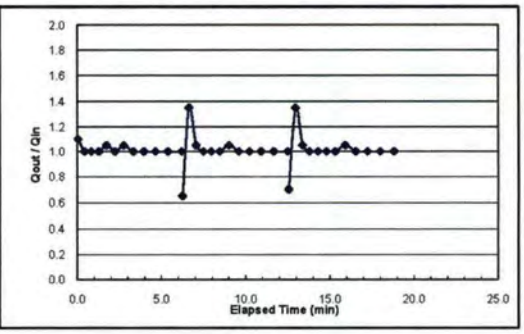
Sample I.D.	305-mm 3' Top Depth -2		Test Date :	12/19/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	20000.0	g	Sample Water Content =	37.5%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.79	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
9C	24.37	163.33	125.45	37.48%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/19/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
12/19/2008 00:02.64	2.0	22.6	2.6	20.6	0.0	8.40E-04	1.1	10	11
12/19/2008 00:25.55	4.0	20.6	22.9	16.6	0.4	9.62E-05	1.0	10	10
12/19/2008 00:50.40	6.0	18.6	24.9	12.6	0.8	9.26E-05	1.0	10	10
12/19/2008 01:16.25	8.0	16.6	25.8	8.6	1.3	9.31E-05	1.0	10	10
12/19/2008 01:44.11	10.0	14.5	27.9	4.5	1.7	9.29E-05	1.1	10	10.5
12/19/2008 02:13.92	12.0	12.5	29.8	0.5	2.2	8.91E-05	1.0	10	10
12/19/2008 02:45.85	14.0	10.4	31.9	-3.6	2.8	8.98E-05	1.1	10	10.5
12/19/2008 03:19.61	16.0	8.4	33.8	-7.6	3.3	8.77E-05	1.0	10	10
12/19/2008 03:57.55	18.0	6.4	37.9	-11.6	4.0	8.27E-05	1.0	10	10
12/19/2008 04:38.74	20.0	4.4	41.2	-15.6	4.6	8.10E-05	1.0	10	10
12/19/2008 05:23.37	22.0	2.4	44.6	-19.6	5.4	7.99E-05	1.0	10	10
12/19/2008 06:12.60	24.0	0.4	49.2	-23.6	6.2	7.77E-05	1.0	10	10
12/19/2008 00:00.00	0.0	24.6	0.0	24.6	6.2				
12/19/2008 00:02.84	2.0	23.3	2.8	21.3	6.3	6.12E-04	0.7	10	6.5
12/19/2008 00:25.55	4.0	20.6	22.7	16.6	6.6	1.14E-04	1.4	10	13.5
12/19/2008 00:51.14	6.0	18.5	25.6	12.5	7.1	9.22E-05	1.1	10	10.5
12/19/2008 01:17.26	8.0	16.5	26.1	8.5	7.5	9.22E-05	1.0	10	10
12/19/2008 01:45.84	10.0	14.5	28.6	4.5	8.0	8.84E-05	1.0	10	10
12/19/2008 02:16.03	12.0	12.5	30.2	0.5	8.5	8.79E-05	1.0	10	10
12/19/2008 02:48.64	14.0	10.4	32.6	-3.6	9.0	8.80E-05	1.1	10	10.5
12/19/2008 03:23.90	16.0	8.4	35.3	-7.6	9.6	8.39E-05	1.0	10	10
12/19/2008 04:02.08	18.0	6.4	38.2	-11.6	10.2	8.22E-05	1.0	10	10
12/19/2008 04:43.36	20.0	4.4	41.3	-15.6	10.9	8.09E-05	1.0	10	10
12/19/2008 05:28.58	22.0	2.4	45.2	-19.6	11.7	7.89E-05	1.0	10	10
12/19/2008 06:18.34	24.0	0.4	49.8	-23.6	12.5	7.69E-05	1.0	10	10
12/19/2008 00:00.00	0.0	24.7	0.0	24.7	12.5				
12/19/2008 00:02.84	2.0	23.3	2.8	21.3	12.6	6.30E-04	0.7	10	7
12/19/2008 00:26.95	4.0	20.6	24.1	16.6	13.0	1.07E-04	1.4	10	13.5
12/19/2008 00:52.03	6.0	18.5	25.1	12.5	13.4	9.41E-05	1.1	10	10.5
12/19/2008 01:18.20	8.0	16.5	26.2	8.5	13.8	9.21E-05	1.0	10	10
12/19/2008 01:46.76	10.0	14.5	28.6	4.5	14.3	8.85E-05	1.0	10	10
12/19/2008 02:17.27	12.0	12.5	30.5	0.5	14.8	8.70E-05	1.0	10	10
12/19/2008 02:49.30	14.0	10.5	32.0	-3.5	15.3	8.73E-05	1.0	10	10
12/19/2008 03:24.53	16.0	8.4	35.2	-7.6	15.9	8.60E-05	1.1	10	10.5
12/19/2008 04:02.65	18.0	6.4	38.1	-11.6	16.6	8.23E-05	1.0	10	10
12/19/2008 04:43.85	20.0	4.4	41.2	-15.6	17.2	8.10E-05	1.0	10	10
12/19/2008 05:28.84	22.0	2.4	45.0	-19.6	18.0	7.93E-05	1.0	10	10
12/19/2008 06:18.27	24.0	0.4	49.4	-23.6	18.8	7.74E-05	1.0	10	10





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

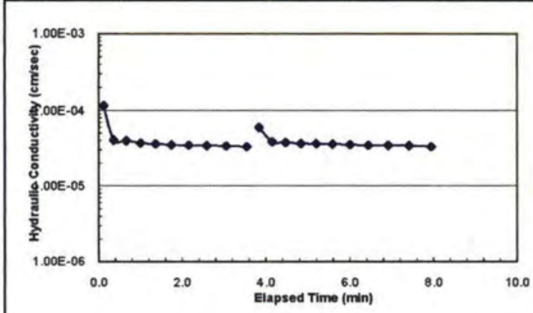
ASTM D 5084 - 00

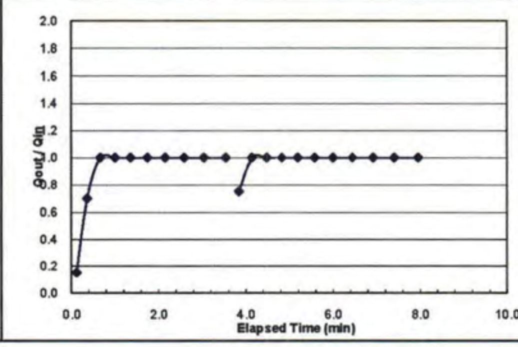
Sample I.D.	150-mm Helena 3' Top Depth-2			Test Date :	1/14/09	
Cell Pressure =	42.0	psi		Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi		Length of Sample, L =	7.0	cm
Outflow Pressre =	40.0	psi		Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi		Sample Volume, V =	1274.2	cm^3
Effective Stress =	1.8	psi		a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0			a_{out} =	1	cm^2
Weight of wet sample =	2071.8	g		Sample Water Content =	33.9%	(%)
Wet Density =	1.6	g/cm^3		Dry Density =	1.21	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
E	24.11	133.77	105.98	33.94%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.0	0.0	23.0	0.0				
0:00:07	2.0	22.7	6.7	20.7	0.1	1.15E-04	0.2	2	0.3
0:00:21	3.0	22.0	14.6	19.0	0.4	4.05E-05	0.7	1	0.7
0:00:39	4.0	21.0	18.1	17.0	0.7	3.98E-05	1.0	1	1
0:01:00	5.0	20.0	20.3	15.0	1.0	3.69E-05	1.0	1	1
0:01:21	6.0	19.0	21.6	13.0	1.4	3.60E-05	1.0	1	1
0:01:45	7.0	18.0	23.3	11.0	1.7	3.49E-05	1.0	1	1
0:02:09	8.0	17.0	24.5	9.0	2.2	3.46E-05	1.0	1	1
0:02:35	9.0	16.0	25.9	7.0	2.6	3.42E-05	1.0	1	1
0:03:03	10.0	15.0	27.6	5.0	3.0	3.37E-05	1.0	1	1
0:03:32	11.0	14.0	29.6	3.0	3.5	3.30E-05	1.0	1	1
0:00:00	0.0	23.0	-212.2	23.0	3.5				
0:00:20	2.0	21.5	20.1	19.5	3.8	5.91E-05	0.8	2	1.5
0:00:39	3.0	20.5	18.6	17.5	4.1	3.84E-05	1.0	1	1
0:00:58	4.0	19.5	19.7	15.5	4.5	3.76E-05	1.0	1	1
0:01:20	5.0	18.5	21.1	13.5	4.8	3.65E-05	1.0	1	1
0:01:42	6.0	17.5	22.2	11.5	5.2	3.62E-05	1.0	1	1
0:02:05	7.0	16.5	23.4	9.5	5.6	3.59E-05	1.0	1	1
0:02:30	8.0	15.5	24.9	7.5	6.0	3.52E-05	1.0	1	1
0:02:57	9.0	14.5	26.7	5.5	6.4	3.45E-05	1.0	1	1
0:03:25	10.0	13.5	28.2	3.5	6.9	3.42E-05	1.0	1	1
0:03:55	11.0	12.5	29.9	1.5	7.4	3.40E-05	1.0	1	1
0:04:27	12.0	11.5	32.5	-0.5	8.0	3.31E-05	1.0	1	1





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

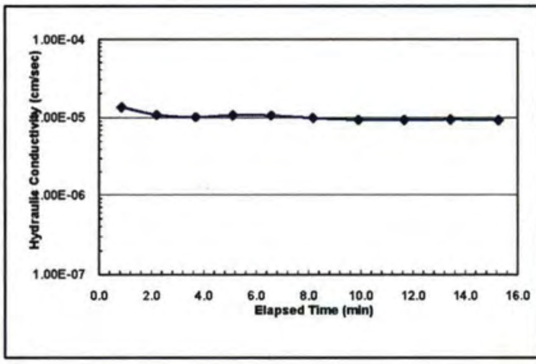
ASTM D 5084 - 00

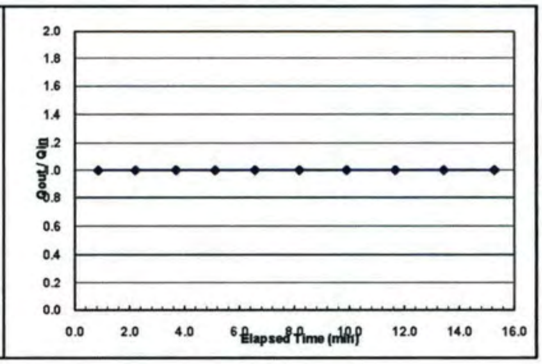
Sample I.D.	75-mm Helena Top depth-2		Test Date :	1/21/09	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	218.6	g	Sample Water Content =	38.2%	(%)
Wet Density =	1.5	g/cm^3	Dry Density =	1.08	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
15	21.07	93.25	73.3	38.20%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.1	24.0	0.0	22.9	0.0				
0:00:51	1.5	23.6	51.2	22.1	0.9	1.35E-05	1.0	0.4	0.4
0:02:13	2.0	23.1	81.3	21.1	2.2	1.08E-05	1.0	0.5	0.5
0:03:41	2.5	22.6	88.5	20.1	3.7	1.01E-05	1.0	0.5	0.5
0:05:06	3.0	22.1	85.4	19.1	5.1	1.06E-05	1.0	0.5	0.5
0:06:34	3.5	21.6	87.6	18.1	6.6	1.06E-05	1.0	0.5	0.5
0:08:10	4.0	21.1	96.2	17.1	8.2	9.79E-06	1.0	0.5	0.5
0:09:54	4.5	20.6	103.5	16.1	9.9	9.28E-06	1.0	0.5	0.5
0:11:40	5.0	20.1	106.2	15.1	11.7	9.22E-06	1.0	0.5	0.5
0:13:26	5.5	19.6	106.0	14.1	13.4	9.42E-06	1.0	0.5	0.5
0:15:17	6.0	19.1	110.7	13.1	15.3	9.21E-06	1.0	0.5	0.5





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

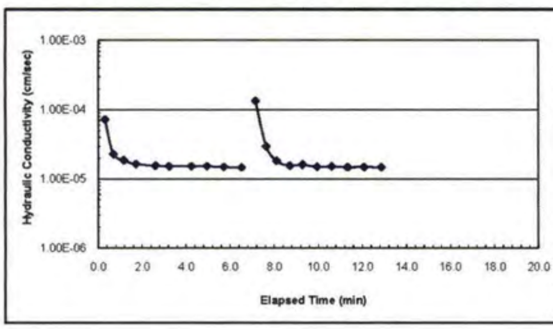
ASTM D 5084 - 00

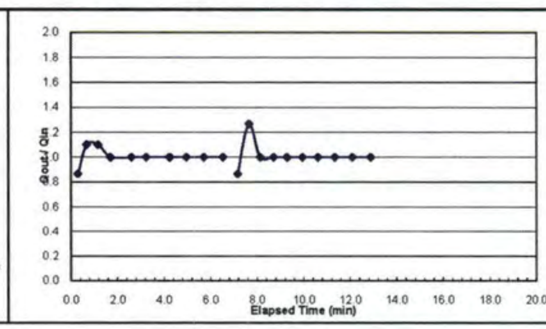
Sample I.D.	**305-mm 3' Top Depth-3**		**Test Date :**	**12/30/08**	
Cell Pressure =	42.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	21.6	cm
Outflow Pressre =	40.5	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	15753.3	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	2.0		a_{out} =	1	cm^2
Weight of wet sample =	27350.0	g	Sample Water Content =	-375.8%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.80	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
94	31.26	117.47		-375.78%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:18	3.0	21.4	18.2	18.4	0.3	7.20E-05	0.9	3	2.6
0:00:41	4.0	20.3	22.7	16.3	0.7	2.30E-05	1.1	1	1.1
0:01:10	5.0	19.2	28.9	14.2	1.2	1.87E-05	1.1	1	1.1
0:01:42	6.0	18.2	32.5	12.2	1.7	1.65E-05	1.0	1	1
0:02:36	7.5	16.7	53.4	9.2	2.6	1.57E-05	1.0	1.5	1.5
0:03:14	8.5	15.7	38.2	7.2	3.2	1.54E-05	1.0	1	1
0:04:15	10.0	14.2	60.8	4.2	4.2	1.52E-05	1.0	1.5	1.5
0:04:57	11.0	13.2	42.7	2.2	5.0	1.53E-05	1.0	1	1
0:05:43	12.0	12.2	45.7	0.2	5.7	1.49E-05	1.0	1	1
0:06:32	13.0	11.2	48.5	-1.8	6.5	1.47E-05	1.0	1	1
0:00:00	0.0	24.0	-391.5	24.0	7.0				
0:00:10	3.0	21.4	9.7	18.4	7.2	1.34E-04	0.9	3	2.6
0:00:38	4.5	19.5	28.7	15.0	7.6	2.97E-05	1.3	1.5	1.9
0:01:07	5.5	18.5	28.8	13.0	8.1	1.83E-05	1.0	1	1
0:01:42	6.5	17.5	35.0	11.0	8.7	1.56E-05	1.0	1	1
0:02:17	7.5	16.5	35.1	9.0	9.3	1.62E-05	1.0	1	1
0:02:57	8.5	15.5	39.2	7.0	9.9	1.50E-05	1.0	1	1
0:03:37	9.5	14.5	40.3	5.0	10.6	1.53E-05	1.0	1	1
0:04:20	10.5	13.5	43.2	3.0	11.3	1.48E-05	1.0	1	1
0:05:05	11.5	12.5	44.8	1.0	12.1	1.49E-05	1.0	1	1
0:05:52	12.5	11.5	47.3	-1.0	12.9	1.48E-05	1.0	1	1





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

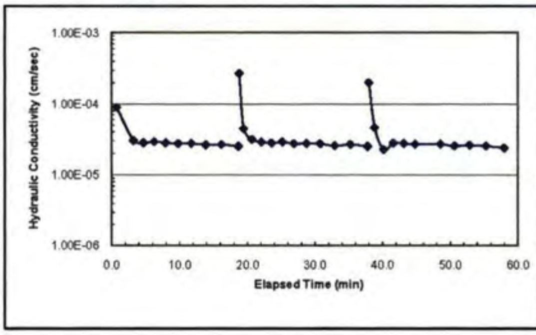
ASTM D 5084 - 00

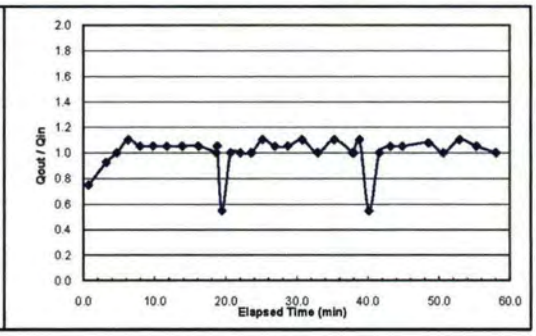
Sample I.D.	**305-mm Mid - 1**		**Test Date :**	**1/6/09**	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	20050.0	g	Sample Water Content =	34.4%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.80	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2M	23.99	172.44	134.46	34.38%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
1/6/2009 00:00.00	0.0	24.6	0.0	24.6	0.0				
1/6/2009 00:41.99	4.0	21.6	42.0	17.6	0.7	8.95E-05	0.8	20	15
1/6/2009 03:10.90	8.0	17.9	148.9	9.9	3.2	3.00E-05	0.9	20	18.5
1/6/2009 04:39.65	10.0	15.9	88.8	5.9	4.7	2.80E-05	1.0	10	10
1/6/2009 06:14.40	12.0	13.7	94.7	1.7	6.2	2.89E-05	1.1	10	11
1/6/2009 07:55.80	14.0	11.6	101.4	-2.4	7.9	2.78E-05	1.1	10	10.5
1/6/2009 09:45.72	16.0	9.5	109.9	-6.5	9.8	2.72E-05	1.1	10	10.5
1/6/2009 11:42.12	18.0	7.4	116.4	-10.6	11.7	2.72E-05	1.1	10	10.5
1/6/2009 13:50.72	20.0	5.3	128.6	-14.7	13.8	2.62E-05	1.1	10	10.5
1/6/2009 16:07.74	22.0	3.2	137.0	-18.8	16.1	2.63E-05	1.1	10	10.5
1/6/2009 18:38.95	24.0	1.2	151.2	-22.8	18.6	2.49E-05	1.0	10	10
1/6/2009 00:00.00	0.0	24.8	0.0	24.8	18.6				
1/6/2009 00:07.98	2.0	22.7	8.0	20.7	18.8	2.71E-04	1.1	10	10.5
1/6/2009 00:46.32	4.0	21.6	38.3	17.6	19.4	4.43E-05	0.5	10	5.5
1/6/2009 01:59.79	6.0	19.6	73.5	13.6	20.6	3.10E-05	1.0	10	10
1/6/2009 03:22.92	8.0	17.6	83.1	9.6	22.0	2.86E-05	1.0	10	10
1/6/2009 04:53.05	10.0	15.6	90.1	5.6	23.5	2.77E-05	1.0	10	10
1/6/2009 06:29.41	12.0	13.4	96.4	1.4	25.1	2.86E-05	1.1	10	11
1/6/2009 08:14.26	14.0	11.3	104.9	-2.7	26.9	2.70E-05	1.1	10	10.5
1/6/2009 10:03.77	16.0	9.2	109.5	-6.8	28.7	2.74E-05	1.1	10	10.5
1/6/2009 12:04.16	18.0	7.0	120.4	-11.0	30.7	2.71E-05	1.1	10	11
1/6/2009 14:14.30	20.0	5.0	130.1	-15.0	32.9	2.54E-05	1.0	10	10
1/6/2009 16:34.56	22.0	2.8	140.3	-19.2	35.2	2.65E-05	1.1	10	11
1/6/2009 19:07.90	24.0	0.8	153.3	-23.2	37.8	2.48E-05	1.0	10	10
1/6/2009 00:00.00	0.0	24.6	0.0	24.6	37.8				
1/6/2009 00:10.55	2.0	22.6	10.5	20.6	38.0	2.00E-04	1.0	10	10
1/6/2009 01:01.32	4.0	20.4	50.8	16.4	38.8	4.56E-05	1.1	10	11
1/6/2009 02:20.30	6.0	19.3	79.0	13.3	40.1	2.25E-05	0.5	10	5.5
1/6/2009 03:47.15	8.0	17.3	86.8	9.3	41.6	2.75E-05	1.0	10	10
1/6/2009 05:21.29	10.0	15.2	94.1	5.2	43.1	2.73E-05	1.1	10	10.5
1/6/2009 07:02.35	12.0	13.1	101.1	1.1	44.8	2.67E-05	1.1	10	10.5
1/6/2009 10:45.46	16.0	8.8	223.1	-7.2	48.5	2.66E-05	1.1	20	21.5
1/6/2009 12:49.28	18.0	6.8	123.8	-11.2	50.6	2.52E-05	1.0	10	10
1/6/2009 15:04.63	20.0	4.6	135.4	-15.4	52.9	2.58E-05	1.1	10	11
1/6/2009 17:30.15	22.0	2.5	145.5	-19.5	55.3	2.51E-05	1.1	10	10.5
1/6/2009 20:11.88	24.0	0.5	161.7	-23.5	58.0	2.36E-05	1.0	10	10





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

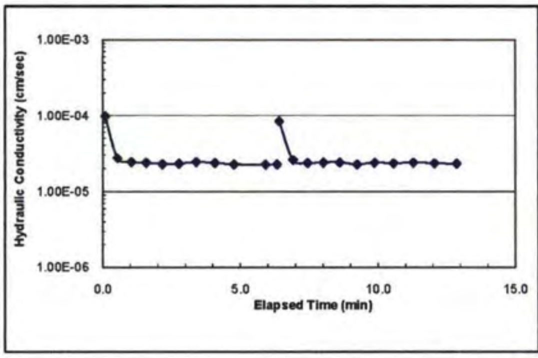
ASTM D 5084 - 00

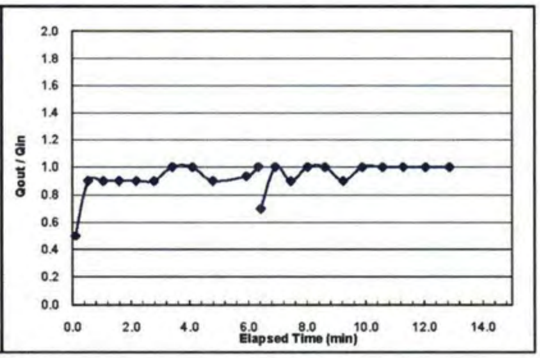
Sample I.D.	150-mm Helena Mid-1		Test Date :	1/14/09	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	1	cm^2
Weight of wet sample =	2458.2	g	Sample Water Content =	33.4%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.33	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
64	30.94	115.31	94.18	33.41%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.0	0.0	23.0	0.0				
0:00:06	1.0	22.5	5.6	21.5	0.1	9.78E-05	0.5	1	0.5
0:00:32	2.0	21.6	26.4	19.6	0.5	2.69E-05	0.9	1	0.9
0:01:03	3.0	20.7	30.7	17.7	1.0	2.40E-05	0.9	1	0.9
0:01:35	4.0	19.8	32.5	15.8	1.6	2.35E-05	0.9	1	0.9
0:02:10	5.0	18.9	35.2	13.9	2.2	2.26E-05	0.9	1	0.9
0:02:47	6.0	18.0	36.2	12.0	2.8	2.28E-05	0.9	1	0.9
0:03:24	7.0	17.0	37.7	10.0	3.4	2.40E-05	1.0	1	1
0:04:05	8.0	16.0	40.7	8.0	4.1	2.32E-05	1.0	1	1
0:04:47	9.0	15.1	42.1	6.1	4.8	2.24E-05	0.9	1	0.9
0:05:56	10.5	13.7	68.7	3.2	5.9	2.21E-05	0.9	1.5	1.4
0:06:20	11.0	13.2	24.6	2.2	6.3	2.24E-05	1.0	0.5	0.5
0:00:00	0.0	23.0	-380.4	23.0	6.3				
0:00:07	1.0	22.3	7.5	21.3	6.4	8.32E-05	0.7	1	0.7
0:00:37	2.0	21.3	29.4	19.3	6.9	2.56E-05	1.0	1	1
0:01:09	3.0	20.4	31.9	17.4	7.4	2.32E-05	0.9	1	0.9
0:01:43	4.0	19.4	34.4	15.4	8.0	2.36E-05	1.0	1	1
0:02:19	5.0	18.4	35.5	13.4	8.6	2.37E-05	1.0	1	1
0:02:56	6.0	17.5	37.4	11.5	9.2	2.23E-05	0.9	1	0.9
0:03:35	7.0	16.5	38.9	9.5	9.9	2.35E-05	1.0	1	1
0:04:17	8.0	15.5	41.6	7.5	10.6	2.30E-05	1.0	1	1
0:04:59	9.0	14.5	42.7	5.5	11.3	2.35E-05	1.0	1	1
0:05:45	10.0	13.5	45.9	3.5	12.1	2.29E-05	1.0	1	1
0:06:34	11.0	12.5	48.7	1.5	12.9	2.28E-05	1.0	1	1





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

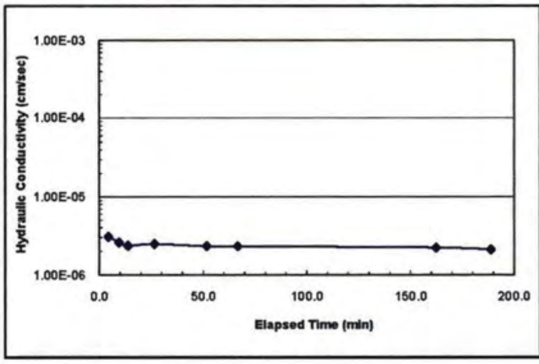
ASTM D 5084 - 00

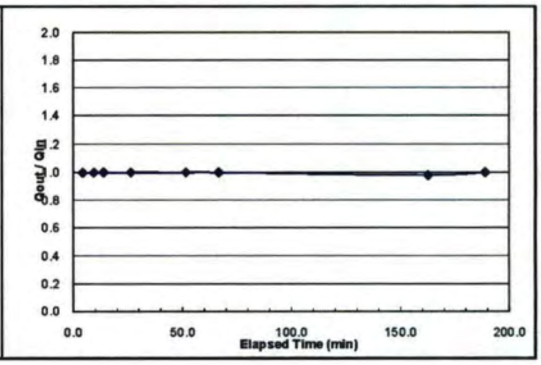
Sample I.D.	75-mm Helena Mid-1		Test Date :	1/14/09	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.4	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.4	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	7.4		a_{out} =	1	cm^2
Weight of wet sample =	239.7	g	Sample Water Content =	36.6%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.20	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
#94	31.97	109.86	89.01	36.55%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.1	24.0	0.0	22.9	0.0				
0:04:19	1.5	23.6	258.9	22.1	4.3	3.03E-06	1.0	0.4	0.4
0:09:28	1.9	23.2	309.5	21.3	9.5	2.58E-06	1.0	0.4	0.4
0:13:46	2.2	22.9	258.0	20.7	13.8	2.35E-06	1.0	0.3	0.3
0:26:22	3.1	22.0	755.6	18.9	26.4	2.47E-06	1.0	0.9	0.9
0:51:35	4.7	20.4	1512.9	15.7	51.6	2.32E-06	1.0	1.6	1.6
1:06:34	5.6	19.5	899.0	13.9	66.6	2.32E-06	1.0	0.9	0.9
2:42:29	10.4	14.8	5755.0	4.4	162.5	2.21E-06	1.0	4.8	4.7
3:08:45	11.5	13.8	1575.9	2.3	188.7	2.11E-06	1.0	1.05	1.05





Hydraulic Conductivity Test - Helena - Store-and-Release Cover

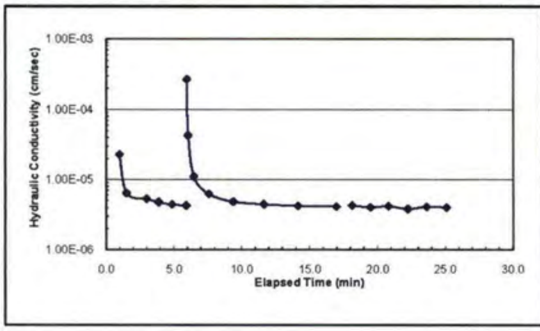
ASTM D 5084 - 00

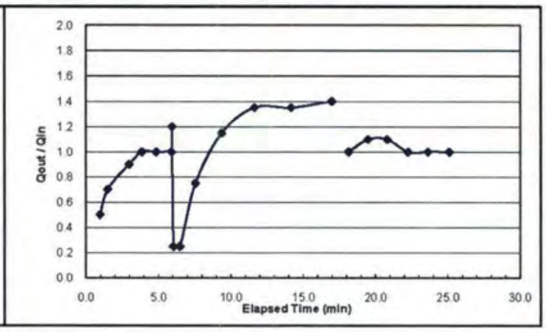
Sample I.D.	305-mm Mid - 2		Test Date :	12/29/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	20400.0	g	Sample Water Content =	16.7%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
120	31.07	158.32	140.14	16.67%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
1/9/2009 00:00.00	0.0	24.5	0.0	24.5	0.0				
1/9/2009 00:58.51	8.0	20.5	58.5	12.5	1.0	2.26E-05	0.5	8	4
1/9/2009 01:30.27	9.0	19.8	31.8	10.8	1.5	6.36E-06	0.7	1	0.7
1/9/2009 02:58.90	11.0	18.0	88.6	7.0	3.0	5.26E-06	0.9	2	1.8
1/9/2009 03:52.30	12.0	17.0	53.4	5.0	3.9	4.76E-06	1.0	1	1
1/9/2009 04:51.71	13.0	16.0	59.4	3.0	4.9	4.38E-06	1.0	1	1
1/9/2009 05:54.78	14.0	15.0	63.1	1.0	5.9	4.24E-06	1.0	1	1
1/9/2009 00:00.00	0.0	24.9	0.0	24.9	5.9				
1/9/2009 00:01.75	2.0	22.5	1.7	20.5	5.9	2.66E-04	1.2	2	2.4
1/9/2009 00:08.14	4.0	22.0	6.4	18.0	6.0	4.28E-05	0.3	2	0.5
1/9/2009 00:33.84	6.0	21.5	25.7	15.5	6.5	1.09E-05	0.3	2	0.5
1/9/2009 01:39.45	8.0	20.0	65.6	12.0	7.6	6.19E-06	0.8	2	1.5
1/9/2009 03:27.41	10.0	17.7	108.0	7.7	9.4	4.83E-06	1.2	2	2.3
1/9/2009 05:43.09	12.0	15.0	135.7	3.0	11.6	4.44E-06	1.4	2	2.7
1/9/2009 08:15.14	14.0	12.3	152.1	-1.7	14.2	4.20E-06	1.4	2	2.7
1/9/2009 11:03.88	16.0	9.5	168.7	-6.5	17.0	4.12E-06	1.4	2	2.8
1/9/2009 00:00.00	18.0	13.0	0.0	-5.0	17.0				
1/9/2009 01:09.97	19.0	12.0	70.0	-7.0	18.1	4.25E-06	1.0	1	1
1/9/2009 02:30.30	20.0	10.9	80.3	-9.1	19.5	4.01E-06	1.1	1	1.1
1/9/2009 03:50.29	21.0	9.8	80.0	-11.2	20.8	4.15E-06	1.1	1	1.1
1/9/2009 05:16.45	22.0	8.8	86.2	-13.2	22.3	3.79E-06	1.0	1	1
1/9/2009 06:38.97	23.0	7.8	82.5	-15.2	23.6	4.08E-06	1.0	1	1
1/9/2009 08:06.90	24.0	6.8	87.9	-17.2	25.1	3.96E-06	1.0	1	1





Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

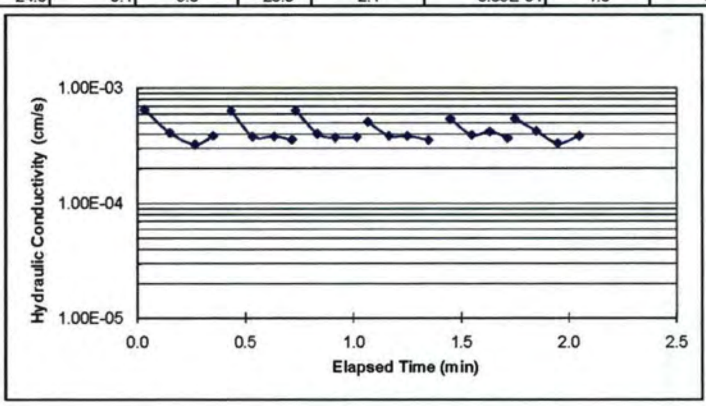
ASTM D 5084 - 00

Sample I.D.	305-mm East Side North Pit 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	17.5	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	12741.7	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.0		a_{out} =	1	cm^2
Weight of wet sample =	24584.6	g	Sample Water Content =	16.6%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.93	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.94	354.14	310.99	16.59%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.7	0.0	23.7	0.0				
0:00:02	5.0	19.0	2.0	14.0	0.0	6.51E-04	0.9	5	4.7
0:00:09	14.0	10.0	7.0	-4.0	0.2	4.10E-04	1.0	9	9
0:00:16	20.0	4.5	7.0	-15.5	0.3	3.25E-04	0.9	6	5.5
0:00:21	24.0	0.3	5.0	-23.7	0.4	3.88E-04	1.1	4	4.2
0:00:00	0.0	24.1	-21.0	24.1	0.4				
0:00:02	5.0	19.5	2.0	14.5	0.4	6.41E-04	0.9	5	4.6
0:00:08	12.5	12.2	6.0	-0.3	0.5	3.82E-04	1.0	7.5	7.3
0:00:14	18.5	6.0	6.0	-12.5	0.6	3.82E-04	1.0	6	6.2
0:00:19	22.5	2.0	5.0	-20.5	0.7	3.56E-04	1.0	4	4
0:00:00	0.0	24.1	-19.0	24.1	0.7				
0:00:02	5.0	19.5	2.0	14.5	0.7	6.41E-04	0.9	5	4.6
0:00:08	12.5	11.5	6.0	-1.0	0.8	4.02E-04	1.1	7.5	8
0:00:13	17.5	6.5	5.0	-11.0	0.9	3.73E-04	1.0	5	5
0:00:19	22.5	1.3	6.0	-21.2	1.0	3.76E-04	1.0	5	5.2
0:00:00	0.0	24.4	-19.0	24.4	1.0				
0:00:04	7.5	17.0	4.0	9.5	1.1	5.12E-04	1.0	7.5	7.4
0:00:10	14.5	10.0	6.0	-4.5	1.2	3.85E-04	1.0	7	7
0:00:15	19.5	5.2	5.0	-14.3	1.3	3.86E-04	1.0	5	4.8
0:00:21	24.0	0.6	6.0	-23.4	1.4	3.53E-04	1.0	4.5	4.6
0:00:00	0.0	24.0	-21.0	24.0	1.4				
0:00:03	6.0	18.0	3.0	12.0	1.5	5.43E-04	1.0	6	6
0:00:09	13.5	10.8	6.0	-2.7	1.6	3.92E-04	1.0	7.5	7.2
0:00:14	19.0	5.4	5.0	-13.6	1.6	4.21E-04	1.0	5.5	5.4
0:00:19	23.0	1.3	5.0	-21.7	1.7	3.69E-04	1.0	4	4.1
0:00:00	0.0	24.0	-19.0	24.0	1.7				
0:00:03	6.0	18.0	3.0	12.0	1.8	5.43E-04	1.0	6	6
0:00:09	14.0	10.2	6.0	-3.8	1.9	4.25E-04	1.0	8	7.8
0:00:15	19.0	5.0	6.0	-14.0	2.0	3.32E-04	1.0	5	5.2
0:00:21	24.0	0.1	6.0	-23.9	2.1	3.85E-04	1.0	5	4.9



Hydraulic Conductivity Test

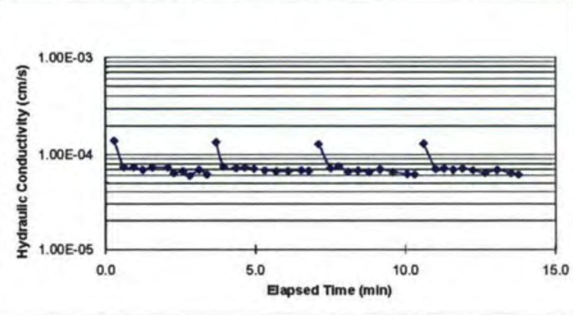
ASTM D 5084 - 00

Sample I.D.	East Side North Pit 0-30 cm			Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm	
Inflow Pressure =	41.0	psi	Length of Sample, L =	8.3	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2	
Pressure Difference =	1.0	psi	Sample Volume, V =	1505.8	cm^3	
Effective Stress =	1.5	psi	a_{in} =	1	cm^2	
Hydraulic Gradient, i =	8.5		a_{out} =	1	cm^2	
Weight of wet sample =		g	Sample Water Content =	-3.8	(%)	
Wet Density =	0.0	g/cm^3	Dry Density =	0.00	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.88	118.21		-3.83

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:17	5.0	19.6	17.0	14.6	0.3	1.40E-04	0.9	5	4.4
0:00:36	7.5	17.0	19.0	9.5	0.6	7.37E-05	1.0	2.5	2.6
0:00:56	10.0	14.5	20.0	4.5	0.9	7.32E-05	1.0	2.5	2.5
0:01:14	12.0	12.5	18.0	0.5	1.2	6.91E-05	1.0	2	2
0:01:33	14.0	10.3	19.0	-3.7	1.6	7.28E-05	1.1	2	2.2
0:02:04	17.0	7.0	31.0	-10.0	2.1	7.25E-05	1.1	3	3.3
0:02:16	18.0	6.0	12.0	-12.0	2.3	6.36E-05	1.0	1	1
0:02:34	19.5	4.5	18.0	-15.0	2.6	6.64E-05	1.0	1.5	1.5
0:02:48	20.5	3.5	14.0	-17.0	2.8	5.95E-05	1.0	1	1
0:03:07	22.0	2.0	19.0	-20.0	3.1	6.90E-05	1.0	1.5	1.5
0:03:22	23.0	1.0	15.0	-22.0	3.4	6.12E-05	1.0	1	1
0:00:00	0.0	24.0	-202.0	24.0	3.4				
0:00:17	5.0	19.9	17.0	14.9	3.7	1.35E-04	0.8	5	4.1
0:00:32	7.0	17.8	15.0	10.8	3.9	7.44E-05	1.1	2	2.1
0:00:57	10.0	14.6	25.0	4.6	4.4	7.20E-05	1.1	3	3.2
0:01:14	12.0	12.6	17.0	0.6	4.6	7.30E-05	1.0	2	2
0:01:33	14.0	10.5	19.0	-3.5	5.0	7.09E-05	1.1	2	2.1
0:01:54	16.0	8.4	21.0	-7.6	5.3	6.82E-05	1.1	2	2.1
0:02:17	18.0	6.3	23.0	-11.7	5.7	6.65E-05	1.1	2	2.1
0:02:41	20.0	4.3	24.0	-15.7	6.1	6.66E-05	1.0	2	2
0:03:07	22.0	2.2	26.0	-19.8	6.5	6.79E-05	1.1	2	2.1
0:03:22	23.0	1.0	15.0	-22.0	6.8	6.71E-05	1.2	1	1.2
0:00:00	0.0	24.0	-202.0	24.0	6.8				
0:00:18	5.0	19.8	18.0	14.8	7.1	1.29E-04	0.8	5	4.2
0:00:42	8.0	16.6	24.0	8.6	7.5	7.13E-05	1.1	3	3.2
0:00:58	10.0	14.5	16.0	4.5	7.8	7.54E-05	1.1	2	2.1
0:01:17	12.0	12.5	19.0	0.5	8.1	6.54E-05	1.0	2	2
0:01:37	14.0	10.4	20.0	-3.6	8.4	6.75E-05	1.1	2	2.1
0:01:59	16.0	8.3	22.0	-7.7	8.8	6.52E-05	1.1	2	2.1
0:02:21	18.0	6.2	22.0	-11.8	9.2	6.96E-05	1.1	2	2.1
0:02:47	20.0	4.0	26.0	-16.0	9.6	6.48E-05	1.1	2	2.2
0:03:15	22.0	2.0	28.0	-20.0	10.1	6.18E-05	1.0	2	2
0:03:30	23.0	1.0	15.0	-22.0	10.3	6.12E-05	1.0	1	1
0:00:00	0.0	24.0	-210.0	24.0	10.3				
0:00:18	5.0	19.7	18.0	14.7	10.6	1.30E-04	0.9	5	4.3
0:00:42	8.0	16.6	24.0	8.6	11.0	7.02E-05	1.0	3	3.1
0:00:59	10.0	14.5	17.0	4.5	11.3	7.10E-05	1.1	2	2.1
0:01:17	12.0	12.5	18.0	0.5	11.6	6.91E-05	1.0	2	2
0:01:36	14.0	10.4	19.0	-3.6	11.9	7.10E-05	1.1	2	2.1
0:01:57	16	8.3	21.0	-7.7	12.3	6.83E-05	1.1	2	2.1
0:02:21	18.0	6.2	24.0	-11.8	12.7	6.38E-05	1.1	2	2.1
0:02:45	20.0	4.1	24.0	-15.9	13.1	6.85E-05	1.1	2	2.1
0:03:13	22.0	2.0	28.0	-20.0	13.5	6.33E-05	1.1	2	2.1
0:03:28	23.0	1.0	15.0	-22.0	13.8	6.12E-05	1.0	1	1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

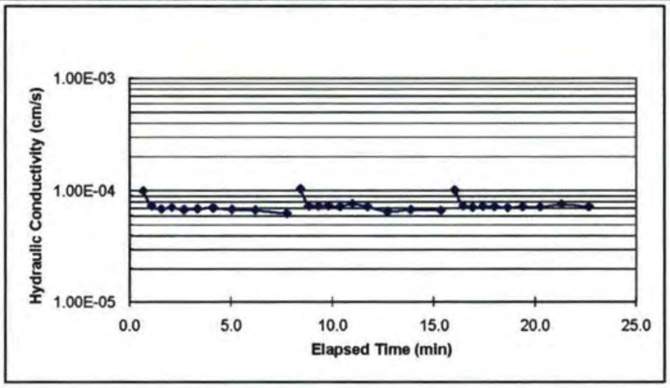
ASTM D 5084 - 00

Sample I.D.	150-mm East Side North Pit 0-30 cm		Test Date :		
Cell Pressure =	41.7	psi	Diameter of Sample, D =	15.6	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	8.3	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	190.09	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1569.2	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.3		a_{out} =	1	cm^2
Weight of wet sample =		g	Sample Water Content =	#DIV/0!	(%)
Wet Density =	0.0	g/cm^3	Dry Density =	#DIV/0!	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
				#DIV/0!

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:39	5.0	19.3	39.0	14.3	0.7	9.97E-05	0.9	5	4.7
0:01:04	7.0	17.3	25.0	10.3	1.1	7.32E-05	1.0	2	2
0:01:33	9.0	15.3	29.0	6.3	1.6	6.90E-05	1.0	2	2
0:02:04	11.0	13.3	31.0	2.3	2.1	7.11E-05	1.0	2	2
0:02:40	13.0	11.3	36.0	-1.7	2.7	6.81E-05	1.0	2	2
0:03:20	15.0	9.3	40.0	-5.7	3.3	6.91E-05	1.0	2	2
0:04:06	17.0	7.2	46.0	-9.8	4.1	7.07E-05	1.1	2	2.1
0:05:02	19.0	5.1	56.0	-13.9	5.0	6.84E-05	1.1	2	2.1
0:06:11	21.0	3.0	69.0	-18.0	6.2	6.74E-05	1.1	2	2.1
0:07:45	23.0	0.9	94.0	-22.1	7.8	6.30E-05	1.1	2	2.1
0:00:00	0.0	24.0	-465.0	24.0	7.8				
0:00:37	5.0	19.4	37.0	14.4	8.4	1.04E-04	0.9	5	4.6
0:01:02	7.0	17.4	25.0	10.4	8.8	7.31E-05	1.0	2	2
0:01:30	9.0	15.3	28.0	6.3	9.3	7.31E-05	1.1	2	2.1
0:02:00	11.0	13.3	30.0	2.3	9.8	7.34E-05	1.0	2	2
0:02:34	13.0	11.3	34.0	-1.7	10.4	7.21E-05	1.0	2	2
0:03:11	15.0	9.2	37.0	-5.8	11.0	7.67E-05	1.1	2	2.1
0:03:55	17.0	7.2	44.0	-9.8	11.7	7.23E-05	1.0	2	2
0:04:55	19.0	5.0	60.0	-14.0	12.7	6.55E-05	1.1	2	2.2
0:06:04	21.0	2.9	69.0	-18.1	13.9	6.78E-05	1.1	2	2.1
0:07:33	23.0	0.8	89.0	-22.2	15.4	6.70E-05	1.1	2	2.1
0:00:00	0.0	24.0	-453.0	24.0	15.4				
0:00:38	5.0	19.4	38.0	14.4	16.0	1.01E-04	0.9	5	4.6
0:01:03	7.0	17.4	25.0	10.4	16.5	7.31E-05	1.0	2	2
0:01:31	9.0	15.4	28.0	6.4	16.9	7.13E-05	1.0	2	2
0:02:02	11.0	13.3	31.0	2.3	17.4	7.27E-05	1.1	2	2.1
0:02:36	13.0	11.3	34.0	-1.7	18.0	7.21E-05	1.0	2	2
0:03:15	15.0	9.3	39.0	-5.7	18.7	7.09E-05	1.0	2	2
0:04:00	17.0	7.2	45.0	-9.8	19.4	7.23E-05	1.1	2	2.1
0:04:52	19.0	5.2	52.0	-13.8	20.3	7.17E-05	1.0	2	2
0:05:55	21.0	3.0	63.0	-18.0	21.3	7.54E-05	1.1	2	2.2
0:07:15	23.0	1.0	80.0	-22.0	22.7	7.20E-05	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

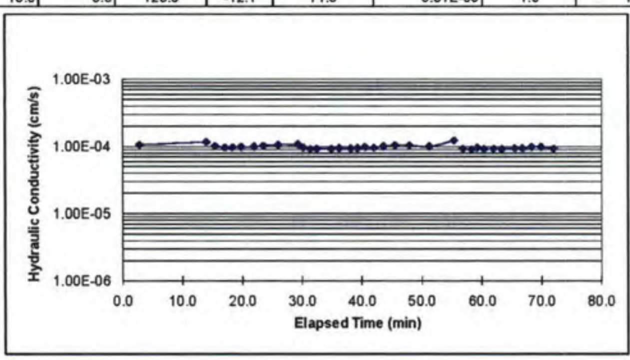
ASTM D 5084 - 00

Sample I.D.	75-mm East Side North Pit 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	40.4	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.7		a_{out} =	1	cm^2
Weight of wet sample =	361.2	g	Sample Water Content =	21.94%	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	2.12	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.77	143.59	123.29	21.94%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:02:48	6.0	18.1	168.0	12.1	2.8	1.06E-04	1.0	6	5.9
0:13:58	18.3	5.8	670.0	-12.5	14.0	1.17E-04	1.0	12.3	12.3
0:00:00	0.0	24.0	-838.0	24.0	14.0				
0:01:23	3.0	20.9	83.0	17.9	15.4	1.02E-04	1.0	2.999039352	3.1
0:03:03	6.0	17.9	100.0	11.9	17.1	9.69E-05	1.0	3	3
0:04:20	8.0	15.9	77.0	7.9	18.3	9.73E-05	1.0	2	2
0:05:47	10.0	13.9	87.0	3.9	19.8	9.89E-05	1.0	2	2
0:07:57	12.5	11.4	130.0	-1.1	22.0	9.96E-05	1.0	2.5	2.5
0:09:29	14.0	9.9	92.0	-4.1	23.5	1.02E-04	1.0	1.5	1.5
0:11:56	16.0	7.9	147.0	-8.1	25.9	1.06E-04	1.0	2	2
0:15:14	18.0	5.9	198.0	-12.1	29.2	1.08E-04	1.0	2	2
0:00:00	0.0	23.9	-914.0	23.9	29.2				
0:00:56	2.0	21.9	56.0	19.9	30.1	9.64E-05	1.0	2	2
0:02:08	4.2	19.7	72.0	15.5	31.3	9.15E-05	1.0	2.2	2.2
0:03:13	6.0	17.9	65.0	11.9	32.4	9.24E-05			
0:05:42	9.5	14.4	149.0	4.9	34.9	9.28E-05	1.0	3.5	3.5
0:06:57	11.0	12.9	75.0	1.9	36.2	9.48E-05	1.0	1.5	1.5
0:08:55	13.0	10.9	118.0	-2.1	38.1	9.39E-05	1.0	2	2
0:10:03	14.0	9.9	68.0	-4.1	39.3	9.49E-05	1.0	1	1
0:11:17	15.0	8.9	74.0	-6.1	40.5	9.81E-05	1.0	1	1
0:12:44	16.0	7.9	87.0	-8.1	41.9	9.54E-05	1.0	1	1
0:14:20	17.0	6.9	96.0	-10.1	43.5	1.01E-04	1.0	1	1
0:16:18	18.0	5.8	118.0	-12.2	45.5	1.04E-04	1.1	1	1.1
0:18:40	19.0	4.8	142.0	-14.2	47.9	1.04E-04	1.0	1	1
0:21:59	20.0	3.8	199.0	-16.2	51.2	9.98E-05	1.0	1	1
0:26:07	21.0	2.8	248.0	-18.2	55.3	1.23E-04	1.0	1	1
0:00:00	0.0	24.0	-1567.0	24.0	55.3				
0:01:29	3.0	21.0	89.0	18.0	56.8	9.30E-05	1.0	3	3
0:02:57	5.5	18.5	88.0	13.0	58.3	9.02E-05	1.0	2.5	2.5
0:03:55	7.0	16.9	58.0	9.9	59.2	9.53E-05	1.1	1.5	1.6
0:05:00	8.5	15.4	65.0	6.9	60.3	9.08E-05	1.0	1.5	1.5
0:06:37	10.5	13.4	97.0	2.9	61.9	9.22E-05	1.0	2	2
0:07:59	12.0	12.0	82.0	0.0	63.3	9.11E-05	0.9	1.5	1.4
0:10:09	14.0	10.0	130.0	-4.0	65.5	9.38E-05	1.0	2	2
0:11:26	15.0	9.0	77.0	-6.0	66.7	9.37E-05	1.0	1	1
0:12:58	16.1	7.9	92.0	-8.2	68.3	9.93E-05	1.0	1.1	1.1
0:14:32	17.0	6.9	94.0	-10.1	69.8	9.83E-05	1.1	0.9	1
0:16:37	18.0	5.9	125.0	-12.1	71.9	9.31E-05	1.0	1	1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

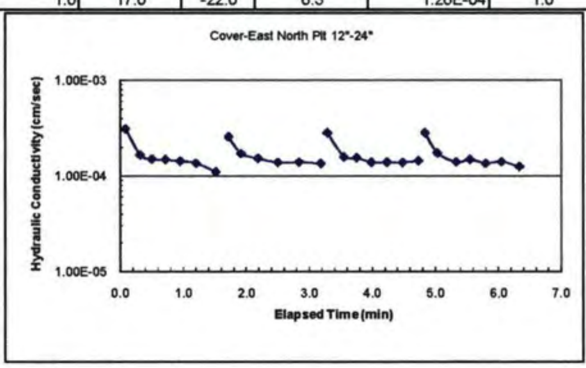
ASTM D 5084 - 00

Sample I.D.	305-mm East Side North Pit 30-60 cm		Test Date :	9/19/07	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.9	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	20.3	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	750.1	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	15241.4	cm^3
Effective Stress =	1.49	psi	a_{in} =	4	cm^2
Hydraulic Gradient, i =	8.4		a_{out} =	4	cm^2
Weight of wet sample =	24720.8	(g)	Sample Water Content =	6.9	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.52	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NA	NA	NA	NA	6.90

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
9/19/2007 12:00	0.0	24.0	0.0	24.0	0.0				
9/19/2007 12:00	3.0	21.5	5.0	18.5	0.1	3.10E-04	0.8	12	10
9/19/2007 12:00	8.0	18.5	14.0	10.5	0.3	1.67E-04	0.6	20	12
9/19/2007 12:00	11.0	16.0	11.0	5.0	0.5	1.52E-04	0.8	12	10
9/19/2007 12:00	14.0	12.8	13.0	-1.2	0.7	1.50E-04	1.1	12	12.8
9/19/2007 12:00	17.0	9.6	14.0	-7.4	1.0	1.44E-04	1.1	12	12.8
9/19/2007 12:01	20.0	6.5	15.0	-13.5	1.2	1.37E-04	1.0	12	12.4
9/19/2007 12:01	23.0	3.5	19.0	-19.5	1.5	1.11E-04	1.0	12	12
9/19/2007 12:01	24.5	1.0	6.0	-23.5	1.6			6	10
9/19/2007 12:00	0.0	24.0	0.0	24.0	1.6				
9/19/2007 12:00	3.0	21.5	6.0	18.5	1.7	2.58E-04	0.8	12	10
9/19/2007 12:00	7.0	18.4	12.0	11.4	1.9	1.73E-04	0.8	16	12.4
9/19/2007 12:00	11.0	14.3	16.0	3.3	2.2	1.54E-04	1.0	16	16.4
9/19/2007 12:00	15.0	10.0	19.0	-5.0	2.5	1.39E-04	1.1	16	17.2
9/19/2007 12:01	19.0	5.6	20.0	-13.4	2.8	1.41E-04	1.1	16	17.6
9/19/2007 12:01	23.0	1.5	21.0	-21.5	3.2	1.36E-04	1.0	16	16.4
9/19/2007 12:00	0.0	24.0	0.0	24.0	3.2				
9/19/2007 12:00	3.0	21.0	6.0	18.0	3.3	2.82E-04	1.0	12	12
9/19/2007 12:00	8.0	17.3	16.0	9.3	3.6	1.60E-04	0.7	20	14.8
9/19/2007 12:00	11.0	14.2	12.0	3.2	3.7	1.55E-04	1.0	12	12.4
9/19/2007 12:00	14.0	11.0	14.0	-3.0	4.0	1.40E-04	1.1	12	12.8
9/19/2007 12:01	17.0	7.6	15.0	-9.4	4.2	1.40E-04	1.1	12	13.6
9/19/2007 12:01	20.0	4.5	15.0	-15.5	4.5	1.39E-04	1.0	12	12.4
9/19/2007 12:01	23.0	1.4	15.0	-21.6	4.7	1.45E-04	1.0	12	12.4
9/19/2007 12:00	0.0	24.0	0.0	24.0	4.7				
9/19/2007 12:00	3.0	21.0	6.0	18.0	4.8	2.82E-04	1.0	12	12
9/19/2007 12:00	7.0	17.8	12.0	10.8	5.0	1.75E-04	0.8	16	12.8
9/19/2007 12:00	11.0	13.5	18.0	2.5	5.3	1.41E-04	1.1	16	17.2
9/19/2007 12:00	14.0	10.4	13.0	-3.6	5.5	1.49E-04	1.0	12	12.4
9/19/2007 12:01	17.0	7.2	15.0	-9.8	5.8	1.36E-04	1.1	12	12.8
9/19/2007 12:01	20.0	4.0	15.0	-16.0	6.0	1.42E-04	1.1	12	12.8
9/19/2007 12:01	23.0	1.0	17.0	-22.0	6.3	1.26E-04	1.0	12	12



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

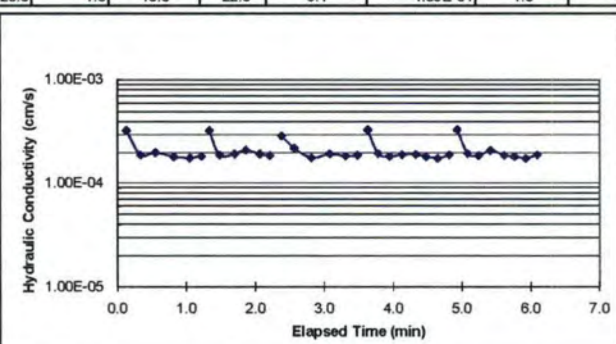
ASTM D 5084 - 00

Sample I.D.	150-mm East Side North Pit 30-60 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.6	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	9.0	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	190.09	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	1714.1	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	7.8		a_{out} =	1	cm^2
Weight of wet sample =	3150.2	g	Sample Water Content =	21.24%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.79	203.02	172.85	21.24%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:08	5.0	19.2	8.0	14.2	0.1	3.25E-04	1.0	5	4.8
0:00:20	9.0	15.5	12.0	6.5	0.3	1.89E-04	0.9	4	3.7
0:00:33	13.0	11.6	13.0	-1.4	0.6	1.98E-04	1.0	4	3.9
0:00:49	17.0	7.7	16.0	-9.3	0.8	1.80E-04	1.0	4	3.9
0:01:03	20.0	4.7	14.0	-15.3	1.1	1.75E-04	1.0	3	3
0:01:13	22.0	2.6	10.0	-19.4	1.2	1.84E-04	1.1	2	2.1
0:00:00	0.0	24.0	-73.0	24.0	1.2				
0:00:08	5.0	19.2	8.0	14.2	1.3	3.25E-04	1.0	5	4.8
0:00:17	8.0	16.4	9.0	8.4	1.5	1.87E-04	0.9	3	2.8
0:00:30	12.0	12.5	13.0	0.5	1.7	1.93E-04	1.0	4	3.9
0:00:40	15.0	9.5	10.0	-5.5	1.9	2.10E-04	1.0	3	3
0:00:52	18.0	6.5	12.0	-11.5	2.1	1.92E-04	1.0	3	3
0:01:01	20.0	4.5	9.0	-15.5	2.2	1.86E-04	1.0	2	2
0:00:00	0.0	24.0	-61.0	24.0	2.2				
0:00:11	6.0	18.2	11.0	12.2	2.4	2.88E-04	1.0	6	5.8
0:00:22	10.0	14.2	11.0	4.2	2.6	2.20E-04	1.0	4	4
0:00:37	14.0	10.3	15.0	-3.7	2.8	1.77E-04	1.0	4	3.9
0:00:53	18.0	6.2	16.0	-11.8	3.1	1.92E-04	1.0	4	4.1
0:01:07	21.0	3.2	14.0	-17.8	3.3	1.83E-04	1.0	3	3
0:01:17	23.0	1.2	10.0	-21.8	3.5	1.88E-04	1.0	2	2
0:00:00	0.0	24.0	-77.0	24.0	3.5				
0:00:08	5.0	19.0	8.0	14.0	3.6	3.32E-04	1.0	5	5
0:00:17	8.0	16.0	9.0	8.0	3.8	1.94E-04	1.0	3	3
0:00:27	11.0	13.2	10.0	2.2	4.0	1.82E-04	0.9	3	2.8
0:00:38	14.0	10.1	11.0	-3.9	4.1	1.89E-04	1.0	3	3.1
0:00:50	17.0	7.0	12.0	-10.0	4.3	1.90E-04	1.0	3	3.1
0:00:59	19.0	5.0	9.0	-14.0	4.5	1.81E-04	1.0	2	2
0:01:09	21.0	3.0	10.0	-18.0	4.7	1.75E-04	1.0	2	2
0:01:19	23.0	1.0	10.0	-22.0	4.8	1.89E-04	1.0	2	2
0:00:00	0.0	24.0	-79.0	24.0	4.8				
0:00:08	5.0	19.0	8.0	14.0	4.9	3.32E-04	1.0	5	5
0:00:17	8.0	16.0	9.0	8.0	5.1	1.94E-04	1.0	3	3
0:00:27	11.0	13.1	10.0	2.1	5.3	1.86E-04	1.0	3	2.9
0:00:37	14.0	10.0	10.0	-4.0	5.4	2.09E-04	1.0	3	3.1
0:00:49	17.0	7.0	12.0	-10.0	5.6	1.87E-04	1.0	3	3
0:00:58	19.0	5.0	9.0	-14.0	5.8	1.81E-04	1.0	2	2
0:01:08	21.0	3.0	10.0	-18.0	5.9	1.75E-04	1.0	2	2
0:01:18	23.0	1.0	10.0	-22.0	6.1	1.89E-04	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

ASTM D 5084 - 00

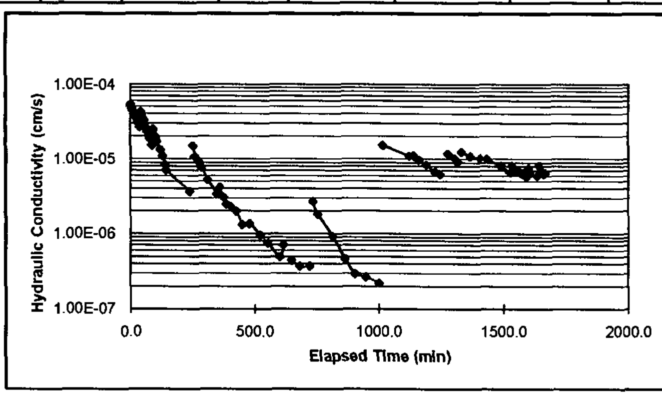
Sample I.D.	75-mm East Side North Pit 30-60 cm		Test Date :		
Cell Pressure =	41.7	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	4.6	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	175.2	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	7.7		a_{out} =	1	cm^2
Weight of wet sample =	319.8	g	Sample Water Content =	23.73%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.82	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.91	133.8	114.07	23.73%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out}/Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:59	1.5	22.4	59.0	20.9	1.0	5.44E-05	1.1	1.5	1.6
0:02:25	3.5	20.4	86.0	16.9	2.4	5.13E-05	1.0	2	2
0:04:01	5.5	18.4	96.0	12.9	4.0	4.97E-05	1.0	2	2
0:06:49	8.5	15.4	168.0	6.9	6.8	4.73E-05	1.0	3	3
0:10:19	11.5	12.4	210.0	0.9	10.3	4.37E-05	1.0	3	3
0:14:48	14.5	9.4	269.0	-5.1	14.8	4.04E-05	1.0	3	3
0:17:35	16.0	7.9	167.0	-8.1	17.6	3.76E-05	1.0	1.5	1.5
0:20:05	17.2	6.7	150.0	-10.5	20.1	3.69E-05	1.0	1.2	1.2
0:26:19	19.6	4.3	374.0	-15.3	26.3	3.45E-05	1.0	2.4	2.4
0:28:11	20.2	3.7	112.0	-16.5	28.2	3.32E-05	1.0	0.6	0.6
0:31:29	21.1	2.8	198.0	-18.3	31.5	3.06E-05	1.0	0.9	0.9
0:35:55	22.2	1.7	266.0	-20.5	35.9	3.13E-05	1.0	1.1	1.1
0:37:28	22.5	1.4	93.0	-21.1	37.5	2.68E-05	1.0	0.3	0.3
0:39:55	23.0	0.9	147.0	-22.1	39.9	2.99E-05	1.0	0.5	0.5
0:00:00	0.0	24.0	-2395.0	24.0	39.9				
0:02:22	3.0	21.3	142.0	18.3	42.3	4.26E-05	0.9	3	2.7
0:05:31	6.0	18.3	189.0	12.3	45.4	3.76E-05	1.0	3	3
0:08:26	8.5	15.8	175.0	7.3	48.3	3.79E-05	1.0	2.5	2.5
0:10:31	10.0	14.3	125.0	4.3	50.4	3.50E-05	1.0	1.5	1.5
0:14:42	12.5	11.7	251.0	-0.8	54.6	3.29E-05	1.0	2.5	2.6
0:18:56	14.5	9.7	254.0	-4.8	58.8	2.91E-05	1.0	2	2
0:22:41	16.0	8.3	225.0	-7.7	62.6	2.66E-05	0.9	1.5	1.4
0:25:43	17.0	7.3	182.0	-9.7	65.6	2.48E-05	1.0	1	1
0:29:16	18.0	6.3	213.0	-11.7	69.2	2.29E-05	1.0	1	1
0:33:29	19.0	5.3	253.0	-13.7	73.4	2.10E-05	1.0	1	1
0:39:47	20.2	4.1	378.0	-16.1	79.7	1.87E-05	1.0	1.2	1.2
0:45:31	21.0	3.3	344.0	-17.7	85.4	1.52E-05	1.0	0.8	0.8
0:00:00	0.0	24.0	-2731.0	24.0	85.4				
0:07:31	5.0	18.8	451.0	13.8	92.9	2.50E-05	1.0	5	5.2
0:11:37	7.0	16.8	246.0	9.8	97.0	2.07E-05	1.0	2	2
0:18:01	9.5	14.3	384.0	4.8	103.4	1.83E-05	1.0	2.5	2.5
0:22:40	11.0	12.7	279.0	1.7	108.1	1.73E-05	1.1	1.5	1.6
0:33:15	13.5	10.3	635.0	-3.2	118.7	1.34E-05	1.0	2.5	2.4
0:43:40	15.2	8.5	625.0	-6.7	129.1	1.11E-05	1.1	1.7	1.8
0:52:43	16.3	7.5	543.0	-8.8	138.1	8.42E-06	0.9	1.1	1
0:57:01	16.7	7.1	258.0	-9.6	142.4	7.12E-06	1.0	0.4	0.4
2:32:41	20.5	3.3	5740.0	-17.2	238.1	3.67E-06	1.0	3.8	3.8
0:00:00	0.0	24.0	-9161.0	24.0	238.1				
0:14:05	5.7	18.3	845.0	12.6	252.2	1.51E-05	1.0	5.7	5.7
0:19:26	7.0	16.9	321.0	9.9	257.5	1.08E-05	1.1	1.3	1.4
0:34:03	9.9	14.0	877.0	4.1	272.2	9.37E-06	1.0	2.9	2.9
0:47:31	11.8	12.0	808.0	0.2	285.6	7.72E-06	1.1	1.9	2
1:12:32	14.0	9.8	1501.0	-4.2	310.6	5.28E-06	1.0	2.2	2.2
1:48:52	15.8	8.0	2180.0	-7.8	347.0	3.38E-06	1.0	1.8	1.8
0:00:00	0.0	24.0	-6532.0	24.0	347.0				
0:11:38	1.3	22.5	698.0	21.2	358.6	4.14E-06	1.2	1.3	1.5
0:26:56	2.6	21.2	918.0	18.6	373.9	3.07E-06	1.0	1.3	1.3
0:39:53	3.5	20.4	777.0	16.9	386.9	2.47E-06	0.9	0.9	0.8
0:54:54	4.4	19.5	901.0	15.1	401.9	2.33E-06	1.0	0.9	0.9
1:19:19	5.6	18.3	1465.0	12.7	426.3	1.99E-06	1.0	1.2	1.2
1:41:57	6.3	17.6	1358.0	11.3	449.0	1.30E-06	1.0	0.7	0.7
2:11:14	7.2	16.7	1757.0	9.5	478.2	1.34E-06	1.0	0.9	0.9

2:54:09	8.1	15.8	2575.0	7.7	521.2	9.53E-07	1.0	0.9	0.9
3:25:16	8.6	15.3	1867.0	6.7	552.3	7.54E-07	1.0	0.5	0.5
4:13:41	9.1	14.8	2905.0	5.7	600.7	4.96E-07	1.0	0.5	0.5
4:27:38	9.3	14.6	837.0	5.3	614.6	7.01E-07	1.0	0.2	0.2
0:00:00	9.0	15.0	-16058.0	6.0	614.6				
0:32:53	9.3	14.7	1973.0	5.4	647.5	4.44E-07	1.0	0.3	0.3
1:06:10	9.6	14.5	1997.0	4.9	680.8	3.70E-07	0.7	0.3	0.2
1:46:24	9.9	14.2	2414.0	4.3	721.0	3.73E-07	1.0	0.3	0.3
0:00:00	0.0	24.0	-6384.0	24.0	721.0				
0:14:02	1.0	22.8	842.0	21.8	735.0	2.68E-06	1.2	1	1.2
0:31:47	1.9	21.9	1065.0	20.0	752.8	1.80E-06	1.0	0.9	0.9
1:32:19	3.4	20.4	3632.0	17.0	813.3	9.18E-07	1.0	1.5	1.5
2:21:36	4.0	19.8	2957.0	15.8	862.6	4.70E-07	1.0	0.6	0.6
3:01:24	4.3	19.5	2388.0	15.2	902.4	2.96E-07	1.0	0.3	0.3
3:45:33	4.6	19.2	2649.0	14.6	946.6	2.70E-07	1.0	0.3	0.3
4:40:05	4.9	18.9	3272.0	14.0	1001.1	2.21E-07	1.0	0.3	0.3
0:00:00	0.0	24.0	-16805.0	24.0	1001.1				
0:12:54	5.3	18.7	774.0	13.4	1014.0	1.52E-05	1.0	5.3	5.3
1:58:50	22.0	1.9	6356.0	-20.1	1119.9	1.10E-05	1.0	16.7	16.8
0:00:00	0.0	24.0	-7130.0	24.0	1119.9				
0:17:20	5.2	18.7	1040.0	13.5	1137.2	1.12E-05	1.0	5.2	5.3
0:38:55	9.8	14.0	1295.0	4.2	1158.8	9.77E-06	1.0	4.6	4.7
1:08:28	14.1	9.7	1773.0	-4.4	1188.4	8.29E-06	1.0	4.3	4.3
1:43:51	17.4	6.4	2123.0	-11.0	1223.8	6.79E-06	1.0	3.3	3.3
2:03:22	17.8	4.0	1171.0	-13.8	1243.3	6.27E-06	6.0	0.4	2.4
0:00:00	0.0	24.0	-7402.0	24.0	1243.3				
0:31:14	9.1	14.8	1874.0	5.7	1274.5	1.18E-05	1.0	9.1	9.2
0:58:02	14.1	9.8	1608.0	-4.3	1301.3	1.04E-05	1.0	5	5
1:11:01	15.8	8.0	779.0	-7.8	1314.3	9.22E-06	1.1	1.7	1.8
0:00:00	0.0	24.0	-4261.0	24.0	1314.3				
0:14:21	4.9	19.1	861.0	14.2	1328.7	1.25E-05	1.0	4.9	4.9
0:50:39	13.0	11.0	2178.0	-2.0	1365.0	1.09E-05	1.0	8.1	8.1
1:29:37	18.5	5.5	2338.0	-13.0	1403.9	1.03E-05	1.0	5.5	5.5
0:00:00	0.0	24.0	-5377.0	24.0	1403.9				
0:27:02	7.0	16.9	1622.0	9.9	1430.9	1.00E-05	1.0	7	7.1
1:24:58	15.4	8.4	3476.0	-7.0	1488.9	8.07E-06	1.0	8.4	8.5
2:02:34	18.5	5.2	2256.0	-13.3	1526.5	6.70E-06	1.0	3.1	3.2
0:00:00	0.0	24.0	-7354.0	24.0	1526.5				
0:06:22	1.5	22.5	382.0	21.0	1532.9	8.13E-06	1.0	1.5	1.5
0:15:25	3.3	20.6	543.0	17.3	1541.9	7.49E-06	1.1	1.8	1.9
0:22:52	4.6	19.3	447.0	14.7	1549.4	6.78E-06	1.0	1.3	1.3
0:30:43	5.9	18.0	471.0	12.1	1557.2	6.78E-06	1.0	1.3	1.3
0:36:20	6.8	17.1	337.0	10.3	1562.8	6.87E-06	1.0	0.9	0.9
0:44:21	8.0	16.0	481.0	8.0	1570.9	6.44E-06	0.9	1.2	1.1
0:54:04	9.3	14.6	583.0	5.3	1580.6	6.61E-06	1.1	1.3	1.4
1:01:46	10.2	13.7	462.0	3.5	1588.3	5.88E-06	1.0	0.9	0.9
1:07:54	10.9	13.0	368.0	2.1	1594.4	5.98E-06	1.0	0.7	0.7
1:12:13	11.5	12.4	259.0	0.9	1598.7	7.54E-06	1.0	0.6	0.6
1:17:17	12.1	11.8	304.0	-0.3	1603.8	6.64E-06	1.0	0.6	0.6
1:48:52	15.1	8.8	1895.0	-6.3	1635.4	5.95E-06	1.0	3	3
0:00:00	0.0	24.0	-6532.0	24.0	1635.4				
0:05:54	1.3	22.5	354.0	21.2	1641.3	8.17E-06	1.2	1.3	1.5
0:16:18	3.3	20.5	624.0	17.2	1651.7	7.04E-06	1.0	2	2
0:24:09	4.6	19.2	471.0	14.6	1659.6	6.45E-06	1.0	1.3	1.3
0:31:01	5.7	18.1	412.0	12.4	1666.4	6.55E-06	1.0	1.1	1.1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

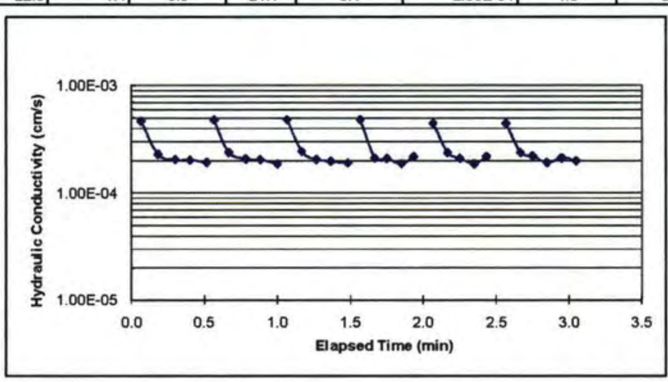
ASTM D 5084 - 00

Sample I.D.	305-mm East Side North Pit 60-90 cm		Test Date :		
Cell Pressure =	42.1	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	12973.3	cm^3
Effective Stress =	1.6	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.0		a_{out} =	1	cm^2
Weight of wet sample =	23949.6	g	Sample Water Content =	0.0	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.85	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.25	356.52		

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out}/Q_{in}	Q_{in}	Q_{out}
0:00:00	0.0	23.9	0.0	23.9	0.0				
0:00:04	7.0	17.5	4.0	10.5	0.1	4.67E-04	0.9	7	6.4
0:00:11	12.0	12.5	7.0	0.5	0.2	2.30E-04	1.0	5	5
0:00:18	16.0	8.6	7.0	-7.4	0.3	2.06E-04	1.0	4	3.9
0:00:24	19.0	5.6	6.0	-13.4	0.4	2.03E-04	1.0	3	3
0:00:31	22.0	2.6	7.0	-19.4	0.5	1.94E-04	1.0	3	3
0:00:00	0.0	24.1	-31.0	24.1	0.5				
0:00:04	7.0	17.4	4.0	10.4	0.6	4.77E-04	1.0	7	6.7
0:00:10	11.5	12.9	6.0	1.4	0.7	2.40E-04	1.0	4.5	4.5
0:00:17	15.5	8.8	7.0	-6.7	0.8	2.09E-04	1.0	4	4.1
0:00:23	18.5	5.7	6.0	-12.8	0.9	2.05E-04	1.0	3	3.1
0:00:30	21.5	2.8	7.0	-18.7	1.0	1.88E-04	1.0	3	2.9
0:00:00	0.0	24.1	-30.0	24.1	1.0				
0:00:04	7.0	17.3	4.0	10.3	1.1	4.81E-04	1.0	7	6.8
0:00:10	11.5	12.7	6.0	1.2	1.2	2.43E-04	1.0	4.5	4.6
0:00:16	15.0	9.3	6.0	-5.7	1.3	2.06E-04	1.0	3.5	3.4
0:00:22	18.0	6.3	6.0	-11.7	1.4	1.98E-04	1.0	3	3
0:00:29	21.0	3.2	7.0	-17.8	1.5	1.91E-04	1.0	3	3.1
0:00:00	0.0	24.0	-29.0	24.0	1.5				
0:00:04	7.0	17.2	4.0	10.2	1.6	4.82E-04	1.0	7	6.8
0:00:10	11.0	13.2	6.0	2.2	1.7	2.12E-04	1.0	4	4
0:00:15	14.0	10.2	5.0	-3.8	1.8	2.10E-04	1.0	3	3
0:00:21	17.0	7.3	6.0	-9.7	1.9	1.89E-04	1.0	3	2.9
0:00:26	19.5	4.6	5.0	-14.9	1.9	2.19E-04	1.1	2.5	2.7
0:00:00	0.0	24.0	-26.0	24.0	2.0				
0:00:04	6.5	17.7	4.0	11.2	2.1	4.44E-04	1.0	6.5	6.3
0:00:10	11.0	13.2	6.0	2.2	2.2	2.38E-04	1.0	4.5	4.5
0:00:15	14.0	10.2	5.0	-3.8	2.3	2.10E-04	1.0	3	3
0:00:21	17.0	7.3	6.0	-9.7	2.4	1.89E-04	1.0	3	2.9
0:00:26	19.5	4.6	5.0	-14.9	2.4	2.19E-04	1.1	2.5	2.7
0:00:00	0.0	24.1	-26.0	24.1	2.5				
0:00:04	6.5	17.8	4.0	11.3	2.6	4.44E-04	1.0	6.5	6.3
0:00:10	11.0	13.3	6.0	2.3	2.7	2.37E-04	1.0	4.5	4.5
0:00:15	14.0	10.0	5.0	-4.0	2.8	2.21E-04	1.1	3	3.3
0:00:21	17.0	7.0	6.0	-10.0	2.9	1.93E-04	1.0	3	3
0:00:27	20.0	4.0	6.0	-16.0	3.0	2.13E-04	1.0	3	3
0:00:33	22.5	1.4	6.0	-21.1	3.1	2.00E-04	1.0	2.5	2.6



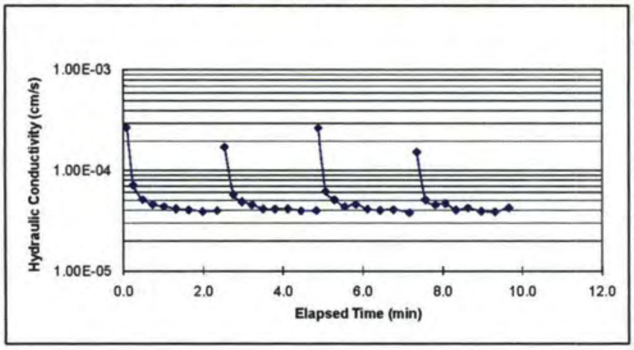
Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

Sample I.D.	305-mm East Side South Pit 0-30 cm			Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	41.0	psi	Length of Sample, L =	19.1	cm	
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2	
Pressure Difference =	1.0	psi	Sample Volume, V =	13900.0	cm^3	
Effective Stress =	1.5	psi	a_{in} =	1	cm^2	
Hydraulic Gradient, i =	3.7		a_{out} =	1	cm^2	
Weight of wet sample =	23400.1	g	Sample Water Content =	8.41%	(%)	
Wet Density =	1.7	g/cm^3	Dry Density =	1.68	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.36	433.12	403.42	8.41%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:05	5.3	20.0	5.0	14.7	0.1	2.71E-04	0.8	5.3	4
0:00:15	7.8	18.0	10.0	10.2	0.3	7.10E-05	0.8	2.5	2
0:00:29	10.1	16.0	14.0	5.9	0.5	5.12E-05	0.9	2.3	2
0:00:44	12.0	14.0	15.0	2.0	0.7	4.57E-05	1.1	1.9	2
0:01:01	13.8	11.8	17.0	-2.0	1.0	4.37E-05	1.2	1.8	2.2
0:01:19	15.8	10.0	18.0	-5.8	1.3	4.15E-05	0.9	2	1.8
0:01:38	17.5	8.0	19.0	-9.5	1.6	4.06E-05	1.2	1.7	2
0:01:59	19.2	6.0	21.0	-13.2	2.0	3.90E-05	1.2	1.7	2
0:02:21	20.9	4.0	22.0	-16.9	2.4	3.97E-05	1.2	1.7	2
0:00:00	0.0	24.0	-141.0	24.0	2.4				
0:00:08	5.5	20.0	8.0	14.5	2.5	1.73E-04	0.7	5.5	4
0:00:21	8.0	17.8	13.0	9.8	2.8	5.72E-05	0.9	2.5	2.2
0:00:34	10.0	16.0	13.0	6.0	3.0	4.88E-05	0.9	2	1.8
0:00:49	11.9	14.0	15.0	2.1	3.2	4.56E-05	1.1	1.9	2
0:01:06	13.7	12.0	17.0	-1.7	3.5	4.14E-05	1.1	1.8	2
0:01:24	15.5	10.0	18.0	-5.5	3.8	4.13E-05	1.1	1.8	2
0:01:43	17.3	8.0	19.0	-9.3	4.1	4.15E-05	1.1	1.8	2
0:02:03	18.9	6.0	20.0	-12.9	4.5	3.97E-05	1.3	1.6	2
0:02:26	20.8	4.0	23.0	-16.8	4.8	3.99E-05	1.1	1.9	2
0:00:00	0.0	24.0	-146.0	24.0	4.8				
0:00:05	5.2	20.0	5.0	14.8	4.9	2.68E-04	0.8	5.2	4
0:00:16	7.5	18.0	11.0	10.5	5.1	6.15E-05	0.9	2.3	2
0:00:29	9.5	16.0	13.0	6.5	5.3	5.10E-05	1.0	2	2
0:00:45	11.5	14.0	16.0	2.5	5.6	4.36E-05	1.0	2	2
0:01:01	13.5	12.0	16.0	-1.5	5.8	4.61E-05	1.0	2	2
0:01:19	15.3	10.0	18.0	-5.3	6.1	4.12E-05	1.1	1.8	2
0:01:38	17.0	8.0	19.0	-9.0	6.4	4.02E-05	1.2	1.7	2
0:01:58	18.7	6.0	20.0	-12.7	6.8	4.06E-05	1.2	1.7	2
0:02:22	20.6	4.0	24.0	-16.6	7.2	3.81E-05	1.1	1.9	2
0:00:00	0.0	24.0	-142.0	24.0	7.2				
0:00:09	5.5	20.0	9.0	14.5	7.4	1.54E-04	0.7	5.5	4
0:00:22	7.7	18.0	13.0	10.3	7.6	5.10E-05	0.9	2.2	2
0:00:37	9.8	16.0	15.0	6.2	7.8	4.54E-05	1.0	2.1	2
0:00:52	11.8	14.0	15.0	2.2	8.1	4.67E-05	1.0	2	2
0:01:08	13.3	12.0	16.0	-1.3	8.3	4.04E-05	1.3	1.5	2
0:01:26	15.2	10.0	18.0	-5.2	8.6	4.22E-05	1.1	1.9	2
0:01:46	17.0	8.0	20.0	-9.0	9.0	3.92E-05	1.1	1.8	2
0:02:07	18.7	6.0	21.0	-12.7	9.3	3.87E-05	1.2	1.7	2
0:02:28	20.5	4.0	21.0	-16.5	9.7	4.24E-05	1.1	1.8	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

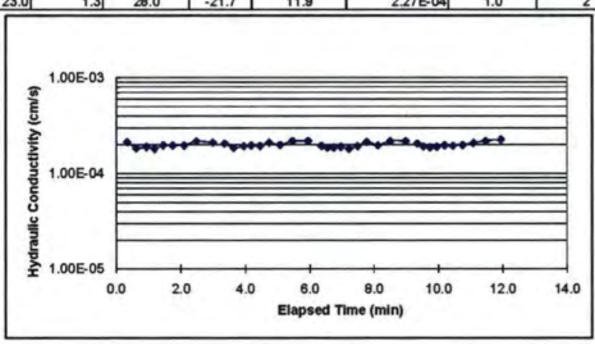
ASTM D 5084 - 00

Sample I.D.	150-mm East Side South Pit 0-30 cm		Test Date :		
Cell Pressure =	41.7	psi	Diameter of Sample, D =	15.6	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	9.3	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	190.09	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1762.4	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	3.8		a_{out} =	1	cm^2
Weight of wet sample =	3330.7	g	Sample Water Content =	19.61%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.89	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.02	157.61	135.87	19.61%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:20	5.0	19.5	20.0	14.5	0.3	2.13E-04	0.9	5	4.5
0:00:37	8.0	16.5	17.0	8.5	0.6	1.85E-04	1.0	3	3
0:00:56	11.0	13.5	19.0	2.5	0.9	1.90E-04	1.0	3	3
0:01:11	13.0	11.5	15.0	-1.5	1.2	1.83E-04	1.0	2	2
0:01:27	15.0	9.4	16.0	-5.6	1.5	1.98E-04	1.1	2	2.1
0:01:45	17.0	7.4	18.0	-9.6	1.8	1.97E-04	1.0	2	2
0:02:06	19.0	5.4	21.0	-13.6	2.1	1.98E-04	1.0	2	2
0:02:29	21.0	3.4	23.0	-17.6	2.5	2.18E-04	1.0	2	2
0:02:59	23.0	1.4	30.0	-21.6	3.0	2.10E-04	1.0	2	2
0:00:00	0.0	24.0	-179.0	24.0	3.0				
0:00:21	5.0	19.4	21.0	14.4	3.4	2.06E-04	0.9	5	4.6
0:00:38	8.0	16.4	17.0	8.4	3.6	1.85E-04	1.0	3	3
0:00:57	11.0	13.3	19.0	2.3	4.0	1.94E-04	1.0	3	3.1
0:01:11	13.0	11.3	14.0	-1.7	4.2	1.97E-04	1.0	2	2
0:01:27	15.0	9.3	16.0	-5.7	4.5	1.94E-04	1.0	2	2
0:01:44	17.0	7.3	17.0	-9.7	4.7	2.09E-04	1.0	2	2
0:02:05	19.0	5.3	21.0	-13.7	5.1	1.98E-04	1.0	2	2
0:02:28	21.0	3.3	23.0	-17.7	5.5	2.19E-04	1.0	2	2
0:02:57	23.0	1.3	29.0	-21.7	6.0	2.19E-04	1.0	2	2
0:00:00	0.0	24.0	-177.0	24.0	6.0				
0:00:22	5.0	19.5	22.0	14.5	6.4	1.94E-04	0.9	5	4.5
0:00:33	7.0	17.5	11.0	10.5	6.6	1.86E-04	1.0	2	2
0:00:45	9.0	15.5	12.0	6.5	6.8	1.86E-04	1.0	2	2
0:00:58	11.0	13.5	13.0	2.5	7.0	1.89E-04	1.0	2	2
0:01:13	13.0	11.5	15.0	-1.5	7.2	1.83E-04	1.0	2	2
0:01:29	15.0	9.5	16.0	-5.5	7.5	1.93E-04	1.0	2	2
0:01:46	17.0	7.4	17.0	-9.6	7.8	2.13E-04	1.1	2	2.1
0:02:07	19.0	5.4	21.0	-13.6	8.1	1.98E-04	1.0	2	2
0:02:30	21.0	3.4	23.0	-17.6	8.5	2.18E-04	1.0	2	2
0:02:59	23.0	1.4	29.0	-21.6	9.0	2.17E-04	1.0	2	2
0:00:00	0.0	24.0	-179.0	24.0	9.0				
0:00:21	5.0	19.4	21.0	14.4	9.4	2.06E-04	0.9	5	4.6
0:00:32	7.0	17.3	11.0	10.3	9.5	1.91E-04	1.1	2	2.1
0:00:44	9.0	15.3	12.0	6.3	9.7	1.87E-04	1.0	2	2
0:00:57	11.0	13.3	13.0	2.3	10.0	1.90E-04	1.0	2	2
0:01:11	13.0	11.3	14.0	-1.7	10.2	1.97E-04	1.0	2	2
0:01:27	15.0	9.3	16.0	-5.7	10.5	1.94E-04	1.0	2	2
0:01:45	17.0	7.3	18.0	-9.7	10.8	1.98E-04	1.0	2	2
0:02:05	19.0	5.3	20.0	-13.7	11.1	2.08E-04	1.0	2	2
0:02:28	21.0	3.3	23.0	-17.7	11.5	2.19E-04	1.0	2	2
0:02:56	23.0	1.3	28.0	-21.7	11.9	2.27E-04	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

ASTM D 5084 - 00

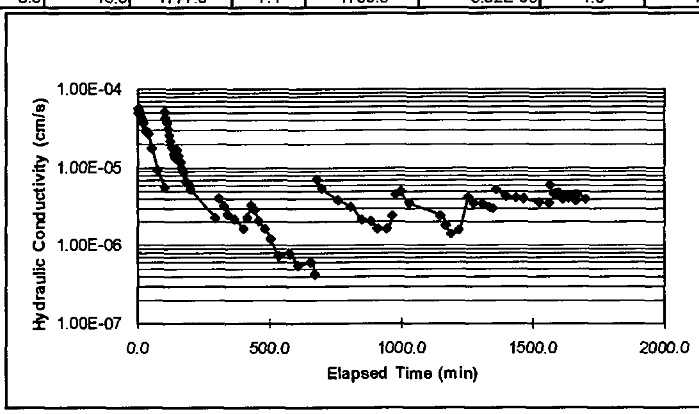
Sample I.D.	75-mm East Side South Pit 0-30 cm		Test Date :		
Cell Pressure =	41.8	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	40.2	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.7		a_{out} =	1	cm^2
Weight of wet sample =	323.3	g	Sample Water Content =	23.77%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.89	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.81	184.46	154.95	23.77%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:03:36	4.3	19.7	216.0	15.4	3.6	5.68E-05	1.0	4.3	4.3
0:04:55	5.5	18.5	79.0	13.0	4.9	4.99E-05	1.0	1.2	1.2
0:06:34	7.0	17.0	99.0	10.0	6.6	5.40E-05	1.0	1.5	1.5
0:09:13	9.0	15.0	159.0	6.0	9.2	5.02E-05	1.0	2	2
0:12:39	11.0	13.0	206.0	2.0	12.7	4.50E-05	1.0	2	2
0:17:02	13.0	11.0	263.0	-2.0	17.0	4.19E-05	1.0	2	2
0:19:53	14.0	10.0	171.0	-4.0	19.9	3.75E-05	1.0	1	1
0:22:48	14.9	9.1	175.0	-5.8	22.8	3.69E-05	1.0	0.9	0.9
0:30:38	16.5	7.5	470.0	-9.0	30.6	2.90E-05	1.0	1.6	1.6
0:36:07	17.4	6.6	329.0	-10.8	36.1	2.84E-05	1.0	0.9	0.9
0:41:22	18.1	5.9	315.0	-12.2	41.4	2.69E-05	1.0	0.7	0.7
0:53:48	19.0	5.0	746.0	-14.0	53.8	1.76E-05	1.0	0.9	0.9
1:16:41	19.7	4.3	1373.0	-15.4	76.7	9.28E-06	1.0	0.7	0.7
1:42:36	20.1	3.9	1555.0	-16.2	102.6	5.64E-06	1.0	0.4	0.4
0:00:00	0.0	24.0	-6156.0	24.0	102.6				
0:02:15	2.5	21.5	135.0	19.0	104.9	5.05E-05	1.0	2.5	2.5
0:04:39	4.5	19.5	144.0	15.0	107.3	4.23E-05	1.0	2	2
0:10:20	8.0	16.0	341.0	8.0	112.9	3.67E-05	1.0	3.5	3.5
0:14:15	9.7	14.3	235.0	4.6	116.9	3.07E-05	1.0	1.7	1.7
0:18:07	11.0	13.1	232.0	2.1	120.7	2.56E-05	0.9	1.3	1.2
0:22:08	12.0	12.1	241.0	0.1	124.7	2.17E-05	1.0	1	1
0:27:25	13.0	11.1	317.0	-1.9	130.0	1.81E-05	1.0	1	1
0:35:02	14.1	10.1	457.0	-4.0	137.6	1.47E-05	0.9	1.1	1
0:42:10	14.9	9.3	428.0	-5.6	144.8	1.33E-05	1.0	0.8	0.8
0:00:00	0.2	23.8	-2530.0	23.6	144.8				
0:05:00	2.0	21.9	300.0	19.9	149.8	1.67E-05	1.1	1.8	1.9
0:10:31	3.6	20.3	331.0	16.7	155.3	1.42E-05	1.0	1.6	1.6
0:16:51	5.0	18.9	380.0	13.9	161.7	1.17E-05	1.0	1.4	1.4
0:22:34	6.0	17.9	343.0	11.9	167.4	9.95E-06	1.0	1	1
0:32:21	7.4	16.5	587.0	9.1	177.2	8.76E-06	1.0	1.4	1.4
0:38:12	8.0	15.9	351.0	7.9	183.0	6.70E-06	1.0	0.6	0.6
0:50:32	9.1	14.8	740.0	5.7	195.3	6.18E-06	1.0	1.1	1.1
0:56:05	9.5	14.4	333.0	4.9	200.9	5.28E-06	1.0	0.4	0.4
2:29:41	12.1	11.9	5616.0	-0.2	294.5	2.26E-06	1.0	2.6	2.5
0:00:00	0.0	24.0	-8981.0	24.0	294.5				
0:13:38	1.2	22.7	818.0	21.5	308.1	4.04E-06	1.1	1.2	1.3
0:33:13	2.5	21.3	1175.0	18.8	327.7	3.23E-06	1.1	1.3	1.4
0:47:10	3.2	20.6	837.0	17.4	341.7	2.48E-06	1.0	0.7	0.7
1:12:04	4.3	19.6	1494.0	15.3	366.6	2.18E-06	0.9	1.1	1
1:49:06	5.4	18.5	2222.0	13.1	403.6	1.63E-06	1.0	1.1	1.1
0:00:00	0.0	24.0	-6546.0	24.0	403.6				
0:12:32	0.7	23.4	752.0	22.7	416.1	2.26E-06	0.9	0.7	0.6
0:27:49	1.8	22.3	917.0	20.5	431.4	3.26E-06	1.0	1.1	1.1
0:41:00	2.6	21.5	791.0	18.9	444.6	2.88E-06	1.0	0.8	0.8
0:55:21	3.2	20.9	861.0	17.7	459.0	2.05E-06	1.0	0.6	0.6
1:20:21	4.0	20.1	1500.0	16.1	484.0	1.63E-06	1.0	0.8	0.8
1:42:23	4.5	19.6	1322.0	15.1	506.0	1.20E-06	1.0	0.5	0.5
2:11:57	4.9	19.2	1774.0	14.3	535.6	7.31E-07	1.0	0.4	0.4

2:54:38	5.5	18.6	2561.0	13.1	578.2	7.81E-07	1.0	0.6	0.6
3:25:45	5.8	18.3	1867.0	12.5	609.4	5.50E-07	1.0	0.3	0.3
4:14:18	6.3	17.8	2913.0	11.5	657.9	6.02E-07	1.0	0.5	0.5
4:28:09	6.4	17.7	831.0	11.3	671.8	4.30E-07	1.0	0.1	0.1
0:00:00	0.0	24.0	-16089.0	24.0	671.8				
0:10:19	1.6	22.3	619.0	20.7	682.1	7.12E-06	1.1	1.6	1.7
0:27:40	3.5	20.3	1041.0	16.8	699.5	5.46E-06	1.1	1.9	2
1:28:15	7.5	16.2	3635.0	8.7	760.1	3.84E-06	1.0	4	4.1
2:17:22	9.7	14.0	2947.0	4.3	809.2	3.14E-06	1.0	2.2	2.2
2:58:23	10.8	12.9	2461.0	2.1	850.2	2.14E-06	1.0	1.1	1.1
3:32:10	11.6	12.1	2027.0	0.5	884.0	2.04E-06	1.0	0.8	0.8
4:00:12	12.1	11.6	1682.0	-0.5	912.0	1.63E-06	1.0	0.5	0.5
4:35:54	12.7	11.0	2142.0	-1.7	947.7	1.63E-06	1.0	0.6	0.6
4:55:00	13.2	10.6	1146.0	-2.6	966.8	2.40E-06	0.8	0.5	0.4
0:00:00	0.0	24	-17700.0	24.0	966.8				
0:12:43	1.3	22.7	763.0	21.4	979.5	4.51E-06	1.0	1.3	1.3
0:00:00	0.0	24.0	-763.0	24.0	979.5				
0:20:04	2.2	21.8	1204.0	19.6	999.6	4.95E-06	1.0	2.2	2.2
0:52:16	4.4	19.5	1932.0	15.1	1031.8	3.52E-06	1.0	2.2	2.3
2:49:45	9.0	14.9	7049.0	5.9	1149.3	2.41E-06	1.0	4.6	4.6
3:09:56	9.5	14.4	1211.0	4.9	1169.4	1.81E-06	1.0	0.5	0.5
3:31:33	9.9	14.0	1297.0	4.1	1191.1	1.40E-06	1.0	0.4	0.4
4:01:27	10.5	13.4	1794.0	2.9	1221.0	1.58E-06	1.0	0.6	0.6
4:36:32	12.2	11.7	2105.0	-0.5	1256.0	4.21E-06	1.0	1.7	1.7
4:55:57	12.9	11.0	1165.0	-1.9	1275.5	3.50E-06	1.0	0.7	0.7
5:29:51	14.0	9.9	2034.0	-4.1	1309.4	3.47E-06	1.0	1.1	1.1
5:56:38	14.7	9.2	1607.0	-5.5	1336.1	3.10E-06	1.0	0.7	0.7
6:09:22	15.0	8.9	764.0	-6.1	1348.9	2.98E-06	1.0	0.3	0.3
0:00:00	0.0	24.0	-22162.0	24.0	1348.9				
0:13:05	1.5	22.4	785.0	20.9	1362.0	5.26E-06	1.1	1.5	1.6
0:49:23	4.7	19.3	2178.0	14.6	1398.3	4.33E-06	1.0	3.2	3.1
1:28:18	7.4	16.5	2335.0	9.1	1437.2	4.16E-06	1.0	2.7	2.8
1:57:04	9.1	14.8	1726.0	5.7	1466.0	4.01E-06	1.0	1.7	1.7
2:55:02	11.7	12.2	3478.0	0.5	1523.9	3.60E-06	1.0	2.6	2.6
3:32:53	13.1	10.8	2271.0	-2.3	1561.8	3.55E-06	1.0	1.4	1.4
0:00:00	0.0	24.0	-12773.0	24.0	1561.8				
0:05:26	0.8	23.3	326.0	22.5	1567.2	6.02E-06	0.9	0.8	0.7
0:17:15	2.0	22.1	709.0	20.1	1579.1	4.63E-06	1.0	1.2	1.2
0:23:48	2.6	21.4	393.0	18.8	1585.6	4.73E-06	1.2	0.6	0.7
0:30:27	3.2	20.8	399.0	17.6	1592.3	4.44E-06	1.0	0.6	0.6
0:00:00	0.0	24.0	-1827.0	24.0	1592.3				
0:05:53	0.7	23.4	353.0	22.7	1598.2	4.81E-06	0.9	0.7	0.6
0:15:10	1.6	22.5	557.0	20.9	1607.5	4.37E-06	1.0	0.9	0.9
0:22:15	2.2	21.9	425.0	19.7	1614.6	3.96E-06	1.0	0.6	0.6
0:30:30	3.0	21.2	495.0	18.2	1622.8	4.39E-06	0.9	0.8	0.7
0:36:13	3.5	20.7	343.0	17.2	1628.5	4.36E-06	1.0	0.5	0.5
0:43:45	4.1	20.1	452.0	16.0	1636.1	4.08E-06	1.0	0.6	0.6
0:55:02	5.0	19.2	677.0	14.2	1647.3	4.26E-06	1.0	0.9	0.9
1:01:44	5.5	18.7	402.0	13.2	1654.0	4.15E-06	1.0	0.5	0.5
1:07:28	5.9	18.2	344.0	12.3	1659.8	4.48E-06	1.3	0.4	0.5
1:12:06	6.2	17.9	278.0	11.7	1664.4	3.78E-06	1.0	0.3	0.3
1:18:42	6.7	17.4	396.0	10.7	1671.0	4.53E-06	1.0	0.5	0.5
1:48:19	8.5	15.6	1777.0	7.1	1700.6	3.92E-06	1.0	1.8	1.8



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

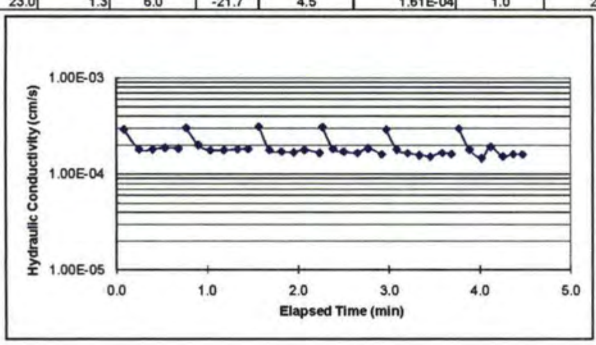
ASTM D 5084 - 00

Sample I.D.	305-mm East Side South Pit 30-60cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	12973.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.0		a_{out} =	1	cm^2
Weight of wet sample =	22888.2	g	Sample Water Content =	14.73%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.76	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	35.04	264.2	234.78	14.73%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.8	0.0	23.8	0.0				
0:00:05	6.0	19.3	5.0	13.3	0.1	2.88E-04	0.8	6	4.5
0:00:15	11.5	13.3	10.0	1.8	0.3	1.80E-04	1.1	5.5	6
0:00:24	16.0	8.8	9.0	-7.2	0.4	1.80E-04	1.0	4.5	4.5
0:00:32	19.5	5.0	8.0	-14.5	0.5	1.87E-04	1.1	3.5	3.8
0:00:41	23.0	1.4	9.0	-21.6	0.7	1.84E-04	1.0	3.5	3.6
0:00:00	0.0	23.8	-41.0	23.8	0.7				
0:00:04	5.0	20.0	4.0	15.0	0.8	2.99E-04	0.8	5	3.8
0:00:12	10.0	14.5	8.0	4.5	0.9	2.00E-04	1.1	5	5.5
0:00:20	14.0	10.3	8.0	-3.7	1.0	1.77E-04	1.1	4	4.2
0:00:29	18.0	6.1	9.0	-11.9	1.2	1.78E-04	1.1	4	4.2
0:00:38	21.5	2.3	9.0	-19.2	1.3	1.81E-04	1.1	3.5	3.8
0:00:45	24.0	-0.3	7.0	-24.3	1.5	1.83E-04	1.0	2.5	2.6
0:00:00	0.0	24.1	-45.0	24.1	1.5				
0:00:04	5.0	20.0	4.0	15.0	1.6	3.09E-04	0.8	5	4.1
0:00:11	9.0	15.7	7.0	6.7	1.7	1.78E-04	1.1	4	4.3
0:00:19	13.0	11.5	8.0	-1.5	1.8	1.71E-04	1.1	4	4.2
0:00:27	16.5	7.8	8.0	-8.7	2.0	1.68E-04	1.1	3.5	3.7
0:00:34	19.5	4.8	7.0	-14.7	2.1	1.78E-04	1.0	3	3
0:00:44	23.0	1.2	10.0	-21.8	2.2	1.66E-04	1.0	3.5	3.6
0:00:00	0.0	23.9	-44.0	23.9	2.2				
0:00:04	5.0	19.9	4.0	14.9	2.3	3.06E-04	0.8	5	4
0:00:11	9.0	15.4	7.0	6.4	2.4	1.83E-04	1.1	4	4.5
0:00:18	12.5	11.7	7.0	-0.8	2.5	1.72E-04	1.1	3.5	3.7
0:00:27	16.5	7.7	9.0	-8.8	2.7	1.65E-04	1.0	4	4
0:00:34	19.5	4.5	7.0	-15.0	2.8	1.85E-04	1.1	3	3.2
0:00:43	22.5	1.3	9.0	-21.2	2.9	1.61E-04	1.1	3	3.2
0:00:00	0.0	23.9	-43.0	23.9	2.9				
0:00:04	5.0	20.4	4.0	15.4	3.0	2.88E-04	0.7	5	3.5
0:00:11	9.0	16.0	7.0	7.0	3.1	1.79E-04	1.1	4	4.4
0:00:18	12.5	12.5	7.0	0.0	3.2	1.65E-04	1.0	3.5	3.5
0:00:26	16.0	9.1	8.0	-6.9	3.3	1.57E-04	1.0	3.5	3.4
0:00:33	18.5	6.3	7.0	-12.2	3.5	1.52E-04	1.1	2.5	2.8
0:00:41	21.5	3.3	8.0	-18.2	3.6	1.66E-04	1.0	3	3
0:00:47	23.5	1.3	6.0	-22.2	3.7	1.62E-04	1.0	2	2
0:00:00	0.0	24.0	-47.0	24.0	3.7				
0:00:04	5.0	20.3	4.0	15.3	3.8	2.95E-04	0.7	5	3.7
0:00:11	9.0	15.9	7.0	6.9	3.9	1.80E-04	1.1	4	4.4
0:00:19	12.5	12.3	8.0	-0.2	4.0	1.47E-04	1.0	3.5	3.6
0:00:25	15.5	9.0	6.0	-6.5	4.1	1.91E-04	1.1	3	3.3
0:00:33	18.5	5.9	8.0	-12.6	4.3	1.53E-04	1.0	3	3.1
0:00:40	21.0	3.3	7.0	-17.7	4.4	1.61E-04	1.0	2.5	2.6
0:00:46	23.0	1.3	6.0	-21.7	4.5	1.61E-04	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

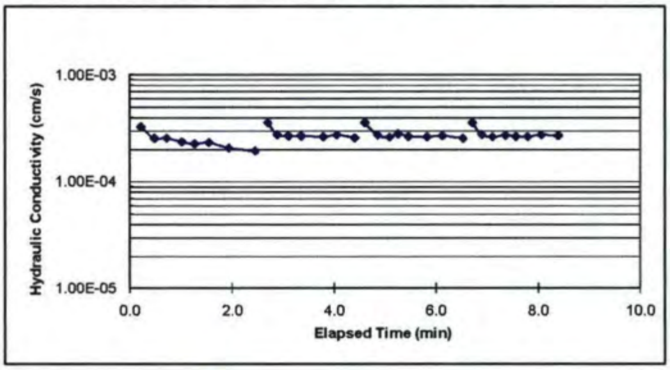
ASTM D 5084 - 00

Sample I.D.	150-mm East Side South Pit 30-60		Test Date :		
Cell Pressure =	41.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	8.6	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1563.7	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.1		a_{out} =	1	cm^2
Weight of wet sample =	2993.3	g	Sample Water Content =	20.66%	(%)
Wet Density =	1.9	g/cm³	Dry Density =	1.91	g/cm³

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.06	167.88	143.43	20.66%

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:13	5.0	19.2	13.0	14.2	0.2	3.27E-04	1.0	5	4.8
0:00:29	9.0	15.3	16.0	6.3	0.5	2.56E-04	1.0	4	3.9
0:00:43	12.0	12.4	14.0	0.4	0.7	2.58E-04	1.0	3	2.9
0:01:01	15.0	9.5	18.0	-5.5	1.0	2.37E-04	1.0	3	2.9
0:01:16	17.0	7.5	15.0	-9.5	1.3	2.27E-04	1.0	2	2
0:01:33	19.0	5.5	17.0	-13.5	1.6	2.34E-04	1.0	2	2
0:01:56	21.0	3.5	23.0	-17.5	1.9	2.09E-04	1.0	2	2
0:02:27	23.0	1.5	31.0	-21.5	2.5	1.95E-04	1.0	2	2
0:00:00	0.0	24.0	-147.0	24.0	2.5				
0:00:12	5.0	19.1	12.0	14.1	2.7	3.59E-04	1.0	5	4.9
0:00:23	8.0	16.1	11.0	8.1	2.9	2.77E-04	1.0	3	3
0:00:36	11.0	13.1	13.0	2.1	3.1	2.70E-04	1.0	3	3
0:00:51	14.0	10.2	15.0	-3.8	3.4	2.70E-04	1.0	3	2.9
0:01:17	18.0	6.2	26.0	-11.8	3.8	2.66E-04	1.0	4	4
0:01:33	20.0	4.2	16.0	-15.8	4.1	2.76E-04	1.0	2	2
0:01:54	22.0	2.2	21.0	-19.8	4.4	2.59E-04	1.0	2	2
0:00:00	0.0	24.0	-114.0	24.0	4.4				
0:00:12	5.0	19.1	12.0	14.1	4.6	3.59E-04	1.0	5	4.9
0:00:27	9.0	15.2	15.0	6.2	4.9	2.74E-04	1.0	4	3.9
0:00:41	12.0	12.2	14.0	0.2	5.1	2.63E-04	1.0	3	3
0:00:51	14.0	10.2	10.0	-3.8	5.3	2.82E-04	1.0	2	2
0:01:03	16.0	8.2	12.0	-7.8	5.5	2.67E-04	1.0	2	2
0:01:25	19.0	5.2	22.0	-13.8	5.8	2.64E-04	1.0	3	3
0:01:43	21.0	3.2	18.0	-17.8	6.1	2.71E-04	1.0	2	2
0:02:07	23.0	1.2	24.0	-21.8	6.5	2.56E-04	1.0	2	2
0:00:00	0.0	24.0	-127.0	24.0	6.5				
0:00:12	5.0	19.1	12.0	14.1	6.7	3.59E-04	1.0	5	4.9
0:00:23	8.0	16.1	11.0	8.1	6.9	2.77E-04	1.0	3	3
0:00:36	11.0	13.2	13.0	2.2	7.1	2.65E-04	1.0	3	2.9
0:00:51	14.0	10.2	15.0	-3.8	7.4	2.74E-04	1.0	3	3
0:01:03	16.0	8.2	12.0	-7.8	7.6	2.67E-04	1.0	2	2
0:01:17	18.0	6.2	14.0	-11.8	7.8	2.65E-04	1.0	2	2
0:01:33	20.0	4.2	16.0	-15.8	8.1	2.76E-04	1.0	2	2
0:01:53	22.0	2.2	20.0	-19.8	8.4	2.72E-04	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

ASTM D 5084 - 00

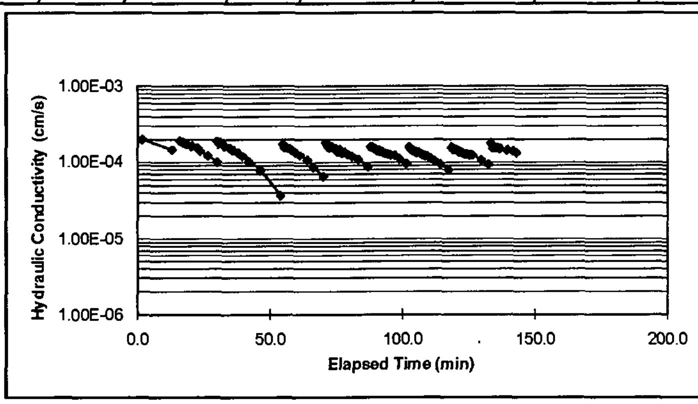
Sample I.D.	75-mm East Side South Pit 30-60 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	40.4	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.7		a_{out} =	1	cm^2
Weight of wet sample =	335.3	g	Sample Water Content =	#DIV/0!	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	#DIV/0!	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
				#DIV/0!

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:01:44	6.5	17.0	104.0	10.5	1.7	1.98E-04	1.1	6.5	7
0:13:10	19.5	4.0	686.0	-15.5	13.2	1.46E-04	1.0	13	13
0:00:00	0.0	24.0	-790.0	24.0	14.0				
0:01:55	7.0	16.8	115.0	9.8	15.9	1.91E-04	1.0	6.999039352	7.2
0:03:05	10.0	13.7	70.0	3.7	17.1	1.82E-04	1.0	3	3.1
0:04:38	13.0	10.7	93.0	-2.3	18.6	1.73E-04	1.0	3	3
0:06:28	15.5	8.2	110.0	-7.3	20.5	1.63E-04	1.0	2.5	2.5
0:08:37	17.5	6.2	129.0	-11.3	22.6	1.54E-04	1.0	2	2
0:09:40	18.2	5.5	63.0	-12.7	23.7	1.42E-04	1.0	0.7	0.7
0:12:38	19.5	4.2	178.0	-15.3	26.6	1.21E-04	1.0	1.3	1.3
0:16:13	20.4	3.3	215.0	-17.1	30.2	1.00E-04	1.0	0.9	0.9
0:00:00	0.0	23.9	-973.0	23.9	29.2				
0:00:45	3.0	20.8	45.0	17.8	30.0	1.88E-04	1.0	3	3.1
0:01:21	5.0	18.8	36.0	13.8	30.6	1.75E-04	1.0	2	2
0:02:01	7.0	16.7	40.0	9.7	31.2	1.81E-04			
0:03:02	9.5	14.2	61.0	4.7	32.2	1.68E-04	1.0	2.5	2.5
0:03:46	11.0	12.7	44.0	1.7	33.0	1.63E-04	1.0	1.5	1.5
0:05:41	14.0	9.7	115.0	-4.3	34.9	1.54E-04	1.0	3	3
0:07:01	15.5	8.2	80.0	-7.3	36.2	1.43E-04	1.0	1.5	1.5
0:08:47	17.0	6.7	106.0	-10.3	38.0	1.34E-04	1.0	1.5	1.5
0:10:26	18.0	5.7	99.0	-12.3	39.6	1.20E-04	1.0	1	1
0:12:53	19.0	4.7	147.0	-14.3	42.1	1.02E-04	1.0	1	1
0:17:11	20.0	3.7	258.0	-16.3	46.4	7.83E-05	1.0	1	1
0:24:42	20.6	3.1	451.0	-17.5	53.9	3.70E-05	1.0	0.6	0.6
0:00:00	0.0	24.0	-1482.0	24.0	53.9				
0:00:49	3.0	20.9	49.0	17.9	54.7	1.72E-04	1.0	3	3.1
0:01:29	5.0	18.9	40.0	13.9	55.4	1.57E-04	1.0	2	2
0:02:14	7.0	16.9	45.0	9.9	56.1	1.56E-04	1.0	2	2
0:03:07	9.0	14.9	53.0	5.9	57.0	1.51E-04	1.0	2	2
0:04:12	11.0	12.9	65.0	1.9	58.1	1.43E-04	1.0	2	2
0:05:34	13.0	10.9	82.0	-2.1	59.5	1.35E-04	1.0	2	2
0:07:25	15.0	8.9	111.0	-6.1	61.3	1.24E-04	1.0	2	2
0:10:13	17.0	6.9	168.0	-10.1	64.1	1.07E-04	1.0	2	2
0:12:27	18.0	5.9	134.0	-12.1	66.4	8.69E-05	1.0	1	1
0:16:09	19.0	4.9	222.0	-14.1	70.1	6.57E-05	1.0	1	1
0:00:00	0.0	23.9	-969.0	23.9	70.1				
0:00:55	3.5	20.4	55.0	16.9	71.0	1.78E-04	1.0	3.5	3.5
0:01:24	5.0	18.9	29.0	13.9	71.5	1.64E-04	1.0	1.5	1.5
0:02:09	7.0	16.9	45.0	9.9	72.3	1.56E-04	1.0	2	2
0:02:59	9.0	14.9	50.0	5.9	73.1	1.60E-04	1.0	2	2
0:04:00	11.0	12.9	61.0	1.9	74.1	1.52E-04	1.0	2	2
0:04:35	12.0	11.9	35.0	-0.1	74.7	1.51E-04	1.0	1	1
0:05:17	13.0	10.9	42.0	-2.1	75.4	1.38E-04	1.0	1	1
0:06:01	14.0	9.9	44.0	-4.1	76.1	1.47E-04	1.0	1	1
0:06:56	15.0	8.9	55.0	-6.1	77.0	1.32E-04	1.0	1	1
0:07:57	16.0	7.9	61.0	-8.1	78.1	1.36E-04	1.0	1	1
0:09:14	17.0	6.9	77.0	-10.1	79.3	1.26E-04	1.0	1	1
0:10:52	18.0	5.9	98.0	-12.1	81.0	1.19E-04	1.0	1	1
0:13:06	19.0	4.9	134.0	-14.1	83.2	1.09E-04	1.0	1	1
0:16:51	20.0	3.9	225.0	-16.1	87.0	8.67E-05	1.0	1	1

0:00:00	0.0	24.0	-1011.0	24.0	87.0				
0:00:53	3.0	20.9	53.0	17.9	87.9	1.59E-04	1.0	3	3.1
0:01:33	5.0	18.9	40.0	13.9	88.6	1.57E-04	1.0	2	2
0:02:21	7.0	16.8	48.0	9.8	89.4	1.51E-04	1.1	2	2.1
0:03:16	9.0	14.9	55.0	5.9	90.3	1.42E-04	1.0	2	1.9
0:03:47	10.0	13.9	31.0	3.9	90.8	1.44E-04	1.0	1	1
0:04:22	11.0	12.9	35.0	1.9	91.4	1.38E-04	1.0	1	1
0:05:00	12.0	11.9	38.0	-0.1	92.0	1.39E-04	1.0	1	1
0:05:43	13.0	10.9	43.0	-2.1	92.7	1.35E-04	1.0	1	1
0:06:33	14.0	9.9	50.0	-4.1	93.6	1.29E-04	1.0	1	1
0:07:30	15.0	8.9	57.0	-6.1	94.5	1.27E-04	1.0	1	1
0:08:37	16.0	7.9	67.0	-8.1	95.6	1.24E-04	1.0	1	1
0:10:00	17.0	6.8	83.0	-10.2	97.0	1.23E-04	1.1	1	1.1
0:11:47	18.0	5.8	107.0	-12.2	98.8	1.10E-04	1.0	1	1
0:14:22	19.0	4.8	155.0	-14.2	101.4	9.53E-05	1.0	1	1
0:00:00	0.0	24.0	-862.0	24.0	101.4				
0:00:54	3.0	20.8	54.0	17.8	102.3	1.59E-04	1.1	3	3.2
0:01:37	5.0	18.8	43.0	13.8	103.0	1.46E-04	1.0	2	2
0:02:27	7.0	16.8	50.0	9.8	103.9	1.41E-04	1.0	2	2
0:03:26	9.0	14.8	59.0	5.8	104.8	1.36E-04	1.0	2	2
0:04:00	10.0	13.8	34.0	3.8	105.4	1.32E-04	1.0	1	1
0:04:36	11.0	12.8	36.0	1.8	106.0	1.35E-04	1.0	1	1
0:05:17	12.0	11.8	41.0	-0.2	106.7	1.29E-04	1.0	1	1
0:06:04	13.0	10.8	47.0	-2.2	107.5	1.24E-04	1.0	1	1
0:06:58	14.0	9.8	54.0	-4.2	108.4	1.20E-04	1.0	1	1
0:07:59	15.0	8.8	61.0	-6.2	109.4	1.20E-04	1.0	1	1
0:09:14	16.0	7.8	75.0	-8.2	110.6	1.11E-04	1.0	1	1
0:10:49	17.0	6.8	95.0	-10.2	112.2	1.03E-04	1.0	1	1
0:12:55	18.0	5.8	126.0	-12.2	114.3	9.33E-05	1.0	1	1
0:16:01	19.0	4.8	186.0	-14.2	117.4	7.94E-05	1.0	1	1
0:00:00	0.0	24.0	-961.0	24.0	117.4				
0:00:55	3.0	20.8	55.0	17.8	118.3	1.56E-04	1.1	3	3.2
0:01:38	5.0	18.8	43.0	13.8	119.0	1.46E-04	1.0	2	2
0:02:26	7.0	16.8	48.0	9.8	119.8	1.47E-04	1.0	2	2
0:03:23	9.0	14.8	57.0	5.8	120.8	1.41E-04	1.0	2	2
0:03:56	10.0	13.8	33.0	3.8	121.3	1.36E-04	1.0	1	1
0:04:32	11.0	12.8	36.0	1.8	121.9	1.35E-04	1.0	1	1
0:05:12	12.0	11.8	40.0	-0.2	122.6	1.33E-04	1.0	1	1
0:05:58	13.0	10.8	46.0	-2.2	123.4	1.27E-04	1.0	1	1
0:06:49	14.0	9.8	51.0	-4.2	124.2	1.27E-04	1.0	1	1
0:07:48	15.0	8.8	59.0	-6.2	125.2	1.24E-04	1.0	1	1
0:08:55	16.0	7.8	67.0	-8.2	126.3	1.25E-04	1.0	1	1
0:12:18	18.0	5.8	203.0	-12.2	129.7	1.06E-04	1.0	2	2
0:14:57	19.0	4.8	159.0	-14.2	132.4	9.29E-05	1.0	1	1
0:00:00	0.0	24.0	-897.0	24.0	132.4				
0:00:47	3.0	21.0	47.0	18.0	133.2	1.76E-04	1.0	3	3
0:01:28	5.0	19.0	41.0	14.0	133.9	1.53E-04	1.0	2	2
0:02:14	7.0	17.0	46.0	10.0	134.6	1.53E-04	1.0	2	2
0:03:06	9.0	15.0	52.0	6.0	135.5	1.54E-04	1.0	2	2
0:04:08	11.0	13.0	62.0	2.0	136.5	1.49E-04	1.0	2	2
0:07:01	15.0	9.0	173.0	-6.0	139.4	1.43E-04	1.0	4	4
0:09:10	17.0	7.0	129.0	-10.0	141.6	1.38E-04	1.0	2	2
0:10:37	18.0	6.0	87.0	-12.0	143.0	1.32E-04	1.0	1	1



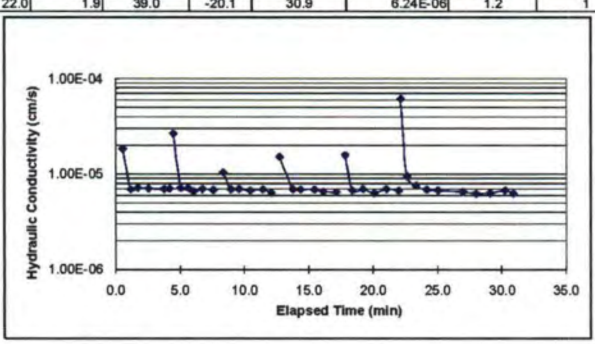
Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

Sample I.D.	305-mm East Side South Pit 60-90 cm		Test Date :		
Cell Pressure =	42.4	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	14.0	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.5	psi	Sample Volume, V =	10193.3	cm^3
Effective Stress =	1.7	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	7.6		a_{out} =	1	cm^2
Weight of wet sample =	20597.5	g	Sample Water Content =	22.51%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.02	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50	554.13	461.51	22.51%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:32	4.0	20.3	32.0	16.3	0.5	1.83E-05	0.9	4	3.7
0:01:10	5.5	18.5	38.0	13.0	1.2	6.92E-06	1.2	1.5	1.8
0:01:43	7.0	17.1	33.0	10.1	1.7	7.19E-06	0.9	1.5	1.4
0:02:33	9.0	14.9	50.0	5.9	2.6	7.09E-06	1.1	2	2.2
0:03:45	12.0	12.2	72.0	0.2	3.8	6.98E-06	0.9	3	2.7
0:04:11	13.0	11.2	26.0	-1.8	4.2	7.03E-06	1.0	1	1
0:00:00	0.0	24.0	-251.0	24.0	4.2				
0:00:16	3.0	21.4	16.0	18.4	4.5	2.65E-05	0.9	3	2.6
0:00:50	4.5	19.8	34.0	15.3	5.0	7.13E-06	1.1	1.5	1.6
0:01:25	6.0	18.2	35.0	12.2	5.6	7.11E-06	1.1	1.5	1.6
0:01:50	7.0	17.2	25.0	10.2	6.0	6.56E-06	1.0	1	1
0:02:31	8.6	15.4	41.0	6.8	6.7	6.96E-06	1.1	1.6	1.8
0:03:22	10.5	13.3	51.0	2.8	7.6	6.81E-06	1.1	1.9	2.1
0:00:00	0.0	24.0	-202.0	24.0	7.6				
0:00:44	3.0	21.0	44.0	18.0	8.3	1.03E-05	1.0	3	3
0:01:20	4.5	19.3	36.0	14.8	8.9	6.98E-06	1.1	1.5	1.7
0:01:57	6.0	17.6	37.0	11.6	9.6	6.98E-06	1.1	1.5	1.7
0:02:49	8.0	15.4	52.0	7.4	10.4	6.72E-06	1.1	2	2.2
0:03:48	10.5	13.2	59.0	2.7	11.4	6.90E-06	0.9	2.5	2.2
0:04:29	12.0	11.8	41.0	-0.2	12.1	6.34E-06	0.9	1.5	1.4
0:00:00	0.0	24.0	-269.0	24.0	12.1				
0:00:37	4.0	20.7	37.0	16.7	12.7	1.50E-05	0.8	4	3.3
0:01:39	6.5	17.8	62.0	11.3	13.8	6.98E-06	1.2	2.5	2.9
0:02:15	8.0	16.3	36.0	8.3	14.4	6.92E-06	1.0	1.5	1.5
0:03:19	10.5	13.7	64.0	3.2	15.4	6.86E-06	1.0	2.5	2.6
0:04:00	12.0	12.2	41.0	0.2	16.1	6.53E-06	1.0	1.5	1.5
0:05:00	14.0	10.0	60.0	-4.0	17.1	6.47E-06	1.1	2	2.2
0:00:00	0.0	24.0	-300.0	24.0	17.1				
0:00:43	4.6	19.8	43.0	15.2	17.8	1.57E-05	0.9	4.6	4.2
0:01:15	6.0	18.5	32.0	12.5	18.4	6.77E-06	0.9	1.4	1.3
0:02:05	8.0	16.3	50.0	8.3	19.2	6.94E-06	1.1	2	2.2
0:02:58	10.0	14.4	53.0	4.4	20.1	6.30E-06	1.0	2	1.9
0:03:54	12.0	12.0	56.0	0.0	21.0	6.99E-06	1.2	2	2.4
0:04:52	14.0	9.8	58.0	-4.2	22.0	6.71E-06	1.1	2	2.2
0:00:00	0.0	24.0	-292.0	24.0	22.0				
0:00:07	3.0	21.3	7.0	18.3	22.1	6.16E-05	0.9	3	2.7
0:00:36	5.0	19.8	29.0	14.8	22.6	9.47E-06	0.8	2	1.5
0:01:18	7.0	17.9	42.0	10.9	23.3	7.51E-06	1.0	2	1.9
0:02:08	9.0	15.8	50.0	6.8	24.1	6.87E-06	1.1	2	2.1
0:03:01	11.0	13.7	53.0	2.7	25.0	6.72E-06	1.1	2	2.1
0:04:57	15.0	9.5	116.0	-5.5	27.0	6.50E-06	1.1	4	4.2
0:05:58	17.0	7.6	61.0	-9.4	28.0	6.24E-06	1.0	2	1.9
0:07:04	19.0	5.5	66.0	-13.5	29.1	6.32E-06	1.1	2	2.1
0:08:14	21.0	3.1	70.0	-17.9	30.2	6.70E-06	1.2	2	2.4
0:08:53	22.0	1.9	39.0	-20.1	30.9	6.24E-06	1.2	1	1.2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

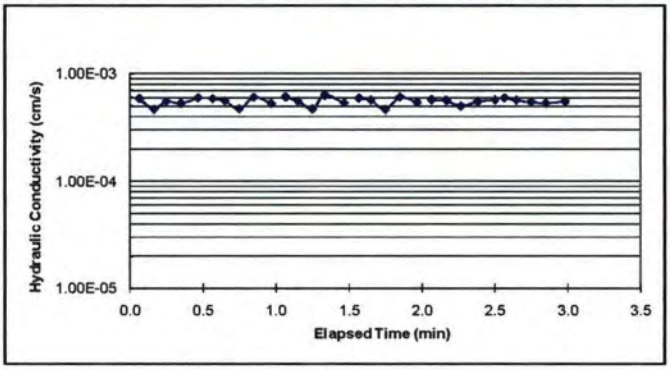
ASTM D 5084 - 00

Sample I.D.	**305-mm West Side North Pit 0-30 cm**		**Test Date :**		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	12973.3	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	2.0		a_{out} =	1	cm^2
Weight of wet sample =	24448.5	g	Sample Water Content =	8.10%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.88	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	51.12	354.17	331.46	8.10%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.8	0.0	23.8	0.0				
0:00:04	5.0	18.5	4.0	13.5	0.1	5.85E-04	1.1	5	5.3
0:00:10	10.0	13.5	6.0	3.5	0.2	4.67E-04	1.0	5	5
0:00:15	14.0	9.7	5.0	-4.3	0.3	5.49E-04	1.0	4	3.8
0:00:21	17.5	6.1	6.0	-11.4	0.4	5.31E-04	1.0	3.5	3.6
0:00:28	21.0	2.7	7.0	-18.3	0.5	5.97E-04	1.0	3.5	3.4
0:00:00	0.0	23.9	-28.0	23.9	0.5				
0:00:04	5.0	18.6	4.0	13.6	0.6	5.84E-04	1.1	5	5.3
0:00:09	10.0	13.6	5.0	3.6	0.7	5.59E-04	1.0	5	5
0:00:15	14.0	9.6	6.0	-4.4	0.8	4.69E-04	1.0	4	4
0:00:21	18.0	5.7	6.0	-12.3	0.9	6.03E-04	1.0	4	3.9
0:00:28	21.0	2.7	7.0	-18.3	1.0	5.30E-04	1.0	3	3
0:00:00	0.0	24.1	-28.0	24.1	1.0				
0:00:04	5.0	18.4	4.0	13.4	1.1	6.06E-04	1.1	5	5.7
0:00:09	10.0	13.5	5.0	3.5	1.2	5.56E-04	1.0	5	4.9
0:00:15	14.0	9.5	6.0	-4.5	1.3	4.71E-04	1.0	4	4
0:00:20	17.5	6.0	5.0	-11.5	1.3	6.31E-04	1.0	3.5	3.5
0:00:28	21.0	2.5	8.0	-18.5	1.5	5.34E-04	1.0	3.5	3.5
0:00:00	0.0	23.9	-28.0	23.9	1.5				
0:00:04	5.0	18.5	4.0	13.5	1.6	5.90E-04	1.1	5	5.4
0:00:09	10.0	13.4	5.0	3.4	1.7	5.67E-04	1.0	5	5.1
0:00:15	14.0	9.5	6.0	-4.5	1.8	4.65E-04	1.0	4	3.9
0:00:21	18.0	5.6	6.0	-12.4	1.9	6.05E-04	1.0	4	3.9
0:00:28	21.0	2.5	7.0	-18.5	2.0	5.43E-04	1.0	3	3.1
0:00:00	0.0	24.0	-28.0	24.0	2.0				
0:00:04	5.0	18.9	4.0	13.9	2.1	5.70E-04	1.0	5	5.1
0:00:10	11.0	13.0	6.0	2.0	2.2	5.64E-04	1.0	6	5.9
0:00:16	15.0	8.9	6.0	-6.1	2.3	4.99E-04	1.0	4	4.1
0:00:23	19.0	5.0	7.0	-14.0	2.4	5.52E-04	1.0	4	3.9
0:00:30	22.0	2.1	7.0	-19.9	2.5	5.69E-04	1.0	3	2.9
0:00:00	0.0	24.0	-30.0	24.0	2.5				
0:00:04	5.0	18.5	4.0	13.5	2.6	5.95E-04	1.1	5	5.5
0:00:09	10.0	13.4	5.0	3.4	2.7	5.67E-04	1.0	5	5.1
0:00:15	14.5	8.8	6.0	-5.7	2.8	5.47E-04	1.0	4.5	4.6
0:00:21	18.0	5.5	6.0	-12.5	2.9	5.33E-04	0.9	3.5	3.3
0:00:29	21.5	2.1	8.0	-19.4	3.0	5.53E-04	1.0	3.5	3.4



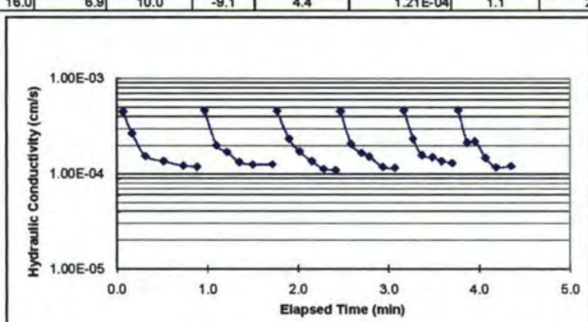
Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

Sample I.D.	305-mm West Side South Pit 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.7	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	41.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	0.7	psi	Sample Volume, V =	12973.3	cm^3
Effective Stress =	0.6	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	2.8		a_{out} =	1	cm^2
Weight of wet sample =	21912.9	g	Sample Water Content =	6.73%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.69	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.93	365.08	345.27	6.73%

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
0:00:00	0.0	24.1	0.0	24.1	0.0				
0:00:04	5.0	19.0	4.0	14.0	0.1	4.51E-04	1.0	5	5.1
0:00:10	9.0	15.2	6.0	6.2	0.2	2.67E-04	1.0	4	3.8
0:00:19	12.0	12.2	9.0	0.2	0.3	1.55E-04	1.0	3	3
0:00:31	15.0	9.0	12.0	-6.0	0.5	1.36E-04	1.1	3	3.2
0:00:44	17.5	6.2	13.0	-11.3	0.7	1.23E-04	1.1	2.5	2.8
0:00:53	19.0	4.5	9.0	-14.5	0.9	1.19E-04	1.1	1.5	1.7
0:00:00	0.0	24.4	-53.0	24.4	0.9				
0:00:04	5.0	19.0	4.0	14.0	1.0	4.64E-04	1.1	5	5.4
0:00:12	9.0	15.2	8.0	6.2	1.1	2.01E-04	1.0	4	3.8
0:00:19	11.5	12.5	7.0	1.0	1.2	1.71E-04	1.1	2.5	2.7
0:00:27	13.5	10.3	8.0	-3.2	1.4	1.33E-04	1.1	2	2.2
0:00:36	15.5	8.2	9.0	-7.3	1.5	1.26E-04	1.1	2	2.1
0:00:49	18.0	5.4	13.0	-12.6	1.7	1.27E-04	1.1	2.5	2.8
0:00:00	0.0	24.1	-49.0	24.1	1.7				
0:00:04	5.0	18.8	4.0	13.8	1.8	4.61E-04	1.1	5	5.3
0:00:12	9.5	14.3	8.0	4.8	1.9	2.35E-04	1.0	4.5	4.5
0:00:19	12.0	11.7	7.0	-0.3	2.0	1.73E-04	1.0	2.5	2.6
0:00:27	14.0	9.5	8.0	-4.5	2.2	1.37E-04	1.1	2	2.2
0:00:35	15.5	7.8	8.0	-7.7	2.3	1.13E-04	1.1	1.5	1.7
0:00:43	17.0	6.4	8.0	-10.6	2.4	1.10E-04	0.9	1.5	1.4
0:00:00	0.0	24.0	-43.0	24.0	2.4				
0:00:04	5.0	18.8	4.0	13.8	2.5	4.57E-04	1.0	5	5.2
0:00:11	8.5	15.2	7.0	6.7	2.6	2.08E-04	1.0	3.5	3.6
0:00:18	11.0	12.6	7.0	1.6	2.7	1.66E-04	1.0	2.5	2.6
0:00:23	12.5	11.0	5.0	-1.5	2.8	1.53E-04	1.1	1.5	1.6
0:00:32	14.5	9.0	9.0	-5.5	2.9	1.18E-04	1.0	2	2
0:00:40	16.0	7.3	8.0	-8.7	3.1	1.16E-04	1.1	1.5	1.7
0:00:00	0.0	24.1	-40.0	24.1	3.1				
0:00:04	5.0	18.7	4.0	13.7	3.2	4.66E-04	1.1	5	5.4
0:00:10	8.5	15.3	6.0	6.8	3.3	2.36E-04	1.0	3.5	3.4
0:00:16	10.5	13.1	6.0	2.6	3.4	1.58E-04	1.1	2	2.2
0:00:23	12.5	10.8	7.0	-1.7	3.5	1.51E-04	1.2	2	2.3
0:00:29	14.0	9.2	6.0	-4.8	3.6	1.37E-04	1.1	1.5	1.6
0:00:36	15.5	7.5	7.0	-8.0	3.7	1.30E-04	1.1	1.5	1.7
0:00:00	0.0	24.0	-36.0	24.0	3.7				
0:00:04	5.0	18.6	4.0	13.6	3.8	4.67E-04	1.1	5	5.4
0:00:10	8.0	15.3	6.0	7.3	3.9	2.15E-04	1.1	3	3.3
0:00:15	10.5	12.9	5.0	2.4	4.0	2.21E-04	1.0	2.5	2.4
0:00:22	12.5	10.7	7.0	-1.8	4.1	1.48E-04	1.1	2	2.2
0:00:29	14.0	9.1	7.0	-4.9	4.2	1.18E-04	1.1	1.5	1.6
0:00:39	16.0	6.9	10.0	-9.1	4.4	1.21E-04	1.1	2	2.2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

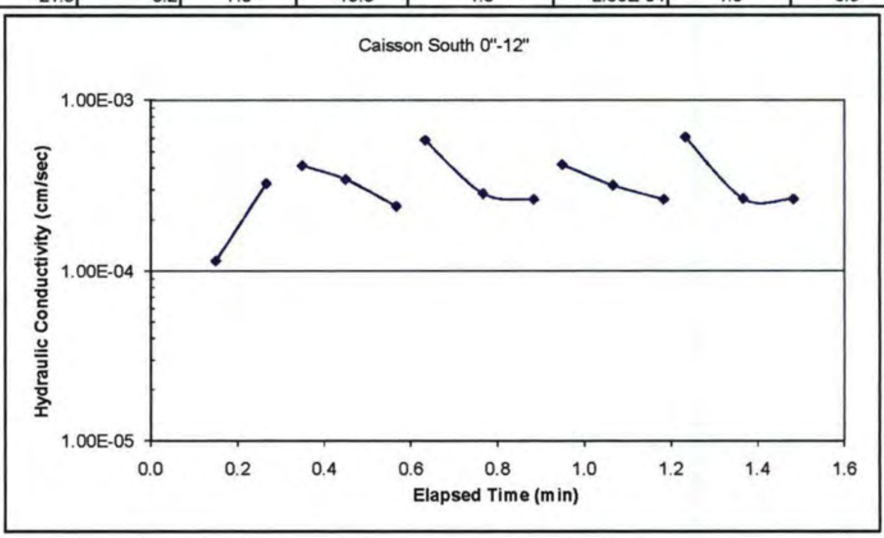
ASTM D 5084 - 00

Sample I.D.	305-mm Cassion South 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	19.3	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.5	psi	Sample Volume, V =	14085.3	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.5		a_{out} =	1	cm^2
Weight of wet sample =	25809.3	g	Sample Water Content =	25.55%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.93	353.86	292.22	25.55%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.3	0.0	24.3	0.0				
0:00:09	5.0	19.5	9.0	14.5	0.2	1.15E-04	1.0	5	4.8
0:00:16	15.0	10.5	7.0	-4.5	0.3	3.26E-04	0.9	10	9
0:00:00	0.0	23.6	-16.0	23.6	0.3				
0:00:03	6.0	18.0	3.0	12.0	0.4	4.15E-04	0.9	6	5.6
0:00:09	15.0	10.0	6.0	-5.0	0.5	3.45E-04	0.9	9	8
0:00:16	21.0	4.0	7.0	-17.0	0.6	2.40E-04	1.0	6	6
0:00:00	0.0	24.0	-16.0	24.0	0.6				
0:00:02	5.5	18.5	2.0	13.0	0.6	5.87E-04	1.0	5.5	5.5
0:00:10	15.5	9.7	8.0	-5.8	0.8	2.86E-04	0.9	10	8.8
0:00:17	22.0	3.2	7.0	-18.8	0.9	2.64E-04	1.0	6.5	6.5
0:00:00	0.0	24.4	-17.0	24.4	0.9				
0:00:03	6.0	18.6	3.0	12.6	1.0	4.20E-04	1.0	6	5.8
0:00:10	15.5	9.8	7.0	-5.7	1.1	3.18E-04	0.9	9.5	8.8
0:00:17	22.0	3.3	7.0	-18.7	1.2	2.64E-04	1.0	6.5	6.5
0:00:00	0.0	23.7	-17.0	23.7	1.2				
0:00:02	6.0	18.3	2.0	12.3	1.2	6.11E-04	0.9	6	5.4
0:00:10	15.0	9.8	8.0	-5.2	1.4	2.66E-04	0.9	9	8.5
0:00:17	21.5	3.2	7.0	-18.3	1.5	2.65E-04	1.0	6.5	6.6



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

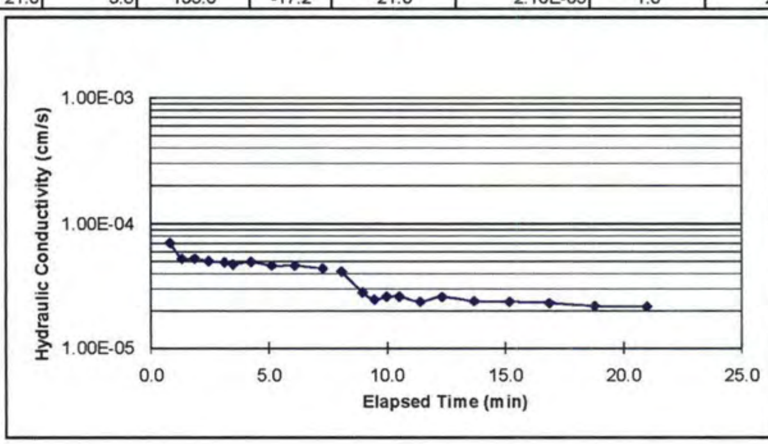
ASTM D 5084 - 00

Sample I.D.	150-mm Caisson South 0-30 cm		Test Date :		
Cell Pressure =	41.6	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	8.9	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.7	psi	Sample Volume, V =	1621.7	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.5		a_{out} =	1	cm^2
Weight of wet sample =	3012.1	g	Sample Water Content =	24.70%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.85	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.81	161.79	135.85	24.70%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:48	5.0	19.5	48.0	14.5	0.8	7.05E-05	0.9	5	4.5
0:01:18	7.0	17.5	30.0	10.5	1.3	5.27E-05	1.0	2	2
0:01:50	9.0	15.5	32.0	6.5	1.8	5.28E-05	1.0	2	2
0:02:26	11.0	13.5	36.0	2.5	2.4	5.04E-05	1.0	2	2
0:03:06	13.0	11.5	40.0	-1.5	3.1	4.90E-05	1.0	2	2
0:03:28	14.0	10.5	22.0	-3.5	3.5	4.74E-05	1.0	1	1
0:04:13	16.0	8.5	45.0	-7.5	4.2	4.96E-05	1.0	2	2
0:05:06	18.0	6.5	53.0	-11.5	5.1	4.63E-05	1.0	2	2
0:06:05	20.0	4.5	59.0	-15.5	6.1	4.63E-05	1.0	2	2
0:07:15	22.0	2.5	70.0	-19.5	7.3	4.39E-05	1.0	2	2
0:00:00	0.0	24.0	-435.0	24.0	7.3				
0:00:45	3.0	21.6	45.0	18.6	8.1	4.15E-05	0.8	3	2.4
0:01:38	5.0	19.6	53.0	14.6	8.9	2.79E-05	1.0	2	2
0:02:08	6.0	18.7	30.0	12.7	9.4	2.45E-05	0.9	1	0.9
0:02:39	7.0	17.7	31.0	10.7	10.0	2.58E-05	1.0	1	1
0:03:11	8.0	16.7	32.0	8.7	10.5	2.58E-05	1.0	1	1
0:04:04	9.5	15.3	53.0	5.8	11.4	2.36E-05	0.9	1.5	1.4
0:04:59	11.0	13.7	55.0	2.7	12.3	2.57E-05	1.1	1.5	1.6
0:06:21	13.0	11.7	82.0	-1.3	13.7	2.38E-05	1.0	2	2
0:07:51	15.0	9.7	90.0	-5.3	15.2	2.36E-05	1.0	2	2
0:09:32	17.0	7.7	101.0	-9.3	16.8	2.30E-05	1.0	2	2
0:11:27	19.0	5.8	115.0	-13.2	18.8	2.18E-05	1.0	2	1.9
0:13:40	21.0	3.8	133.0	-17.2	21.0	2.16E-05	1.0	2	2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

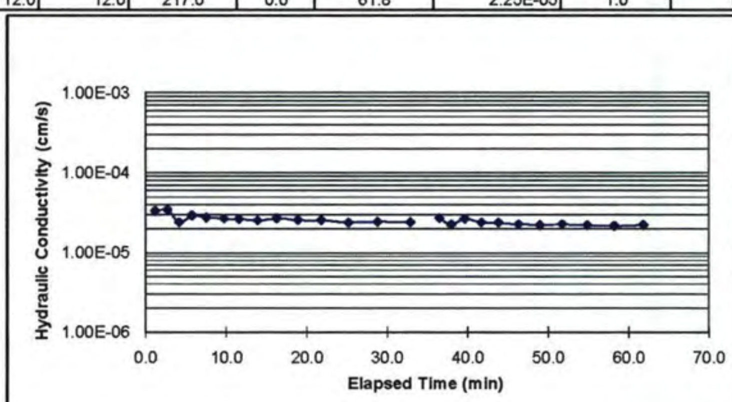
ASTM D 5084 - 00

Sample I.D.	75-mm Caisson South 0 - 30 cm		Test Date :		
Cell Pressure =	41.8	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	4.1	cm
Outflow Pressre =	40.4	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	158.2	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.1		a_{out} =	1	cm^2
Weight of wet sample =	322.2	g	Sample Water Content =	25.79%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.03	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.36	130.36	108.83	25.79%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:01:13	1.0	23.0	73.0	22.0	1.2	3.35E-05	1.0	1	1
0:02:42	2.2	21.8	89.0	19.6	2.7	3.47E-05	1.0	1.2	1.2
0:04:11	3.0	21.0	89.0	18.0	4.2	2.43E-05	1.0	0.8	0.8
0:05:47	4.0	20.0	96.0	16.0	5.8	2.95E-05	1.0	1	1
0:07:34	5.0	19.0	107.0	14.0	7.6	2.79E-05	1.0	1	1
0:09:43	6.1	17.9	129.0	11.8	9.7	2.70E-05	1.0	1.1	1.1
0:11:36	7.0	17.0	113.0	10.0	11.6	2.68E-05	1.0	0.9	0.9
0:13:56	8.0	16.0	140.0	8.0	13.9	2.56E-05	1.0	1	1
0:16:17	9.0	15.0	141.0	6.0	16.3	2.72E-05	1.0	1	1
0:18:56	10.0	14.0	159.0	4.0	18.9	2.60E-05	1.0	1	1
0:21:50	11.0	13.0	174.0	2.0	21.8	2.57E-05	1.0	1	1
0:25:11	12.0	12.0	201.0	0.0	25.2	2.43E-05	1.0	1	1
0:28:49	13.0	11.0	218.0	-2.0	28.8	2.46E-05	1.0	1	1
0:32:53	14.0	10.0	244.0	-4.0	32.9	2.44E-05	1.0	1	1
0:00:00	0.0	24.0	-1973.0	24.0	32.9				
0:03:32	2.3	21.7	212.0	19.4	36.4	2.73E-05	1.0	2.3	2.3
0:05:01	3.0	20.9	89.0	17.9	37.9	2.28E-05	1.1	0.7	0.8
0:06:41	4.0	20.0	100.0	16.0	39.6	2.69E-05	0.9	1	0.9
0:08:44	5.0	19.0	123.0	14.0	41.6	2.43E-05	1.0	1	1
0:10:55	6.0	18.0	131.0	12.0	43.8	2.41E-05	1.0	1	1
0:13:21	7.0	17.0	146.0	10.0	46.3	2.30E-05	1.0	1	1
0:16:00	8.0	16.0	159.0	8.0	48.9	2.25E-05	1.0	1	1
0:18:47	9.0	15.0	167.0	6.0	51.7	2.30E-05	1.0	1	1
0:21:52	10.0	14.0	185.0	4.0	54.8	2.23E-05	1.0	1	1
0:25:16	11.0	13.0	204.0	2.0	58.2	2.19E-05	1.0	1	1
0:28:53	12.0	12.0	217.0	0.0	61.8	2.25E-05	1.0	1	1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

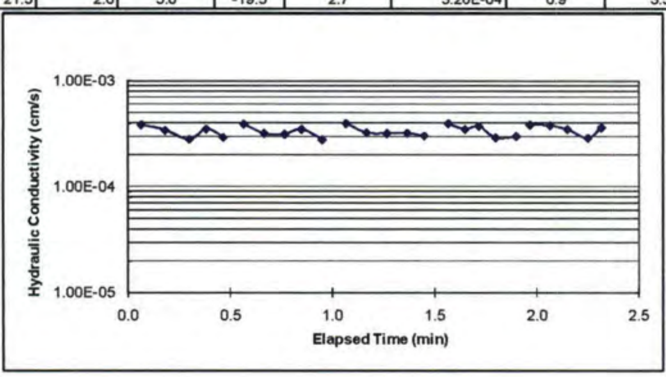
ASTM D 5084 - 00

Sample I.D.	305-mm Caisson South 20-60 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	18.9	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	13807.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	3.7		a_{out} =	1	cm^2
Weight of wet sample =	19976.1	lb	Sample Water Content =	13.17%	(%)
Wet Density =	1.4	g/cm^3	Dry Density =	1.44	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.96	161.96	146.71	13.17%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.1	0.0	24.1	0.0				
0:00:04	5.0	18.5	4.0	13.5	0.1	3.86E-04	1.1	5	5.6
0:00:11	12.0	11.4	7.0	-0.6	0.2	3.41E-04	1.0	7	7.1
0:00:18	17.0	6.6	7.0	-10.4	0.3	2.81E-04	1.0	5	4.8
0:00:23	21.0	3.0	5.0	-18.0	0.4	3.52E-04	0.9	4	3.6
0:00:28	24.0	0.4	5.0	-23.6	0.5	2.94E-04	0.9	3	2.6
0:00:00	0.0	24.2	-28.0	24.2	0.5				
0:00:04	5.0	18.5	4.0	13.5	0.6	3.89E-04	1.1	5	5.7
0:00:10	10.5	12.5	6.0	2.0	0.7	3.19E-04	1.1	5.5	6
0:00:16	15.5	7.7	6.0	-7.8	0.8	3.15E-04	1.0	5	4.8
0:00:21	19.5	3.8	5.0	-15.7	0.9	3.50E-04	1.0	4	3.9
0:00:27	23.0	0.7	6.0	-22.3	1.0	2.78E-04	0.9	3.5	3.1
0:00:00	0.0	24.3	-27.0	24.3	1.0				
0:00:04	5.0	18.4	4.0	13.4	1.1	3.97E-04	1.2	5	5.9
0:00:10	10.5	12.2	6.0	1.7	1.2	3.25E-04	1.1	5.5	6.2
0:00:16	15.5	7.3	6.0	-8.2	1.3	3.20E-04	1.0	5	4.9
0:00:22	20.0	3.2	6.0	-16.8	1.4	3.22E-04	0.9	4.5	4.1
0:00:27	23.0	0.3	5.0	-22.7	1.5	3.03E-04	1.0	3	2.9
0:00:00	0.0	24.5	-27.0	24.5	1.5				
0:00:04	5.0	18.6	4.0	13.6	1.6	3.96E-04	1.2	5	5.9
0:00:09	10.0	13.0	5.0	3.0	1.7	3.50E-04	1.1	5	5.6
0:00:13	14.0	9.0	4.0	-5.0	1.7	3.74E-04	1.0	4	4
0:00:18	17.5	5.6	5.0	-11.9	1.8	2.89E-04	1.0	3.5	3.4
0:00:24	21.5	2.0	6.0	-19.5	1.9	3.01E-04	0.9	4	3.6
0:00:00	0.0	24.4	-24.0	24.4	1.9				
0:00:04	5.0	18.8	4.0	13.8	2.0	3.85E-04	1.1	5	5.6
0:00:10	11.5	11.8	6.0	0.3	2.1	3.78E-04	1.1	6.5	7
0:00:15	16.0	7.4	5.0	-8.6	2.2	3.49E-04	1.0	4.5	4.4
0:00:21	20.0	3.7	6.0	-16.3	2.3	2.88E-04	0.9	4	3.7
0:00:25	23.0	1.0	4.0	-22.0	2.3	3.61E-04	0.9	3	2.7
0:00:00	0.0	24.2	-25.0	24.2	2.3				
0:00:04	5.0	18.5	4.0	13.5	2.4	3.89E-04	1.1	5	5.7
0:00:09	10.0	13.0	5.0	3.0	2.5	3.47E-04	1.1	5	5.5
0:00:13	14.0	9.0	4.0	-5.0	2.5	3.74E-04	1.0	4	4
0:00:18	18.0	5.3	5.0	-12.7	2.6	3.25E-04	0.9	4	3.7
0:00:23	21.5	2.0	5.0	-19.5	2.7	3.26E-04	0.9	3.5	3.3



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

ASTM D 5084 - 00

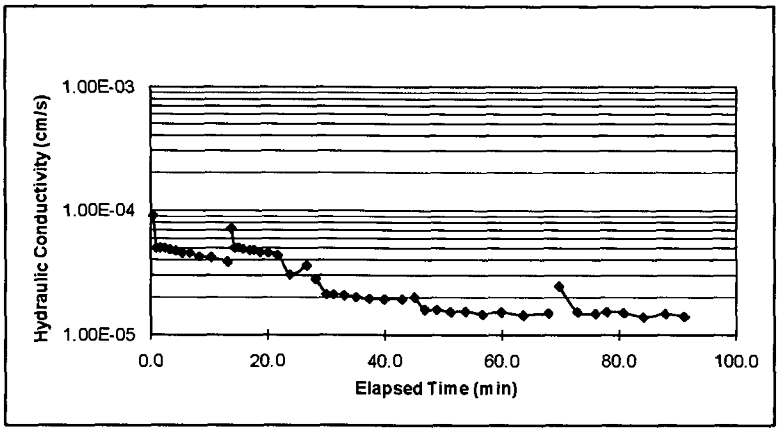
Sample I.D.	150-mm Caisson South 30-60 cm			Test Date :		
Cell Pressure =	41.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	8.9	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1621.7	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.0		a_{out} =	1	cm^2
Weight of wet sample =	2821.0	g	Sample Water Content =	27.11%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.73	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.09	203.07	165.11	27.11%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:27	3.0	21.3	27.0	18.3	0.5	9.14E-05	0.9	3	2.7
0:01:05	5.0	19.3	38.0	14.3	1.1	4.99E-05	1.0	2	2
0:01:46	7.0	17.3	41.0	10.3	1.8	5.01E-05	1.0	2	2
0:02:32	9.0	15.2	46.0	6.2	2.5	5.01E-05	1.1	2	2.1
0:03:23	11.0	13.2	51.0	2.2	3.4	4.86E-05	1.0	2	2
0:04:21	13.0	11.2	58.0	-1.8	4.4	4.76E-05	1.0	2	2
0:05:29	15.0	9.2	68.0	-5.8	5.5	4.58E-05	1.0	2	2
0:06:47	17.0	7.2	78.0	-9.8	6.8	4.57E-05	1.0	2	2
0:08:25	19.0	5.2	98.0	-13.8	8.4	4.27E-05	1.0	2	2
0:10:26	21.0	3.2	121.0	-17.8	10.4	4.17E-05	1.0	2	2
0:13:11	23.0	1.2	165.0	-21.8	13.2	3.87E-05	1.0	2	2
0:00:00	0.0	24.0	-791.0	24.0	13.2				
0:00:36	3.0	21.0	36.0	18.0	13.8	7.24E-05	1.0	3	3
0:01:14	5.0	19.0	38.0	14.0	14.4	5.02E-05	1.0	2	2
0:01:55	7.0	17.0	41.0	10.0	15.1	5.04E-05	1.0	2	2
0:02:41	9.0	15.0	46.0	6.0	15.9	4.91E-05	1.0	2	2
0:03:48	11.5	12.4	67.0	0.9	17.0	4.81E-05	1.0	2.5	2.6
0:04:32	13.0	10.9	44.0	-2.1	17.7	4.81E-05	1.0	1.5	1.5
0:05:40	15.0	8.9	68.0	-6.1	18.9	4.62E-05	1.0	2	2
0:06:59	17.0	6.9	79.0	-10.1	20.2	4.57E-05	1.0	2	2
0:08:36	19.0	4.9	97.0	-14.1	21.8	4.37E-05	1.0	2	2
0:10:39	21.0	3.9	123.0	-17.1	23.9	3.04E-05	0.5	2	1
0:13:28	23.0	1.9	169.0	-21.1	26.7	3.61E-05	1.0	2	2
0:00:00	0.0	24.0	-808.0	24.0	26.7				
0:01:31	3.0	21.1	91.0	18.1	28.2	2.81E-05	1.0	3	2.9
0:03:22	5.5	18.7	111.0	13.2	30.1	2.12E-05	1.0	2.5	2.4
0:04:36	7.0	17.2	74.0	10.2	31.3	2.11E-05	1.0	1.5	1.5
0:06:24	9.0	15.2	108.0	6.2	33.1	2.08E-05	1.0	2	2
0:08:24	11.0	13.3	120.0	2.3	35.1	2.01E-05	0.9	2	1.9
0:10:41	13.0	11.4	137.0	-1.6	37.4	1.96E-05	1.0	2	1.9
0:13:16	15.0	9.5	155.0	-5.5	40.0	1.94E-05	1.0	2	1.9
0:16:18	17.0	7.5	182.0	-9.5	43.0	1.94E-05	1.0	2	2
0:00:00	0.0	24.0	-978.0	24.0	43.0				
0:02:07	3.1	21.2	127.0	18.1	45.1	2.02E-05	0.9	3.1	2.8
0:03:53	5.0	19.5	106.0	14.5	46.9	1.61E-05	0.9	1.9	1.7
0:05:57	7.0	17.6	124.0	10.6	49.0	1.61E-05	0.9	2	1.9
0:08:15	9.0	15.8	138.0	6.8	51.3	1.53E-05	0.9	2	1.8
0:10:48	11.0	13.9	153.0	2.9	53.8	1.55E-05	1.0	2	1.9
0:13:42	13.0	12.1	174.0	-0.9	56.7	1.47E-05	0.9	2	1.8
0:16:55	15.0	10.2	193.0	-4.8	59.9	1.53E-05	1.0	2	1.9
0:20:40	17.0	8.4	225.0	-8.6	63.7	1.45E-05	0.9	2	1.8
0:24:58	19.0	6.5	258.0	-12.5	68.0	1.50E-05	1.0	2	1.9
0:00:00	0.0	24.0	-1498.0	24.0	68.0				
0:01:46	3.0	21.0	106.0	18.0	69.8	2.46E-05	1.0	3	3

0:04:56	6.0	18.0	190.0	12.0	72.9	1.54E-05	1.0	3	3
0:07:59	8.5	15.5	183.0	7.0	76.0	1.49E-05	1.0	2.5	2.5
0:09:56	10.0	14.0	117.0	4.0	77.9	1.54E-05	1.0	1.5	1.5
0:12:50	12.0	12.0	174.0	0.0	80.8	1.51E-05	1.0	2	2
0:16:09	14.0	10.2	199.0	-3.8	84.2	1.40E-05	0.9	2	1.8
0:19:54	16.0	8.2	225.0	-7.8	87.9	1.48E-05	1.0	2	2
0:23:08	17.5	6.8	194.0	-10.7	91.1	1.41E-05	0.9	1.5	1.4



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

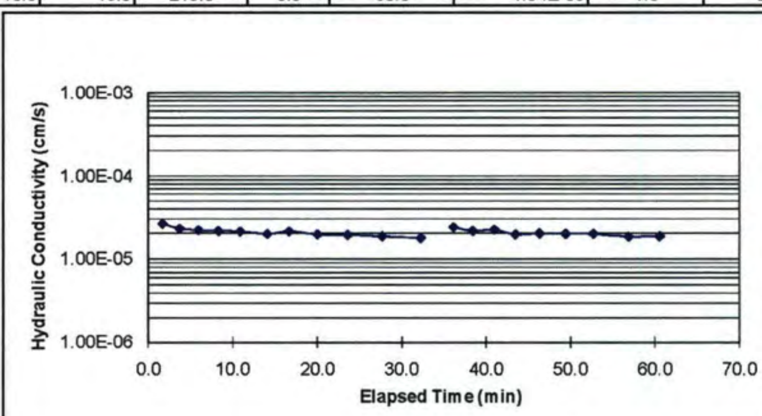
ASTM D 5084 - 00

Sample I.D.	75-mm Caisson South 30-60 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	40.4	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.7		a_{out} =	1	cm^2
Weight of wet sample =	325.9	g	Sample Water Content =	25.81%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.91	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.78	142.8	119.82	25.81%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:01:41	1.0	23.0	101.0	22.0	1.7	2.60E-05	1.0	1	1
0:03:42	2.0	22.0	121.0	20.0	3.7	2.28E-05	1.0	1	1
0:05:55	3.0	21.0	133.0	18.0	5.9	2.18E-05	1.0	1	1
0:08:18	4.0	20.0	143.0	16.0	8.3	2.13E-05	1.0	1	1
0:10:51	5.0	19.0	153.0	14.0	10.9	2.10E-05	1.0	1	1
0:14:03	6.1	17.9	192.0	11.8	14.1	1.96E-05	1.0	1.1	1.1
0:16:38	7.0	17.0	155.0	10.0	16.6	2.11E-05	1.0	0.9	0.9
0:19:58	8.0	16.0	200.0	8.0	20.0	1.93E-05	1.0	1	1
0:23:35	9.0	15.0	217.0	6.0	23.6	1.90E-05	1.0	1	1
0:27:38	10.0	14.0	243.0	4.0	27.6	1.83E-05	1.0	1	1
0:32:13	11.0	13.0	275.0	2.0	32.2	1.75E-05	1.0	1	1
0:00:00	0.0	24.0		24.0	32.2				
0:03:54	2.0	21.9	234.0	19.9	36.1	2.36E-05	1.1	2	2.1
0:06:10	3.0	20.9	136.0	17.9	38.4	2.13E-05	1.0	1	1
0:08:43	4.1	19.8	153.0	15.7	40.9	2.20E-05	1.0	1.1	1.1
0:11:14	5.0	18.9	151.0	13.9	43.4	1.93E-05	1.0	0.9	0.9
0:14:05	6.0	17.9	171.0	11.9	46.3	2.00E-05	1.0	1	1
0:17:10	7.0	16.9	185.0	9.9	49.4	1.96E-05	1.0	1	1
0:20:27	8.0	15.9	197.0	7.9	52.7	1.96E-05	1.0	1	1
0:24:40	9.1	14.8	253.0	5.7	56.9	1.81E-05	1.0	1.1	1.1
0:28:19	10.0	13.9	219.0	3.9	60.5	1.84E-05	1.0	0.9	0.9



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

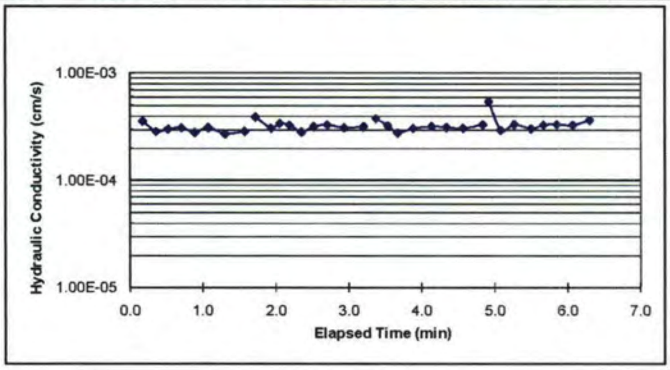
ASTM D 5084 - 00

Sample I.D.	150-mm Caisson South Radon		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	9.5	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1737.5	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	3.7		a_{out} =	1	cm^2
Weight of wet sample =	3277.3	g	Sample Water Content =	12.19%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.88	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.79	142.94	130.75	12.19%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:10	4.0	20.4	10.0	16.4	0.2	3.59E-04	0.9	4	3.6
0:00:21	7.0	17.5	11.0	10.5	0.4	2.88E-04	1.0	3	2.9
0:00:31	9.5	15.0	10.0	5.5	0.5	3.03E-04	1.0	2.5	2.5
0:00:42	12.0	12.5	11.0	0.5	0.7	3.11E-04	1.0	2.5	2.5
0:00:53	14.0	10.5	11.0	-3.5	0.9	2.82E-04	1.0	2	2
0:01:04	16.0	8.6	11.0	-7.4	1.1	3.12E-04	1.0	2	1.9
0:01:18	18.0	6.8	14.0	-11.2	1.3	2.74E-04	0.9	2	1.8
0:01:34	20.0	4.9	16.0	-15.1	1.6	2.90E-04	1.0	2	1.9
0:00:00	0.0	24.0	-94.0	24.0	1.6				
0:00:07	3.0	21.1	7.0	18.1	1.7	3.92E-04	1.0	3	2.9
0:00:20	7.0	17.5	13.0	10.5	1.9	3.09E-04	0.9	4	3.6
0:00:27	9.0	15.5	7.0	6.5	2.1	3.42E-04	1.0	2	2
0:00:35	11.0	13.5	8.0	2.5	2.2	3.29E-04	1.0	2	2
0:00:45	13.0	11.6	10.0	-1.4	2.4	2.85E-04	1.0	2	1.9
0:00:55	15.0	9.7	10.0	-5.3	2.5	3.20E-04	1.0	2	1.9
0:01:06	17.0	7.8	11.0	-9.2	2.7	3.32E-04	1.0	2	1.9
0:01:20	19.0	5.8	14.0	-13.2	2.9	3.12E-04	1.0	2	2
0:01:36	21.0	3.9	16.0	-17.1	3.2	3.19E-04	1.0	2	1.9
0:00:00	0.0	24.0	-96.0	24.0	3.2				
0:00:10	4.0	20.0	10.0	16.0	3.4	3.79E-04	1.0	4	4
0:00:20	7.0	17.0	10.0	10.0	3.5	3.26E-04	1.0	3	3
0:00:28	9.0	15.3	8.0	6.3	3.7	2.79E-04	0.9	2	1.7
0:00:41	12.0	12.4	13.0	0.4	3.9	3.08E-04	1.0	3	2.9
0:00:56	15.0	9.4	15.0	-5.6	4.1	3.22E-04	1.0	3	3
0:01:08	17.0	7.4	12.0	-9.6	4.3	3.16E-04	1.0	2	2
0:01:22	19.0	5.5	14.0	-13.5	4.6	3.09E-04	1.0	2	1.9
0:01:38	21.0	3.5	16.0	-17.5	4.8	3.33E-04	1.0	2	2
0:00:00	0.0	24.0	-98.0	24.0	4.8				
0:00:07	4.0	20.0	7.0	16.0	4.9	5.42E-04	1.0	4	4
0:00:17	7.0	17.5	10.0	10.5	5.1	2.97E-04	0.8	3	2.5
0:00:28	10.0	14.5	11.0	4.5	5.3	3.34E-04	1.0	3	3
0:00:42	13.0	11.5	14.0	-1.5	5.5	3.06E-04	1.0	3	3
0:00:52	15.0	9.5	10.0	-5.5	5.7	3.30E-04	1.0	2	2
0:01:03	17.0	7.6	11.0	-9.4	5.9	3.35E-04	1.0	2	1.9
0:01:16	19.0	5.7	13.0	-13.3	6.1	3.30E-04	1.0	2	1.9
0:01:30	21.0	3.8	14.0	-17.2	6.3	3.66E-04	1.0	2	1.9



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

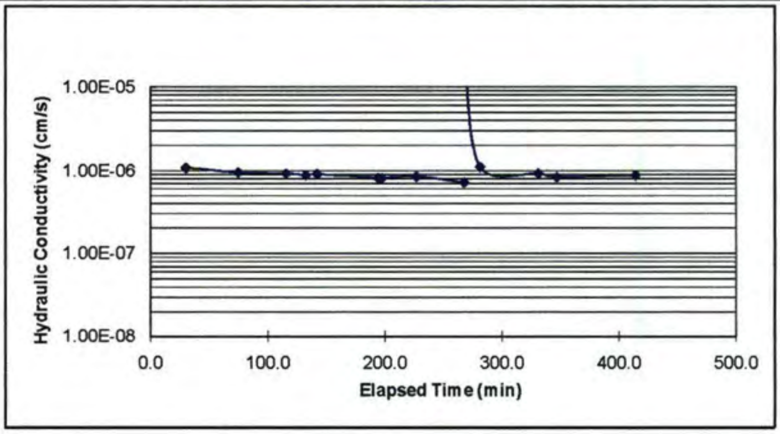
ASTM D 5084 - 00

Sample I.D.	150-mm Caisson South Radon		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	10.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1853.3	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	3.5		a_{out} =	1	cm^2
Weight of wet sample =	4023.4	g	Sample Water Content =	12.87%	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	2.17	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.03	114.9	104.65	12.87%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	2.0	23.3	0.0	21.3	0.0				
0:29:59	3.9	21.4	1799.0	17.5	30.0	1.08E-06	1.0	1.9	1.9
1:14:39	6.2	19.1	2680.0	12.9	74.7	9.50E-07	1.0	2.3	2.3
1:55:15	8.1	17.3	2436.0	9.2	115.3	9.16E-07	0.9	1.9	1.8
2:12:10	8.8	16.6	1015.0	7.8	132.2	8.80E-07	1.0	0.7	0.7
2:21:51	9.2	16.2	581.0	7.0	141.9	9.01E-07	1.0	0.4	0.4
3:14:13	11.1	14.4	3142.0	3.3	194.2	8.14E-07	0.9	1.9	1.8
3:17:13	11.2	14.3	180.0	3.1	197.2	8.07E-07	1.0	0.1	0.1
3:46:43	12.2	13.3	1770.0	1.1	226.7	8.45E-07	1.0	1	1
4:27:22	13.3	12.2	2439.0	-1.1	267.4	7.15E-07	1.0	1.1	1.1
0:00:00	0.0	24.0	-16042.0	24.0	267.4				
0:00:55	1.6	23.4	55.0	21.8	268.3	1.92E-05	0.4	1.6	0.6
0:13:39	2.5	22.6	764.0	20.1	281.1	1.10E-06	0.9	0.9	0.8
1:03:36	5.2	20.1	2997.0	14.9	331.0	9.18E-07	0.9	2.7	2.5
1:19:27	5.9	19.4	951.0	13.5	346.9	8.31E-07	1.0	0.7	0.7
2:26:28	8.8	16.5	4021.0	7.7	413.9	8.79E-07	1.0	2.9	2.9



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

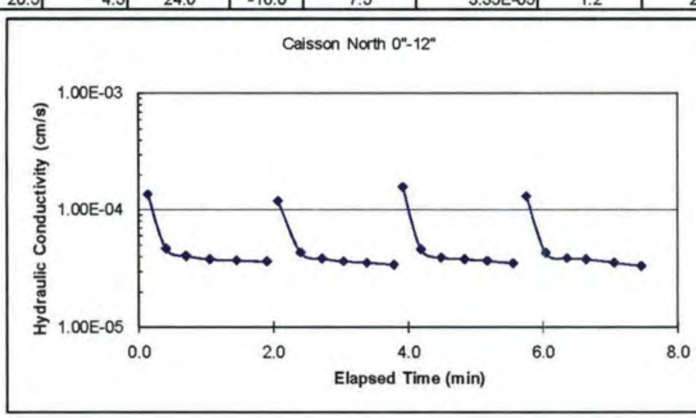
ASTM D 5084 - 00

Sample I.D.	305-mm Caisson North 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	19.7	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.5	psi	Sample Volume, V =	14363.3	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.4		a_{out} =	1	cm^2
Weight of wet sample =	23056.0	g	Sample Water Content =	12.88%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.60	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.34	336.2	303.59	12.88%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.5	0.0	24.5	0.0				
0:00:08	5.5	20.0	8.0	14.5	0.1	1.35E-04	0.8	5.5	4.5
0:00:24	9.0	17.0	16.0	8.0	0.4	4.70E-05	0.9	3.5	3
0:00:42	12.0	14.0	18.0	2.0	0.7	4.07E-05	1.0	3	3
0:01:03	15.0	10.8	21.0	-4.2	1.1	3.82E-05	1.1	3	3.2
0:01:27	18.0	7.3	24.0	-10.7	1.5	3.73E-05	1.2	3	3.5
0:01:54	21.0	3.6	27.0	-17.4	1.9	3.66E-05	1.2	3	3.7
0:00:00	0.0	23.9	-114.0	23.9	1.9				
0:00:10	6.0	19.0	10.0	13.0	2.1	1.19E-04	0.8	6	4.9
0:00:30	10.0	15.6	20.0	5.6	2.4	4.35E-05	0.9	4	3.4
0:00:49	13.0	12.7	19.0	-0.3	2.7	3.87E-05	1.0	3	2.9
0:01:08	15.5	9.9	19.0	-5.6	3.0	3.67E-05	1.1	2.5	2.8
0:01:29	18.0	7.0	21.0	-11.0	3.4	3.57E-05	1.2	2.5	2.9
0:01:53	20.5	3.9	24.0	-16.6	3.8	3.43E-05	1.2	2.5	3.1
0:00:00	0.0	24.2	-113.0	24.2	3.8				
0:00:07	5.5	19.6	7.0	14.1	3.9	1.56E-04	0.8	5.5	4.6
0:00:23	9.0	16.7	16.0	7.7	4.2	4.64E-05	0.8	3.5	2.9
0:00:41	12.0	13.9	18.0	1.9	4.5	3.94E-05	0.9	3	2.8
0:01:02	15.0	10.7	21.0	-4.3	4.8	3.82E-05	1.1	3	3.2
0:01:22	17.5	7.8	20.0	-9.7	5.2	3.70E-05	1.2	2.5	2.9
0:01:45	20.0	4.7	23.0	-15.3	5.6	3.53E-05	1.2	2.5	3.1
0:00:00	0.0	24.1	-105.0	24.1	5.6				
0:00:09	6.0	19.3	9.0	13.3	5.8	1.30E-04	0.8	6	4.8
0:00:26	9.5	16.5	17.0	7.0	6.0	4.32E-05	0.8	3.5	2.8
0:00:45	12.5	13.5	19.0	1.0	6.4	3.89E-05	1.0	3	3
0:01:02	15.0	11.0	17.0	-4.0	6.6	3.82E-05	1.0	2.5	2.5
0:01:27	18.0	7.5	25.0	-10.5	7.1	3.57E-05	1.2	3	3.5
0:01:51	20.5	4.5	24.0	-16.0	7.5	3.35E-05	1.2	2.5	3



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

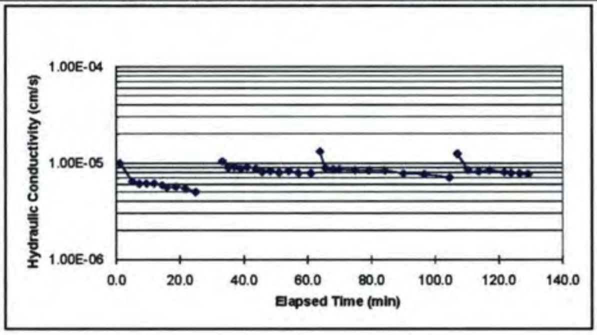
ASTM D 5084 - 00

Sample I.D.	150-mm Caisson North 0-30 cm			Test Date :		
Cell Pressure =	41.7	psi		Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.7	psi		Length of Sample, L =	9.3	cm
Outflow Pressre =	40.1	psi		Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.6	psi		Sample Volume, V =	1691.2	cm^3
Effective Stress =	1.3	psi		a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6			a_{out} =	1	cm^2
Weight of wet sample =	3157.4	g		Sample Water Content =	25.95%	(%)
Wet Density =	1.9	g/cm^3		Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.89	200.1	165.24	25.95%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:01:06	1.0	23.3	66.0	22.3	1.1	1.00E-05	0.7	1	0.7
0:05:06	3.0	21.5	239.0	18.5	5.1	6.46E-06	0.9	2	1.8
0:07:17	4.0	20.6	132.0	16.6	7.3	6.12E-06	0.9	1	0.9
0:09:33	5.0	19.7	136.0	14.7	9.6	6.14E-06	0.9	1	0.9
0:11:54	6.0	18.8	141.0	12.8	11.9	6.12E-06	0.9	1	0.9
0:14:26	7.0	17.9	152.0	10.9	14.4	5.88E-06	0.9	1	0.9
0:15:53	7.5	17.4	87.0	9.9	15.9	5.55E-06	1.0	0.5	0.5
0:18:40	8.5	16.5	167.0	8.0	18.7	5.65E-06	0.9	1	0.9
0:21:41	9.5	15.6	181.0	6.1	21.7	5.42E-06	0.9	1	0.9
0:24:54	10.5	14.8	193.0	4.3	24.9	5.00E-06	0.8	1	0.8
					24.9				
0:00:00	0.0	24.0	0.0	24.0	24.9				
0:08:27	6.5	18.0	507.0	11.5	33.4	1.05E-05	0.9	6.5	6
0:10:14	7.5	17.0	107.0	9.5	35.1	9.01E-06	1.0	1	1
0:12:08	8.5	15.9	114.0	7.4	37.0	9.24E-06	1.1	1	1.1
0:14:07	9.5	14.9	119.0	5.4	39.0	8.79E-06	1.0	1	1
0:16:13	10.5	13.8	126.0	3.3	41.1	9.10E-06	1.1	1	1.1
0:18:58	11.7	12.5	165.0	0.8	43.9	8.70E-06	1.1	1.2	1.3
0:20:56	12.5	11.7	118.0	-0.8	45.8	8.17E-06	1.0	0.8	0.8
0:23:27	13.5	10.7	151.0	-2.8	48.4	8.33E-06	1.0	1	1
0:26:12	14.5	9.7	165.0	-4.8	51.1	8.02E-06	1.0	1	1
0:29:09	15.5	8.6	177.0	-6.9	54.1	8.30E-06	1.1	1	1.1
0:32:17	16.5	7.6	188.0	-8.9	57.2	7.88E-06	1.0	1	1
0:36:09	17.6	6.4	232.0	-11.2	61.1	7.84E-06	1.1	1.1	1.2
0:00:00	0.0	24.0	-2169.0	24.0	61.1				
0:02:50	3.0	21.4	170.0	18.4	63.9	1.32E-05	0.9	3	2.6
0:04:26	4.0	20.4	96.0	16.4	65.5	8.88E-06	1.0	1	1
0:07:01	5.5	18.9	155.0	13.4	68.1	8.62E-06	1.0	1.5	1.5
0:08:49	6.5	17.9	108.0	11.4	69.9	8.62E-06	1.0	1	1
0:13:44	9.0	15.4	295.0	6.4	74.8	8.44E-06	1.0	2.5	2.5
0:18:11	11.0	13.3	267.0	2.3	79.3	8.39E-06	1.1	2	2.1
0:23:12	13.0	11.1	301.0	-1.9	84.3	8.37E-06	1.1	2	2.2
0:29:01	15.0	9.0	349.0	-6.0	90.1	7.81E-06	1.1	2	2.1
0:35:30	17.0	7.0	389.0	-10.0	96.6	7.65E-06	1.0	2	2
0:43:28	19.0	5.0	478.0	-14.0	104.6	7.05E-06	1.0	2	2
0:00:00	0.0	24.0	-2608.0	24.0	104.6				
0:02:26	2.5	21.9	146.0	19.4	107.0	1.25E-05	0.8	2.5	2.1
0:05:46	4.5	19.9	200.0	15.4	110.4	8.53E-06	1.0	2	2
0:09:06	6.3	18.1	200.0	11.8	113.7	8.20E-06	1.0	1.8	1.8
0:12:28	8.0	16.3	202.0	8.3	117.1	8.43E-06	1.1	1.7	1.8
0:17:09	10.1	14.1	281.0	4.0	121.8	8.05E-06	1.0	2.1	2.2
0:19:17	11.0	13.2	128.0	2.2	123.9	7.89E-06	1.0	0.9	0.9
0:21:55	12.0	12.1	158.0	0.1	126.5	7.79E-06	1.1	1	1.1
0:24:36	13.0	11.1	161.0	-1.9	129.2	7.65E-06	1.0	1	1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

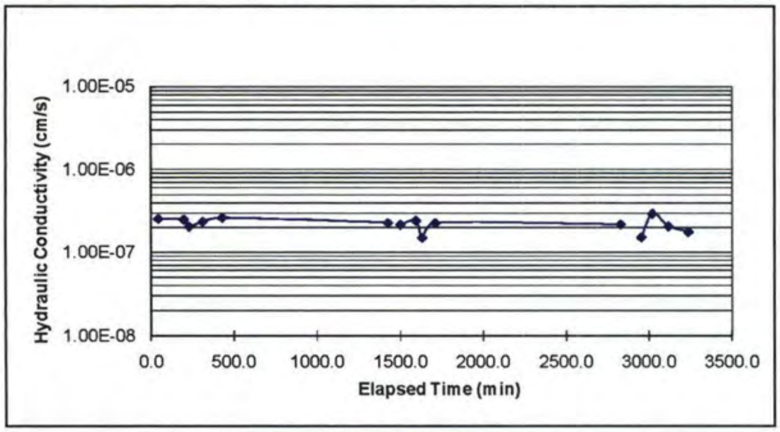
ASTM D 5084 - 00

Sample I.D.	75-mm Caisson North 0-30 cm		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.8	psi	Length of Sample, L =	2.5	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.2	psi	Sample Volume, V =	97.3	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.5		a_{out} =	1	cm^2
Weight of wet sample =	210.1	g	Sample Water Content =	26.20%	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	2.15	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.81	157.22	130.98	26.20%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:46:02	0.5	23.7	2762.0	23.2	46.0	2.55E-07	0.6	0.5	0.3
3:19:47	1.8	22.5	9225.0	20.7	199.8	2.49E-07	0.9	1.3	1.2
3:50:47	2.0	22.3	1860.0	20.3	230.8	2.06E-07	1.0	0.2	0.2
5:13:57	2.6	21.7	4990.0	19.1	314.0	2.36E-07	1.0	0.6	0.6
7:11:06	3.5	20.8	7029.0	17.3	431.1	2.63E-07	1.0	0.9	0.9
23:47:34	8.8	15.5	59788.0	6.7	1427.6	2.29E-07	1.0	5.3	5.3
0:00:00	8.9	15.5	-85654.0	6.6	1427.6				
1:15:08	9.2	15.2	4508.0	6.0	1502.7	2.17E-07	1.0	0.3	0.3
2:47:59	9.6	14.8	5571.0	5.2	1595.6	2.42E-07	1.0	0.4	0.4
3:26:13	9.7	14.7	2294.0	5.0	1633.8	1.51E-07	1.0	0.1	0.1
4:44:09	10.0	14.4	4676.0	4.4	1711.8	2.27E-07	1.0	0.3	0.3
23:22:14	13.3	11.1	67085.0	-2.2	2829.8	2.18E-07	1.0	3.3	3.3
0:00:00	13.3	11.1	-84134.0	-2.2	2829.8				
2:04:45	13.5	10.9	7485.0	-2.6	2954.6	1.52E-07	1.0	0.2	0.2
3:11:32	13.7	10.7	4007.0	-3.0	3021.3	2.94E-07	1.0	0.2	0.2
4:49:46	13.9	10.5	5894.0	-3.4	3119.6	2.07E-07	1.0	0.2	0.2
6:48:34	14.1	10.3	7128.0	-3.8	3238.4	1.78E-07	1.0	0.2	0.2



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

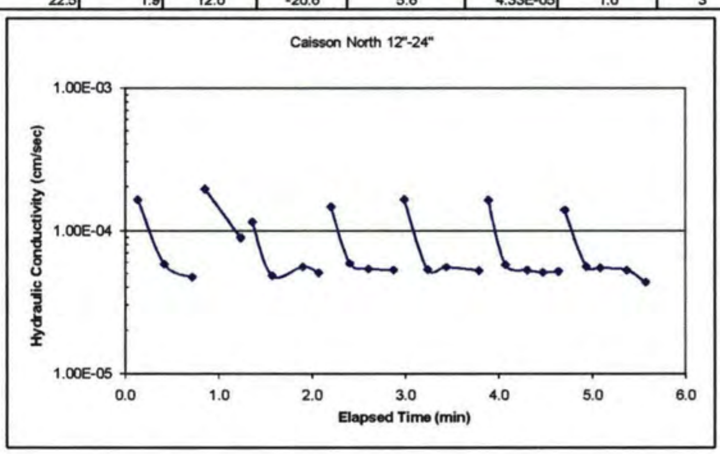
ASTM D 5084 - 00

Sample I.D.	305-mm Cassion North 30-60 cm		Test Date :		
Cell Pressure =	35.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	32.5	psi	Length of Sample, L =	20.3	cm
Outflow Pressre =	30.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.5	psi	Sample Volume, V =	14826.7	cm^3
Effective Stress =	3.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	8.7		a_{out} =	1	cm^2
Weight of wet sample =	21835.8	g	Sample Water Content =	17.92%	(%)
Wet Density =	1.5	g/cm^3	Dry Density =	1.47	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.78	337.5	293.92	17.92%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.5	0.0	24.5	0.0				
0:00:08	10.0	16.5	8.0	6.5	0.1	1.64E-04	0.8	10	8
0:00:25	19.0	13.0	17.0	-6.0	0.4	5.82E-05	0.4	9	3.5
0:00:43	25.0	9.0	18.0	-16.0	0.7	4.69E-05	0.7	6	4
0:00:00	0.0	24.0	0.0	24.0	0.7				
0:00:08	10.0	13.0	8.0	3.0	0.9	1.93E-04	1.1	10	11
0:00:31	22.4	0.8	23.0	-21.6	1.2	8.96E-05	1.0	12.4	12.2
0:00:00	0.0	24.1	-31.0	24.1	1.2				
0:00:10	8.0	17.0	9.5	9.0	1.4	1.15E-04	0.9	8	7.1
0:00:22	12.0	13.2	12.5	1.2	1.6	4.80E-05	1.0	4	3.8
0:00:42	19.0	6.6	20.0	-12.4	1.9	5.57E-05	0.9	7	6.6
0:00:52	22.0	3.8	10.0	-18.2	2.1	5.03E-05	0.9	3	2.8
0:00:00	0.0	24.1	-52.0	24.1	2.1				
0:00:06	6.5	18.4	6.0	11.9	2.2	1.46E-04	0.9	6.5	5.7
0:00:18	11.0	13.6	12.0	2.6	2.4	5.90E-05	1.1	4.5	4.8
0:00:30	15.0	9.5	12.0	-5.5	2.6	5.39E-05	1.0	4	4.1
0:00:46	20.0	4.5	16.0	-15.5	2.9	5.27E-05	1.0	5	5
0:00:00	0.0	24.1	-46.0	24.1	2.9				
0:00:05	6.0	18.7	5.0	12.7	3.0	1.64E-04	0.9	6	5.4
0:00:20	11.0	13.2	15.0	2.2	3.2	5.32E-05	1.1	5	5.5
0:00:32	15.0	8.9	12.0	-6.1	3.4	5.54E-05	1.1	4	4.3
0:00:53	21.5	2.5	21.0	-19.0	3.8	5.24E-05	1.0	6.5	6.4
0:00:00	0.0	24.0	-53.0	24.0	3.8				
0:00:05	6.0	18.7	5.0	12.7	3.9	1.62E-04	0.9	6	5.3
0:00:16	10.0	14.3	11.0	4.3	4.1	5.77E-05	1.1	4	4.4
0:00:30	14.5	9.5	14.0	-5.0	4.3	5.27E-05	1.1	4.5	4.8
0:00:40	17.5	6.4	10.0	-11.1	4.5	5.06E-05	1.0	3	3.1
0:00:50	20.5	3.4	10.0	-17.1	4.6	5.17E-05	1.0	3	3
0:00:00	0.0	24.1	-50.0	24.1	4.6				
0:00:06	6.0	18.5	6.0	12.5	4.7	1.39E-04	0.9	6	5.6
0:00:20	11.0	13.2	14.0	2.2	4.9	5.59E-05	1.1	5	5.3
0:00:29	14.0	10.0	9.0	-4.0	5.1	5.48E-05	1.1	3	3.2
0:00:46	19.5	4.8	17.0	-14.7	5.4	5.27E-05	0.9	5.5	5.2
0:00:58	22.5	1.9	12.0	-20.6	5.6	4.33E-05	1.0	3	2.9



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

ASTM D 5084 - 00

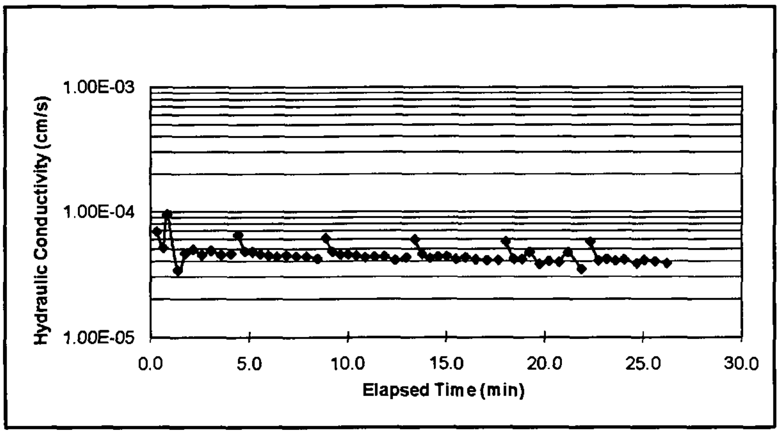
Sample I.D.	150-mm Caisson North 30-60 cm		Test Date :		
Cell Pressure =	43.9	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	9.2	cm
Outflow Pressre =	39.5	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1681.9	cm^3
Effective Stress =	3.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	3134.5	g	Sample Water Content =	21.53%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.86	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	25.87	176.58	149.88	21.53%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:20	3.0	21.2	20.0	18.2	0.3	6.95E-05	0.9	3	2.8
0:00:39	5.0	19.3	19.0	14.3	0.7	5.15E-05	0.9	2	1.9
0:00:50	7.0	17.3	11.0	10.3	0.8	9.51E-05	1.0	2	2
0:01:22	9.0	15.3	32.0	6.3	1.4	3.41E-05	1.0	2	2
0:01:46	11.0	13.4	24.0	2.4	1.8	4.63E-05	1.0	2	1.9
0:02:10	13.0	11.4	24.0	-1.6	2.2	4.97E-05	1.0	2	2
0:02:37	15.0	9.5	27.0	-5.5	2.6	4.52E-05	1.0	2	1.9
0:03:04	17.0	7.5	27.0	-9.5	3.1	4.87E-05	1.0	2	2
0:03:34	19.0	5.6	30.0	-13.4	3.6	4.51E-05	1.0	2	1.9
0:04:05	21.0	3.7	31.0	-17.3	4.1	4.61E-05	1.0	2	1.9
					4.1				
0:00:00	0.0	24.0	0.0	24.0	4.1				
0:00:22	3.0	21.0	22.0	18.0	4.5	6.54E-05	1.0	3	3
0:00:43	5.0	19.0	21.0	14.0	4.8	4.80E-05	1.0	2	2
0:01:05	7.0	17.0	22.0	10.0	5.2	4.77E-05	1.0	2	2
0:01:29	9.0	15.0	24.0	6.0	5.6	4.56E-05	1.0	2	2
0:01:54	11.0	13.1	25.0	2.1	6.0	4.46E-05	1.0	2	1.9
0:02:20	13.0	11.3	26.0	-1.7	6.4	4.37E-05	0.9	2	1.8
0:02:48	15.0	9.3	28.0	-5.7	6.9	4.47E-05	1.0	2	2
0:03:18	17.0	7.3	30.0	-9.7	7.4	4.39E-05	1.0	2	2
0:03:49	19.0	5.4	31.0	-13.6	7.9	4.37E-05	1.0	2	1.9
0:04:23	21.0	3.5	34.0	-17.5	8.5	4.21E-05	1.0	2	1.9
0:00:00	0.0	24.0	-263.0	24.0	8.5				
0:00:23	3.0	21.1	23.0	18.1	8.9	6.15E-05	1.0	3	2.9
0:00:44	5.0	19.1	21.0	14.1	9.2	4.79E-05	1.0	2	2
0:01:07	7.0	17.1	23.0	10.1	9.6	4.56E-05	1.0	2	2
0:01:31	9.0	15.1	24.0	6.1	10.0	4.55E-05	1.0	2	2
0:01:56	11.0	13.2	25.0	2.2	10.4	4.45E-05	1.0	2	1.9
0:02:23	13.0	11.3	27.0	-1.7	10.9	4.31E-05	0.9	2	1.9
0:02:51	15.0	9.4	28.0	-5.6	11.4	4.36E-05	1.0	2	1.9
0:03:21	17.0	7.4	30.0	-9.6	11.9	4.39E-05	1.0	2	2
0:03:54	19.0	5.5	33.0	-13.5	12.4	4.10E-05	1.0	2	1.9
0:04:28	21.0	3.5	34.0	-17.5	13.0	4.32E-05	1.0	2	2
0:00:00	0.0	24.0	-268.0	24.0	13.0				
0:00:24	3.0	21.0	24.0	18.0	13.4	6.00E-05	1.0	3	3
0:00:46	5.0	19.0	22.0	14.0	13.8	4.58E-05	1.0	2	2
0:01:10	7.0	17.1	24.0	10.1	14.2	4.26E-05	0.9	2	1.9
0:01:35	9.0	15.1	25.0	6.1	14.6	4.37E-05	1.0	2	2
0:02:01	11.0	13.1	26.0	2.1	15.0	4.39E-05	1.0	2	2
0:02:29	13.0	11.2	28.0	-1.8	15.5	4.16E-05	1.0	2	1.9
0:02:58	15.0	9.2	29.0	-5.8	16.0	4.33E-05	1.0	2	2
0:03:29	17.0	7.3	31.0	-9.7	16.5	4.15E-05	1.0	2	1.9
0:04:03	19.0	5.3	34.0	-13.7	17.1	4.09E-05	1.0	2	2
0:04:38	21.0	3.4	35.0	-17.6	17.6	4.10E-05	1.0	2	1.9

0:00:00	0.0	24.0	-278.0	24.0	17.6				
0:00:25	3.0	21.0	25.0	18.0	18.0	5.76E-05	1.0	3	3
0:00:49	5.0	19.0	24.0	14.0	18.4	4.20E-05	1.0	2	2
0:01:14	7.0	17.0	25.0	10.0	18.8	4.20E-05	1.0	2	2
0:01:37	9.0	15.0	23.0	6.0	19.2	4.76E-05	1.0	2	2
0:02:07	11.0	13.0	30.0	2.0	19.7	3.81E-05	1.0	2	2
0:02:36	13.0	11.1	29.0	-1.9	20.2	4.03E-05	1.0	2	1.9
0:03:07	15.0	9.2	31.0	-5.8	20.7	3.95E-05	1.0	2	1.9
0:03:35	17.0	7.2	28.0	-9.8	21.2	4.71E-05	1.0	2	2
0:04:15	19.0	5.2	40.0	-13.8	21.9	3.48E-05	1.0	2	2
0:00:00	0.0	24.0	-255.0	24.0	21.9				
0:00:25	3.0	21.0	25.0	18.0	22.3	5.76E-05	1.0	3	3
0:00:49	5.0	19.1	24.0	14.1	22.7	4.09E-05	0.9	2	1.9
0:01:14	7.0	17.1	25.0	10.1	23.1	4.19E-05	1.0	2	2
0:01:41	9.0	15.1	27.0	6.1	23.6	4.05E-05	1.0	2	2
0:02:08	11.0	13.2	27.0	2.2	24.0	4.12E-05	1.0	2	1.9
0:02:46	13.5	10.8	38.0	-2.7	24.7	3.87E-05	1.0	2.5	2.4
0:03:09	15.0	9.3	23.0	-5.7	25.1	4.11E-05	1.0	1.5	1.5
0:03:42	17.0	7.3	33.0	-9.7	25.6	4.00E-05	1.0	2	2
0:04:17	19.0	5.4	35.0	-13.6	26.2	3.87E-05	1.0	2	1.9



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

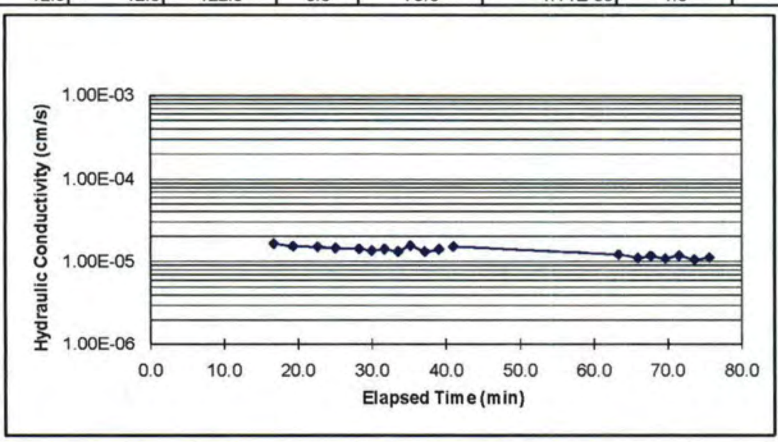
ASTM D 5084 - 00

Sample I.D.	75-mm Caisson North 30-60 cm			Test Date :	
Cell Pressure =	44.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	39.9	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.6	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	3.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.5		a_{out} =	1	cm^2
Weight of wet sample =	333.8	g	Sample Water Content =	23.89%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.96	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	31.28	148.12	125.59	23.89%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:16:40	8.0	15.9	1000.0	7.9	16.7	1.62E-05	1.0	8	8.1
0:19:17	9.0	14.9	157.0	5.9	19.3	1.51E-05	1.0	1	1
0:22:38	10.2	13.7	201.0	3.5	22.6	1.48E-05	1.0	1.2	1.2
0:25:02	11.0	12.9	144.0	1.9	25.0	1.44E-05	1.0	0.8	0.8
0:28:13	12.0	11.9	191.0	-0.1	28.2	1.41E-05	1.0	1	1
0:29:57	12.5	11.4	104.0	-1.1	30.0	1.34E-05	1.0	0.5	0.5
0:31:39	13.0	10.9	102.0	-2.1	31.7	1.40E-05	1.0	0.5	0.5
0:33:31	13.5	10.4	112.0	-3.1	33.5	1.31E-05	1.0	0.5	0.5
0:35:09	14.0	9.9	98.0	-4.1	35.2	1.53E-05	1.0	0.5	0.5
0:37:07	14.5	9.4	118.0	-5.1	37.1	1.31E-05	1.0	0.5	0.5
0:39:01	15.0	8.9	114.0	-6.1	39.0	1.39E-05	1.0	0.5	0.5
0:00:00	0.0	24.0		24.0	39.0				
0:01:59	1.0	23.0	119.0	22.0	41.0	1.50E-05	1.0	1	1
0:24:20	8.8	15.2	1341.0	6.4	63.3	1.20E-05	1.0	7.8	7.8
0:26:55	9.5	14.5	155.0	5.0	65.9	1.09E-05	1.0	0.7	0.7
0:28:42	10.0	14.0	107.0	4.0	67.7	1.16E-05	1.0	0.5	0.5
0:30:39	10.5	13.5	117.0	3.0	69.7	1.08E-05	1.0	0.5	0.5
0:32:30	11.0	13.0	111.0	2.0	71.5	1.17E-05	1.0	0.5	0.5
0:34:36	11.5	12.5	126.0	1.0	73.6	1.05E-05	1.0	0.5	0.5
0:36:38	12.0	12.0	122.0	0.0	75.6	1.11E-05	1.0	0.5	0.5



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

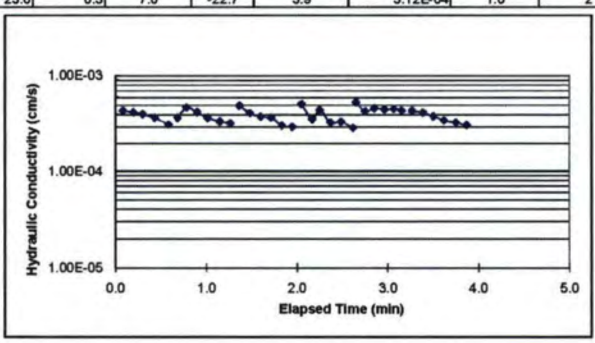
ASTM D 5084 - 00

Sample I.D.	305-mm Caisson North Radon			Test Date :		
Cell Pressure =	42.0	psi		Diameter of Sample, D =	30.5	cm
Inflow Pressure =	40.6	psi		Length of Sample, L =	17.5	cm
Outflow Pressre =	40.0	psi		Area of Sample, A =	729.66	cm^2
Pressure Difference =	0.6	psi		Sample Volume, V =	12741.7	cm^3
Effective Stress =	1.7	psi		a_{in} =	1	cm^2
Hydraulic Gradient, i =	2.4			a_{out} =	1	cm^2
Weight of wet sample =	22997.0	g		Sample Water Content =	16.28%	(%)
Wet Density =	1.8	g/cm^3		Dry Density =	1.80	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.35	328.01	289.14	16.28%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.8	0.0	23.8	0.0				
0:00:05	5.0	17.8	5.0	12.8	0.1	4.36E-04	1.2	5	6
0:00:12	11.0	11.8	7.0	0.8	0.2	4.21E-04	1.0	6	6
0:00:18	15.0	7.9	6.0	-7.1	0.3	4.05E-04	1.0	4	3.9
0:00:26	19.0	4.2	8.0	-14.8	0.4	3.70E-04	0.9	4	3.7
0:00:35	22.0	1.4	9.0	-20.6	0.6	3.16E-04	0.9	3	2.8
0:00:00	0.0	24.0	-35.0	24.0	0.6				
0:00:05	4.5	19.0	5.0	14.5	0.7	3.71E-04	1.1	4.5	5
0:00:11	10.5	13.0	6.0	2.5	0.8	4.74E-04	1.0	6	6
0:00:18	15.5	8.2	7.0	-7.3	0.9	4.23E-04	1.0	5	4.8
0:00:25	19.0	4.9	7.0	-14.1	1.0	3.70E-04	0.9	3.5	3.3
0:00:33	22.0	2.2	8.0	-19.8	1.2	3.39E-04	0.9	3	2.7
0:00:40	24.0	0.3	7.0	-23.7	1.3	3.27E-04	1.0	2	1.9
0:00:00	0.0	24.1	-40.0	24.1	1.3				
0:00:04	4.5	18.5	4.0	14.0	1.4	4.94E-04	1.2	4.5	5.6
0:00:11	10.5	12.4	7.0	1.9	1.5	4.14E-04	1.0	6	6.1
0:00:18	15.0	8.1	7.0	-6.9	1.6	3.81E-04	1.0	4.5	4.3
0:00:25	18.5	4.7	7.0	-13.8	1.7	3.72E-04	1.0	3.5	3.4
0:00:32	21.0	2.5	7.0	-18.5	1.8	3.09E-04	0.9	2.5	2.2
0:00:39	23.0	0.7	7.0	-22.3	2.0	2.99E-04	0.9	2	1.8
0:00:00	0.0	24.0	-39.0	24.0	2.0				
0:00:03	3.5	19.5	3.0	16.0	2.1	5.14E-04	1.3	3.5	4.5
0:00:10	9.0	14.0	7.0	5.0	2.2	3.58E-04	1.0	5.5	5.5
0:00:15	13.0	10.0	5.0	-3.0	2.3	4.44E-04	1.0	4	4
0:00:22	16.5	6.6	7.0	-9.9	2.4	3.31E-04	1.0	3.5	3.4
0:00:29	19.5	3.8	7.0	-15.7	2.5	3.38E-04	0.9	3	2.8
0:00:37	22.0	1.6	8.0	-20.4	2.6	2.92E-04	0.9	2.5	2.2
0:00:00	0.0	24.1	-37.0	24.1	2.6				
0:00:03	4.0	19.8	3.0	15.8	2.7	5.33E-04	1.1	4	4.3
0:00:09	9.5	14.0	6.0	4.5	2.8	4.32E-04	1.1	5.5	5.8
0:00:15	14.5	9.3	6.0	-5.2	2.9	4.64E-04	0.9	5	4.7
0:00:22	19.0	5.2	7.0	-13.8	3.0	4.52E-04	0.9	4.5	4.1
0:00:28	22.0	2.4	6.0	-19.6	3.1	4.56E-04	0.9	3	2.8
0:00:33	24.0	0.6	5.0	-23.4	3.2	4.41E-04	0.9	2	1.8
0:00:00	0.0	24.0	-33.0	24.0	3.2				
0:00:04	4.0	19.0	4.0	15.0	3.3	4.37E-04	1.3	4	5
0:00:11	10.0	12.6	7.0	2.6	3.4	4.18E-04	1.1	6	6.4
0:00:18	14.5	8.1	7.0	-6.4	3.5	3.83E-04	1.0	4.5	4.5
0:00:25	18.0	5.0	7.0	-13.0	3.6	3.48E-04	0.9	3.5	3.1
0:00:33	21.0	2.2	8.0	-18.8	3.8	3.31E-04	0.9	3	2.8
0:00:40	23.0	0.3	7.0	-22.7	3.9	3.12E-04	1.0	2	1.9



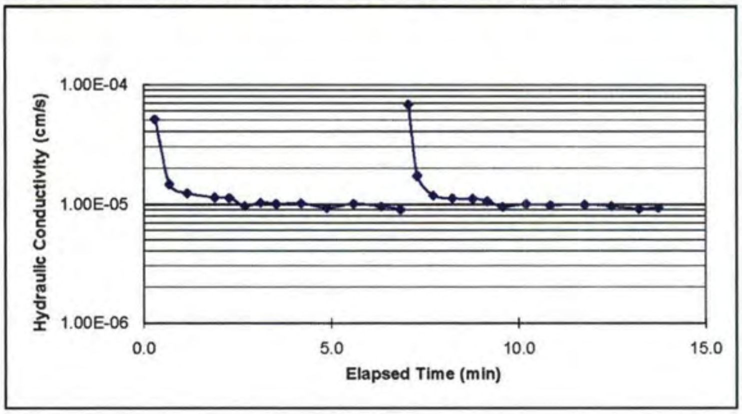
Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

Sample I.D.	305-mm Caisson North Radon		Test Date :		
Cell Pressure =	42.5	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.5	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.5	psi	Sample Volume, V =	12973.3	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.9		a_{out} =	1	cm^2
Weight of wet sample =	26126.8	lb	Sample Water Content =	15.75%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.01	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	50.37	360.26	318.09	15.75%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:18	6.0	20.7	18.0	14.7	0.3	5.04E-05	0.6	6	3.3
0:00:41	7.5	18.9	23.0	11.4	0.7	1.47E-05	1.2	1.5	1.8
0:01:10	9.0	17.0	29.0	8.0	1.2	1.24E-05	1.3	1.5	1.9
0:01:54	11.0	14.4	44.0	3.4	1.9	1.15E-05	1.3	2	2.6
0:02:17	12.0	13.1	23.0	1.1	2.3	1.13E-05	1.3	1	1.3
0:02:42	13.0	12.0	25.0	-1.0	2.7	9.70E-06	1.1	1	1.1
0:03:07	14.0	10.8	25.0	-3.2	3.1	1.04E-05	1.2	1	1.2
0:03:32	15.0	9.7	25.0	-5.3	3.5	1.01E-05	1.1	1	1.1
0:04:12	16.5	7.9	40.0	-8.6	4.2	1.02E-05	1.2	1.5	1.8
0:04:53	18.0	6.4	41.0	-11.6	4.9	9.35E-06	1.0	1.5	1.5
0:05:36	19.5	4.6	43.0	-14.9	5.6	1.01E-05	1.2	1.5	1.8
0:06:20	21.0	3.0	44.0	-18.0	6.3	9.64E-06	1.1	1.5	1.6
0:06:51	22.0	2.0	31.0	-20.0	6.9	9.09E-06	1.0	1	1
0:00:00	0.0	24.0	-411.0	24.0	6.9				
0:00:10	5.0	22.0	10.0	17.0	7.1	6.77E-05	0.4	5	2
0:00:24	6.5	21.1	14.0	14.6	7.3	1.72E-05	0.6	1.5	0.9
0:00:50	8.0	19.6	26.0	11.6	7.7	1.19E-05	1.0	1.5	1.5
0:01:20	9.5	17.9	30.0	8.4	8.2	1.13E-05	1.1	1.5	1.7
0:01:53	11.0	16.0	33.0	5.0	8.8	1.12E-05	1.3	1.5	1.9
0:02:16	12.0	14.8	23.0	2.8	9.2	1.07E-05	1.2	1	1.2
0:02:41	13.0	13.7	25.0	0.7	9.6	9.54E-06	1.1	1	1.1
0:03:18	14.5	12.0	37.0	-2.5	10.2	1.01E-05	1.1	1.5	1.7
0:03:57	16.0	10.3	39.0	-5.7	10.9	9.86E-06	1.1	1.5	1.7
0:04:52	18.0	7.9	55.0	-10.1	11.8	9.99E-06	1.2	2	2.4
0:05:35	19.5	6.2	43.0	-13.3	12.5	9.67E-06	1.1	1.5	1.7
0:06:19	21.0	4.7	44.0	-16.3	13.2	9.16E-06	1.0	1.5	1.5
0:06:50	22.0	3.6	31.0	-18.4	13.7	9.36E-06	1.1	1	1.1



Hydraulic Conductivity Test - Monticello - Store-and-Release Cover

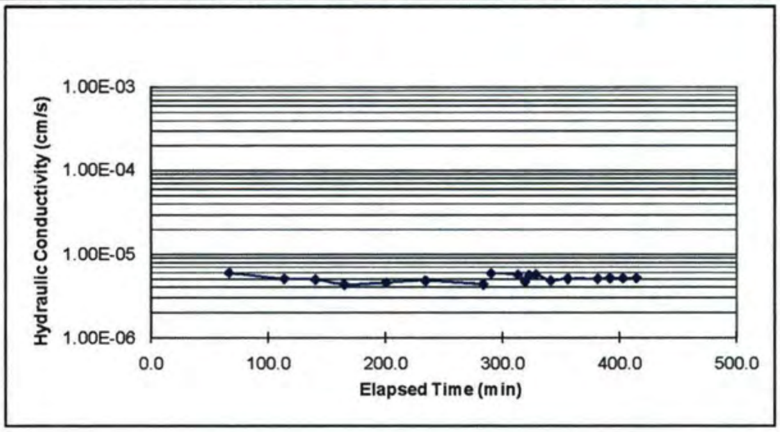
ASTM D 5084 - 00

Sample I.D.	75-mm Caisson North Radon		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.3	psi	Length of Sample, L =	4.4	cm
Outflow Pressre =	40.1	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.2	psi	Sample Volume, V =	170.3	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	3.2		a_{out} =	1	cm^2
Weight of wet sample =	340.8	g	Sample Water Content =	21.94%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.00	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
	30.76	128.57	110.97	21.94%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
1:06:39	6.4	17.7	3999.0	11.3	66.7	5.89E-06	1.0	6.4	6.3
1:53:47	9.1	14.9	2828.0	5.8	113.8	5.01E-06	1.0	2.7	2.8
2:20:21	10.4	13.7	1594.0	3.3	140.4	4.89E-06	0.9	1.3	1.2
2:44:56	11.3	12.8	1475.0	1.5	164.9	4.30E-06	1.0	0.9	0.9
3:20:49	12.5	11.6	2153.0	-0.9	200.8	4.51E-06	1.0	1.2	1.2
3:54:21	13.5	10.6	2012.0	-2.9	234.4	4.75E-06	1.0	1	1
4:43:38	14.6	9.5	2957.0	-5.1	283.6	4.30E-06	1.0	1.1	1.1
0:00:00	0.0	24.0	-17018.0	24.0	283.6				
0:06:41	0.8	23.3	401.0	22.5	290.3	5.81E-06	0.9	0.8	0.7
0:29:48	3.1	21.0	1387.0	17.9	313.4	5.62E-06	1.0	2.3	2.3
0:35:48	3.6	20.6	360.0	17.0	319.4	4.60E-06	0.8	0.5	0.4
0:39:13	3.9	20.3	205.0	16.4	322.8	5.52E-06	1.0	0.3	0.3
0:44:58	4.4	19.8	345.0	15.4	328.6	5.61E-06	1.0	0.5	0.5
0:57:45	5.3	18.9	767.0	13.6	341.4	4.77E-06	1.0	0.9	0.9
1:12:09	6.3	17.9	864.0	11.6	355.8	5.04E-06	1.0	1	1
1:37:57	7.9	16.3	1548.0	8.4	381.6	4.99E-06	1.0	1.6	1.6
1:48:22	8.5	15.7	625.0	7.2	392.0	5.09E-06	1.0	0.6	0.6
1:59:26	9.1	15.1	664.0	6.0	403.0	5.07E-06	1.0	0.6	0.6
2:11:09	9.7	14.5	703.0	4.8	414.8	5.09E-06	1.0	0.6	0.6



Hydraulic Conductivity Test - Omaha - Composite Cover

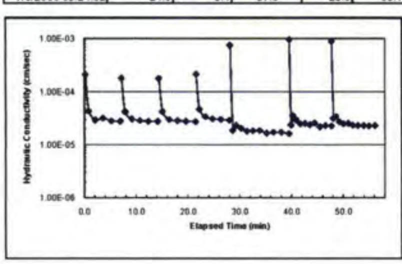
ASTM D 5084 - 00

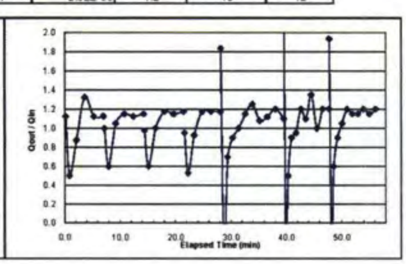
Sample I.D.	305-mm DCRDF C1 Below Membrane				Test Date :	7/3/08	
Cell Pressure =	42.7	psi		Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	42.4	psi		Length of Sample, L =	15.2	cm	
Outflow Pressre =	40.0	psi		Area of Sample, A =	729.66	cm^2	
Pressure Difference =	2.4	psi		Sample Volume, V =	11120.0	cm^3	
Effective Stress =	1.5	psi		a_{in} =	5	cm^2	
Hydraulic Gradient, i =	11.1			a_{out} =	5	cm^2	
Weight of wet sample =	22150.0	g		Sample Water Content =	24.3%	(%)	
Wet Density =	2.0	g/cm^3		Dry Density =	1.99	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
GC-2	30.79	119.7	102.32	24.30%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/3/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
7/3/2008 00:11.00	4.0	20.3	11.0	16.3	0.2	2.13E-04	1.1	20	22.5
7/3/2008 00:50.00	8.0	18.3	39.0	10.3	0.8	4.40E-05	0.5	20	10
7/3/2008 02:05.00	12.0	14.8	75.0	2.8	2.1	2.97E-05	0.9	20	17.5
7/3/2008 03:35.00	16.0	9.5	90.0	-6.5	3.6	3.23E-05	1.3	20	26.5
7/3/2008 05:13.00	20.0	5.0	98.0	-15.0	5.2	2.86E-05	1.1	20	22.5
7/3/2008 06:58.00	24.0	0.5	105.0	-23.5	7.0	2.82E-05	1.1	20	22.5
7/3/2008 00:00.00	0.0	24.8	0.0	24.8	7.0				
7/3/2008 00:12.00	4.0	20.8	12.0	16.8	7.2	1.83E-04	1.0	20	20
7/3/2008 00:55.00	8.0	18.4	43.0	10.4	7.9	4.25E-05	0.6	20	12
7/3/2008 02:14.00	12.0	14.2	79.0	2.2	9.2	3.09E-05	1.1	20	21
7/3/2008 03:46.00	16.0	9.6	92.0	-6.4	10.7	2.92E-05	1.2	20	23
7/3/2008 05:26.00	20.0	5.1	100.0	-14.9	12.4	2.80E-05	1.1	20	22.5
7/3/2008 07:13.00	24.0	0.5	107.0	-23.5	14.2	2.80E-05	1.2	20	23
7/3/2008 00:00.00	0.0	24.8	0.0	24.8	14.2				
7/3/2008 00:12.00	4.0	20.9	12.0	16.9	14.4	1.81E-04	1.0	20	19.5
7/3/2008 00:55.00	8.0	18.5	43.0	10.5	15.1	4.25E-05	0.6	20	12
7/3/2008 02:13.00	12.0	14.5	78.0	2.5	16.4	3.05E-05	1.0	20	20
7/3/2008 03:47.00	16.0	9.8	94.0	-6.2	18.0	2.89E-05	1.2	20	23.5
7/3/2008 05:27.00	20.0	5.2	100.0	-14.8	19.6	2.83E-05	1.2	20	23
7/3/2008 07:16.00	24.0	0.5	109.0	-23.5	21.5	2.78E-05	1.2	20	23.5
7/3/2008 00:00.00	0.0	24.8	0.0	24.8	21.5				
7/3/2008 00:10.00	4.0	21.0	10.0	17.0	21.6	2.14E-04	1.0	20	19
7/3/2008 00:47.00	8.0	18.9	37.0	10.9	22.2	4.70E-05	0.5	20	10.5
7/3/2008 01:54.00	12.0	15.2	67.0	3.2	23.4	3.41E-05	0.9	20	18.5
7/3/2008 03:21.00	16.0	10.5	87.0	-5.5	24.8	3.11E-05	1.2	20	23.5
7/3/2008 04:55.00	20.0	5.8	94.0	-14.2	26.4	3.03E-05	1.2	20	23.5
7/3/2008 06:38.00	24.0	1.1	103.0	-22.9	28.1	2.93E-05	1.2	20	23.5
7/6/2008 00:00.00	0.0	24.4	0.0	24.4	28.1				
7/6/2008 00:03.14	3.0	18.9	3.1	15.9	28.1	7.47E-04	1.8	15	27.5
7/6/2008 00:36.55	6.0	19.7	33.4	13.7	28.7	1.87E-05	-0.3	15	-4
7/6/2008 01:18.68	8.0	18.3	42.1	10.3	29.4	2.33E-05	0.7	10	7
7/6/2008 02:12.78	10.0	16.5	54.1	6.5	30.3	2.07E-05	0.9	10	9
7/6/2008 03:18.56	12.0	14.5	65.8	2.5	31.4	1.83E-05	1.0	10	10
7/6/2008 04:30.23	14.0	12.2	71.7	-1.8	32.6	1.85E-05	1.2	10	11.5
7/6/2008 05:46.25	16.0	9.7	76.0	-6.3	33.9	1.87E-05	1.3	10	12.5
7/6/2008 07:07.06	18.0	7.5	80.8	-10.5	35.2	1.67E-05	1.1	10	10.8
7/6/2008 08:28.33	20.0	5.3	81.3	-14.7	36.6	1.74E-05	1.1	10	11.2
7/6/2008 09:56.02	22.0	2.9	87.7	-19.1	38.0	1.72E-05	1.2	10	12
7/6/2008 11:26.06	24.0	0.7	90.0	-23.3	39.5	1.65E-05	1.1	10	11
7/8/2008 00:00.00	0.0	24.9	0.0	24.9	39.5				
7/8/2008 00:02.78	3.0	18.3	2.8	15.3	39.6	9.53E-04	2.2	15	33
7/8/2008 00:23.05	6.0	19.6	20.3	13.6	39.9	2.39E-05	-0.4	15	-6.5
7/8/2008 00:47.14	8.0	18.6	24.1	10.6	40.3	3.59E-05	0.5	10	5
7/8/2008 01:24.95	10.0	16.8	37.8	6.8	40.9	2.95E-05	0.9	10	9
7/8/2008 02:11.92	12.0	14.9	47.0	2.9	41.7	2.49E-05	1.0	10	9.5
7/8/2008 03:04.61	14.0	12.5	52.7	-1.5	42.6	2.57E-05	1.2	10	12
7/8/2008 03:59.87	16.0	10.3	55.3	-5.7	43.5	2.40E-05	1.1	10	11
7/8/2008 04:58.56	18.0	7.6	58.7	-10.4	44.5	2.60E-05	1.4	10	13.5
7/8/2008 05:59.11	20.0	5.6	60.6	-14.4	45.5	2.20E-05	1.0	10	10
7/8/2008 07:03.65	22.0	3.2	64.5	-18.8	46.6	2.33E-05	1.2	10	12
7/8/2008 08:11.25	24.0	0.8	67.6	-23.2	47.7	2.29E-05	1.2	10	12
7/8/2008 00:00.00	0.0	24.8	0.0	24.8	47.7				
7/8/2008 00:02.73	3.0	19	2.7	16	47.8	8.88E-04	1.9	15	29
7/8/2008 00:24.21	6.0	19.6	21.5	13.6	48.1	3.17E-05	-0.2	15	-3
7/8/2008 00:50.95	8.0	18.4	26.7	10.4	48.6	3.45E-05	0.6	10	6
7/8/2008 01:31.75	10.0	16.6	40.8	6.6	49.2	2.74E-05	0.9	10	9
7/8/2008 02:20.25	12.0	14.5	48.5	2.5	50.0	2.54E-05	1.1	10	10.5
7/8/2008 03:13.33	14.0	12.1	53.1	-1.9	50.9	2.55E-05	1.2	10	12
7/8/2008 04:11.02	16.0	9.8	57.7	-6.2	51.9	2.36E-05	1.2	10	11.5
7/8/2008 05:10.87	18.0	7.5	59.9	-10.5	52.9	2.33E-05	1.2	10	11.5
7/8/2008 06:13.61	20.0	5.1	62.7	-14.9	53.9	2.34E-05	1.2	10	12
7/8/2008 07:17.56	22.0	2.8	64.0	-19.2	55.0	2.31E-05	1.2	10	11.5
7/8/2008 08:24.52	24.0	0.4	67.0	-23.6	56.1	2.32E-05	1.2	10	12





Hydraulic Conductivity Test - Omaha - Thin Store-and-Release Cover

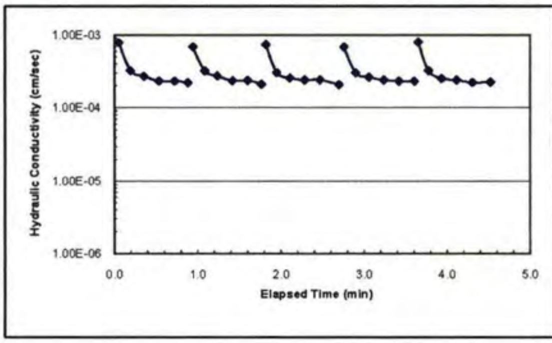
ASTM D 5084 - 00

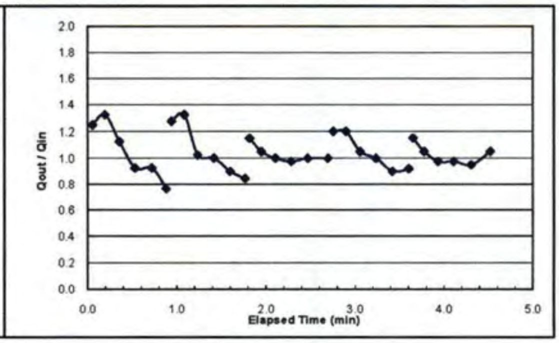
Sample I.D.	305-mm DCRDF A-1 Shallow		Test Date :	7/9/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	21150.0	g	Sample Water Content =	24.7%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.90	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
k7	30.8	141.98	119.95	24.71%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/9/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
7/9/2008 00:03.15	4.0	19.8	3.1	15.8	0.1	7.88E-04	1.3	20	25
7/9/2008 00:11.56	8.0	14.5	8.4	6.5	0.2	3.20E-04	1.3	20	26.5
7/9/2008 00:21.25	12.0	10.0	9.7	-2.0	0.4	2.67E-04	1.1	20	22.5
7/9/2008 00:31.92	16.0	6.3	10.7	-9.7	0.5	2.31E-04	0.9	20	18.5
7/9/2008 00:43.15	20.0	2.6	11.2	-17.4	0.7	2.30E-04	0.9	20	18.5
7/9/2008 00:52.75	23.4	0.0	9.6	-23.4	0.9	2.19E-04	0.8	17	13
7/9/2008 00:00.00	0.0	24.8	0.0	24.8	0.9				
7/9/2008 00:03.65	4.0	19.7	3.6	15.7	0.9	6.87E-04	1.3	20	25.5
7/9/2008 00:12.14	8.0	14.4	8.5	6.4	1.1	3.17E-04	1.3	20	26.5
7/9/2008 00:21.25	12.0	10.3	9.1	-1.7	1.2	2.71E-04	1.0	20	20.5
7/9/2008 00:32.28	16.0	6.3	11.0	-9.7	1.4	2.32E-04	1.0	20	20
7/9/2008 00:43.15	20.0	2.7	10.9	-17.3	1.6	2.35E-04	0.9	20	18
7/9/2008 00:53.06	23.2	0.0	9.9	-23.2	1.8	2.09E-04	0.8	16	13.5
7/9/2008 00:00.00	0.0	24.8	0.0	24.8	1.8				
7/9/2008 00:03.21	4.0	20.2	3.2	16.2	1.8	7.38E-04	1.2	20	23
7/9/2008 00:11.05	8.0	16.0	7.8	8.0	1.9	3.01E-04	1.1	20	21
7/9/2008 00:20.55	12.0	12.0	9.5	0.0	2.1	2.54E-04	1.0	20	20
7/9/2008 00:31.09	16.0	8.1	10.5	-7.9	2.3	2.37E-04	1.0	20	19.5
7/9/2008 00:42.18	20.0	4.1	11.1	-15.9	2.5	2.40E-04	1.0	20	20
7/9/2008 00:55.90	24.0	0.1	13.7	-23.9	2.7	2.04E-04	1.0	20	20
7/9/2008 00:00.00	0.0	24.8	0.0	24.8	2.7				
7/9/2008 00:03.56	4.0	20.0	3.6	16.0	2.8	6.81E-04	1.2	20	24
7/9/2008 00:12.05	8.0	15.2	8.5	7.2	2.9	2.99E-04	1.2	20	24
7/9/2008 00:21.64	12.0	11.0	9.6	-1.0	3.1	2.59E-04	1.1	20	21
7/9/2008 00:32.33	16.0	7.0	10.7	-9.0	3.2	2.38E-04	1.0	20	20
7/9/2008 00:43.46	20.0	3.4	11.1	-16.6	3.4	2.28E-04	0.9	20	18
7/9/2008 00:54.37	23.7	0.0	10.9	-23.7	3.6	2.28E-04	0.9	18.5	17
7/9/2008 00:00.00	0.0	24.8	0.0	24.8	3.6				
7/9/2008 00:02.96	4.0	20.2	3.0	16.2	3.7	8.00E-04	1.2	20	23
7/9/2008 00:10.36	8.0	16.0	7.4	8.0	3.8	3.19E-04	1.1	20	21
7/9/2008 00:19.87	12.0	12.1	9.5	0.1	3.9	2.50E-04	1.0	20	19.5
7/9/2008 00:30.42	16.0	8.2	10.5	-7.8	4.1	2.37E-04	1.0	20	19.5
7/9/2008 00:42.15	20.0	4.4	11.7	-15.6	4.3	2.21E-04	1.0	20	19
7/9/2008 00:55.06	24.0	0.2	12.9	-23.8	4.5	2.22E-04	1.1	20	21





Hydraulic Conductivity Test - Omaha - Thin Store-and-Release Cover

ASTM D 5084 - 00

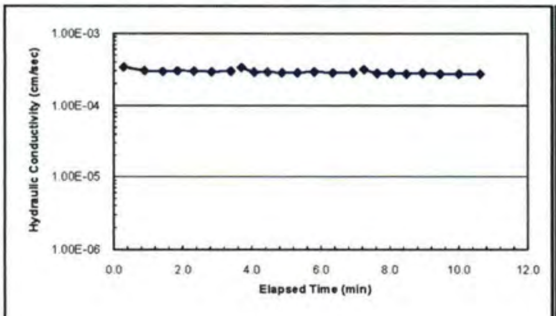
Sample I.D. **150-mm Omaha DCRDF A1 Shallow 1** **Test Date :** **7/14/08**

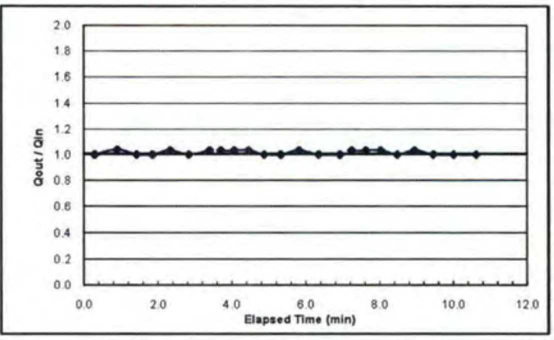
Cell Pressure =	42.7	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	41.8	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.6	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.2	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.50	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	2366.8	(g)	Sample Water Content =	28.3%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.70	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
B3	30.94	124.91	104.18	28.30%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/14/08 00:00.00	0.0	24.8	0.0	24.8	0.0				
7/14/08 00:17.42	3.0	21.8	17.4	18.8	0.3	3.39E-04	1.0	15	15
7/14/08 00:53.57	8.0	16.6	36.2	8.6	0.9	3.01E-04	1.0	25	26
7/14/08 01:25.55	12.0	12.6	32.0	0.6	1.4	2.94E-04	1.0	20	20
7/14/08 01:51.17	15.0	9.6	25.6	-5.4	1.9	2.98E-04	1.0	15	15
7/14/08 02:19.44	18.0	6.5	28.3	-11.5	2.3	2.97E-04	1.0	15	15.5
7/14/08 02:50.30	21.0	3.5	30.9	-17.5	2.8	2.91E-04	1.0	15	15
7/14/08 03:23.83	24.0	0.4	33.5	-23.6	3.4	2.98E-04	1.0	15	15.5
7/14/08 00:00.00	0.0	24.8	0.0	24.8	3.4				
7/14/08 00:17.99	3.0	21.7	18.0	18.7	3.7	3.34E-04	1.0	15	15.5
7/14/08 00:40.06	6.0	18.6	22.1	12.6	4.1	2.89E-04	1.0	15	15.5
7/14/08 01:03.54	9.0	15.5	23.5	6.5	4.5	2.89E-04	1.0	15	15.5
7/14/08 01:28.84	12.0	12.5	25.3	0.5	4.9	2.82E-04	1.0	15	15
7/14/08 01:55.94	15.0	9.5	27.1	-5.5	5.3	2.82E-04	1.0	15	15
7/14/08 02:25.08	18.0	6.4	29.1	-11.6	5.8	2.88E-04	1.0	15	15.5
7/14/08 02:57.10	21.0	3.4	32.0	-17.6	6.3	2.81E-04	1.0	15	15
7/14/08 03:31.99	24.0	0.4	34.9	-23.6	6.9	2.82E-04	1.0	15	15
7/14/08 00:00.00	0.0	24.8	0.0	24.8	6.9				
7/14/08 00:19.24	3.0	21.7	19.2	18.7	7.3	3.12E-04	1.0	15	15.5
7/14/08 00:42.34	6.0	18.6	23.1	12.6	7.6	2.76E-04	1.0	15	15.5
7/14/08 01:06.82	9.0	15.5	24.5	6.5	8.0	2.77E-04	1.0	15	15.5
7/14/08 01:33.00	12.0	12.5	26.2	0.5	8.5	2.72E-04	1.0	15	15
7/14/08 02:01.10	15.0	9.4	28.1	-5.6	8.9	2.77E-04	1.0	15	15.5
7/14/08 02:31.64	18.0	6.4	30.5	-11.6	9.5	2.71E-04	1.0	15	15
7/14/08 03:04.69	21.0	3.4	33.0	-17.6	10.0	2.72E-04	1.0	15	15
7/14/08 03:41.27	24.0	0.4	36.6	-23.6	10.6	2.69E-04	1.0	15	15





Hydraulic Conductivity Test - Omaha - Thin Store-and-Release Cover

ASTM D 5084 - 00

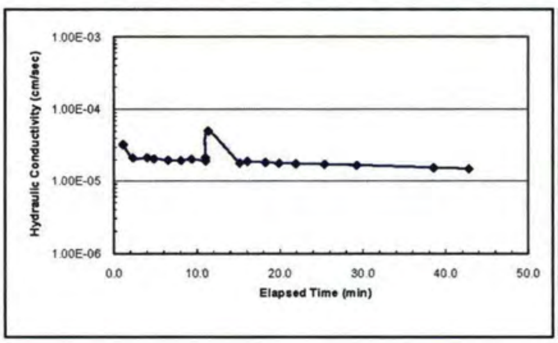
Sample I.D.	75-mm Omaha DCRDF A1-Shallow 1	Test Date :	7/31/08

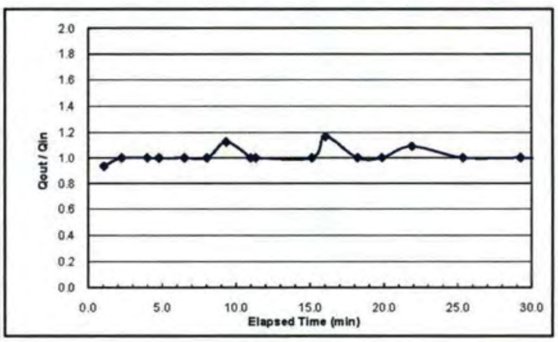
Cell Pressure =	38.1	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	37.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	37.0	psi	Area of Sample, A =	45.6	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	173.7	cm^3
Effective Stress =	0.85	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	279.9	(g)	Sample Water Content =	-405.5%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.68	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
k7	30.78	124.8		-405.46%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/31/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
7/31/08 01:04.56	1.5	22.6	64.6	21.1	1.1	3.25E-05	0.9	1.5	1.4
7/31/08 02:15.84	2.5	21.6	71.3	19.1	2.3	2.12E-05	1.0	1	1
7/31/08 03:59.87	3.9	20.2	104.0	16.3	4.0	2.13E-05	1.0	1.4	1.4
7/31/08 04:47.68	4.5	19.6	47.8	15.1	4.8	2.06E-05	1.0	0.6	0.6
7/31/08 06:31.33	5.7	18.4	103.6	12.7	6.5	1.97E-05	1.0	1.2	1.2
7/31/08 08:02.78	6.7	17.4	91.4	10.7	8.0	1.95E-05	1.0	1	1
7/31/08 09:20.50	7.5	16.5	77.7	9.0	9.3	2.03E-05	1.1	0.8	0.9
7/31/08 11:00.96	8.5	15.5	100.5	7.0	11.0	1.93E-05	1.0	1	1
7/31/08 00:00.00	0.0	24.0	-661.0	24.0	11.0	2.14E-05	1.0	-8.5	-8.5
7/31/08 00:19.95	0.7	23.3	19.9	22.6	11.3	5.01E-05	1.0	0.7	0.7
7/31/08 04:08.15	3.4	20.6	228.2	17.2	15.1	1.80E-05	1.0	2.7	2.7
7/31/08 05:03.65	4.0	19.9	55.5	15.9	16.1	1.89E-05	1.2	0.6	0.7
7/31/08 07:13.46	5.4	18.5	129.8	13.1	18.2	1.81E-05	1.0	1.4	1.4
7/31/08 08:52.55	6.4	17.5	99.1	11.1	19.9	1.78E-05	1.0	1	1
7/31/08 10:53.75	7.5	16.3	121.2	8.8	21.9	1.76E-05	1.1	1.1	1.2
7/31/08 14:21.73	9.3	14.5	208.0	5.2	25.4	1.72E-05	1.0	1.8	1.8
7/31/08 18:15.84	11.1	12.7	234.1	1.6	29.3	1.67E-05	1.0	1.8	1.8
7/31/08 27:31.15	14.5	9.3	555.3	-5.2	38.5	1.54E-05	1.0	3.4	3.4
7/31/08 31:47.83	15.8	8.0	256.7	-7.8	42.8	1.48E-05	1.0	1.3	1.3





Hydraulic Conductivity Test - Omaha - Thin Store-and-Release Cover

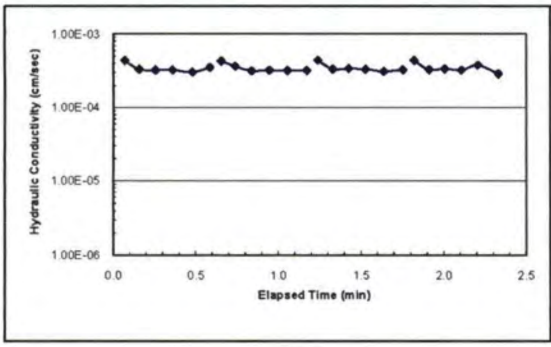
ASTM D 5084 - 00

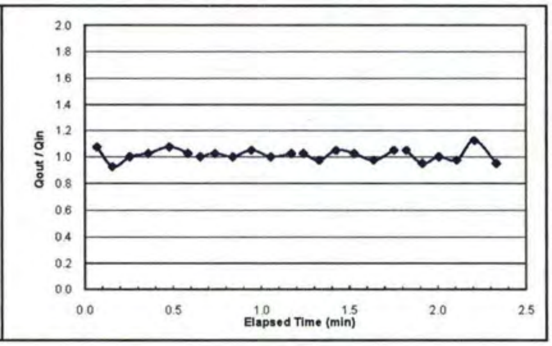
Sample I.D.	305-mm DCRDF A01-BT2 (Top)		Test Date :	7/9/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	4	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	4	cm^2
Weight of wet sample =	20900.0	g	Sample Water Content =	24.8%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.87	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
B-3	30.87	165.59	138.85	24.76%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/14/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
7/14/2008 00:04.14	4.0	20.5	4.1	16.5	0.1	4.41E-04	1.1	16	17.2
7/14/2008 00:09.44	8.0	16.8	5.3	8.8	0.2	3.34E-04	0.9	16	14.8
7/14/2008 00:15.33	12.0	12.8	5.9	0.8	0.3	3.26E-04	1.0	16	16
7/14/2008 00:21.58	16.0	8.7	6.3	-7.3	0.4	3.26E-04	1.0	16	16.4
7/14/2008 00:28.76	20.0	4.4	7.2	-15.6	0.5	3.06E-04	1.1	16	17.2
7/14/2008 00:35.14	24.0	0.3	6.4	-23.7	0.6	3.55E-04	1.0	16	16.4
7/14/2008 00:00.00	0.0	24.8	0.0	24.8	0.6				
7/14/2008 00:04.08	4.0	20.8	4.1	16.8	0.7	4.31E-04	1.0	16	16
7/14/2008 00:09.14	8.0	16.7	5.1	8.7	0.7	3.68E-04	1.0	16	16.4
7/14/2008 00:15.19	12.0	12.7	6.0	0.7	0.8	3.18E-04	1.0	16	16
7/14/2008 00:21.53	16.0	8.5	6.3	-7.5	0.9	3.26E-04	1.1	16	16.8
7/14/2008 00:28.16	20.0	4.5	6.6	-15.5	1.1	3.20E-04	1.0	16	16
7/14/2008 00:35.15	24.0	0.4	7.0	-23.6	1.2	3.24E-04	1.0	16	16.4
7/14/2008 00:00.00	0.0	24.8	0.0	24.8	1.2				
7/14/2008 00:04.02	4.0	20.7	4.0	16.7	1.2	4.43E-04	1.0	16	16.4
7/14/2008 00:09.42	8.0	16.8	5.4	8.8	1.3	3.36E-04	1.0	16	15.6
7/14/2008 00:15.18	12.0	12.6	5.8	0.6	1.4	3.42E-04	1.1	16	16.8
7/14/2008 00:21.29	16.0	8.5	6.1	-7.5	1.5	3.34E-04	1.0	16	16.4
7/14/2008 00:27.98	20.0	4.6	6.7	-15.4	1.6	3.13E-04	1.0	16	15.6
7/14/2008 00:34.92	24.0	0.4	6.9	-23.6	1.8	3.30E-04	1.1	16	16.8
7/14/2008 00:00.00	0.0	24.8	0.0	24.8	1.8				
7/14/2008 00:04.12	4.0	20.6	4.1	16.6	1.8	4.38E-04	1.1	16	16.8
7/14/2008 00:09.54	8.0	16.8	5.4	8.8	1.9	3.31E-04	1.0	16	15.2
7/14/2008 00:15.21	12.0	12.8	5.7	0.8	2.0	3.39E-04	1.0	16	16
7/14/2008 00:21.31	16.0	8.9	6.1	-7.1	2.1	3.26E-04	1.0	16	15.6
7/14/2008 00:27.25	20.0	4.4	5.9	-15.6	2.2	3.79E-04	1.1	16	18
7/14/2008 00:34.79	24.0	0.6	7.5	-23.4	2.3	2.89E-04	1.0	16	15.2





Hydraulic Conductivity Test - Omaha - Thin Store-and-Release Cover

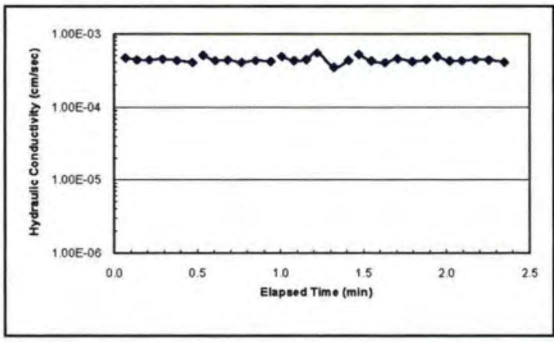
ASTM D 5084 - 00

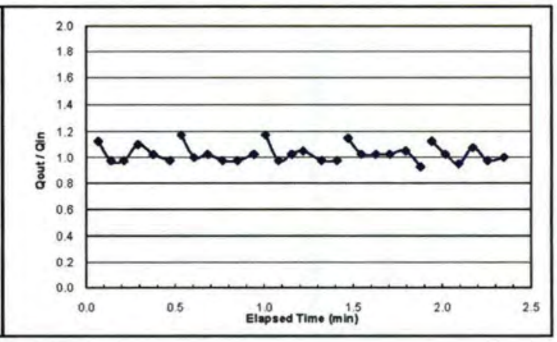
Sample I.D.	**305-mm DCRDF A01- (Top)**		**Test Date :**	**7/21/08**	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	4	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	4	cm^2
Weight of wet sample =	19900.0	g	Sample Water Content =	24.2%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.79	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
k7	30.85	153	129.17	24.24%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/21/2008 00:00.00	0.0	24.7	0.0	24.7	0.0				
7/21/2008 00:04.08	4.0	20.2	4.1	16.2	0.1	4.59E-04	1.1	16	18
7/21/2008 00:08.29	8.0	16.3	4.2	8.3	0.1	4.32E-04	1.0	16	15.6
7/21/2008 00:12.70	12.0	12.4	4.4	0.4	0.2	4.31E-04	1.0	16	15.6
7/21/2008 00:17.50	16.0	8.0	4.8	-8.0	0.3	4.42E-04	1.1	16	17.6
7/21/2008 00:22.60	20.0	3.9	5.1	-16.1	0.4	4.22E-04	1.0	16	16.4
7/21/2008 00:28.18	24.0	0.0	5.6	-24.0	0.5	3.97E-04	1.0	16	15.6
7/21/2008 00:00.00	0.0	24.8	0.0	24.8	0.5				
7/21/2008 00:03.85	4.0	20.1	3.8	16.1	0.5	4.98E-04	1.2	16	18.8
7/21/2008 00:08.21	8.0	16.1	4.4	8.1	0.6	4.23E-04	1.0	16	16
7/21/2008 00:12.77	12.0	12.0	4.6	0.0	0.7	4.28E-04	1.0	16	16.4
7/21/2008 00:17.79	16.0	8.1	5.0	-7.9	0.8	3.98E-04	1.0	16	15.6
7/21/2008 00:22.76	20.0	4.2	5.0	-15.8	0.8	4.22E-04	1.0	16	15.6
7/21/2008 00:28.31	24.0	0.1	5.5	-23.9	0.9	4.08E-04	1.0	16	16.4
7/21/2008 00:00.00	0.0	24.8	0.0	24.8	0.9				
7/21/2008 00:04.01	4.0	20.1	4.0	16.1	1.0	4.78E-04	1.2	16	18.8
7/21/2008 00:08.36	8.0	16.2	4.3	8.2	1.1	4.18E-04	1.0	16	15.6
7/21/2008 00:12.84	12.0	12.1	4.5	0.1	1.2	4.36E-04	1.0	16	16.4
7/21/2008 00:16.67	16.0	7.9	3.8	-8.1	1.2	5.42E-04	1.1	16	16.8
7/21/2008 00:22.86	20.0	4.0	6.2	-16.0	1.3	3.39E-04	1.0	16	15.6
7/21/2008 00:28.08	24.0	0.1	5.2	-23.9	1.4	4.24E-04	1.0	16	15.6
7/21/2008 00:00.00	0.0	24.8	0.0	24.8	1.4				
7/21/2008 00:03.69	4.0	20.2	3.7	16.2	1.5	5.13E-04	1.2	16	18.4
7/21/2008 00:08.19	8.0	16.1	4.5	8.1	1.5	4.15E-04	1.0	16	16.4
7/21/2008 00:13.15	12.0	12.0	5.0	0.0	1.6	3.94E-04	1.0	16	16.4
7/21/2008 00:17.74	16.0	7.9	4.6	-8.1	1.7	4.47E-04	1.0	16	16.4
7/21/2008 00:23.09	20.0	3.7	5.3	-16.3	1.8	4.08E-04	1.1	16	16.8
7/21/2008 00:28.10	24.0	0.0	5.0	-24.0	1.9	4.31E-04	0.9	16	14.8
7/21/2008 00:00.00	0.0	24.8	0.0	24.8	1.9				
7/21/2008 00:03.91	4.0	20.3	3.9	16.3	1.9	4.79E-04	1.1	16	18
7/21/2008 00:08.41	8.0	16.2	4.5	8.2	2.0	4.15E-04	1.0	16	16.4
7/21/2008 00:12.88	12.0	12.4	4.5	0.4	2.1	4.20E-04	1.0	16	15.2
7/21/2008 00:17.72	16.0	8.1	4.8	-7.9	2.2	4.33E-04	1.1	16	17.2
7/21/2008 00:22.62	20.0	4.2	4.9	-15.8	2.3	4.28E-04	1.0	16	15.6
7/21/2008 00:28.19	24.0	0.2	5.6	-23.8	2.3	4.02E-04	1.0	16	16





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

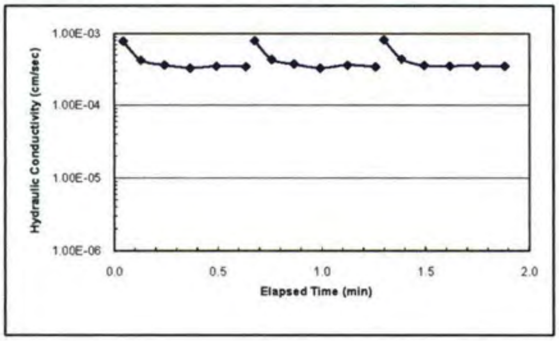
ASTM D 5084 - 00

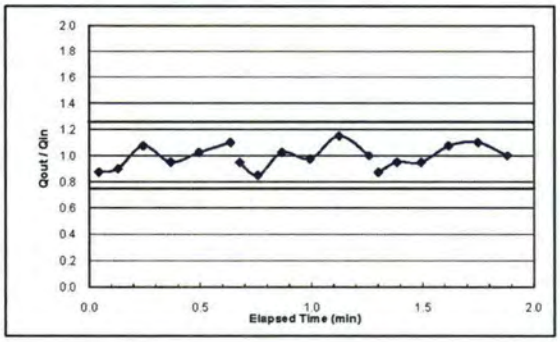
Sample I.D.	**305-mm DCRDF AO2-S1 Deep**		**Test Date :**	**5/30/08**	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	19800.0	g	Sample Water Content =	24.9%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.78	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
X3	30.4	107.1	91.8	24.92%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
5/30/2008 00:00.00	0.0	24.5	0.0	24.5	0.0				
5/30/2008 00:02.64	4.0	21.0	2.6	17.0	0.0	7.81E-04	0.9	20	17.5
5/30/2008 00:07.78	8.0	17.4	5.1	9.4	0.1	4.23E-04	0.9	20	18
5/30/2008 00:14.64	12.0	13.1	6.9	1.1	0.2	3.62E-04	1.1	20	21.5
5/30/2008 00:22.05	16.0	9.3	7.4	-6.7	0.4	3.30E-04	1.0	20	19
5/30/2008 00:29.68	20.0	5.2	7.6	-14.8	0.5	3.50E-04	1.0	20	20.5
5/30/2008 00:38.14	24.0	0.8	8.5	-23.2	0.6	3.45E-04	1.1	20	22
5/30/2008 00:00.00	0.2	24.6	0.0	24.4	0.6				
5/30/2008 00:02.55	4.0	21.0	2.5	17.0	0.7	7.98E-04	0.9	19	18
5/30/2008 00:07.43	8.0	17.6	4.9	9.6	0.8	4.34E-04	0.9	20	17
5/30/2008 00:13.93	12.0	13.5	6.5	1.5	0.9	3.73E-04	1.0	20	20.5
5/30/2008 00:21.45	16.0	9.6	7.5	-6.4	1.0	3.29E-04	1.0	20	19.5
5/30/2008 00:29.28	20.0	5.0	7.8	-15.0	1.1	3.62E-04	1.2	20	23
5/30/2008 00:37.43	24.0	1.0	8.2	-23.0	1.3	3.41E-04	1.0	20	20
5/30/2008 00:00.00	0.1	24.4	0.0	24.3	1.3				
5/30/2008 00:02.46	4.0	21.0	2.5	17.0	1.3	8.16E-04	0.9	19.5	17
5/30/2008 00:07.52	8.0	17.2	5.1	9.2	1.4	4.42E-04	1.0	20	19
5/30/2008 00:14.06	12.0	13.4	6.5	1.4	1.5	3.57E-04	1.0	20	19
5/30/2008 00:21.46	16.0	9.1	7.4	-6.9	1.6	3.52E-04	1.1	20	21.5
5/30/2008 00:29.33	20.0	4.7	7.9	-15.3	1.7	3.53E-04	1.1	20	22
5/30/2008 00:37.34	24.0	0.7	8.0	-23.3	1.9	3.48E-04	1.0	20	20





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

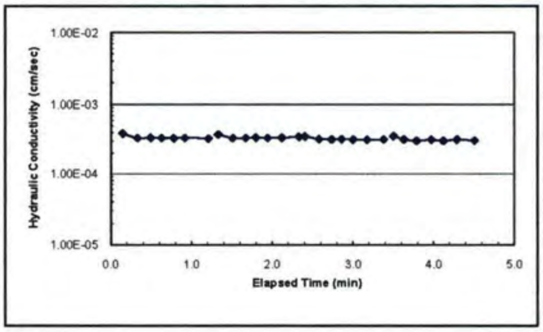
Sample I.D. **150-mm Omaha DCRDF AO2-S1-Deep** **Test Date :** **7/15/08**

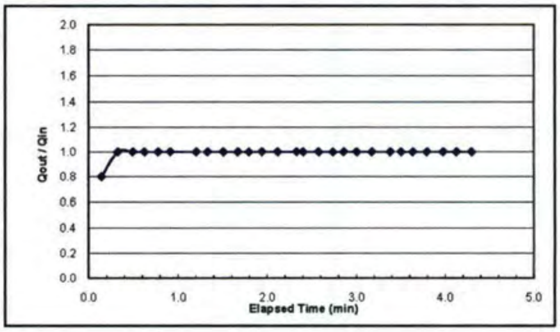
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	6.4	cm
Outflow Pressre =	40.1	psi	Area of Sample, A =	181.5	cm^2
Pressure Difference =	0.4	psi	Sample Volume, V =	1161.3	cm^3
Effective Stress =	1.70	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.4		a_{out} =	1	cm^2
Weight of wet sample =	2126.1	(g)	Sample Water Content =	30.0%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.83	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
H1	30.9	139.39	114.35	30.01%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/22/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
7/22/08 00:08.68	5.0	20.0	8.7	15.0	0.1	3.85E-04	0.8	5	4
7/22/08 00:19.65	9.0	16.0	11.0	7.0	0.3	3.30E-04	1.0	4	4
7/22/08 00:29.56	12.0	13.0	9.9	1.0	0.5	3.33E-04	1.0	3	3
7/22/08 00:37.46	14.0	11.0	7.9	-3.0	0.6	3.30E-04	1.0	2	2
7/22/08 00:46.75	16.0	9.0	9.3	-7.0	0.8	3.29E-04	1.0	2	2
7/22/08 00:54.87	17.5	7.5	8.1	-10.0	0.9	3.33E-04	1.0	1.5	1.5
7/22/08 01:12.37	20.0	5.0	17.5	-15.0	1.2	3.25E-04	1.0	2.5	2.5
7/22/08 00:00.00	0.0	24.0	0.0	24.0	1.2				
7/22/08 00:07.87	4.0	20.0	7.9	16.0	1.3	3.73E-04	1.0	4	4
7/22/08 00:18.56	8.0	16.0	10.7	8.0	1.5	3.30E-04	1.0	4	4
7/22/08 00:28.25	11.0	13.0	9.7	2.0	1.7	3.30E-04	1.0	3	3
7/22/08 00:35.73	13.0	11.0	7.5	-2.0	1.8	3.36E-04	1.0	2	2
7/22/08 00:44.56	15.0	9.0	8.8	-6.0	1.9	3.32E-04	1.0	2	2
7/22/08 00:55.06	17.0	7.0	10.5	-10.0	2.1	3.35E-04	1.0	2	2
7/22/08 01:07.83	19.0	5.0	12.8	-14.0	2.3	3.44E-04	1.0	2	2
7/22/08 00:00.00	0.0	24.0	-67.8	24.0	2.3				
7/22/08 00:06.18	3.0	21.0	6.2	18.0	2.4	3.49E-04	1.0	3	3
7/22/08 00:16.65	7.0	17.0	10.5	10.0	2.6	3.21E-04	1.0	4	4
7/22/08 00:26.21	10.0	14.0	9.6	4.0	2.7	3.16E-04	1.0	3	3
7/22/08 00:33.59	12.0	12.0	7.4	0.0	2.9	3.18E-04	1.0	2	2
7/22/08 00:42.21	14.0	10.0	8.6	-4.0	3.0	3.14E-04	1.0	2	2
7/22/08 00:52.43	16.0	8.0	10.2	-8.0	3.2	3.13E-04	1.0	2	2
7/22/08 01:04.84	18.0	6.0	12.4	-12.0	3.4	3.15E-04	1.0	2	2
7/22/08 00:00.00	0.0	24.0	-64.8	24.0	3.4				
7/22/08 00:06.15	3.0	21.0	6.1	18.0	3.5	3.51E-04	1.0	3	3
7/22/08 00:13.93	6.0	18.0	7.8	12.0	3.6	3.16E-04	1.0	3	3
00:23.4	9.0	15.0	9.5	6.0	3.8	3.02E-04	1.0	3	3
00:34.3	12.0	12.0	10.9	0.0	4.0	3.12E-04	1.0	3	3
00:43.3	14.0	10.0	9.0	-4.0	4.1	3.01E-04	1.0	2	2
00:53.5	16.0	8.0	10.2	-8.0	4.3	3.13E-04	1.0	2	2
01:06.4	18.0	6.0	12.9	-12.0	4.5	3.03E-04	1.0	2	2





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

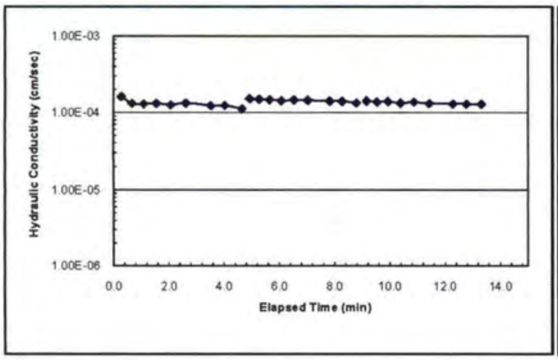
Sample I.D. **75-mm Omaha DCRDF AO2 S1 Deep** **Test Date :** **7/15/08**

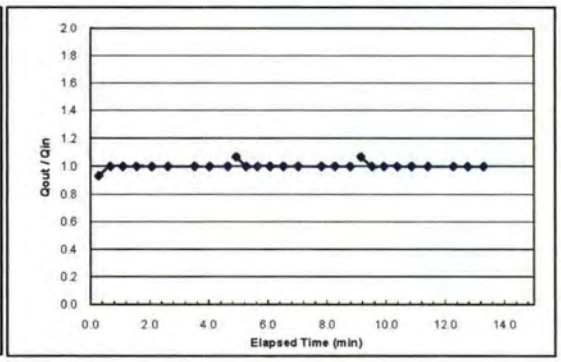
Cell Pressure =	42.1	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.3	psi	Length of Sample, L =	3.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.3	cm^2
Pressure Difference =	0.3	psi	Sample Volume, V =	121.7	cm^3
Effective Stress =	1.95	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	6.6		a_{out} =	1	cm^2
Weight of wet sample =	198.1	(g)	Sample Water Content =	-466.6%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.71	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
h3	24.42	113.94		-466.58%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/1/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
8/1/08 00:17.05	1.5	22.6	17.0	21.1	0.3	1.61E-04	0.9	1.5	1.4
8/1/08 00:40.45	3.0	21.1	23.4	18.1	0.7	1.31E-04	1.0	1.5	1.5
8/1/08 01:05.95	4.5	19.6	25.5	15.1	1.1	1.29E-04	1.0	1.5	1.5
8/1/08 01:33.37	6.0	18.1	27.4	12.1	1.6	1.31E-04	1.0	1.5	1.5
8/1/08 02:04.65	7.5	16.6	31.3	9.1	2.1	1.25E-04	1.0	1.5	1.5
8/1/08 02:37.46	9.0	15.1	32.8	6.1	2.6	1.32E-04	1.0	1.5	1.5
8/1/08 03:31.15	11.0	13.1	53.7	2.1	3.5	1.23E-04	1.0	2	2
8/1/08 04:01.65	12.0	12.1	30.5	0.1	4.0	1.22E-04	1.0	1	1
8/1/08 04:38.65	13.0	11.1	37.0	-1.9	4.6	1.11E-04	1.0	1	1
8/1/08 00:00.00	0.0	24.0	-278.6	24.0	4.6				
8/1/08 00:19.46	1.5	22.4	19.5	20.9	4.9	1.52E-04	1.1	1.5	1.6
8/1/08 00:40.27	3.0	20.9	20.8	17.9	5.3	1.48E-04	1.0	1.5	1.5
8/1/08 01:02.90	4.5	19.4	22.6	14.9	5.6	1.47E-04	1.0	1.5	1.5
8/1/08 01:28.28	6.0	17.9	25.4	11.9	6.1	1.42E-04	1.0	1.5	1.5
8/1/08 01:55.46	7.5	16.4	27.2	8.9	6.5	1.45E-04	1.0	1.5	1.5
8/1/08 02:25.73	9.0	14.9	30.3	5.9	7.0	1.44E-04	1.0	1.5	1.5
8/1/08 03:12.95	11.0	12.9	47.2	1.9	7.8	1.41E-04	1.0	2	2
8/1/08 03:39.92	12.0	11.9	27.0	-0.1	8.3	1.40E-04	1.0	1	1
8/1/08 04:11.11	13.0	10.9	31.2	-2.1	8.8	1.33E-04	1.0	1	1
8/1/08 00:00.00	0.0	24.0	-251.1	24.0	8.8				
8/1/08 00:20.95	1.5	22.4	21.0	20.9	9.1	1.41E-04	1.1	1.5	1.6
8/1/08 00:43.42	3.0	20.9	22.5	17.9	9.5	1.37E-04	1.0	1.5	1.5
8/1/08 01:07.40	4.5	19.4	24.0	14.9	9.9	1.38E-04	1.0	1.5	1.5
8/1/08 01:34.65	6.0	17.9	27.2	11.9	10.4	1.32E-04	1.0	1.5	1.5
8/1/08 02:03.65	7.5	16.4	29.0	8.9	10.9	1.36E-04	1.0	1.5	1.5
8/1/08 02:37.18	9.0	14.9	33.5	5.9	11.4	1.30E-04	1.0	1.5	1.5
8/1/08 03:28.68	11.0	12.9	51.5	1.9	12.3	1.29E-04	1.0	2	2
03:57.9	12.0	11.9	29.2	-0.1	12.8	1.29E-04	1.0	1	1
04:30.4	13.0	10.9	32.5	-2.1	13.3	1.27E-04	1.0	1	1





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

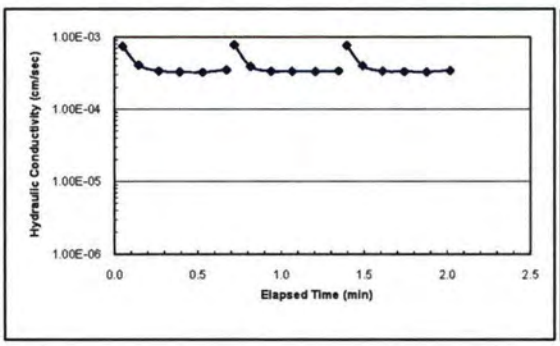
ASTM D 5084 - 00

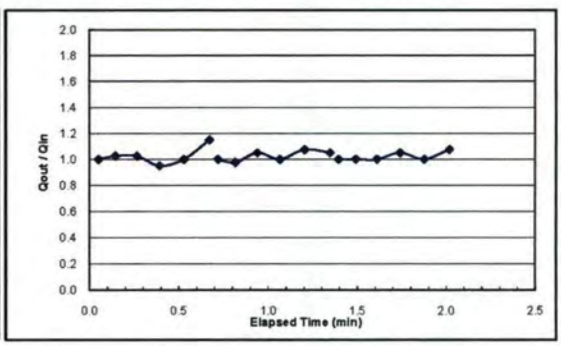
Sample I.D.	305-mm DCRDF AO2-T2		Test Date :	6/3/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	19000.0	g	Sample Water Content =	25.4%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.70	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A3	25.14	146.93	122.29	25.36%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
6/3/2008 00:00.00	0.0	24.7	0.0	24.7	0.0				
6/3/2008 00:02.96	4.0	20.7	3.0	16.7	0.0	7.43E-04	1.0	20	20
6/3/2008 00:08.71	8.0	16.6	5.7	8.6	0.1	4.05E-04	1.0	20	20.5
6/3/2008 00:15.95	12.0	12.5	7.2	0.5	0.3	3.36E-04	1.0	20	20.5
6/3/2008 00:23.52	16.0	8.7	7.6	-7.3	0.4	3.25E-04	1.0	20	19
6/3/2008 00:31.73	20.0	4.7	8.2	-15.3	0.5	3.22E-04	1.0	20	20
6/3/2008 00:40.34	24.0	0.1	8.6	-23.9	0.7	3.49E-04	1.2	20	23
6/3/2008 00:00.00	0.0	24.6	0.0	24.6	0.7				
6/3/2008 00:02.83	4.0	20.6	2.8	16.6	0.7	7.78E-04	1.0	20	20
6/3/2008 00:08.65	8.0	16.7	5.8	8.7	0.8	3.90E-04	1.0	20	19.5
6/3/2008 00:16.05	12.0	12.5	7.4	0.5	0.9	3.33E-04	1.1	20	21
6/3/2008 00:23.64	16.0	8.5	7.6	-7.5	1.1	3.32E-04	1.0	20	20
6/3/2008 00:31.95	20.0	4.2	8.3	-15.8	1.2	3.31E-04	1.1	20	21.5
6/3/2008 00:40.45	24.0	0.0	8.5	-24.0	1.3	3.38E-04	1.1	20	21
6/3/2008 00:00.00	0.0	24.7	0.0	24.7	1.3				
6/3/2008 00:02.87	4.0	20.7	2.9	16.7	1.4	7.67E-04	1.0	20	20
6/3/2008 00:08.65	8.0	16.7	5.8	8.7	1.5	3.97E-04	1.0	20	20
6/3/2008 00:15.83	12.0	12.7	7.2	0.7	1.6	3.35E-04	1.0	20	20
6/3/2008 00:23.65	16.0	8.5	7.8	-7.5	1.7	3.30E-04	1.1	20	21
6/3/2008 00:31.75	20.0	4.5	8.1	-15.5	1.9	3.27E-04	1.0	20	20
6/3/2008 00:40.27	24.0	0.2	8.5	-23.8	2.0	3.40E-04	1.1	20	21.5





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

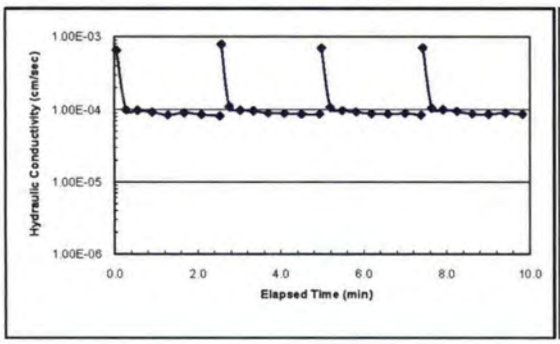
ASTM D 5084 - 00

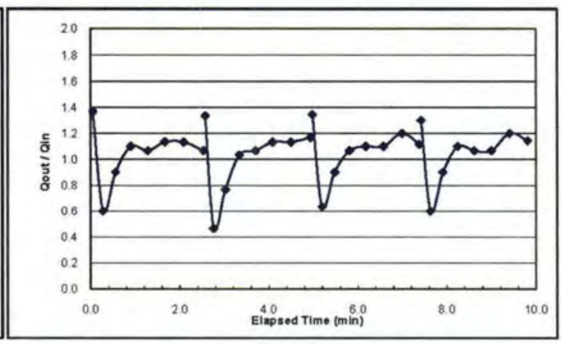
Sample I.D.	305-mm DCRDF AO2-S2 Shallow		Test Date :	6/12/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	20000.0	g	Sample Water Content =	26.0%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.79	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
RC4-2	24.47	132.74	110.4	26.00%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
6/12/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
6/12/2008 00:02.96	3.0	20.8	3.0	17.8	0.0	6.58E-04	1.4	15	20.5
6/12/2008 00:16.64	6.0	19.0	13.7	13.0	0.3	9.93E-05	0.6	15	9
6/12/2008 00:33.56	9.0	16.3	16.9	7.3	0.6	9.81E-05	0.9	15	13.5
6/12/2008 00:54.06	12.0	13.0	20.5	1.0	0.9	9.26E-05	1.1	15	16.5
6/12/2008 01:17.02	15.0	9.8	23.0	-5.2	1.3	8.44E-05	1.1	15	16
6/12/2008 01:39.96	18.0	6.4	22.9	-11.6	1.7	9.06E-05	1.1	15	17
6/12/2008 02:05.28	21.0	3.0	25.3	-18.0	2.1	8.55E-05	1.1	15	17
6/12/2008 02:31.84	24.0	-0.2	26.6	-24.2	2.5	8.23E-05	1.1	15	16
6/12/2008 00:00.00	0.0	24.8	0.0	24.8	2.5				
6/12/2008 00:02.42	3.0	20.8	2.4	17.8	2.6	7.93E-04	1.3	15	20
6/12/2008 00:13.75	6.0	19.4	11.3	13.4	2.8	1.10E-04	0.5	15	7
6/12/2008 00:29.40	9.0	17.1	15.6	8.1	3.0	9.83E-05	0.8	15	11.5
6/12/2008 00:48.42	12.0	14.0	19.0	2.0	3.3	9.61E-05	1.0	15	15.5
6/12/2008 01:09.92	15.0	10.8	21.5	-4.2	3.7	8.96E-05	1.1	15	16
6/12/2008 01:33.15	18.0	7.4	23.2	-10.6	4.1	8.89E-05	1.1	15	17
6/12/2008 01:57.90	21.0	4.0	24.7	-17.0	4.5	8.69E-05	1.1	15	17
6/12/2008 02:24.14	24.0	0.5	26.2	-23.5	4.9	8.69E-05	1.2	15	17.5
6/12/2008 00:00.00	0.1	24.8	0.0	24.7	4.9				
6/12/2008 00:02.65	3.0	20.9	2.7	17.9	5.0	7.04E-04	1.3	14.5	19.5
6/12/2008 00:15.55	6.0	19.0	12.9	13.0	5.2	1.07E-04	0.6	15	9.5
6/12/2008 00:32.61	9.0	16.3	17.1	7.3	5.5	9.73E-05	0.9	15	13.5
6/12/2008 00:52.75	12.0	13.1	20.1	1.1	5.8	9.27E-05	1.1	15	16
6/12/2008 01:15.05	15.0	9.8	22.3	-5.2	6.2	8.83E-05	1.1	15	16.5
6/12/2008 01:38.61	18.0	6.5	23.6	-11.5	6.6	8.68E-05	1.1	15	16.5
6/12/2008 02:03.65	21.0	2.9	25.0	-18.1	7.0	8.92E-05	1.2	15	18
6/12/2008 02:26.64	23.6	0.0	23.0	-23.6	7.4	8.42E-05	1.1	13	14.5
6/12/2008 00:00.00	0.0	24.9	0.0	24.9	7.4				
6/12/2008 00:02.67	3.0	21.0	2.7	18.0	7.4	7.08E-04	1.3	15	19.5
6/12/2008 00:15.56	6.0	19.2	12.9	13.2	7.6	1.05E-04	0.6	15	9
6/12/2008 00:32.17	9.0	16.5	16.6	7.5	7.9	9.98E-05	0.9	15	13.5
6/12/2008 00:52.17	12.0	13.2	20.0	1.2	8.2	9.48E-05	1.1	15	16.5
6/12/2008 01:14.25	15.0	10.0	22.1	-5.0	8.6	8.77E-05	1.1	15	16
6/12/2008 01:37.46	18.0	6.8	23.2	-11.2	9.0	8.66E-05	1.1	15	16
6/12/2008 02:02.18	21.0	3.2	24.7	-17.8	9.4	9.02E-05	1.2	15	18
6/12/2008 02:26.55	23.8	0.0	24.4	-23.8	9.8	8.67E-05	1.1	14	16





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

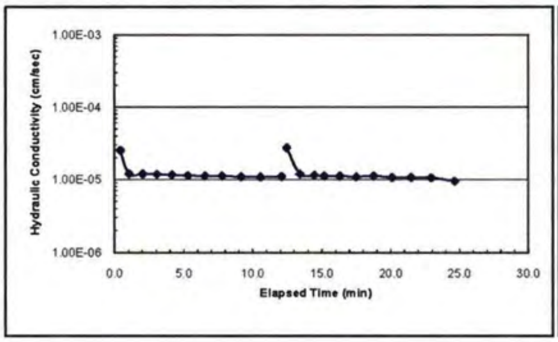
Sample I.D.	150-mm Omaha DCRDF AO2-S2-Shallow	Test Date :	7/15/08

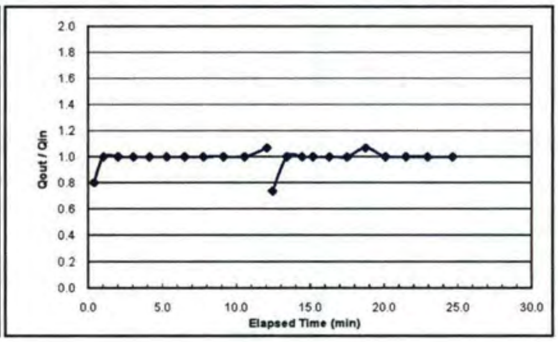
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	39.5	psi	Area of Sample, A =	182.4	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	2.00	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	2463.2	(g)	Sample Water Content =	29.2%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.77	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
K7	30.78	130.37	107.85	29.22%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/18/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
7/18/08 00:23.78	1.5	22.8	23.8	21.3	0.4	2.55E-05	0.8	1.5	1.2
7/18/08 01:02.06	2.5	21.8	38.3	19.3	1.0	1.20E-05	1.0	1	1
7/18/08 02:01.11	4.0	20.3	59.0	16.3	2.0	1.20E-05	1.0	1.5	1.5
7/18/08 03:02.84	5.5	18.8	61.7	13.3	3.0	1.19E-05	1.0	1.5	1.5
7/18/08 04:08.02	7.0	17.3	65.2	10.3	4.1	1.17E-05	1.0	1.5	1.5
7/18/08 05:17.46	8.5	15.8	69.4	7.3	5.3	1.14E-05	1.0	1.5	1.5
7/18/08 06:30.52	10.0	14.3	73.1	4.3	6.5	1.13E-05	1.0	1.5	1.5
7/18/08 07:46.33	11.5	12.8	75.8	1.3	7.8	1.13E-05	1.0	1.5	1.5
7/18/08 09:07.92	13.0	11.3	81.6	-1.7	9.1	1.10E-05	1.0	1.5	1.5
7/18/08 10:33.45	14.5	9.8	85.5	-4.7	10.6	1.09E-05	1.0	1.5	1.5
7/18/08 12:04.55	16.0	8.2	91.1	-7.8	12.1	1.11E-05	1.1	1.5	1.6
7/18/08 00:00.00	0.0	24.0	0.0	24.0	12.1				
7/18/08 00:21.05	1.5	22.9	21.1	21.4	12.5	2.77E-05	0.7	1.5	1.1
7/18/08 01:18.87	3.0	21.4	57.8	18.4	13.4	1.20E-05	1.0	1.5	1.5
7/18/08 02:21.14	4.5	19.9	62.3	15.4	14.5	1.15E-05	1.0	1.5	1.5
7/18/08 03:04.87	5.5	18.9	43.7	13.4	15.2	1.13E-05	1.0	1	1
7/18/08 04:12.18	7.0	17.4	67.3	10.4	16.3	1.13E-05	1.0	1.5	1.5
7/18/08 05:24.15	8.5	15.9	72.0	7.4	17.5	1.10E-05	1.0	1.5	1.5
7/18/08 06:39.37	10.0	14.3	75.2	4.3	18.8	1.13E-05	1.1	1.5	1.6
7/18/08 07:59.25	11.5	12.8	79.9	1.3	20.1	1.07E-05	1.0	1.5	1.5
7/18/08 09:22.96	13.0	11.3	83.7	-1.7	21.5	1.07E-05	1.0	1.5	1.5
7/18/08 10:50.56	14.5	9.8	87.6	-4.7	22.9	1.07E-05	1.0	1.5	1.5
7/18/08 12:33.45	16.0	8.3	102.9	-7.7	24.7	9.50E-06	1.0	1.5	1.5





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

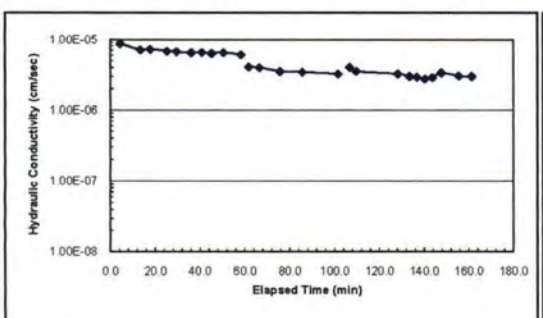
Sample I.D. **75-mm Omaha DCRDF AO2-S2-Shallow** **Test Date :** **7/14/08**

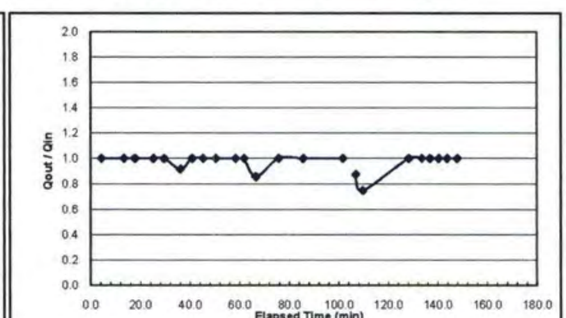
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.3	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.75	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	242.3	(g)	Sample Water Content =	-506.3%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.75	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
h1	30.84	156.13		-506.26%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/31/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
7/31/08 04:17.50	1.3	22.7	257.5	21.4	4.3	8.68E-06	1.0	1.3	1.3
7/31/08 13:18.42	3.4	20.6	540.9	17.2	13.3	7.09E-06	1.0	2.1	2.1
7/31/08 17:45.60	4.4	19.6	267.2	15.2	17.8	7.25E-06	1.0	1	1
7/31/08 25:13.02	5.9	18.1	447.4	12.2	25.2	6.82E-06	1.0	1.5	1.5
7/31/08 29:28.64	6.7	17.3	255.6	10.6	29.5	6.68E-06	1.0	0.8	0.8
7/31/08 36:03.65	7.9	16.2	395.0	8.3	36.1	6.49E-06	0.9	1.2	1.1
7/31/08 40:50.11	8.7	15.4	286.5	6.7	40.8	6.51E-06	1.0	0.8	0.8
7/31/08 45:16.25	9.4	14.7	266.1	5.3	45.3	6.35E-06	1.0	0.7	0.7
7/31/08 50:24.65	10.2	13.9	308.4	3.7	50.4	6.50E-06	1.0	0.8	0.8
7/31/08 58:21.33	11.3	12.8	476.7	1.5	58.4	6.08E-06	1.0	1.1	1.1
7/31/08 00:00.00	0.0	24.0	-3501.3	24.0	58.4				
7/31/08 03:27.73	0.5	23.5	207.7	23.0	61.9	4.08E-06	1.0	0.5	0.5
7/31/08 08:07.61	1.2	22.9	279.9	21.7	66.5	4.01E-06	0.9	0.7	0.6
7/31/08 17:20.83	2.3	21.8	553.2	19.5	75.7	3.55E-06	1.0	1.1	1.1
7/31/08 27:13.03	3.4	20.7	592.2	17.3	85.6	3.45E-06	1.0	1.1	1.1
7/31/08 43:13.53	5.0	19.1	960.5	14.1	101.6	3.26E-06	1.0	1.6	1.6
7/31/08 00:00.00	0.0	24.0	0.0	24.0	101.6				
7/31/08 05:15.37	0.8	23.3	315.4	22.5	106.9	4.05E-06	0.9	0.8	0.7
7/31/08 08:06.45	1.2	23.0	171.1	21.8	109.7	3.55E-06	0.8	0.4	0.3
7/31/08 26:41.15	3.2	21.0	1114.7	17.8	128.3	3.25E-06	1.0	2	2
7/31/08 31:57.55	3.7	20.5	316.4	16.8	133.6	2.99E-06	1.0	0.5	0.5
7/31/08 35:13.84	4.0	20.2	196.3	16.2	136.8	2.94E-06	1.0	0.3	0.3
7/31/08 38:45.73	4.3	19.9	211.9	15.6	140.4	2.76E-06	1.0	0.3	0.3
7/31/08 42:09.31	4.6	19.6	203.6	15.0	143.8	2.90E-06	1.0	0.3	0.3
7/31/08 46:07.37	5.0	19.2	238.1	14.2	147.7	3.36E-06	1.0	0.4	0.4
53:57.2	5.7	18.5	469.8	12.8	155.6	3.04E-06	1.0	0.7	0.7
59:47.2	6.2	18.0	350.0	11.8	161.4	2.99E-06	1.0	0.5	0.5





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

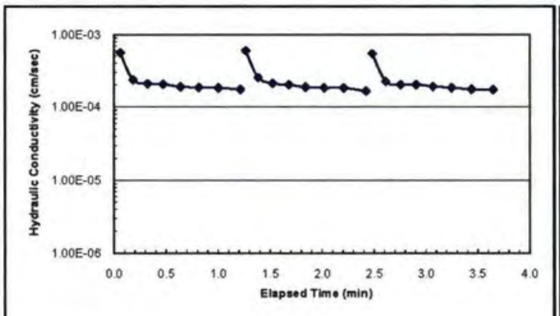
ASTM D 5084 - 00

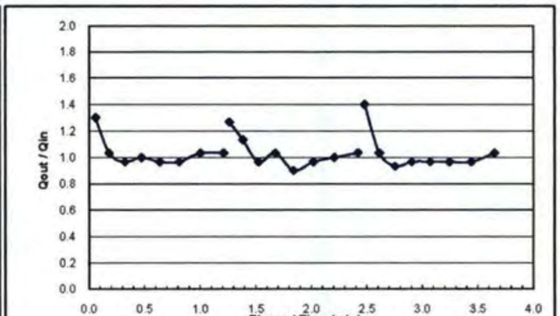
Sample I.D.	305-mm DCRDF A-2 Top		Test Date :	6/17/08	
Cell Pressure =	42.7	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	42.4	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	2.4	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	5	cm^2
Weight of wet sample =	19700.0	g	Sample Water Content =	22.5%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.77	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
RC4-2	24.47	130.64	111.16	22.47%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
6/17/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
6/17/2008 00:03.42	3.0	21.0	3.4	18.0	0.1	5.53E-04	1.3	15	19.5
6/17/2008 00:10.84	6.0	17.9	7.4	11.9	0.2	2.33E-04	1.0	15	15.5
6/17/2008 00:19.25	9.0	15.0	8.4	6.0	0.3	2.06E-04	1.0	15	14.5
6/17/2008 00:28.25	12.0	12.0	9.0	0.0	0.5	2.02E-04	1.0	15	15
6/17/2008 00:38.15	15.0	9.1	9.9	-5.9	0.6	1.87E-04	1.0	15	14.5
6/17/2008 00:48.65	18.0	6.2	10.5	-11.8	0.8	1.83E-04	1.0	15	14.5
6/17/2008 01:00.11	21.0	3.1	11.5	-17.9	1.0	1.80E-04	1.0	15	15.5
6/17/2008 01:12.61	24.0	0.0	12.5	-24.0	1.2	1.72E-04	1.0	15	15.5
6/17/2008 00:00.00	0.0	24.8	0.0	24.8	1.2				
6/17/2008 00:03.14	3.0	21.0	3.1	18.0	1.3	5.93E-04	1.3	15	19
6/17/2008 00:10.37	6.0	17.6	7.2	11.6	1.4	2.51E-04	1.1	15	17
6/17/2008 00:18.71	9.0	14.7	8.3	5.7	1.5	2.08E-04	1.0	15	14.5
6/17/2008 00:28.06	12.0	11.6	9.3	-0.4	1.7	1.98E-04	1.0	15	15.5
6/17/2008 00:37.78	15.0	8.9	9.7	-6.1	1.8	1.85E-04	0.9	15	13.5
6/17/2008 00:48.45	18.0	6.0	10.7	-12.0	2.0	1.80E-04	1.0	15	14.5
6/17/2008 00:59.75	21.0	3.0	11.3	-18.0	2.2	1.80E-04	1.0	15	15
6/17/2008 01:12.55	23.9	0.0	12.8	-23.9	2.4	1.62E-04	1.0	14.5	15
6/17/2008 00:00.00	0.0	24.8	0.0	24.8	2.4				
6/17/2008 00:03.68	3.0	20.6	3.7	17.6	2.5	5.37E-04	1.4	15	21
6/17/2008 00:11.55	6.0	17.5	7.9	11.5	2.6	2.20E-04	1.0	15	15.5
6/17/2008 00:20.08	9.0	14.7	8.5	5.7	2.8	2.00E-04	0.9	15	14
6/17/2008 00:29.06	12.0	11.8	9.0	-0.2	2.9	2.00E-04	1.0	15	14.5
6/17/2008 00:38.92	15.0	8.9	9.9	-6.1	3.1	1.88E-04	1.0	15	14.5
6/17/2008 00:49.56	18.0	6.0	10.6	-12.0	3.2	1.81E-04	1.0	15	14.5
6/17/2008 01:01.15	21.0	3.1	11.6	-17.9	3.4	1.72E-04	1.0	15	14.5
6/17/2008 01:13.78	24.0	0.0	12.6	-24.0	3.6	1.70E-04	1.0	15	15.5





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

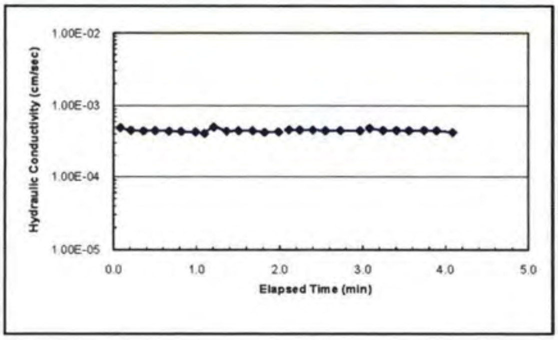
Sample I.D.	150-mm Omaha DCRDF A2 Top	Test Date :	7/15/08

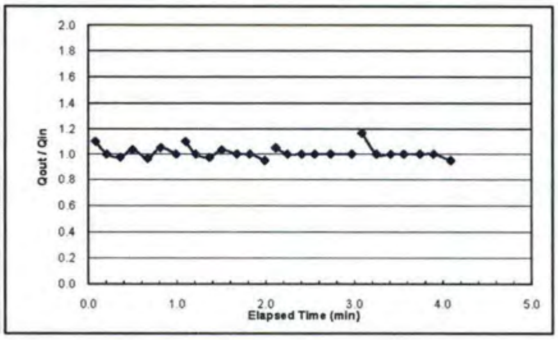
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.0	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	39.5	psi	Area of Sample, A =	181.5	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1379.1	cm^3
Effective Stress =	2.25	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	1	cm^2
Weight of wet sample =	2403.2	(g)	Sample Water Content =	28.5%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.74	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A3	25.2	135.8	111.3	28.46%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
7/15/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
7/15/08 00:04.82	3.0	20.7	4.8	17.7	0.1	4.89E-04	1.1	3	3.3
7/15/08 00:12.46	7.0	16.7	7.6	9.7	0.2	4.50E-04	1.0	4	4
7/15/08 00:21.61	11.0	12.8	9.2	1.8	0.4	4.43E-04	1.0	4	3.9
7/15/08 00:30.12	14.0	9.7	8.5	-4.3	0.5	4.44E-04	1.0	3	3.1
7/15/08 00:40.22	17.0	6.8	10.1	-10.2	0.7	4.40E-04	1.0	3	2.9
7/15/08 00:48.87	19.0	4.7	8.7	-14.3	0.8	4.34E-04	1.1	2	2.1
7/15/08 00:59.35	21.0	2.7	10.5	-18.3	1.0	4.25E-04	1.0	2	2
7/15/08 00:00.00	0.0	24.0	0.0	24.0	1.0				
7/15/08 00:05.80	3.0	20.7	5.8	17.7	1.1	4.07E-04	1.1	3	3.3
7/15/08 00:12.68	7.0	16.7	6.9	9.7	1.2	4.99E-04	1.0	4	4
7/15/08 00:21.88	11.0	12.8	9.2	1.8	1.4	4.41E-04	1.0	4	3.9
7/15/08 00:30.38	14.0	9.7	8.5	-4.3	1.5	4.44E-04	1.0	3	3.1
7/15/08 00:40.58	17.0	6.7	10.2	-10.3	1.7	4.44E-04	1.0	3	3
7/15/08 00:49.26	19.0	4.7	8.7	-14.3	1.8	4.23E-04	1.0	2	2
7/15/08 00:59.40	21.0	2.8	10.1	-18.2	2.0	4.27E-04	1.0	2	1.9
7/15/08 00:00.00	0.0	24.0	-59.4	24.0	2.0				
7/15/08 00:06.82	4.0	19.8	6.8	15.8	2.1	4.58E-04	1.1	4	4.2
7/15/08 00:14.68	8.0	15.8	7.9	7.8	2.2	4.55E-04	1.0	4	4
7/15/08 00:24.17	12.0	11.8	9.5	-0.2	2.4	4.55E-04	1.0	4	4
7/15/08 00:33.04	15.0	8.8	8.9	-6.2	2.6	4.44E-04	1.0	3	3
7/15/08 00:43.91	18.0	5.8	10.9	-12.2	2.7	4.47E-04	1.0	3	3
7/15/08 00:58.14	21.0	2.8	14.2	-18.2	3.0	4.46E-04	1.0	3	3
7/15/08 00:00.00	0.0	24.0	-58.1	24.0	3.0				
7/15/08 00:05.08	3.0	20.5	5.1	17.5	3.1	4.80E-04	1.2	3	3.5
7/15/08 00:14.86	8.0	15.5	9.8	7.5	3.2	4.51E-04	1.0	5	5
7/15/08 00:24.57	12.0	11.5	9.7	-0.5	3.4	4.48E-04	1.0	4	4
00:33.5	15.0	8.5	8.9	-6.5	3.6	4.46E-04	1.0	3	3
00:44.5	18.0	5.5	11.0	-12.5	3.7	4.48E-04	1.0	3	3
00:53.6	20.0	3.5	9.1	-16.5	3.9	4.46E-04	1.0	2	2
01:05.3	22.0	1.6	11.7	-20.4	4.1	4.21E-04	1.0	2	1.9





Hydraulic Conductivity Test - Omaha - Thick Store-and-Release Cover

ASTM D 5084 - 00

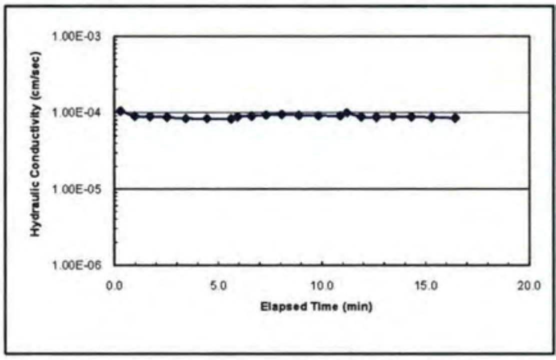
Sample I.D. **75-mm Omaha DCRDF A2 Top** **Test Date :** **7/15/08**

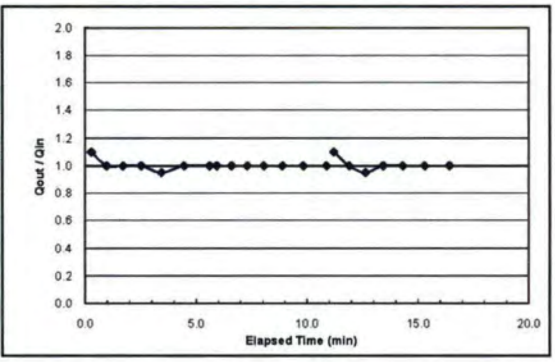
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.3	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.75	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	252.4	(g)	Sample Water Content =	-404.9%	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.80	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
6	30.9	125.1		-404.85%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/1/08 00:00.00	0.0	24.0	0.0	24.0	0.0				
8/1/08 00:17.23	1.0	22.9	17.2	21.9	0.3	1.04E-04	1.1	1	1.1
00:57.9	3	20.9	40.7	17.9	1.0	8.88E-05	1.0	2	2
8/1/08 01:42.28	5.0	18.9	44.4	13.9	1.7	8.78E-05	1.0	2	2
8/1/08 02:31.55	7.0	16.9	49.3	9.9	2.5	8.58E-05	1.0	2	2
8/1/08 03:25.87	9.0	15.0	54.3	6.0	3.4	8.28E-05	0.9	2	1.9
8/1/08 04:27.25	11.0	13.0	61.4	2.0	4.5	8.28E-05	1.0	2	2
8/1/08 05:36.65	13.0	11.0	69.4	-2.0	5.6	8.16E-05	1.0	2	2
8/1/08 00:00.00	0.0	24.0	-336.7	24.0	5.6				
8/1/08 00:19.45	1.0	23.0	19.5	22.0	5.9	8.79E-05	1.0	1	1
8/1/08 00:59.92	3.0	21.0	40.5	18.0	6.6	8.91E-05	1.0	2	2
8/1/08 01:42.02	5.0	19.0	42.1	14.0	7.3	9.24E-05	1.0	2	2
8/1/08 02:26.95	7.0	17.0	44.9	10.0	8.0	9.39E-05	1.0	2	2
8/1/08 03:17.45	9.0	15.0	50.5	6.0	8.9	9.13E-05	1.0	2	2
8/1/08 04:13.75	11.0	13.0	56.3	2.0	9.8	9.03E-05	1.0	2	2
8/1/08 05:16.56	13.0	11.0	62.8	-2.0	10.9	9.01E-05	1.0	2	2
8/1/08 00:00.00	0.0	24.0	-316.6	24.0	10.9				
8/1/08 00:18.23	1.0	22.9	18.2	21.9	11.2	9.86E-05	1.1	1	1.1
8/1/08 00:59.73	3.0	20.9	41.5	17.9	11.9	8.71E-05	1.0	2	2
8/1/08 01:43.75	5.0	19.0	44.0	14.0	12.6	8.62E-05	0.9	2	1.9
8/1/08 02:31.56	7.0	17.0	47.8	10.0	13.4	8.82E-05	1.0	2	2
8/1/08 03:24.65	9.0	15.0	53.1	6.0	14.3	8.68E-05	1.0	2	2
8/1/08 04:23.73	11.0	13.0	59.1	2.0	15.3	8.60E-05	1.0	2	2
8/1/08 05:31.18	13.0	11.0	67.5	-2.0	16.4	8.39E-05	1.0	2	2





Hydraulic Conductivity Test - Polson - Composite Cover

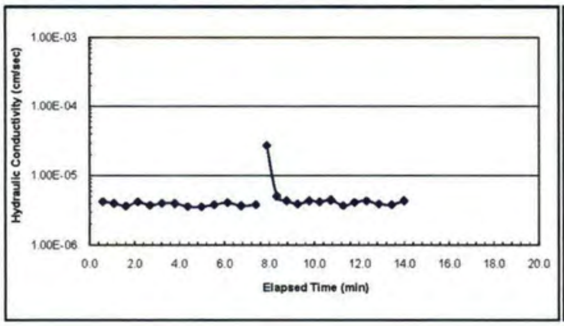
ASTM D 5084 - 00

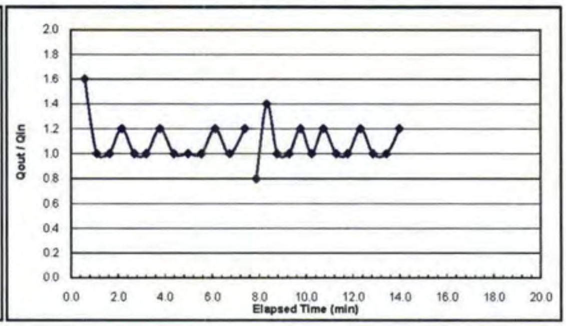
Sample I.D.	305-mm Polson Conv Below Memebrane-1		Test Date :	11/12/08	
Cell Pressure =	41.8	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	14.0	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	10193.3	cm^3
Effective Stress =	1.3	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	15850.0	g	Sample Water Content =	11.5%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.55	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
k11	30.58	94.89	88.27	11.48%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	4.0	17.5	0.0	13.5	0.0				
0:00:36	4.5	16.7	35.6	12.2	0.6	4.21E-06	1.6	0.5	0.8
0:01:05	5.0	16.2	29.4	11.2	1.1	3.97E-06	1.0	0.5	0.5
0:01:37	5.5	15.7	32.4	10.2	1.6	3.65E-06	1.0	0.5	0.5
0:02:09	6.0	15.1	31.6	9.1	2.1	4.16E-06	1.2	0.5	0.6
0:02:42	6.5	14.6	32.6	8.1	2.7	3.73E-06	1.0	0.5	0.5
0:03:12	7.0	14.1	30.8	7.1	3.2	3.99E-06	1.0	0.5	0.5
0:03:47	7.5	13.5	34.6	6.0	3.8	3.96E-06	1.2	0.5	0.6
0:04:22	8.0	13.0	35.2	5.0	4.4	3.59E-06	1.0	0.5	0.5
0:04:58	8.5	12.5	36.0	4.0	5.0	3.56E-06	1.0	0.5	0.5
0:05:32	9.0	12.0	34.2	3.0	5.5	3.79E-06	1.0	0.5	0.5
0:06:08	9.5	11.4	35.4	1.9	6.1	4.08E-06	1.2	0.5	0.6
0:06:44	10.0	10.9	36.3	0.9	6.7	3.68E-06	1.0	0.5	0.5
0:07:23	10.5	10.3	39.1	-0.2	7.4	3.81E-06	1.2	0.5	0.6
0:00:00	2.0	24.0	-443.1	22.0	7.4				
0:00:29	6.0	20.8	28.6	14.8	7.9	2.72E-05	0.8	4	3.2
0:00:56	6.5	20.1	27.0	13.6	8.3	5.03E-06	1.4	0.5	0.7
0:01:22	7.0	19.6	26.4	12.6	8.8	4.35E-06	1.0	0.5	0.5
0:01:52	7.5	19.1	29.8	11.6	9.3	3.90E-06	1.0	0.5	0.5
0:02:22	8.0	18.5	29.8	10.5	9.8	4.34E-06	1.2	0.5	0.6
0:02:50	8.5	18.0	28.4	9.5	10.2	4.19E-06	1.0	0.5	0.5
0:03:20	9.0	17.4	29.9	8.4	10.7	4.44E-06	1.2	0.5	0.6
0:03:53	9.5	16.9	33.1	7.4	11.3	3.70E-06	1.0	0.5	0.5
0:04:23	10.0	16.4	30.0	6.4	11.8	4.13E-06	1.0	0.5	0.5
0:04:55	10.5	15.8	32.0	5.3	12.3	4.32E-06	1.2	0.5	0.6
0:05:28	11.0	15.3	32.6	4.3	12.9	3.91E-06	1.0	0.5	0.5
0:06:02	11.5	14.8	34.0	3.3	13.4	3.80E-06	1.0	0.5	0.5
0:06:35	12.0	14.2	33.2	2.2	14.0	4.35E-06	1.2	0.5	0.6





Hydraulic Conductivity Test - Polson - Composite Cover

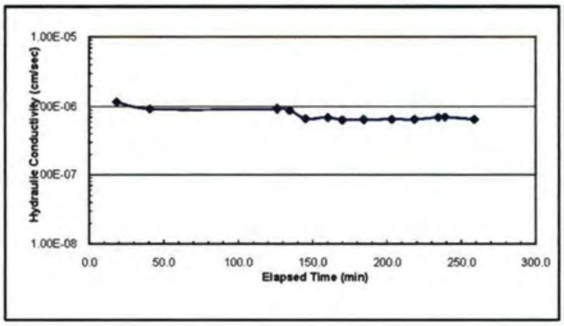
ASTM D 5084 - 00

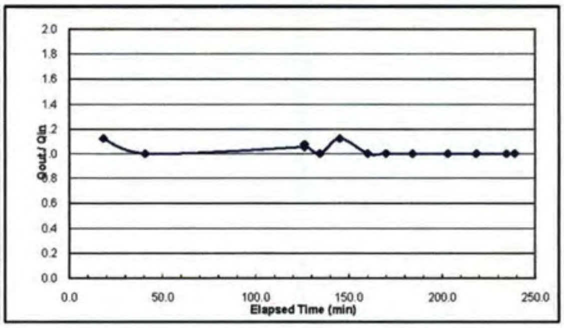
Sample I.D.	150-mm Polson Conv Below Memebrane-1			Test Date :	12/31/08
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.7	psi	Length of Sample, L =	6.4	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.7	psi	Sample Volume, V =	1158.3	cm^3
Effective Stress =	1.7	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	7.8		a_{out} =	1	cm^2
Weight of wet sample =	2207.7	g	Sample Water Content =	26.1%	(%)
Wet Density =	1.91	g/cm^3	Dry Density =	1.51	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A	31	126.36	106.63	26.09%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.0	24.0	0.0	23.0	0.0				
0:18:09	3.4	21.3	1088.7	17.9	18.1	1.17E-06	1.1	2.4	2.7
0:40:34	5.7	19.0	1345.7	13.3	40.6	9.18E-07	1.0	2.3	2.3
2:06:08	12.9	11.4	5133.3	-1.5	126.1	9.16E-07	1.1	7.2	7.6
0:00:00	1.3	23.9	-7567.7	22.6	126.1	9.40E-07	1.1	-11.6	-12.5
0:08:22	2.2	23.0	501.8	20.8	134.5	8.80E-07	1.0	0.9	0.9
0:19:03	3.0	22.1	641.2	19.1	145.1	6.67E-07	1.1	0.8	0.9
0:34:06	4.2	20.9	902.6	16.7	160.2	6.89E-07	1.0	1.2	1.2
0:43:54	4.9	20.2	588.1	15.3	170.0	6.35E-07	1.0	0.7	0.7
0:58:05	5.9	19.2	851.4	13.3	184.2	6.44E-07	1.0	1	1
1:17:01	7.2	17.9	1136.0	10.7	203.1	6.51E-07	1.0	1.3	1.3
1:32:12	8.2	16.9	910.9	8.7	218.3	6.49E-07	1.0	1	1
1:48:24	9.3	15.8	972.0	6.5	234.5	6.93E-07	1.0	1.1	1.1
1:52:53	9.6	15.5	268.8	5.9	239.0	7.01E-07	1.0	0.3	0.3
2:12:45	10.8	14.3	1192.2	3.5	258.9	6.50E-07			





Hydraulic Conductivity Test - Polson - Composite Cover

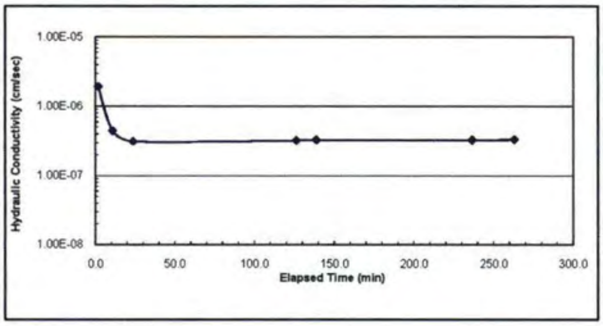
ASTM D 5084 - 00

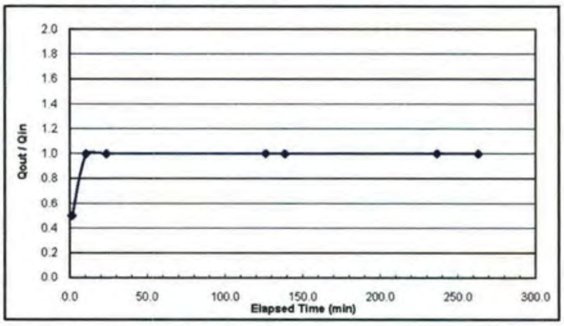
Sample I.D.	75-mm Polson Conv Below Memebrane-1		Test Date :	12/31/08	
Cell Pressure =	41.8	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	45.60	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	144.8	cm^3
Effective Stress =	1.6	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	249.5	g	Sample Water Content =	24.1%	(%)
Wet Density =	1.72	g/cm^3	Dry Density =	1.39	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A	31	134.66	114.55	24.07%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.0	24.0	0.0	23.0	0.0				
0:01:33	1.2	23.9	93.0	22.7	1.6	1.93E-06	0.5	0.2	0.1
0:10:38	1.4	23.7	544.8	22.3	10.6	4.43E-07	1.0	0.2	0.2
0:23:34	1.6	23.5	776.5	21.9	23.6	3.13E-07	1.0	0.2	0.2
0:48:59	2.0	23.1	1524.8	21.1	126.1	3.22E-07	1.0	0.4	0.4
1:01:36	2.2	22.9	757.0	20.7	138.7	3.28E-07	1.0	0.2	0.2
2:39:26	3.7	21.4	5870.0	17.7	236.6	3.27E-07	1.0	1.5	1.5
3:05:58	4.1	21.0	1592.0	16.9	263.1	3.33E-07	1.0	0.4	0.4





Hydraulic Conductivity Test - Polson - Composite Cover

ASTM D 5084 - 00

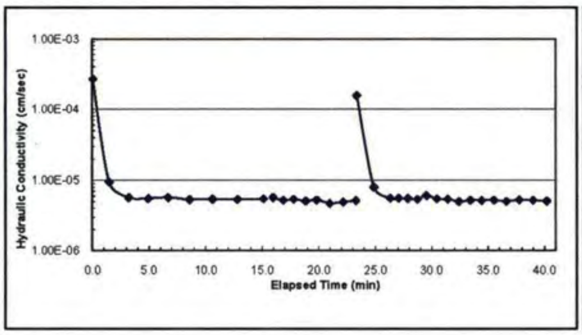
Sample I.D.	305-mm Conv Below Membrane-4	Test Date :	11/17/08

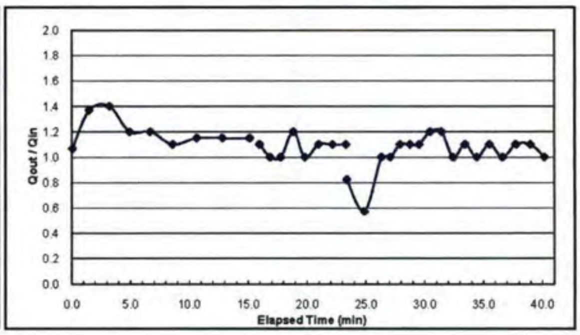
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.1		a_{out} =	1	cm^2
Weight of wet sample =	21800.0	g	Sample Water Content =	21.8%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.96	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
BB	30.36	178.34	151.84	21.81%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/17/2008 00:00.00	0.0	24.0	0.0	24.0	0.0				
12/17/2008 00:02.46	3.0	20.8	2.5	17.8	0.0	2.68E-04	1.1	3	3.2
12/17/2008 01:28.52	6.0	16.7	86.1	10.7	1.5	9.41E-06	1.4	3	4.1
12/17/2008 03:11.61	8.0	13.9	103.1	5.9	3.2	5.68E-06	1.4	2	2.8
12/17/2008 04:54.56	10.0	11.5	103.0	1.5	4.9	5.51E-06	1.2	2	2.4
12/17/2008 06:39.96	12.0	9.1	105.4	-2.9	6.7	5.69E-06	1.2	2	2.4
12/17/2008 08:34.46	14.0	6.9	114.5	-7.1	8.6	5.30E-06	1.1	2	2.2
12/17/2008 10:37.15	16.0	4.6	122.7	-11.4	10.6	5.38E-06	1.2	2	2.3
12/17/2008 12:48.46	18.0	2.3	131.3	-15.7	12.8	5.36E-06	1.2	2	2.3
12/17/2008 15:07.06	20.0	0.0	138.6	-20.0	15.1	5.45E-06	1.2	2	2.3
12/17/2008 00:00.00	16.0	16.1	0.0	0.1	15.1				
12/17/2008 00:50.56	17.0	15.0	50.6	-2.0	16.0	5.68E-06	1.1	1	1.1
12/17/2008 01:44.61	18.0	14.0	54.1	-4.0	16.9	5.20E-06	1.0	1	1
12/17/2008 02:38.45	19.0	13.0	53.8	-6.0	17.8	5.36E-06	1.0	1	1
12/17/2008 03:42.61	20.0	11.8	64.2	-8.2	18.8	5.10E-06	1.2	1	1.2
12/17/2008 04:41.02	21.0	10.8	58.4	-10.2	19.8	5.25E-06	1.0	1	1
12/17/2008 05:51.52	22.0	9.7	70.5	-12.3	21.0	4.71E-06	1.1	1	1.1
12/17/2008 07:01.37	23.0	8.6	69.9	-14.4	22.1	4.91E-06	1.1	1	1.1
12/17/2008 08:10.05	24.0	7.5	68.7	-16.5	23.3	5.16E-06	1.1	1	1.1
12/17/2008 00:00.00	0.0	24.9	0.0	24.9	23.3				
12/17/2008 00:04.95	4.0	21.6	5.0	17.6	23.4	1.56E-04	0.8	4	3.3
12/17/2008 01:34.95	8.0	19.3	90.0	11.3	24.9	7.97E-06	0.6	4	2.3
12/17/2008 03:01.84	10.0	17.3	86.9	7.3	26.3	5.55E-06	1.0	2	2
12/17/2008 03:46.95	11.0	16.3	45.1	5.3	27.1	5.53E-06	1.0	1	1
12/17/2008 04:35.75	12.0	15.2	48.8	3.2	27.9	5.51E-06	1.1	1	1.1
12/17/2008 05:27.14	13.0	14.1	51.4	1.1	28.7	5.37E-06	1.1	1	1.1
12/17/2008 06:13.64	14.0	13.0	46.5	-1.0	29.5	6.09E-06	1.1	1	1.1
12/17/2008 07:09.78	15.0	11.8	56.1	-3.2	30.4	5.44E-06	1.2	1	1.2
12/17/2008 08:08.05	16.0	10.6	58.3	-5.4	31.4	5.40E-06	1.2	1	1.2
12/17/2008 09:07.15	17.0	9.6	59.1	-7.4	32.4	4.98E-06	1.0	1	1
12/17/2008 10:08.14	18.0	8.5	61.0	-9.5	33.4	5.22E-06	1.1	1	1.1
12/17/2008 11:08.62	19.0	7.5	60.5	-11.5	34.4	5.17E-06	1.0	1	1
12/17/2008 12:13.14	20.0	6.4	64.5	-13.6	35.5	5.24E-06	1.1	1	1.1
12/17/2008 13:19.64	21.0	5.4	66.5	-15.6	36.6	5.00E-06	1.0	1	1
12/17/2008 14:28.18	22.0	4.3	68.5	-17.7	37.8	5.27E-06	1.1	1	1.1
12/17/2008 15:40.62	23.0	3.2	72.4	-19.8	39.0	5.17E-06	1.1	1	1.1
12/17/2008 16:53.52	24.0	2.2	72.9	-21.8	40.2	5.07E-06	1.0	1	1





Hydraulic Conductivity Test - Polson - Store-and-Release Cover

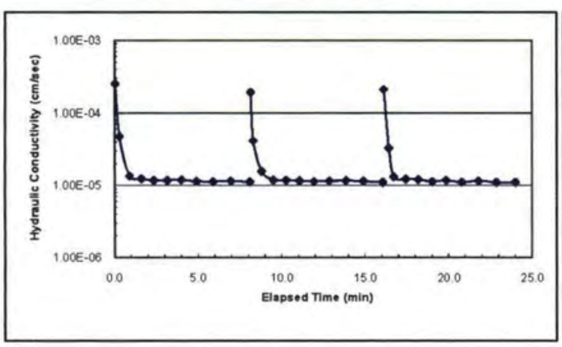
ASTM D 5084 - 00

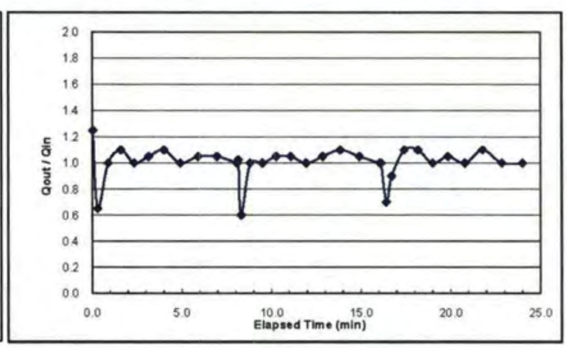
Sample I.D.	305-mm Alt Upper Silt-2		Test Date :	11/12/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	18000.0	g	Sample Water Content =	4.4%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.62	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
CC	30.84	171.15	165.22	4.41%

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
11/12/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
11/12/2008 00:01.90	2.0	22.4	1.9	20.4	0.0	2.50E-04	1.3	2	2.5
11/12/2008 00:17.62	6.0	19.8	15.7	13.8	0.3	4.70E-05	0.6	4	2.6
11/12/2008 00:53.03	8.0	17.8	35.4	9.8	0.9	1.34E-05	1.0	2	2
11/12/2008 01:35.48	10.0	15.6	42.4	5.6	1.6	1.23E-05	1.1	2	2.2
11/12/2008 02:20.40	12.0	13.6	44.9	1.6	2.3	1.17E-05	1.0	2	2
11/12/2008 03:08.34	14.0	11.5	47.9	-2.5	3.1	1.18E-05	1.1	2	2.1
11/12/2008 03:59.60	16.0	9.3	51.3	-6.7	4.0	1.20E-05	1.1	2	2.2
11/12/2008 04:54.09	18.0	7.3	54.5	-10.7	4.9	1.14E-05	1.0	2	2
11/12/2008 05:53.98	20.0	5.2	59.9	-14.8	5.9	1.13E-05	1.1	2	2.1
11/12/2008 06:56.88	22.0	3.1	62.9	-18.9	6.9	1.15E-05	1.1	2	2.1
11/12/2008 08:04.49	24.0	1.1	67.6	-22.9	8.1	1.12E-05	1.0	2	2
11/12/2008 00:00.00	0.0	24.9	0.0	24.9	8.1				
11/12/2008 00:04.57	4.0	20.8	4.6	16.8	8.2	1.91E-04	1.0	4	4.1
11/12/2008 00:13.40	6.0	19.6	8.8	13.6	8.3	4.14E-05	0.6	2	1.2
11/12/2008 00:43.60	8.0	17.6	30.2	9.6	8.8	1.58E-05	1.0	2	2
11/12/2008 01:25.56	10.0	15.6	42.0	5.6	9.5	1.19E-05	1.0	2	2
11/12/2008 02:11.16	12.0	13.5	45.6	1.5	10.3	1.18E-05	1.1	2	2.1
11/12/2008 02:59.88	14.0	11.4	48.7	-2.6	11.1	1.16E-05	1.1	2	2.1
11/12/2008 03:51.59	16.0	9.4	51.7	-6.6	11.9	1.13E-05	1.0	2	2
11/12/2008 04:46.80	18.0	7.3	55.2	-10.7	12.9	1.15E-05	1.1	2	2.1
11/12/2008 05:46.35	20.0	5.1	59.5	-14.9	13.8	1.16E-05	1.1	2	2.2
11/12/2008 06:49.88	22.0	3.0	63.5	-19.0	14.9	1.14E-05	1.1	2	2.1
11/12/2008 07:58.50	24.0	1.0	68.6	-23.0	16.0	1.10E-05	1.0	2	2
11/12/2008 00:00.00	0.0	24.7	0.0	24.7	16.0				
11/12/2008 00:04.15	4.0	20.7	4.2	16.7	16.1	2.08E-04	1.0	4	4
11/12/2008 00:22.16	7.0	18.6	18.0	11.6	16.4	3.27E-05	0.7	3	2.1
11/12/2008 00:39.48	8.0	17.7	17.3	9.7	16.7	1.32E-05	0.9	1	0.9
11/12/2008 01:22.21	10.0	15.5	42.7	5.5	17.4	1.23E-05	1.1	2	2.2
11/12/2008 02:07.94	12.0	13.3	45.7	1.3	18.2	1.21E-05	1.1	2	2.2
11/12/2008 02:57.01	14.0	11.3	49.1	-2.7	19.0	1.13E-05	1.0	2	2
11/12/2008 03:48.18	16.0	9.2	51.2	-6.8	19.9	1.17E-05	1.1	2	2.1
11/12/2008 04:44.22	18.0	7.2	56.0	-10.8	20.8	1.11E-05	1.0	2	2
11/12/2008 05:44.42	20.0	5.0	60.2	-15.0	21.8	1.15E-05	1.1	2	2.2
11/12/2008 06:48.74	22.0	3.0	64.3	-19.0	22.9	1.10E-05	1.0	2	2
11/12/2008 07:57.56	24.0	1.0	68.8	-23.0	24.0	1.10E-05	1.0	2	2





Hydraulic Conductivity Test - Polson - Store-and-Release Cover

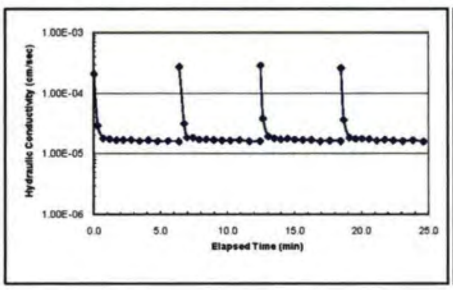
ASTM D 5084 - 00

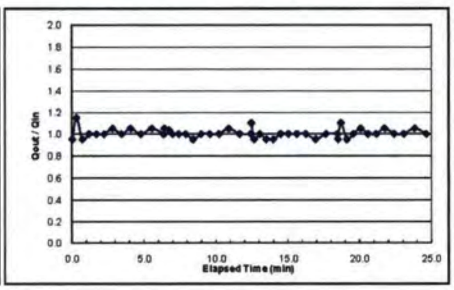
Sample I.D.	305-mm Alt Upper Silt-3		Test Date :	11/12/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	18000.0	g	Sample Water Content =	5.8%	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.62	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
#1	30.92	142.34	136.26	5.77%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
11/12/2008 00:00.00	0.0	24.5	0.0	24.5	0.0				
11/12/2008 00:01.96	2.0	22.6	2.0	20.6	0.0	2.10E-04	0.9	2	1.9
11/12/2008 00:18.37	4.0	20.3	16.4	16.3	0.3	2.89E-05	1.2	2	2.3
11/12/2008 00:43.86	6.0	18.4	25.5	12.4	0.7	1.76E-05	1.0	2	1.9
11/12/2008 01:11.74	8.0	16.4	27.9	8.4	1.2	1.73E-05	1.0	2	2
11/12/2008 01:42.35	10.0	14.4	30.6	4.4	1.7	1.65E-05	1.0	2	2
11/12/2008 02:14.29	12.0	12.4	31.9	0.4	2.2	1.66E-05	1.0	2	2
11/12/2008 02:48.77	14.0	10.3	34.5	-3.7	2.8	1.67E-05	1.1	2	2.1
11/12/2008 03:25.75	16.0	8.3	37.0	-7.7	3.4	1.60E-05	1.0	2	2
11/12/2008 04:04.81	18.0	6.2	39.1	-11.8	4.1	1.65E-05	1.1	2	2.1
11/12/2008 04:47.16	20.0	4.2	42.4	-15.8	4.8	1.58E-05	1.0	2	2
11/12/2008 05:33.05	22.0	2.1	45.9	-19.9	5.6	1.60E-05	1.1	2	2.1
11/12/2008 06:22.12	24.0	0.1	49.1	-23.9	6.4	1.57E-05	1.0	2	2
11/12/2008 00:00.00	0.0	24.9	0.0	24.9	6.4				
11/12/2008 00:01.58	2.0	22.8	1.6	20.8	6.4	2.74E-04	1.1	2	2.1
11/12/2008 00:23.25	5.0	19.7	21.7	14.7	6.8	3.13E-05	1.0	3	3.1
11/12/2008 00:35.95	6.0	18.7	12.7	12.7	7.0	1.83E-05	1.0	1	1
11/12/2008 01:02.30	8.0	16.7	26.4	8.7	7.4	1.82E-05	1.0	2	2
11/12/2008 01:32.10	10.0	14.7	29.8	4.7	7.9	1.69E-05	1.0	2	2
11/12/2008 02:02.55	12.0	12.8	30.4	0.8	8.4	1.69E-05	0.9	2	1.9
11/12/2008 02:35.96	14.0	10.8	33.4	-3.2	9.0	1.67E-05	1.0	2	2
11/12/2008 03:11.85	16.0	8.8	35.9	-7.2	9.6	1.64E-05	1.0	2	2
11/12/2008 03:50.10	18.0	6.8	38.2	-11.2	10.2	1.63E-05	1.0	2	2
11/12/2008 04:31.27	20.0	4.7	41.2	-15.3	10.9	1.65E-05	1.1	2	2.1
11/12/2008 05:16.20	22.0	2.7	44.9	-19.3	11.6	1.58E-05	1.0	2	2
11/12/2008 06:04.08	24.0	0.7	47.9	-23.3	12.4	1.59E-05	1.0	2	2
11/12/2008 00:00.00	0.0	24.9	0.0	24.9	12.4				
11/12/2008 00:01.54	2.0	22.7	1.5	20.7	12.5	2.88E-04	1.1	2	2.2
11/12/2008 00:12.94	4.0	20.8	11.4	16.8	12.7	3.76E-05	0.9	2	1.9
11/12/2008 00:37.11	6.0	18.8	24.2	12.8	13.1	1.90E-05	1.0	2	2
11/12/2008 01:03.64	8.0	16.9	26.5	8.9	13.5	1.76E-05	1.0	2	1.9
11/12/2008 01:32.50	10.0	15.0	28.9	5.0	14.0	1.70E-05	0.9	2	1.9
11/12/2008 02:02.76	12.0	13.0	30.3	1.0	14.5	1.74E-05	1.0	2	2
11/12/2008 02:35.62	14.0	11.0	32.9	-3.0	15.0	1.69E-05	1.0	2	2
11/12/2008 03:11.08	16.0	9.0	35.5	-7.0	15.6	1.66E-05	1.0	2	2
11/12/2008 03:48.59	18.0	7.0	37.5	-11.0	16.2	1.66E-05	1.0	2	2
11/12/2008 04:29.35	20.0	5.1	40.8	-14.9	16.9	1.58E-05	1.0	2	1.9
11/12/2008 05:12.95	22.0	3.1	43.6	-18.9	17.7	1.62E-05	1.0	2	2
11/12/2008 06:00.70	24.0	1.1	47.8	-22.9	18.4	1.58E-05	1.0	2	2
11/12/2008 00:00.00	0.0	24.9	0.0	24.9	18.4				
11/12/2008 00:01.58	2.0	23.0	1.6	21.0	18.5	2.60E-04	0.9	2	1.9
11/12/2008 00:14.49	4.0	20.8	12.9	16.8	18.7	3.57E-05	1.1	2	2.2
11/12/2008 00:39.17	6.0	18.9	24.7	12.9	19.1	1.81E-05	1.0	2	1.9
11/12/2008 01:06.82	8.0	16.9	27.7	8.9	19.6	1.73E-05	1.0	2	2
11/12/2008 01:36.56	10.0	14.8	29.7	4.8	20.1	1.73E-05	1.1	2	2.1
11/12/2008 02:07.43	12.0	12.8	30.9	0.8	20.6	1.71E-05	1.0	2	2
11/12/2008 02:41.86	14.0	10.8	34.4	-3.2	21.1	1.62E-05	1.0	2	2
11/12/2008 03:17.85	16.0	8.7	36.0	-7.3	21.7	1.68E-05	1.1	2	2.1
11/12/2008 03:56.20	18.0	6.7	38.4	-11.3	22.4	1.63E-05	1.0	2	2
11/12/2008 04:37.79	20.0	4.7	41.6	-15.3	23.1	1.60E-05	1.0	2	2
11/12/2008 05:22.22	22.0	2.6	44.4	-19.4	23.8	1.64E-05	1.1	2	2.1
11/12/2008 06:11.20	24.0	0.6	49.0	-23.4	24.6	1.56E-05	1.0	2	2





Hydraulic Conductivity Test - Polson - Store-and-Release Cover

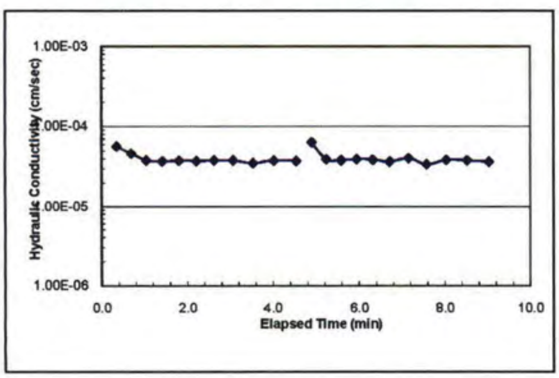
ASTM D 5084 - 00

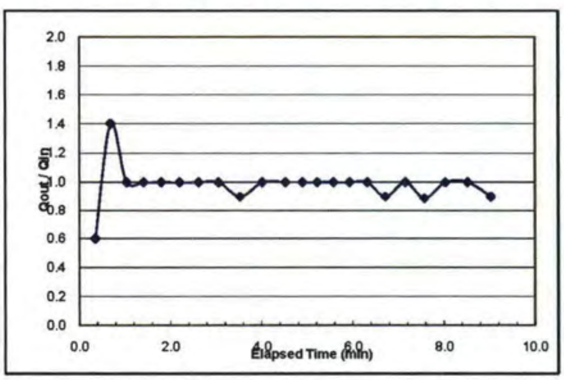
Sample I.D.	150-mm Polson Alt Upper Silt-3		Test Date :	1/13/09	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	7.6	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1390.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	4.6		a_{out} =	1	cm^2
Weight of wet sample =	2504.8	g	Sample Water Content =	28.9%	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.40	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln \left\{ \frac{(\Delta H_1)}{(\Delta H_2)} \right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
A	31.07	122.39	101.93	28.87%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23.0	0.0	23.0	0.0				
0:00:21	2.0	21.8	20.9	19.8	0.3	5.65E-05	0.6	2	1.2
0:00:41	3.0	20.4	20.1	17.4	0.7	4.63E-05	1.4	1	1.4
0:01:02	4.0	19.4	21.1	15.4	1.0	3.85E-05	1.0	1	1
0:01:25	5.0	18.4	22.6	13.4	1.4	3.73E-05	1.0	1	1
0:01:48	6.0	17.4	23.1	11.4	1.8	3.80E-05	1.0	1	1
0:02:12	7.0	16.4	24.3	9.4	2.2	3.77E-05	1.0	1	1
0:02:37	8.0	15.4	24.9	7.4	2.6	3.85E-05	1.0	1	1
0:03:03	9.0	14.4	26.3	5.4	3.1	3.82E-05	1.0	1	1
0:03:32	10.0	13.5	28.2	3.5	3.5	3.55E-05	0.9	1	0.9
0:04:01	11.0	12.5	29.0	1.5	4.0	3.83E-05	1.0	1	1
0:04:32	12.0	11.5	31.1	-0.5	4.5	3.77E-05	1.0	1	1
0:00:00	0.0	23.0	-271.7	23.0	4.5				
0:00:24	2.0	21.0	23.6	19.0	4.9	6.31E-05	1.0	2	2
0:00:43	3.0	20.0	19.9	17.0	5.2	3.95E-05	1.0	1	1
0:01:05	4.0	19.0	21.3	15.0	5.6	3.83E-05	1.0	1	1
0:01:26	5.0	18.0	21.5	13.0	5.9	3.96E-05	1.0	1	1
0:01:49	6.0	17.0	22.8	11.0	6.3	3.89E-05	1.0	1	1
0:02:13	7.0	16.1	23.8	9.1	6.7	3.69E-05	0.9	1	0.9
0:02:39	8.1	15.0	26.3	6.9	7.2	4.04E-05	1.0	1.1	1.1
0:03:04	9.0	14.2	25.3	5.2	7.6	3.40E-05	0.9	0.9	0.8
0:03:32	10.0	13.2	27.4	3.2	8.0	3.87E-05	1.0	1	1
0:04:01	11.0	12.2	29.4	1.2	8.5	3.80E-05	1.0	1	1
0:04:32	12.0	11.3	30.5	-0.7	9.0	3.68E-05	0.9	1	0.9





Hydraulic Conductivity Test - Polson - Store-and-Release Cover

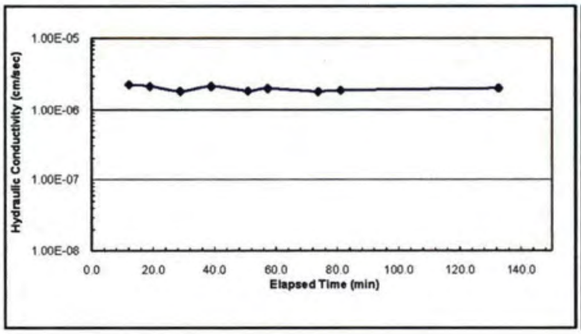
ASTM D 5084 - 00

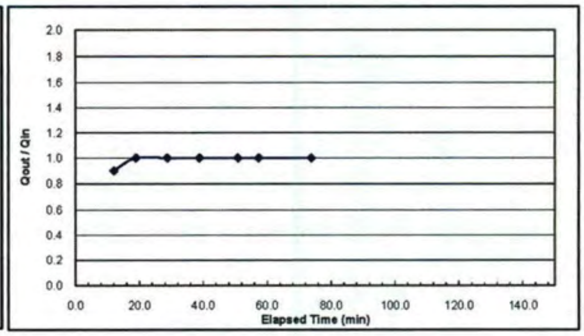
Sample I.D.	75-mm Polson Alt Upper Silt-3		Test Date :	1/26/09	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.0	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	38.32	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	146.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.2		a_{out} =	1	cm^2
Weight of wet sample =	275.2	g	Sample Water Content =	30.5%	(%)
Wet Density =	1.88	g/cm^3	Dry Density =	1.44	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
64	30.95	124.12	102.33	30.53%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.0	24.0	0.0	23.0	0.0				
0:12:03	2.0	23.1	723.2	21.1	12.1	2.28E-06	0.9	1	0.9
0:18:55	2.5	22.6	412.3	20.1	18.9	2.16E-06	1.0	0.5	0.5
0:28:46	3.1	22.0	590.6	18.9	28.8	1.85E-06	1.0	0.6	0.6
0:38:51	3.8	21.3	605.0	17.5	38.9	2.16E-06	1.0	0.7	0.7
0:50:50	4.5	20.6	719.0	16.1	50.8	1.86E-06	1.0	0.7	0.7
0:57:19	4.9	20.2	389.0	15.3	57.3	2.01E-06	1.0	0.4	0.4
1:13:48	5.8	19.3	989.0	13.5	73.8	1.83E-06	1.0	0.9	0.9
1:21:02	6.2	18.9	434.0	12.7	81.0	1.90E-06	1.0	0.4	0.4
2:12:39	9.1	16.1	3097.0	7.0	132.7	2.04E-06	1.0	2.9	2.8





Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

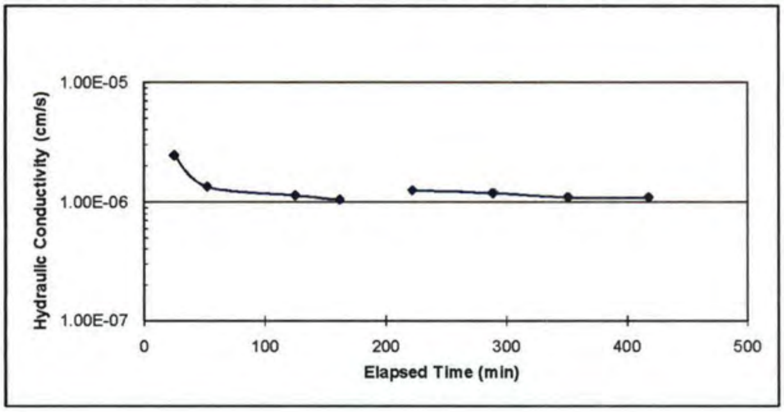
ASTM D 5084 - 00

Sample I.D.	305-mm K#1		Test Date :		
Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	13005.0	cm^3
Effective Stress =	4.0	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	7.9		a_{out} =	5	cm^2
Weight of wet sample =	26308.8	g	Sample Water Content =	27.1	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.59	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
7	49.4	383.2	311.96	27.13

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
9:00:00	0.5	22.1	0	21.6	0				
9:25:00	8.1	20.2	1500	12.1	25	2.45E-06	0.3	38	9.5
9:52:00	11.5	18.2	1620	6.7	52	1.35E-06	0.6	17	10
11:05:00	17.9	13	4380	-4.9	125	1.14E-06	0.8	32	26
11:42:00	20.6	10.6	2220	-10	162	1.05E-06	0.9	13.5	12
11:42:00	0.4	23.2	0	22.8	162				
12:42:00	6.8	17.9	3600	11.1	222	1.26E-06	0.8	32	26.5
13:49:00	12.6	12.2	4020	-0.4	289	1.19E-06	1	29	28.5
14:51:00	17.2	7.7	3720	-9.5	351	1.10E-06	1	23	22.5
15:58:00	21.9	3.2	4020	-18.7	418	1.10E-06	1	23.5	22.5



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

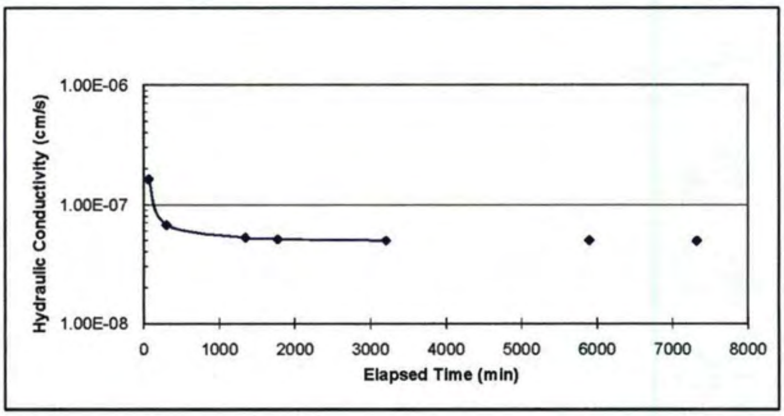
ASTM D 5084 - 00

Sample I.D.	150-mm K#1		Test Date :	12/21/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	12.5	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	181.46	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	2268.2	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.3		a_{out} =	1	cm^2
Weight of wet sample =	4776.8	g	Sample Water Content =	17.8	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.79	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
4	49.4	441.8	382.64	17.75

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/21/2005 11:39	0	24	0	24	0				
12/21/2005 12:45	2.9	23.8	3960	20.9	66	1.64E-07	0.1	14.5	1
12/21/2005 16:40	5.6	22.1	14100	16.5	301	6.71E-08	0.6	13.5	8.5
12/22/2005 10:03	13.4	15.6	62580	2.2	1344	5.22E-08	0.8	39	32.5
12/22/2005 17:09	16.1	13	25560	-3.1	1770	5.07E-08	1	13.5	13
12/23/2005 17:03	24.4	5.3	86040	-19.1	3204	4.92E-08	0.9	41.5	38.5
12/23/2005 17:03	6	23.3	0	17.3	3204				
12/25/2005 13:53	23.2	7.6	161400	-15.6	5894	4.96E-08	0.9	86	78.5
12/25/2005 13:53	9	23.9	0	14.9	5894				
12/26/2005 13:35	18.2	15.2	85320	-3	7316	4.91E-08	0.9	46	43.5
12/27/2005 9:12	24.7	9	70620	-15.7	8493	4.70E-08	1	32.5	31



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

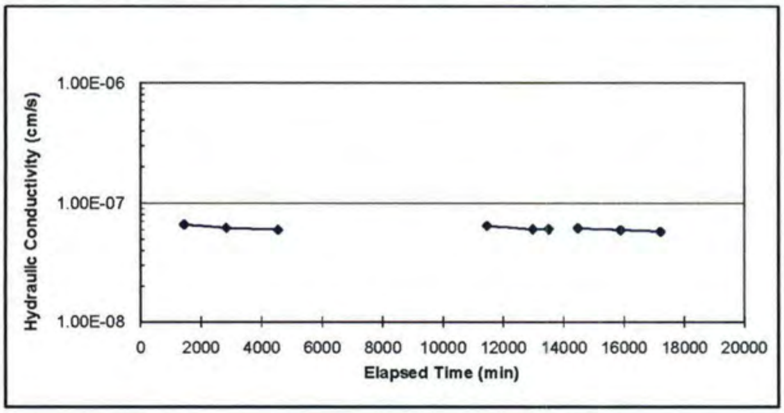
ASTM D 5084 - 00

Sample I.D.	100-mm K#1		Test Date :		
Cell Pressure =	20.0	psi	Diameter of Sample, D =	10.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	10.0	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	81.71	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	817.1	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	14.1		a_{out} =	1	cm^2
Weight of wet sample =	1645.5	g	Sample Water Content =		(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.01	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/28/2005 9:22	0.5	24.1	0	23.6	0.0				
12/29/2005 9:19	8.4	17.5	86220	9.1	1437.0	6.61E-08	0.8	39.5	33
12/30/2005 8:29	14.7	11.8	83400	-2.9	2827.0	6.18E-08	0.9	31.5	28.5
12/31/2005 13:05	21.5	5.5	102960	-16	4543.0	5.99E-08	0.9	34	31.5
1/4/2006 8:45	7	22.4	330000	15.4	10043.0				
1/5/2006 8:17	13.3	15.5	84720	2.2	11455.0	6.43E-08	1.1	31.5	34.5
1/6/2006 9:36	19.5	9.5	91140	-10	12974.0	6.04E-08	1	31	30
1/6/2006 18:23	21.5	7.5	31620	-14	13501.0	6.06E-08	1	10	10
1/6/2006 18:23	7.8	23.8	0	16	13501.0				
1/7/2006 10:27	12.2	19.4	57840	7.2	14465.0	6.16E-08	1	22	22
1/8/2006 10:01	18.1	13.7	84840	-4.4	15879.0	5.94E-08	1	29.5	28.5
1/9/2006 8:05	23.1	8.9	79440	-14.2	17203.0	5.79E-08	1	25	24



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

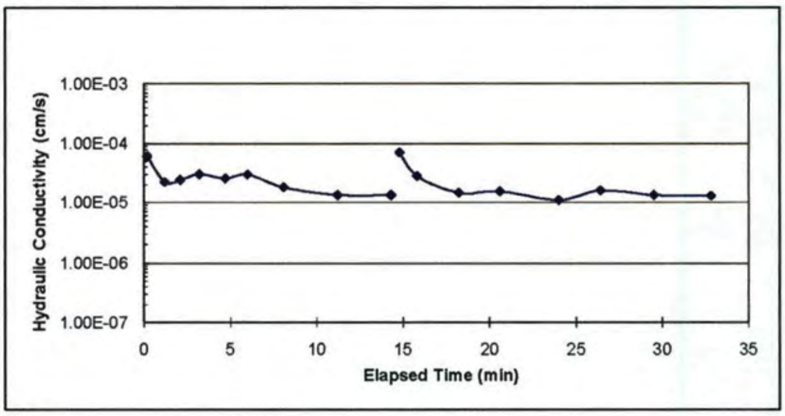
ASTM D 5084 - 00

Sample I.D.	305-mm K#2-L		Test Date :	12/7/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	11105.4	cm^3
Effective Stress =	4.0	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	9.3		a_{out} =	5	cm^2
Weight of wet sample =	23768.6	g	Sample Water Content =	24.1	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.72	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
1	50.1	381.1	316.77	24.12

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24	0	24	0				
0:00:10	1.0	23.1	10	22.1	0.2	6.06E-05	0.9	5	4.5
0:01:10	3.0	21	60	18	1.2	2.22E-05	1.05	10	10.5
0:02:04	5.0	19.1	54	14.1	2.1	2.41E-05	0.95	10	9.5
0:03:14	8.0	16	70	8	3.2	3.00E-05	1.03	15	15.5
0:04:40	11.0	12.9	86	1.9	4.7	2.54E-05	1.03	15	15.5
0:05:57	14.0	9.8	77	-4.2	6	2.97E-05	1.03	15	15.5
0:08:05	17.0	6.9	128	-10.1	8.1	1.80E-05	0.97	15	14.5
0:11:10	20.0	3.9	185	-16.1	11.2	1.33E-05	1	15	15
0:14:20	23.0	1	190	-22	14.3	1.33E-05	0.97	15	14.5
0:00:00	0.0	24.5	0	24.5	14.3				
0:00:30	3.0	21	30	18	14.8	6.99E-05	1.17	15	17.5
0:01:30	6.0	19	60	13	15.8	2.79E-05	0.67	15	10
0:03:51	9.0	16.1	141	7.1	18.2	1.45E-05	0.97	15	14.5
0:06:15	12.0	13	144	1	20.6	1.53E-05	1	15	15.5
0:09:38	15.0	10.1	203	-4.9	24	1.09E-05	1	15	14.5
0:12:04	18.0	7.2	146	-10.8	26.4	1.59E-05	1	15	14.5
0:15:07	21.0	4.3	183	-16.7	29.5	1.33E-05	1	15	14.5
0:18:25	24.0	1.4	198	-22.6	32.8	1.29E-05	1	15	14.5



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

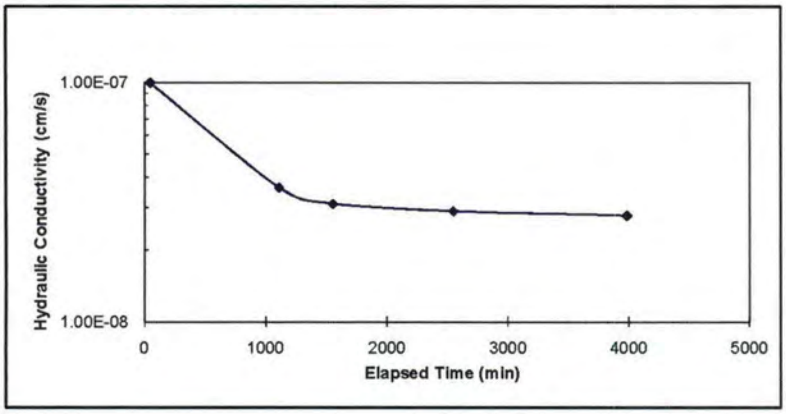
ASTM D 5084 - 00

Sample I.D.	150-mm K#2-L		Test Date :	12/12/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	10.0	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	181.46	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	1814.6	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	14.1		a_{out} =	1	cm^2
Weight of wet sample =	3800.1	g	Sample Water Content =	13.6	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.84	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35.1	379.6	338.47	13.56

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/12/2005 14:42	0.2	22.7	0	22.5	0				
12/12/2005 15:30	1	21.8	2880	20.8	48	9.97E-08	1.13	4	4.5
12/13/2005 9:13	7.8	15.6	63780	7.8	1111	3.61E-08	0.91	34	31
12/13/2005 16:37	10.2	13.6	26640	3.4	1555	3.10E-08	0.83	12	10
12/14/2005 9:13	15	9.6	59760	-5.4	2551	2.89E-08	0.83	24	20
12/15/2005 9:10	21	4.3	86220	-16.7	3988	2.77E-08	0.88	30	26.5



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

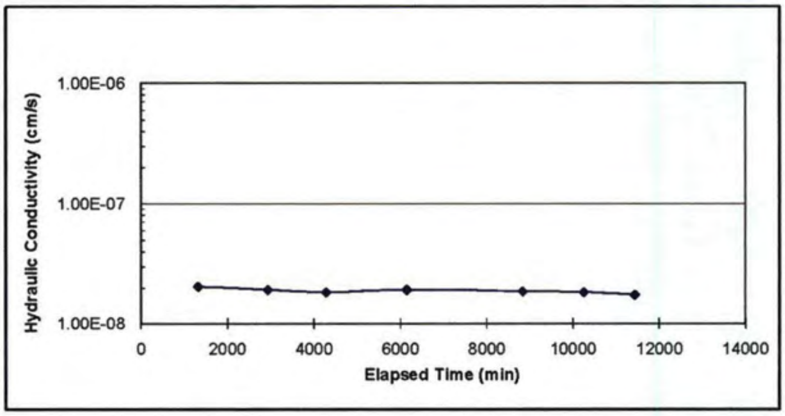
ASTM D 5084 - 00

Sample I.D.	100-mm K#2-L		Test Date :	12/15/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	10.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	10.0	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	81.71	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	817.1	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	14.1		a_{out} =	1	cm^2
Weight of wet sample =	1661.6	g	Sample Water Content =	18.8	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	1.71	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
2	50.2	292.2	253.89	18.81

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
12/19/2005 10:33	1.1	24.2	0	23.1	0.0				
12/20/2005 8:37	3.6	22.4	79440	18.8	1324.0	2.07E-08	0.72	12.5	9
12/21/2005 11:35	6	20	97080	14	2942.0	1.94E-08	1	12	12
12/22/2005 10:03	7.9	18.2	80880	10.3	4290.0	1.85E-08	0.95	9.5	9
12/23/2005 17:04	10.4	15.5	111660	5.1	6151.0	1.94E-08	1.08	12.5	13.5
12/25/2005 13:53	14	12.1	161340	-1.9	8840.0	1.88E-08	0.94	18	17
12/26/2005 13:35	15.7	10.3	85320	-5.4	10262.0	1.85E-08	1.06	8.5	9
12/27/2005 9:11	17	8.9	70560	-8.1	11438.0	1.76E-08	1.08	6.5	7



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

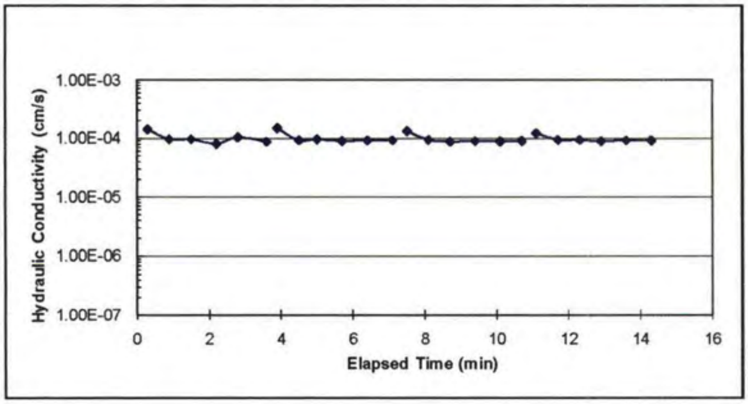
ASTM D 5084 - 00

Sample I.D.		305-mm K#3-L		Test Date :	12/19/05
Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	17.8	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	13005.0	cm^3
Effective Stress =	4.0	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	7.9		a_{out} =	5	cm^2
Weight of wet sample =	24040.8	g	Sample Water Content =	21.4	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.52	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in}+a_{out})} \frac{L}{A*\Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	34.8	316	266.48	21.37

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24	0	24	0				
0:00:20	4.0	20.5	20	16.5	0.3	1.42E-04	0.9	20	17.5
0:00:53	8.0	16.5	33	8.5	0.9	9.64E-05	1	20	20
0:01:28	12.0	12.5	35	0.5	1.5	9.59E-05	1	20	20
0:02:11	16.0	8.7	43	-7.3	2.2	8.05E-05	1	20	19
0:02:48	20.0	4.5	37	-15.5	2.8	1.04E-04	1.1	20	21
0:03:34	24.0	0.5	46	-23.5	3.6	8.75E-05	1	20	20
0:00:00	0.0	24.3	0	24.3	3.6				
0:00:20	4.0	20.5	20	16.5	3.9	1.48E-04	1	20	19
0:00:53	8.0	16.8	33	8.8	4.5	9.27E-05	0.9	20	18.5
0:01:28	12.0	12.8	35	0.8	5	9.58E-05	1	20	20
0:02:07	16.0	8.9	39	-7.1	5.7	8.98E-05	1	20	19.5
0:02:49	20.0	4.7	42	-15.3	6.4	9.19E-05	1.1	20	21
0:03:33	24.0	0.6	44	-23.4	7.1	9.25E-05	1	20	20.5
0:00:00	0.0	24.2	0	24.2	7.1				
0:00:25	4.0	19.5	25	15.5	7.5	1.32E-04	1.2	20	23.5
0:00:59	8.0	15.5	34	7.5	8.1	9.42E-05	1	20	20
0:01:35	12.0	12	36	0	8.7	8.79E-05	0.9	20	17.5
0:02:16	16.0	7.8	41	-8.2	9.4	8.92E-05	1.1	20	21
0:02:59	20.0	3.8	43.0	-16.2	10.1	8.83E-05	1.0	20	20
0:03:33	23.0	0.7	34.0	-22.3	10.7	9.00E-05	1.0	15	15.5
0:00:00	0.0	24.0	0.0	24.0	10.7				
0:00:25	4.0	20.0	25.0	16.0	11.1	1.21E-04	1.0	20	20
0:00:59	8.0	16.0	34.0	8.0	11.7	9.39E-05	1.0	20	20
0:01:35	12.0	12.0	36.0	0.0	12.3	9.36E-05	1.0	20	20
0:02:15	16.0	8.0	40.0	-8.0	12.9	8.92E-05	1.0	20	20
0:02:57	20.0	3.8	42.0	-16.2	13.6	9.25E-05	1.1	20	21
0:03:40	24.0	0.0	43.0	-24.0	14.3	9.17E-05	1.0	20	19



Hydraulic Conductivity Test - Sacramento - Thin Store-and-Release Cover

ASTM D 5084 - 00

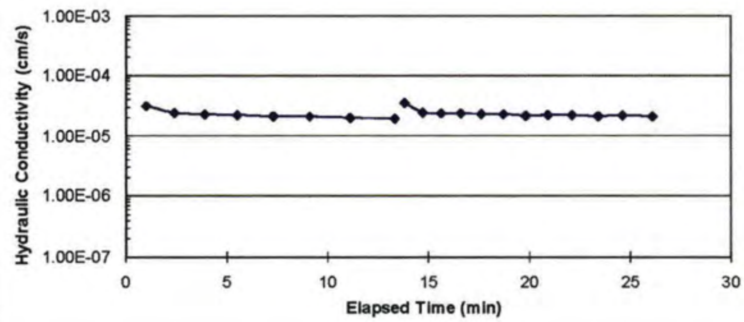
Sample I.D.	305-mm K#5-L	Test Date :	12/7/05

Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	11105.4	cm^3
Effective Stress =	4.0	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	9.3		a_{out} =	5	cm^2
Weight of wet sample =	22770.7	g	Sample Water Content =	15.7	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	1.77	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	34.9	314.4	276.57	15.65

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24	0	24	0				
0:00:58	3.0	21.4	58	18.4	1	3.12E-05	0.9	15	13
0:02:21	6.0	18.4	83	12.4	2.4	2.42E-05	1	15	15
0:03:51	9.0	15.5	90	6.5	3.9	2.28E-05	1	15	14.5
0:05:29	12.0	12.5	98	0.5	5.5	2.22E-05	1	15	15
0:07:16	15.0	9.5	107	-5.5	7.3	2.12E-05	1	15	15
0:09:07	18.0	6.6	111	-11.4	9.1	2.10E-05	1	15	14.5
0:11:06	21.0	3.8	119	-17.2	11.1	2.01E-05	0.9	15	14
0:13:20	24.0	0.8	134	-23.2	13.3	1.94E-05	1	15	15
0:00:00	0.0	24.5	0	24.5	13.3				
0:00:30	2.0	23.2	30	21.2	13.8	3.51E-05	0.7	10	6.5
0:01:22	4.0	21.3	52	17.3	14.7	2.45E-05	0.9	10	9.5
0:02:18	6.0	19.3	56	13.3	15.6	2.39E-05	1	10	10
0:03:16	8.0	17.3	58	9.3	16.6	2.37E-05	1	10	10
0:04:17	10.0	15.3	61	5.3	17.6	2.31E-05	1	10	10
0:05:20	12.0	13.3	63	1.3	18.7	2.30E-05	1	10	10
0:06:29	14.0	11.3	69	-2.7	19.8	2.16E-05	1	10	10
0:07:36	16.0	9.4	67	-6.6	20.9	2.23E-05	1	10	9.5
0:08:46	18.0	7.5	70	-10.5	22.1	2.20E-05	1	10	9.5
0:10:03	20.0	5.5	77.0	-14.5	23.4	2.12E-05	1.0	10	10
0:11:18	22.0	3.6	75.0	-18.4	24.6	2.19E-05	1.0	10	9.5
0:12:43	24.0	1.5	85.0	-22.5	26.1	2.10E-05	1.1	10	10.5



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

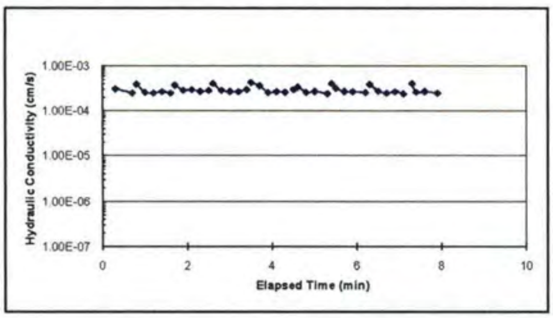
ASTM D 5084 - 00

Sample I.D.		**305-mm K#4-L**		**Test Date :**		**11/29/05**	
Cell Pressure =	20.0	psi		Diameter of Sample, D =	30.5	cm	
Inflow Pressure =	17.0	psi		Length of Sample, L =	16.5	cm	
Outflow Pressre =	15.0	psi		Area of Sample, A =	730.62	cm^2	
Pressure Difference =	2.0	psi		Sample Volume, V =	12055.2	cm^3	
Effective Stress =	4.0	psi		a_{in} =	4	cm^2	
Hydraulic Gradient, i =	8.5			a_{out} =	4	cm^2	
Weight of wet sample =	20185.2	g		Sample Water Content =	24.2	(%)	
Wet Density =	1.7	g/cm^3		Dry Density =	1.35	g/cm^3	

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	34.9	262.3	218.04	24.17

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24	0	24	0				
0:00:15	10.0	18	15	8	0.3	3.08E-04	0.6	40	24
0:00:40	20.0	9	25	-11	0.7	2.48E-04	0.9	40	36
0:00:00	0.0	24.5	0	24.5	0.7				
0:00:08	5.0	18.5	8	13.5	0.8	3.90E-04	1.2	20	24
0:00:18	10.0	15	10	5	1	2.57E-04	0.7	20	14
0:00:31	15.0	10	13	-5	1.2	2.48E-04	1	20	20
0:00:44	20.0	5	13	-15	1.4	2.67E-04	1	20	20
0:00:56	24.0	1	12	-23	1.6	2.48E-04	1	16	16
0:00:00	0.0	24.5	0	24.5	1.6				
0:00:08	5.0	19	8	14	1.7	3.72E-04	1.1	20	22
0:00:18	10.0	14.5	10	4.5	1.9	2.87E-04	0.9	20	18
0:00:29	15.0	9.5	11	-5.5	2.1	2.94E-04	1	20	20
0:00:42	20.0	4.5	13	-15.5	2.3	2.68E-04	1	20	20
0:00:54	24.5	0	12	-24.5	2.5	2.81E-04	1	18	18
0:00:00	0.0	24.5	0	24.5	2.5				
0:00:07	5.0	19.5	7	14.5	2.6	4.04E-04	1	20	20
0:00:17	10.0	15	10	5	2.8	2.86E-04	0.9	20	18
0:00:29	15.0	10	12	-5	3	2.68E-04	1	20	20
0:00:42	20.0	5.0	13.0	-15.0	3.2	2.67E-04	1.0	20	20
0:00:54	24.5	0.0	12.0	-24.5	3.4	2.96E-04	1.1	18	20
0:00:00	0.0	24.5	0.0	24.5	3.4				
0:00:07	5.0	19.0	7.0	14.0	3.5	4.25E-04	1.1	20	22
0:00:15	10.0	14.5	8.0	4.5	3.7	3.59E-04	0.9	20	18
0:00:27	15.0	10.0	12.0	-5.0	3.9	2.55E-04	0.9	20	18
0:00:40	20.0	5.0	13.0	-15.0	4.1	2.67E-04	1.0	20	20
0:00:53	24.5	0.5	13.0	-24.0	4.3	2.59E-04	1.0	18	18
0:00:00	0.0	24.5	0.0	24.5	4.3				
0:00:10	5.0	19.0	10.0	14.0	4.5	2.97E-04	1.1	20	22
0:00:19	10.0	14.0	9.0	4.0	4.6	3.36E-04	1.0	20	20
0:00:31	15.0	9.5	12.0	-5.5	4.8	2.56E-04	0.9	20	18
0:00:44	20.0	4.5	13.0	-15.5	5.0	2.68E-04	1.0	20	20
0:00:58	24.5	0.0	14.0	-24.5	5.3	2.41E-04	1.0	18	18
0:00:00	0.0	24.5	0.0	24.5	5.3				
0:00:07	5.0	19.5	7.0	14.5	5.4	4.04E-04	1.0	20	20
0:00:16	10.0	15.0	9.0	5.0	5.5	3.18E-04	0.9	20	18
0:00:28	15.0	10.0	12.0	-5.0	5.7	2.68E-04	1.0	20	20
0:00:41	20.0	5.0	13.0	-15.0	5.9	2.67E-04	1.0	20	20
0:00:55	24.5	0.0	14.0	-24.5	6.2	2.54E-04	1.1	18	20
0:00:00	0.0	24.5	0.0	24.5	6.2				
0:00:07	5.0	20.0	7.0	15.0	6.3	3.83E-04	0.9	20	18
0:00:18	10.0	15.0	11.0	5.0	6.5	2.73E-04	1.0	20	20
0:00:31	15.0	10.0	13.0	-5.0	6.7	2.48E-04	1.0	20	20
0:00:44	20.0	5.0	13.0	-15.0	6.9	2.67E-04	1.0	20	20
0:00:58	24.5	0.5	14.0	-24.0	7.1	2.40E-04	1.0	18	18
0:00:00	0.0	24.5	0.0	24.5	7.1				
0:00:07	5.0	19.5	7.0	14.5	7.3	4.04E-04	1.0	20	20
0:00:18	10.0	15.0	11.0	5.0	7.4	2.60E-04	0.9	20	18
0:00:30	15.0	10.0	12.0	-5.0	7.6	2.68E-04	1.0	20	20
0:00:44	20.0	5.0	14.0	-15.0	7.9	2.48E-04	1.0	20	20



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

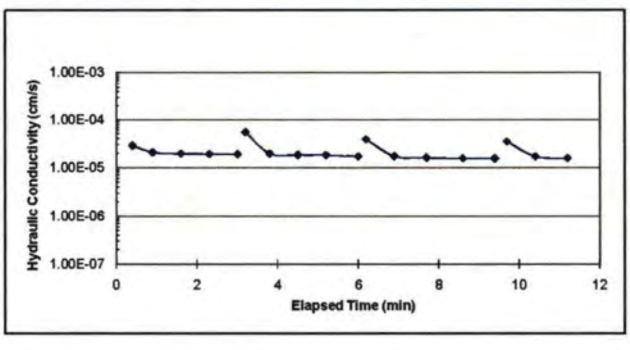
ASTM D 5084 - 00

Sample I.D.	305-mm K#6-L		Test Date :	12/7/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	11105.4	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.3		a_{out} =	1	cm^2
Weight of wet sample =	20729.5	g	Sample Water Content =	32.2	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.41	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
874	35	342.7	267.68	32.24

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24	0	24	0				
0:00:22	5.0	19.5	22	14.5	0.4	2.82E-05	0.9	5	4.5
0:00:56	10.0	14.5	34	4.5	0.9	2.05E-05	1	5	5
0:01:35	15.0	9.4	39	-5.6	1.6	1.93E-05	1	5	5.1
0:02:18	20.0	4.3	43	-15.7	2.3	1.89E-05	1	5	5.1
0:02:58	24.3	0	40	-24.3	3	1.86E-05	1	4.3	4.3
0:00:00	0.0	24.5	0	24.5	3				
0:00:12	5.0	19.5	12	14.5	3.2	5.44E-05	1	5	5
0:00:48	10.0	14.5	36	4.5	3.8	1.93E-05	1	5	5
0:01:29	15.0	9.5	41	-5.5	4.5	1.82E-05	1	5	5
0:02:14	20.0	4.5	45	-15.5	5.2	1.78E-05	1	5	5
0:02:59	24.3	0	45	-24.3	6	1.69E-05	1	4.3	4.5
0:00:00	0.0	24.5	0	24.5	6				
0:00:17	5.0	19.5	17	14.5	6.2	3.84E-05	1	5	5
0:00:58	10.0	14.5	41	4.5	6.9	1.70E-05	1	5	5
0:01:45	15.0	9.5	47	-5.5	7.7	1.59E-05	1	5	5
0:02:37	20.0	4.5	52	-15.5	8.6	1.54E-05	1	5	5
0:03:28	24.5	0	51	-24.5	9.4	1.53E-05	1	4.5	4.5
0:00:00	0.0	24.5	0	24.5	9.4				
0:00:19	5.0	19.5	19.0	14.5	9.7	3.43E-05	1.0	5	5
0:01:00	10.0	14.6	41.0	4.6	10.4	1.68E-05	1.0	5	4.9
0:01:48	15.0	9.7	48.0	-5.3	11.2	1.54E-05	1.0	5	4.9
0:02:41	20.0	4.5	53.0	-15.5	12.1	1.54E-05	1.0	5	5.2
0:03:36	24.5	0.0	55.0	-24.5	13.0	1.42E-05	1.0	4.5	4.5
0:00:00	0.0	24.5	0.0	24.5	13.0				
0:00:16	5.0	19.2	16.0	14.2	13.3	4.20E-05	1.1	5	5.3
0:00:58	10.0	14.2	42.0	4.2	14.0	1.66E-05	1.0	5	5
0:01:46	15.0	9.2	48.0	-5.8	14.8	1.56E-05	1.0	5	5
0:02:41	20.0	4.0	55.0	-16.0	15.7	1.49E-05	1.0	5	5.2
0:03:28	24.0	0.0	47.0	-24.0	16.5	1.47E-05	1.0	4	4
0:00:00	0.0	24.5	0.0	24.5	16.5				
0:00:18	5.0	19.7	18.0	14.7	16.8	3.55E-05	1.0	5	4.8
0:01:02	10.0	14.8	44.0	4.8	17.5	1.56E-05	1.0	5	4.9
0:01:53	15.0	9.8	51.0	-5.2	18.4	1.46E-05	1.0	5	5
0:02:49	20.0	4.5	56.0	-15.5	19.3	1.47E-05	1.1	5	5.3
0:03:45	24.5	0.0	56.0	-24.5	20.2	1.39E-05	1.0	4.5	4.5
0:00:00	0.0	24.5	0.0	24.5	20.2				
0:00:17	5	20	17	15	20.5	3.64E-05	0.9	5	4.5
0:01:03	10	15	46	5	21.3	1.51E-05	1	5	5
0:01:55	15	10	52	-5	22.2	1.43E-05	1	5	5
0:02:52	20	5	57	-15	23.1	1.40E-05	1	5	5
0:03:52	25	0	60	-25	24.1	1.44E-05	1	5	5



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

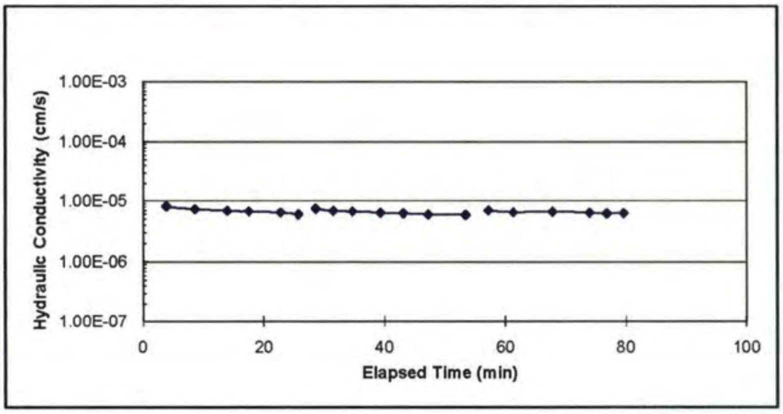
ASTM D 5084 - 00

Sample I.D.	150-mm K#6-L		Test Date :	12/7/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	11.5	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	181.46	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	2086.8	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.2		a_{out} =	1	cm^2
Weight of wet sample =	4042.5	g	Sample Water Content =	31.1	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.48	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
10	51	399.95	317.17	31.10

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
0:00:00	0.0	24	0	24	0				
0:03:47	5.0	19.7	227	14.7	3.8	8.07E-06	0.9	5	4.3
0:08:29	10.0	14.9	282	4.9	8.5	7.28E-06	1	5	4.8
0:13:53	15.0	10	324	-5	13.9	6.85E-06	1	5	4.9
0:17:30	18.0	6.9	217	-11.1	17.5	6.68E-06	1	3	3.1
0:22:49	22.0	2.8	319	-19.2	22.8	6.38E-06	1	4	4.1
0:25:41	24.0	0.9	172	-23.1	25.7	5.98E-06	1	2	1.9
0:00:00	0.8	24.5	0	23.7	25.7				
0:02:52	4.0	21.2	172	17.2	28.6	7.39E-06	1	3.2	3.3
0:05:48	7.0	18.3	176	11.3	31.5	6.82E-06	1	3	2.9
0:08:58	10.0	15.3	190	5.3	34.7	6.68E-06	1	3	3
0:13:37	14.0	11.3	279	-2.7	39.3	6.37E-06	1	4	4
0:17:23	17.0	8.3	226	-8.7	43.1	6.20E-06	1	3	3
0:21:29	20.0	5.3	246	-14.7	47.2	5.96E-06	1	3	3
0:27:45	24.2	1	376	-23.2	53.4	5.86E-06	1	4.2	4.3
0:00:00	0.0	24.5	0	24.5	53.4				
0:03:43	4.0	20.6	223	16.6	57.2	6.93E-06	1	4	3.9
0:07:51	8.0	16.8	248	8.8	61.3	6.47E-06	1	4	3.8
0:14:24	14.0	10.9	393	-3.1	67.8	6.65E-06	1	6	5.9
0:20:36	19.0	6.0	372.0	-13.0	74.0	6.33E-06	1.0	5	4.9
0:23:23	21.0	3.9	167.0	-17.1	76.8	6.16E-06	1.1	2	2.1
0:26:10	23.0	1.9	167.0	-21.1	79.6	6.21E-06	1.0	2	2



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

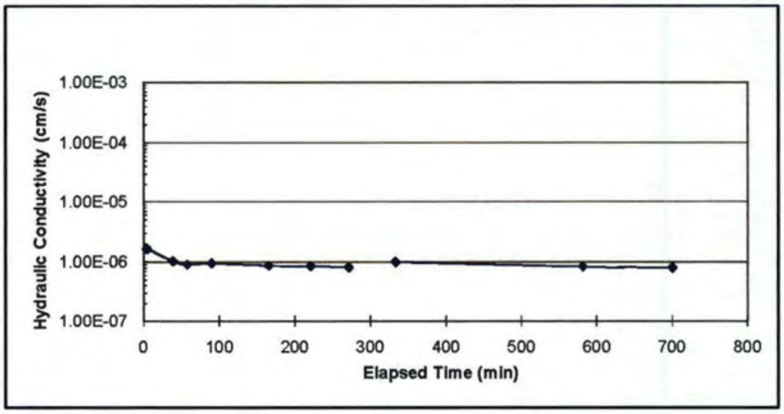
ASTM D 5084 - 00

Sample I.D.	100-mm K#6-L		Test Date :		
Cell Pressure =	20.0	psi	Diameter of Sample, D =	10.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	11.5	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	81.71	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	939.7	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	12.2		a_{out} =	1	cm^2
Weight of wet sample =	1812.6	g	Sample Water Content =		(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.93	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
10	51.1	292.9		

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.2	24.3	0	24.1	0				
0:04:22	1.0	24.1	262	23.1	4.4	1.65E-06	0.2	0.8	0.2
0:38:35	3.8	22.1	2053	18.3	38.6	1.03E-06	0.7	2.8	2
0:57:44	5.0	21	1149	16	57.7	9.00E-07	0.9	1.2	1.1
1:29:59	7.0	19	1935	12	90	9.48E-07	1	2	2
2:45:30	11.2	15	4531	3.8	165.5	8.64E-07	1	4.2	4
3:41:07	14.1	12.2	3337	-1.9	221.1	8.56E-07	1	2.9	2.8
4:31:33	16.5	9.9	3026	-6.6	271.6	8.08E-07	1	2.4	2.3
0:00:00	0.0	24.1	0	24.1	271.6				
1:02:12	4.8	20.5	3732	15.7	333.8	9.94E-07	0.8	4.8	3.6
5:10:22	17.4	8.1	14890	-9.3	581.9	8.30E-07	1	12.6	12.4
7:09:10	22.4	3	7128	-19.4	700.7	7.96E-07	1	5	5.1



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

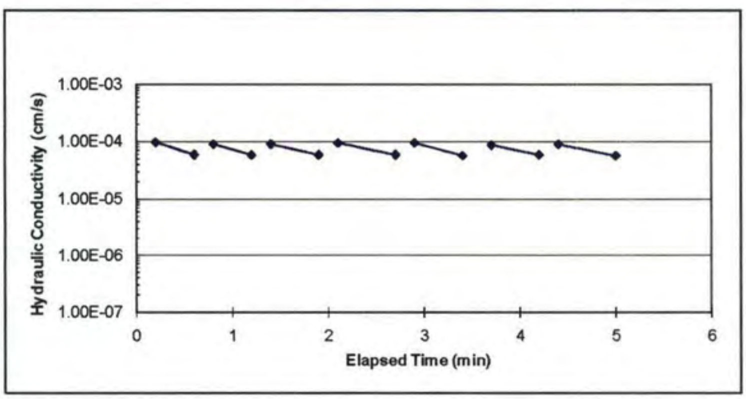
ASTM D 5084 - 00

Sample I.D.	305-mm K#7-L		Test Date :	11/22/05	
Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	12.7	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	9278.8	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	17690.4	g	Sample Water Content =	27.1	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.50	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
10	51.12	480.74	389.15	27.10

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
0:00:00	0.0	24.7	0	24.7	0				
0:00:11	10.0	15.8	11	5.8	0.2	9.60E-05	0.9	10	8.9
0:00:33	20.0	5.5	22	-14.5	0.6	5.90E-05	1	10	10.3
0:00:00	0.0	24.5	0	24.5	0.6				
0:00:14	10.0	12.5	14	2.5	0.8	8.89E-05	1.2	10	12
0:00:37	20.0	2	23	-18	1.2	5.85E-05	1.1	10	10.5
0:00:00	0.0	24.5	0	24.5	1.2				
0:00:13	10.0	14	13	4	1.4	8.87E-05	1.1	10	10.5
0:00:45	24.0	0	32	-24	1.9	5.85E-05	1	14	14
0:00:00	0.0	24.5	0	24.5	1.9				
0:00:12	10.0	14.5	12	4.5	2.1	9.36E-05	1	10	10
0:00:45	24.5	0	33	-24.5	2.7	5.88E-05	1	14.5	14.5
0:00:00	0.0	24.5	0	24.5	2.7				
0:00:12	10.0	14.5	12	4.5	2.9	9.36E-05	1	10	10
0:00:46	24.5	0	34	-24.5	3.4	5.70E-05	1	14.5	14.5
0:00:00	0.0	24.5	0	24.5	3.4				
0:00:13	10.0	14.5	13	4.5	3.7	8.64E-05	1	10	10
0:00:46	24.5	0	33	-24.5	4.2	5.88E-05	1	14.5	14.5
0:00:00	0.0	24.5	0	24.5	4.2				
0:00:13	10.0	14.0	13.0	4.0	4.4	8.87E-05	1.1	10	10.5
0:00:46	24.0	0.0	33.0	-24.0	5.0	5.67E-05	1.0	14	14
0:00:00	0.0	24.5	0.0	24.5	5.0				
0:00:13	10.0	14.5	13.0	4.5	5.2	8.64E-05	1.0	10	10
0:00:47	24.5	0.0	34.0	-24.5	5.8	5.70E-05	1.0	14.5	14.5
0:00:00	0.0	24.5	0.0	24.5	5.8				
0:00:13	10.0	14.0	13.0	4.0	6.0	8.87E-05	1.1	10	10.5
0:00:43	24.0	0.0	30.0	-24.0	6.5	6.24E-05	1.0	14	14
0:00:00	0.0	24.5	0.0	24.5	6.5				
0:00:12	10.0	14.5	12.0	4.5	6.7	9.36E-05	1.0	10	10
0:00:45	24.5	0.0	33.0	-24.5	7.2	5.88E-05	1.0	14.5	14.5



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

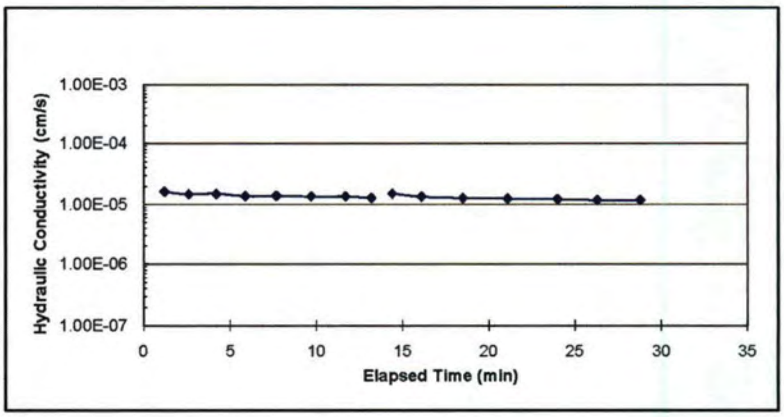
ASTM D 5084 - 00

Sample I.D.	150-mm K#7-L		Test Date :		
Cell Pressure =	20.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	12.7	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	181.46	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	2304.5	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	4478.6	g	Sample Water Content =	26.9	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.53	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
4	50	412.3	335.61	26.85

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
0:00:00	1.0	23.5	0	22.5	0				
0:01:11	4.0	21.2	71	17.2	1.2	1.62E-05	0.8	3	2.3
0:02:38	7.0	18.5	87	11.5	2.6	1.47E-05	0.9	3	2.7
0:04:10	10.0	15.6	92	5.6	4.2	1.50E-05	1	3	2.9
0:05:55	13.0	12.7	105	-0.3	5.9	1.37E-05	1	3	2.9
0:07:43	16.0	9.8	108	-6.2	7.7	1.38E-05	1	3	2.9
0:09:39	19.0	6.9	116	-12.1	9.7	1.35E-05	1	3	2.9
0:11:40	22.0	4	121	-18	11.7	1.35E-05	1	3	2.9
0:13:10	24.0	2	90	-22	13.2	1.28E-05	1	2	2
0:00:00	0.5	24	0	23.5	13.2				
0:01:16	3.0	21.2	76	18.2	14.4	1.50E-05	1.1	2.5	2.8
0:02:56	6.0	18.2	100	12.2	16.1	1.34E-05	1	3	3
0:05:19	10.0	14.4	143	4.4	18.5	1.27E-05	1	4	3.8
0:07:57	14.0	10.4	158	-3.6	21.1	1.25E-05	1	4	4
0:10:48	18.0	6.4	171	-11.6	24	1.22E-05	1	4	4
0:13:08	21.0	3.4	140	-17.6	26.3	1.18E-05	1	3	3
0:15:36	24.0	0.4	148	-23.6	28.8	1.18E-05	1	3	3



Hydraulic Conductivity Test - Sacramento - Thick Store-and-Release Cover

ASTM D 5084 - 00

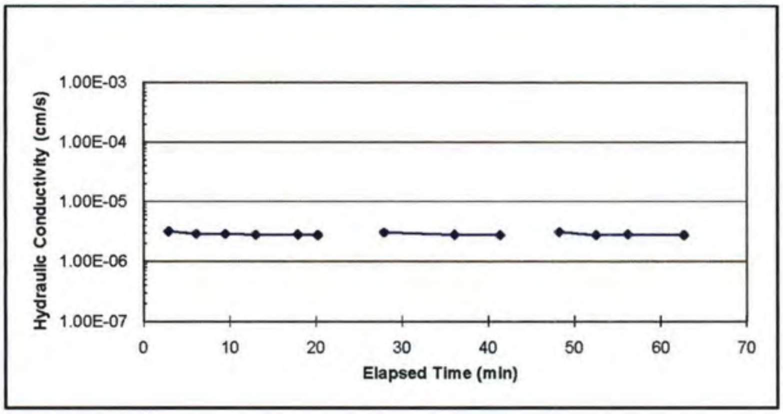
Sample I.D.	305-mm K#8-L	Test Date :	11/22/05

Cell Pressure =	20.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	17.0	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	15.0	psi	Area of Sample, A =	730.62	cm^2
Pressure Difference =	2.0	psi	Sample Volume, V =	11105.4	cm^3
Effective Stress =	4.0	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	9.3		a_{out} =	1	cm^2
Weight of wet sample =	21319.2	g	Sample Water Content =	30.6	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.47	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
10	51.12	404.58	321.77	30.60

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	23	0	23	0				
0:02:53	4.0	18.6	173	14.6	2.9	3.18E-06	1.1	4	4.4
0:06:04	8.0	14.6	191	6.6	6.1	2.89E-06	1	4	4
0:09:27	12.0	10.6	203	-1.4	9.5	2.87E-06	1	4	4
0:13:01	16.0	6.9	214	-9.1	13	2.78E-06	0.9	4	3.7
0:17:54	21.0	2	293	-19	17.9	2.79E-06	1	5	4.9
0:20:11	23.3	0	137	-23.3	20.2	2.74E-06	0.9	2.3	2
0:00:00	0.0	24.5	0	24.5	20.2				
0:07:44	10.0	13.6	464	3.6	27.9	3.05E-06	1.1	10	10.9
0:15:53	19.0	4.9	489	-14.1	36.1	2.80E-06	1	9	8.7
0:21:15	24.4	0	322	-24.4	41.4	2.75E-06	0.9	5.4	4.9
0:00:00	0.0	25	0	25	41.4				
0:06:46	9.0	15.2	406	6.2	48.2	3.10E-06	1.1	9	9.8
0:11:05	14.0	10.5	259	-3.5	52.5	2.76E-06	0.9	5	4.7
0:14:45	18.0	6.6	220	-11.4	56.2	2.82E-06	1	4	3.9
0:21:14	24.5	0.5	389	-24	62.7	2.75E-06	0.9	6.5	6.1



Hydraulic Conductivity Test - Underwood - Thick Clay Cover

ASTM D 5084 - 00

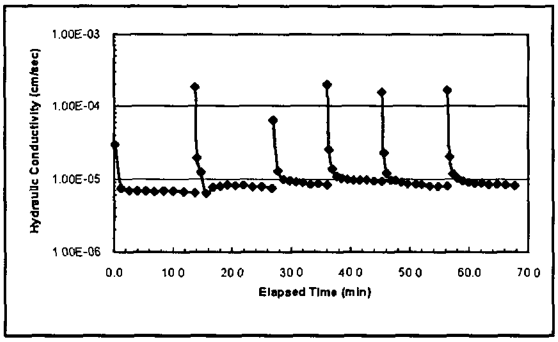
Sample I.D.	305-mm CC5 - Clay Top 1		Test Date :	9/2/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	24750.0	g	Sample Water Content =	11.6%	(%)
Wet Density =	2.2	g/cm^3	Dry Density =	2.22	g/cm^3

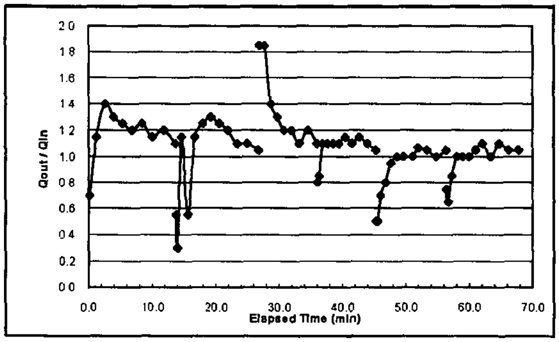
$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
NS-2	24.88	162.34	148	11.65%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
9/2/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
9/2/2008 00:11.88	2.0	23.5	11.9	21.5	0.2	3.01E-05	0.7	2	1.4
9/2/2008 01:15.02	4.0	21.2	63.1	17.2	1.3	7.44E-06	1.2	2	2.3
9/2/2008 02:34.58	6.0	18.4	79.6	12.4	2.6	6.93E-06	1.4	2	2.8
9/2/2008 03:56.41	8.0	15.8	81.8	7.8	3.9	6.80E-06	1.3	2	2.6
9/2/2008 05:21.48	10.0	13.3	85.1	3.3	5.4	6.76E-06	1.3	2	2.5
9/2/2008 06:50.30	12.0	10.9	88.8	-1.1	6.8	6.69E-06	1.2	2	2.4
9/2/2008 08:24.52	14.0	8.4	94.2	-5.6	8.4	6.85E-06	1.3	2	2.5
9/2/2008 10:01.48	16.0	6.1	97.0	-9.9	10.0	6.77E-06	1.2	2	2.3
9/2/2008 11:49.42	18.0	3.7	107.9	-14.3	11.8	6.64E-06	1.2	2	2.4
9/2/2008 13:43.77	20.0	1.5	114.4	-18.5	13.7	6.42E-06	1.1	2	2.2
9/2/2008 00:00.00	0.0	24.7	0.0	24.7	13.7				
9/2/2008 00:01.79	2.0	23.6	1.8	21.6	13.8	1.82E-04	0.5	2	1.1
9/2/2008 00:16.03	4.0	23.0	14.2	19.0	14.0	1.98E-05	0.3	2	0.6
9/2/2008 00:55.03	6.0	20.7	39.0	14.7	14.6	1.24E-05	1.2	2	2.3
9/2/2008 01:52.64	8.0	19.6	57.6	11.6	15.6	6.29E-06	0.5	2	1.1
9/2/2008 03:00.55	10.0	17.3	67.9	7.3	16.7	7.72E-06	1.2	2	2.3
9/2/2008 04:13.75	12.0	14.8	73.2	2.8	18.0	7.90E-06	1.3	2	2.5
9/2/2008 05:29.30	14.0	12.2	75.6	-1.8	19.2	8.29E-06	1.3	2	2.6
9/2/2008 06:48.81	16.0	9.7	79.5	-6.3	20.5	8.19E-06	1.3	2	2.5
9/2/2008 08:11.06	18.0	7.3	82.3	-10.7	21.9	8.26E-06	1.2	2	2.4
9/2/2008 09:39.67	20.0	5.1	88.6	-14.9	23.4	7.81E-06	1.1	2	2.2
9/2/2008 11:14.74	22.0	2.9	95.1	-19.1	25.0	7.80E-06	1.1	2	2.2
9/2/2008 12:58.77	24.0	0.8	104.0	-23.2	26.7	7.48E-06	1.1	2	2.1
9/2/2008 00:00.00	0.0	24.9	0.0	24.9	26.7				
9/2/2008 00:09.46	2.0	21.2	9.5	19.2	26.9	6.41E-05	1.9	2	3.7
9/2/2008 00:59.08	4.0	17.5	49.6	13.5	27.7	1.30E-05	1.9	2	3.7
9/2/2008 01:57.00	6.0	14.7	57.9	8.7	28.7	9.92E-06	1.4	2	2.8
9/2/2008 02:58.00	8.0	12.1	61.0	4.1	29.7	9.54E-06	1.3	2	2.6
9/2/2008 04:03.00	10.0	9.7	65.0	-0.3	30.8	9.05E-06	1.2	2	2.4
9/2/2008 05:13.00	12.0	7.3	70.0	-4.7	31.9	8.91E-06	1.2	2	2.4
9/2/2008 06:28.00	14.0	5.1	75.0	-8.9	33.2	8.43E-06	1.1	2	2.2
9/2/2008 07:50.00	16.0	2.7	82.0	-13.3	34.5	8.61E-06	1.2	2	2.4
9/2/2008 09:17.00	18.0	0.5	87.0	-17.5	36.0	8.30E-06	1.1	2	2.2
9/2/2008 00:00.00	0.0	24.9	0.0	24.9	36.0				
9/2/2008 00:01.91	2.0	23.3	1.9	21.3	36.0	1.98E-04	0.8	2	1.6
9/2/2008 00:17.65	4.0	21.6	15.7	17.6	36.3	2.57E-05	0.9	2	1.7
9/2/2008 00:52.24	6.0	19.4	34.6	13.4	36.9	1.38E-05	1.1	2	2.2
9/2/2008 01:37.89	8.0	17.2	45.6	9.2	37.6	1.10E-05	1.1	2	2.2
9/2/2008 02:29.27	10.0	15.0	51.4	5.0	38.5	1.03E-05	1.1	2	2.2
9/2/2008 03:25.39	12.0	12.8	56.1	0.8	39.4	9.88E-06	1.1	2	2.2
9/2/2008 04:27.42	14.0	10.5	62.0	-3.5	40.4	9.67E-06	1.2	2	2.3
9/2/2008 05:31.72	16.0	8.3	64.3	-7.7	41.5	9.67E-06	1.1	2	2.2
9/2/2008 06:40.72	18.0	6.0	69.0	-12.0	42.7	9.81E-06	1.2	2	2.3
9/2/2008 07:55.90	20.0	3.8	75.2	-16.2	43.9	9.40E-06	1.1	2	2.2
9/2/2008 09:15.20	22.0	1.7	79.3	-20.3	45.2	9.32E-06	1.1	2	2.1
9/2/2008 00:00.00	0.0	24.0	0.0	24.0	45.2				
9/2/2008 00:02.03	2.0	23.0	2.0	21.0	45.3	1.56E-04	0.5	2	1
9/2/2008 00:16.16	4.0	22.0	14.1	18.0	45.5	2.32E-05	0.5	2	1
9/2/2008 00:47.75	6.0	20.6	31.6	14.6	46.0	1.22E-05	0.7	2	1.4
9/2/2008 01:31.24	8.0	19.0	43.5	11.0	46.8	9.71E-06	0.8	2	1.6
9/2/2008 02:21.45	10.0	17.1	50.2	7.1	47.6	9.52E-06	0.9	2	1.9
9/2/2008 03:18.31	12.0	15.1	56.9	3.1	48.6	9.04E-06	1.0	2	2
9/2/2008 04:21.31	14.0	13.1	63.0	-0.9	49.6	8.58E-06	1.0	2	2
9/2/2008 05:46.26	16.5	10.6	85.0	-5.9	51.0	8.45E-06	1.0	2.5	2.5
9/2/2008 06:41.95	18.0	9.0	55.7	-9.0	51.9	8.46E-06	1.1	1.5	1.6

9/2/2008 08:04.00	20.0	6.9	82.1	-13.1	53.3	8.01E-06	1.1	2	2.1
9/2/2008 09:30.06	22.0	4.9	86.1	-17.1	54.7	7.95E-06	1.0	2	2
9/2/2008 11:04.16	24.0	2.8	94.1	-21.2	56.3	7.98E-06	1.1	2	2.1
9/3/2008 00:00.00	0.0	24.0	0.0	24.0	56.3				
9/3/2008 00:02.24	2.0	22.5	2.2	20.5	56.4	1.66E-04	0.8	2	1.5
9/3/2008 00:20.03	4.0	21.2	17.8	17.2	56.6	2.04E-05	0.7	2	1.3
9/3/2008 00:55.98	6.0	19.5	36.0	13.5	57.2	1.17E-05	0.9	2	1.7
9/3/2008 01:42.60	8.0	17.5	46.6	9.5	58.0	1.02E-05	1.0	2	2
9/3/2008 02:35.52	10.0	15.5	52.9	5.5	58.9	9.43E-06	1.0	2	2
9/3/2008 03:33.60	12.0	13.5	58.1	1.5	59.9	9.03E-06	1.0	2	2
9/3/2008 04:38.04	14.0	11.4	64.4	-2.6	60.9	8.79E-06	1.1	2	2.1
9/3/2008 05:47.25	16.0	9.2	69.2	-6.8	62.1	8.87E-06	1.1	2	2.2
9/3/2008 07:00.25	18.0	7.2	73.0	-10.8	63.3	8.49E-06	1.0	2	2
9/3/2008 08:21.71	20.0	5.0	81.5	-15.0	64.7	8.51E-06	1.1	2	2.2
9/3/2008 09:49.14	22.0	2.9	87.4	-19.1	66.1	8.28E-06	1.1	2	2.1
9/3/2008 11:24.21	24.0	0.8	95.1	-23.2	67.7	8.19E-06	1.1	2	2.1





Hydraulic Conductivity Test - Underwood - Thick Clay Cover

ASTM D 5084 - 00

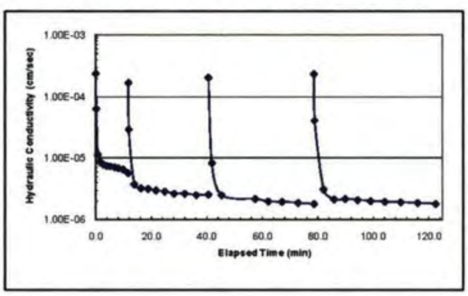
Sample I.D.	305-mm CC5- Clay Top 2		Test Date :	8/21/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	23900.0	g	Sample Water Content =	12.1%	(%)
Wet Density =	2.1	g/cm^3	Dry Density =	2.15	g/cm^3

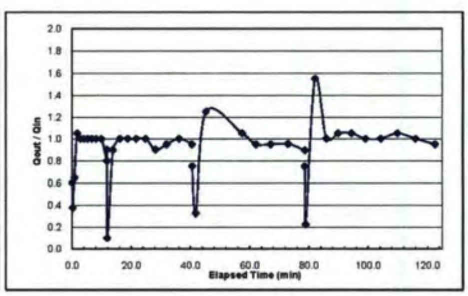
$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
MV-3	50.54	431.49	390.23	12.15%

Date, Time	Inflow	OutFlow	Δt (sec)	H (cm)	Time (min)	K (cm/sec)	Q_{out} / Q_{in}	Q_{in}	Q_{out}
8/20/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
8/20/2008 00:01.40	2.0	23.7	1.4	21.7	0.0	2.40E-04	0.6	2	1.2
8/20/2008 00:10.88	6.0	22.2	9.5	16.2	0.2	6.37E-05	0.4	4	1.5
8/20/2008 00:44.72	8.0	20.9	33.8	12.9	0.7	1.12E-05	0.7	2	1.3
8/20/2008 01:42.92	10.0	18.8	58.2	8.8	1.7	8.45E-06	1.1	2	2.1
8/20/2008 02:47.60	12.0	16.8	64.7	4.8	2.8	7.78E-06	1.0	2	2
8/20/2008 03:58.50	14.0	14.8	70.9	0.8	4.0	7.46E-06	1.0	2	2
8/20/2008 05:14.82	16.0	12.8	76.3	-3.2	5.2	7.30E-06	1.0	2	2
8/20/2008 06:38.04	18.0	10.8	83.2	-7.2	6.6	7.07E-06	1.0	2	2
8/20/2008 08:10.10	20.0	8.8	92.1	-11.2	8.2	6.77E-06	1.0	2	2
8/20/2008 09:51.81	22.0	6.8	101.7	-15.2	9.9	6.52E-06	1.0	2	2
8/20/2008 11:43.92	24.0	5.2	112.1	-18.8	11.7	5.67E-06	0.8	2	1.6
8/21/2008 00:00.00	0.0	24.8	0.0	24.8	11.7				
8/21/2008 00:02.36	2.0	23.0	2.4	21.0	11.8	1.70E-04	0.9	2	1.8
8/21/2008 00:10.60	4.0	22.8	8.2	18.8	11.9	2.90E-05	0.1	2	0.2
8/21/2008 02:04.35	6.0	21.0	113.8	15.0	13.8	3.75E-06	0.9	2	1.8
8/21/2008 04:28.42	8.0	19.0	144.1	11.0	16.2	3.25E-06	1.0	2	2
8/21/2008 07:04.45	10.0	17.0	156.0	7.0	18.8	3.14E-06	1.0	2	2
8/21/2008 09:56.32	12.0	15.0	171.9	3.0	21.7	2.99E-06	1.0	2	2
8/21/2008 13:06.60	14.0	13.0	190.3	-1.0	24.8	2.84E-06	1.0	2	2
8/21/2008 16:31.14	16.0	11.2	204.5	-4.8	28.3	2.65E-06	0.9	2	1.8
8/21/2008 20:14.22	18.0	9.3	223.1	-8.7	32.0	2.63E-06	0.9	2	1.9
8/21/2008 24:28.10	20.0	7.3	253.9	-12.7	36.2	2.51E-06	1.0	2	2
8/21/2008 28:49.32	22.0	5.4	261.2	-16.6	40.6	2.53E-06	1.0	2	1.9
8/21/2008 00:00.00	0.0	24.9	0.0	24.9	40.6				
8/21/2008 00:01.80	2.0	23.4	1.8	21.4	40.6	2.04E-04	0.8	2	1.5
8/21/2008 01:13.18	6.0	22.1	71.4	16.1	41.8	8.17E-06	0.3	4	1.3
8/21/2008 04:41.60	8.0	19.6	208.4	11.6	45.2	2.50E-06	1.3	2	2.5
8/21/2008 16:52.29	14.0	13.3	730.7	-0.7	57.4	2.16E-06	1.1	6	6.3
8/21/2008 21:32.84	16.0	11.4	280.6	-4.6	62.1	1.97E-06	1.0	2	1.9
8/21/2008 26:33.99	18.0	9.5	301.1	-8.5	67.1	1.94E-06	1.0	2	1.9
8/21/2008 32:21.94	20.1	7.5	347.9	-12.6	72.9	1.88E-06	1.0	2.1	2
8/21/2008 38:03.06	22.0	5.8	341.1	-16.2	78.6	1.78E-06	0.9	1.9	1.7
8/21/2008 00:00.00	0.0	24.8	0.0	24.8	78.6				
8/21/2008 00:01.57	2.0	23.3	1.6	21.3	78.6	2.35E-04	0.8	2	1.5
8/21/2008 00:14.75	6.0	22.4	13.2	16.4	78.9	4.09E-05	0.2	4	0.9
8/21/2008 03:26.44	8.0	19.3	191.7	11.3	82.0	3.09E-06	1.6	2	3.1
8/21/2008 07:17.22	10.0	17.3	230.8	7.3	85.9	2.12E-06	1.0	2	2
8/21/2008 11:20.02	12.0	15.2	242.8	3.2	89.9	2.17E-06	1.1	2	2.1
8/21/2008 15:45.36	14.0	13.1	265.3	-0.9	94.4	2.09E-06	1.1	2	2.1
8/21/2008 20:28.18	16.0	11.1	282.8	-4.9	99.1	2.02E-06	1.0	2	2
8/21/2008 25:36.95	18.0	9.1	308.8	-8.9	104.2	1.95E-06	1.0	2	2
8/21/2008 31:18.50	20.0	7.0	341.6	-13.0	109.9	1.92E-06	1.1	2	2.1
8/21/2008 37:23.46	22.0	5.0	365.0	-17.0	116.0	1.87E-06	1.0	2	2
8/21/2008 43:59.60	24.0	3.1	396.1	-20.9	122.6	1.80E-06	1.0	2	1.9

Note:
The highlighted data was recorded prior to a membrane leak.
All other data was recorded following membrane replacement.





Hydraulic Conductivity Test - Underwood - Thick Clay Cover

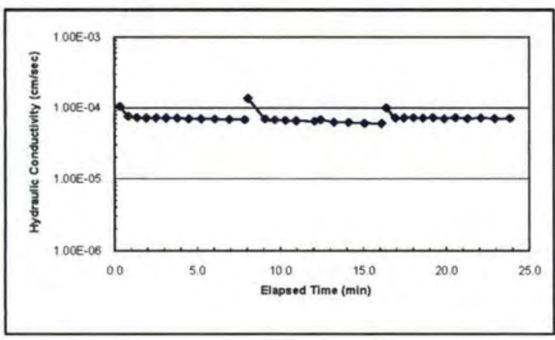
ASTM D 5084 - 00

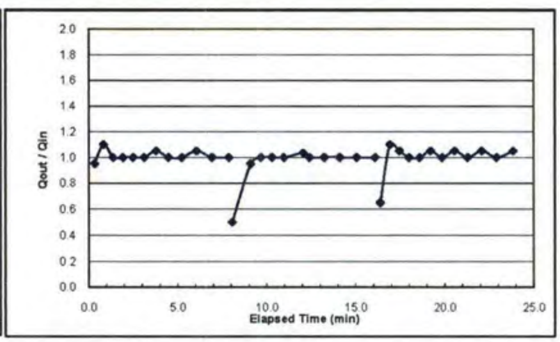
Sample I.D.	305-mm CC5 - Clay Bottom		Test Date :	10/2/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	22600.0	g	Sample Water Content =	15.3%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.03	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
G	30.8	157.28	140.54	15.25%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/2/2008 00:00.00	0.0	24.7	0.0	24.7	0.0				
10/2/2008 00:19.73	2.0	22.8	19.7	20.8	0.3	1.04E-04	0.9	10	9.5
10/2/2008 00:50.11	4.0	20.6	30.4	16.6	0.8	7.61E-05	1.1	10	11
10/2/2008 01:21.65	6.0	18.6	31.5	12.6	1.4	7.29E-05	1.0	10	10
10/2/2008 01:55.14	8.0	16.6	33.5	8.6	1.9	7.19E-05	1.0	10	10
10/2/2008 02:30.14	10.0	14.6	35.0	4.6	2.5	7.21E-05	1.0	10	10
10/2/2008 03:06.96	12.0	12.6	36.8	0.6	3.1	7.20E-05	1.0	10	10
10/2/2008 03:47.02	14.0	10.5	40.1	-3.5	3.8	7.15E-05	1.1	10	10.5
10/2/2008 04:29.28	16.0	8.5	42.3	-7.5	4.5	6.99E-05	1.0	10	10
10/2/2008 05:14.18	18.0	6.5	44.9	-11.5	5.2	6.98E-05	1.0	10	10
10/2/2008 06:03.28	20.0	4.4	49.1	-15.6	6.1	6.96E-05	1.1	10	10.5
10/2/2008 06:55.52	22.0	2.4	52.2	-19.6	6.9	6.83E-05	1.0	10	10
10/2/2008 07:51.73	24.0	0.4	56.2	-23.6	7.9	6.81E-05	1.0	10	10
10/2/2008 00:00.00	0.0	24.8	0.0	24.8	7.9				
10/2/2008 00:11.62	2.0	23.8	11.6	21.8	8.1	1.36E-04	0.5	10	5
10/2/2008 01:13.84	6.0	20.0	62.2	14.0	9.1	6.96E-05	1.0	20	19
10/2/2008 01:48.84	8.0	18.0	35.0	10.0	9.7	6.77E-05	1.0	10	10
10/2/2008 02:26.23	10.0	16.0	37.4	6.0	10.3	6.64E-05	1.0	10	10
10/2/2008 03:05.95	12.0	14.0	39.7	2.0	11.0	6.56E-05	1.0	10	10
10/2/2008 04:11.52	15.0	10.9	65.6	-4.1	12.1	6.47E-05	1.0	15	15.5
10/2/2008 04:33.12	16.0	9.9	21.6	-6.1	12.4	6.80E-05	1.0	5	5
10/2/2008 05:22.02	18.0	7.9	48.9	-10.1	13.2	6.27E-05	1.0	10	10
10/2/2008 06:14.42	20.0	5.9	52.4	-14.1	14.1	6.22E-05	1.0	10	10
10/2/2008 07:11.62	22.0	3.9	57.2	-18.1	15.1	6.08E-05	1.0	10	10
10/2/2008 08:13.73	24.0	1.9	62.1	-22.1	16.1	6.00E-05	1.0	10	10
10/2/2008 00:00.00	0.0	24.8	0.0	24.8	16.1				
10/2/2008 00:17.34	2.0	23.5	17.3	21.5	16.4	1.00E-04	0.7	10	6.5
10/2/2008 00:49.25	4.0	21.3	31.9	17.3	16.9	7.19E-05	1.1	10	11
10/2/2008 01:21.61	6.0	19.2	32.4	13.2	17.5	7.24E-05	1.1	10	10.5
10/2/2008 01:54.61	8.0	17.2	33.0	9.2	18.0	7.24E-05	1.0	10	10
10/2/2008 02:29.61	10.0	15.2	35.0	5.2	18.6	7.16E-05	1.0	10	10
10/2/2008 03:06.73	12.0	13.1	37.1	1.1	19.2	7.27E-05	1.1	10	10.5
10/2/2008 03:46.25	14.0	11.1	39.5	-2.9	19.9	7.02E-05	1.0	10	10
10/2/2008 04:27.56	16.0	9.0	41.3	-7.0	20.6	7.28E-05	1.1	10	10.5
10/2/2008 05:11.73	18.0	7.0	44.2	-11.0	21.3	7.04E-05	1.0	10	10
10/2/2008 05:59.05	20.0	4.9	47.3	-15.1	22.1	7.17E-05	1.1	10	10.5
10/2/2008 06:49.34	22.0	2.9	50.3	-19.1	22.9	7.03E-05	1.0	10	10
10/2/2008 07:44.25	24.0	0.8	54.9	-23.2	23.8	7.09E-05	1.1	10	10.5





Hydraulic Conductivity Test - Underwood - Thick Clay Cover

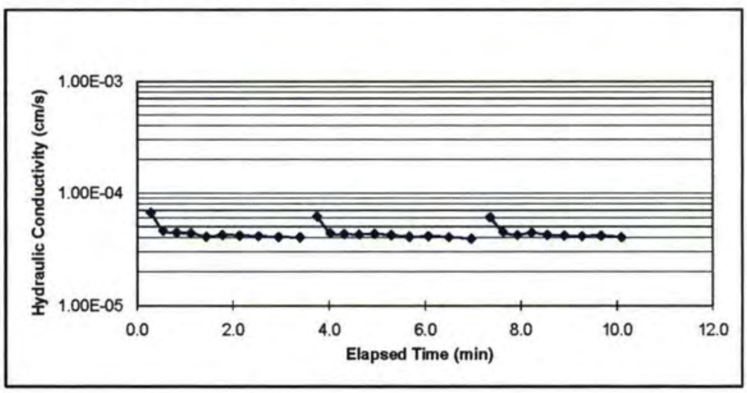
ASTM D 5084 - 00

Sample I.D.	150-mm CC5-Clay-Bottom		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	6.1	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1112.0	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.8		a_{out} =	1	cm^2
Weight of wet sample =	2041.3	g	Sample Water Content =	18.1	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.55	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
62	30.97	125.63	111.1	18.13

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	8.0	24.0	0.0	16.0	0.0				
0:00:17	10.0	22.7	16.8	12.7	0.3	6.64E-05	0.7	2	1.3
0:00:32	11.0	21.7	15.6	10.7	0.5	4.58E-05	1.0	1	1
0:00:49	12.0	20.7	16.9	8.7	0.8	4.40E-05	1.0	1	1
0:01:07	13.0	19.7	17.9	6.7	1.1	4.36E-05	1.0	1	1
0:01:26	14.0	18.8	19.1	4.8	1.4	4.06E-05	0.9	1	0.9
0:01:47	15.0	17.8	20.3	2.8	1.8	4.22E-05	1.0	1	1
0:02:08	16.0	16.8	21.7	0.8	2.1	4.17E-05	1.0	1	1
0:02:32	17.0	15.8	23.3	-1.2	2.5	4.11E-05	1.0	1	1
0:02:57	18.0	14.8	25.1	-3.2	2.9	4.04E-05	1.0	1	1
0:03:24	19.0	13.8	27.0	-5.2	3.4	4.00E-05	1.0	1	1
0:00:00	8.0	24.0	-203.7	16.0	3.4				
0:00:21	10.0	22.2	21.1	12.2	3.8	6.13E-05	0.9	2	1.8
0:00:38	11.0	21.2	16.5	10.2	4.0	4.36E-05	1.0	1	1
0:00:55	12.0	20.2	17.6	8.2	4.3	4.29E-05	1.0	1	1
0:01:14	13.0	19.2	18.6	6.2	4.6	4.25E-05	1.0	1	1
0:01:33	14.0	18.2	19.2	4.2	4.9	4.30E-05	1.0	1	1
0:01:54	15.0	17.2	20.8	2.2	5.3	4.19E-05	1.0	1	1
0:02:16	16.0	16.2	22.6	0.2	5.7	4.06E-05	1.0	1	1
0:02:40	17.0	15.2	23.7	-1.8	6.1	4.10E-05	1.0	1	1
0:03:06	18.0	14.2	25.6	-3.8	6.5	4.03E-05	1.0	1	1
0:03:34	19.0	13.2	28.2	-5.8	7.0	3.90E-05	1.0	1	1
0:00:00	8.0	24.0	-214.0	16.0	7.0				
0:00:21	10.0	22.2	21.4	12.2	7.4	6.03E-05	0.9	2	1.8
0:00:38	11.0	21.2	16.1	10.2	7.6	4.47E-05	1.0	1	1
0:00:55	12.0	20.2	17.9	8.2	7.9	4.21E-05	1.0	1	1
0:01:13	13.0	19.2	18.0	6.2	8.2	4.39E-05	1.0	1	1
0:01:33	14.0	18.2	19.7	4.2	8.6	4.20E-05	1.0	1	1
0:01:54	15.0	17.2	21.0	2.2	8.9	4.15E-05	1.0	1	1
0:02:16	16.0	16.2	22.4	0.2	9.3	4.11E-05	1.0	1	1
0:02:40	17.0	15.2	23.5	-1.8	9.7	4.15E-05	1.0	1	1
0:03:06	18.0	14.2	25.8	-3.8	10.1	4.01E-05	1.0	1	1



Hydraulic Conductivity Test - Underwood - Thick Clay Cover

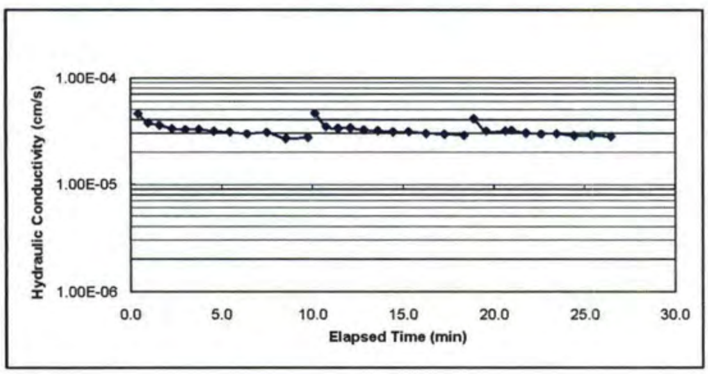
ASTM D 5084 - 00

Sample I.D.	75-mm CC5-Clay Bottom		Test Date :	11.03.08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	3.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	45.60	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	144.8	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	11.1		a_{out} =	1	cm^2
Weight of wet sample =	233.3	g	Sample Water Content =	21.6	(%)
Wet Density =	1.6	g/cm^3	Dry Density =	1.32	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
14	30.73	100.58	88.15	21.65

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	1.0	23.8	0.0	22.8	0.0				
0:00:24	2.0	23.0	24.2	21.0	0.4	4.54E-05	0.8	1	0.8
0:00:58	3.0	22.0	33.8	19.0	1.0	3.73E-05	1.0	1	1
0:01:35	4.0	21.0	36.9	17.0	1.6	3.55E-05	1.0	1	1
0:02:16	5.0	20.0	41.2	15.0	2.3	3.30E-05	1.0	1	1
0:03:00	6.0	19.0	43.7	13.0	3.0	3.24E-05	1.0	1	1
0:03:45	7.0	18.0	45.4	11.0	3.8	3.25E-05	1.0	1	1
0:04:35	8.0	17.0	49.6	9.0	4.6	3.11E-05	1.0	1	1
0:05:27	9.0	16.0	52.5	7.0	5.5	3.07E-05	1.0	1	1
0:06:25	10.0	15.0	57.4	5.0	6.4	2.95E-05	1.0	1	1
0:07:29	11.1	13.9	64.7	2.8	7.5	3.03E-05	1.0	1.1	1.1
0:08:33	12.0	13.0	63.3	1.0	8.5	2.67E-05	1.0	0.9	0.9
0:09:45	13.0	12.0	72.3	-1.0	9.7	2.74E-05	1.0	1	1
0:00:00	1.0	24.0	-585.0	23.0	9.7				
0:00:26	2.0	23.0	26.5	21.0	10.1	4.60E-05	1.0	1	1
0:01:03	3.0	22.0	36.7	19.0	10.8	3.44E-05	1.0	1	1
0:01:43	4.0	21.0	39.4	17.0	11.4	3.33E-05	1.0	1	1
0:02:23	5.0	20.0	40.7	15.0	12.1	3.35E-05	1.0	1	1
0:03:07	6.0	19.0	44.2	13.0	12.8	3.20E-05	1.0	1	1
0:03:54	7.0	18.0	46.8	11.0	13.6	3.16E-05	1.0	1	1
0:04:44	8.0	17.0	50.2	9.0	14.4	3.07E-05	1.0	1	1
0:05:37	9.0	16.0	52.3	7.0	15.3	3.09E-05	1.0	1	1
0:06:34	10.0	15.0	56.9	5.0	16.3	2.98E-05	1.0	1	1
0:07:34	11.0	14.0	60.5	3.0	17.3	2.94E-05	1.0	1	1
0:08:39	12.0	13.0	65.4	1.0	18.4	2.86E-05	1.0	1	1
0:00:00	1.0	24.0	-519.5	23.0	18.4				
0:00:30	2.0	23.0	29.8	21.0	18.9	4.09E-05	1.0	1	1
0:01:10	3.0	22.0	40.2	19.0	19.6	3.14E-05	1.0	1	1
0:02:13	4.5	20.5	63.1	16.0	20.6	3.15E-05	1.0	1.5	1.5
0:02:35	5.0	20.0	21.6	15.0	21.0	3.18E-05	1.0	0.5	0.5
0:03:22	6.0	19.0	47.1	13.0	21.8	3.01E-05	1.0	1	1
0:04:12	7.0	18.0	50.2	11.0	22.6	2.94E-05	1.0	1	1
0:05:04	8.0	17.0	51.9	9.0	23.5	2.97E-05	1.0	1	1
0:06:01	9.0	16.0	56.8	7.0	24.4	2.84E-05	1.0	1	1
0:07:00	10.0	15.0	58.9	5.0	25.4	2.87E-05	1.0	1	1
0:08:03	11.0	14.0	63.8	3.0	26.5	2.79E-05	1.0	1	1



Hydraulic Conductivity Test - Underwood - Thin Clay Cover

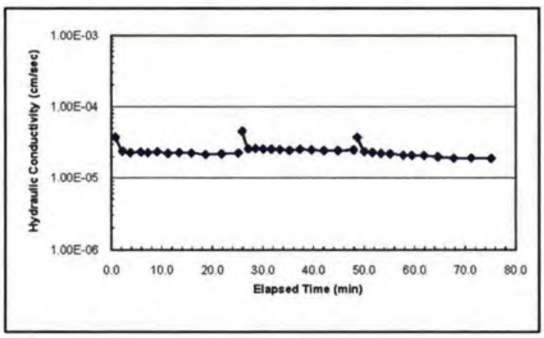
ASTM D 5084 - 00

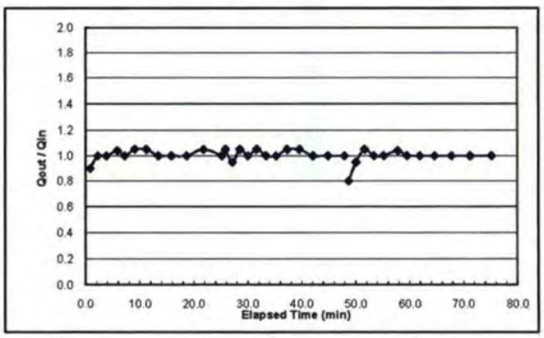
Sample I.D.	305-mm CC3 - Clay Middle		Test Date :	9/29/08	
Cell Pressure =	41.9	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	40.8	psi	Length of Sample, L =	10.8	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	0.8	psi	Sample Volume, V =	7876.7	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	15750.0	g	Sample Water Content =	14.0%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.00	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
44	30.35	125.33	113.7	13.95%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
9/29/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
9/29/2008 00:48.53	2.0	23.0	48.5	21.0	0.8	3.77E-05	0.9	10	9
9/29/2008 02:12.61	4.0	21.0	84.1	17.0	2.2	2.41E-05	1.0	10	10
9/29/2008 03:46.15	6.0	19.0	93.5	13.0	3.8	2.29E-05	1.0	10	10
9/29/2008 05:51.53	8.5	16.4	125.4	7.9	5.9	2.34E-05	1.0	12.5	13
9/29/2008 07:11.78	10.0	14.9	80.2	4.9	7.2	2.29E-05	1.0	7.5	7.5
9/29/2008 09:04.84	12.0	12.8	113.1	0.8	9.1	2.36E-05	1.1	10	10.5
9/29/2008 11:12.55	14.0	10.7	127.7	-3.3	11.2	2.25E-05	1.1	10	10.5
9/29/2008 13:25.03	16.0	8.7	132.5	-7.3	13.4	2.30E-05	1.0	10	10
9/29/2008 15:51.53	18.0	6.7	146.5	-11.3	15.9	2.26E-05	1.0	10	10
9/29/2008 18:40.30	20.0	4.7	168.8	-15.3	18.7	2.16E-05	1.0	10	10
9/29/2008 21:47.78	22.0	2.6	187.5	-19.4	21.8	2.21E-05	1.1	10	10.5
9/29/2008 25:08.56	24.0	0.6	200.8	-23.4	25.1	2.27E-05	1.0	10	10
9/29/2008 00:00.00	0.0	24.8	0.0	24.8	25.1				
9/29/2008 00:43.45	2.0	22.7	43.5	20.7	25.9	4.55E-05	1.1	10	10.5
9/29/2008 01:59.75	4.0	20.8	76.3	16.8	27.1	2.60E-05	0.9	10	9.5
9/29/2008 03:23.95	6.0	18.7	84.2	12.7	28.5	2.62E-05	1.1	10	10.5
9/29/2008 04:52.78	8.0	16.7	88.8	8.7	30.0	2.58E-05	1.0	10	10
9/29/2008 06:30.61	10.0	14.6	97.8	4.6	31.7	2.56E-05	1.1	10	10.5
9/29/2008 08:13.87	12.0	12.6	103.3	0.6	33.4	2.53E-05	1.0	10	10
9/29/2008 10:07.61	14.0	10.6	113.7	-3.4	35.3	2.48E-05	1.0	10	10
9/29/2008 12:10.36	16.0	8.5	122.7	-7.5	37.3	2.55E-05	1.1	10	10.5
9/29/2008 14:26.28	18.0	6.4	135.9	-11.6	39.6	2.51E-05	1.1	10	10.5
9/29/2008 16:56.46	20.0	4.4	150.2	-15.6	42.1	2.44E-05	1.0	10	10
9/29/2008 19:42.87	22.0	2.4	166.4	-19.6	44.9	2.45E-05	1.0	10	10
9/29/2008 22:45.95	24.0	0.4	183.1	-23.6	47.9	2.50E-05	1.0	10	10
9/29/2008 00:00.00	0.0	24.9	0.0	24.9	47.9				
9/29/2008 00:46.34	2.0	23.3	46.3	21.3	48.7	3.73E-05	0.8	10	8
9/29/2008 02:09.33	4.0	21.4	83.0	17.4	50.1	2.37E-05	1.0	10	9.5
9/29/2008 03:44.28	6.0	19.3	95.0	13.3	51.6	2.30E-05	1.1	10	10.5
9/29/2008 05:26.23	8.0	17.3	101.9	9.3	53.3	2.22E-05	1.0	10	10
9/29/2008 07:15.34	10.0	15.3	109.1	5.3	55.2	2.21E-05	1.0	10	10
9/29/2008 09:53.11	12.5	12.7	157.8	0.2	57.8	2.11E-05	1.0	12.5	13
9/29/2008 11:33.34	14.0	11.2	100.2	-2.8	59.5	2.10E-05	1.0	7.5	7.5
9/29/2008 13:57.84	16.0	9.2	144.5	-6.8	61.9	2.08E-05	1.0	10	10
9/29/2008 16:42.68	18.0	7.2	164.8	-10.8	64.6	1.99E-05	1.0	10	10
9/29/2008 19:51.56	20.0	5.2	188.9	-14.8	67.8	1.90E-05	1.0	10	10
9/29/2008 23:18.15	22.0	3.2	206.6	-18.8	71.2	1.93E-05	1.0	10	10
9/29/2008 27:13.75	24.0	1.2	235.6	-22.8	75.1	1.90E-05	1.0	10	10





Hydraulic Conductivity Test - Underwood - Thin Clay Cover

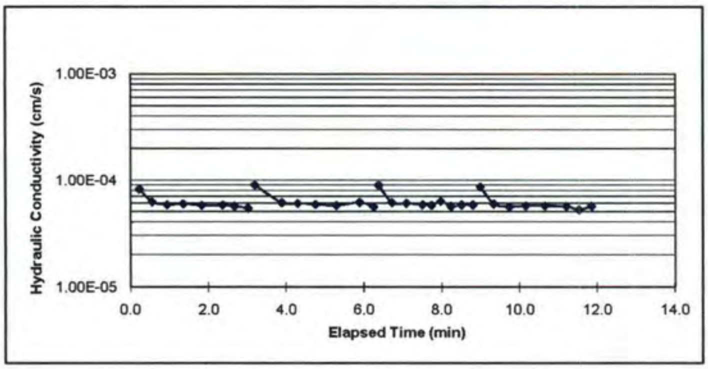
ASTM D 5084 - 00

Sample I.D.	150-mm CC3-Clay-Middle		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.4	psi	Length of Sample, L =	5.1	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.4	psi	Sample Volume, V =	926.7	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.5		a_{out} =	1	cm^2
Weight of wet sample =	1656.2	g	Sample Water Content =	18.7	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.51	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
MB	30.74	121.2	106.96	18.68

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:14	2.0	22.0	13.6	20.0	0.2	8.15E-05	1.0	2	2
0:00:33	4.0	20.0	19.6	16.0	0.6	6.17E-05	1.0	2	2
0:00:56	6.0	18.0	22.9	12.0	0.9	5.78E-05	1.0	2	2
0:01:21	8.0	16.0	24.9	8.0	1.3	5.88E-05	1.0	2	2
0:01:50	10.0	14.0	28.8	4.0	1.8	5.67E-05	1.0	2	2
0:02:22	12.0	12.0	32.3	0.0	2.4	5.73E-05	1.0	2	2
0:02:40	13.0	11.0	18.3	-2.0	2.7	5.61E-05	1.0	1	1
0:03:01	14.0	10.0	20.6	-4.0	3.0	5.37E-05	1.0	1	1
0:00:00	0.0	24.0	-181.0	24.0	3.0				
0:00:11	2.0	22.3	11.5	20.3	3.2	8.95E-05	0.9	2	1.7
0:00:53	6.0	18.3	41.7	12.3	3.9	6.03E-05	1.0	4	4
0:01:18	8.0	16.3	24.4	8.3	4.3	5.95E-05	1.0	2	2
0:01:45	10.0	14.3	27.8	4.3	4.8	5.82E-05	1.0	2	2
0:02:18	12.0	12.3	32.2	0.3	5.3	5.70E-05	1.0	2	2
0:02:53	14.0	10.2	35.8	-3.8	5.9	6.06E-05	1.1	2	2.1
0:03:15	15.0	9.2	21.6	-5.8	6.2	5.54E-05	1.0	1	1
0:00:00	0.0	24.0	-194.8	24.0	6.2				
0:00:11	2.0	22.5	10.8	20.5	6.4	8.93E-05	0.8	2	1.5
0:00:31	4.0	20.4	20.2	16.4	6.7	6.07E-05	1.1	2	2.1
0:00:54	6.0	18.3	22.5	12.3	7.1	5.97E-05	1.1	2	2.1
0:01:19	8.0	16.3	25.1	8.3	7.5	5.79E-05	1.0	2	2
0:01:32	9.0	15.3	13.7	6.3	7.7	5.73E-05	1.0	1	1
0:01:46	10.0	14.2	14.0	4.2	8.0	6.24E-05	1.1	1	1.1
0:02:02	11.0	13.2	15.9	2.2	8.2	5.60E-05	1.0	1	1
0:02:19	12.0	12.2	16.4	0.2	8.5	5.78E-05	1.0	1	1
0:02:36	13.0	11.2	17.6	-1.8	8.8	5.78E-05	1.0	1	1
0:00:00	0.0	24.0	-156.3	24.0	8.8				
0:00:12	2.0	22.4	11.6	20.4	9.0	8.58E-05	0.8	2	1.6
0:00:32	4.0	20.3	20.9	16.3	9.3	5.89E-05	1.1	2	2.1
0:00:56	6.0	18.3	23.7	12.3	9.7	5.55E-05	1.0	2	2
0:01:22	8.0	16.3	25.6	8.3	10.2	5.66E-05	1.0	2	2
0:01:51	10.0	14.2	29.4	4.2	10.7	5.65E-05	1.1	2	2.1
0:02:24	12.0	12.2	32.9	0.2	11.2	5.59E-05	1.0	2	2
0:02:44	13.0	11.2	19.6	-1.8	11.5	5.20E-05	1.0	1	1
0:03:03	14.0	10.2	19.6	-3.8	11.9	5.62E-05	1.0	1	1



Hydraulic Conductivity Test - Underwood - Thin Clay Cover

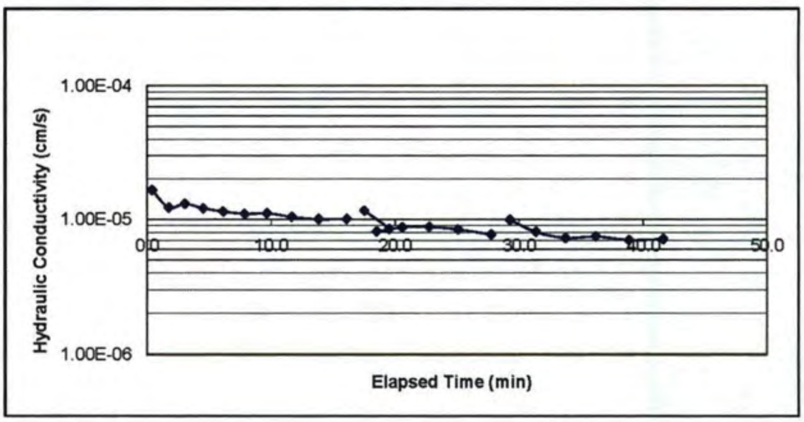
ASTM D 5084 - 00

Sample I.D.	75-mm CC3 Clay-Middle		Test Date :	10.13.08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	2.5	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	45.60	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	115.8	cm^3
Effective Stress =	1.8	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	13.8		a_{out} =	1	cm^2
Weight of wet sample =	191.4	g	Sample Water Content =	25.4	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.32	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
7	30.38	103.03	88.32	25.39

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.5	23.8	0.0	23.3	0.0				
0:00:23	1.0	23.5	23.3	22.5	0.4	1.65E-05	0.6	0.5	0.3
0:01:44	2.0	22.5	80.8	20.5	1.7	1.22E-05	1.0	1	1
0:03:03	3.0	21.5	78.5	18.5	3.0	1.30E-05	1.0	1	1
0:04:31	4.0	20.5	88.0	16.5	4.5	1.20E-05	1.0	1	1
0:06:07	5.0	19.5	96.3	14.5	6.1	1.14E-05	1.0	1	1
0:07:51	6.0	18.5	104.6	12.5	7.9	1.09E-05	1.0	1	1
0:09:39	7.0	17.5	107.9	10.5	9.7	1.11E-05	1.0	1	1
0:11:39	8.0	16.5	119.7	8.5	11.7	1.04E-05	1.0	1	1
0:13:50	9.0	15.5	130.4	6.5	13.8	1.00E-05	1.0	1	1
0:16:06	10.0	14.5	136.3	4.5	16.1	1.01E-05	1.0	1	1
0:00:00	1.0	24.0	-965.8	23.0	16.1				
0:01:24	2.0	23.0	84.4	21.0	17.5	1.15E-05	1.0	1	1
0:03:24	3.0	22.0	119.3	19.0	19.5	8.46E-06	1.0	1	1
0:05:33	4.0	21.0	129.1	17.0	18.5	8.11E-06	1.0	1	1
0:07:38	5.0	20.0	125.1	15.0	20.6	8.70E-06	1.0	1	1
0:09:47	6.0	19.0	129.1	13.0	22.7	8.78E-06	1.0	1	1
0:12:07	7.0	18.0	140.4	11.0	25.1	8.41E-06	1.0	1	1
0:14:48	8.0	17.0	160.4	9.0	27.7	7.69E-06	1.0	1	1
0:00:00	1.0	24.0	-887.8	23.0	27.7				
0:01:33	2.0	23.1	93.2	21.1	29.3	9.92E-06	0.9	1	0.9
0:03:38	3.0	22.1	125.0	19.1	31.3	8.07E-06	1.0	1	1
0:06:02	4.0	21.1	143.7	17.1	33.7	7.28E-06	1.0	1	1
0:08:28	5.0	20.1	145.9	15.1	36.2	7.45E-06	1.0	1	1
0:11:09	6.0	19.1	160.8	13.1	38.8	7.03E-06	1.0	1	1
0:13:54	7.0	18.1	165.2	11.1	41.6	7.14E-06	1.0	1	1



Hydraulic Conductivity Test - Underwood - Store-and-Release Cover

ASTM D 5084 - 00

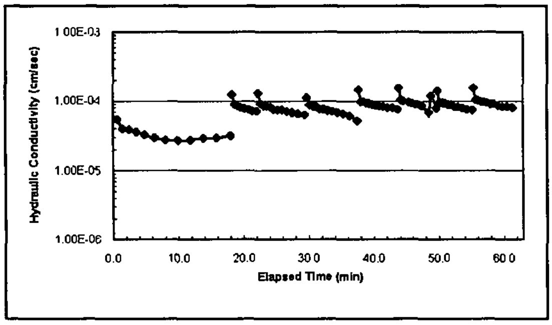
Sample I.D.	305-mm ET-Soil Top 1		Test Date :	10/27/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	21650.0	g	Sample Water Content =	12.4%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.94	g/cm^3

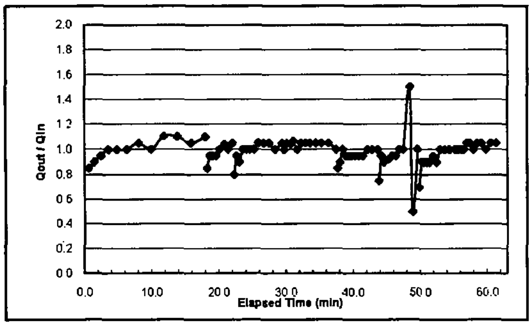
$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
X2	30.92	168.15	153.02	12.39%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/27/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
10/27/2008 00:36.09	2.0	23.1	36.1	21.1	0.6	5.40E-05	0.9	10	8.5
10/27/2008 01:28.70	4.0	21.3	52.6	17.3	1.5	3.95E-05	0.9	10	9
10/27/2008 02:26.14	6.0	19.4	57.4	13.4	2.4	3.87E-05	1.0	10	9.5
10/27/2008 03:33.04	8.0	17.4	66.9	9.4	3.6	3.56E-05	1.0	10	10
10/27/2008 04:50.02	10.0	15.4	77.0	5.4	4.8	3.25E-05	1.0	10	10
10/27/2008 06:19.12	12.0	13.4	89.1	1.4	6.3	2.95E-05	1.0	10	10
10/27/2008 08:03.10	14.0	11.3	104.0	-2.7	8.1	2.73E-05	1.1	10	10.5
10/27/2008 09:57.40	16.1	9.2	114.3	-6.9	10.0	2.69E-05	1.0	10.5	10.5
10/27/2008 11:50.19	18.0	7.1	112.8	-10.9	11.8	2.75E-05	1.1	9.5	10.5
10/27/2008 13:50.05	20.0	4.9	119.9	-15.1	13.8	2.90E-05	1.1	10	11
10/27/2008 15:54.20	22.0	2.8	124.1	-19.2	15.9	2.92E-05	1.1	10	10.5
10/27/2008 18:00.36	24.0	0.6	126.2	-23.4	18.0	3.17E-05	1.1	10	11
10/27/2008 00:00.00	0.0	24.9	0.0	24.9	18.0				
10/27/2008 00:15.71	2.0	23.2	15.7	21.2	18.3	1.24E-04	0.9	10	8.5
10/27/2008 00:39.67	4.0	21.3	24.0	17.3	18.7	8.91E-05	0.9	10	9.5
10/27/2008 01:05.91	6.0	19.4	26.2	13.4	19.1	8.48E-05	1.0	10	9.5
10/27/2008 01:34.80	8.0	17.5	28.9	9.5	19.6	8.04E-05	0.9	10	9.5
10/27/2008 02:06.67	10.0	15.5	31.9	5.5	20.1	7.83E-05	1.0	10	10
10/27/2008 02:51.27	12.5	12.9	44.6	0.4	20.9	7.55E-05	1.0	12.5	13
10/27/2008 03:20.47	14.0	11.4	29.2	-2.6	21.3	7.14E-05	1.0	7.5	7.5
10/27/2008 04:02.17	16.0	9.3	41.7	-6.7	22.0	7.18E-05	1.1	10	10.5
10/27/2008 00:00.00	0.0	24.9	0.0	24.9	22.0				
10/27/2008 00:14.61	2.0	23.3	14.6	21.3	22.3	1.30E-04	0.8	10	8
10/27/2008 00:37.92	4.0	21.4	23.3	17.4	22.7	9.14E-05	1.0	10	9.5
10/27/2008 01:03.21	6.0	19.6	25.3	13.6	23.1	8.56E-05	0.9	10	9
10/27/2008 01:31.07	8.0	17.6	27.9	9.6	23.6	8.54E-05	1.0	10	10
10/27/2008 02:02.65	10.1	15.5	31.6	5.4	24.1	8.30E-05	1.0	10.5	10.5
10/27/2008 02:35.38	12.0	13.6	32.7	1.6	24.6	7.61E-05	1.0	9.5	9.5
10/27/2008 03:12.28	14.0	11.6	36.9	-2.4	25.2	7.47E-05	1.0	10	10
10/27/2008 03:52.26	16.0	9.5	40.0	-6.5	25.9	7.47E-05	1.1	10	10.5
10/27/2008 04:37.05	18.0	7.4	44.8	-10.6	26.7	7.07E-05	1.1	10	10.5
10/27/2008 05:26.78	20.0	5.3	49.7	-14.7	27.5	6.78E-05	1.1	10	10.5
10/27/2008 06:20.75	22.0	3.3	54.0	-18.7	28.4	6.51E-05	1.0	10	10
10/27/2008 07:22.05	24.0	1.2	61.3	-22.8	29.4	6.30E-05	1.1	10	10.5
10/27/2008 00:00.00	0.0	24.8	0.0	24.8	29.4				
10/27/2008 00:18.84	2.0	22.8	18.8	20.8	29.7	1.12E-04	1.0	10	10
10/27/2008 00:44.46	4.0	20.7	25.6	16.7	30.2	8.80E-05	1.1	10	10.5
10/27/2008 01:20.10	6.5	18.1	35.6	11.6	30.7	8.27E-05	1.0	12.5	13
10/27/2008 01:42.54	8.0	16.5	22.4	8.5	31.1	8.36E-05	1.1	7.5	8
10/27/2008 02:15.55	10.0	14.5	33.0	4.5	31.7	7.65E-05	1.0	10	10
10/27/2008 02:51.16	12.0	12.4	35.6	0.4	32.3	7.65E-05	1.1	10	10.5
10/27/2008 03:30.60	14.0	10.3	39.4	-3.7	32.9	7.28E-05	1.1	10	10.5
10/27/2008 04:13.66	16.0	8.2	43.1	-7.8	33.6	7.06E-05	1.1	10	10.5
10/27/2008 05:00.94	18.0	6.1	47.3	-11.9	34.4	6.83E-05	1.1	10	10.5
10/27/2008 05:53.45	20.0	4.0	52.5	-16.0	35.3	6.55E-05	1.1	10	10.5
10/27/2008 06:54.08	22.0	1.9	60.6	-20.1	36.3	6.08E-05	1.1	10	10.5
10/27/2008 08:05.35	23.9	0.0	71.3	-23.9	37.5	5.14E-05	1.0	9.5	9.5
10/27/2008 00:00.00	0.0	24.9	0.0	24.9	37.5				
10/27/2008 00:13.30	2.0	23.2	13.3	21.2	37.7	1.46E-04	0.9	10	8.5
10/27/2008 00:34.57	4.0	21.4	21.3	17.4	38.1	9.77E-05	0.9	10	9
10/27/2008 00:57.90	6.0	19.4	23.3	13.4	38.5	9.78E-05	1.0	10	10
10/27/2008 01:22.61	8.0	17.5	24.7	9.5	38.9	9.40E-05	0.9	10	9.5
10/27/2008 01:48.93	10.0	15.6	26.3	5.6	39.3	9.24E-05	1.0	10	9.5
10/27/2008 02:17.60	12.0	13.7	28.7	1.7	39.8	8.90E-05	1.0	10	9.5
10/27/2008 02:48.48	14.0	11.8	30.9	-2.2	40.3	8.69E-05	0.9	10	9.5
10/27/2008 03:21.61	16.0	9.9	33.1	-6.1	40.9	8.53E-05	1.0	10	9.5
10/27/2008 03:57.31	18.0	8.0	35.7	-10.0	41.5	8.37E-05	1.0	10	9.5
10/27/2008 04:37.88	20.0	6.0	40.6	-14.0	42.1	8.02E-05	1.0	10	10
10/27/2008 05:21.25	22.0	4.0	43.4	-18.0	42.9	8.00E-05	1.0	10	10

10/27/2008 06:10.18	24.0	2.0	48.9	-22.0	43.7	7.60E-05	1.0	10	10
10/27/2008 00:00.00	0.0	24.7	0.0	24.7	43.7				
10/27/2008 00:11.91	2.0	23.2	11.9	21.2	43.9	1.55E-04	0.8	10	7.5
10/27/2008 00:32.41	4.0	21.3	20.5	17.3	44.2	1.04E-04	0.9	10	9.5
10/27/2008 00:54.10	6.0	19.5	21.7	13.5	44.6	9.99E-05	0.9	10	9
10/27/2008 01:42.48	10.0	15.8	48.4	5.8	45.4	9.69E-05	0.9	20	18.5
10/27/2008 02:09.79	12.0	13.9	27.3	1.9	45.8	9.32E-05	1.0	10	9.5
10/27/2008 02:39.57	14.0	12.0	29.8	-2.0	46.3	8.98E-05	1.0	10	9.5
10/27/2008 03:12.30	16.0	10.0	32.7	-6.0	46.9	8.84E-05	1.0	10	10
10/27/2008 03:47.87	18.0	8.0	35.6	-10.0	47.5	8.61E-05	1.0	10	10
10/27/2008 04:48.30	20.0	5.0	60.4	-15.0	48.5	6.79E-05	1.5	10	15
10/27/2008 05:10.28	22.0	4.0	22.0	-18.0	48.8	1.19E-04	0.5	10	5
10/27/2008 05:57.54	24.0	2.0	47.3	-22.0	49.6	7.87E-05	1.0	10	10
10/27/2008 00:00.00	0.0	24.6	0.0	24.6	49.6				
10/27/2008 00:12.72	2.0	23.2	12.7	21.2	49.8	1.41E-04	0.7	10	7
10/27/2008 00:34.19	4.0	21.4	21.5	17.4	50.2	9.68E-05	0.9	10	9
10/27/2008 00:57.10	6.0	19.6	22.9	13.6	50.6	9.45E-05	0.9	10	9
10/27/2008 01:21.42	8.0	17.8	24.3	9.8	51.0	9.28E-05	0.9	10	9
10/27/2008 01:47.74	10.0	16.0	26.3	6.0	51.4	8.97E-05	0.9	10	9
10/27/2008 02:16.40	12.0	14.1	28.7	2.1	51.9	8.86E-05	1.0	10	9.5
10/27/2008 02:47.82	14.0	12.3	31.4	-1.7	52.4	8.27E-05	0.9	10	9
10/27/2008 03:22.80	16.0	10.3	35.0	-5.7	53.0	8.24E-05	1.0	10	10
10/27/2008 04:01.52	18.0	8.3	38.7	-9.7	53.7	7.88E-05	1.0	10	10
10/27/2008 04:44.59	20.0	6.3	43.1	-13.7	54.4	7.52E-05	1.0	10	10
10/27/2008 05:31.09	22.0	4.3	46.5	-17.7	55.1	7.43E-05	1.0	10	10
10/27/2008 00:00.00	0.0	24.7	0.0	24.7	55.1				
10/27/2008 00:13.72	2.0	22.7	13.7	20.7	55.4	1.54E-04	1.0	10	10
10/27/2008 00:34.77	4.0	20.7	21.0	16.7	55.7	1.05E-04	1.0	10	10
10/27/2008 00:57.15	6.0	18.7	22.4	12.7	56.1	1.03E-04	1.0	10	10
10/27/2008 01:21.66	8.0	16.7	24.5	8.7	56.5	9.81E-05	1.0	10	10
10/27/2008 01:48.26	10.0	14.6	26.6	4.6	57.0	9.72E-05	1.1	10	10.5
10/27/2008 02:16.88	12.0	12.5	28.6	0.5	57.4	9.50E-05	1.1	10	10.5
10/27/2008 02:47.92	14.0	10.5	31.0	-3.5	57.9	9.01E-05	1.0	10	10
10/27/2008 03:21.25	16.0	8.4	33.3	-7.6	58.5	9.09E-05	1.1	10	10.5
10/27/2008 03:58.34	18.0	6.3	37.1	-11.7	59.1	8.68E-05	1.1	10	10.5
10/27/2008 04:38.62	20.0	4.3	40.3	-15.7	59.8	8.30E-05	1.0	10	10
10/27/2008 05:23.12	22.0	2.2	44.5	-19.8	60.5	8.23E-05	1.1	10	10.5
10/27/2008 06:11.99	24.0	0.1	48.9	-23.9	61.3	8.06E-05	1.1	10	10.5





Hydraulic Conductivity Test - Underwood - Store-and-Release Cover

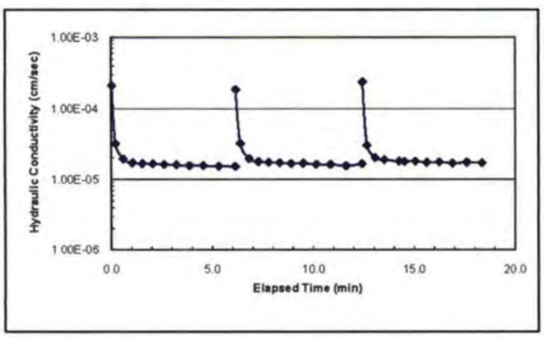
ASTM D 5084 - 00

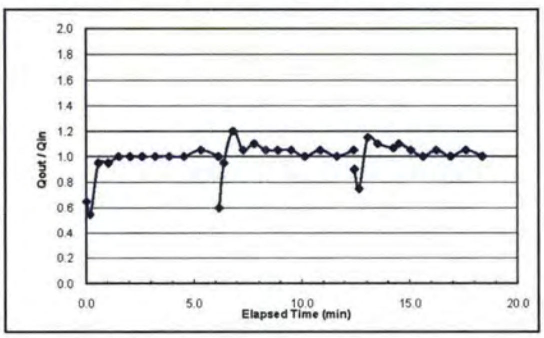
Sample I.D.	305-mm ET - Soil Top 2		Test Date :	8/18/08	
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	1	cm^2
Weight of wet sample =	21550.0	g	Sample Water Content =	11.3%	(%)
Wet Density =	1.9	g/cm^3	Dry Density =	1.94	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
MV-3	30.84	182.71	167.28	11.31%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
8/20/2008 00:00.00	0.0	24.9	0.0	24.9	0.0				
8/20/2008 00:01.62	2.0	23.6	1.6	21.6	0.0	2.14E-04	0.6	2	1.3
8/20/2008 00:12.22	4.0	22.5	10.6	18.5	0.2	3.17E-05	0.6	2	1.1
8/20/2008 00:35.02	6.0	20.6	22.8	14.6	0.6	1.93E-05	0.9	2	1.9
8/20/2008 01:01.99	8.0	18.7	27.0	10.7	1.0	1.70E-05	1.0	2	1.9
8/20/2008 01:31.54	10.0	16.7	29.6	6.7	1.5	1.67E-05	1.0	2	2
8/20/2008 02:02.81	12.0	14.7	31.3	2.7	2.0	1.65E-05	1.0	2	2
8/20/2008 02:36.62	14.0	12.7	33.8	-1.3	2.6	1.61E-05	1.0	2	2
8/20/2008 03:12.57	16.0	10.7	35.9	-5.3	3.2	1.59E-05	1.0	2	2
8/20/2008 03:51.72	18.0	8.7	39.2	-9.3	3.9	1.55E-05	1.0	2	2
8/20/2008 04:33.20	20.0	6.7	41.5	-13.3	4.6	1.55E-05	1.0	2	2
8/20/2008 05:19.45	22.0	4.6	46.2	-17.4	5.3	1.52E-05	1.1	2	2.1
8/20/2008 06:08.20	24.0	2.6	48.8	-21.4	6.1	1.51E-05	1.0	2	2
8/20/2008 00:00.00	0.0	24.9	0.0	24.9	6.1				
8/20/2008 00:01.78	2.0	23.7	1.8	21.7	6.2	1.89E-04	0.6	2	1.2
8/20/2008 00:15.18	4.0	21.8	13.4	17.8	6.4	3.17E-05	0.9	2	1.9
8/20/2008 00:41.01	6.0	19.4	25.8	13.4	6.8	1.94E-05	1.2	2	2.4
8/20/2008 01:08.89	8.0	17.3	27.9	9.3	7.3	1.75E-05	1.1	2	2.1
8/20/2008 01:39.46	10.0	15.1	30.6	5.1	7.8	1.72E-05	1.1	2	2.2
8/20/2008 02:11.35	12.0	13.0	31.9	1.0	8.3	1.69E-05	1.1	2	2.1
8/20/2008 02:45.80	14.0	10.9	34.5	-3.1	8.9	1.65E-05	1.1	2	2.1
8/20/2008 03:21.85	16.0	8.8	36.0	-7.2	9.5	1.67E-05	1.1	2	2.1
8/20/2008 04:00.52	18.0	6.8	38.7	-11.2	10.1	1.61E-05	1.0	2	2
8/20/2008 04:42.95	20.0	4.7	42.4	-15.3	10.9	1.60E-05	1.1	2	2.1
8/20/2008 05:29.01	22.0	2.7	46.1	-19.3	11.6	1.54E-05	1.0	2	2
8/20/2008 06:16.61	24.0	0.6	47.6	-23.4	12.4	1.64E-05	1.1	2	2.1
8/20/2008 00:00.00	0.0	24.9	0.0	24.9	12.4				
8/20/2008 00:01.67	2.0	23.1	1.7	21.1	12.4	2.40E-04	0.9	2	1.8
8/20/2008 00:14.48	4.0	21.6	12.8	17.6	12.7	2.99E-05	0.8	2	1.5
8/20/2008 00:38.98	6.0	19.3	24.5	13.3	13.1	2.00E-05	1.2	2	2.3
8/20/2008 01:05.88	8.0	17.1	26.9	9.1	13.5	1.87E-05	1.1	2	2.2
8/20/2008 01:50.10	11.0	13.9	44.2	2.9	14.2	1.78E-05	1.1	3	3.2
8/20/2008 02:05.96	12.0	12.8	15.9	0.8	14.5	1.77E-05	1.1	1	1.1
8/20/2008 02:38.16	14.0	10.7	32.2	-3.3	15.0	1.77E-05	1.1	2	2.1
8/20/2008 03:12.59	16.0	8.7	34.4	-7.3	15.6	1.71E-05	1.0	2	2
8/20/2008 03:49.60	18.0	6.6	37.0	-11.4	16.2	1.73E-05	1.1	2	2.1
8/20/2008 04:29.29	20.0	4.6	39.7	-15.4	16.9	1.68E-05	1.0	2	2
8/20/2008 05:11.74	22.0	2.5	42.5	-19.5	17.6	1.72E-05	1.1	2	2.1
8/20/2008 05:57.09	24.0	0.5	45.3	-23.5	18.4	1.68E-05	1.0	2	2





Hydraulic Conductivity Test - Underwood - Store-and-Release Cover

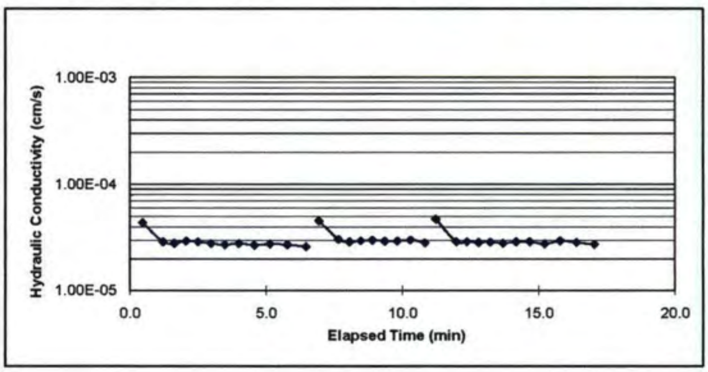
ASTM D 5084 - 00

Sample I.D.	150-mm ET-Soil-Top-2		Test Date :		
Cell Pressure =	42.1	psi	Diameter of Sample, D =	15.2	cm
Inflow Pressure =	40.5	psi	Length of Sample, L =	6.4	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	182.41	cm^2
Pressure Difference =	0.5	psi	Sample Volume, V =	1158.3	cm^3
Effective Stress =	1.9	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	5.5		a_{out} =	1	cm^2
Weight of wet sample =	2066.6	g	Sample Water Content =	25.5	(%)
Wet Density =	1.8	g/cm^3	Dry Density =	1.42	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
62	30.71	139.36	117.3	25.48

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:28	2.0	22.0	27.8	20.0	0.5	4.38E-05	1.0	2	2
0:01:13	4.0	20.0	45.4	16.0	1.2	2.89E-05	1.0	2	2
0:01:38	5.0	19.0	24.7	14.0	1.6	2.81E-05	1.0	1	1
0:02:04	6.0	17.9	25.7	11.9	2.1	2.96E-05	1.1	1	1.1
0:02:30	7.0	16.9	26.1	9.9	2.5	2.89E-05	1.0	1	1
0:02:58	8.0	15.9	28.4	7.9	3.0	2.79E-05	1.0	1	1
0:03:29	9.0	14.9	30.5	5.9	3.5	2.72E-05	1.0	1	1
0:04:00	10.0	13.9	31.1	3.9	4.0	2.80E-05	1.0	1	1
0:04:34	11.0	12.9	34.0	1.9	4.6	2.69E-05	1.0	1	1
0:05:09	12.0	11.9	35.0	-0.1	5.1	2.76E-05	1.0	1	1
0:05:46	13.0	10.9	37.6	-2.1	5.8	2.72E-05	1.0	1	1
0:06:28	14.0	9.9	41.7	-4.1	6.5	2.61E-05	1.0	1	1
0:00:00	0.0	24.0	-387.9	24.0	6.5				
0:00:26	2.0	22.1	26.2	20.1	6.9	4.54E-05	0.9	2	1.9
0:01:09	4.0	20.1	42.9	16.1	7.7	3.05E-05	1.0	2	2
0:01:33	5.0	19.1	23.9	14.1	8.0	2.90E-05	1.0	1	1
0:01:59	6.0	18.0	25.6	12.0	8.5	2.96E-05	1.1	1	1.1
0:02:24	7.0	17.0	25.2	10.0	8.9	3.00E-05	1.0	1	1
0:02:51	8.0	16.0	26.8	8.0	9.3	2.94E-05	1.0	1	1
0:03:19	9.0	15.0	28.0	6.0	9.8	2.95E-05	1.0	1	1
0:03:47	10.0	14.0	28.8	4.0	10.3	3.01E-05	1.0	1	1
0:04:19	11.0	13.0	32.1	2.0	10.8	2.84E-05	1.0	1	1
0:00:00	0.0	24.0	-259.5	24.0	10.8				
0:00:25	2.0	22.1	25.1	20.1	11.2	4.72E-05	0.9	2	1.9
0:01:10	4.0	20.1	45.0	16.1	12.0	2.90E-05	1.0	2	2
0:01:34	5.0	19.1	24.0	14.1	12.4	2.89E-05	1.0	1	1
0:01:59	6.0	18.1	25.3	12.1	12.8	2.85E-05	1.0	1	1
0:02:26	7.0	17.1	26.1	10.1	13.2	2.88E-05	1.0	1	1
0:02:54	8.0	16.1	28.1	8.1	13.7	2.80E-05	1.0	1	1
0:03:22	9.0	15.1	28.5	6.1	14.2	2.89E-05	1.0	1	1
0:03:52	10.0	14.1	29.8	4.1	14.7	2.90E-05	1.0	1	1
0:04:25	11.0	13.1	33.0	2.1	15.2	2.76E-05	1.0	1	1
0:04:59	12.0	12.0	34.2	0.0	15.8	2.95E-05	1.1	1	1.1
0:05:35	13.0	11.0	35.8	-2.0	16.4	2.85E-05	1.0	1	1
0:06:15	14.0	10.0	39.7	-4.0	17.0	2.73E-05	1.0	1	1



Hydraulic Conductivity Test - Underwood - Store-and-Release Cover

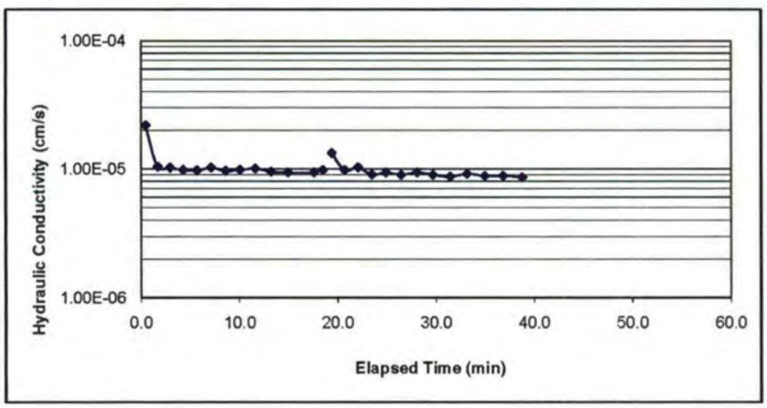
ASTM D 5084 - 00

Sample I.D.	75-mm ET-Soil-Top-2		Test Date :		
Cell Pressure =	42.0	psi	Diameter of Sample, D =	7.6	cm
Inflow Pressure =	41.0	psi	Length of Sample, L =	3.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	45.60	cm^2
Pressure Difference =	1.0	psi	Sample Volume, V =	144.8	cm^3
Effective Stress =	1.5	psi	a_{in} =	1	cm^2
Hydraulic Gradient, i =	22.2		a_{out} =	1	cm^2
Weight of wet sample =	244.2	g	Sample Water Content =	25.1	(%)
Wet Density =	1.7	g/cm^3	Dry Density =	1.35	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
Y	30.96	145.11	122.22	25.08

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
0:00:00	0.0	24.0	0.0	24.0	0.0				
0:00:27	1.0	23.4	27.3	22.4	0.5	2.18E-05	0.6	1	0.6
0:01:40	2.0	22.4	72.8	20.4	1.7	1.04E-05	1.0	1	1
0:02:56	3.0	21.4	75.9	18.4	2.9	1.02E-05	1.0	1	1
0:04:17	4.0	20.4	80.9	16.4	4.3	9.81E-06	1.0	1	1
0:05:41	5.0	19.4	83.6	14.4	5.7	9.72E-06	1.0	1	1
0:07:06	6.0	18.3	85.4	12.3	7.1	1.02E-05	1.1	1	1.1
0:08:34	7.0	17.3	88.4	10.3	8.6	9.65E-06	1.0	1	1
0:10:03	8.0	16.3	89.0	8.3	10.1	9.82E-06	1.0	1	1
0:11:37	9.0	15.2	93.5	6.2	11.6	1.01E-05	1.1	1	1.1
0:13:14	10.0	14.2	97.1	4.2	13.2	9.50E-06	1.0	1	1
0:14:55	11.0	13.2	100.9	2.2	14.9	9.38E-06	1.0	1	1
0:17:37	12.5	11.6	162.0	-0.9	17.6	9.39E-06	1.1	1.5	1.6
0:18:28	13.0	11.1	51.6	-1.9	18.5	9.79E-06	1.0	0.5	0.5
0:00:00	0.0	24.0	-1108.3	24.0	18.5				
0:00:53	1.0	23.1	53.2	22.1	19.4	1.33E-05	0.9	1	0.9
0:02:11	2.0	22.1	77.7	20.1	20.7	9.80E-06	1.0	1	1
0:03:34	3.1	21.0	83.5	17.9	22.1	1.03E-05	1.0	1.1	1.1
0:04:58	4.0	20.0	84.0	16.0	23.5	9.02E-06	1.1	0.9	1
0:06:26	5.0	19.0	87.2	14.0	24.9	9.36E-06	1.0	1	1
0:07:58	6.0	18.0	92.8	12.0	26.5	9.00E-06	1.0	1	1
0:09:34	7.0	16.9	95.9	9.9	28.1	9.38E-06	1.1	1	1.1
0:11:12	8.0	15.9	97.7	7.9	29.7	8.99E-06	1.0	1	1
0:12:56	9.0	14.9	103.8	5.9	31.4	8.69E-06	1.0	1	1
0:14:42	10.0	13.8	106.3	3.8	33.2	9.15E-06	1.1	1	1.1
0:16:30	11.0	12.8	108.0	1.8	35.0	8.82E-06	1.0	1	1
0:18:21	12.0	11.8	110.9	-0.2	36.8	8.83E-06	1.0	1	1
0:20:18	13.0	10.8	117.1	-2.2	38.8	8.60E-06	1.0	1	1



Hydraulic Conductivity Test - Underwood - Store-and-Release Cover

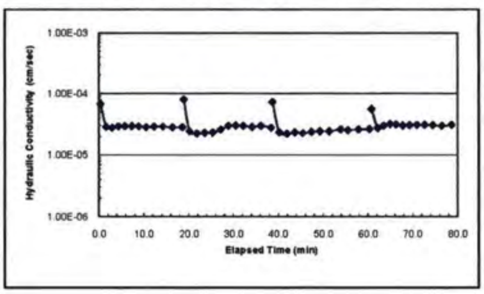
ASTM D 5084 - 00

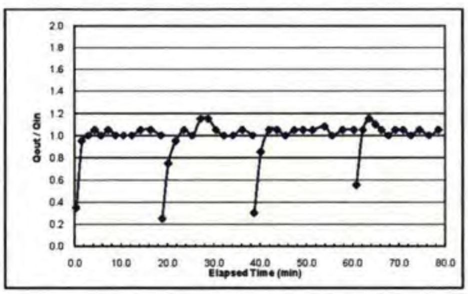
Sample I.D.	**305-mm ET-Soil Bottom**			**Test Date :**	**10/13/08**
Cell Pressure =	42.0	psi	Diameter of Sample, D =	30.5	cm
Inflow Pressure =	41.1	psi	Length of Sample, L =	15.2	cm
Outflow Pressre =	40.0	psi	Area of Sample, A =	729.66	cm^2
Pressure Difference =	1.1	psi	Sample Volume, V =	11120.0	cm^3
Effective Stress =	1.5	psi	a_{in} =	5	cm^2
Hydraulic Gradient, i =	5.0		a_{out} =	5	cm^2
Weight of wet sample =	22600.0	g	Sample Water Content =	15.3%	(%)
Wet Density =	2.0	g/cm^3	Dry Density =	2.03	g/cm^3

$$K_s = \frac{a_{in} * a_{out}}{(a_{in} + a_{out})} \frac{L}{A * \Delta t} Ln\left\{\frac{(\Delta H_1)}{(\Delta H_2)}\right\}$$

Can #	WT of Can	WT of Can + Wet Soil	WT of Can + Dry Soil	Water Content
	(g)	(g)	(g)	(%)
G	30.8	157.28	140.54	15.25%

Date, Time	Inflow	OutFlow	Δt	H	Time	K	Q_{out} / Q_{in}	Q_{in}	Q_{out}
			(sec)	(cm)	(min)	(cm/sec)			
10/13/2008 00:00.00	0.0	24.8	0.0	24.8	0.0				
10/13/2008 00:21.19	2.0	24.1	21.2	22.1	0.4	6.68E-05	0.4	10	3.5
10/13/2008 01:35.12	4.0	22.2	73.9	18.2	1.6	2.86E-05	1.0	10	9.5
10/13/2008 02:57.11	6.0	20.2	82.0	14.2	3.0	2.76E-05	1.0	10	10
10/13/2008 04:20.61	8.0	18.1	83.5	10.1	4.3	2.90E-05	1.1	10	10.5
10/13/2008 05:45.00	10.0	16.1	84.4	6.1	5.8	2.94E-05	1.0	10	10
10/13/2008 07:16.31	12.0	14.0	91.3	2.0	7.3	2.92E-05	1.1	10	10.5
10/13/2008 08:50.68	14.0	12.0	94.4	-2.0	8.8	2.91E-05	1.0	10	10
10/13/2008 10:32.91	16.0	10.0	102.2	-6.0	10.5	2.83E-05	1.0	10	10
10/13/2008 12:19.77	18.0	8.0	106.9	-10.0	12.3	2.87E-05	1.0	10	10
10/13/2008 14:15.60	20.0	5.9	115.8	-14.1	14.3	2.88E-05	1.1	10	10.5
10/13/2008 16:22.87	22.0	3.8	127.3	-18.2	16.4	2.80E-05	1.1	10	10.5
10/13/2008 18:36.03	24.0	1.8	133.2	-22.2	18.6	2.80E-05	1.0	10	10
10/13/2008 00:00.00	0.0	24.7	0.0	24.7	18.6				
10/13/2008 00:16.50	2.0	24.2	16.5	22.2	18.9	7.94E-05	0.3	10	2.5
10/13/2008 01:34.75	4.0	22.7	78.3	18.7	20.2	2.42E-05	0.8	10	7.5
10/13/2008 03:14.24	6.0	20.8	99.5	14.8	21.8	2.20E-05	0.9	10	9.5
10/13/2008 05:00.10	8.0	18.7	105.9	10.7	23.6	2.27E-05	1.1	10	10.5
10/13/2008 06:47.16	10.0	16.7	107.1	6.7	25.4	2.30E-05	1.0	10	10
10/13/2008 08:35.21	12.0	14.4	108.1	2.4	27.2	2.57E-05	1.2	10	11.5
10/13/2008 10:14.20	14.0	12.1	99.0	-1.9	28.8	2.97E-05	1.2	10	11.5
10/13/2008 11:53.16	16.0	10.0	99.0	-6.0	30.5	3.00E-05	1.1	10	10.5
10/13/2008 13:37.21	18.0	8.0	104.1	-10.0	32.2	2.94E-05	1.0	10	10
10/13/2008 15:32.02	20.0	6.0	114.8	-14.0	34.1	2.83E-05	1.0	10	10
10/13/2008 17:32.92	22.0	3.9	120.9	-18.1	36.1	2.95E-05	1.1	10	10.5
10/13/2008 19:48.36	24.0	1.9	135.4	-22.1	38.4	2.75E-05	1.0	10	10
10/13/2008 00:00.00	0.0	24.8	0.0	24.8	38.4				
10/13/2008 00:19.20	2.0	24.2	19.2	22.2	38.7	7.09E-05	0.3	10	3
10/13/2008 01:45.52	4.0	22.5	86.3	18.5	40.2	2.32E-05	0.9	10	8.5
10/13/2008 03:30.29	6.0	20.4	104.8	14.4	41.9	2.21E-05	1.1	10	10.5
10/13/2008 05:15.32	8.0	18.3	105.0	10.3	43.7	2.30E-05	1.1	10	10.5
10/13/2008 07:04.80	10.0	16.3	109.5	6.3	45.5	2.26E-05	1.0	10	10
10/13/2008 08:57.59	12.0	14.2	112.8	2.2	47.4	2.36E-05	1.1	10	10.5
10/13/2008 10:53.45	14.0	12.1	115.9	-1.9	49.3	2.42E-05	1.1	10	10.5
10/13/2008 12:55.82	16.0	10.0	122.4	-6.0	51.3	2.42E-05	1.1	10	10.5
10/13/2008 15:31.21	18.5	7.3	155.4	-11.2	53.9	2.59E-05	1.1	12.5	13.5
10/13/2008 17:08.64	20.0	5.8	97.4	-14.2	55.6	2.53E-05	1.0	7.5	7.5
10/13/2008 19:26.66	22.0	3.7	138.0	-18.3	57.9	2.59E-05	1.1	10	10.5
10/13/2008 21:53.00	24.0	1.6	146.3	-22.4	60.3	2.62E-05	1.1	10	10.5
10/13/2008 00:00.00	0.0	24.8	0.0	24.8	60.3				
10/13/2008 00:29.54	2.0	23.7	29.5	21.7	60.8	5.51E-05	0.6	10	5.5
10/13/2008 01:52.30	4.0	21.6	82.8	17.6	62.2	2.70E-05	1.1	10	10.5
10/13/2008 03:14.51	6.0	19.3	82.2	13.3	63.5	2.98E-05	1.2	10	11.5
10/13/2008 04:34.11	8.0	17.1	79.6	9.1	64.9	3.15E-05	1.1	10	11
10/13/2008 05:56.68	10.0	15.0	82.6	5.0	66.2	3.12E-05	1.1	10	10.5
10/13/2008 07:24.82	12.0	13.0	88.1	1.0	67.7	2.99E-05	1.0	10	10
10/13/2008 08:58.86	14.0	10.9	94.0	-3.1	69.3	3.03E-05	1.1	10	10.5
10/13/2008 10:37.86	16.0	8.8	99.0	-7.2	70.9	3.04E-05	1.1	10	10.5
10/13/2008 12:19.05	18.0	6.8	101.2	-11.2	72.6	3.08E-05	1.0	10	10
10/13/2008 14:10.55	20.0	4.7	111.5	-15.3	74.5	3.05E-05	1.1	10	10.5
10/13/2008 16:10.10	22.0	2.7	119.5	-19.3	76.5	2.97E-05	1.0	10	10
10/13/2008 18:17.55	24.0	0.6	127.5	-23.4	78.6	3.06E-05	1.1	10	10.5





APPENDIX E - SOIL WATER CHARACTERISTIC CURVE TEST DATA

Pressure Plate Extractor Test - Altamont - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm CMP-CL-3		Test Date	8/13/2008
WT of Sample Ring =	699.6	g		
WT of Sample Ring + Soil =	3920.8	g		
Water Content =	21.73	%		
Diameter of Sample Ring, D =	8.00	in		
Height of Sample Ring, L =	1.9	in		
Volume, V =	5.53E-02	ft^3	1565.0	cm^3
Dry Unit Weight =	105.55	pcf	1.69	Mg/m^3
Water WT =	575.11	g		
Solid WT =	2646.09	g		
Add Water for saturation =	115.4	g	Sr	119.67
Saturated Water Content =	26.10	%		
Tube Area, A =	20.268299	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	0.1	0.000	0.001	0.261	0.441
0.5	3	58.778	3.449	0.239	0.404
1	4.3	85.127	6.897	0.229	0.387
2	5.7	113.502	13.794	0.218	0.369
4	10.2	204.710	27.588	0.184	0.311
		Activity	2090.00	0.129	0.219
		Meter	4280.00	0.105	0.177
		Test	12100.00	0.081	0.136
			24000.00	0.069	0.117
			37600.00	0.062	0.106
			54600.00	0.056	0.094
			78700.00	0.048	0.081
			1870.00	0.124	0.209
			3730.00	0.106	0.180
			11200.00	0.080	0.135
			20800.00	0.069	0.117
			32900.00	0.062	0.105
			49000.00	0.055	0.094
			73600.00	0.048	0.081

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.09	18.4009	27.0626	26.0697	0.129	0.219
4.28	18.4009	26.8719	26.0697	0.105	0.177
12.1	18.4009	26.6879	26.0697	0.081	0.136
24	18.4009	26.6015	26.0697	0.069	0.117
37.6	18.4009	26.5488	26.0697	0.062	0.106
54.6	18.4009	26.4962	26.0697	0.056	0.094
78.7	18.4009	26.4384	26.0697	0.048	0.081
1.87	18.4205	26.2555	25.3938	0.124	0.209
3.73	18.4205	26.1359	25.3938	0.106	0.180
11.2	18.4205	25.9484	25.3938	0.080	0.135
20.8	18.4205	25.8741	25.3938	0.069	0.117
32.9	18.4205	25.8264	25.3938	0.062	0.105
49	18.4205	25.7796	25.3938	0.055	0.094
73.6	18.4205	25.7274	25.3938	0.048	0.081

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4371
α =	0.1949
n =	1.1543
m =	0.1337

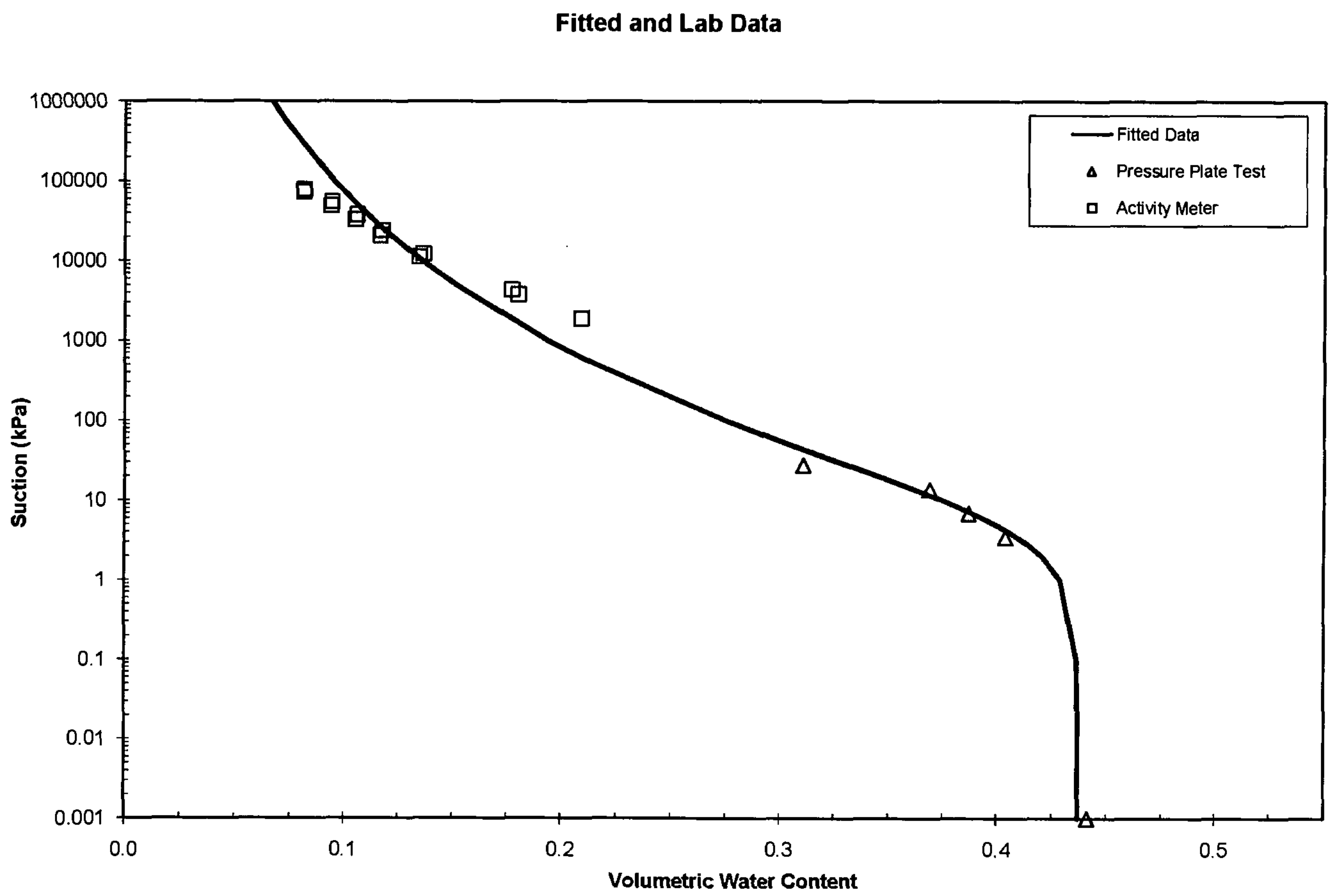
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4371
0.025	0.4370
0.05	0.4368
0.075	0.4367
0.1	0.4365
1	0.4289
2	0.4205
3	0.4126
4	0.4056
5	0.3992
6	0.3934
7	0.3881
8	0.3833
9	0.3789
10	0.3748
15	0.3580
20	0.3455
30	0.3274
40	0.3146
50	0.3047
60	0.2968
70	0.2902
80	0.2845
90	0.2796
100	0.2752
500	0.2154
1000	0.1937
5000	0.1511
10000	0.1358
25000	0.1179
5.00E+04	0.1059
1.00E+05	0.0952
5.00E+05	0.0742
7.50E+05	0.0697
1.00E+06	0.0667

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.441	0.4371	0.004	0.000
3.45	0.404	0.4094	-0.006	0.000
6.90	0.387	0.3887	-0.002	0.000
13.79	0.369	0.3616	0.007	0.000
27.59	0.311	0.3312	-0.021	0.000
4280.00	0.177	0.1548	0.022	0.000
12100.00	0.136	0.1318	0.005	0.000
24000.00	0.117	0.1186	-0.001	0.000
37600.00	0.106	0.1107	-0.005	0.000
54600.00	0.094	0.1045	-0.010	0.000
78700.00	0.081	0.0987	-0.017	0.000
1870.00	0.209	0.1758	0.033	0.001
3730.00	0.180	0.1581	0.022	0.000
11200.00	0.135	0.1334	0.001	0.000
20800.00	0.117	0.1213	-0.005	0.000
32900.00	0.105	0.1130	-0.008	0.000
49000.00	0.094	0.1062	-0.013	0.000
73600.00	0.081	0.0998	-0.019	0.000

Residual = 0.000203676



Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Altamont - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	CMP-CL-3		Test Date	4/9/2008
WT of Sample Ring =	70.16	g		
WT of Sample Ring + Soil =	288.93	g		
Water Content =	20.45	%		
Diameter of Sample Ring, D =	2.87	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.75E-03	ft^3	106.2	cm^3
Dry Unit Weight =	106.81	pcf	1.71	Mg/m^3
Water WT =	37.14	g		
Solid WT =	181.63	g		
Add Water for saturation =	1.22	g	Sr	100.05
Saturated Water Content =	21.12	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	20.7	0.000	0.001	0.211	0.362
0.5	35	2.717	3.449	0.196	0.336
1	36.3	2.964	6.897	0.195	0.334
2	37.8	3.249	13.794	0.193	0.331
4	42.9	4.218	27.588	0.188	0.322
8	48.5	5.282	55.176	0.182	0.312
16	57	6.897	110.352	0.173	0.297
30	65.8	8.569	206.910	0.164	0.281
60	73.3	9.994	413.820	0.156	0.267
90	83.5	11.932	620.730	0.146	0.249
		Activity Meter Test	47800.00	0.048	0.082
			1910.00	0.108	0.185
			21000.00	0.068	0.116
			5660.00	0.084	0.143

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
21	19.505	27.7869	27.2603	0.068	0.116
1.91	18.8021	27.3736	26.5357	0.108	0.185
47.8	48.9143	57.2121	56.8331	0.048	0.082
5.66	19.5261	28.1184	27.4542	0.084	0.143

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

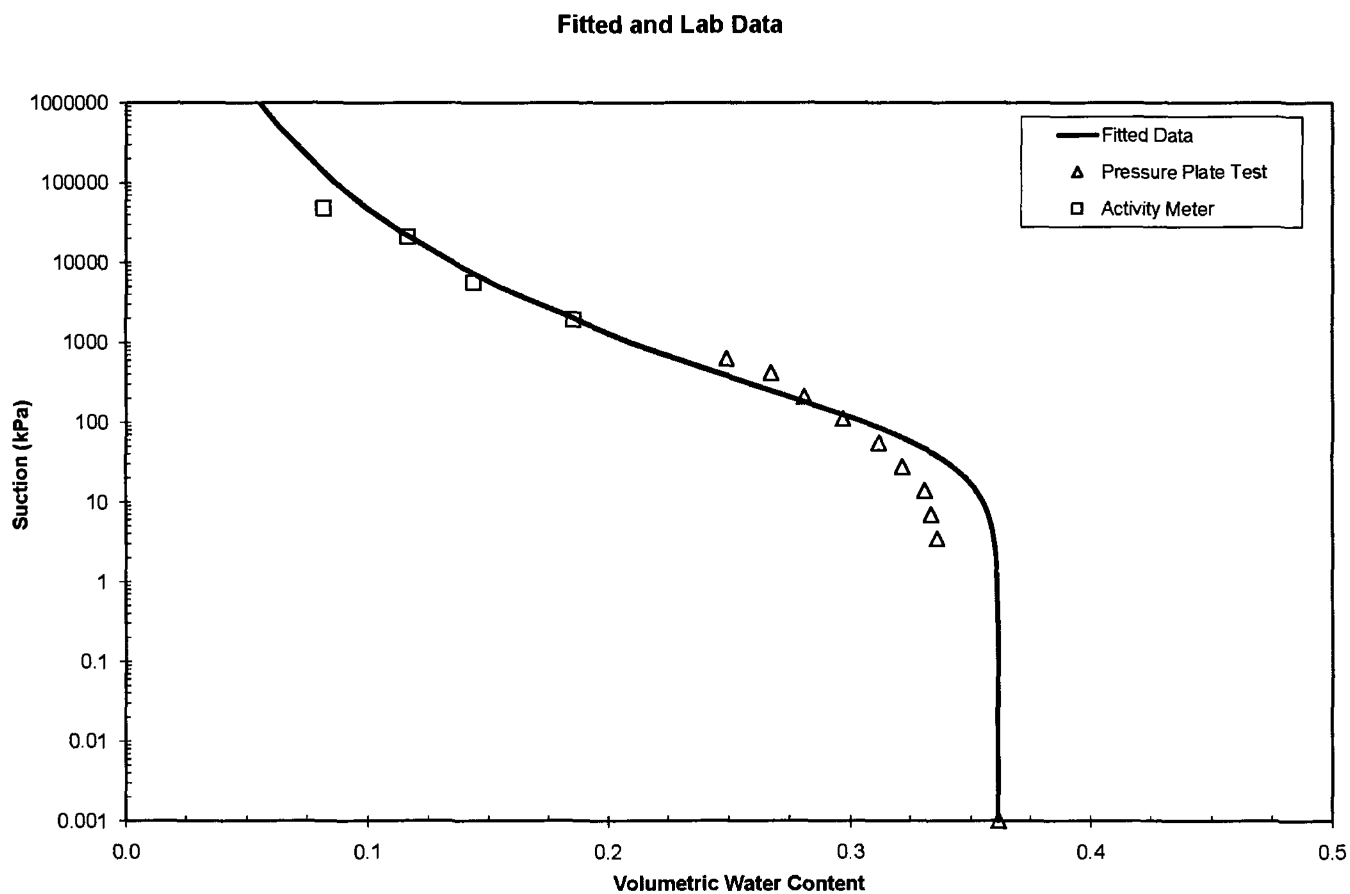
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3615
α =	0.0164
n =	1.1931
m =	0.1618

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.362	0.3615	0.000	0.000
3.45	0.336	0.3597	-0.024	0.001
6.90	0.334	0.3574	-0.024	0.001
13.79	0.331	0.3525	-0.022	0.000
27.59	0.322	0.3428	-0.021	0.000
55.18	0.312	0.3262	-0.014	0.000
110.35	0.297	0.3021	-0.006	0.000
206.91	0.281	0.2760	0.005	0.000
413.82	0.267	0.2458	0.021	0.000
620.73	0.249	0.2287	0.020	0.000
47800.00	0.082	0.0998	-0.018	0.000
1910.00	0.185	0.1854	0.000	0.000
21000.00	0.116	0.1170	-0.001	0.000
5660.00	0.143	0.1506	-0.007	0.000

Residual = 0.000253464

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.3615
0.025	0.3615
0.05	0.3615
0.075	0.3615
0.1	0.3615
1	0.3611
2	0.3605
3	0.3599
4	0.3593
5	0.3586
6	0.3580
7	0.3573
8	0.3566
9	0.3559
10	0.3552
15	0.3516
20	0.3480
30	0.3412
40	0.3349
50	0.3290
60	0.3236
70	0.3187
80	0.3141
90	0.3099
100	0.3059
500	0.2377
1000	0.2094
5000	0.1542
10000	0.1350
25000	0.1131
5.00E+04	0.0989
1.00E+05	0.0865
5.00E+05	0.0634
7.50E+05	0.0587
1.00E+06	0.0555


Fitted and Lab Data
Suction (kPa)
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100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content
Fitted Data
Pressure Plate Test
Activity Meter

Pressure Plate Extractor Test - Altamont - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	CMP-SDRI		Test Date	4/9/2008
WT of Sample Ring =	71.33	g		
WT of Sample Ring + Soil =	291.45	g		
Water Content =	21.17	%		
Diameter of Sample Ring, D =	2.87	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.75E-03	ft^3	106.2	cm^3
Dry Unit Weight =	106.83	pcf	1.71	Mg/m^3
Water WT =	38.46	g		
Solid WT =	181.66	g		
Add Water for saturation =	1.31	g	Sr	103.75
Saturated Water Content =	21.89	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	11.5	0.000	0.001	0.219	0.375
0.5	24.1	2.394	3.449	0.206	0.352
1	28.2	3.173	6.897	0.201	0.345
2	30.9	3.686	13.794	0.199	0.340
4	32.35	3.962	27.588	0.197	0.337
8	36.3	4.712	55.176	0.193	0.330
16	41.95	5.786	110.352	0.187	0.320
30	48.3	6.992	206.910	0.180	0.309
60	54	8.075	413.820	0.174	0.299
90	62	9.595	620.730	0.166	0.284
		Activity Meter Test	2050.00	0.119	0.205
			53300.00	0.044	0.075
			5720.00	0.078	0.134
			840.00	0.153	0.262

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
5.72	18.4042	26.8033	26.1942	0.078	0.134
53.3	19.5051	27.7352	27.3908	0.044	0.075
2.05	19.4865	28.3213	27.3784	0.119	0.205
0.84	18.5042	27.4406	26.2528	0.153	0.262

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3748
α =	0.0053
n =	1.2620
m =	0.2076

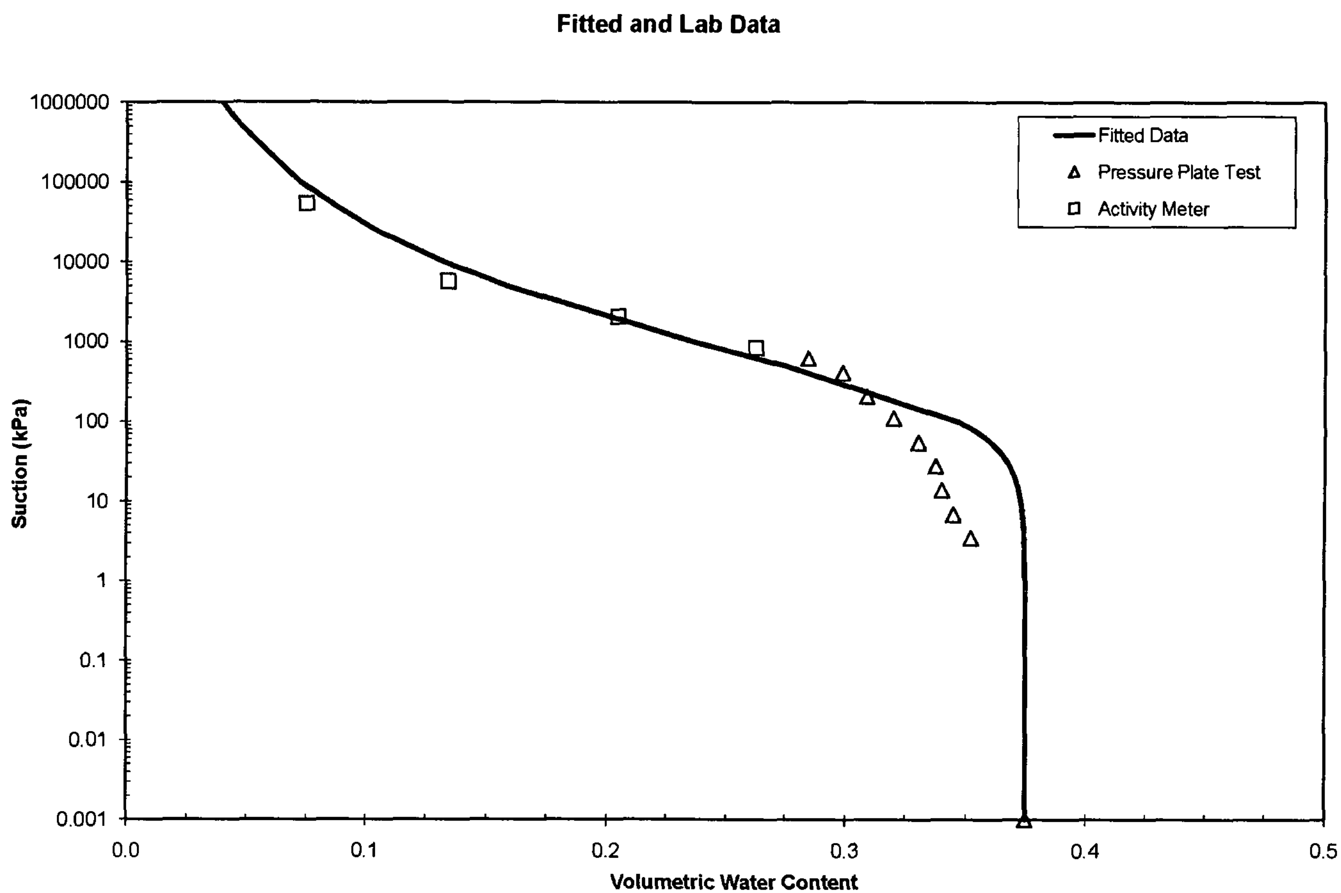
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3748
0.025	0.3748
0.05	0.3748
0.075	0.3748
0.1	0.3748
1	0.3747
2	0.3745
3	0.3743
4	0.3742
5	0.3740
6	0.3738
7	0.3736
8	0.3733
9	0.3731
10	0.3729
15	0.3717
20	0.3703
30	0.3675
40	0.3646
50	0.3616
60	0.3586
70	0.3557
80	0.3527
90	0.3498
100	0.3470
500	0.2752
1000	0.2363
5000	0.1582
10000	0.1322
25000	0.1041
5.00E+04	0.0868
1.00E+05	0.0724
5.00E+05	0.0475
7.50E+05	0.0427
1.00E+06	0.0396

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.375	0.3748	0.000	0.000
3.45	0.352	0.3743	-0.022	0.000
6.90	0.345	0.3736	-0.029	0.001
13.79	0.340	0.3720	-0.032	0.001
27.59	0.337	0.3682	-0.031	0.001
55.18	0.330	0.3601	-0.030	0.001
110.35	0.320	0.3441	-0.024	0.001
206.91	0.309	0.3205	-0.012	0.000
413.82	0.299	0.2856	0.013	0.000
620.73	0.284	0.2630	0.021	0.000
2050.00	0.205	0.1985	0.006	0.000
53300.00	0.075	0.0854	-0.011	0.000
5720.00	0.134	0.1528	-0.019	0.000
840.00	0.262	0.2460	0.016	0.000

Residual = 0.000447616


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Altamont - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	**254-mm ALT-ML-4**		**Test Date**	8/8/2008
WT of Sample Ring =	881.7	g		
WT of Sample Ring + Soil =	6056.1	g		
Water Content =	25.11	%		
Diameter of Sample Ring, D =	10.00	in		
Height of Sample Ring, L =	2.0	in		
Volume, V =	9.09E-02	ft^3	2574.1	cm^3
Dry Unit Weight =	100.30	pcf	1.61	Mg/m^3
Water WT =	1038.50	g		
Solid WT =	4135.90	g		
Add Water for saturation =	91.02	g	Sr	109.69
Saturated Water Content =	27.31	%		
Tube Area, A =	20.26829916	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	***Volumetric* Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	2.3	0.000	0.001	0.273	0.439
0.5	5.6	66.885	3.449	0.257	0.413
1	7	95.261	6.897	0.250	0.402
2	8.1	117.556	13.794	0.245	0.393
4	10	156.066	27.588	0.235	0.378
8	13.2	220.924	55.176	0.220	0.353
15	15.8	273.622	103.455	0.207	0.333
30	19.5	348.615	206.910	0.189	0.304
60	23	419.554	413.820	0.172	0.276
		Activity Meter Test	2420.00	0.105	0.169
			4490.00	0.089	0.143
			12300.00	0.072	0.115
			30300.00	0.057	0.092
			61500.00	0.043	0.070
			61600.00	0.043	0.070

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.42	19.5173	27.8053	27.016	0.105	0.169
4.49	19.5516	27.7125	27.0477	0.089	0.143
12.3	18.801	26.8497	26.3116	0.072	0.115
30.3	19.484	27.4082	26.9784	0.057	0.092
61.5	18.1351	25.9697	25.6444	0.043	0.070
61.6	22.7621	30.5877	30.2625	0.043	0.070

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4136
α =	0.0159
n =	1.2442
m =	0.1963

FOR GRAPHING

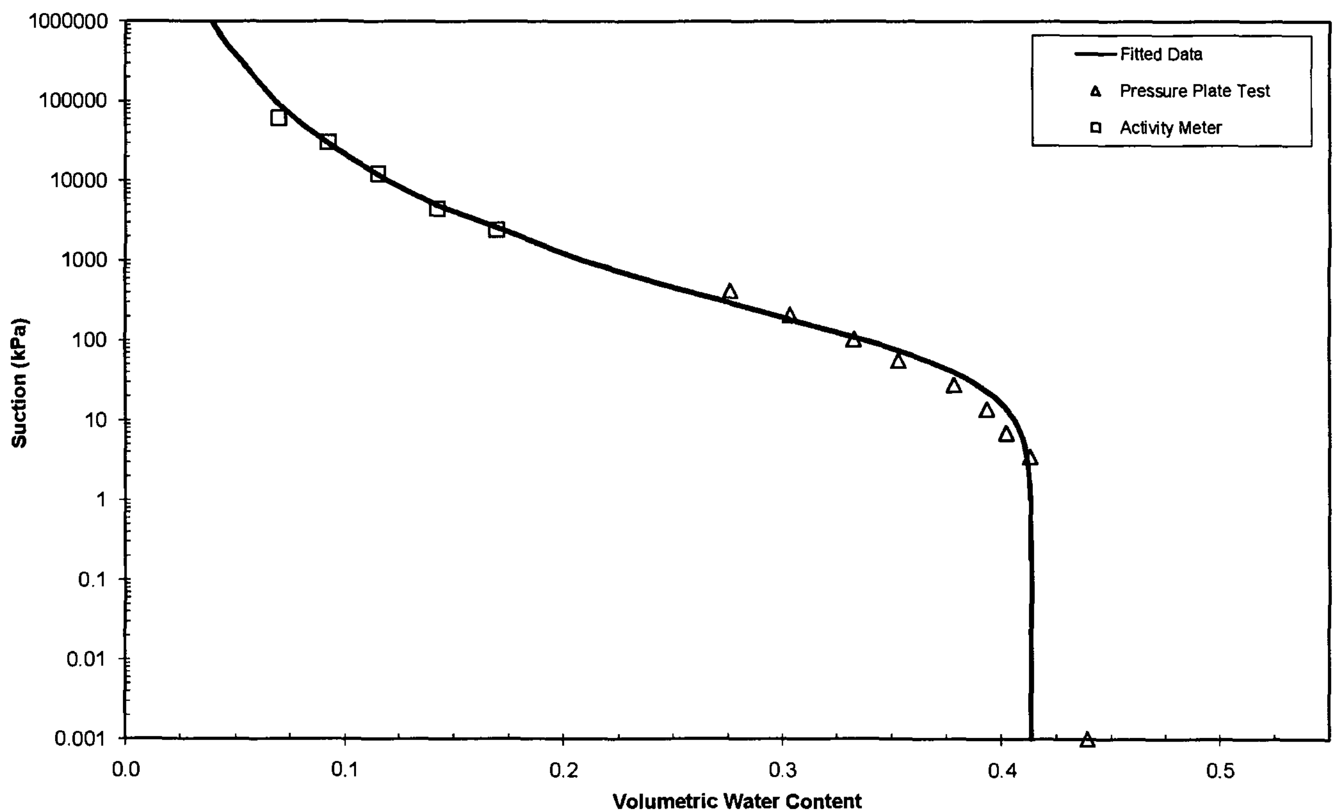
Suction (kPa)	VWC
0.001	0.4136
0.025	0.4136
0.05	0.4136
0.075	0.4136
0.1	0.4136
1	0.4131
2	0.4125
3	0.4118
4	0.4110
5	0.4102
6	0.4094
7	0.4085
8	0.4076
9	0.4067
10	0.4058
15	0.4011
20	0.3964
30	0.3872
40	0.3785
50	0.3704
60	0.3629
70	0.3560
80	0.3497
90	0.3438
100	0.3383
500	0.2456
1000	0.2091
5000	0.1419
10000	0.1198
25000	0.0958
5.00E+04	0.0809
1.00E+05	0.0683
5.00E+05	0.0461
7.50E+05	0.0418
1.00E+06	0.0389

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.439	0.4136	0.025	0.001
3.45	0.413	0.4114	0.002	0.000
6.90	0.402	0.4086	-0.007	0.000
13.79	0.393	0.4023	-0.009	0.000
27.59	0.378	0.3894	-0.011	0.000
55.18	0.353	0.3665	-0.013	0.000
103.46	0.333	0.3365	-0.004	0.000
206.91	0.304	0.2969	0.007	0.000
413.82	0.276	0.2563	0.020	0.000
2420.00	0.169	0.1692	0.000	0.000
4490.00	0.143	0.1456	-0.003	0.000
12300.00	0.115	0.1139	0.001	0.000
30300.00	0.092	0.0914	0.001	0.000
61500.00	0.070	0.0769	-0.007	0.000
61600.00	0.070	0.0769	-0.007	0.000

Residual = 0.000108804

Fitted and Lab Data



Pressure Plate Extractor Test - Altamont - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ALT-ML-4		Test Date	4/9/2008
WT of Sample Ring =	71.16	g		
WT of Sample Ring + Soil =	293.11	g		
Water Content =	18.94	%		
Diameter of Sample Ring, D =	2.87	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.75E-03	ft^3	106.2	cm^3
Dry Unit Weight =	109.73	pcf	1.76	Mg/m^3
Water WT =	35.34	g		
Solid WT =	186.61	g		
Add Water for saturation =	0.91	g	Sr	99.37
Saturated Water Content =	19.43	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	25	0.000	0.001	0.194	0.342
0.5	37.4	2.356	3.449	0.182	0.319
1	38.6	2.584	6.897	0.180	0.317
2	40.5	2.945	13.794	0.178	0.314
4	42.9	3.401	27.588	0.176	0.310
8	46.5	4.085	55.176	0.172	0.303
16	48.95	4.551	110.352	0.170	0.299
30	52.9	5.301	206.910	0.166	0.292
60	57	6.080	413.820	0.162	0.284
90	64	7.410	620.730	0.155	0.272
		Activity Meter Test	1240.00	0.151	0.265
			3640.00	0.099	0.173
			24200.00	0.059	0.103

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
3.64	22.0096	30.4257	29.6704	0.099	0.173
1.24	18.6204	27.3852	26.2368	0.151	0.265
24.2	19.7051	28.2719	27.7974	0.059	0.103

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3416
α =	0.0041
n =	1.2284
m =	0.1860

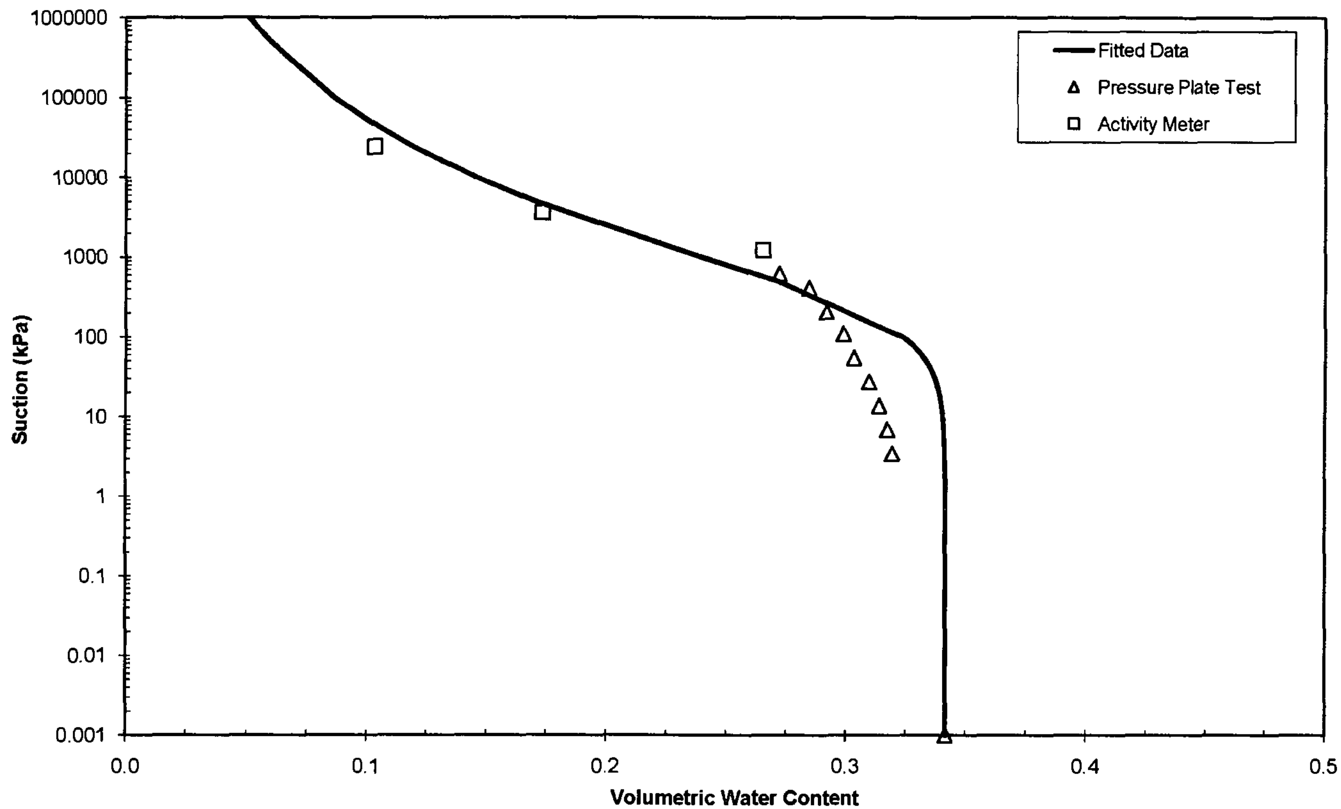
FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.342	0.3416	0.000	0.000
3.45	0.319	0.3413	-0.022	0.000
6.90	0.317	0.3409	-0.024	0.001
13.79	0.314	0.3398	-0.026	0.001
27.59	0.310	0.3374	-0.028	0.001
55.18	0.303	0.3322	-0.029	0.001
110.35	0.299	0.3218	-0.023	0.001
206.91	0.292	0.3056	-0.014	0.000
413.82	0.284	0.2799	0.004	0.000
620.73	0.272	0.2620	0.010	0.000
1240.00	0.265	0.2299	0.035	0.001
3640.00	0.173	0.1829	-0.009	0.000
24200.00	0.103	0.1193	-0.016	0.000
			Residual =	0.000443069

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3416
0.025	0.3416
0.05	0.3416
0.075	0.3416
0.1	0.3416
1	0.3416
2	0.3415
3	0.3414
4	0.3412
5	0.3411
6	0.3410
7	0.3408
8	0.3407
9	0.3405
10	0.3404
15	0.3396
20	0.3388
30	0.3370
40	0.3351
50	0.3332
60	0.3313
70	0.3294
80	0.3275
90	0.3256
100	0.3237
500	0.2717
1000	0.2399
5000	0.1704
10000	0.1459
25000	0.1185
5.00E+04	0.1011
1.00E+05	0.0863
5.00E+05	0.0598
7.50E+05	0.0545
1.00E+06	0.0510

Fitted and Lab Data



Pressure Plate Extractor Test - Altamont - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ALT-SL-1		Test Date	4/9/2008
WT of Sample Ring =	69.88	g		
WT of Sample Ring + Soil =	290.77	g		
Water Content =	20.35	%		
Diameter of Sample Ring, D =	2.87	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.75E-03	ft^3	106.2	cm^3
Dry Unit Weight =	107.93	pcf	1.73	Mg/m^3
Water WT =	37.35	g		
Solid WT =	183.54	g		
Add Water for saturation =	1.23	g	Sr	102.53
Saturated Water Content =	21.02	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	14.9	0.000	0.001	0.210	0.364
0.5	27.8	2.451	3.449	0.197	0.340
1	28.8	2.641	6.897	0.196	0.339
2	30	2.869	13.794	0.195	0.337
4	31.2	3.097	27.588	0.193	0.334
8	34.9	3.800	55.176	0.189	0.328
16	41.95	5.140	110.352	0.182	0.315
30	46	5.909	206.910	0.178	0.308
60	52.1	7.068	413.820	0.172	0.297
90	61	8.759	620.730	0.162	0.281
		Activity Meter Test	4700.00	0.085	0.147
			1060.00	0.139	0.240
			6260.00	0.081	0.141
			2320.00	0.104	0.179

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.06	22.0099	30.6383	29.5869	0.139	0.240
4.7	19.5515	27.8289	27.1785	0.085	0.147
6.26	19.5081	28.1293	27.4813	0.081	0.141
2.32	18.6818	27.4445	26.6225	0.104	0.179

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3636
α =	0.0046
n =	1.2735
m =	0.2148

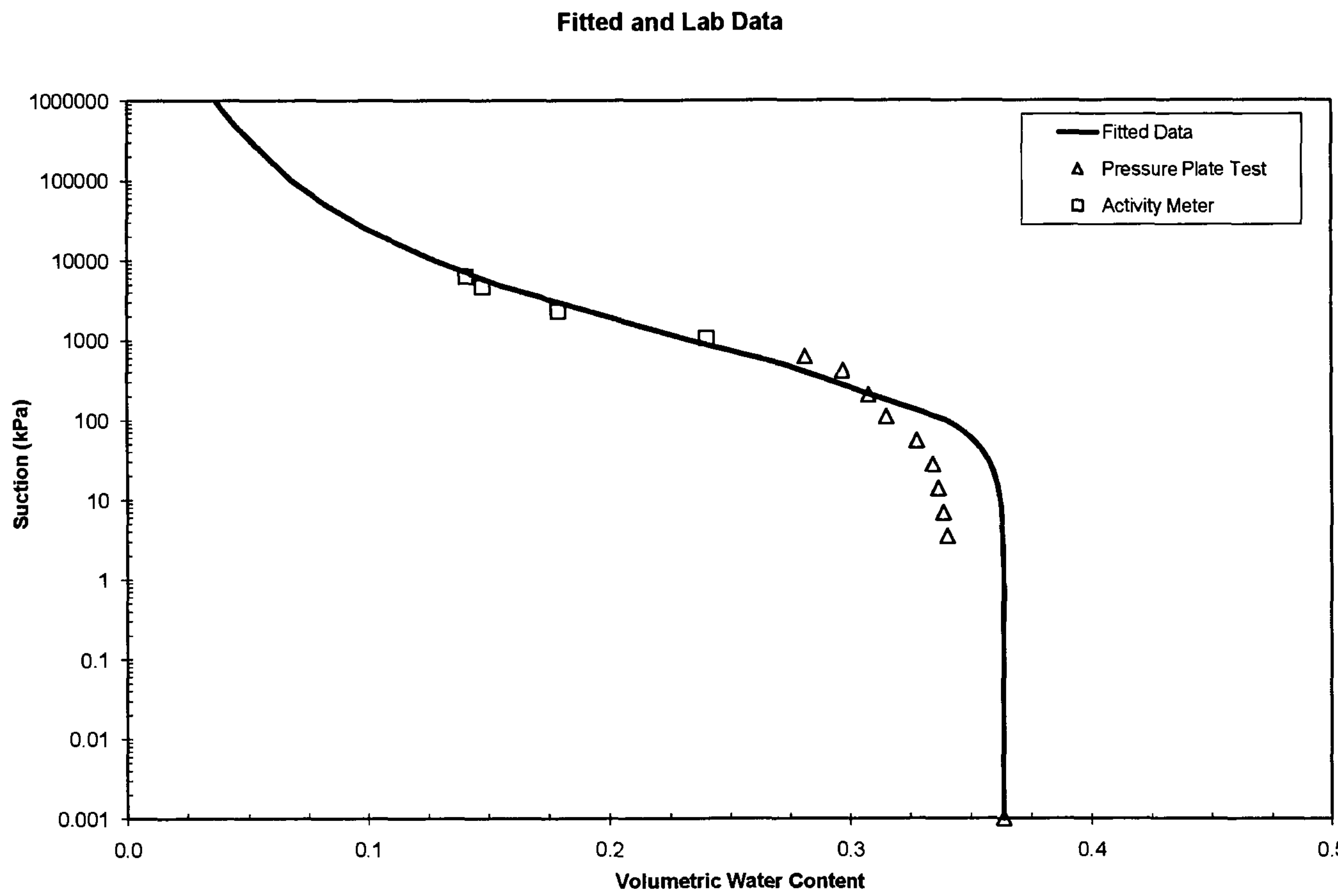
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3636
0.025	0.3636
0.05	0.3636
0.075	0.3636
0.1	0.3636
1	0.3635
2	0.3634
3	0.3632
4	0.3631
5	0.3629
6	0.3628
7	0.3626
8	0.3624
9	0.3622
10	0.3621
15	0.3611
20	0.3600
30	0.3576
40	0.3552
50	0.3527
60	0.3501
70	0.3475
80	0.3449
90	0.3424
100	0.3399
500	0.2720
1000	0.2331
5000	0.1539
10000	0.1276
25000	0.0994
5.00E+04	0.0823
1.00E+05	0.0681
5.00E+05	0.0438
7.50E+05	0.0392
1.00E+06	0.0363

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.364	0.3636	0.000	0.000
3.45	0.340	0.3632	-0.023	0.001
6.90	0.339	0.3626	-0.024	0.001
13.79	0.337	0.3613	-0.025	0.001
27.59	0.334	0.3582	-0.024	0.001
55.18	0.328	0.3513	-0.024	0.001
110.35	0.315	0.3373	-0.022	0.000
206.91	0.308	0.3156	-0.008	0.000
413.82	0.297	0.2822	0.015	0.000
620.73	0.281	0.2599	0.021	0.000
4700.00	0.147	0.1565	-0.009	0.000
1060.00	0.240	0.2298	0.010	0.000
6260.00	0.141	0.1448	-0.004	0.000
2320.00	0.179	0.1886	-0.010	0.000

Residual = 0.000309498


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Apple Valley - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm AV-B-1-C		Test Date	3/4/2009
WT of Sample Ring =	887.9	g		
WT of Sample Ring + Soil =	6289.6	g		
Water Content =	21.38	%		
Diameter of Sample Ring, D =	10.00	in		
Height of Sample Ring, L =	2.0	in		
Volume, V =	9.09E-02	ft^3	2574.1	cm^3
Dry Unit Weight =	107.93	pcf	1.73	Mg/m^3
Water WT =	951.55	g		
Solid WT =	4450.15	g		
Add Water for saturation =	0	g	Sr	104.28
Saturated Water Content =	21.38	%		
Tube Area, A =	20.268299	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	23.2	0.000	0.001	0.214	0.370
0.5	27.8	93.234	3.449	0.193	0.334
1	29.4	125.663	6.897	0.186	0.321
2	30.3	143.905	13.794	0.181	0.314
3	31.1	160.120	20.691	0.178	0.308
4	31.9	176.334	27.588	0.174	0.301
Leak in gasket at application of 8 psi. Test was terminated early.					
		Activity Meter Test	1990.00	0.143	0.248
			19300.00	0.087	0.150
			29000.00	0.077	0.133
			43600.00	0.066	0.115
			64000.00	0.057	0.098
			3150.00	0.129	0.223
			28800.00	0.075	0.130
			40800.00	0.066	0.113
			1940.00	0.144	0.249
			10300.00	0.104	0.179
			17200.00	0.089	0.154

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.99	18.1354	23.2973	22.6502	0.143	0.248
19.3	18.1354	23.043	22.6502	0.087	0.150
29	18.1354	22.998	22.6502	0.077	0.133
43.6	18.1354	22.95	22.6502	0.066	0.115
64	18.1354	22.9069	22.6502	0.057	0.098
3.15	18.1346	23.7432	23.1029	0.129	0.223
28.8	18.1346	23.4757	23.1029	0.075	0.130
40.8	18.1346	23.4287	23.1029	0.066	0.113
1.94	18.5171	26.7201	25.6871	0.144	0.249
10.3	18.5171	26.4296	25.6871	0.104	0.179
17.2	18.5171	26.3246	25.6871	0.089	0.154

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

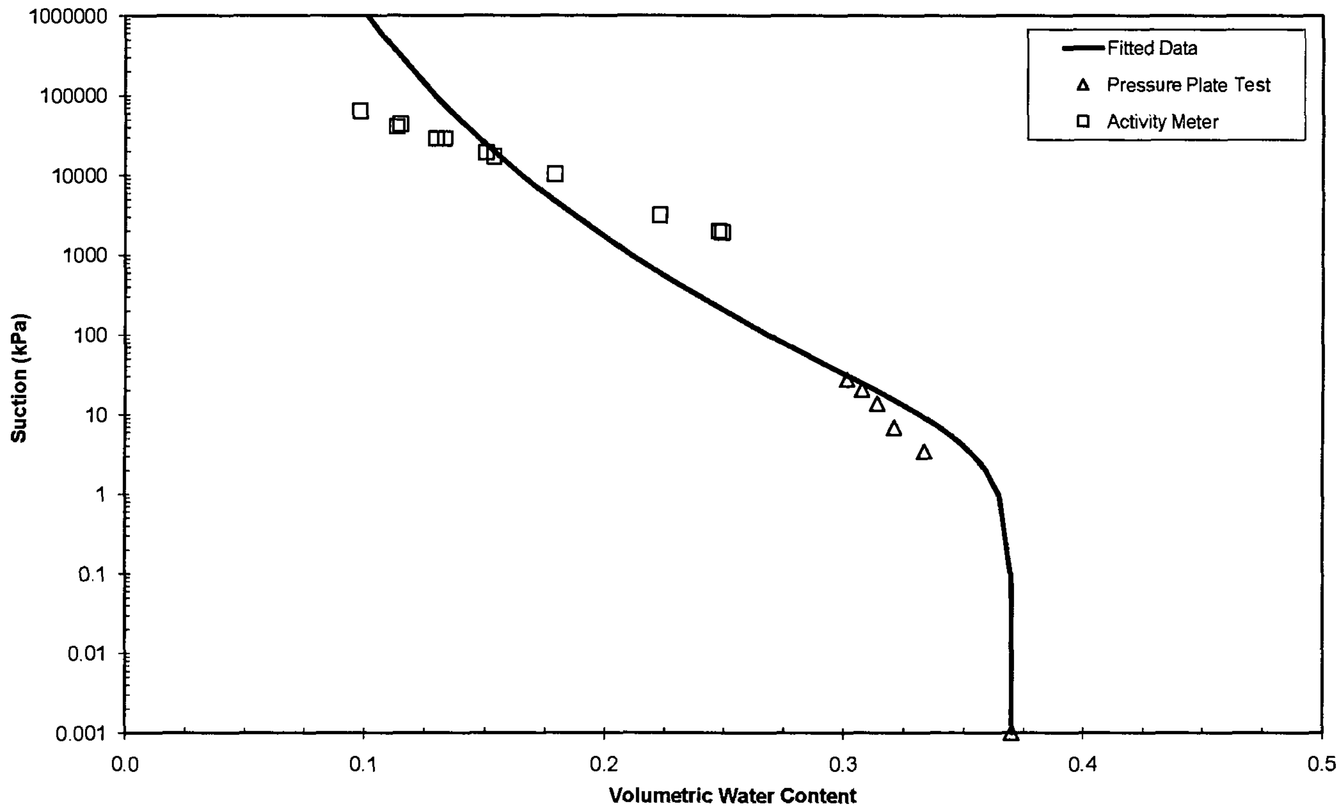
θ_r =	0.0000
θ_s =	0.3700
α =	0.2004
n =	1.1060
m =	0.0958

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.3700
0.025	0.3699
0.05	0.3698
0.075	0.3697
0.1	0.3695
1	0.3645
2	0.3592
3	0.3544
4	0.3501
5	0.3462
6	0.3427
7	0.3395
8	0.3366
9	0.3339
10	0.3314
15	0.3212
20	0.3135
30	0.3022
40	0.2941
50	0.2877
60	0.2826
70	0.2783
80	0.2745
90	0.2713
100	0.2684
500	0.2269
1000	0.2109
5000	0.1779
10000	0.1653
25000	0.1500
5.00E+04	0.1394
1.00E+05	0.1295
5.00E+05	0.1092
7.50E+05	0.1046
1.00E+06	0.1015

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.370	0.3700	0.000	0.000
3.45	0.334	0.3524	-0.019	0.000
6.90	0.321	0.3398	-0.019	0.000
13.79	0.314	0.3234	-0.009	0.000
20.69	0.308	0.3125	-0.005	0.000
27.59	0.301	0.3045	-0.003	0.000
1990.00	0.248	0.1961	0.052	0.003
19300.00	0.150	0.1542	-0.004	0.000
29000.00	0.133	0.1477	-0.014	0.000
43600.00	0.115	0.1414	-0.027	0.001
64000.00	0.098	0.1358	-0.037	0.001
3150.00	0.223	0.1868	0.036	0.001
28800.00	0.130	0.1478	-0.018	0.000
40800.00	0.113	0.1424	-0.029	0.001
1940.00	0.249	0.1967	0.053	0.003
10300.00	0.179	0.1648	0.014	0.000
17200.00	0.154	0.1561	-0.002	0.000

Residual = 0.000663486

Fitted and Lab Data



Pressure Plate Extractor Test - Apple Valley - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm AV-B-1-C		Test Date	9/19/2008
WT of Sample Ring =	274.6	g		
WT of Sample Ring + Soil =	1687	g		
Water Content =	24.83	%		
Diameter of Sample Ring, D =	5.90	in		
Height of Sample Ring, L =	1.5	in		
Volume, V =	2.37E-02	ft^3	672.0	cm^3
Dry Unit Weight =	105.11	pcf	1.68	Mg/m^3
Water WT =	280.94	g		
Solid WT =	1131.46	g		
Add Water for saturation =	0.1	g	Sr	112.62
Saturated Water Content =	24.84	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.248	0.418
2		4.000	13.794	0.245	0.412
4		5.000	27.588	0.244	0.411
8		16.000	55.176	0.234	0.395
14.9		31.000	102.765	0.221	0.372
29.1		47.000	200.703	0.207	0.348
58.8		67.000	405.544	0.189	0.319
		Activity Meter Test	3770.00	0.112	0.189
			4060.00	0.110	0.186
			13800.00	0.081	0.137
			16800.00	0.077	0.130
			46000.00	0.054	0.091
			52400.00	0.052	0.087

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
3.77	20.4476	29.6817	28.7505	0.112	0.189
4.06	20.5238	29.3848	28.5057	0.110	0.186
13.8	19.552	28.157	27.5087	0.081	0.137
16.8	18.1355	26.5391	25.935	0.077	0.130
46	18.518	26.3943	25.9893	0.054	0.091
52.4	18.018	25.8285	25.4442	0.052	0.087

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

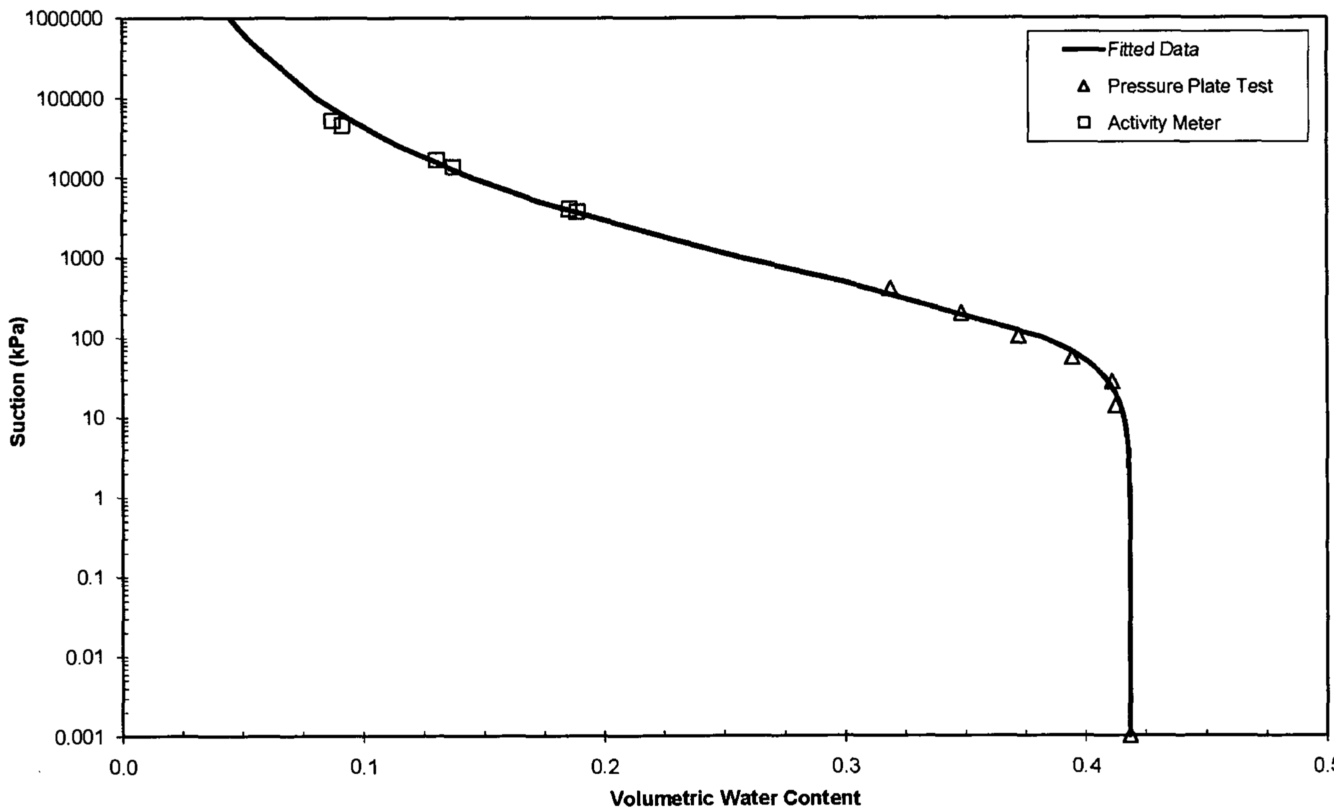
θ_r =	0.0000
θ_s =	0.4184
α =	0.0063
n =	1.2550
m =	0.2032

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4184
0.025	0.4184
0.05	0.4184
0.075	0.4184
0.1	0.4184
1	0.4182
2	0.4180
3	0.4178
4	0.4175
5	0.4173
6	0.4170
7	0.4167
8	0.4164
9	0.4161
10	0.4158
15	0.4141
20	0.4123
30	0.4085
40	0.4047
50	0.4008
60	0.3969
70	0.3931
80	0.3893
90	0.3857
100	0.3821
500	0.2988
1000	0.2564
5000	0.1730
10000	0.1452
25000	0.1150
5.00E+04	0.0964
1.00E+05	0.0808
5.00E+05	0.0536
7.50E+05	0.0483
1.00E+06	0.0449

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.418	0.4184	0.000	0.000
13.79	0.412	0.4145	-0.002	0.000
27.59	0.411	0.4095	0.001	0.000
55.18	0.395	0.3987	-0.004	0.000
102.77	0.372	0.3811	-0.009	0.000
200.70	0.348	0.3517	-0.003	0.000
405.54	0.319	0.3116	0.007	0.000
3770.00	0.189	0.1857	0.003	0.000
4060.00	0.186	0.1822	0.003	0.000
13800.00	0.137	0.1338	0.003	0.000
16800.00	0.130	0.1272	0.003	0.000
46000.00	0.091	0.0985	-0.007	0.000
52400.00	0.087	0.0952	-0.008	0.000

Residual = 2.4877E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Apple Valley - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	AV-B-1-C		Test Date	9/19/2008
WT of Sample Ring =	71.15	g		
WT of Sample Ring + Soil =	290.16	g		
Water Content =	20.34	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	107.92	pcf	1.73	Mg/m^3
Water WT =	37.01	g		
Solid WT =	182.00	g		
Add Water for saturation =	0.1	g	Sr	99.45
Saturated Water Content =	20.39	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	2.1	0.000	0.001	0.204	0.353
0.5	12.7	2.014	3.449	0.193	0.334
1	13.4	2.147	6.897	0.192	0.332
2	15	2.451	13.794	0.190	0.329
4	16.6	2.755	27.588	0.189	0.327
8	21.4	3.667	55.176	0.184	0.318
15	26.9	4.712	103.455	0.178	0.308
30	28.2	4.959	206.910	0.177	0.306
60	29.8	5.263	413.820	0.175	0.303
90	35.3	6.308	620.730	0.169	0.293
		Activity Meter Test	1950.00	0.146	0.252
			7110.00	0.119	0.206
			15800.00	0.096	0.166
			25200.00	0.084	0.144
			47100.00	0.067	0.116
			57600.00	0.061	0.106
			68000.00	0.058	0.100

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.95	18.1353	29.5873	28.1301	0.146	0.252
7.11	18.1353	29.323	28.1301	0.119	0.206
15.8	18.1353	29.0886	28.1301	0.096	0.166
25.2	18.1353	28.9648	28.1301	0.084	0.144
47.1	18.1353	28.7994	28.1301	0.067	0.116
57.6	18.1353	28.7413	28.1301	0.061	0.106
68	18.1353	28.7083	28.1301	0.05785008	0.10005361

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3527
α =	0.0041
n =	1.1885
m =	0.1586

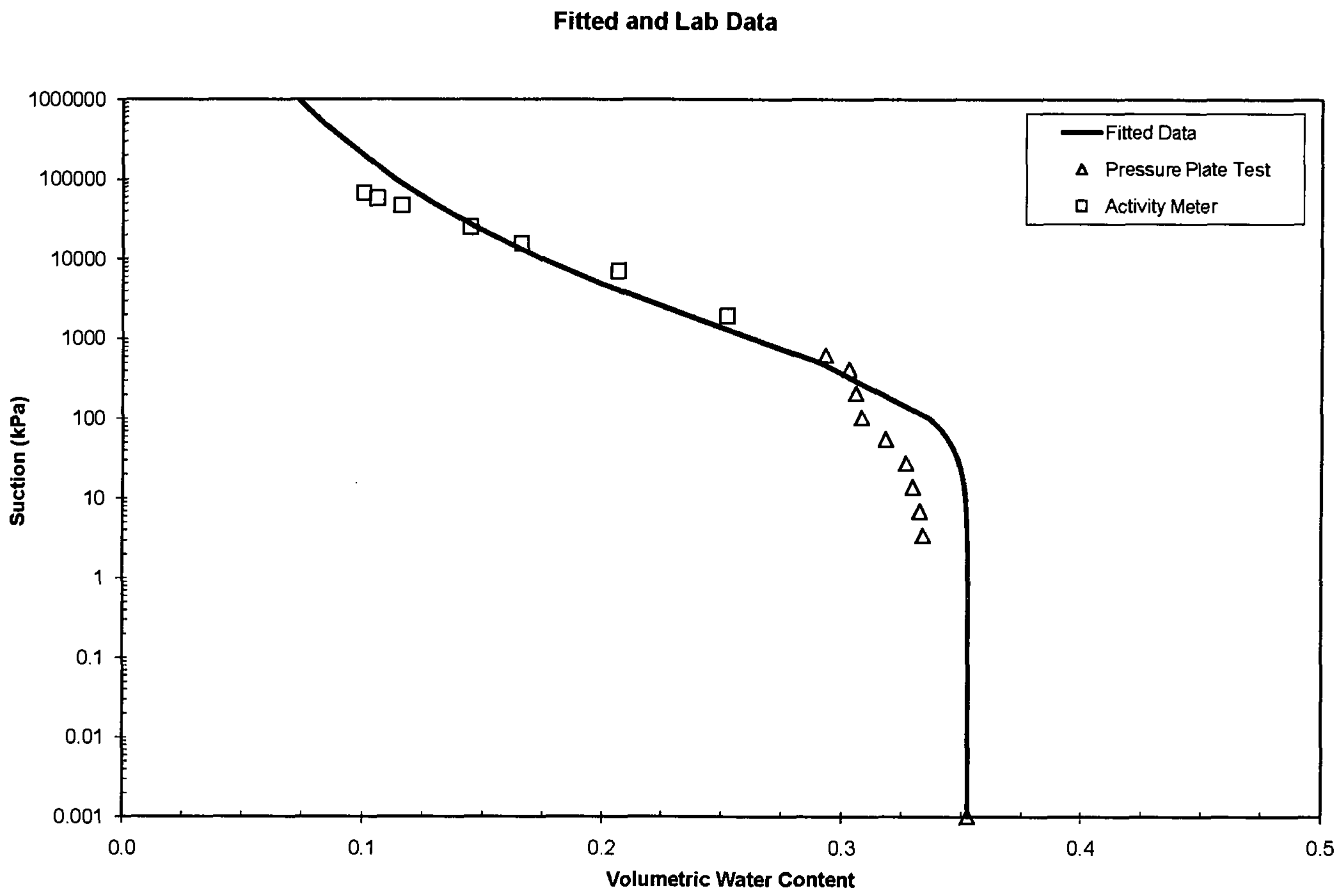
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3527
0.025	0.3527
0.05	0.3527
0.075	0.3527
0.1	0.3527
1	0.3526
2	0.3525
3	0.3524
4	0.3523
5	0.3521
6	0.3520
7	0.3519
8	0.3517
9	0.3516
10	0.3514
15	0.3507
20	0.3499
30	0.3482
40	0.3465
50	0.3448
60	0.3430
70	0.3413
80	0.3396
90	0.3379
100	0.3362
500	0.2907
1000	0.2626
5000	0.1983
10000	0.1744
25000	0.1469
5.00E+04	0.1290
1.00E+05	0.1132
5.00E+05	0.0836
7.50E+05	0.0774
1.00E+06	0.0733

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.353	0.3527	0.000	0.000
3.45	0.334	0.3523	-0.019	0.000
6.90	0.332	0.3519	-0.020	0.000
13.79	0.329	0.3509	-0.021	0.000
27.59	0.327	0.3486	-0.022	0.000
55.18	0.318	0.3439	-0.026	0.001
103.46	0.308	0.3357	-0.028	0.001
206.91	0.306	0.3203	-0.015	0.000
413.82	0.303	0.2979	0.005	0.000
620.73	0.293	0.2822	0.011	0.000
1950.00	0.252	0.2348	0.017	0.000
7110.00	0.206	0.1858	0.021	0.000
15800.00	0.166	0.1601	0.006	0.000
25200.00	0.144	0.1467	-0.002	0.000
47100.00	0.116	0.1304	-0.015	0.000
57600.00	0.106	0.1256	-0.020	0.000
68000.00	0.100	0.1217	-0.022	0.000

Residual = 0.000303468


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Apple Valley - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	AV-B-4-C		Test Date	*8/12/2008*
WT of Sample Ring =	69.98	g		
WT of Sample Ring + Soil =	281.11	g		
Water Content =	22.42	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	102.27	pcf	1.64	Mg/m^3
Water WT =	38.66	g		
Solid WT =	172.47	g		
Add Water for saturation =	3	g	Sr	101.92
Saturated Water Content =	24.15	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	2.5	0.000	0.001	0.242	0.396
0.5	7.8	1.007	3.449	0.236	0.386
1	8.7	1.178	6.897	0.235	0.385
2	10.4	1.501	13.794	0.233	0.382
4	13.2	2.033	27.588	0.230	0.377
8	16.5	2.660	55.176	0.226	0.371
15	29.9	5.206	103.455	0.211	0.346
30	34	5.985	206.910	0.207	0.339
60	42.8	7.657	413.820	0.197	0.323
90	48.3	8.702	620.730	0.191	0.313
		Activity Meter Test	1390.00	0.164	0.269
			4450.00	0.136	0.222
			11500.00	0.108	0.178
			18700.00	0.094	0.154
			34900.00	0.077	0.126
			44400.00	0.069	0.114
			55100.00	0.065	0.106
			66000.00	0.060	0.098

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.39	22.762	32.3461	30.9968	0.164	0.269
4.45	22.762	32.1134	30.9968	0.136	0.222
11.5	22.762	31.8902	30.9968	0.108	0.178
18.7	22.762	31.7729	30.9968	0.094	0.154
34.9	22.762	31.6291	30.9968	0.077	0.126
44.4	22.762	31.5677	30.9968	0.069	0.114
55.1	22.762	31.5291	30.9968	0.065	0.106
66	22.762	31.4874	30.9968	0.060	0.098
	22.762	31.439	30.9968	0.054	0.088

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3959
α =	0.0070
n =	1.1763
m =	0.1499

FOR GRAPHING

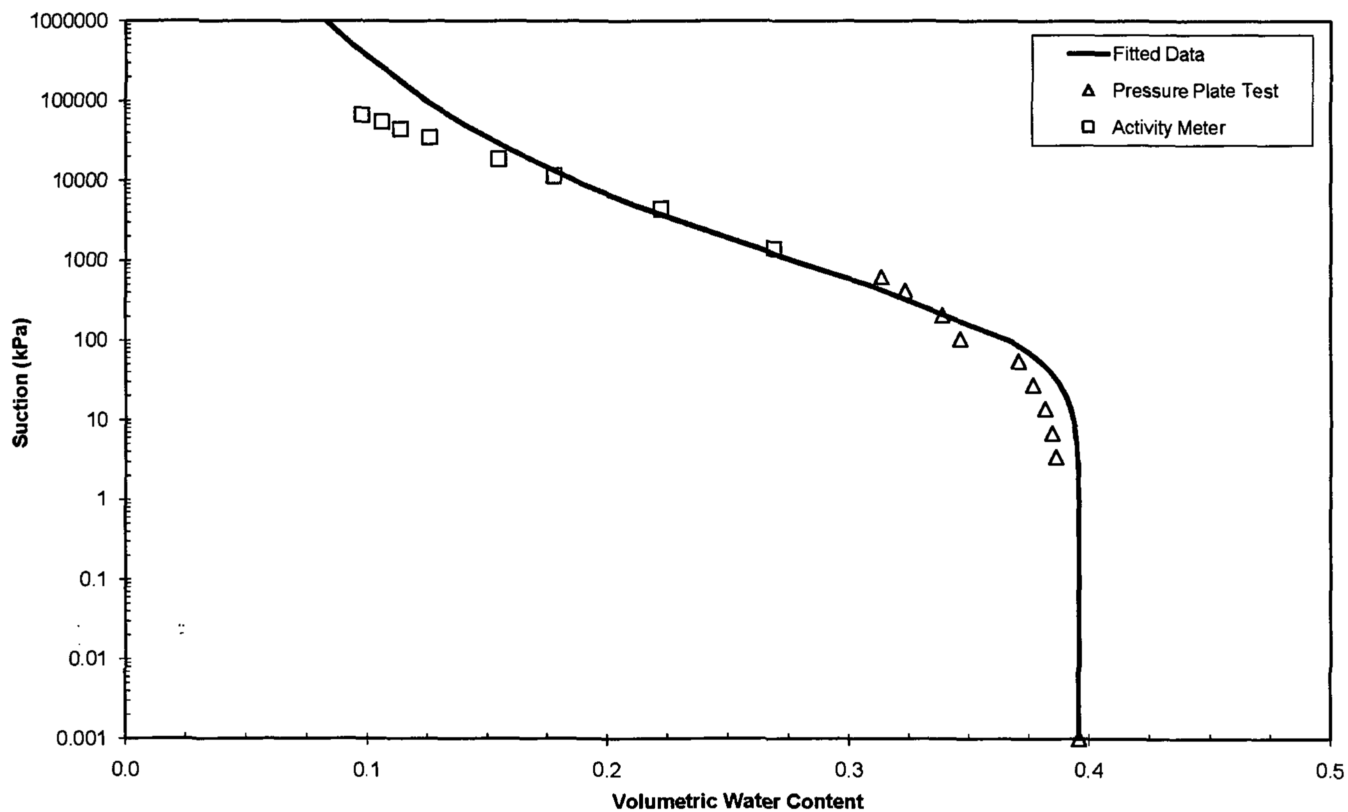
Suction (kPa)	VWC
0.001	0.3959
0.025	0.3959
0.05	0.3959
0.075	0.3959
0.1	0.3959
1	0.3957
2	0.3955
3	0.3953
4	0.3950
5	0.3948
6	0.3945
7	0.3942
8	0.3939
9	0.3936
10	0.3933
15	0.3918
20	0.3903
30	0.3872
40	0.3840
50	0.3809
60	0.3779
70	0.3750
80	0.3722
90	0.3695
100	0.3669
500	0.3075
1000	0.2767
5000	0.2109
10000	0.1868
25000	0.1591
5.00E+04	0.1408
1.00E+05	0.1246
5.00E+05	0.0939
7.50E+05	0.0874
1.00E+06	0.0831

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.396	0.3959	0.000	0.000
3.45	0.386	0.3952	-0.009	0.000
6.90	0.385	0.3942	-0.010	0.000
13.79	0.382	0.3922	-0.011	0.000
27.59	0.377	0.3879	-0.011	0.000
55.18	0.371	0.3794	-0.009	0.000
103.46	0.346	0.3660	-0.020	0.000
206.91	0.339	0.3440	-0.005	0.000
413.82	0.323	0.3158	0.007	0.000
620.73	0.313	0.2979	0.015	0.000
1390.00	0.269	0.2622	0.006	0.000
4450.00	0.222	0.2152	0.007	0.000
11500.00	0.178	0.1823	-0.005	0.000
18700.00	0.154	0.1674	-0.013	0.000
34900.00	0.126	0.1500	-0.024	0.001
44400.00	0.114	0.1438	-0.030	0.001
55100.00	0.106	0.1384	-0.032	0.001
66000.00	0.098	0.1341	-0.036	0.001

Residual = 0.000104174

Fitted and Lab Data



Pressure Plate Extractor Test - Boardman - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm 6' Upper Slope Surface		Test Date	
WT of Sample Ring =	0	g		
WT of Sample Ring + Soil =	1399	g		
Water Content =	33.09	%		
Diameter of Sample Ring, D =	5.90	in		
Height of Sample Ring, L =	1.5	in		
Volume, V =	2.37E-02	ft^3	672.0	cm^3
Dry Unit Weight =	97.65	pcf	1.56	Mg/m^3
Water WT =	347.86	g		
Solid WT =	1051.17	g		
Add Water for saturation =	0	g	Sr	124.45
Saturated Water Content =	33.09	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.331	0.518
5		20.000	34.485	0.312	0.488
8.3		59.000	57.245	0.275	0.430
13.9		116.500	95.868	0.220	0.344
21.5		149.500	148.286	0.189	0.295
34.5		161.500	237.947	0.177	0.277
59.6		175.000	411.061	0.164	0.257
		Activity Meter Test	1380.00	0.069	0.108
			3490.00	0.047	0.073
			5510.00	0.039	0.061
			34100.00	0.025	0.039
			0.00	0.000	0.000

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.38	18.018	25.8126	25.3094	0.069	0.108
3.49	18.421	26.0578	25.7182	0.047	0.073
5.51	18.5184	26.0582	25.7765	0.039	0.061
34.1	20.5459	28.009	27.8285	0.025	0.039

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

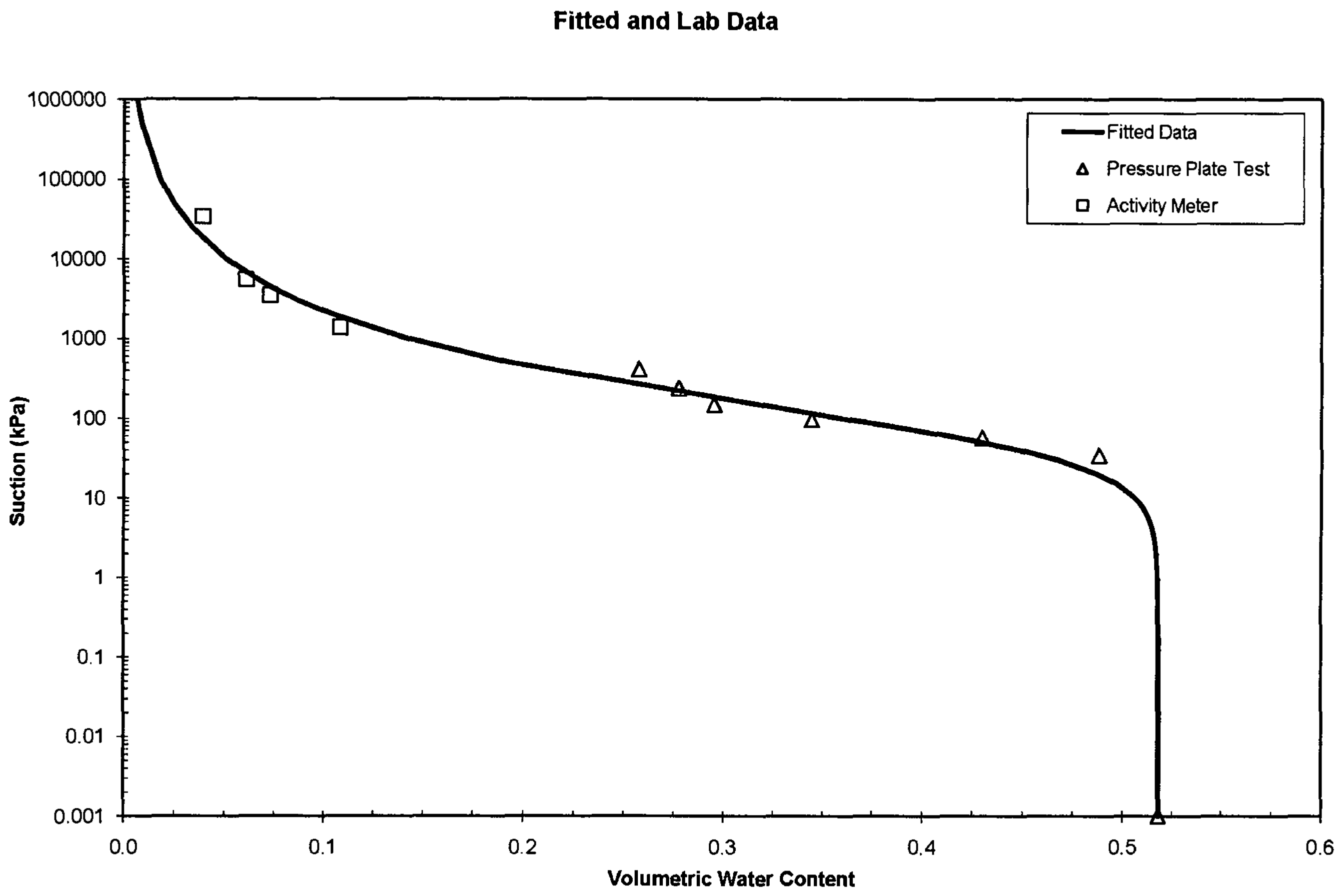
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5180
α =	0.0174
n =	1.4500
m =	0.3103

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.5180
0.025	0.5180
0.05	0.5180
0.075	0.5180
0.1	0.5180
1	0.5175
2	0.5168
3	0.5158
4	0.5147
5	0.5134
6	0.5121
7	0.5106
8	0.5091
9	0.5075
10	0.5058
15	0.4969
20	0.4874
30	0.4676
40	0.4483
50	0.4302
60	0.4134
70	0.3981
80	0.3841
90	0.3713
100	0.3597
500	0.1929
1000	0.1424
2000	0.1046
3000	0.0872
4000	0.0766
5000	0.0693
10000	0.0508
25000	0.0336
5.00E+04	0.0246
1.00E+05	0.0180
5.00E+05	0.0087
7.50E+05	0.0073
1.00E+06	0.0064

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.518	0.5180	0.000	0.000
34.49	0.488	0.4588	0.029	0.001
57.25	0.430	0.4179	0.012	0.000
95.87	0.344	0.3644	-0.020	0.000
148.29	0.295	0.3150	-0.020	0.000
237.95	0.277	0.2631	0.014	0.000
411.06	0.257	0.2098	0.048	0.002
1380.00	0.108	0.1234	-0.015	0.000
3490.00	0.073	0.0815	-0.009	0.000
5510.00	0.061	0.0664	-0.006	0.000
34100.00	0.039	0.0292	0.010	0.000

Residual = 0.000426278


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content

Pressure Plate Extractor Test - Boardman - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	6' Upper Slope Surface		Test Date	
WT of Sample Ring =	69.68	g		
WT of Sample Ring + Soil =	286.79	g		
Water Content =	22.62	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	104.99	pcf	1.68	Mg/m^3
Water WT =	40.06	g		
Solid WT =	177.05	g		
Add Water for saturation =	0	g	Sr	102.28
Saturated Water Content =	22.62	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	12	0.000	0.001	0.226	0.381
0.5	19.2	1.368	3.449	0.219	0.368
1	19.5	1.425	6.897	0.218	0.367
2	20.1	1.539	13.794	0.218	0.366
4	16.4	0.836	27.588	0.222	0.373
8	21.3	1.767	55.176	0.216	0.364
15	40.6	5.434	103.455	0.196	0.329
30	58.5	8.835	206.910	0.176	0.297
60	111.8	18.962	413.820	0.119	0.200
90	118.7	20.273	620.730	0.112	0.188
		Activity Meter Test	1290.00	0.063	0.106
			1570.00	0.058	0.098
			4830.00	0.041	0.069
			17200.00	0.029	0.049
			61800.00	0.021	0.035

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.29	18.6729	26.9807	26.4869	0.063	0.106
1.57	19.5189	27.8048	27.349	0.058	0.098
4.83	18.1361	26.314	25.9921	0.041	0.069
17.2	19.5513	27.6115	27.3843	0.029	0.049
61.8	19.4836	27.4826	27.3192	0.021	0.035

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0356
θ_s =	0.3715
α =	0.0045
n =	1.8122
m =	0.4482

FOR GRAPHING

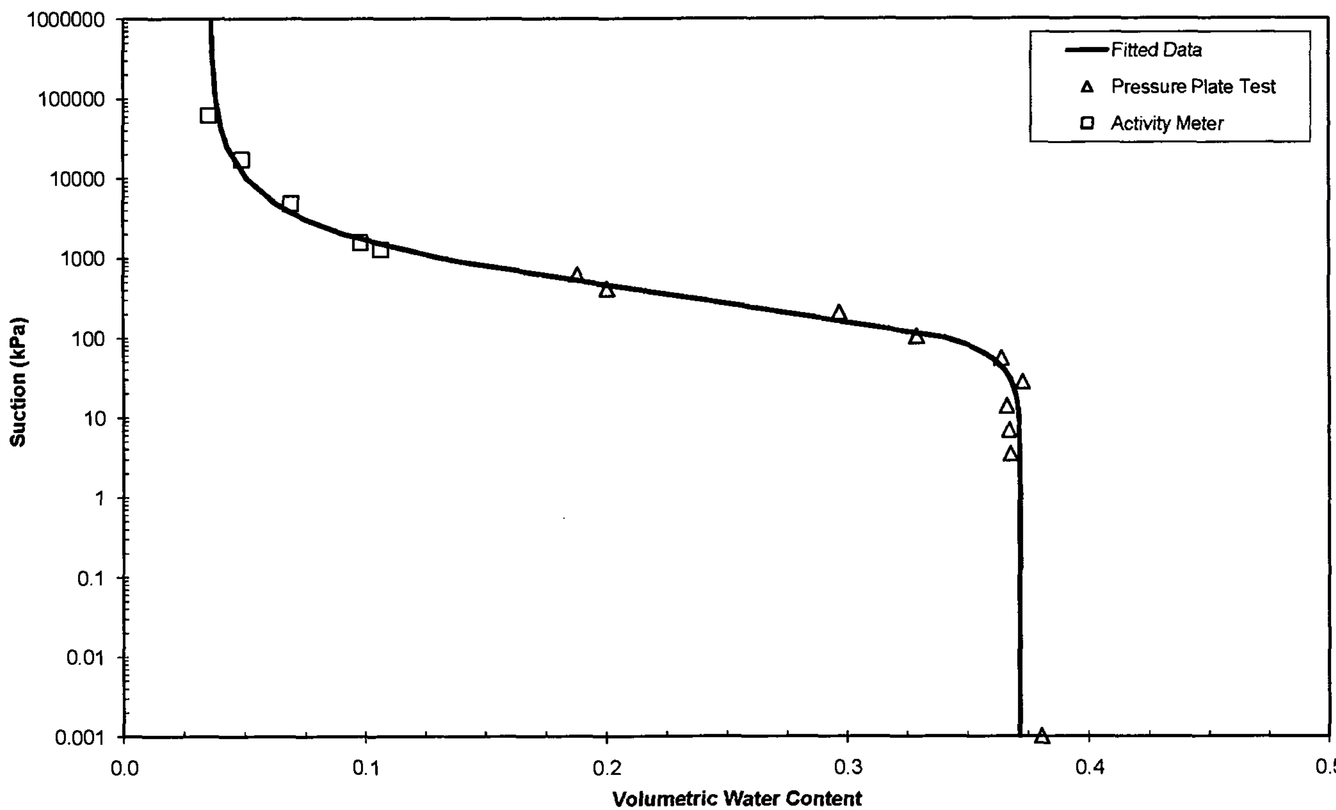
Suction (kPa)	VWC
0.001	0.3715
0.025	0.3715
0.05	0.3715
0.075	0.3715
0.1	0.3715
1	0.3715
2	0.3715
3	0.3715
4	0.3714
5	0.3714
6	0.3713
7	0.3713
8	0.3712
9	0.3711
10	0.3710
15	0.3704
20	0.3696
30	0.3676
40	0.3649
50	0.3618
60	0.3582
70	0.3542
80	0.3500
90	0.3455
100	0.3408
500	0.1932
1000	0.1312
2000	0.0912
3000	0.0757
4000	0.0674
5000	0.0622
10000	0.0508
25000	0.0428
5.00E+04	0.0397
1.00E+05	0.0380
5.00E+05	0.0363
7.50E+05	0.0361
1.00E+06	0.0360

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.381	0.3715	0.009	0.000
3.45	0.368	0.3715	-0.004	0.000
6.90	0.367	0.3713	-0.004	0.000
13.79	0.366	0.3706	-0.005	0.000
27.59	0.373	0.3681	0.005	0.000
55.18	0.364	0.3600	0.004	0.000
103.46	0.329	0.3391	-0.010	0.000
206.91	0.297	0.2880	0.009	0.000
413.82	0.200	0.2134	-0.013	0.000
620.73	0.188	0.1715	0.017	0.000
1290.00	0.106	0.1142	-0.008	0.000
1570.00	0.098	0.1029	-0.005	0.000
4830.00	0.069	0.0629	0.006	0.000
17200.00	0.049	0.0454	0.003	0.000
61800.00	0.035	0.0391	-0.004	0.000

Residual = 6.26606E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Boardman - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	Boardman -6'- Upper Slope- 3'-4'		Test Date	6/5/2008
WT of Sample Ring =	70.61	g		
WT of Sample Ring + Soil =	298.51	g		
Water Content =	20.34	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	112.30	pcf	1.80	Mg/m^3
Water WT =	38.52	g		
Solid WT =	189.38	g		
Add Water for saturation =	0	g	Sr	111.44
Saturated Water Content =	20.34	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	8.3	0.000	0.001	0.203	0.366
0.5	8.8	0.095	3.449	0.203	0.365
1	8.8	0.095	6.897	0.203	0.365
2	9.3	0.190	13.794	0.202	0.364
4	11.7	0.646	27.588	0.200	0.360
8	14.9	1.254	55.176	0.197	0.354
15	20.3	2.280	103.455	0.191	0.344
30	28.5	3.838	206.910	0.183	0.330
60	43.2	6.631	413.820	0.168	0.303
		Activity	11400.00	0.031	0.055
		Meter	48700.00	0.019	0.034
		Test	73800.00	0.016	0.029

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
11.4	18.8011	27.4672	27.2104	0.031	0.055
48.7	20.5239	29.0924	28.9325	0.019	0.034
73.8	18.8309	27.3813	27.244	0.016	0.029

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0119
θ_s =	0.3660
α =	0.0021
n =	1.6227
m =	0.3837

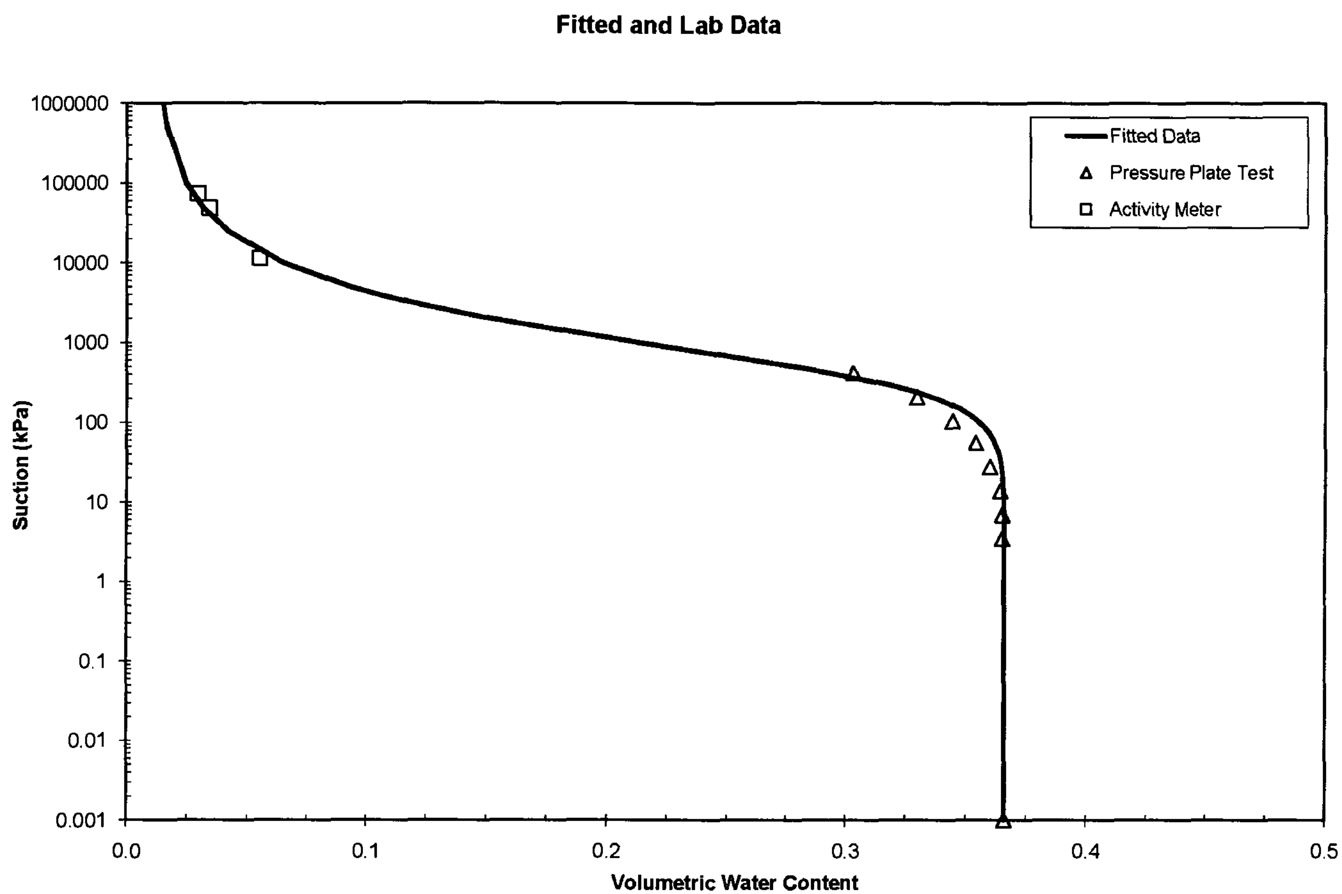
FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.366	0.3660	0.000	0.000
3.45	0.365	0.3660	-0.001	0.000
6.90	0.365	0.3659	-0.001	0.000
13.79	0.364	0.3656	-0.001	0.000
27.59	0.360	0.3647	-0.005	0.000
55.18	0.354	0.3620	-0.008	0.000
103.46	0.344	0.3552	-0.011	0.000
206.91	0.330	0.3362	-0.007	0.000
413.82	0.303	0.2949	0.008	0.000
11400.00	0.055	0.0608	-0.006	0.000
48700.00	0.034	0.0317	0.002	0.000
73800.00	0.029	0.0272	0.002	0.000

Residual = 3.00122E-05

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3660
0.025	0.3660
0.05	0.3660
0.075	0.3660
0.1	0.3660
1	0.3660
2	0.3660
3	0.3660
4	0.3659
5	0.3659
6	0.3659
7	0.3659
8	0.3658
9	0.3658
10	0.3657
15	0.3655
20	0.3652
30	0.3645
40	0.3636
50	0.3626
60	0.3614
70	0.3601
80	0.3588
90	0.3573
100	0.3558
125	0.3517
150	0.3472
175	0.3424
200	0.3375
250	0.3274
300	0.3172
500	0.2793
1000	0.2138
2000	0.1518
3000	0.1225
4000	0.1050
5000	0.0932
10000	0.0650
25000	0.0419
5.00E+04	0.0314
1.00E+05	0.0246
5.00E+05	0.0165
7.50E+05	0.0155
1.00E+06	0.0149


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Boardman - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	Boardman 6' Lower Slope-Surface		Test Date	6/5/2008
WT of Sample Ring =	70.8	g		
WT of Sample Ring + Soil =	293.15	g		
Water Content =	24.27	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	106.10	pcf	1.70	Mg/m^3
Water WT =	43.42	g		
Solid WT =	178.93	g		
Add Water for saturation =	0	g	Sr	112.88
Saturated Water Content =	24.27	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	16.9	0.000	0.001	0.243	0.413
0.5	25.4	1.615	3.449	0.234	0.397
1	25.8	1.691	6.897	0.233	0.397
2	26	1.729	13.794	0.233	0.396
4	18.2	0.247	27.588	0.241	0.410
8	20.2	0.627	55.176	0.239	0.407
15	26.7	1.862	103.455	0.232	0.395
30	39	4.199	206.910	0.219	0.373
60	47.3	5.776	413.820	0.210	0.358
90	104.8	16.701	620.730	0.149	0.254
		Activity Meter Test	930.00	0.114	0.194
			1100.00	0.081	0.139
			2690.00	0.052	0.088
			20500.00	0.028	0.047
			59800.00	0.021	0.035

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
0.93	20.5234	29.2042	28.3157	0.114	0.194
1.1	20.4479	28.9174	28.2793	0.081	0.139
2.69	18.8005	27.0448	26.6394	0.052	0.088
20.5	19.5513	27.6018	27.3834	0.028	0.047
59.8	18.4024	26.3931	26.2316	0.021	0.035

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

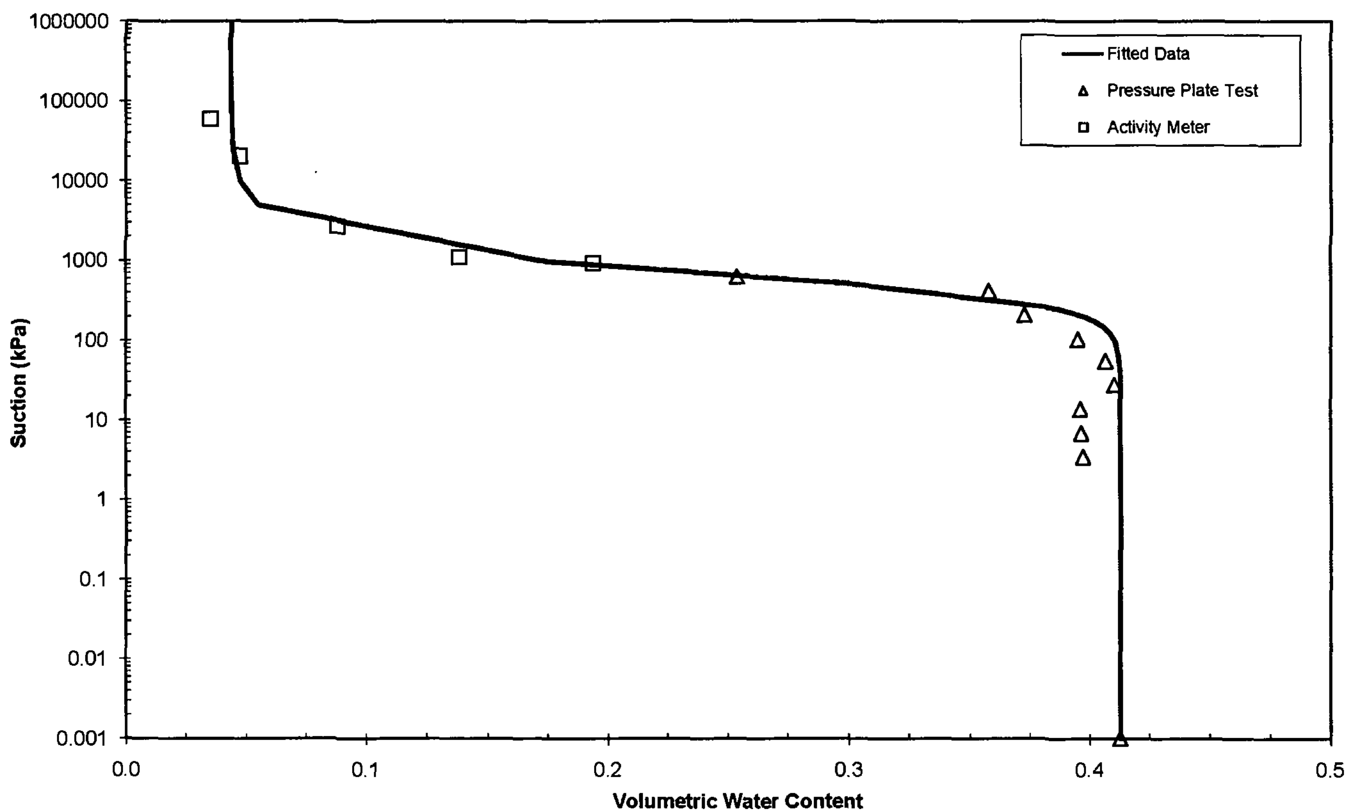
θ_r =	0.0437
θ_s =	0.4130
α =	0.0018
n =	2.5856
m =	0.6132

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4130
0.025	0.4130
0.05	0.4130
0.075	0.4130
0.1	0.4130
1	0.4130
2	0.4130
3	0.4130
4	0.4130
5	0.4130
6	0.4130
7	0.4130
8	0.4130
9	0.4130
10	0.4130
15	0.4130
20	0.4130
30	0.4129
40	0.4127
50	0.4125
60	0.4123
70	0.4119
80	0.4115
90	0.4110
100	0.4103
125	0.4083
150	0.4055
175	0.4019
200	0.3976
250	0.3867
500	0.3042
750	0.2251
1000	0.1720
5000	0.0549
10000	0.0474
25000	0.0446
5.00E+04	0.0440
1.00E+05	0.0438
5.00E+05	0.0437
7.50E+05	0.0437
1.00E+06	0.0437

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.413	0.4130	0.000	0.000
3.45	0.397	0.4130	-0.016	0.000
6.90	0.397	0.4130	-0.016	0.000
13.79	0.396	0.4130	-0.017	0.000
27.59	0.410	0.4129	-0.003	0.000
55.18	0.407	0.4124	-0.006	0.000
103.46	0.395	0.4101	-0.015	0.000
206.91	0.373	0.3963	-0.024	0.001
413.82	0.358	0.3353	0.022	0.001
620.73	0.254	0.2629	-0.009	0.000
930.00	0.194	0.1845	0.009	0.000
1100.00	0.139	0.1568	-0.018	0.000
2690.00	0.088	0.0735	0.014	0.000
20500.00	0.047	0.0449	0.003	0.000
59800.00	0.035	0.0439	-0.009	0.000

Residual = 0.000194786

Fitted and Lab Data



Pressure Plate Extractor Test - Boardman - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	Boardman-6'-Lower Slope- 5'-6'		Test Date		5/7/2008
WT of Sample Ring =	69.35	g			
WT of Sample Ring + Soil =	283.12	g			
Water Content =	23.00	%			
Diameter of Sample Ring, D =	2.86	in			
Height of Sample Ring, L =	1.0	in			
Volume, V =	3.72E-03	ft^3	105.3	cm^3	
Dry Unit Weight =	103.06	pcf	1.65	Mg/m^3	
Water WT =	39.97	g			
Solid WT =	173.80	g			
Add Water for saturation =	2.23	g	Sr	104.51	
Saturated Water Content =	24.28	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	14.3	0.000	0.001	0.243	0.401
1	18.36	0.771	6.897	0.238	0.394
2	19	0.893	13.794	0.238	0.393
4	33.2	3.591	27.588	0.222	0.367
8	72.2	11.001	55.176	0.180	0.296
15	106.9	17.594	103.455	0.142	0.234
30	129.2	21.831	206.910	0.117	0.194
60	143.6	24.567	413.820	0.101	0.168
90	148.9	25.574	620.730	0.096	0.158
		Activity Meter Test	1070.00	0.065	0.108
			3120.00	0.042	0.070
			36300.00	0.022	0.037
			650.00	0.085	0.141
			23500.00	0.025	0.041

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
36.3	18.5001	26.3735	26.2028	0.022	0.037
3.12	19.485	27.4997	27.1757	0.042	0.070
1.07	19.5061	27.5888	27.0924	0.065	0.108
0.65	19.5533	27.7762	27.1293	0.085	0.141
23.5	22.01	29.822	29.634	0.025	0.041

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4010
α =	0.0285
n =	1.3671
m =	0.2685

FOR GRAPHING

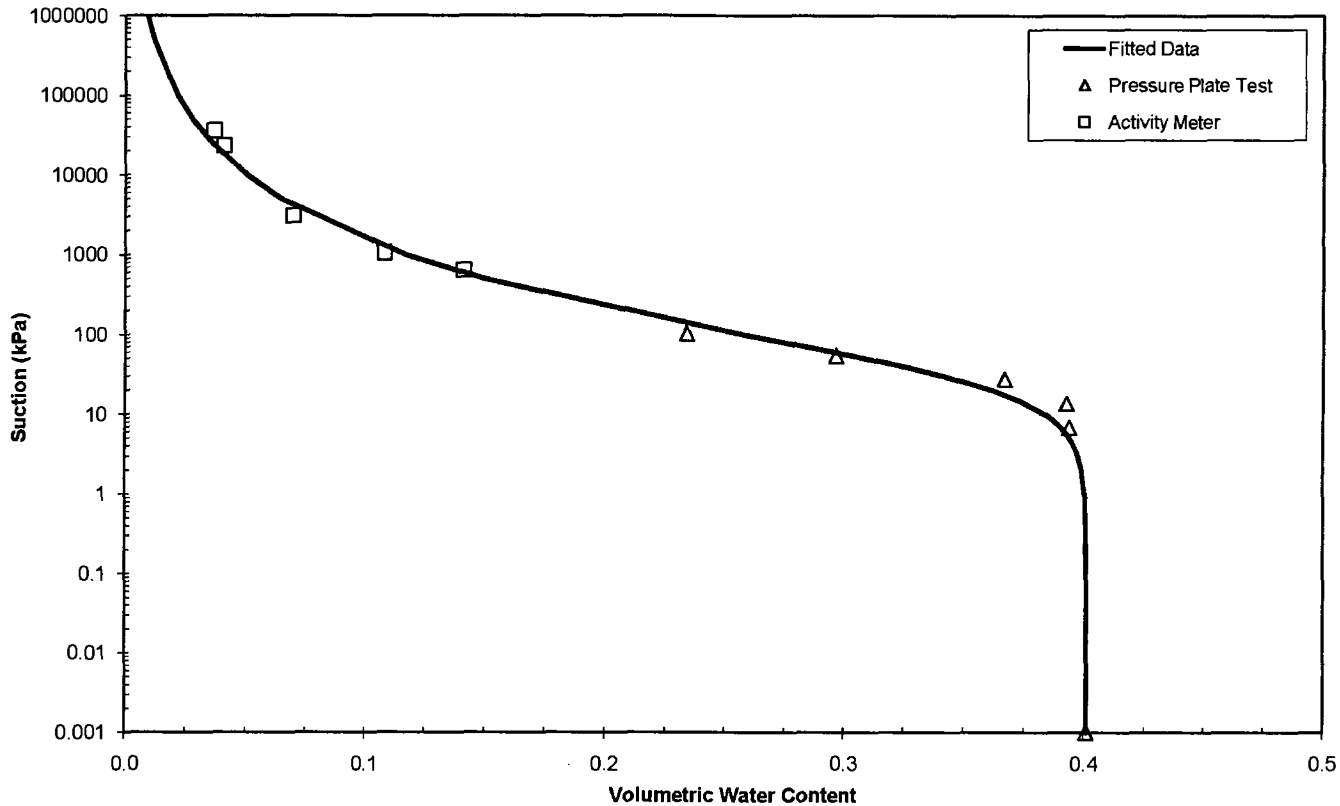
Suction (kPa)	VWC
0.001	0.4010
0.025	0.4010
0.05	0.4010
0.075	0.4010
0.1	0.4010
1	0.4002
2	0.3989
3	0.3974
4	0.3957
5	0.3939
6	0.3919
7	0.3899
8	0.3879
9	0.3858
10	0.3837
15	0.3728
20	0.3621
30	0.3422
40	0.3248
50	0.3097
60	0.2965
70	0.2851
80	0.2749
90	0.2659
100	0.2579
500	0.1503
1000	0.1170
5000	0.0650
10000	0.0504
25000	0.0360
5.00E+04	0.0279
1.00E+05	0.0216
5.00E+05	0.0120
7.50E+05	0.0103
1.00E+06	0.0093

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.401	0.4010	0.000	0.000
6.90	0.394	0.3901	0.004	0.000
13.79	0.393	0.3754	0.017	0.000
27.59	0.367	0.3468	0.020	0.000
55.18	0.296	0.3026	-0.006	0.000
103.46	0.234	0.2553	-0.021	0.000
206.91	0.194	0.2045	-0.011	0.000
413.82	0.168	0.1607	0.007	0.000
620.73	0.158	0.1390	0.019	0.000
1070.00	0.108	0.1142	-0.006	0.000
3120.00	0.070	0.0772	-0.008	0.000
36300.00	0.037	0.0314	0.005	0.000
650.00	0.141	0.1367	0.004	0.000
23500.00	0.041	0.0368	0.004	0.000

Residual = 0.000135062

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ICY1U		Test Date	12/1/2006
WT of Sample Ring =	69.21	g		
WT of Sample Ring + Soil =	306.39	g		
Water Content =	13.90	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	123.48	pcf	1.98	Mg/m^3
Water WT =	28.94	g		
Solid WT =	208.24	g		
Add Water for saturation =	0	g	Sr	105.14
Saturated Water Content =	13.90	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	22	0.000	0.001	0.139	0.275
0.5	22.4	0.076	3.449	0.139	0.274
1	22.5	0.095	6.897	0.139	0.274
2	20.1	-0.361	13.794	0.141	0.278
4	22.1	0.019	27.588	0.139	0.275
8	24.9	0.551	55.176	0.136	0.270
15	31.8	1.862	103.455	0.130	0.257
30	34.1	2.299	206.910	0.128	0.253
60	40.4	3.496	413.820	0.122	0.242
90	45	4.370	620.730	0.118	0.234
		Activity Meter Test	970.00	0.111	0.220
			3020.00	0.072	0.142
			11900.00	0.045	0.088

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
11.9	7.4819	17.0918	16.682	0.045	0.088
3.02	7.7149	17.3654	16.7197	0.072	0.142
0.97	7.7406	17.9713	16.9476	0.111	0.220

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

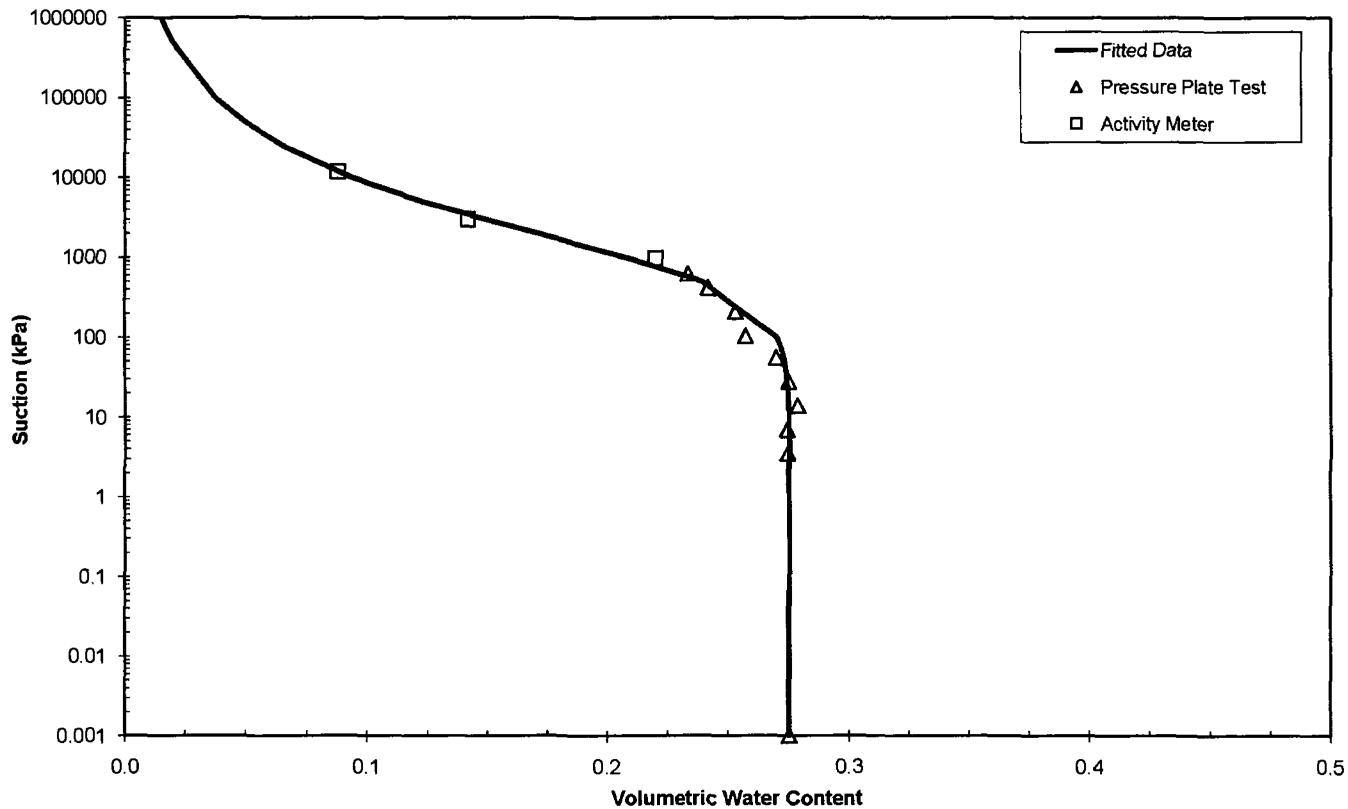
θ_r =	0.0000
θ_s =	0.2751
α =	0.0014
n =	1.4011
m =	0.2863

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.2751
0.025	0.2751
0.05	0.2751
0.075	0.2751
0.1	0.2751
1	0.2751
2	0.2750
3	0.2750
4	0.2750
5	0.2750
6	0.2750
7	0.2749
8	0.2749
9	0.2749
10	0.2749
15	0.2747
20	0.2745
30	0.2741
40	0.2736
50	0.2731
60	0.2726
70	0.2720
80	0.2714
90	0.2708
100	0.2701
500	0.2393
1000	0.2080
5000	0.1227
10000	0.0939
25000	0.0654
5.00E+04	0.0496
1.00E+05	0.0375
5.00E+05	0.0197
7.50E+05	0.0167
1.00E+06	0.0149

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.275	0.2751	0.000	0.000
3.45	0.274	0.2750	-0.001	0.000
6.90	0.274	0.2749	-0.001	0.000
13.79	0.278	0.2747	0.004	0.000
27.59	0.275	0.2742	0.001	0.000
55.18	0.270	0.2729	-0.003	0.000
103.46	0.257	0.2699	-0.013	0.000
206.91	0.253	0.2622	-0.009	0.000
413.82	0.242	0.2458	-0.004	0.000
620.73	0.234	0.2307	0.003	0.000
970.00	0.220	0.2096	0.010	0.000
3020.00	0.142	0.1477	-0.006	0.000
11900.00	0.088	0.0877	0.000	0.000

Residual = 3.29537E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ICY2L		Test Date	7/1/2006
WT of Sample Ring =	70.85	g		
WT of Sample Ring + Soil =	304.11	g		
Water Content =	14.18	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	121.14	pcf	1.94	Mg/m^3
Water WT =	28.97	g		
Solid WT =	204.29	g		
Add Water for saturation =	0.04	g	Sr	100.04
Saturated Water Content =	14.20	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	62.5	0.000	0.001	0.142	0.276
0.5	69.6	1.349	3.449	0.135	0.263
1	66	0.665	6.897	0.139	0.269
2	65.5	0.570	13.794	0.139	0.270
4	64	0.285	27.588	0.141	0.273
8	66.3	0.722	55.176	0.138	0.269
15	69.3	1.292	103.455	0.136	0.263
30	71.5	1.710	206.910	0.134	0.259
60	72.6	1.919	413.820	0.133	0.257
90	77.4	2.831	620.730	0.128	0.249
		Activity Meter Test	13700.00	0.039	0.076
			720.00	0.133	0.258
			10000.00	0.042	0.081
			29200.00	0.029	0.056

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
10	7.6648	16.923	16.5506	0.042	0.081
0.72	7.9967	18.0311	16.854	0.133	0.258
13.7	8.6279	17.9553	17.6043	0.039	0.076
29.2	7.7438	16.92	16.6611	0.029	0.056

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

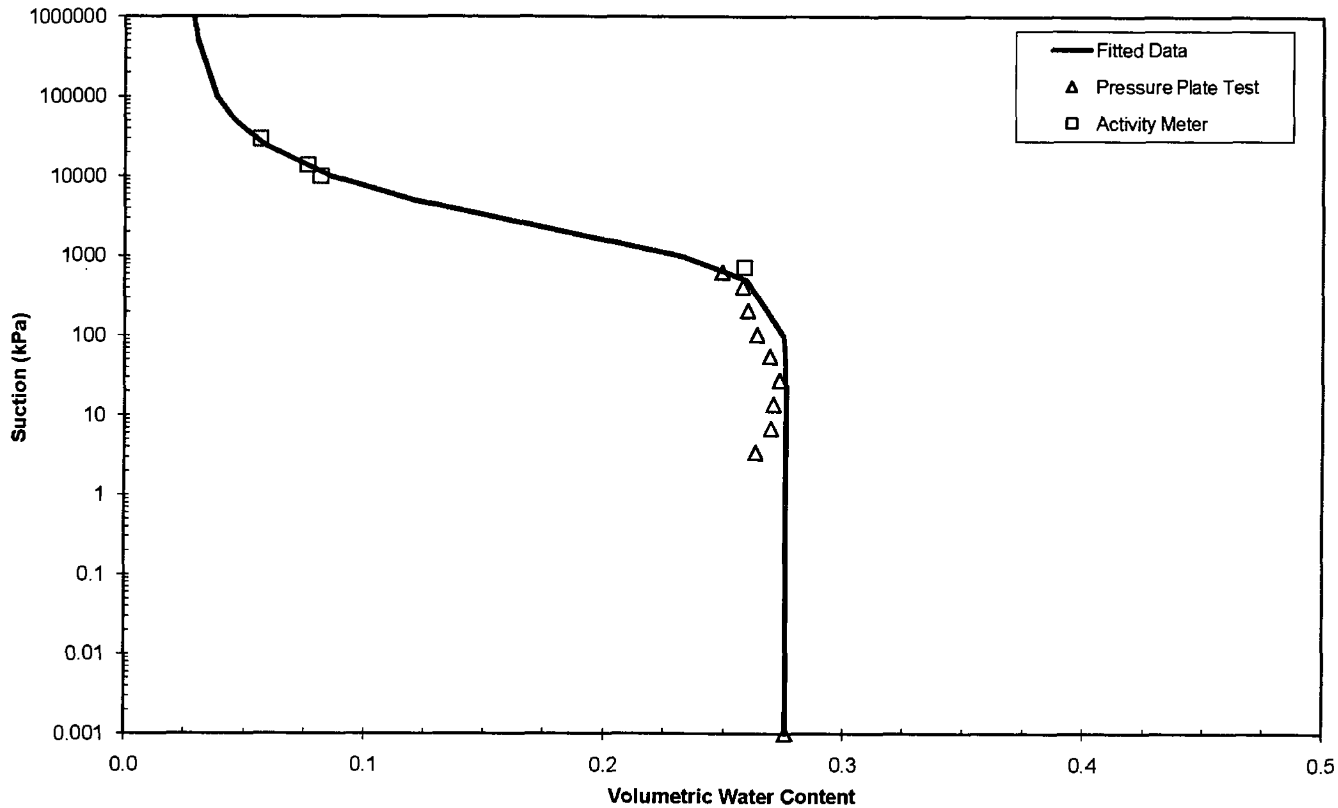
θ_r =	0.0266
θ_s =	0.2757
α =	0.0007
n =	1.7105
m =	0.4154

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.2757
0.025	0.2757
0.05	0.2757
0.075	0.2757
0.1	0.2757
1	0.2757
2	0.2757
3	0.2757
4	0.2757
5	0.2757
6	0.2757
7	0.2757
8	0.2757
9	0.2757
10	0.2757
15	0.2757
20	0.2756
30	0.2756
40	0.2755
50	0.2753
60	0.2752
70	0.2751
80	0.2749
90	0.2747
100	0.2745
500	0.2589
1000	0.2316
5000	0.1207
10000	0.0858
25000	0.0578
5.00E+04	0.0457
1.00E+05	0.0383
5.00E+05	0.0303
7.50E+05	0.0294
1.00E+06	0.0288

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.276	0.2757	0.000	0.000
3.45	0.263	0.2757	-0.013	0.000
6.90	0.269	0.2757	-0.006	0.000
13.79	0.270	0.2757	-0.005	0.000
27.59	0.273	0.2756	-0.003	0.000
55.18	0.269	0.2753	-0.006	0.000
103.46	0.263	0.2744	-0.011	0.000
206.91	0.259	0.2716	-0.012	0.000
413.82	0.257	0.2632	-0.006	0.000
620.73	0.249	0.2525	-0.004	0.000
0.00	0.000	0.2757	-0.276	0.076
13700.00	0.076	0.0742	0.002	0.000
720.00	0.258	0.2471	0.011	0.000
10000.00	0.081	0.0858	-0.004	0.000
29200.00	0.056	0.0545	0.002	0.000

Residual = 0.00511726

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ICY2U		Test Date	12/1/2006
WT of Sample Ring =	70.61	g		
WT of Sample Ring + Soil =	305.2	g		
Water Content =	14.66	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	121.32	pcf	1.94	Mg/m^3
Water WT =	29.99	g		
Solid WT =	204.60	g		
Add Water for saturation =	0	g	Sr	103.83
Saturated Water Content =	14.66	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	18.4	0.000	0.001	0.147	0.285
0.5	30.4	2.280	3.449	0.135	0.263
1	30.2	2.242	6.897	0.136	0.264
2	27.5	1.729	13.794	0.138	0.269
4	29.6	2.128	27.588	0.136	0.265
8	23.5	0.969	55.176	0.142	0.276
15	25.3	1.311	103.455	0.140	0.273
30	31.4	2.470	206.910	0.135	0.262
60	41.9	4.465	413.820	0.125	0.243
90	40.6	4.218	620.730	0.126	0.245
		Activity	760.00	0.128	0.249
		Meter	33100.00	0.030	0.059
		Test	54000.00	0.025	0.048

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
54	8.0014	17.249	17.0247	0.025	0.048
33.1	8.6299	17.8625	17.5909	0.030	0.059
0.76	7.7444	17.6593	16.5349	0.128	0.249

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.2850
α =	0.0013
n =	1.4077
m =	0.2896

FOR GRAPHING

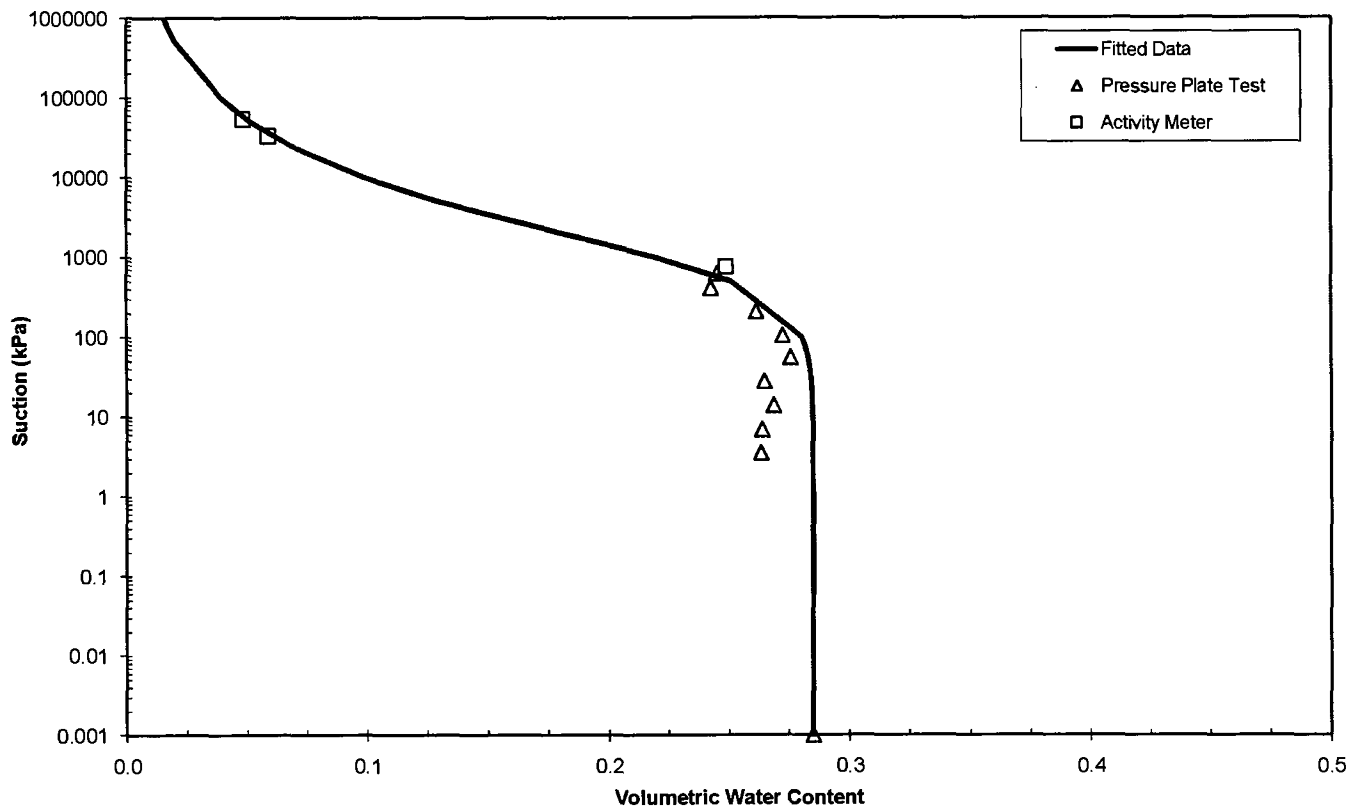
Suction (kPa)	VWC
0.001	0.2850
0.025	0.2850
0.05	0.2850
0.075	0.2850
0.1	0.2850
1	0.2850
2	0.2850
3	0.2850
4	0.2850
5	0.2850
6	0.2849
7	0.2849
8	0.2849
9	0.2849
10	0.2848
15	0.2847
20	0.2845
30	0.2842
40	0.2837
50	0.2833
60	0.2828
70	0.2822
80	0.2817
90	0.2811
100	0.2805
500	0.2510
1000	0.2195
5000	0.1298
10000	0.0991
25000	0.0686
5.00E+04	0.0518
1.00E+05	0.0390
5.00E+05	0.0203
7.50E+05	0.0172
1.00E+06	0.0153

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.285	0.2850	0.000	0.000
3.45	0.263	0.2850	-0.022	0.000
6.90	0.264	0.2849	-0.021	0.000
13.79	0.269	0.2847	-0.016	0.000
27.59	0.265	0.2843	-0.019	0.000
55.18	0.276	0.2830	-0.007	0.000
103.46	0.273	0.2803	-0.008	0.000
206.91	0.262	0.2731	-0.012	0.000
413.82	0.243	0.2574	-0.015	0.000
620.73	0.245	0.2425	0.002	0.000
760.00	0.249	0.2334	0.015	0.000
33100.00	0.059	0.0612	-0.002	0.000
54000.00	0.048	0.0502	-0.002	0.000

Residual = 0.000174397

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.		ICYRL		Test Date	7/1/2005
WT of Sample Ring =	70.15	g			
WT of Sample Ring + Soil =	302.35	g			
Water Content =	14.70	%			
Diameter of Sample Ring, D =	2.86	in			
Height of Sample Ring, L =	1.0	in			
Volume, V =	3.72E-03	ft^3	105.3	cm^3	
Dry Unit Weight =	120.05	pcf	1.92	Mg/m^3	
Water WT =	29.76	g			
Solid WT =	202.44	g			
Add Water for saturation =	2.67	g	Sr	109.22	
Saturated Water Content =	16.02	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
1	66	0.000	0.001	0.160	0.308
2	68.6	0.494	13.794	0.158	0.303
4	70.5	0.855	27.588	0.156	0.300
8	70.4	0.836	55.176	0.156	0.300
15	74.5	1.615	103.455	0.152	0.293
30	87.3	4.047	206.910	0.140	0.270
60	100.1	6.479	413.820	0.128	0.247
90	100.4	6.536	620.730	0.128	0.246
		Activity Meter Test	1790.00	0.082	0.157
			31100.00	0.031	0.059
			63500.00	0.023	0.045

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
63.5	7.744	16.8361	16.6285	0.023	0.045
31.1	8.0634	17.2023	16.9295	0.031	0.059
1.79	7.7181	17.0324	16.3294	0.082	0.157

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

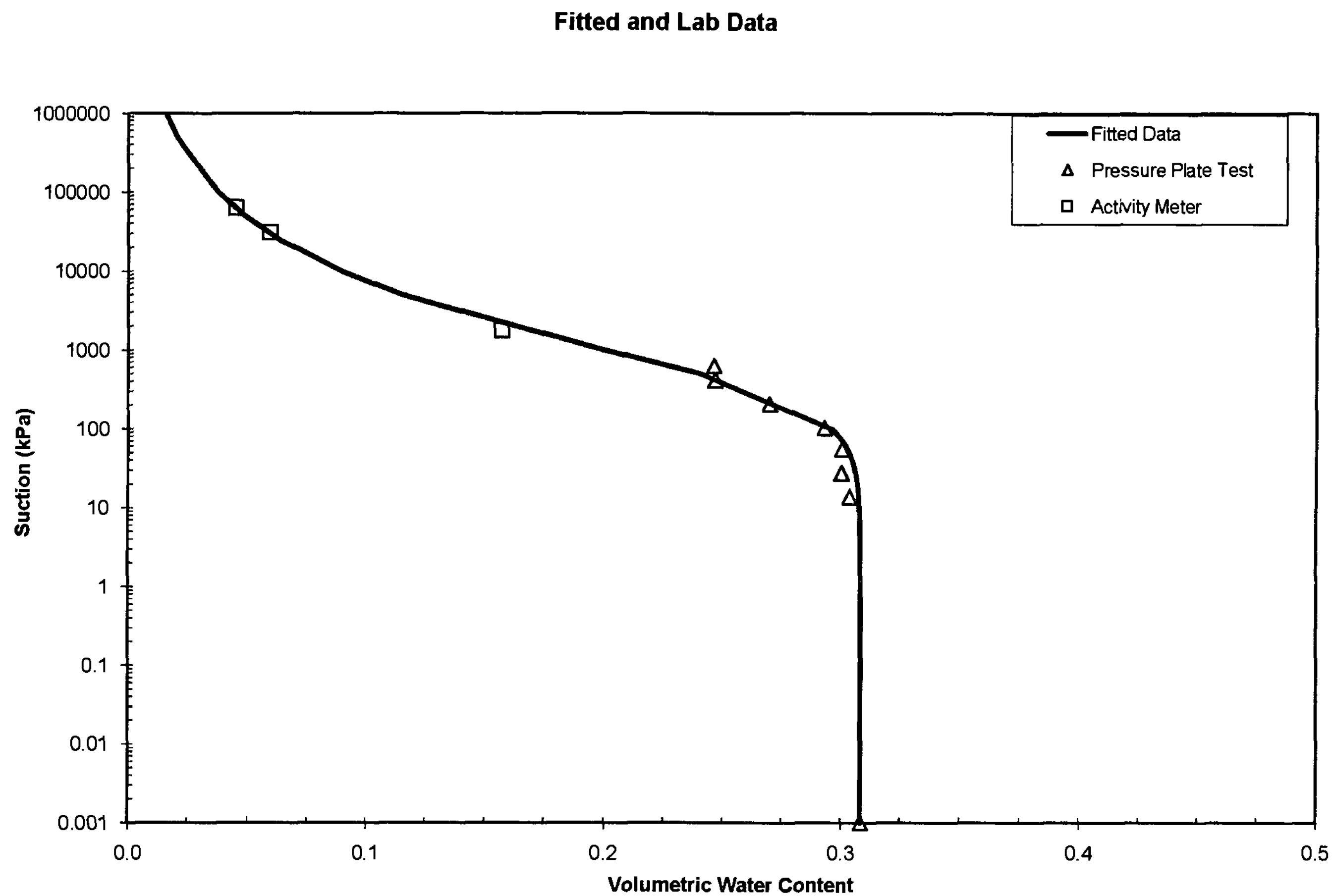
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3082
α =	0.0027
n =	1.3771
m =	0.2739

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.3082
0.025	0.3082
0.05	0.3082
0.075	0.3082
0.1	0.3082
1	0.3082
2	0.3081
3	0.3081
4	0.3080
5	0.3080
6	0.3079
7	0.3078
8	0.3078
9	0.3077
10	0.3076
15	0.3072
20	0.3067
30	0.3056
40	0.3044
50	0.3031
60	0.3018
70	0.3003
80	0.2988
90	0.2973
100	0.2958
500	0.2403
1000	0.2000
5000	0.1152
10000	0.0891
25000	0.0632
5.00E+04	0.0487
1.00E+05	0.0375
5.00E+05	0.0204
7.50E+05	0.0175
1.00E+06	0.0157

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.308	0.3082	0.000	0.000
13.79	0.303	0.3073	-0.004	0.000
27.59	0.300	0.3059	-0.006	0.000
55.18	0.300	0.3024	-0.002	0.000
103.46	0.293	0.2953	-0.002	0.000
206.91	0.270	0.2789	-0.009	0.000
413.82	0.247	0.2502	-0.004	0.000
620.73	0.246	0.2282	0.018	0.000
1790.00	0.157	0.1660	-0.009	0.000
31100.00	0.059	0.0582	0.001	0.000
63500.00	0.045	0.0445	0.000	0.000

Residual =	5.05924E-05


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Cedar Rapids - Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ICYRU		Test Date	7/31/2006
WT of Sample Ring =	71.52	g		
WT of Sample Ring + Soil =	308.27	g		
Water Content =	13.90	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	123.26	pcf	1.97	Mg/m^3
Water WT =	28.89	g		
Solid WT =	207.86	g		
Add Water for saturation =	1.52	g	Sr	109.91
Saturated Water Content =	14.63	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	17.7	0.000	0.001	0.146	0.289
0.5	29.9	2.318	3.449	0.135	0.267
1	31.9	2.698	6.897	0.133	0.263
2	33	2.907	13.794	0.132	0.261
4	34.3	3.154	27.588	0.131	0.259
8	33.1	2.926	55.176	0.132	0.261
15	33.5	3.002	103.455	0.132	0.260
30	25	1.387	206.910	0.140	0.276
60	36.1	3.496	413.820	0.129	0.256
90	33.9	3.078	620.730	0.132	0.260
		Activity Meter Test	950.00	0.132	0.261
			15000.00	0.038	0.075
			1230.00	0.117	0.231

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.23	7.7044	17.5589	16.5271	0.117	0.231
15	7.7042	17.126	16.783	0.038	0.075
0.95	8.4794	18.6031	17.4206	0.132	0.261

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.2890
α =	0.0008
n =	1.5302
m =	0.3465

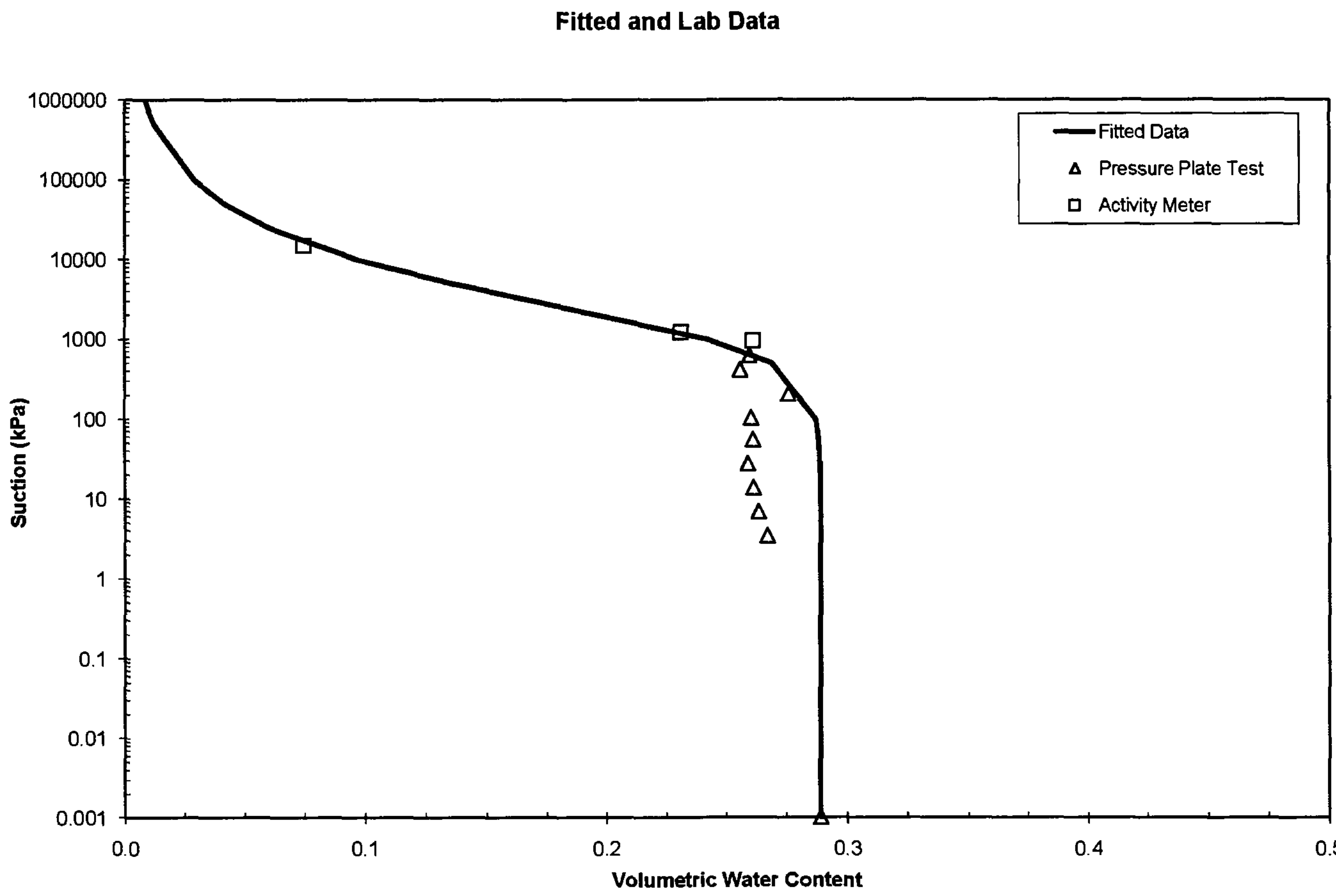
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.2890
0.025	0.2890
0.05	0.2890
0.075	0.2890
0.1	0.2890
1	0.2890
2	0.2890
3	0.2890
4	0.2890
5	0.2890
6	0.2890
7	0.2890
8	0.2890
9	0.2890
10	0.2890
15	0.2889
20	0.2888
30	0.2887
40	0.2885
50	0.2883
60	0.2881
70	0.2879
80	0.2876
90	0.2874
100	0.2871
500	0.2690
1000	0.2422
5000	0.1360
10000	0.0967
25000	0.0602
5.00E+04	0.0418
1.00E+05	0.0289
5.00E+05	0.0123
7.50E+05	0.0100
1.00E+06	0.0085

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.289	0.2890	0.000	0.000
3.45	0.267	0.2890	-0.022	0.000
6.90	0.263	0.2890	-0.026	0.001
13.79	0.261	0.2889	-0.028	0.001
27.59	0.259	0.2887	-0.030	0.001
55.18	0.261	0.2882	-0.027	0.001
103.46	0.260	0.2870	-0.026	0.001
206.91	0.276	0.2833	-0.007	0.000
413.82	0.256	0.2735	-0.018	0.000
620.73	0.260	0.2625	-0.003	0.000
950.00	0.261	0.2448	0.016	0.000
15000.00	0.075	0.0785	-0.004	0.000
1230.00	0.231	0.2308	0.000	0.000

Residual = 0.000374985



Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	IOY1L		Test Date	7/1/2005
WT of Sample Ring =	70.68	g		
WT of Sample Ring + Soil =	303.3	g		
Water Content =	15.17	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	119.77	pcf	1.92	Mg/m^3
Water WT =	30.64	g		
Solid WT =	201.98	g		
Add Water for saturation =	0.27	g	Sr	103.51
Saturated Water Content =	15.30	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	53.9	0.000	0.001	0.153	0.294
0.5	56.3	0.456	3.449	0.151	0.289
1	53.7	-0.038	6.897	0.153	0.294
2	55.6	0.323	13.794	0.151	0.291
4	52.2	-0.323	27.588	0.155	0.297
8	54.1	0.038	55.176	0.153	0.293
15	54.9	0.190	103.455	0.152	0.292
30	58.5	0.874	206.910	0.149	0.285
60	64.2	1.957	413.820	0.143	0.275
90	71.4	3.325	620.730	0.137	0.262
		Activity Meter Test	1100.00	0.122	0.233
			1690.00	0.086	0.166
			16200.00	0.042	0.081
			7540.00	0.055	0.105
			71400.00	0.023	0.045

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
16.2	8.0638	17.3326	16.9554	0.042	0.081
1.69	7.7186	17.3575	16.591	0.086	0.166
1.1	7.7446	17.6361	16.5638	0.122	0.233
7.54	7.7175	17.0967	16.6101	0.055	0.105
71.4	7.7441	16.9055	16.6952	0.023	0.045

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

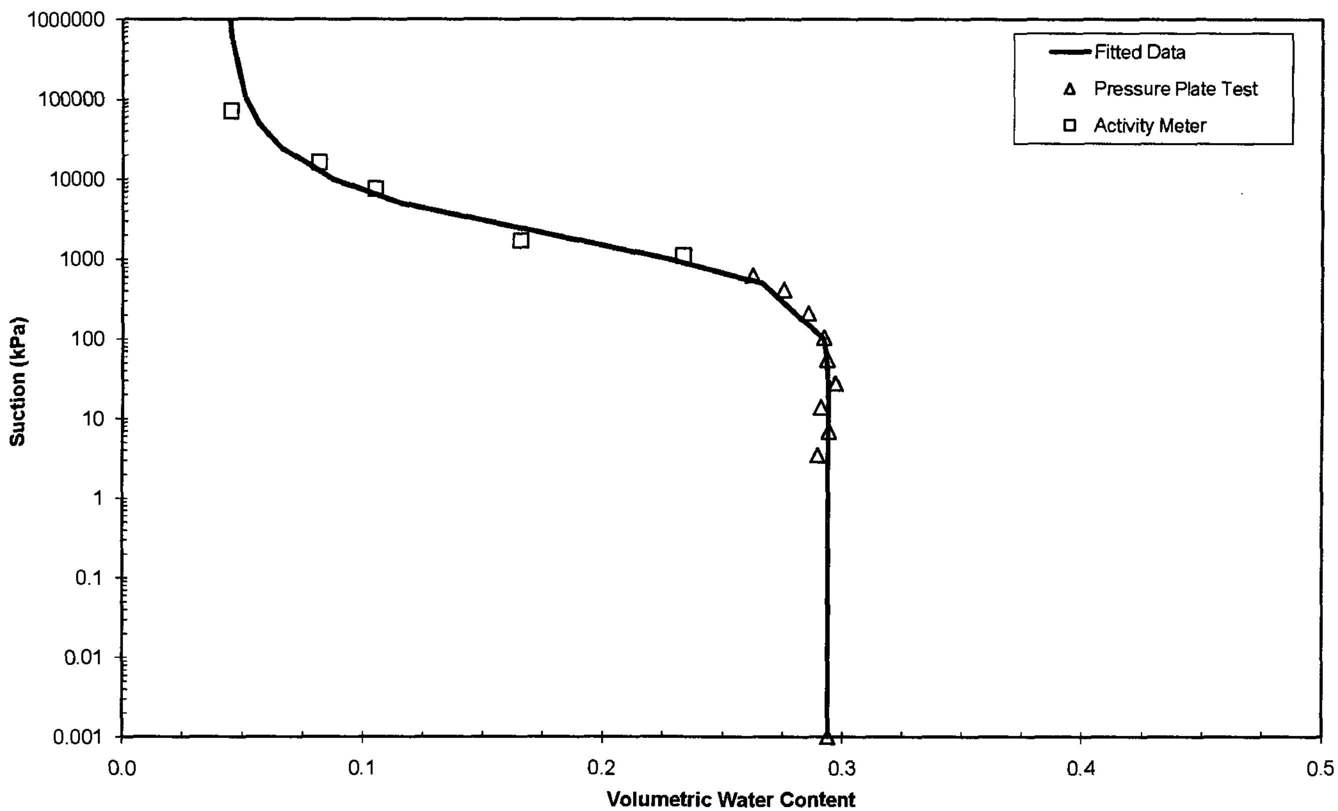
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0433
θ_s =	0.2938
α =	0.0010
n =	1.7428
m =	0.4262

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.2938
0.025	0.2938
0.05	0.2938
0.075	0.2938
0.1	0.2938
1	0.2938
2	0.2938
3	0.2938
4	0.2937
5	0.2937
6	0.2937
7	0.2937
8	0.2937
9	0.2937
10	0.2937
15	0.2937
20	0.2936
30	0.2935
40	0.2933
50	0.2931
60	0.2929
70	0.2927
80	0.2924
90	0.2921
100	0.2917
500	0.2661
1000	0.2274
5000	0.1155
10000	0.0872
25000	0.0657
5.00E+04	0.0567
1.00E+05	0.0513
5.00E+05	0.0457
7.50E+05	0.0451
1.00E+06	0.0448

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.294	0.2938	0.000	0.000
3.45	0.289	0.2937	-0.004	0.000
6.90	0.294	0.2937	0.000	0.000
13.79	0.291	0.2937	-0.003	0.000
27.59	0.297	0.2935	0.003	0.000
55.18	0.293	0.2930	0.000	0.000
103.46	0.292	0.2916	0.000	0.000
206.91	0.285	0.2868	-0.001	0.000
413.82	0.275	0.2728	0.002	0.000
620.73	0.262	0.2564	0.006	0.000
1100.00	0.233	0.2205	0.013	0.000
1690.00	0.166	0.1877	-0.022	0.000
16200.00	0.081	0.0741	0.007	0.000
7540.00	0.105	0.0972	0.008	0.000
71400.00	0.045	0.0536	-0.008	0.000
			Residual =	6.05708E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	IOY1U		Test Date	7/1/2005
WT of Sample Ring =	71.52	g		
WT of Sample Ring + Soil =	306.2	g		
Water Content =	13.91	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	122.17	pcf	1.96	Mg/m^3
Water WT =	28.65	g		
Solid WT =	206.03	g		
Add Water for saturation =	0.69	g	Sr	103.49
Saturated Water Content =	14.24	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	70.2	0.000	0.001	0.142	0.279
0.5	75	0.912	3.449	0.138	0.270
1	73.1	0.551	6.897	0.140	0.274
2	73.7	0.665	13.794	0.139	0.273
4	72	0.342	27.588	0.141	0.276
8	73.9	0.703	55.176	0.139	0.272
15	75.8	1.064	103.455	0.137	0.269
30	79	1.672	206.910	0.134	0.263
60	82.1	2.261	413.820	0.131	0.257
90	86	3.002	620.730	0.128	0.250
		Activity Meter Test	1030.00	0.103	0.203
			7380.00	0.053	0.103
			33100.00	0.031	0.060
			820.00	0.101	0.197
			34500.00	0.030	0.059

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
33.1	8.0013	17.3391	17.0598	0.031	0.060
7.38	8.6296	18.2361	17.7557	0.053	0.103
1.03	7.4871	17.5724	16.627	0.103	0.203
0.82	7.6659	17.6535	16.7389	0.101	0.197
34.5	8.0633	17.451	17.1743	0.030	0.059

Fit van Genuchten Eqn to SWCC Data

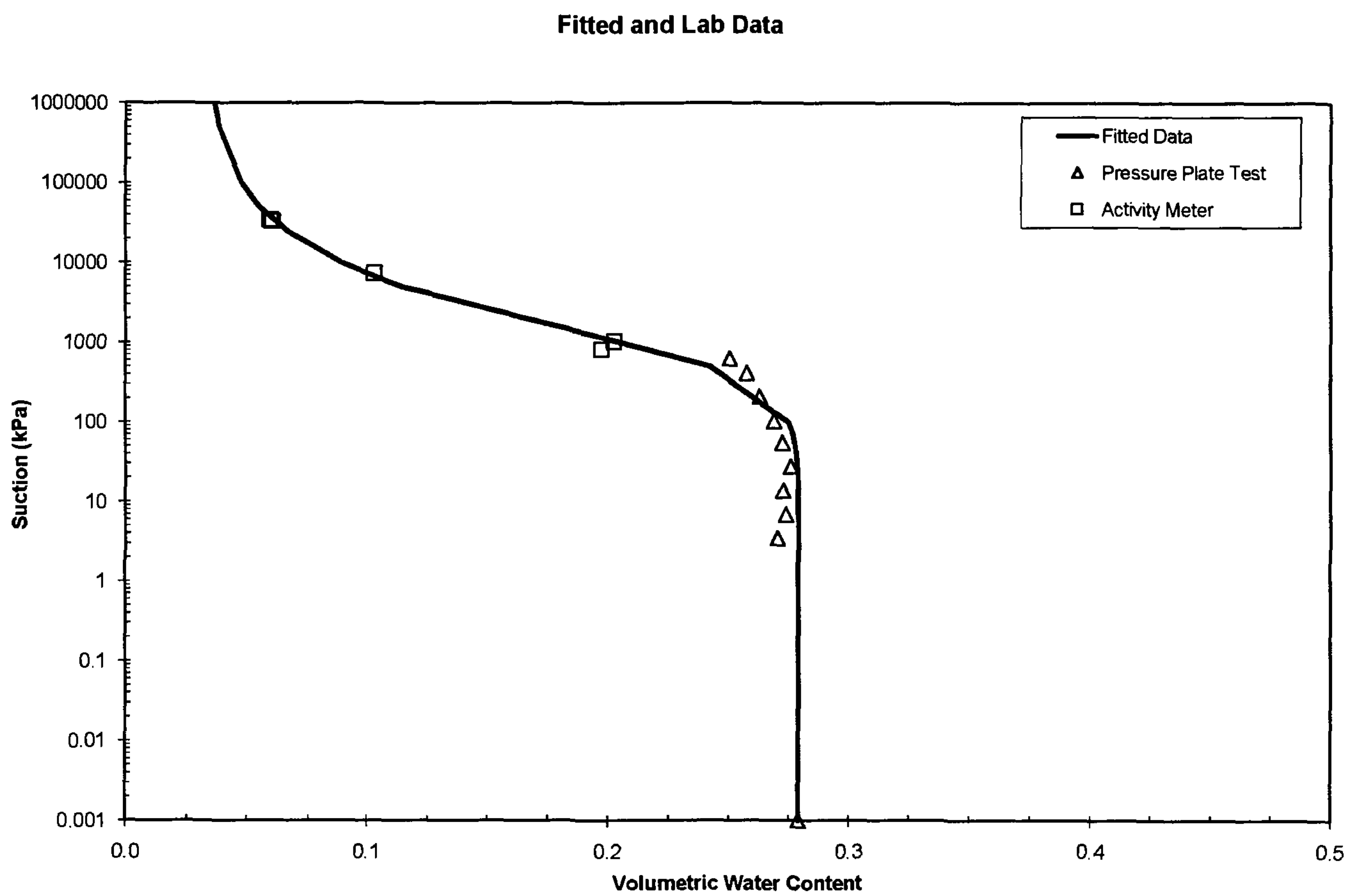
van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0316
θ_s =	0.2788
α =	0.0014
n =	1.5525
m =	0.3559

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.2788
0.025	0.2788
0.05	0.2788
0.075	0.2788
0.1	0.2788
1	0.2788
2	0.2788
3	0.2788
4	0.2788
5	0.2788
6	0.2788
7	0.2788
8	0.2788
9	0.2787
10	0.2787
15	0.2786
20	0.2785
30	0.2782
40	0.2778
50	0.2774
60	0.2770
70	0.2765
80	0.2760
90	0.2754
100	0.2748
500	0.2419
1000	0.2055
5000	0.1145
10000	0.0888
25000	0.0662
5.00E+04	0.0552
1.00E+05	0.0477
5.00E+05	0.0383
7.50E+05	0.0369
1.00E+06	0.0361

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.279	0.2788	0.000	0.000
3.45	0.270	0.2788	-0.009	0.000
6.90	0.274	0.2788	-0.005	0.000
13.79	0.273	0.2786	-0.006	0.000
27.59	0.276	0.2783	-0.003	0.000
55.18	0.272	0.2772	-0.005	0.000
103.46	0.269	0.2746	-0.006	0.000
206.91	0.263	0.2671	-0.004	0.000
413.82	0.257	0.2493	0.008	0.000
620.73	0.250	0.2319	0.018	0.000
1030.00	0.203	0.2037	-0.001	0.000
7380.00	0.103	0.0990	0.004	0.000
33100.00	0.060	0.0613	-0.001	0.000
820.00	0.197	0.2171	-0.020	0.000
34500.00	0.059	0.0606	-0.001	0.000
			Residual =	6.90088E-05


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	IOY2L		Test Date	12/1/2006
WT of Sample Ring =	70.72	g		
WT of Sample Ring + Soil =	308.46	g		
Water Content =	15.50	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	122.06	pcf	1.96	Mg/m^3
Water WT =	31.90	g		
Solid WT =	205.84	g		
Add Water for saturation =	0	g	Sr	112.24
Saturated Water Content =	15.50	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	27	0.000	0.001	0.155	0.303
0.5	35.5	1.615	3.449	0.147	0.288
1	35.6	1.634	6.897	0.147	0.288
2	31.9	0.931	13.794	0.150	0.294
4	33.3	1.197	27.588	0.149	0.292
8	36.2	1.748	55.176	0.147	0.287
15	35.3	1.577	103.455	0.147	0.288
30	39.9	2.451	206.910	0.143	0.280
60	56.4	5.586	413.820	0.128	0.250
90	56	5.510	620.730	0.128	0.251
		Activity Meter Test	2850.00	0.076	0.149
			17600.00	0.042	0.083
			42400.00	0.031	0.060

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
42.4	7.6662	17.1119	16.8309	0.031	0.060
17.6	7.4869	16.9528	16.5671	0.042	0.083
2.85	7.718	17.4463	16.7593	0.076	0.149

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3032
α =	0.0022
n =	1.3559
m =	0.2625

FOR GRAPHING

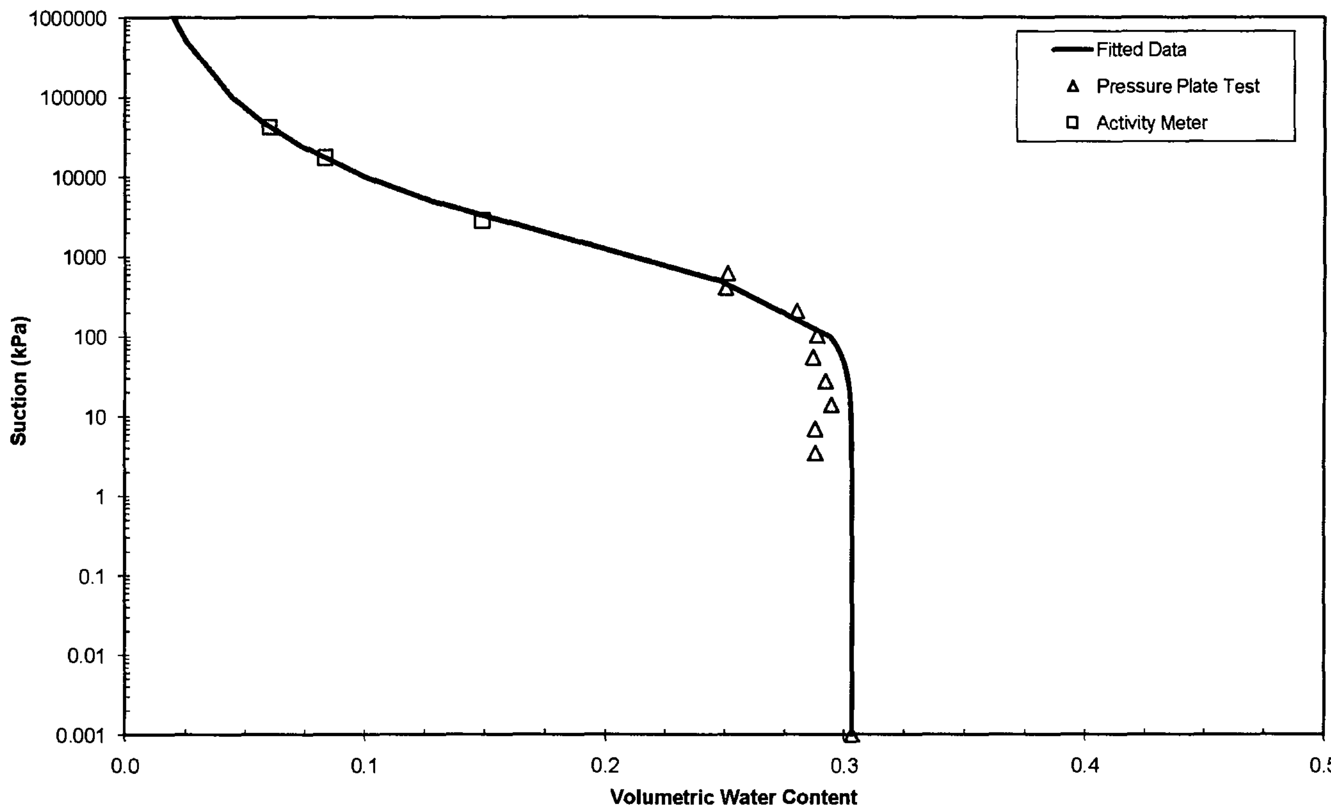
Suction (kPa)	VWC
0.001	0.3032
0.025	0.3032
0.05	0.3032
0.075	0.3032
0.1	0.3032
1	0.3032
2	0.3031
3	0.3031
4	0.3031
5	0.3030
6	0.3030
7	0.3029
8	0.3029
9	0.3028
10	0.3027
15	0.3024
20	0.3020
30	0.3012
40	0.3003
50	0.2993
60	0.2982
70	0.2971
80	0.2960
90	0.2948
100	0.2936
500	0.2479
1000	0.2114
5000	0.1274
10000	0.1002
25000	0.0725
5.00E+04	0.0567
1.00E+05	0.0443
5.00E+05	0.0250
7.50E+05	0.0216
1.00E+06	0.0195

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.303	0.3032	0.000	0.000
3.45	0.288	0.3031	-0.015	0.000
6.90	0.288	0.3029	-0.015	0.000
13.79	0.294	0.3025	-0.008	0.000
27.59	0.292	0.3014	-0.010	0.000
55.18	0.287	0.2987	-0.012	0.000
103.46	0.288	0.2932	-0.005	0.000
206.91	0.280	0.2803	0.000	0.000
413.82	0.250	0.2564	-0.006	0.000
620.73	0.251	0.2372	0.014	0.000
2850.00	0.149	0.1540	-0.005	0.000
17600.00	0.083	0.0821	0.001	0.000
42400.00	0.060	0.0601	0.000	0.000

Residual = 8.08391E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.		IOY2U	Test Date	7/1/2005
WT of Sample Ring =	70.49	g		
WT of Sample Ring + Soil =	304.85	g		
Water Content =	14.82	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	121.04	pcf	1.94	Mg/m^3
Water WT =	30.25	g		
Solid WT =	204.11	g		
Add Water for saturation =	2.23	g	Sr	111.73
Saturated Water Content =	15.91	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
1	40.5	0.000	0.001	0.159	0.309
2	40.1	-0.076	13.794	0.159	0.309
4	40.8	0.057	27.588	0.159	0.308
8	40.7	0.038	55.176	0.159	0.308
15	45.6	0.969	103.455	0.154	0.299
30	58.7	3.458	206.910	0.142	0.276
60	67.6	5.149	413.820	0.134	0.260
90	74.3	6.422	620.730	0.128	0.248
		Activity Meter Test	46800.00	0.023	0.045
			680.00	0.144	0.280
			6050.00	0.052	0.101

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
6.05	8.0635	17.4922	17.0243	0.052	0.101
0.68	7.4869	17.748	16.4554	0.144	0.280
46.8	7.7173	16.9492	16.7383	0.023	0.045

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3087
α =	0.0014
n =	1.4827
m =	0.3255

FOR GRAPHING

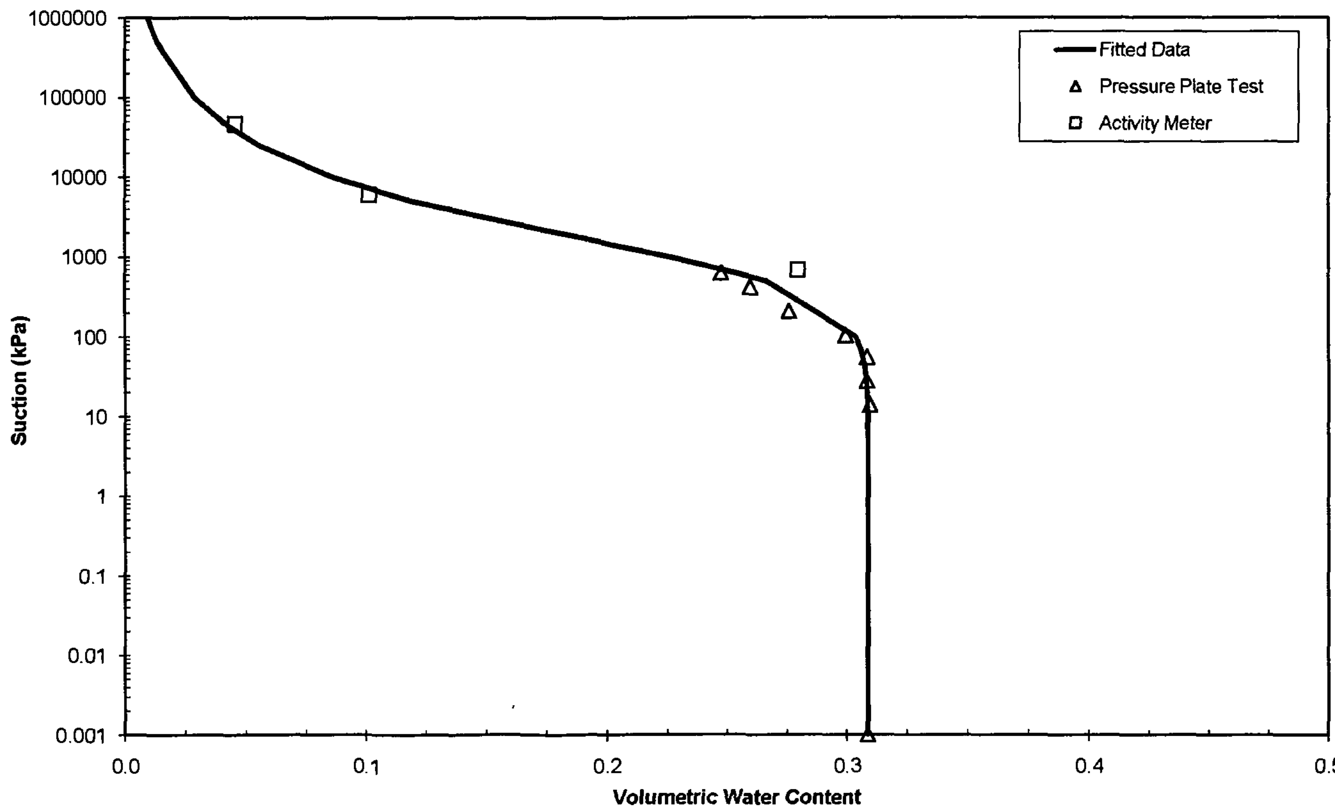
Suction (kPa)	VWC
0.001	0.3087
0.025	0.3087
0.05	0.3087
0.075	0.3087
0.1	0.3087
1	0.3086
2	0.3086
3	0.3086
4	0.3086
5	0.3086
6	0.3086
7	0.3085
8	0.3085
9	0.3085
10	0.3085
15	0.3083
20	0.3082
30	0.3078
40	0.3073
50	0.3068
60	0.3062
70	0.3056
80	0.3049
90	0.3042
100	0.3035
500	0.2661
1000	0.2258
5000	0.1193
10000	0.0864
25000	0.0558
5.00E+04	0.0400
1.00E+05	0.0286
5.00E+05	0.0132
7.50E+05	0.0108
1.00E+06	0.0094

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.309	0.3087	0.000	0.000
13.79	0.309	0.3084	0.001	0.000
27.59	0.308	0.3079	0.000	0.000
55.18	0.308	0.3065	0.002	0.000
103.46	0.299	0.3032	-0.004	0.000
206.91	0.276	0.2944	-0.019	0.000
413.82	0.260	0.2743	-0.015	0.000
620.73	0.248	0.2551	-0.007	0.000
46800.00	0.045	0.0412	0.004	0.000
680.00	0.280	0.2500	0.030	0.001
6050.00	0.101	0.1093	-0.008	0.000

Residual = 0.000144631

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	IOYRL (LH-6)		Test Date	7/1/2005
WT of Sample Ring =	69.2	g		
WT of Sample Ring + Soil =	294.56	g		
Water Content =	14.50	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	116.71	pcf	1.87	Mg/m^3
Water WT =	28.54	g		
Solid WT =	196.82	g		
Add Water for saturation =	2.42	g	Sr	97.39
Saturated Water Content =	15.73	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	23.5	0.000	0.001	0.157	0.294
0.5	37	2.565	3.449	0.144	0.270
1	38.6	2.869	6.897	0.143	0.267
2	39	2.945	13.794	0.142	0.266
4	40.8	3.287	27.588	0.141	0.263
8	39.2	2.983	55.176	0.142	0.266
15	40.3	3.192	103.455	0.141	0.264
30	39.5	3.040	206.910	0.142	0.265
60	43.1	3.724	413.820	0.138	0.259
90	60.9	7.106	620.730	0.121	0.227
		Activity Meter Test	2340.00	0.079	0.147
			5390.00	0.058	0.108
			46400.00	0.026	0.048
			800.00	0.125	0.233

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
46.4	7.5966	16.3603	16.1404	0.026	0.048
5.39	7.7043	16.6931	16.2019	0.058	0.108
2.34	8.4797	17.5482	16.8859	0.079	0.147
0.8	7.6402	16.9879	15.9512	0.125	0.233

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

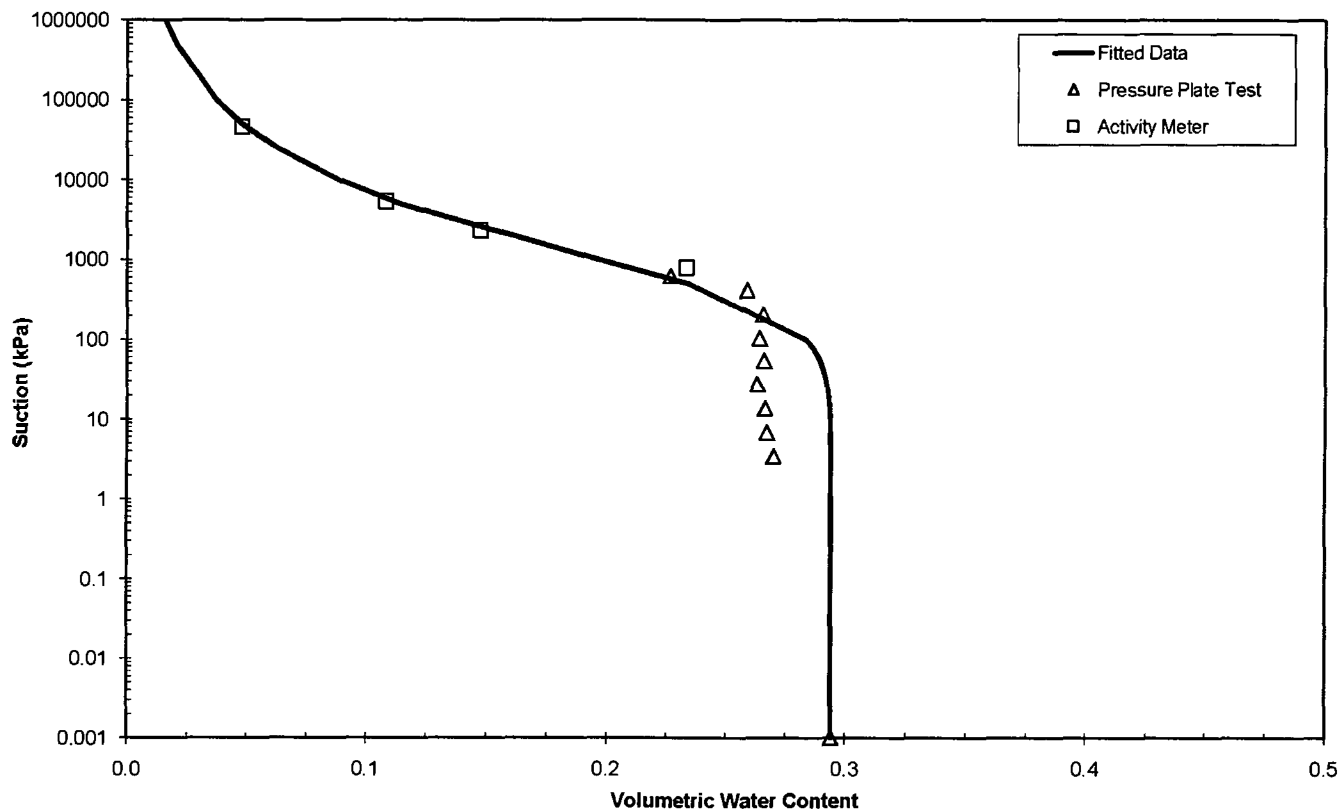
θ_r =	0.0000
θ_s =	0.2942
α =	0.0024
n =	1.3773
m =	0.2740

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.2942
0.025	0.2942
0.05	0.2942
0.075	0.2942
0.1	0.2942
1	0.2942
2	0.2942
3	0.2941
4	0.2941
5	0.2940
6	0.2940
7	0.2939
8	0.2939
9	0.2938
10	0.2937
15	0.2934
20	0.2930
30	0.2921
40	0.2911
50	0.2900
60	0.2888
70	0.2876
80	0.2864
90	0.2851
100	0.2838
500	0.2344
1000	0.1965
5000	0.1140
10000	0.0882
25000	0.0626
5.00E+04	0.0482
1.00E+05	0.0371
5.00E+05	0.0202
7.50E+05	0.0174
1.00E+06	0.0156

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.294	0.2942	0.000	0.000
3.45	0.270	0.2941	-0.024	0.001
6.90	0.267	0.2939	-0.027	0.001
13.79	0.266	0.2935	-0.027	0.001
27.59	0.263	0.2923	-0.029	0.001
55.18	0.266	0.2894	-0.024	0.001
103.46	0.264	0.2833	-0.019	0.000
206.91	0.265	0.2692	-0.004	0.000
413.82	0.259	0.2434	0.015	0.000
620.73	0.227	0.2232	0.004	0.000
2340.00	0.147	0.1495	-0.002	0.000
5390.00	0.108	0.1109	-0.003	0.000
46400.00	0.048	0.0496	-0.001	0.000
800.00	0.233			

Residual = 0.000317666

Fitted and Lab Data



Pressure Plate Extractor Test - Cedar Rapids - Composite Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	IOYRU		Test Date	7/1/2005
WT of Sample Ring =	70.79	g		
WT of Sample Ring + Soil =	312.56	g		
Water Content =	14.30	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	125.43	pcf	2.01	Mg/m^3
Water WT =	30.25	g		
Solid WT =	211.52	g		
Add Water for saturation =	1.4	g	Sr	120.32
Saturated Water Content =	14.96	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
1	70.8	0.000	0.001	0.150	0.301
2	66.1	-0.893	13.794	0.154	0.309
4	66.5	-0.817	27.588	0.153	0.309
8	66.5	-0.817	55.176	0.153	0.309
15	68	-0.532	103.455	0.152	0.306
30	67.7	-0.589	206.910	0.152	0.306
60	73.1	0.437	413.820	0.148	0.297
90	78.3	1.425	620.730	0.143	0.287
		Activity Meter Test	3000.00	0.066	0.134
			9450.00	0.047	0.095
			49800.00	0.023	0.046

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
49.8	7.7178	17.2673	17.0522	0.023	0.046
9.45	7.7442	17.451	17.012	0.047	0.095
3	8.0633	17.8767	17.265	0.066	0.134

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0546
θ_s =	0.3007
α =	0.0007
n =	2.2418
m =	0.5539

FOR FITTING

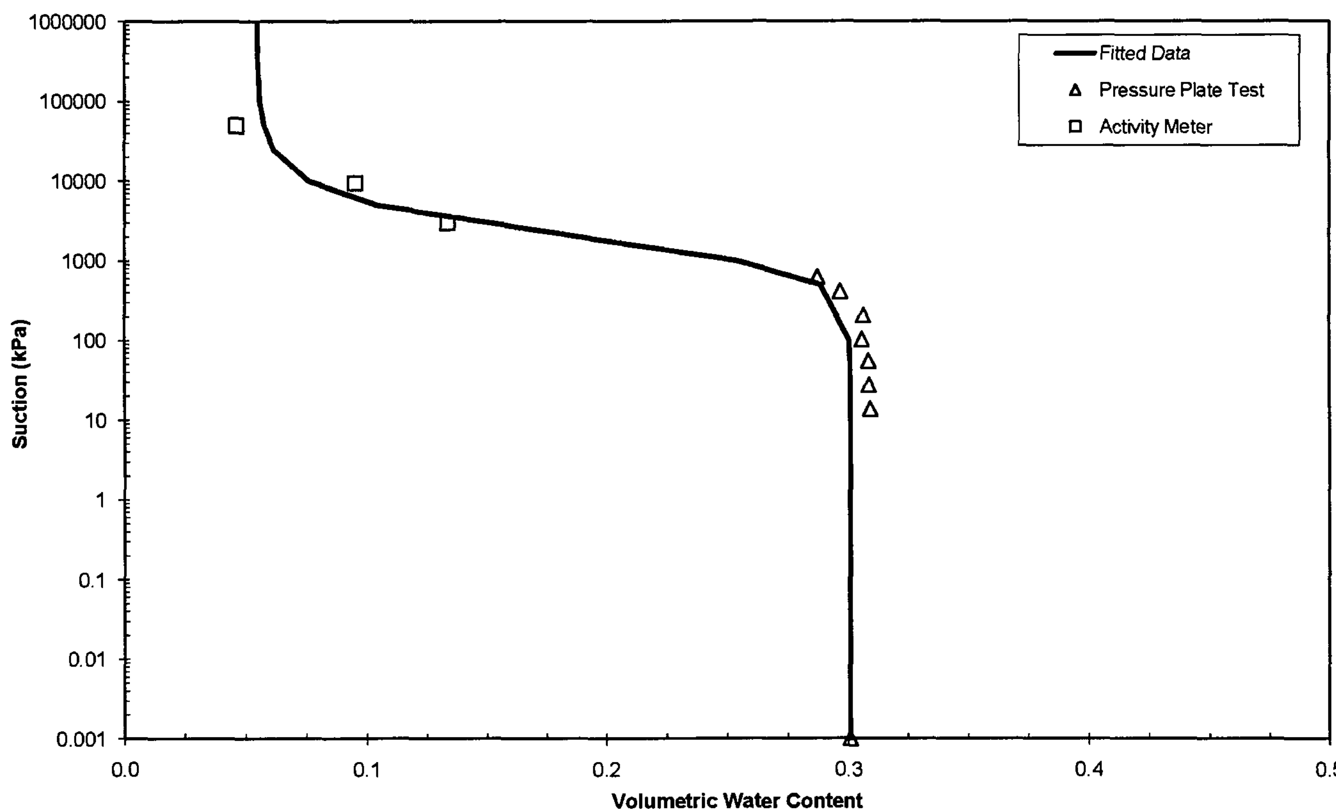
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.301	0.3007	0.000	0.000
13.79	0.309	0.3007	0.008	0.000
27.59	0.309	0.3007	0.008	0.000
55.18	0.309	0.3006	0.008	0.000
103.46	0.306	0.3003	0.005	0.000
206.91	0.306	0.2989	0.007	0.000
413.82	0.297	0.2924	0.004	0.000
620.73	0.287	0.2814	0.006	0.000
3000.00	0.134	0.1422	-0.009	0.000
9450.00	0.095	0.0776	0.018	0.000
49800.00	0.046	0.0576	-0.011	0.000

Residual = 7.65783E-05

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3007
0.025	0.3007
0.05	0.3007
0.075	0.3007
0.1	0.3007
1	0.3007
2	0.3007
3	0.3007
4	0.3007
5	0.3007
6	0.3007
7	0.3007
8	0.3007
9	0.3007
10	0.3007
15	0.3007
20	0.3007
30	0.3007
40	0.3007
50	0.3007
60	0.3006
70	0.3006
80	0.3005
90	0.3005
100	0.3004
500	0.2883
1000	0.2539
5000	0.1041
10000	0.0760
25000	0.0615
5.00E+04	0.0575
1.00E+05	0.0559
5.00E+05	0.0548
7.50E+05	0.0547
1.00E+06	0.0547

Fitted and Lab Data



Pressure Plate Extractor Test - Helena - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm Helena Mid 1		Test Date	3/6/2009
WT of Sample Ring =	382.6	g		
WT of Sample Ring + Soil =	1642.8	g		
Water Content =	38.82	%		
Diameter of Sample Ring, D =	5.92	in		
Height of Sample Ring, L =	1.5	in		
Volume, V =	2.45E-02	ft^3	694.6	cm^3
Dry Unit Weight =	81.58	pcf	1.31	Mg/m^3
Water WT =	352.43	g		
Solid WT =	907.77	g		
Add Water for saturation =	5	g	Sr	100.51
Saturated Water Content =	39.37	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.394	0.515
0.5		31.500	3.449	0.359	0.469
1		46.500	6.897	0.343	0.448
2		66.500	13.794	0.320	0.419
3		85.000	20.691	0.300	0.392
4		99.000	27.588	0.285	0.372
8		124.000	55.176	0.257	0.336
15		139.000	103.455	0.241	0.315
		Activity Meter Test	1200.00	0.221	0.288
			8160.00	0.158	0.206
			12400.00	0.147	0.192
			55600.00	0.099	0.129
			69900.00	0.092	0.120
			2010.00	0.195	0.254
			9550.00	0.147	0.192
			16100.00	0.130	0.170
			33400.00	0.108	0.141
			62000.00	0.090	0.117
			73700.00	0.084	0.110

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.2	18.7998	25.5458	24.3268	0.221	0.288
8.16	18.7998	25.1981	24.3268	0.158	0.206
12.4	18.7998	25.1372	24.3268	0.147	0.192
55.6	18.7998	24.8715	24.3268	0.099	0.129
69.9	18.7998	24.8335	24.3268	0.092	0.120
2.01	18.1342	24.5823	23.5322	0.195	0.254
9.55	18.1342	24.3243	23.5322	0.147	0.192
16.1	18.1342	24.2342	23.5322	0.130	0.170
33.4	18.1342	24.1155	23.5322	0.108	0.141
62	18.1342	24.0158	23.5322	0.090	0.117
73.7	18.1342	23.9877	23.5322	0.084	0.110

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5148
α =	0.3312
n =	1.1292
m =	0.1144

FOR GRAPHING

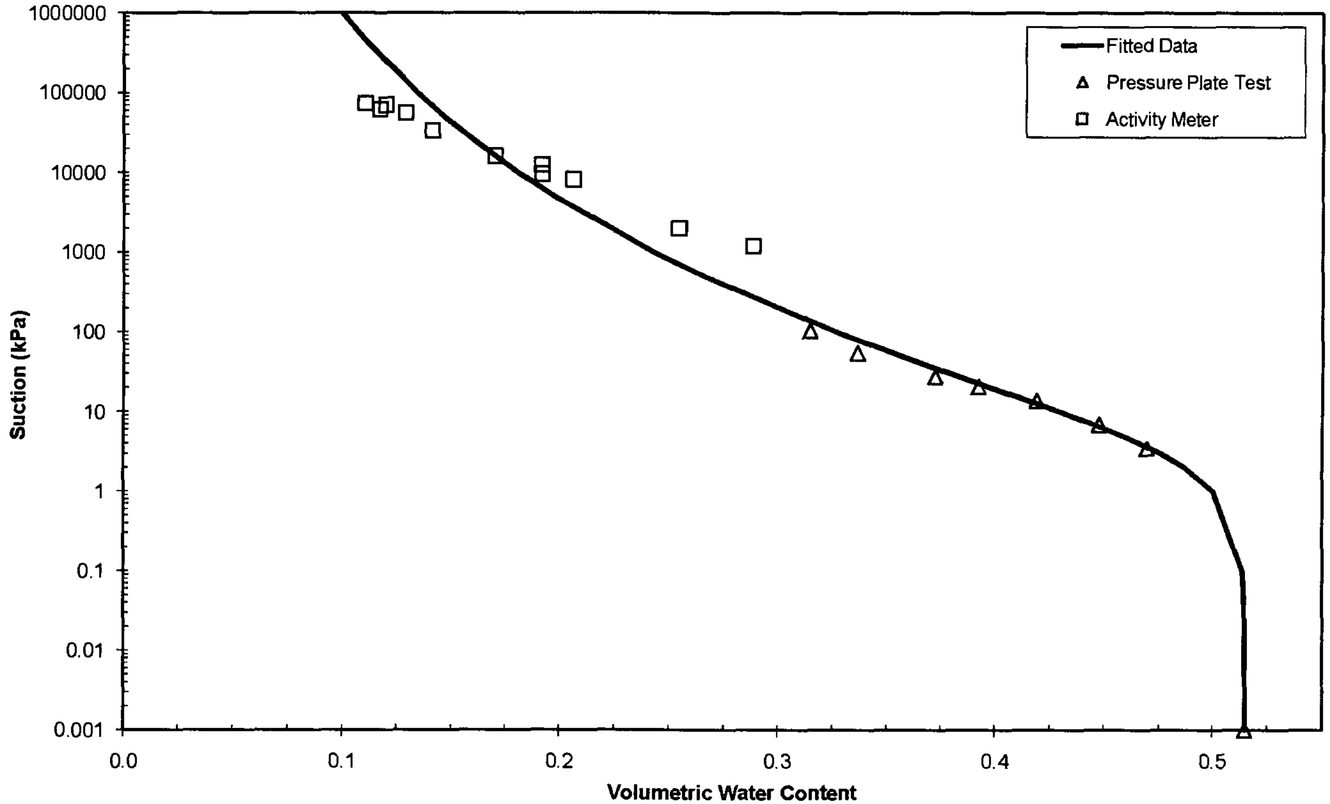
Suction (kPa)	VWC
0.001	0.5148
0.025	0.5145
0.05	0.5142
0.075	0.5139
0.1	0.5135
1	0.5001
2	0.4869
3	0.4757
4	0.4663
5	0.4582
6	0.4511
7	0.4448
8	0.4392
9	0.4341
10	0.4295
15	0.4113
20	0.3981
30	0.3795
40	0.3665
50	0.3565
60	0.3485
70	0.3419
80	0.3362
90	0.3312
100	0.3268
500	0.2659
1000	0.2432
5000	0.1976
10000	0.1807
25000	0.1605
5.00E+04	0.1468
1.00E+05	0.1342
5.00E+05	0.1090
7.50E+05	0.1034
1.00E+06	0.0997

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.515	0.5148	0.000	0.000
3.45	0.469	0.4713	-0.002	0.000
6.90	0.448	0.4454	0.002	0.000
13.79	0.419	0.4151	0.004	0.000
20.69	0.392	0.3965	-0.004	0.000
27.59	0.372	0.3833	-0.011	0.000
55.18	0.336	0.3522	-0.016	0.000
103.46	0.315	0.3254	-0.011	0.000
1200.00	0.288	0.2376	0.051	0.003
8160.00	0.206	0.1855	0.021	0.000
12400.00	0.192	0.1757	0.016	0.000
55600.00	0.129	0.1448	-0.016	0.000
69900.00	0.120	0.1405	-0.021	0.000
2010.00	0.254	0.2223	0.032	0.001
9550.00	0.192	0.1817	0.010	0.000
16100.00	0.170	0.1699	0.000	0.000
33400.00	0.141	0.1546	-0.013	0.000
62000.00	0.117	0.1427	-0.026	0.001
73700.00	0.110	0.1396	-0.029	0.001

Residual = 0.000384189

Fitted and Lab Data



Pressure Plate Extractor Test - Helena - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	**Helena Mid 1**		**Test Date**	1/29/2009
WT of Sample Ring =	69.35	g		
WT of Sample Ring + Soil =	248.39	g		
Water Content =	37.80	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	77.05	pcf	1.23	Mg/m^3
Water WT =	49.11	g		
Solid WT =	129.93	g		
Add Water for saturation =	5.45	g	Sr	96.15
Saturated Water Content =	41.99	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	13.1	0.000	0.001	0.420	0.519
0.5	13.1	0.000	3.449	0.420	0.519
1	33.8	3.933	6.897	0.390	0.481
2	41.3	5.358	13.794	0.379	0.468
4	56.2	8.189	27.588	0.357	0.441
8	72.6	11.305	55.176	0.333	0.411
15	85.1	13.680	103.455	0.315	0.389
30	87.7	14.174	206.910	0.311	0.384
60	102.5	16.986	413.820	0.289	0.357
80	104.3	17.328	551.760	0.287	0.354

	Activity Meter Test	2210.00	0.235	0.290
		15300.00	0.153	0.189
		20900.00	0.140	0.173
		30900.00	0.131	0.162
		61100.00	0.095	0.117

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.21	3.1914	10.7371	9.3024433	0.235	0.290
15.3	3.1914	10.2358	9.3024433	0.153	0.189
20.9	3.1914	10.1587	9.3024433	0.140	0.173
30.9	3.1914	10.1041	9.3024433	0.131	0.162
61.1	3.1914	9.88	9.3024433	0.095	0.117

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5190
α =	0.0483
n =	1.1493
m =	0.1299

FOR GRAPHING

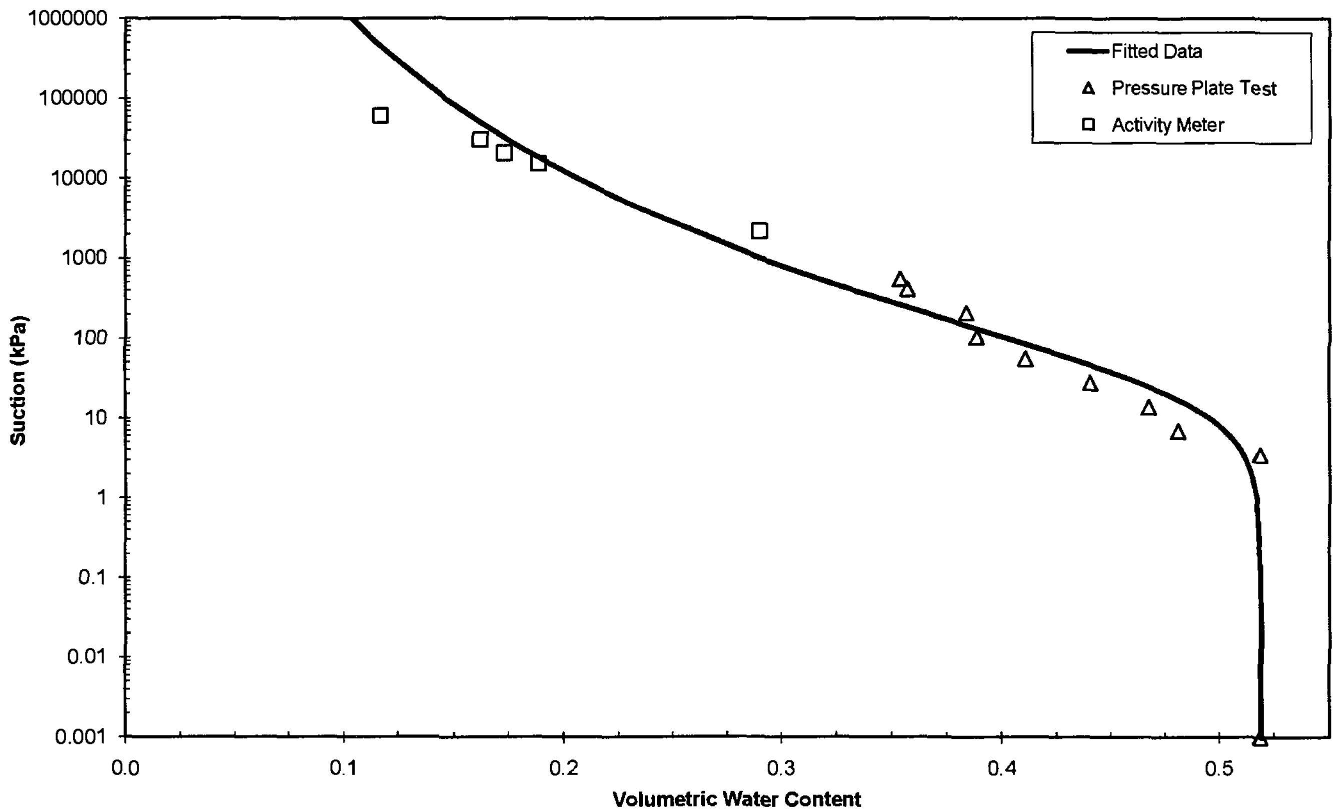
Suction (kPa)	VWC
0.001	0.5190
0.025	0.5190
0.05	0.5189
0.075	0.5189
0.1	0.5189
1	0.5170
2	0.5146
3	0.5121
4	0.5096
5	0.5071
6	0.5047
7	0.5022
8	0.4999
9	0.4976
10	0.4953
15	0.4848
20	0.4755
30	0.4600
40	0.4475
50	0.4371
60	0.4282
70	0.4205
80	0.4137
90	0.4077
100	0.4023
500	0.3216
1000	0.2905
5000	0.2287
10000	0.2063
25000	0.1799
5.00E+04	0.1622
1.00E+05	0.1463
5.00E+05	0.1150
7.50E+05	0.1083
1.00E+06	0.1037

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.519	0.5190	0.000	0.000
3.45	0.519	0.5110	0.008	0.000
6.90	0.481	0.5025	-0.021	0.000
13.79	0.468	0.4872	-0.020	0.000
27.59	0.441	0.4634	-0.023	0.001
55.18	0.411	0.4323	-0.021	0.000
103.46	0.389	0.4005	-0.012	0.000
206.91	0.384	0.3648	0.019	0.000
413.82	0.357	0.3305	0.027	0.001
551.76	0.354	0.3170	0.037	0.001
2210.00	0.290	0.2583	0.032	0.001
15300.00	0.189	0.1936	-0.005	0.000
20900.00	0.173	0.1848	-0.012	0.000
30900.00	0.162	0.1743	-0.012	0.000
61100.00	0.117	0.1574	-0.041	0.002

Residual = 0.000493924

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm EAST NORTH TOP		Test Date	4/9/2008
WT of Sample Ring =	376.6	g		
WT of Sample Ring + Soil =	1607	g		
Water Content =	24.55	%		
Diameter of Sample Ring, D =	6.06	in		
Height of Sample Ring, L =	1.4	in		
Volume, V =	2.39E-02	ft^3	675.9	cm^3
Dry Unit Weight =	91.24	pcf	1.46	Mg/m^3
Water WT =	242.52	g		
Solid WT =	987.88	g		
Add Water for saturation =	58.4	g	Sr	98.03
Saturated Water Content =	30.46	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.305	0.445
0.5		19.000	3.449	0.285	0.417
1		31.000	6.897	0.273	0.400
2		49.000	13.794	0.255	0.373
4		79.000	27.588	0.225	0.328
8		112.500	55.176	0.191	0.279
15		136.500	103.455	0.166	0.243
30		154.500	206.910	0.148	0.217
60		163.500	413.820	0.139	0.203
		Activity Meter Test	1350.00	0.092	0.135
			17900.00	0.049	0.072
			24100.00	0.047	0.069

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.35	7.7255	15.0651	14.4444	0.092	0.135
17.9	8.0855	15.0824	14.7555	0.049	0.072
24.1	7.6806	14.7071	14.391	0.047	0.069

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

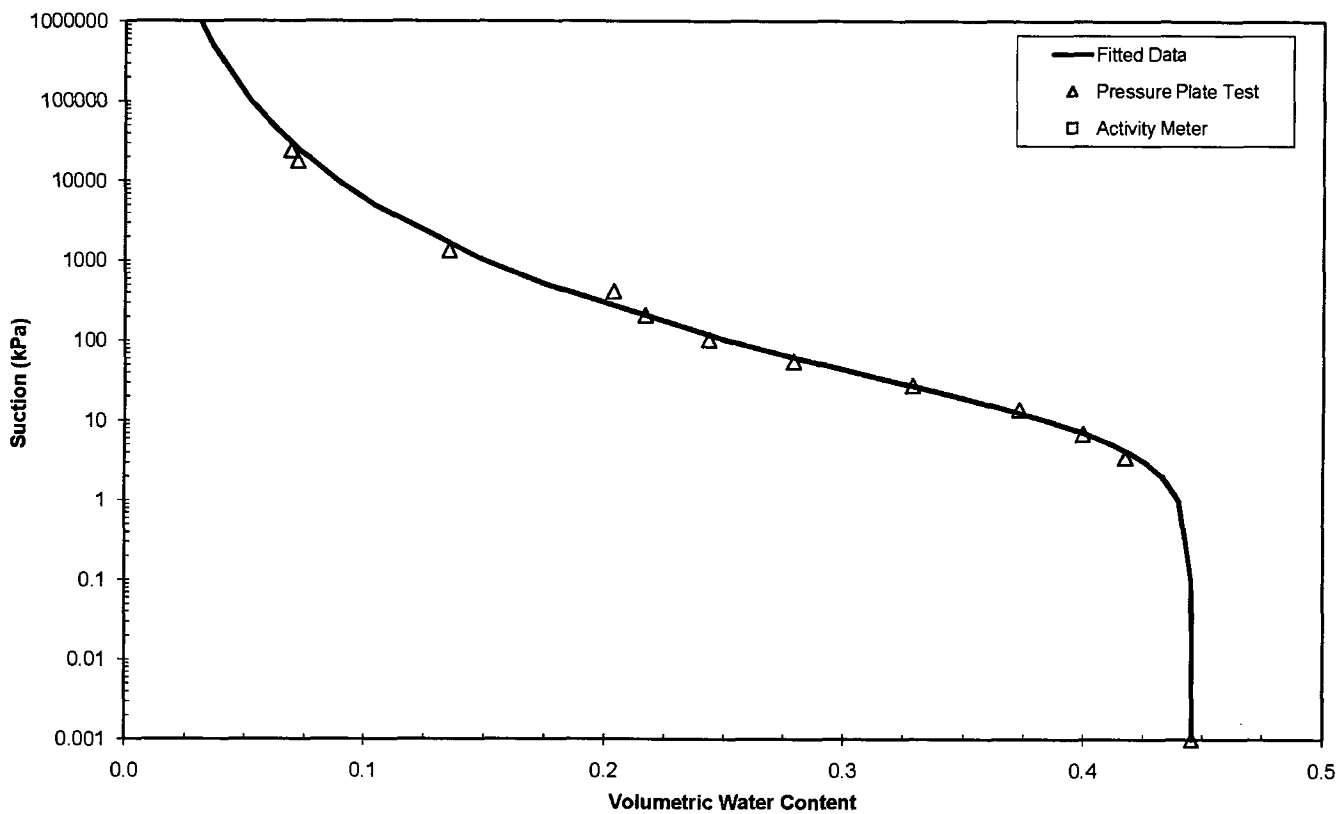
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4454
α =	0.1168
n =	1.2285
m =	0.1860

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4454
0.025	0.4454
0.05	0.4453
0.075	0.4452
0.1	0.4451
1	0.4397
2	0.4328
3	0.4257
4	0.4188
5	0.4122
6	0.4060
7	0.4001
8	0.3945
9	0.3893
10	0.3843
15	0.3633
20	0.3469
30	0.3226
40	0.3051
50	0.2917
60	0.2809
70	0.2719
80	0.2642
90	0.2576
100	0.2518
500	0.1757
1000	0.1500
5000	0.1039
10000	0.0887
25000	0.0720
5.00E+04	0.0614
1.00E+05	0.0524
5.00E+05	0.0363
7.50E+05	0.0331
1.00E+06	0.0310

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.445	0.4454	0.000	0.000
3.45	0.417	0.4226	-0.005	0.000
6.90	0.400	0.4007	-0.001	0.000
13.79	0.373	0.3679	0.005	0.000
27.59	0.328	0.3277	0.001	0.000
55.18	0.279	0.2858	-0.007	0.000
103.46	0.243	0.2499	-0.007	0.000
206.91	0.217	0.2144	0.002	0.000
413.82	0.203	0.1834	0.020	0.000
1350.00	0.135	0.1401	-0.005	0.000
17900.00	0.072	0.0777	-0.006	0.000
24100.00	0.069	0.0726	-0.004	0.000
		0.4454	-0.445	0.198
			Residual =	5.23861E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	East Side North Pit 0-30 cm		Test Date	1/10/2008
WT of Sample Ring =	69.9	g		
WT of Sample Ring + Soil =	293.5	g		
Water Content =	23.70	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	107.19	pcf	1.72	Mg/m^3
Water WT =	42.84	g		
Solid WT =	180.76	g		
Add Water for saturation =	0	g	Sr	113.39
Saturated Water Content =	23.70	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	13.9	0.000	0.001	0.237	0.407
1	21.2	1.387	6.897	0.229	0.394
2	25.8	2.261	13.794	0.224	0.386
4	33.3	3.686	27.588	0.217	0.372
7.7	43.2	5.567	53.107	0.206	0.354
15	69.5	10.564	103.455	0.179	0.307
		Activity Meter Test	1150.00	0.113	0.194
			11800.00	0.063	0.108
			26100.00	0.051	0.088

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
26.1	20.44	28.82	28.4096	0.051	0.088
11.8	19.57	28.07	27.568	0.063	0.108
1.15	18.5	27.41	26.5059	0.113	0.194

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4071
α =	0.0239
n =	1.2323
m =	0.1885

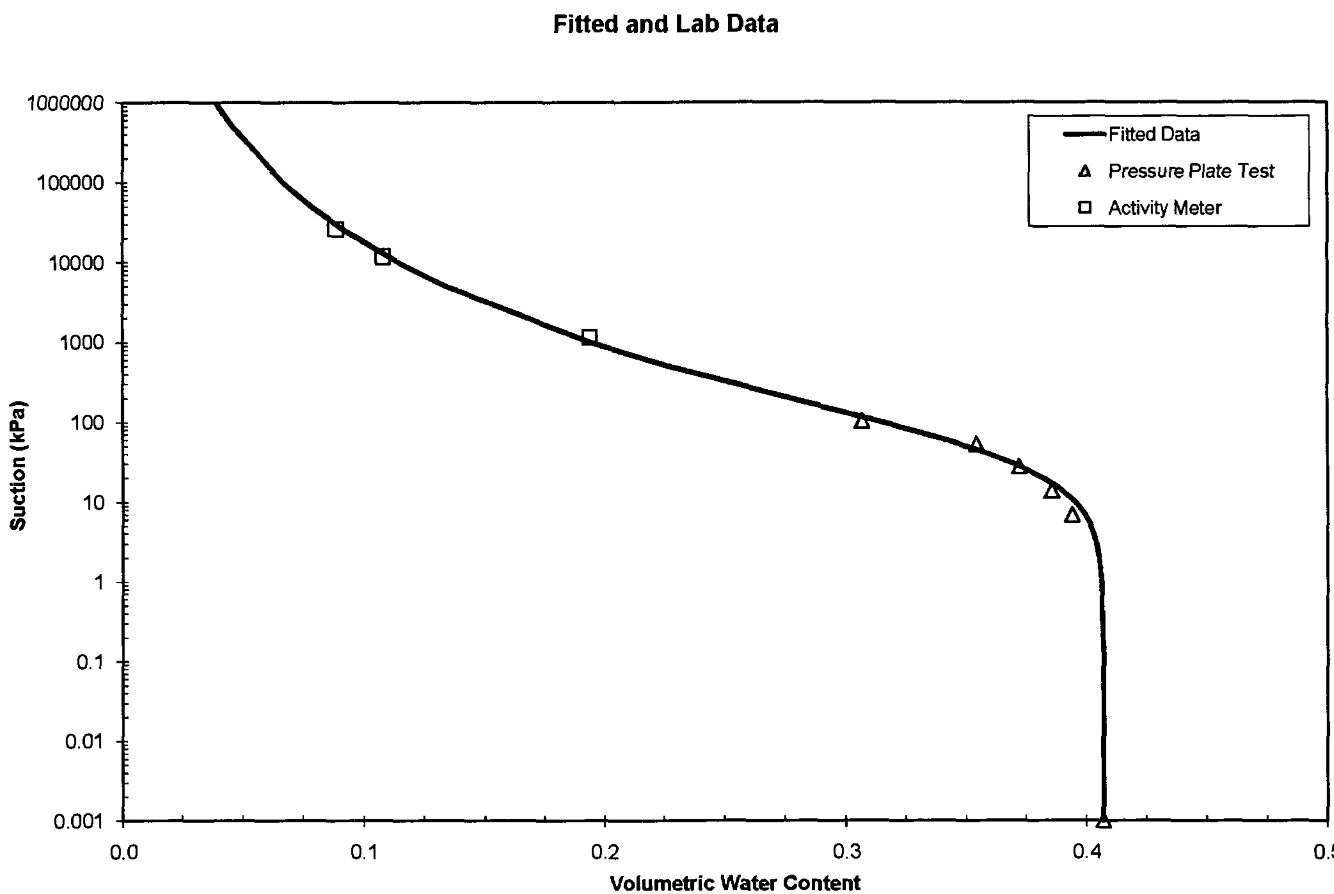
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4071
0.025	0.4071
0.05	0.4071
0.075	0.4071
0.1	0.4071
1	0.4063
2	0.4053
3	0.4042
4	0.4030
5	0.4018
6	0.4005
7	0.3992
8	0.3978
9	0.3965
10	0.3952
15	0.3885
20	0.3820
30	0.3699
40	0.3592
50	0.3496
60	0.3411
70	0.3335
80	0.3266
90	0.3204
100	0.3147
500	0.2269
1000	0.1941
5000	0.1340
10000	0.1141
25000	0.0922
5.00E+04	0.0785
1.00E+05	0.0668
5.00E+05	0.0460
7.50E+05	0.0418
1.00E+06	0.0391

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.407	0.4071	0.000	0.000
6.90	0.394	0.3993	-0.005	0.000
13.79	0.386	0.3901	-0.004	0.000
27.59	0.372	0.3727	-0.001	0.000
53.11	0.354	0.3469	0.007	0.000
103.46	0.307	0.3128	-0.006	0.000
1150.00	0.194	0.1880	0.006	0.000
11800.00	0.108	0.1098	-0.002	0.000
26100.00	0.088	0.0913	-0.003	0.000

Residual = 2.09061E-05


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	East Side North Pit 30-60 cm		Test Date	1/10/2008
WT of Sample Ring =	69.5	g		
WT of Sample Ring + Soil =	281.3	g		
Water Content =	24.81	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	100.63	pcf	1.61	Mg/m^3
Water WT =	42.10	g		
Solid WT =	169.70	g		
Add Water for saturation =	0.6	g	Sr	101.89
Saturated Water Content =	25.16	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	10.2	0.000	0.001	0.252	0.406
1	13.7	0.665	6.897	0.248	0.399
2	13.4	0.608	13.794	0.248	0.400
4	13.2	0.570	27.588	0.248	0.400
8	23.7	2.565	55.176	0.237	0.381
16	31.8	4.104	110.352	0.227	0.367
		Activity Meter Test	690.00	0.135	0.217
			3040.00	0.077	0.124
			19400.00	0.046	0.075

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
19.4	18.619	26.4791	26.1316	0.046	0.075
3.04	19.4855	27.5518	26.9776	0.077	0.124
0.69	18.5505	27.0092	26.0063	0.135	0.217

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

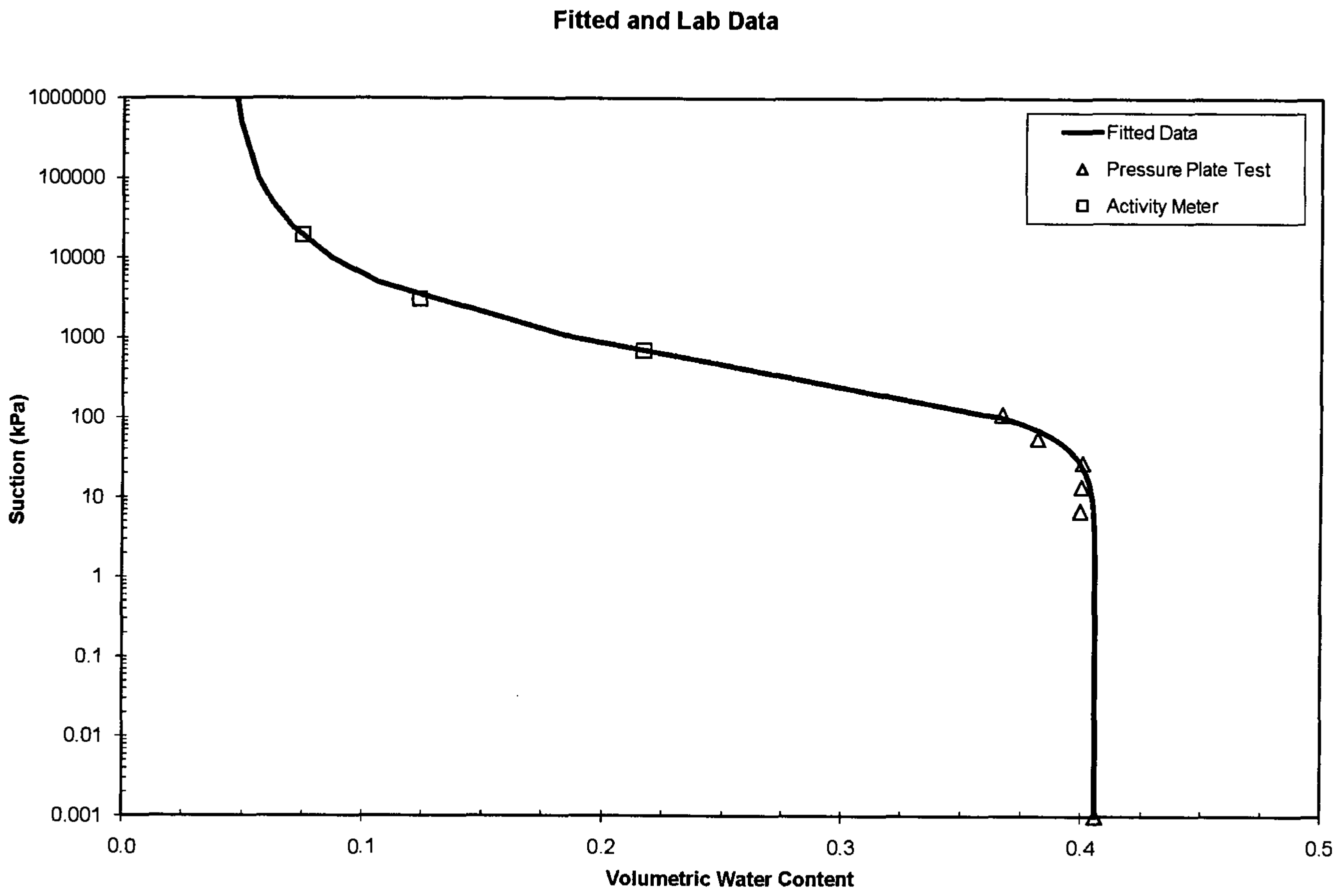
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0434
θ_s =	0.4058
α =	0.0053
n =	1.5356
m =	0.3488

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4058
0.025	0.4058
0.05	0.4058
0.075	0.4058
0.1	0.4058
1	0.4058
2	0.4057
3	0.4056
4	0.4055
5	0.4053
6	0.4052
7	0.4050
8	0.4048
9	0.4046
10	0.4044
15	0.4033
20	0.4019
30	0.3986
40	0.3949
50	0.3907
60	0.3864
70	0.3818
80	0.3772
90	0.3724
100	0.3677
500	0.2441
1000	0.1882
5000	0.1060
10000	0.0866
25000	0.0699
5.00E+04	0.0617
1.00E+05	0.0560
5.00E+05	0.0487
7.50E+05	0.0477
1.00E+06	0.0470

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.406	0.4058	0.000	0.000
6.90	0.399	0.4050	-0.006	0.000
13.79	0.400	0.4036	-0.004	0.000
27.59	0.400	0.3995	0.001	0.000
55.18	0.381	0.3885	-0.007	0.000
110.35	0.367	0.3628	0.004	0.000
690.00	0.217	0.2167	0.000	0.000
3040.00	0.124	0.1249	-0.001	0.000
19400.00	0.075	0.0737	0.001	0.000

Residual = 1.25272E-05


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm EAST SOUTH TOP		Test Date	4/9/2008
WT of Sample Ring =	385.6	g		
WT of Sample Ring + Soil =	2150.1	g		
Water Content =	26.60	%		
Diameter of Sample Ring, D =	6.04	in		
Height of Sample Ring, L =	2.0	in		
Volume, V =	3.33E-02	ft^3	943.8	cm^3
Dry Unit Weight =	92.19	pcf	1.48	Mg/m^3
Water WT =	370.74	g		
Solid WT =	1393.76	g		
Add Water for saturation =	37.5	g	Sr	96.44
Saturated Water Content =	29.29	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.293	0.433
0.5		40.500	3.449	0.264	0.390
1		55.500	6.897	0.253	0.374
2		78.500	13.794	0.237	0.350
4		135.500	27.588	0.196	0.289
8		178.500	55.176	0.165	0.244
15		212.500	103.455	0.140	0.207
30		237.500	206.910	0.123	0.181
60		254.500	413.820	0.110	0.163
		Activity Meter Test	1730.00	0.072	0.107
			2530.00	0.063	0.092
			26700.00	0.040	0.058

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.73	8.2984	15.5346	15.0461	0.072	0.107
2.53	7.5862	14.8092	14.3843	0.063	0.092
26.7	8.6789	15.4027	15.1469	0.040	0.058

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0081
θ_s =	0.4328
α =	0.1515
n =	1.2608
m =	0.2069

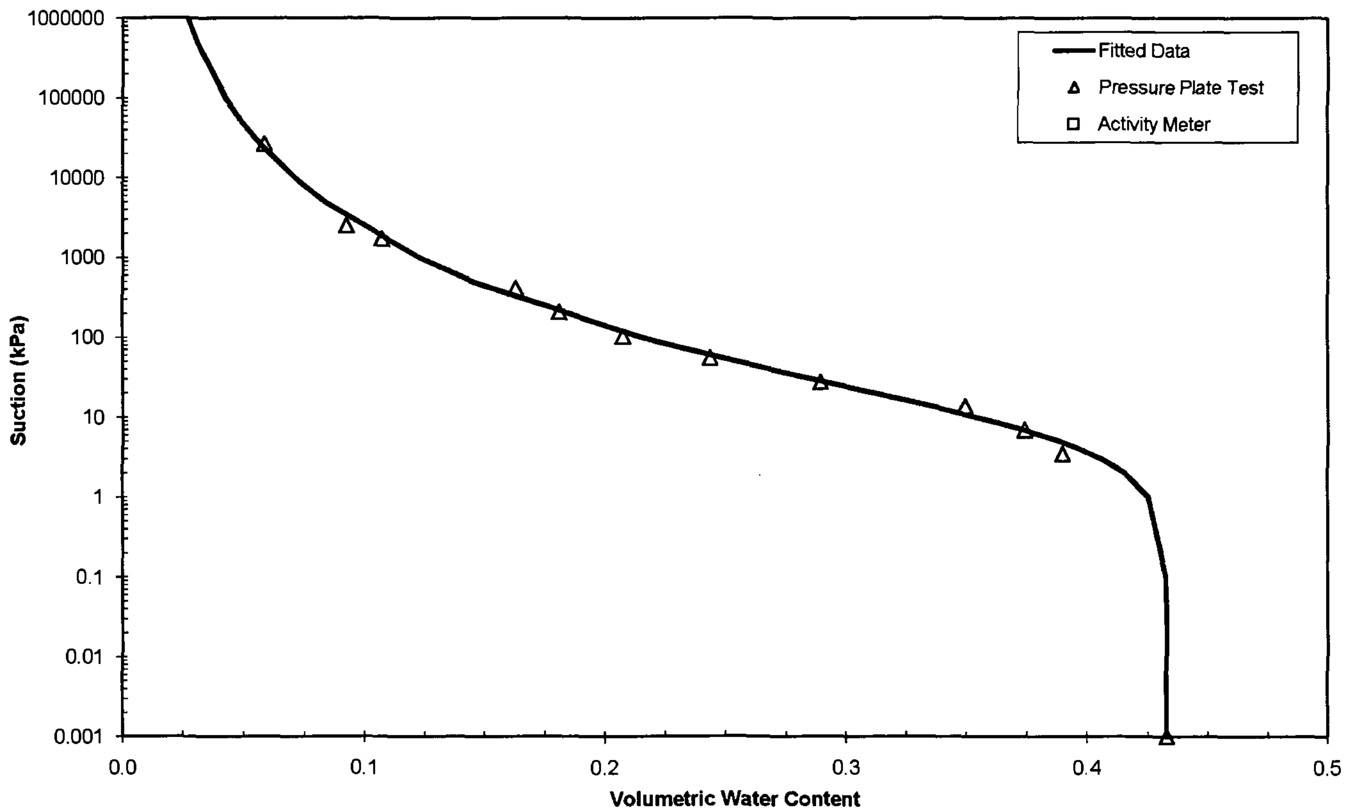
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4328
0.025	0.4327
0.05	0.4326
0.075	0.4324
0.1	0.4323
1	0.4250
2	0.4155
3	0.4060
4	0.3969
5	0.3884
6	0.3805
7	0.3732
8	0.3664
9	0.3601
10	0.3542
15	0.3300
20	0.3119
30	0.2862
40	0.2682
50	0.2547
60	0.2440
70	0.2351
80	0.2277
90	0.2213
100	0.2157
500	0.1453
1000	0.1227
5000	0.0834
10000	0.0710
25000	0.0576
5.00E+04	0.0494
1.00E+05	0.0426
5.00E+05	0.0307
7.50E+05	0.0285
1.00E+06	0.0270

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.433	0.4328	0.000	0.000
3.45	0.390	0.4018	-0.012	0.000
6.90	0.374	0.3739	0.000	0.000
13.79	0.350	0.3352	0.014	0.000
27.59	0.289	0.2915	-0.002	0.000
55.18	0.244	0.2488	-0.005	0.000
103.46	0.207	0.2140	-0.006	0.000
206.91	0.181	0.1805	0.000	0.000
413.82	0.163	0.1522	0.011	0.000
1730.00	0.107	0.1074	0.000	0.000
2530.00	0.092	0.0981	-0.006	0.000
26700.00	0.058	0.0567	0.002	0.000
0.00	0.000	0.4328	-0.433	0.187
			Residual =	4.81003E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	East Side South Pit 0-30 cm		Test Date	1/10/2008
WT of Sample Ring =	69.1	g		
WT of Sample Ring + Soil =	276.9	g		
Water Content =	24.99	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	98.59	pcf	1.58	Mg/m^3
Water WT =	41.55	g		
Solid WT =	166.25	g		
Add Water for saturation =	0.4	g	Sr	97.11
Saturated Water Content =	25.23	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	4.3	0.000	0.001	0.252	0.399
1	9.8	1.045	6.897	0.246	0.389
3.5	17.8	2.565	24.140	0.237	0.374
7.7	49.2	8.531	53.107	0.201	0.318
15.7	64.5	11.438	108.283	0.184	0.290
		Activity Meter Test	630.00	0.133	0.211
			2600.00	0.072	0.113
			8390.00	0.053	0.085

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
8.39	18.1381	25.8541	25.4623	0.053	0.085
2.6	18.521	26.3718	25.8468	0.072	0.113
0.63	19.5055	27.6341	26.678	0.133	0.211

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3986
α =	0.0229
n =	1.2815
m =	0.2197

FOR FITTING

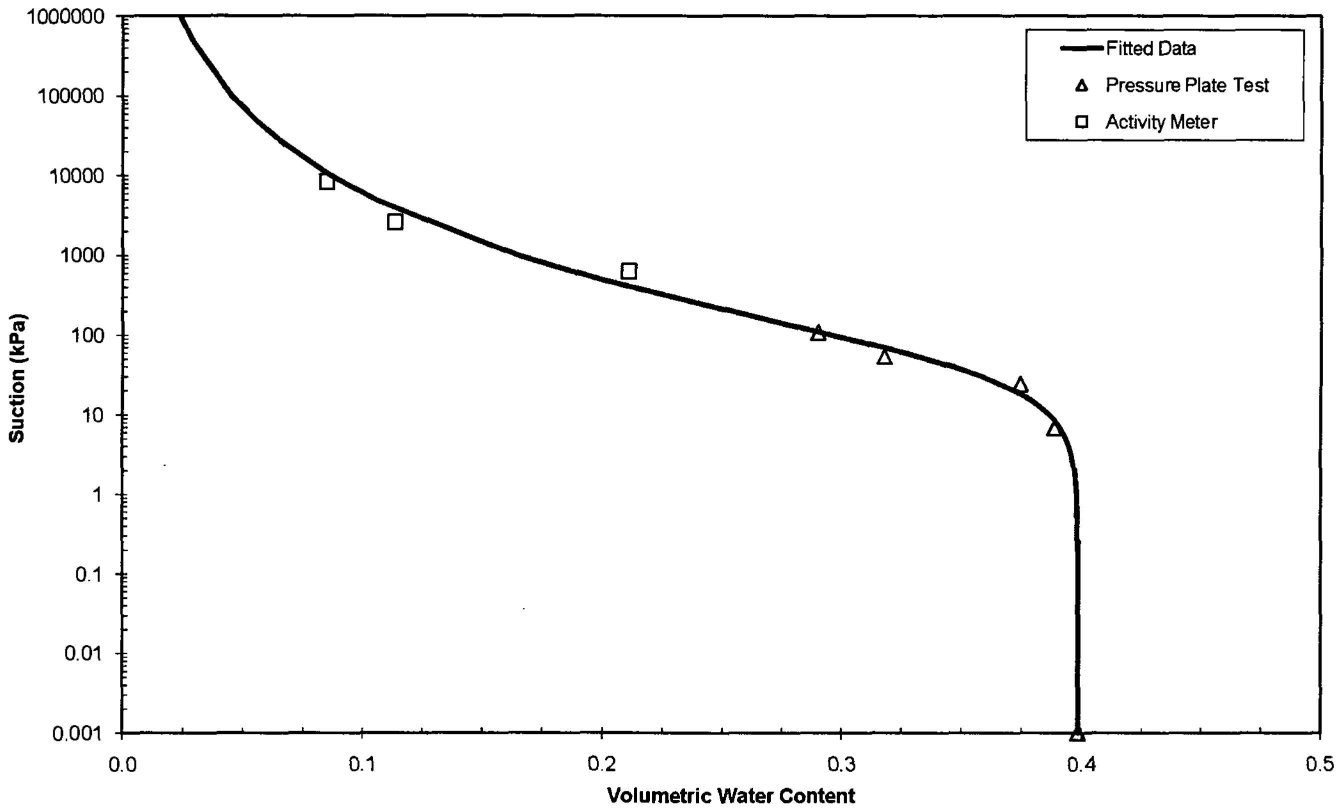
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.399	0.3986	0.000	0.000
6.90	0.389	0.3908	-0.002	0.000
24.14	0.374	0.3664	0.008	0.000
53.11	0.318	0.3325	-0.015	0.000
108.28	0.290	0.2908	-0.001	0.000
630.00	0.211	0.1867	0.024	0.001
2600.00	0.113	0.1260	-0.013	0.000
8390.00	0.085	0.0907	-0.006	0.000

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3986
0.025	0.3986
0.05	0.3986
0.075	0.3986
0.1	0.3986
1	0.3979
2	0.3970
3	0.3958
4	0.3946
5	0.3934
6	0.3921
7	0.3907
8	0.3893
9	0.3879
10	0.3865
15	0.3793
20	0.3721
30	0.3587
40	0.3465
50	0.3356
60	0.3259
70	0.3172
80	0.3094
90	0.3023
100	0.2958
500	0.1988
1000	0.1645
5000	0.1049
10000	0.0863
25000	0.0667
5.00E+04	0.0549
1.00E+05	0.0452
5.00E+05	0.0287
7.50E+05	0.0256
1.00E+06	0.0236

Residual = 0.000132708

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	East Side South Pit 30-60cm		Test Date	1/10/2008
WT of Sample Ring =	70.8	g		
WT of Sample Ring + Soil =	281.6	g		
Water Content =	25.89	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	99.30	pcf	1.59	Mg/m^3
Water WT =	43.35	g		
Solid WT =	167.45	g		
Add Water for saturation =	0	g	Sr	101.41
Saturated Water Content =	25.89	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	32.5	0.000	0.001	0.259	0.412
1	36.5	0.760	6.897	0.254	0.405
2.1	40.4	1.501	14.484	0.250	0.398
3.8	59.2	5.073	26.209	0.229	0.364
		Activity Meter Test	800.00	0.118	0.187
			1530.00	0.079	0.126
			33200.00	0.036	0.058

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
33.2	22.7723	30.4468	30.1778	0.036	0.058
1.53	18.9694	26.9177	26.3363	0.079	0.126
0.8	18.8017	27.0835	26.2118	0.118	0.187

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4120
α =	0.0242
n =	1.2954
m =	0.2280

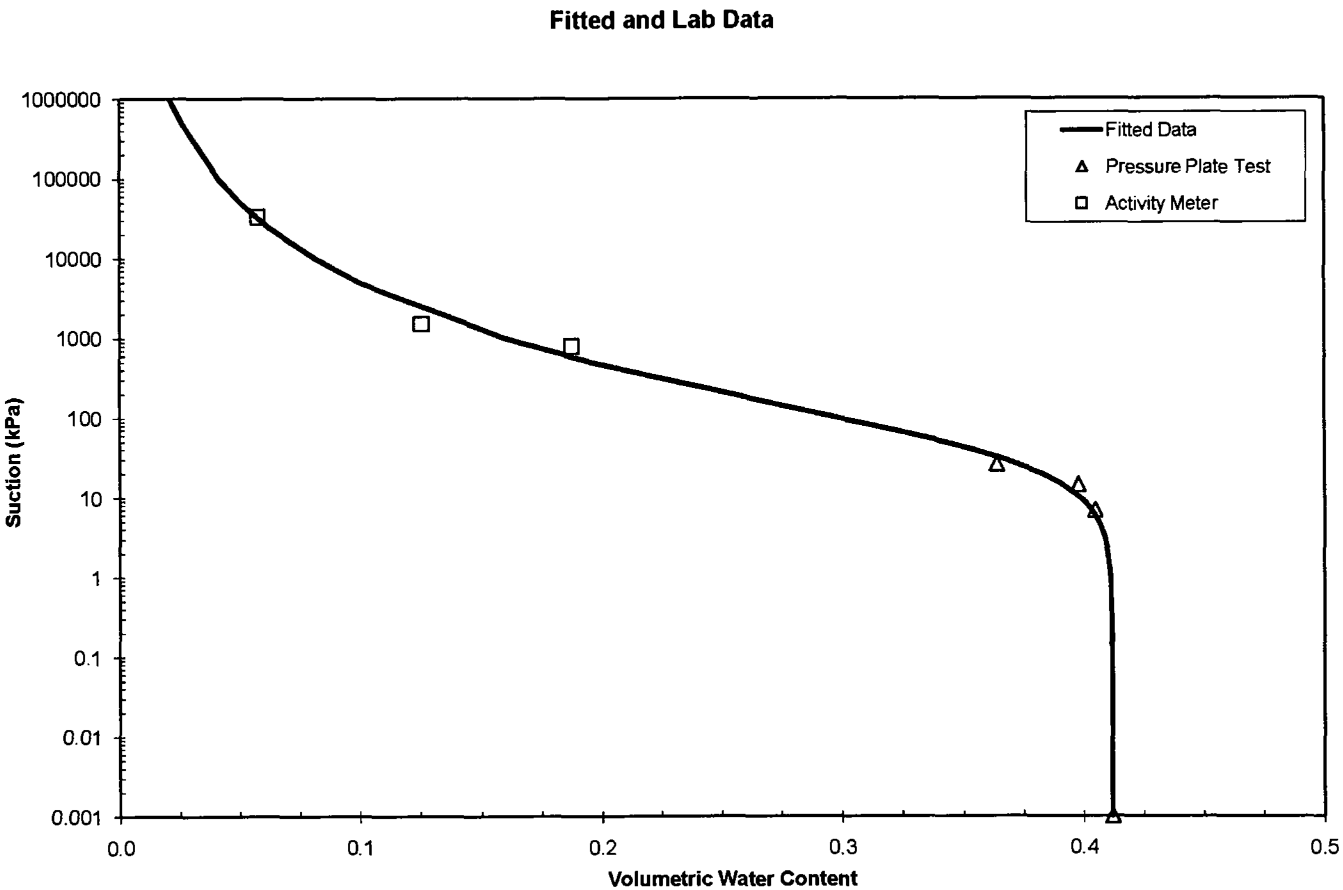
FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.412	0.4120	0.000	0.000
6.90	0.405	0.4032	0.002	0.000
14.48	0.398	0.3910	0.007	0.000
26.21	0.364	0.3725	-0.009	0.000
800.00	0.187	0.1708	0.016	0.000
1530.00	0.126	0.1414	-0.016	0.000
33200.00	0.058	0.0571	0.001	0.000

Residual = 9.19351E-05

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4120
0.025	0.4120
0.05	0.4120
0.075	0.4120
0.1	0.4119
1	0.4112
2	0.4101
3	0.4089
4	0.4075
5	0.4061
6	0.4046
7	0.4031
8	0.4015
9	0.3999
10	0.3983
15	0.3901
20	0.3821
30	0.3669
40	0.3533
50	0.3413
60	0.3306
70	0.3211
80	0.3125
90	0.3048
100	0.2978
500	0.1954
1000	0.1601
5000	0.0998
10000	0.0814
25000	0.0621
5.00E+04	0.0506
1.00E+05	0.0412
5.00E+05	0.0256
7.50E+05	0.0227
1.00E+06	0.0209


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm Caisson North Surface		Test Date	8/5/2008
WT of Sample Ring =	884.2	g		
WT of Sample Ring + Soil =	6515	g		
Water Content =	29.00	%		
Diameter of Sample Ring, D =	10.00	in		
Height of Sample Ring, L =	2.1	in		
Volume, V =	9.66E-02	ft^3	2735.0	cm^3
Dry Unit Weight =	99.63	pcf	1.60	Mg/m^3
Water WT =	1265.85	g		
Solid WT =	4364.95	g		
Add Water for saturation =	213.3	g	Sr	133.85
Saturated Water Content =	33.89	%		
Tube Area, A =	20.268299	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	2.3	0.000	0.001	0.339	0.541
0.5	5.9	72.966	3.449	0.322	0.514
1	10.3	162.146	6.897	0.302	0.482
2	15.1	259.434	13.794	0.279	0.446
3	18.7	332.400	20.691	0.263	0.419
4	22	399.285	27.588	0.247	0.395
8	29.2	545.217	55.176	0.214	0.342
15	36	683.042	103.455	0.182	0.291
30	41.1	786.410	206.910	0.159	0.253
60	47.8	922.208	413.820	0.128	0.204
		Activity Meter Test	930.00	0.122	0.195
			1120.00	0.108	0.172
			3080.00	0.084	0.133
			12300.00	0.065	0.104
			62000.00	0.040	0.064

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
0.93	20.5492	28.4406	27.5813	0.122	0.195
1.12	18.8023	27.239	26.4166	0.108	0.172
3.08	22.7633	30.9988	30.3634	0.084	0.133
12.3	18.832	26.8103	26.3235	0.065	0.104
62	19.5213	27.2954	26.9946	0.040	0.064

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0070
θ_s =	0.5411
α =	0.1160
n =	1.2418
m =	0.1947

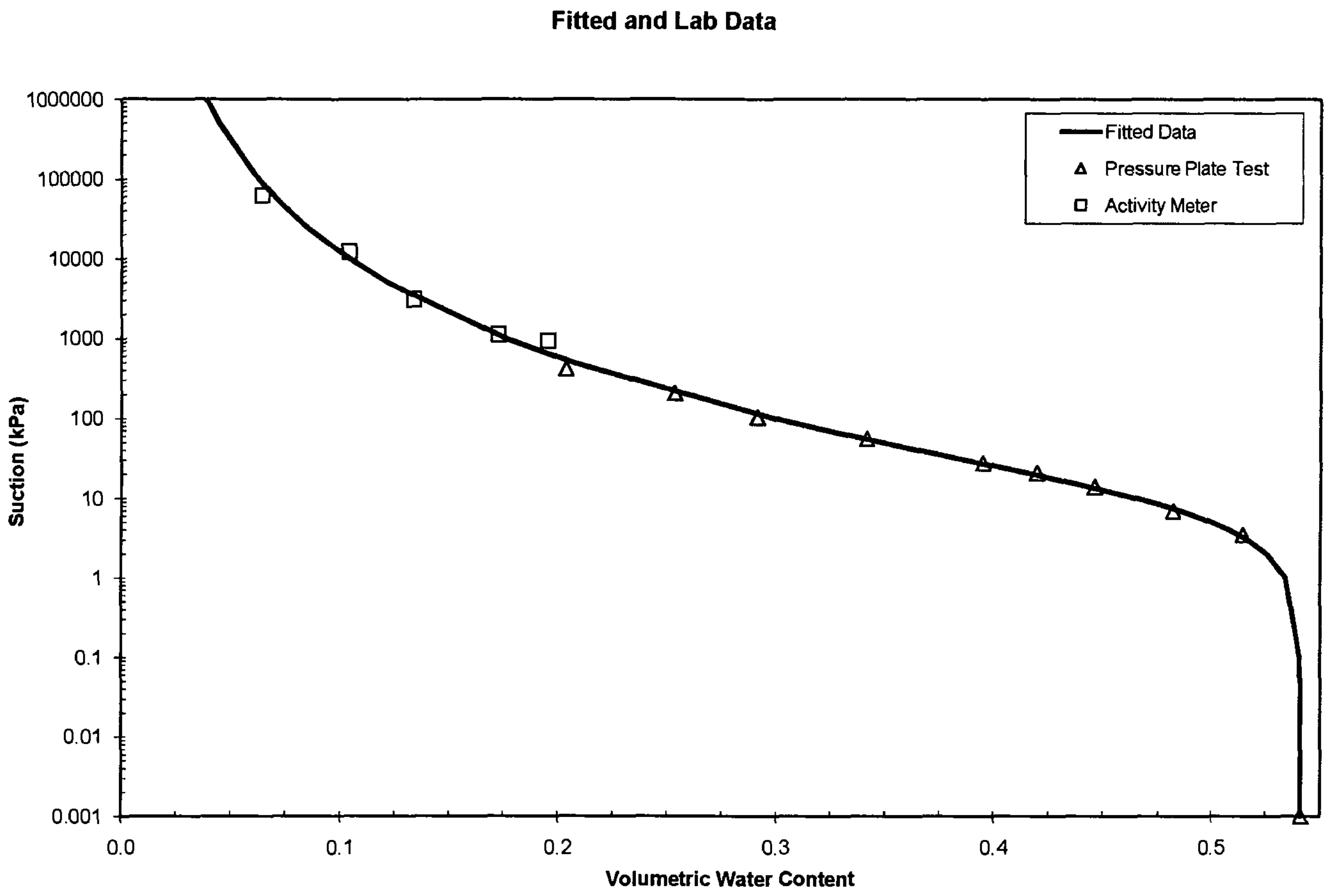
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.5411
0.025	0.5410
0.05	0.5409
0.075	0.5408
0.1	0.5407
1	0.5342
2	0.5256
3	0.5168
4	0.5082
5	0.5000
6	0.4921
7	0.4847
8	0.4778
9	0.4712
10	0.4649
15	0.4385
20	0.4179
30	0.3874
40	0.3656
50	0.3489
60	0.3355
70	0.3244
80	0.3149
90	0.3067
100	0.2995
500	0.2068
1000	0.1761
5000	0.1216
10000	0.1039
25000	0.0846
5.00E+04	0.0727
1.00E+05	0.0625
5.00E+05	0.0446
7.50E+05	0.0411
1.00E+06	0.0388

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.541	0.5411	0.000	0.000
3.45	0.514	0.5129	0.001	0.000
6.90	0.482	0.4855	-0.004	0.000
13.79	0.446	0.4442	0.002	0.000
20.69	0.419	0.4154	0.004	0.000
27.59	0.395	0.3938	0.001	0.000
55.18	0.342	0.3416	0.000	0.000
103.46	0.291	0.2973	-0.006	0.000
206.91	0.253	0.2537	0.000	0.000
413.82	0.204	0.2161	-0.012	0.000
930.00	0.195	0.1790	0.016	0.000
1120.00	0.172	0.1715	0.001	0.000
3080.00	0.133	0.1358	-0.002	0.000
12300.00	0.104	0.0992	0.005	0.000
62000.00	0.064	0.0693	-0.005	0.000

Residual = 3.58545E-05


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm NORTH CAISSON TOP		Test Date	4/9/2008
WT of Sample Ring =	387	g		
WT of Sample Ring + Soil =	1817.8	g		
Water Content =	31.08	%		
Diameter of Sample Ring, D =	6.03	in		
Height of Sample Ring, L =	1.7	in		
Volume, V =	2.73E-02	ft^3	772.2	cm^3
Dry Unit Weight =	88.25	pcf	1.41	Mg/m^3
Water WT =	339.25	g		
Solid WT =	1091.55	g		
Add Water for saturation =	31.2	g	Sr	101.62
Saturated Water Content =	33.94	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.339	0.480
0.5		20.000	3.449	0.321	0.454
1		36.000	6.897	0.306	0.433
2		55.000	13.794	0.289	0.409
4		88.000	27.588	0.259	0.366
8		125.000	55.176	0.225	0.318
15		151.000	103.455	0.201	0.284
30		178.000	206.910	0.176	0.249
60		189.500	413.820	0.166	0.234
		Activity Meter Test	1380.00	0.088	0.125
			1620.00	0.081	0.115
			6880.00	0.058	0.082

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.38	7.7906	14.6633	14.1046	0.088	0.125
1.62	7.6997	14.6378	14.1172	0.081	0.115
6.88	8.2177	15.0395	14.6646	0.058	0.082

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4800
α =	0.0742
n =	1.2611
m =	0.2070

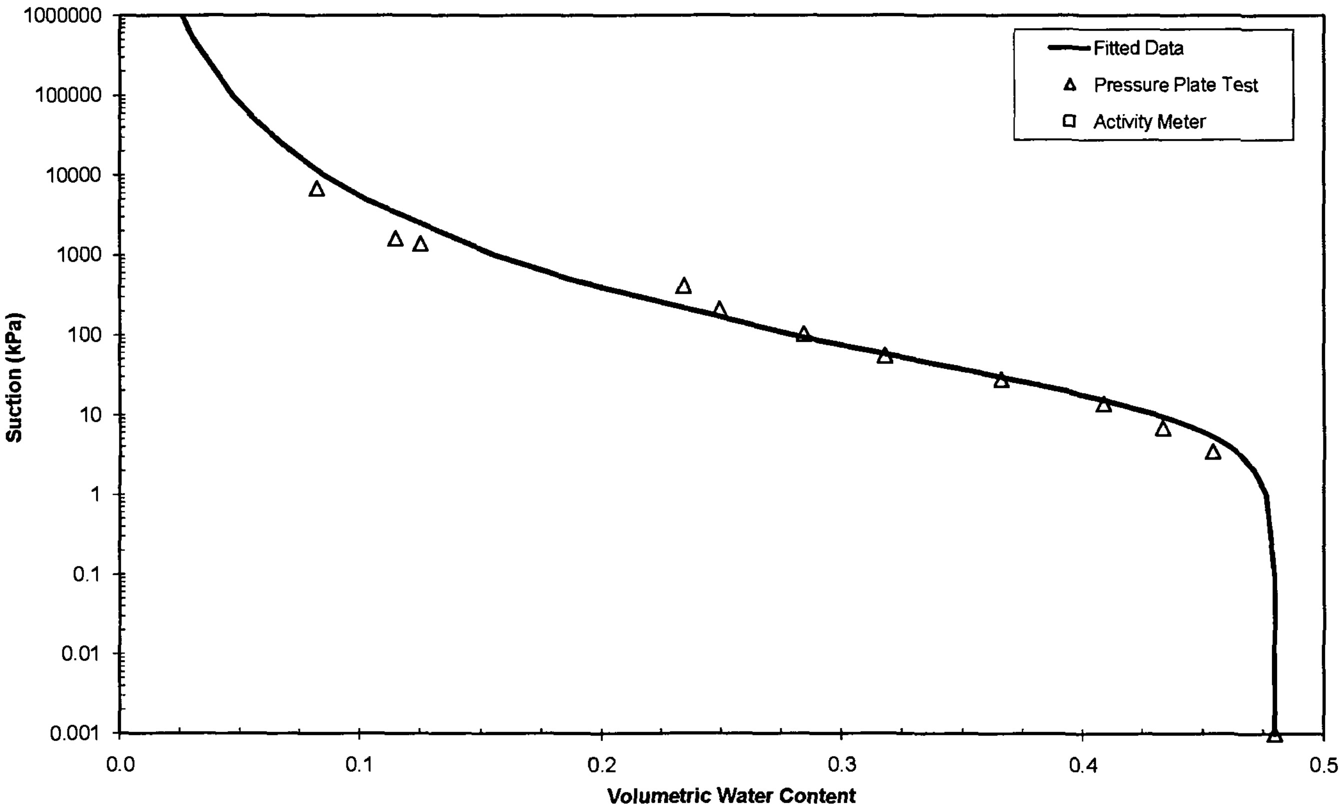
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4800
0.025	0.4799
0.05	0.4799
0.075	0.4798
0.1	0.4798
1	0.4763
2	0.4715
3	0.4662
4	0.4609
5	0.4556
6	0.4503
7	0.4452
8	0.4402
9	0.4354
10	0.4307
15	0.4098
20	0.3924
30	0.3652
40	0.3448
50	0.3287
60	0.3156
70	0.3046
80	0.2953
90	0.2871
100	0.2799
500	0.1864
1000	0.1558
5000	0.1024
10000	0.0855
25000	0.0673
5.00E+04	0.0562
1.00E+05	0.0469
5.00E+05	0.0308
7.50E+05	0.0277
1.00E+06	0.0257

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.480	0.4800	0.000	0.000
3.45	0.454	0.4639	-0.010	0.000
6.90	0.433	0.4457	-0.012	0.000
13.79	0.409	0.4145	-0.006	0.000
27.59	0.366	0.3710	-0.005	0.000
55.18	0.318	0.3216	-0.004	0.000
103.46	0.284	0.2776	0.007	0.000
206.91	0.249	0.2337	0.016	0.000
413.82	0.234	0.1958	0.039	0.001
1380.00	0.125	0.1433	-0.018	0.000
1620.00	0.115	0.1374	-0.023	0.001
6880.00	0.082	0.0942	-0.012	0.000
0.00	0.000	0.4800	-0.480	0.230
			Residual =	0.000257788

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	North Caisson 30-60 cm		Test Date		1/10/2008
WT of Sample Ring =	70.21	g			
WT of Sample Ring + Soil =	279.4	g			
Water Content =	26.01	%			
Diameter of Sample Ring, D =	2.86	in			
Height of Sample Ring, L =	1.0	in			
Volume, V =	3.72E-03	ft^3	105.3	cm^3	
Dry Unit Weight =	98.44	pcf	1.58	Mg/m^3	
Water WT =	43.18	g			
Solid WT =	166.01	g			
Add Water for saturation =	0	g	Sr	99.76	
Saturated Water Content =	26.01	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	16.1	0.000	0.001	0.260	0.410
1.1	34.3	3.458	7.587	0.239	0.377
2	33.6	3.325	13.794	0.240	0.379
3.9	35.1	3.610	26.898	0.238	0.376
8	54.5	7.296	55.176	0.216	0.341
		Activity	970.00	0.121	0.190
		Meter	4160.00	0.073	0.115
		Test	63700.00	0.033	0.053

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
63.7	20.5509	28.1818	27.9347	0.033	0.053
4.16	22.0099	29.8876	29.3512	0.073	0.115
0.97	18.423	26.4685	25.6017	0.121	0.190

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4103
α =	0.0255
n =	1.2595
m =	0.2060

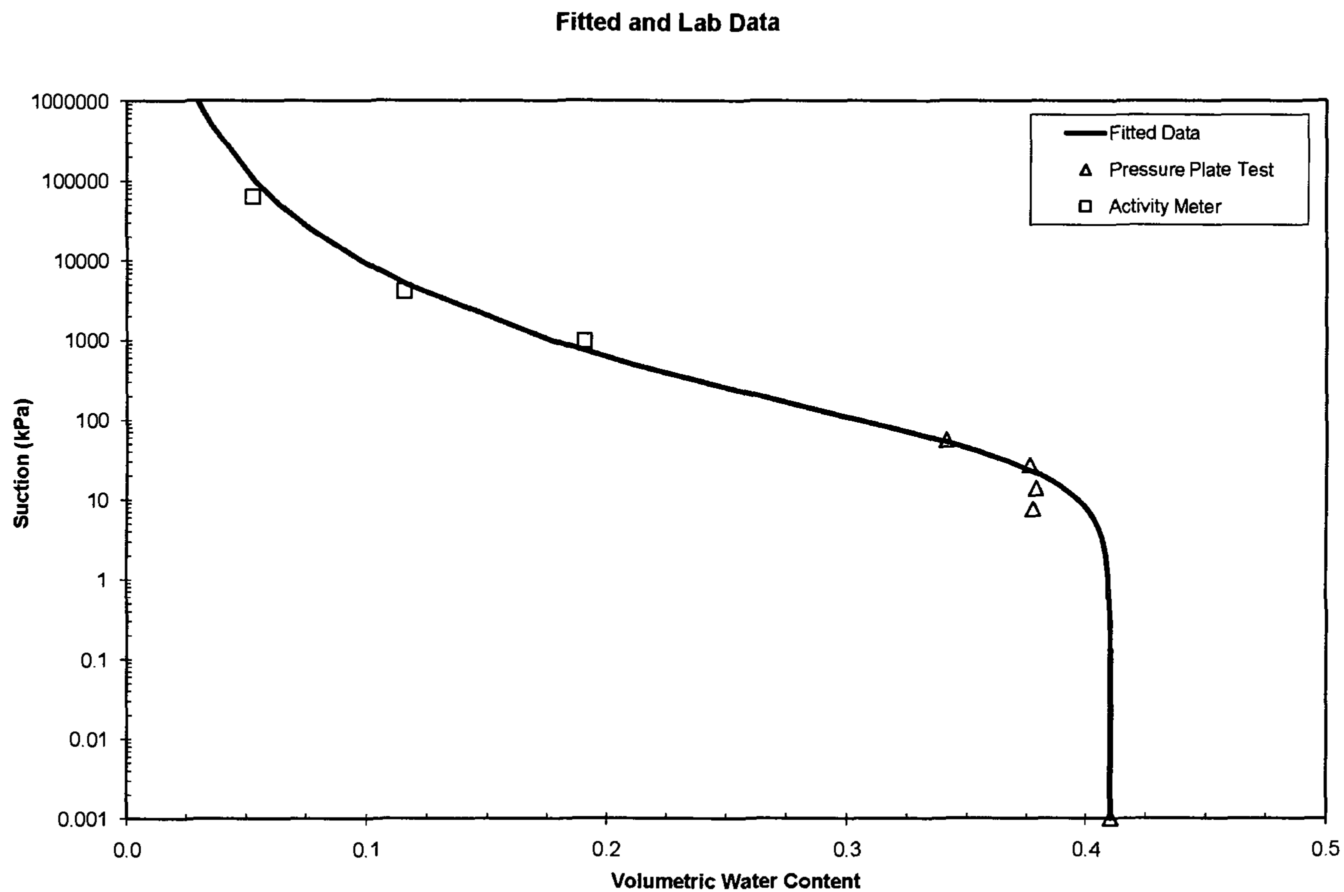
FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.410	0.4103	0.000	0.000
7.59	0.377	0.4004	-0.023	0.001
13.79	0.379	0.3907	-0.012	0.000
26.90	0.376	0.3714	0.005	0.000
55.18	0.341	0.3387	0.002	0.000
970.00	0.190	0.1779	0.013	0.000
4160.00	0.115	0.1223	-0.007	0.000
63700.00	0.053	0.0603	-0.007	0.000

Residual = 0.000120058

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4103
0.025	0.4103
0.05	0.4103
0.075	0.4103
0.1	0.4103
1	0.4095
2	0.4084
3	0.4071
4	0.4057
5	0.4043
6	0.4028
7	0.4013
8	0.3998
9	0.3982
10	0.3967
15	0.3889
20	0.3813
30	0.3673
40	0.3548
50	0.3439
60	0.3342
70	0.3256
80	0.3179
90	0.3109
100	0.3046
500	0.2103
1000	0.1765
5000	0.1166
10000	0.0974
25000	0.0768
5.00E+04	0.0642
1.00E+05	0.0536
5.00E+05	0.0353
7.50E+05	0.0318
1.00E+06	0.0295



Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm North Caisson Radon		Test Date	8/5/2008
WT of Sample Ring =	887.9	g		
WT of Sample Ring + Soil =	5709.1	g		
Water Content =	21.59	%		
Diameter of Sample Ring, D =	10.00	in		
Height of Sample Ring, L =	3.0	in		
Volume, V =	1.36E-01	ft^3	3861.1	cm^3
Dry Unit Weight =	64.11	pcf	1.03	Mg/m^3
Water WT =	856.20	g		
Solid WT =	3965.00	g		
Add Water for saturation =	373.9	g	Sr	51.69
Saturated Water Content =	31.02	%		
Tube Area, A =	20.268299	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	4.5	0.000	0.001	0.310	0.319
0.5	10.5	121.610	3.449	0.280	0.287
1	16	233.085	6.897	0.251	0.258
2	20.3	320.239	13.794	0.229	0.236
3	22.2	358.749	20.691	0.220	0.226
4	22.8	370.910	27.588	0.217	0.223
8	26	435.768	55.176	0.200	0.206
15	28	476.305	103.455	0.190	0.195
30	35.3	624.264	206.910	0.153	0.157
60	39.3	705.337	413.820	0.132	0.136
		Activity Meter Test	1610.00	0.099	0.101
			3680.00	0.083	0.086
			16000.00	0.058	0.059
			51400.00	0.040	0.042
			67100.00	0.038	0.039

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.61	18.5489	26.3966	25.6926	0.099	0.101
3.68	20.4466	28.19	27.5938	0.083	0.086
16	18.5383	26.1324	25.7191	0.058	0.059
51.4	18.4012	25.8415	25.5519	0.040	0.042
67.1	18.8332	26.2845	26.0101	0.038	0.039

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3190
α =	0.2296
n =	1.1923
m =	0.1613

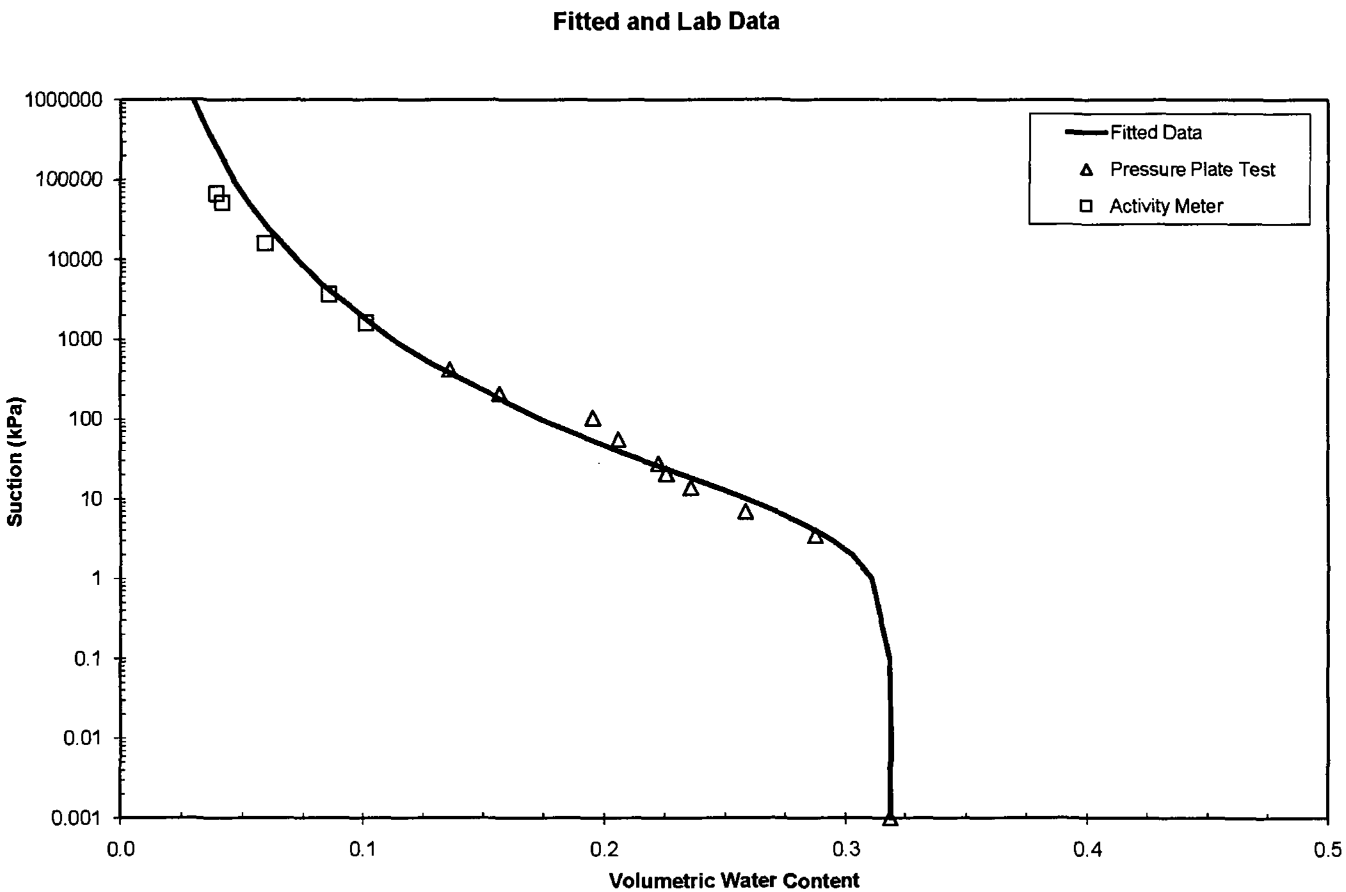
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3190
0.025	0.3189
0.05	0.3188
0.075	0.3186
0.1	0.3184
1	0.3109
2	0.3023
3	0.2945
4	0.2875
5	0.2813
6	0.2758
7	0.2708
8	0.2663
9	0.2622
10	0.2584
15	0.2433
20	0.2323
30	0.2168
40	0.2060
50	0.1978
60	0.1913
70	0.1860
80	0.1814
90	0.1774
100	0.1740
500	0.1281
1000	0.1121
5000	0.0823
10000	0.0720
25000	0.0604
5.00E+04	0.0529
1.00E+05	0.0463
5.00E+05	0.0340
7.50E+05	0.0314
1.00E+06	0.0297

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.319	0.3190	0.000	0.000
3.45	0.287	0.2913	-0.004	0.000
6.90	0.258	0.2713	-0.013	0.000
13.79	0.236	0.2465	-0.011	0.000
20.69	0.226	0.2310	-0.005	0.000
27.59	0.223	0.2199	0.003	0.000
55.18	0.206	0.1943	0.012	0.000
103.46	0.195	0.1729	0.022	0.001
206.91	0.157	0.1516	0.005	0.000
413.82	0.136	0.1328	0.003	0.000
1610.00	0.101	0.1023	-0.001	0.000
3680.00	0.086	0.0873	-0.002	0.000
16000.00	0.059	0.0658	-0.007	0.000
51400.00	0.042	0.0526	-0.011	0.000
67100.00	0.039	0.0500	-0.011	0.000

Residual = 8.61574E-05



Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm RADON BARRIER TOP		Test Date		4/9/2008
WT of Sample Ring =	382	g			
WT of Sample Ring + Soil =	1899.6	g			
Water Content =	22.63	%			
Diameter of Sample Ring, D =	6.06	in			
Height of Sample Ring, L =	1.7	in			
Volume, V =	2.87E-02	ft^3	813.0	cm^3	
Dry Unit Weight =	95.03	pcf	1.52	Mg/m^3	
Water WT =	280.06	g			
Solid WT =	1237.54	g			
Add Water for saturation =	41.6	g	Sr	91.68	
Saturated Water Content =	25.99	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.260	0.396
0.5		19.000	3.449	0.245	0.372
1		28.000	6.897	0.237	0.361
2		45.000	13.794	0.224	0.340
4		82.000	27.588	0.194	0.295
8		112.000	55.176	0.169	0.258
15		132.000	103.455	0.153	0.233
30		147.000	206.910	0.141	0.215
60		165.000	413.820	0.127	0.193
		Activity Meter Test	1540.00	0.095	0.144
			3490.00	0.072	0.110
			18500.00	0.051	0.077

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
1.54	7.6695	15.2484	14.5921	0.095	0.144
3.49	7.8806	15.3258	14.8235	0.072	0.110
18.5	8.0124	15.3422	14.989	0.051	0.077

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

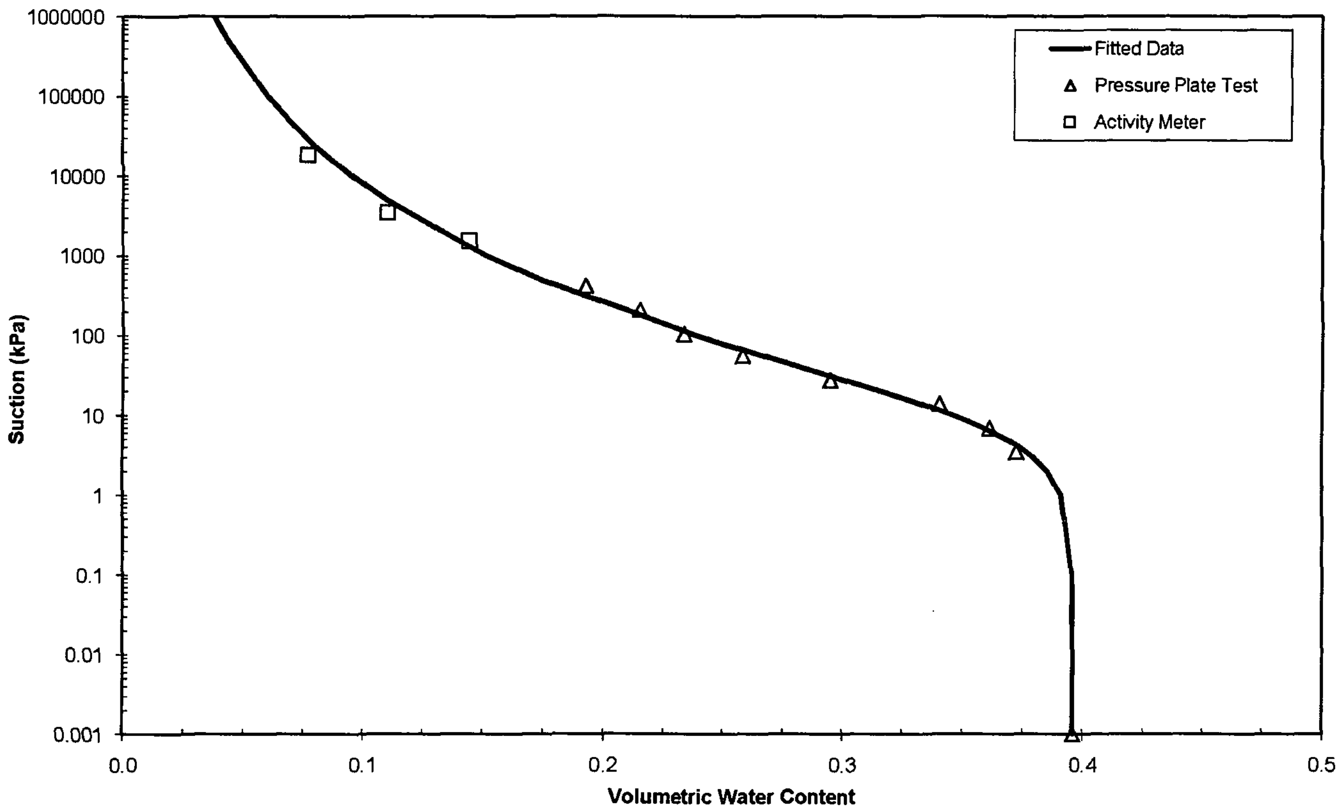
θ_r =	0.0000
θ_s =	0.3958
α =	0.1188
n =	1.2009
m =	0.1673

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.3958
0.025	0.3958
0.05	0.3957
0.075	0.3956
0.1	0.3955
1	0.3909
2	0.3851
3	0.3793
4	0.3738
5	0.3685
6	0.3635
7	0.3587
8	0.3543
9	0.3501
10	0.3462
15	0.3294
20	0.3163
30	0.2967
40	0.2826
50	0.2717
60	0.2628
70	0.2554
80	0.2491
90	0.2436
100	0.2388
500	0.1741
1000	0.1515
5000	0.1097
10000	0.0955
25000	0.0794
5.00E+04	0.0691
1.00E+05	0.0601
5.00E+05	0.0435
7.50E+05	0.0401
1.00E+06	0.0379

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.396	0.3958	0.000	0.000
3.45	0.372	0.3768	-0.004	0.000
6.90	0.361	0.3592	0.002	0.000
13.79	0.340	0.3330	0.007	0.000
27.59	0.295	0.3008	-0.006	0.000
55.18	0.258	0.2669	-0.009	0.000
103.46	0.233	0.2372	-0.004	0.000
206.91	0.215	0.2073	0.008	0.000
413.82	0.193	0.1807	0.012	0.000
1540.00	0.144	0.1390	0.005	0.000
3490.00	0.110	0.1179	-0.008	0.000
18500.00	0.077	0.0844	-0.007	0.000

Residual = 4.60104E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	North Caisson Radon		Test Date		1/10/2008
WT of Sample Ring =	70.73	g			
WT of Sample Ring + Soil =	284.6	g			
Water Content =	20.93	%			
Diameter of Sample Ring, D =	2.86	in			
Height of Sample Ring, L =	1.0	in			
Volume, V =	3.72E-03	ft^3	105.3	cm^3	
Dry Unit Weight =	104.87	pcf	1.68	Mg/m^3	
Water WT =	37.02	g			
Solid WT =	176.85	g			
Add Water for saturation =	0	g	Sr	94.33	
Saturated Water Content =	20.93	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	13.6	0.000	0.001	0.209	0.352
1.1	33.2	3.724	7.587	0.188	0.316
2	36.3	4.313	13.794	0.185	0.311
		Activity	940.00	0.120	0.202
		Meter	7930.00	0.072	0.122
		Test	34500.00	0.048	0.081

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
34.5	18.5206	26.6611	26.2857	0.048	0.081
7.93	18.5009	26.8282	26.2653	0.072	0.122
0.94	18.405	27.126	26.1909	0.120	0.202

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3518
α =	0.0912
n =	1.1561
m =	0.1350

FOR FITTING

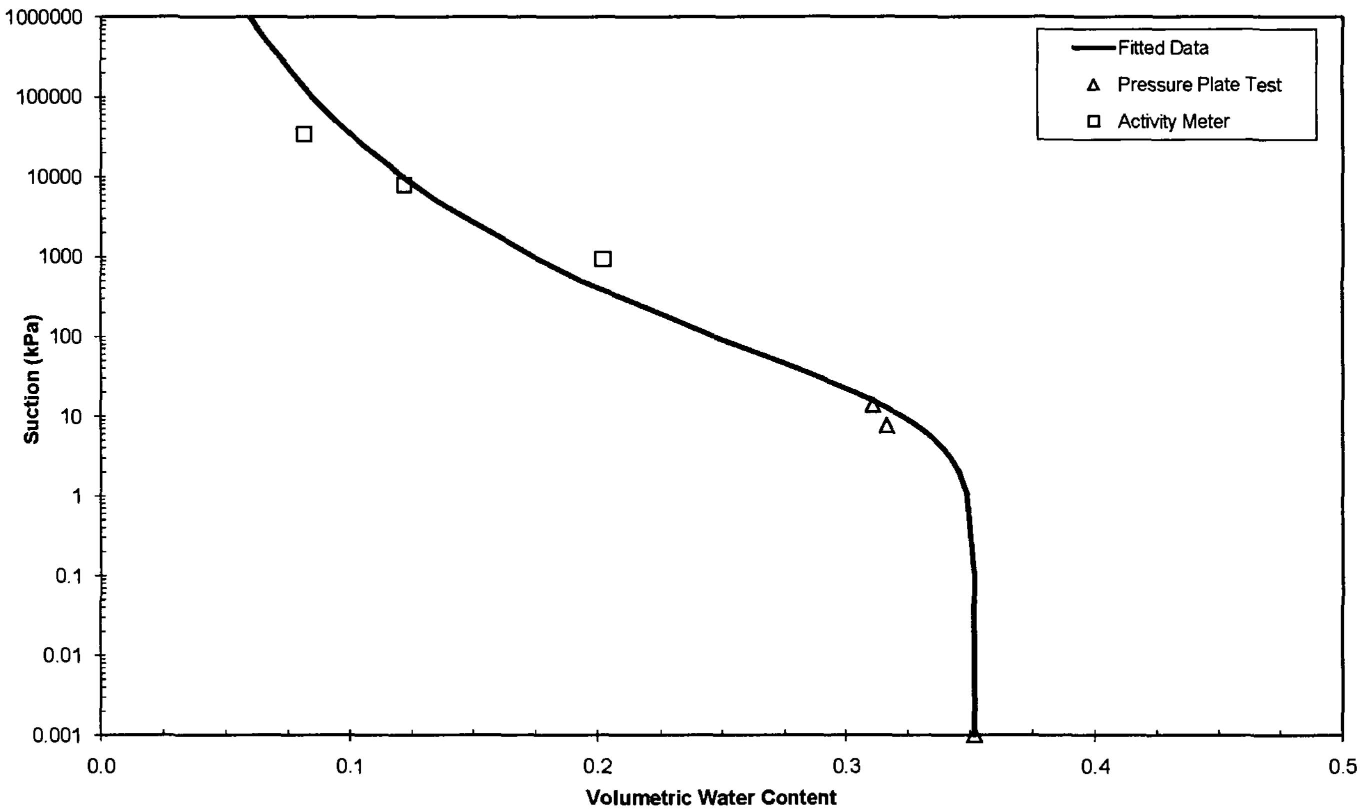
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.352	0.3518	0.000	0.000
7.59	0.316	0.3287	-0.012	0.000
13.79	0.311	0.3143	-0.003	0.000
940.00	0.202	0.1754	0.026	0.001
7930.00	0.122	0.1259	-0.004	0.000
34500.00	0.081	0.1001	-0.019	0.000

Residual = 0.000205067

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.3518
0.025	0.3517
0.05	0.3517
0.075	0.3516
0.1	0.3516
1	0.3489
2	0.3456
3	0.3423
4	0.3391
5	0.3360
6	0.3331
7	0.3303
8	0.3276
9	0.3250
10	0.3226
15	0.3119
20	0.3032
30	0.2898
40	0.2797
50	0.2717
60	0.2651
70	0.2595
80	0.2546
90	0.2504
100	0.2466
500	0.1935
1000	0.1738
5000	0.1352
10000	0.1214
25000	0.1052
5.00E+04	0.0944
1.00E+05	0.0847
5.00E+05	0.0659
7.50E+05	0.0619
1.00E+06	0.0592

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	South Caisson 0-30 cm		Test Date	1/10/2008
WT of Sample Ring =	71.1	g		
WT of Sample Ring + Soil =	282.8	g		
Water Content =	27.10	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	98.77	pcf	1.58	Mg/m^3
Water WT =	45.14	g		
Solid WT =	166.56	g		
Add Water for saturation =	0	g	Sr	104.78
Saturated Water Content =	27.10	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	36.1	0.000	0.001	0.271	0.429
1	45.4	1.767	6.897	0.260	0.412
2	46.3	1.938	13.794	0.259	0.411
4	53.2	3.249	27.588	0.251	0.398
8	60.1	4.560	55.176	0.244	0.386
		Activity Meter Test	1130.00	0.121	0.191
			11300.00	0.067	0.106
			57500.00	0.043	0.068

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
57.5	18.4046	26.0699	25.7549	0.043	0.068
11.3	18.8333	26.618	26.1288	0.067	0.106
1.13	19.7076	27.8032	26.9301	0.121	0.191

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

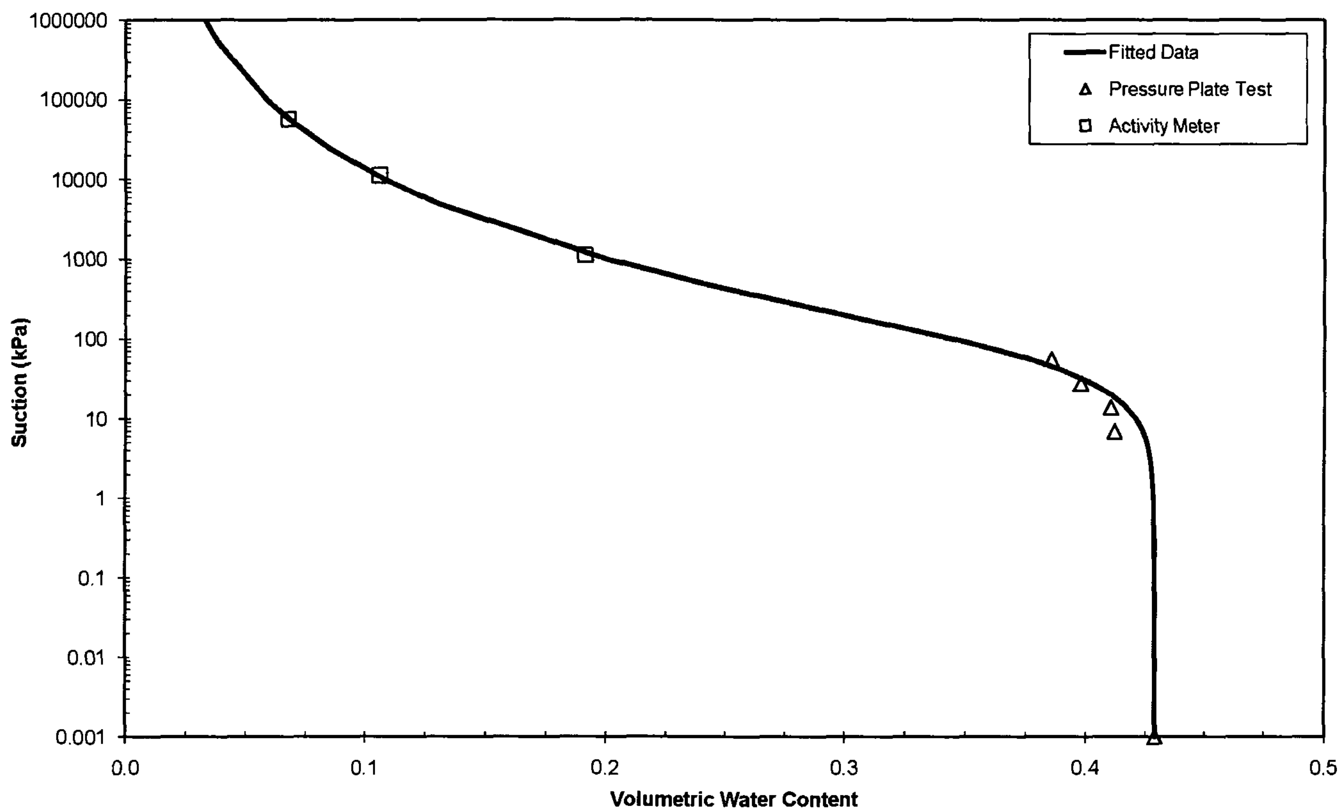
θ_r =	0.0044
θ_s =	0.4290
α =	0.0155
n =	1.2795
m =	0.2185

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.429	0.4290	0.000	0.000
6.90	0.412	0.4238	-0.012	0.000
13.79	0.411	0.4171	-0.007	0.000
27.59	0.398	0.4029	-0.005	0.000
55.18	0.386	0.3771	0.009	0.000
1130.00	0.191	0.1942	-0.003	0.000
11300.00	0.106	0.1046	0.001	0.000
57500.00	0.068	0.0680	0.000	0.000

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4290
0.025	0.4289
0.05	0.4289
0.075	0.4289
0.1	0.4289
1	0.4285
2	0.4279
3	0.4272
4	0.4264
5	0.4255
6	0.4246
7	0.4237
8	0.4228
9	0.4219
10	0.4209
15	0.4159
20	0.4107
30	0.4005
40	0.3907
50	0.3815
60	0.3730
70	0.3652
80	0.3579
90	0.3511
100	0.3449
500	0.2404
1000	0.2006
5000	0.1302
10000	0.1081
25000	0.0847
5.00E+04	0.0706
1.00E+05	0.0589
5.00E+05	0.0392
7.50E+05	0.0355
1.00E+06	0.0331

Residual = 3.57724E-05

Fitted and Lab Data



Pressure Plate Extractor Test - Monticello - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	South Caisson 30-60 cm		Test Date	1/10/2008
WT of Sample Ring =	68.3	g		
WT of Sample Ring + Soil =	275.6	g		
Water Content =	27.55	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	96.38	pcf	1.54	Mg/m^3
Water WT =	44.78	g		
Solid WT =	162.52	g		
Add Water for saturation =	0	g	Sr	100.43
Saturated Water Content =	27.55	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	37.7	0.000	0.001	0.276	0.426
1.1	52.2	2.755	7.587	0.259	0.399
6.1	73.8	6.859	42.072	0.233	0.360
		Activity	1080.00	0.126	0.195
		Meter	10500.00	0.070	0.109
		Test	31700.00	0.050	0.077

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
31.7	18.9869	26.5276	26.1681	0.050	0.077
10.5	19.5246	27.1874	26.6832	0.070	0.109
1.08	18.5538	26.6219	25.7169	0.126	0.195

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

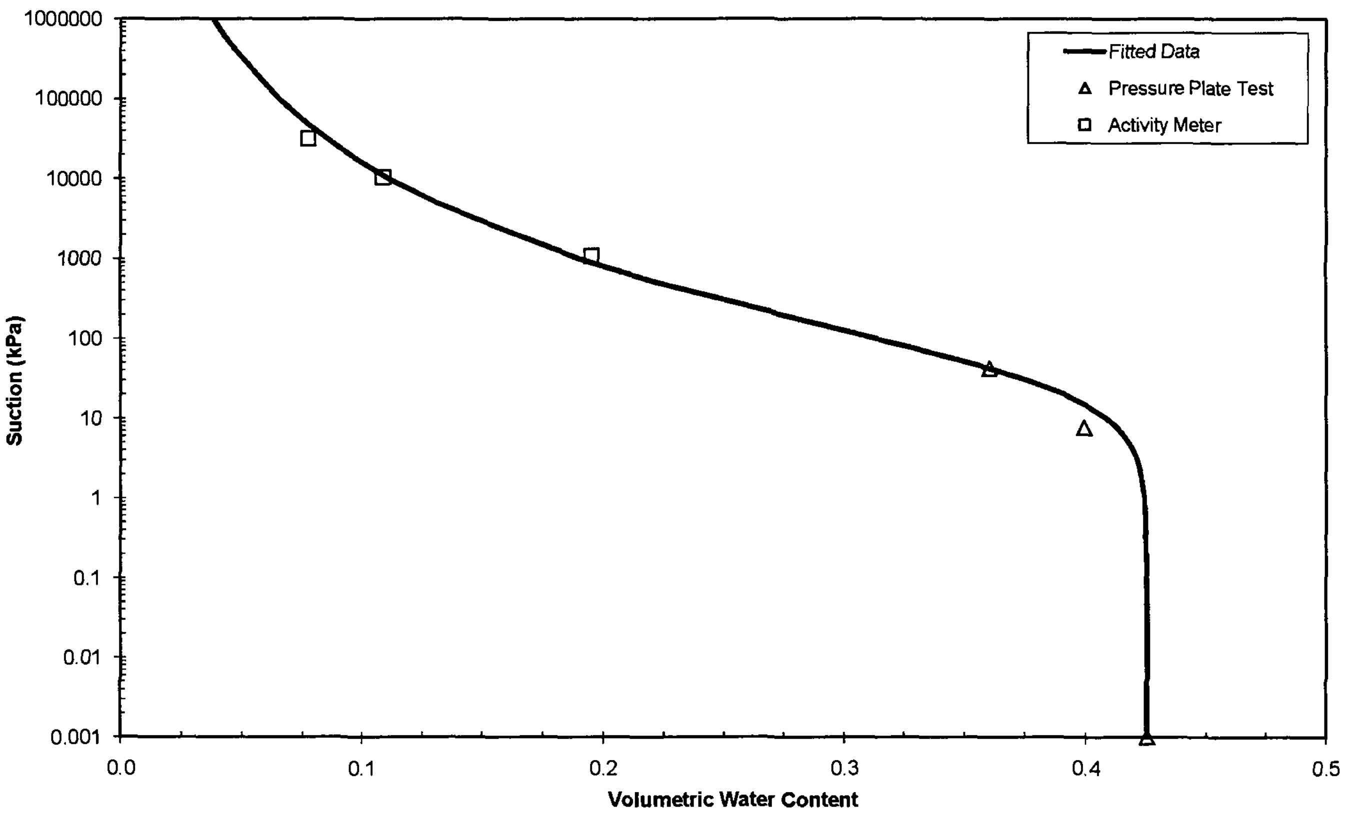
θ_r =	0.0000
θ_s =	0.4255
α =	0.0315
n =	1.2331
m =	0.1890

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.426	0.4255	0.000	0.000
7.59	0.399	0.4130	-0.014	0.000
42.07	0.360	0.3602	0.000	0.000
1080.00	0.195	0.1865	0.009	0.000
10500.00	0.109	0.1100	-0.001	0.000
31700.00	0.077	0.0850	-0.008	0.000

Residual = 5.36214E-05

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4255
0.025	0.4255
0.05	0.4255
0.075	0.4255
0.1	0.4254
1	0.4244
2	0.4229
3	0.4213
4	0.4195
5	0.4177
6	0.4159
7	0.4141
8	0.4122
9	0.4104
10	0.4085
15	0.3995
20	0.3909
30	0.3757
40	0.3626
50	0.3514
60	0.3417
70	0.3331
80	0.3255
90	0.3187
100	0.3125
500	0.2224
1000	0.1899
5000	0.1308
10000	0.1113
25000	0.0899
5.00E+04	0.0765
1.00E+05	0.0651
5.00E+05	0.0447
7.50E+05	0.0407
1.00E+06	0.0380

Fitted and Lab Data



Pressure Plate Extractor Test - Omaha - Thin Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	A1 Shallow 1		Test Date	8/6/2008
WT of Sample Ring =	69.9	g	Ring 13	
WT of Sample Ring + Soil =	258.81	g		
Water Content =	31.89	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	0.9	in		
Volume, V =	3.49E-03	ft^3	99.0	cm^3
Dry Unit Weight =	90.36	pcf	1.45	Mg/m^3
Water WT =	45.68	g		
Solid WT =	143.23	g		
Add Water for saturation =	0	g	Sr	100.46
Saturated Water Content =	31.89	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	8.3	0.000	0.001	0.319	0.462
0.5	11.4	0.589	3.449	0.315	0.456
1	12	0.703	6.897	0.314	0.455
2	14.2	1.121	13.794	0.311	0.450
4	26.4	3.439	27.588	0.295	0.427
8	41.6	6.327	55.176	0.275	0.398
15	58.9	9.614	103.455	0.252	0.365
30	74.4	12.559	206.910	0.231	0.335
60	79.2	13.471	413.820	0.225	0.326
90	84.3	14.440	620.730	0.218	0.316
		Activity Meter Test	1810.00	0.132	0.191
			7090.00	0.099	0.144
			30800.00	0.066	0.096
			75500.00	0.049	0.071

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.81	18.4016	25.5033	24.6743	0.132	0.191
7.09	18.4016	25.2963	24.6743	0.099	0.144
30.8	18.4016	25.0892	24.6743	0.066	0.096
75.5	18.4016	24.9835	24.6743	0.049	0.071

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4618
α =	0.0128
n =	1.2499
m =	0.1999

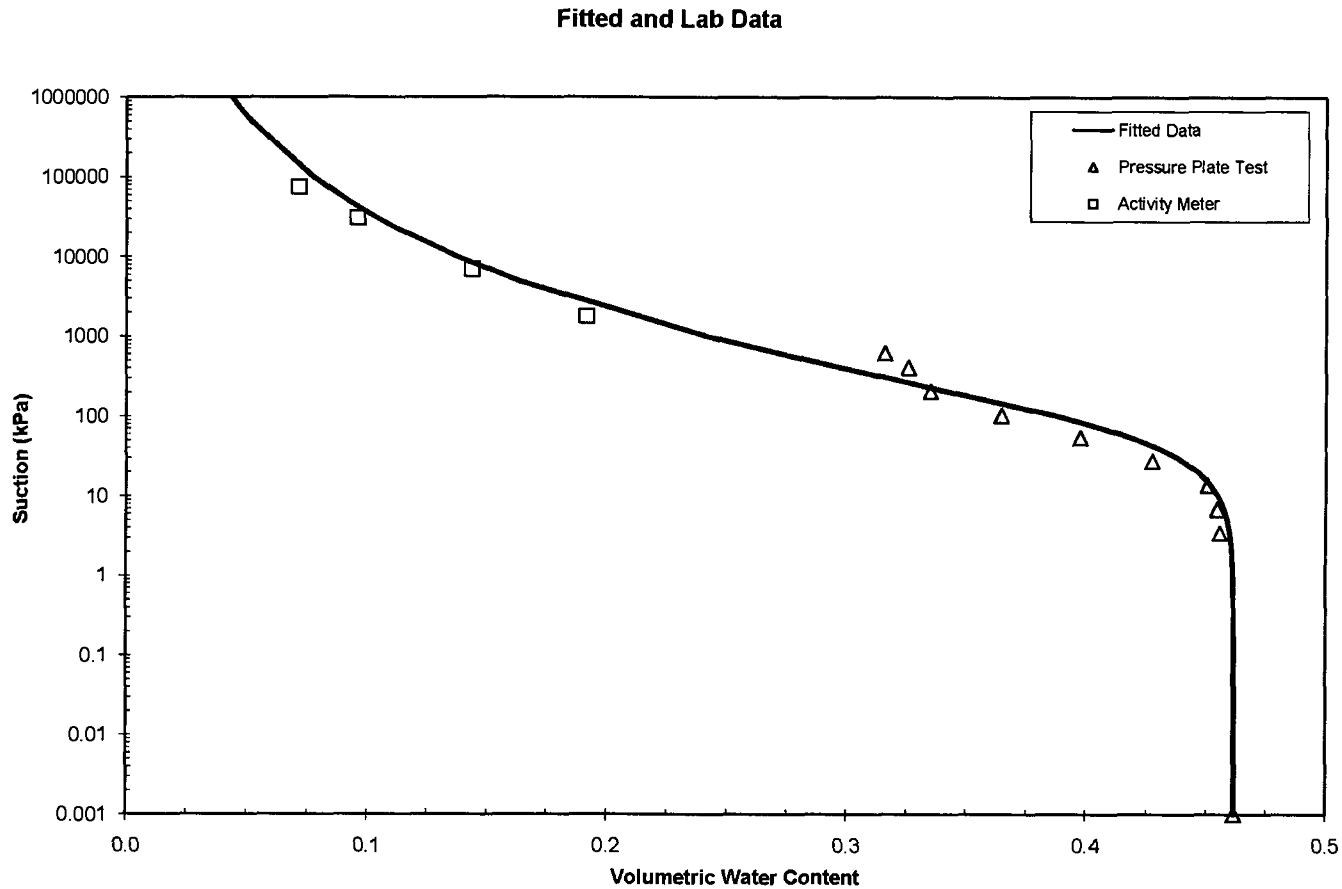
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4618
0.025	0.4618
0.05	0.4618
0.075	0.4618
0.1	0.4618
1	0.4614
2	0.4609
3	0.4603
4	0.4596
5	0.4589
6	0.4582
7	0.4574
8	0.4567
9	0.4559
10	0.4551
15	0.4509
20	0.4467
30	0.4381
40	0.4298
50	0.4219
60	0.4145
70	0.4075
80	0.4009
90	0.3948
100	0.3890
500	0.2851
1000	0.2423
5000	0.1632
10000	0.1374
25000	0.1093
5.00E+04	0.0919
1.00E+05	0.0773
5.00E+05	0.0517
7.50E+05	0.0467
1.00E+06	0.0435

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.462	0.4618	0.000	0.000
3.45	0.456	0.4600	-0.004	0.000
6.90	0.455	0.4575	-0.003	0.000
13.79	0.450	0.4519	-0.001	0.000
27.59	0.427	0.4401	-0.013	0.000
55.18	0.398	0.4180	-0.020	0.000
103.46	0.365	0.3871	-0.022	0.001
206.91	0.335	0.3439	-0.009	0.000
413.82	0.326	0.2975	0.028	0.001
620.73	0.316	0.2713	0.045	0.002
1810.00	0.191	0.2098	-0.018	0.000
7090.00	0.144	0.1497	-0.006	0.000
30800.00	0.096	0.1037	-0.008	0.000
75500.00	0.071	0.0829	-0.012	0.000

Residual = 0.000324346


Fitted and Lab Data
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content
Fitted Data
Pressure Plate Test
Activity Meter

Pressure Plate Extractor Test - Omaha - Thick Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	**A2 Top**		**Test Date**	8/6/2008
WT of Sample Ring =	71.36	g	Ring: K#6	
WT of Sample Ring + Soil =	265.76	g		
Water Content =	33.88	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	86.10	pcf	1.38	Mg/m^3
Water WT =	49.20	g		
Solid WT =	145.20	g		
Add Water for saturation =	2.41	g	Sr	101.10
Saturated Water Content =	35.54	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	7.6	0.000	0.001	0.355	0.490
0.5	16.6	1.710	3.449	0.344	0.474
1	21.5	2.641	6.897	0.337	0.465
2	32.3	4.693	13.794	0.323	0.446
4	51.3	8.303	27.588	0.298	0.412
8	68.4	11.552	55.176	0.276	0.381
15	73.8	12.578	103.455	0.269	0.371
30	85.6	14.820	206.910	0.253	0.350
60	91.9	16.017	413.820	0.245	0.338
90	93.4	16.302	620.730	0.180	0.249
		Activity Meter Test	2970.00	0.166	0.229
			11900.00	0.100	0.138
			15900.00	0.099	0.137
			78400.00	0.053	0.074

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.97	18.4203	20.7406	20.4104	0.166	0.229
11.9	18.1362	20.713	20.4792	0.100	0.138
15.9	18.4203	20.608	20.4104	0.099	0.137
78.4	18.1362	20.6042	20.4792	0.053	0.074
Too Dry	18.4203	20.5018	20.4104	0.046	0.063

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

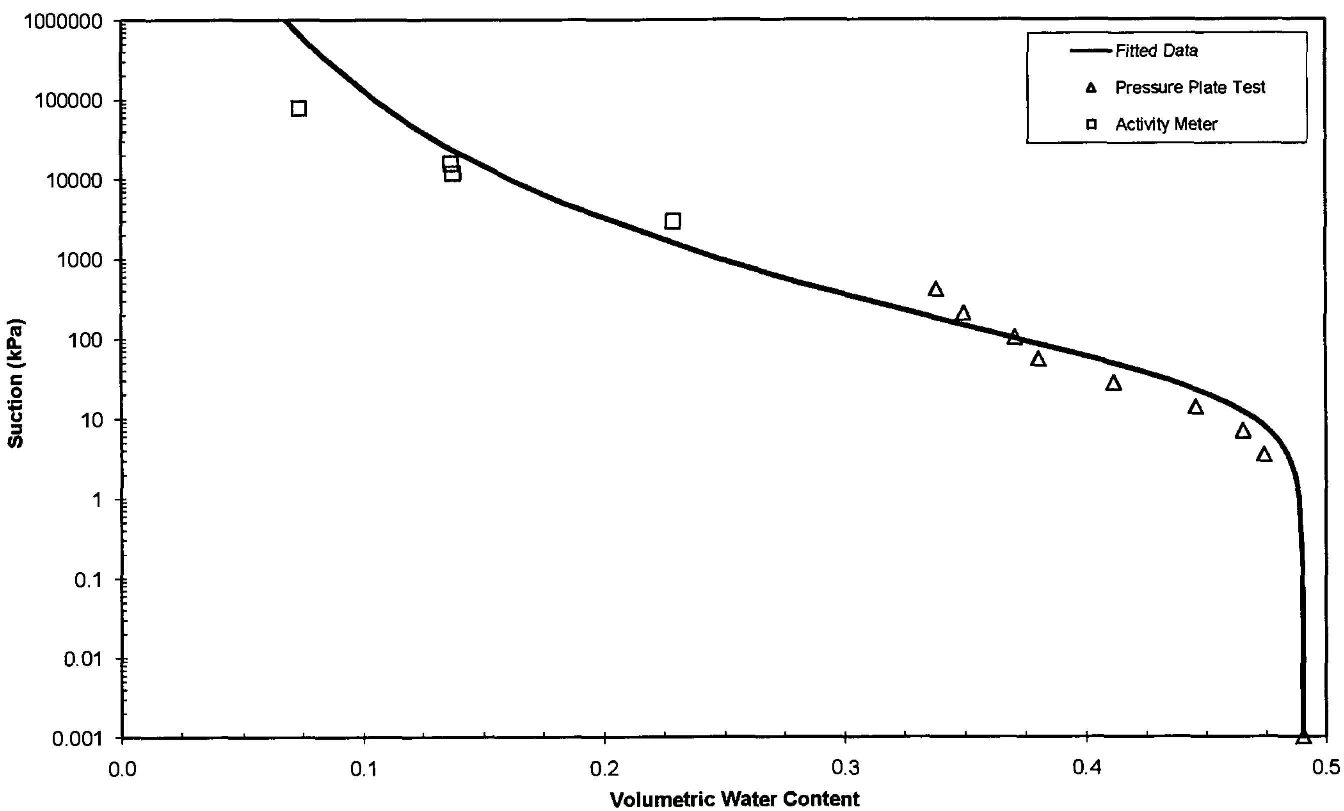
θ_r =	0.0000
θ_s =	0.4904
α =	0.0375
n =	1.1875
m =	0.1579

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4904
0.025	0.4904
0.05	0.4904
0.075	0.4904
0.1	0.4903
1	0.4889
2	0.4870
3	0.4849
4	0.4828
5	0.4806
6	0.4784
7	0.4763
8	0.4741
9	0.4720
10	0.4699
15	0.4598
20	0.4506
30	0.4346
40	0.4213
50	0.4100
60	0.4003
70	0.3918
80	0.3843
90	0.3776
100	0.3715
500	0.2817
1000	0.2480
5000	0.1837
10000	0.1614
25000	0.1359
5.00E+04	0.1193
1.00E+05	0.1048
5.00E+05	0.0775
7.50E+05	0.0718
1.00E+06	0.0681

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.490	0.4904	0.000	0.000
3.45	0.474	0.4839	-0.010	0.000
6.90	0.465	0.4765	-0.011	0.000
13.79	0.446	0.4621	-0.016	0.000
27.59	0.412	0.4382	-0.027	0.001
55.18	0.381	0.4048	-0.024	0.001
103.46	0.371	0.3696	0.001	0.000
206.91	0.350	0.3296	0.020	0.000
413.82	0.338	0.2915	0.047	0.002
2970.00	0.229	0.2025	0.026	0.001
11900.00	0.138	0.1562	-0.019	0.000
15900.00	0.137	0.1479	-0.011	0.000
78400.00	0.074	0.1097	-0.036	0.001

Residual = 0.000524792

Fitted and Lab Data



Pressure Plate Extractor Test - Omaha - Thick Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm AO2-S2-Shallow		Test Date		2/21/2009
WT of Sample Ring =	885.2	g			
WT of Sample Ring + Soil =	5984.7	g			
Water Content =	29.29	%			
Diameter of Sample Ring, D =	10.00	in			
Height of Sample Ring, L =	2.0	in			
Volume, V =	9.14E-02	ft^3	2587.0	cm^3	
Dry Unit Weight =	95.18	pcf	1.52	Mg/m^3	
Water WT =	1155.22	g			
Solid WT =	3944.28	g			
Add Water for saturation =	5	g	Sr	104.14	
Saturated Water Content =	29.42	%			
Tube Area, A =	20.268299	cm^2			

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.294	0.449
0.5		91.207	3.449	0.271	0.413
1		152.012	6.897	0.256	0.390
2		212.817	13.794	0.240	0.366
3		261.461	20.691	0.228	0.348
4		322.266	27.588	0.212	0.324
8		484.412	55.176	0.171	0.261
15		589.808	103.455	0.145	0.221
30		646.559	206.910	0.130	0.199
		Activity Meter Test	27300.00	0.073	0.111
			51200.00	0.059	0.090
			71400.00	0.052	0.079
			17400.00	0.082	0.125
			31100.00	0.069	0.106
			56300.00	0.057	0.086

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
27.3	18.6161	24.1559	23.7801	0.073	0.111
51.2	18.6161	24.0849	23.7801	0.059	0.090
71.4	18.6161	24.0461	23.7801	0.052	0.079
17.4	3.278	10.2895	9.7569312	0.082	0.125
31.1	3.278	10.2071	9.7569312	0.069	0.106
56.3	3.278	10.1238	9.7569312	0.057	0.086

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4487
α =	0.2567
n =	1.1730
m =	0.1475

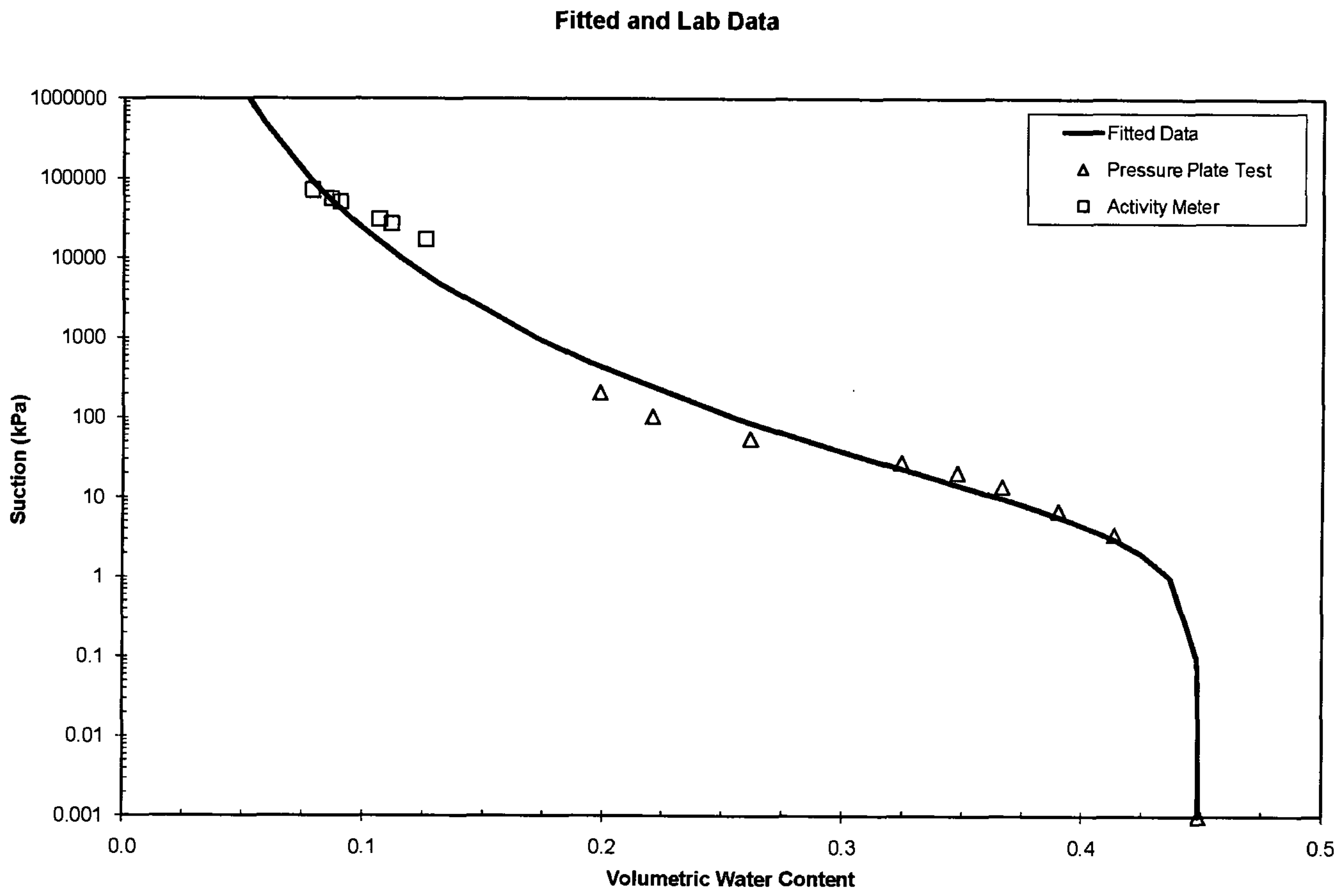
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4487
0.025	0.4485
0.05	0.4483
0.075	0.4480
0.1	0.4478
1	0.4366
2	0.4244
3	0.4136
4	0.4041
5	0.3958
6	0.3884
7	0.3818
8	0.3758
9	0.3704
10	0.3654
15	0.3457
20	0.3313
30	0.3112
40	0.2971
50	0.2865
60	0.2779
70	0.2709
80	0.2649
90	0.2597
100	0.2551
500	0.1936
1000	0.1718
5000	0.1301
10000	0.1154
25000	0.0985
5.00E+04	0.0873
1.00E+05	0.0775
5.00E+05	0.0587
7.50E+05	0.0547
1.00E+06	0.0520

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.449	0.4487	0.000	0.000
3.45	0.413	0.4092	0.004	0.000
6.90	0.390	0.3824	0.007	0.000
13.79	0.366	0.3498	0.017	0.000
20.69	0.348	0.3296	0.018	0.000
27.59	0.324	0.3153	0.009	0.000
55.18	0.261	0.2818	-0.020	0.000
103.46	0.221	0.2536	-0.033	0.001
206.91	0.199	0.2254	-0.027	0.001
27300.00	0.111	0.0970	0.014	0.000
51200.00	0.090	0.0870	0.003	0.000
71400.00	0.079	0.0821	-0.004	0.000
17400.00	0.125	0.1048	0.021	0.000
31100.00	0.106	0.0948	0.011	0.000
56300.00	0.086	0.0856	0.001	0.000

Residual = 0.000249181


Fitted and Lab Data
Suction (kPa)
Volumetric Water Content
Fitted Data
Pressure Plate Test
Activity Meter
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5

Pressure Plate Extractor Test - Omaha - Thick Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm AO2-S2-Shallow		Test Date		9/19/2008
WT of Sample Ring =	384.9	g			
WT of Sample Ring + Soil =	1708.7	g			
Water Content =	31.07	%			
Diameter of Sample Ring, D =	6.00	in			
Height of Sample Ring, L =	1.5	in			
Volume, V =	2.45E-02	ft^3	*695.0*	*cm^3*	
Dry Unit Weight =	90.72	pcf	1.45	Mg/m^3	
Water WT =	313.81	g			
Solid WT =	1009.99	g			
Add Water for saturation =	5	g	Sr	100.30	
Saturated Water Content =	31.57	%			
Tube Area, A =	0.19	cm^2			

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0		0.000	0.001	0.316	0.459
2		4.000	13.794	0.312	0.453
3.8		16.000	26.209	0.300	0.436
7.9		54.000	54.486	0.262	0.381
14.9		98.500	102.765	0.218	0.317
29.1		130.000	200.703	0.187	0.272
59		138.500	406.923	0.179	0.260
		Activity Meter Test	2030.00	0.119	0.174
			2760.00	0.111	0.161
			19200.00	0.073	0.106
			36100.00	0.057	0.082
			41000.00	0.051	0.074
			70900.00	0.040	0.059

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.03	18.5508	25.0707	24.3752	0.119	0.174
2.76	18.4217	26.2543	25.4736	0.111	0.161
19.2	18.6724	26.1013	25.5977	0.073	0.106
36.1	19.4839	27.0004	26.5974	0.057	0.082
41	18.5372	25.7108	25.3624	0.051	0.074
70.9	18.4018	25.4397	25.1662	0.040	0.059

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

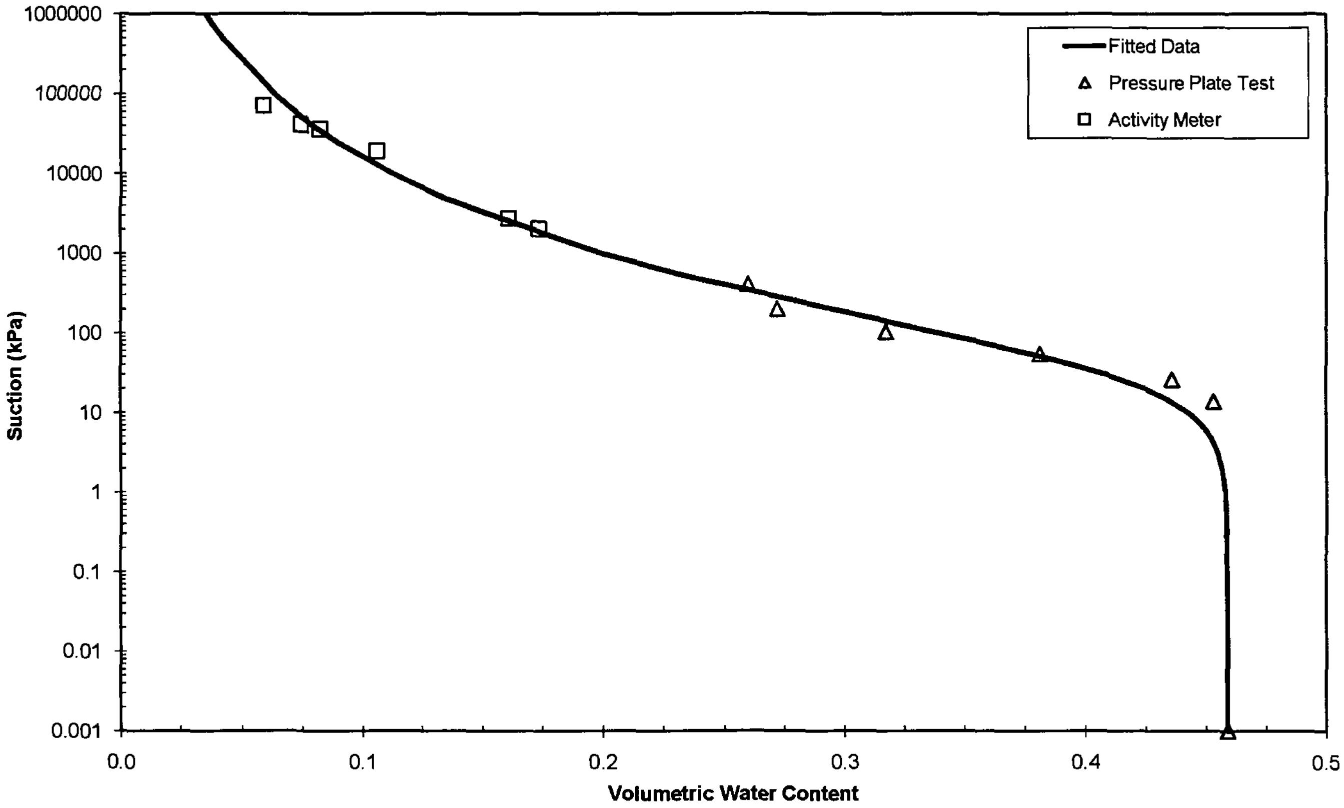
θ_r =	0.0000
θ_s =	0.4589
α =	0.0274
n =	1.2507
m =	0.2004

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4589
0.025	0.4589
0.05	0.4589
0.075	0.4589
0.1	0.4589
1	0.4579
2	0.4565
3	0.4550
4	0.4533
5	0.4516
6	0.4498
7	0.4481
8	0.4462
9	0.4444
10	0.4426
15	0.4335
20	0.4247
30	0.4087
40	0.3947
50	0.3824
60	0.3717
70	0.3621
80	0.3536
90	0.3460
100	0.3390
500	0.2363
1000	0.1995
5000	0.1336
10000	0.1123
25000	0.0893
5.00E+04	0.0751
1.00E+05	0.0631
5.00E+05	0.0421
7.50E+05	0.0381
1.00E+06	0.0354

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.459	0.4589	0.000	0.000
13.79	0.453	0.4356	0.018	0.000
26.21	0.436	0.4145	0.021	0.000
54.49	0.381	0.3774	0.004	0.000
102.77	0.317	0.3372	-0.020	0.000
200.70	0.272	0.2926	-0.021	0.000
406.92	0.260	0.2483	0.011	0.000
2030.00	0.174	0.1673	0.006	0.000
2760.00	0.161	0.1550	0.006	0.000
19200.00	0.106	0.0954	0.010	0.000
36100.00	0.082	0.0814	0.001	0.000
41000.00	0.074	0.0789	-0.005	0.000
70900.00	0.059	0.0688	-0.010	0.000

Residual = 0.000157357

Fitted and Lab Data



Pressure Plate Extractor Test - Omaha - Thick Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	AO2 S1 Deep		Test Date	8/6/2008
WT of Sample Ring =	71.19	g	Ring C	
WT of Sample Ring + Soil =	251.87	g		
Water Content =	30.67	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	0.9	in		
Volume, V =	3.42E-03	ft^3	96.9	cm^3
Dry Unit Weight =	89.13	pcf	1.43	Mg/m^3
Water WT =	42.41	g		
Solid WT =	138.27	g		
Add Water for saturation =	3.19	g	Sr	100.84
Saturated Water Content =	32.97	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	12.3	0.000	0.001	0.330	0.471
0.5	15	0.513	3.449	0.326	0.466
1	17.4	0.969	6.897	0.323	0.461
2	23.4	2.109	13.794	0.314	0.449
4	41	5.453	27.588	0.290	0.415
8	58.3	8.740	55.176	0.267	0.381
15	72.4	11.419	103.455	0.247	0.353
30	85.8	13.965	206.910	0.229	0.327
60	90.1	14.782	413.820	0.223	0.318
90	91.4	15.029	620.730	0.221	0.316
		Activity Meter Test	3170.00	0.125	0.179
			9340.00	0.103	0.147
			16800.00	0.085	0.121
			39700.00	0.069	0.098
			68700.00	0.056	0.079

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
3.17	22.762	27.191	26.6977	0.125	0.179
9.34	18.4008	22.2806	21.9176	0.103	0.147
16.8	22.762	27.031	26.6977	0.085	0.121
39.7	18.4008	22.1592	21.9176	0.069	0.098
68.7	18.4008	22.1133	21.9176	0.056	0.079
Final w%-1	22.762	26.871	26.6977	0.044	0.063

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

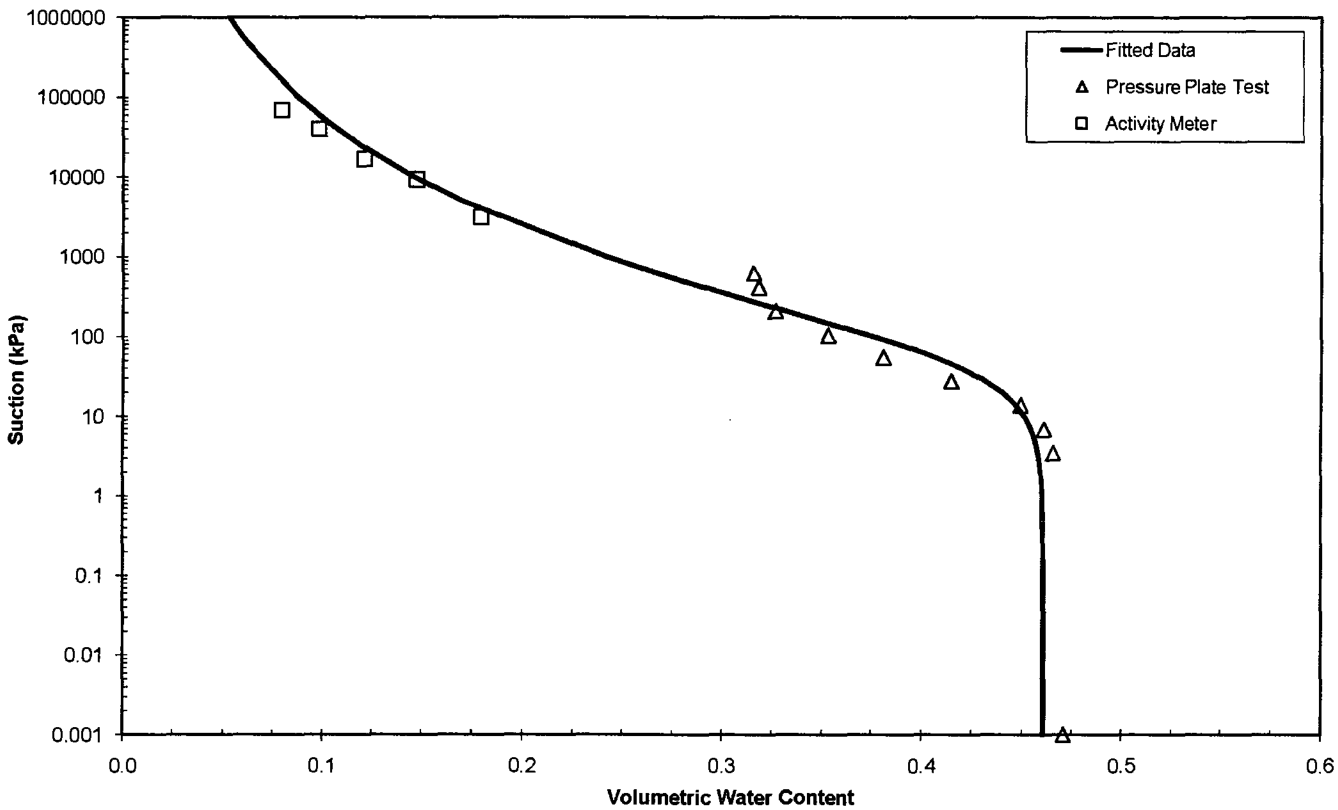
θ_r =	0.0000
θ_s =	0.4605
α =	0.0180
n =	1.2211
m =	0.1810

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4605
0.025	0.4605
0.05	0.4605
0.075	0.4605
0.1	0.4605
1	0.4599
2	0.4591
3	0.4582
4	0.4572
5	0.4562
6	0.4552
7	0.4542
8	0.4531
9	0.4520
10	0.4509
15	0.4454
20	0.4399
30	0.4294
40	0.4196
50	0.4107
60	0.4026
70	0.3951
80	0.3883
90	0.3820
100	0.3762
500	0.2798
1000	0.2417
5000	0.1701
10000	0.1460
25000	0.1192
5.00E+04	0.1023
1.00E+05	0.0878
5.00E+05	0.0615
7.50E+05	0.0562
1.00E+06	0.0528

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.471	0.4605	0.010	0.000
3.45	0.466	0.4578	0.008	0.000
6.90	0.461	0.4543	0.007	0.000
13.79	0.449	0.4467	0.002	0.000
27.59	0.415	0.4318	-0.017	0.000
55.18	0.381	0.4064	-0.026	0.001
103.46	0.353	0.3743	-0.021	0.000
206.91	0.327	0.3330	-0.006	0.000
413.82	0.318	0.2909	0.027	0.001
620.73	0.316	0.2675	0.048	0.002
3170.00	0.179	0.1880	-0.009	0.000
9340.00	0.147	0.1482	-0.001	0.000
16800.00	0.121	0.1302	-0.009	0.000
39700.00	0.098	0.1077	-0.010	0.000
68700.00	0.079	0.0954	-0.016	0.000

Residual = 0.00035061

Fitted and Lab Data



Pressure Plate Extractor Test - Omaha - Thick Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	**AO2 S1 Deep**		**Test Date**	8/6/2008
WT of Sample Ring =	70.2	g	Ring C	
WT of Sample Ring + Soil =	240.18	g		
Water Content =	33.38	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	0.9	in		
Volume, V =	3.35E-03	ft^3	94.7	cm^3
Dry Unit Weight =	83.97	pcf	1.35	Mg/m^3
Water WT =	42.54	g		
Solid WT =	127.44	g		
Add Water for saturation =	5.08	g	Sr	100.99
Saturated Water Content =	37.37	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	15	0.000	0.001	0.374	0.503
0.5	24.1	1.729	3.449	0.360	0.485
1	28.1	2.489	6.897	0.354	0.477
2	36.1	4.009	13.794	0.342	0.461
4	57.1	7.999	27.588	0.311	0.418
8	73.6	11.134	55.176	0.286	0.385
15	89.7	14.193	103.455	0.262	0.353
30	99.4	16.036	206.910	0.248	0.334
60	107.7	17.613	413.820	0.235	0.317
90	109.1	17.879	620.730	0.233	0.314
		Activity Meter Test	1890.00	0.127	0.171
			5200.00	0.099	0.133
			13900.00	0.076	0.102
			44100.00	0.054	0.073
			54500.00	0.051	0.068
			55800.00	0.050	0.068

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.89	22.7623	29.7686	28.9781	0.127	0.171
5.2	18.5505	25.3962	24.7809	0.099	0.133
13.9	18.9868	25.6918	25.2191	0.076	0.102
44.1	18.5373	25.1244	24.7843	0.054	0.073
54.5	18.5193	25.0984	24.7808	0.051	0.068
55.8	20.5466	27.0767	26.7641	0.050	0.068

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4780
α =	0.0170
n =	1.2646
m =	0.2092

FOR GRAPHING

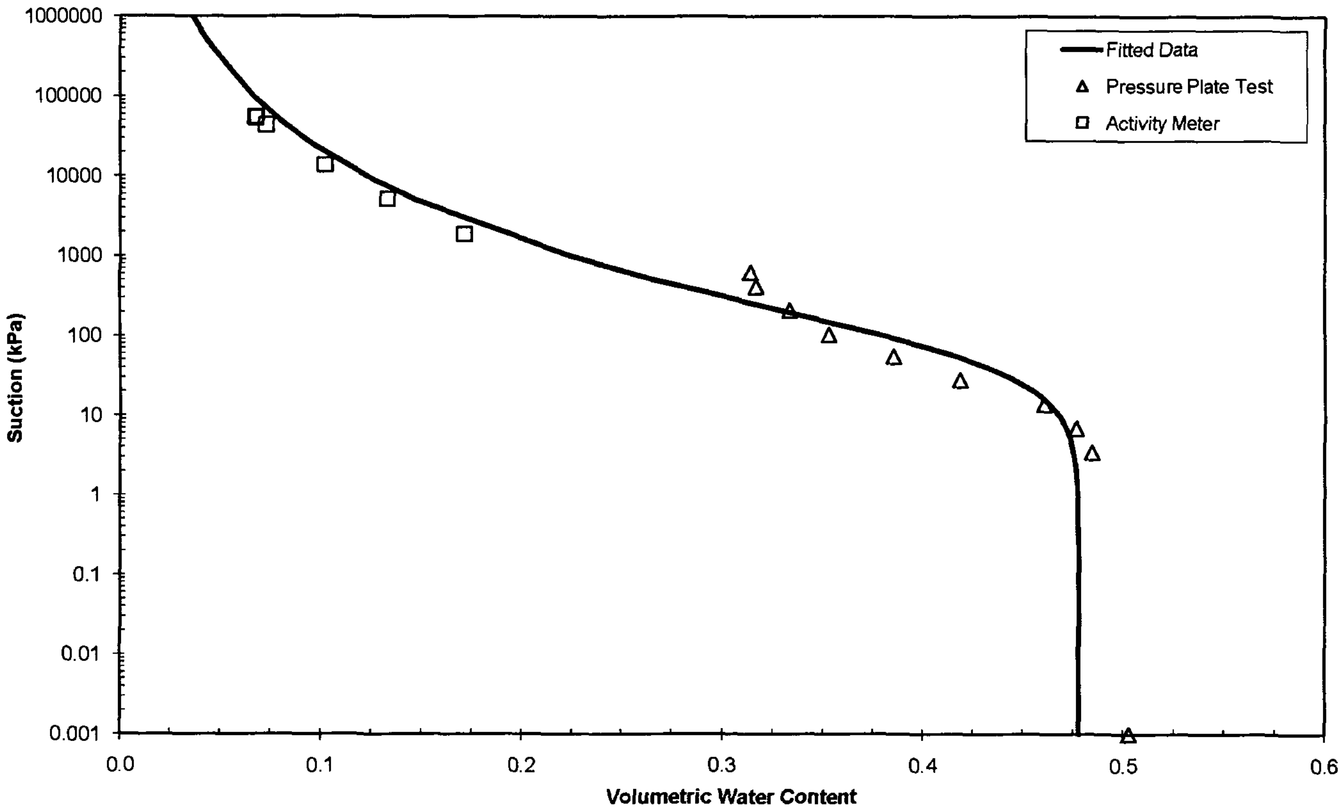
Suction (kPa)	VWC
0.001	0.4780
0.025	0.4780
0.05	0.4780
0.075	0.4779
0.1	0.4779
1	0.4774
2	0.4766
3	0.4757
4	0.4747
5	0.4736
6	0.4726
7	0.4714
8	0.4703
9	0.4691
10	0.4679
15	0.4618
20	0.4557
30	0.4436
40	0.4323
50	0.4218
60	0.4122
70	0.4034
80	0.3953
90	0.3878
100	0.3808
500	0.2675
1000	0.2244
5000	0.1473
10000	0.1227
25000	0.0963
5.00E+04	0.0802
1.00E+05	0.0667
5.00E+05	0.0436
7.50E+05	0.0392
1.00E+06	0.0363

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.503	0.4780	0.025	0.001
3.45	0.485	0.4752	0.009	0.000
6.90	0.477	0.4716	0.005	0.000
13.79	0.461	0.4633	-0.003	0.000
27.59	0.418	0.4465	-0.028	0.001
55.18	0.385	0.4168	-0.031	0.001
103.46	0.353	0.3785	-0.026	0.001
206.91	0.334	0.3294	0.004	0.000
413.82	0.317	0.2803	0.037	0.001
620.73	0.314	0.2534	0.061	0.004
1890.00	0.171	0.1902	-0.019	0.000
5200.00	0.133	0.1458	-0.013	0.000
13900.00	0.102	0.1125	-0.010	0.000
44100.00	0.073	0.0829	-0.010	0.000
54500.00	0.068	0.0784	-0.010	0.000
55800.00	0.068	0.0779	-0.010	0.000

Residual = 0.000571633

Fitted and Lab Data



Pressure Plate Extractor Test - Polson - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	Polson Alt Upper Silt 3		Test Date	1/29/2009
WT of Sample Ring =	72	g		
WT of Sample Ring + Soil =	266.85	g		
Water Content =	28.59	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	89.86	pcf	1.44	Mg/m^3
Water WT =	43.32	g		
Solid WT =	151.53	g		
Add Water for saturation =	5.36	g	Sr	99.98
Saturated Water Content =	32.13	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	16	0.000	0.001	0.321	0.463
0.5	25.3	1.767	3.449	0.310	0.446
1	28.1	2.299	6.897	0.306	0.441
2	31.8	3.002	13.794	0.301	0.434
4	38	4.180	27.588	0.294	0.423
8	44.5	5.415	55.176	0.286	0.411
15	53.3	7.087	103.455	0.274	0.395
30	85.1	13.129	206.910	0.235	0.338
60	122.2	20.178	413.820	0.188	0.271
80	133.4	22.306	551.760	0.174	0.251
		Activity Meter Test	1020.00	0.172	0.247
			1200.00	0.143	0.206
			2140.00	0.108	0.156
			23500.00	0.033	0.047

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.02	3.2386	8.046	7.342	0.172	0.247
1.2	3.2386	7.9296	7.342	0.143	0.206
2.14	3.2386	7.786	7.342	0.108	0.156
23.5	3.2386	7.4757	7.342	0.033	0.047

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

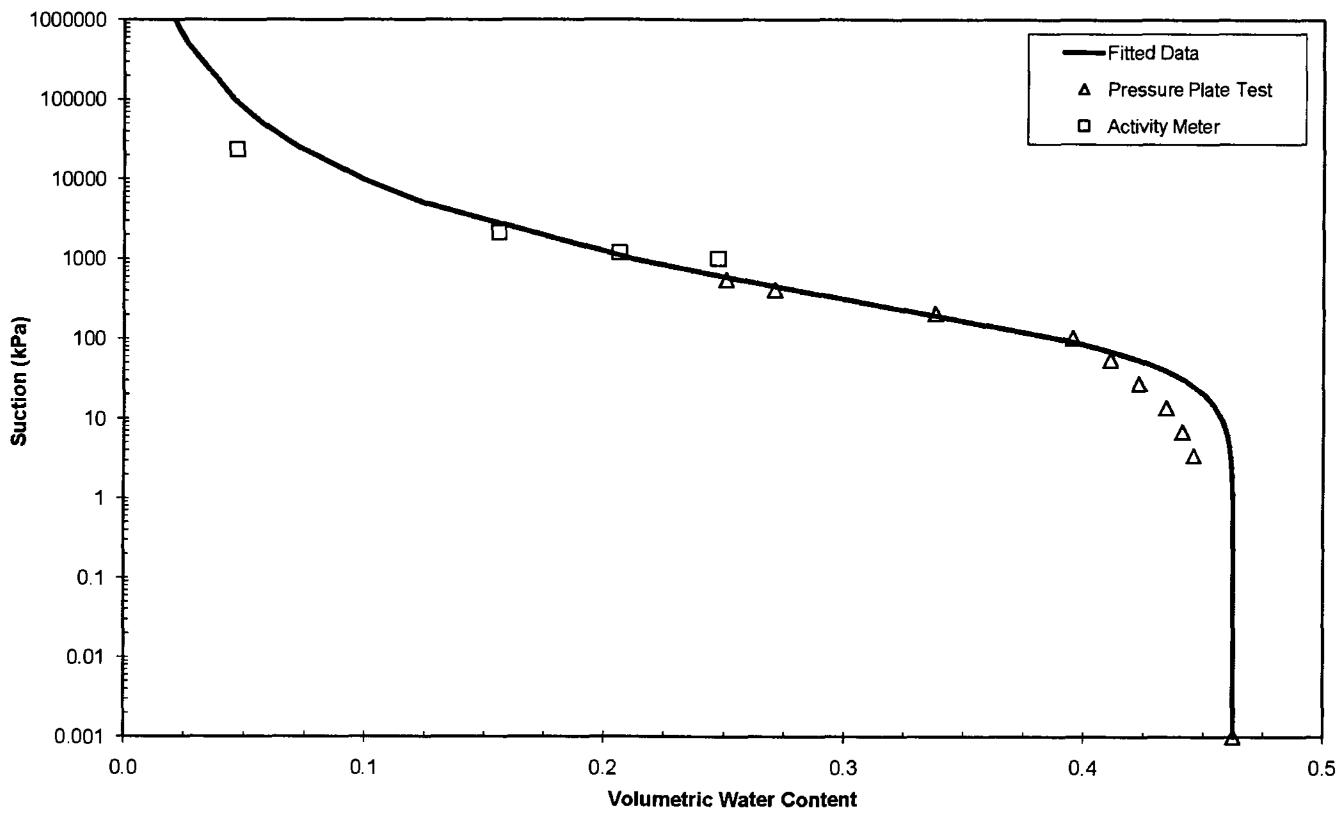
θ_r =	0.0000
θ_s =	0.4626
α =	0.0098
n =	1.3369
m =	0.2520

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4626
0.025	0.4626
0.05	0.4626
0.075	0.4626
0.1	0.4626
1	0.4624
2	0.4620
3	0.4616
4	0.4611
5	0.4606
6	0.4600
7	0.4594
8	0.4588
9	0.4582
10	0.4576
15	0.4541
20	0.4503
30	0.4424
40	0.4343
50	0.4263
60	0.4184
70	0.4109
80	0.4036
90	0.3966
100	0.3900
500	0.2635
1000	0.2122
5000	0.1247
10000	0.0988
25000	0.0726
5.00E+04	0.0575
1.00E+05	0.0455
5.00E+05	0.0265
7.50E+05	0.0231
1.00E+06	0.0209

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.463	0.4626	0.000	0.000
3.45	0.446	0.4614	-0.016	0.000
6.90	0.441	0.4595	-0.019	0.000
13.79	0.434	0.4549	-0.021	0.000
27.59	0.423	0.4444	-0.021	0.000
55.18	0.411	0.4222	-0.011	0.000
103.46	0.395	0.3878	0.007	0.000
206.91	0.338	0.3359	0.002	0.000
413.82	0.271	0.2787	-0.008	0.000
551.76	0.251	0.2558	-0.005	0.000
1020.00	0.247	0.2108	0.036	0.001
1200.00	0.206	0.2000	0.006	0.000
2140.00	0.156	0.1654	-0.010	0.000
23500.00	0.047	0.0741	-0.027	0.001

Residual = 0.000281372

Fitted and Lab Data



Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-1 (K#1-S)**		**Test Date**	
WT of Sample Ring =	71.33	g		
WT of Sample Ring + Soil =	293.83	g		
Water Content =	19.4	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	110.50	pcf	1.77	Mg/m^3
Water WT =	36.15	g		
Solid WT =	186.35	g		
Add Water for saturation =	0.91	g	Sr	103.83
Saturated Water Content =	19.89	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	8.5	0.000	0.001	0.199	0.352
0.5	11.6	0.589	3.4	0.196	0.347
1	13.8	1.007	6.9	0.193	0.343
2	21	2.375	13.8	0.186	0.330
4	32	4.465	27.6	0.175	0.310
8	45.5	7.030	55.2	0.161	0.285
15	54.6	8.759	103.5	0.152	0.269
30	61.5	10.070	206.9	0.145	0.257
60	68.4	11.381	413.8	0.138	0.244
95	72.8	12.217	655.2	0.133	0.236
120	90	15.485	827.6	0.116	0.205
150	95.2	16.473	1034.6	0.110	0.196
200	112.7	19.798	1379.4	0.093	0.164
		Activity Meter Test	11200.0	0.062	0.110
			77300.0	0.035	0.062
			315000.0	0.027	0.049

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
315	8.6301	16.9387	16.717	0.027	0.049
77.3	8.0011	16.4314	16.145	0.035	0.062
11.2	7.4184	16.0509	15.5447	0.062	0.110

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3522
α =	0.0207
n =	1.2108
m =	0.1741

FOR GRAPHING

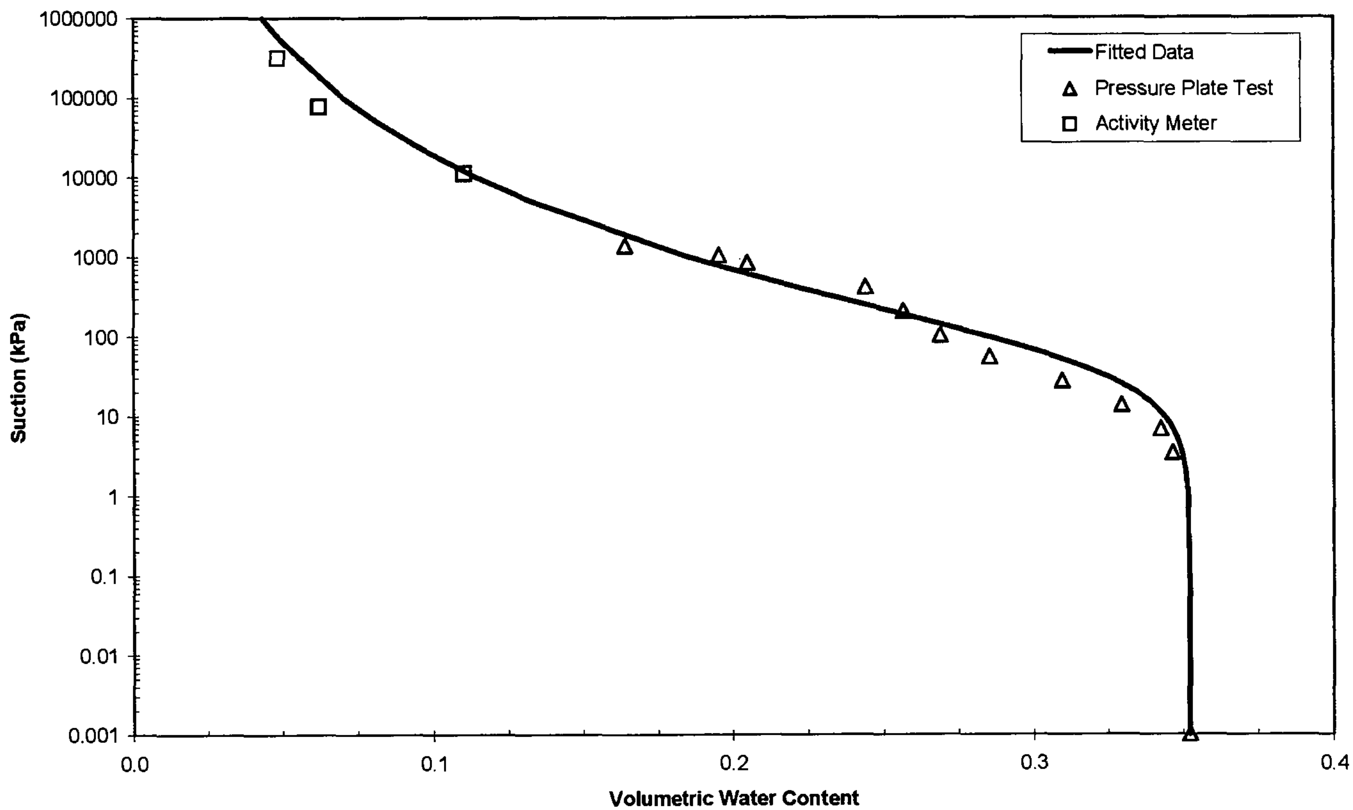
Suction (kPa)	VWC
0.001	0.3522
0.025	0.3522
0.05	0.3522
0.075	0.3522
0.1	0.3522
1	0.3516
2	0.3509
3	0.3501
4	0.3493
5	0.3484
6	0.3475
7	0.3466
8	0.3457
9	0.3447
10	0.3438
15	0.3391
20	0.3345
30	0.3259
40	0.3181
50	0.3110
60	0.3046
70	0.2989
80	0.2936
90	0.2888
100	0.2844
500	0.2130
1000	0.1851
5000	0.1323
10000	0.1144
25000	0.0943
5.00E+04	0.0815
1.00E+05	0.0704
5.00E+05	0.0502
7.50E+05	0.0460
1.00E+06	0.0433

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.352	0.3522	0.000	0.000
3.45	0.347	0.3497	-0.003	0.000
6.90	0.343	0.3467	-0.004	0.000
13.79	0.330	0.3403	-0.011	0.000
27.59	0.310	0.3279	-0.018	0.000
55.18	0.285	0.3076	-0.022	0.000
103.46	0.269	0.2830	-0.014	0.000
206.91	0.257	0.2521	0.004	0.000
413.82	0.244	0.2212	0.023	0.001
827.64	0.205	0.1732	-0.009	0.000
1034.55	0.196	0.1117	-0.001	0.000
1379.40	0.164	0.0743	-0.012	0.000
11200.00	0.110	0.1117	-0.001	0.000
77300.00	0.062	0.0743	-0.012	0.000
315000.00	0.049	0.0553	-0.007	0.000

Residual = 0.000141754

Fitted and Lab Data



Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	SB-2 (K#2-S - S SWCC)		Test Date	2/15/2006
WT of Sample Ring =	71.52	g		
WT of Sample Ring + Soil =	270.97	g		
Water Content =	26.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	93.38	pcf	1.50	Mg/m^3
Water WT =	41.98	g		
Solid WT =	157.47	g		
Add Water for saturation =	6.82	g	Sr	105.01
Saturated Water Content =	30.99	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	11.5	0.000	0.001	0.310	0.464
0.5	19.8	1.577	3.449	0.300	0.449
1	30.4	3.591	6.897	0.287	0.430
2	43	5.985	13.794	0.272	0.407
4	64.1	9.994	27.588	0.246	0.369
8	75.1	12.084	55.176	0.233	0.349
16	90.8	15.067	110.352	0.214	0.321
30	105.1	17.784	206.910	0.197	0.295
60	117.2	20.083	413.820	0.182	0.273
95	125.4	21.641	655.215	0.172	0.258
		Activity	6650.00	0.113	0.170
		Meter	27000.00	0.083	0.125
		Test	180600.00	0.047	0.071

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
180.6	7.7601	14.9181	14.595	0.047	0.071
27	7.7173	15.1257	14.556	0.083	0.125
6.65	8.0011	15.5631	14.7934	0.113	0.170

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

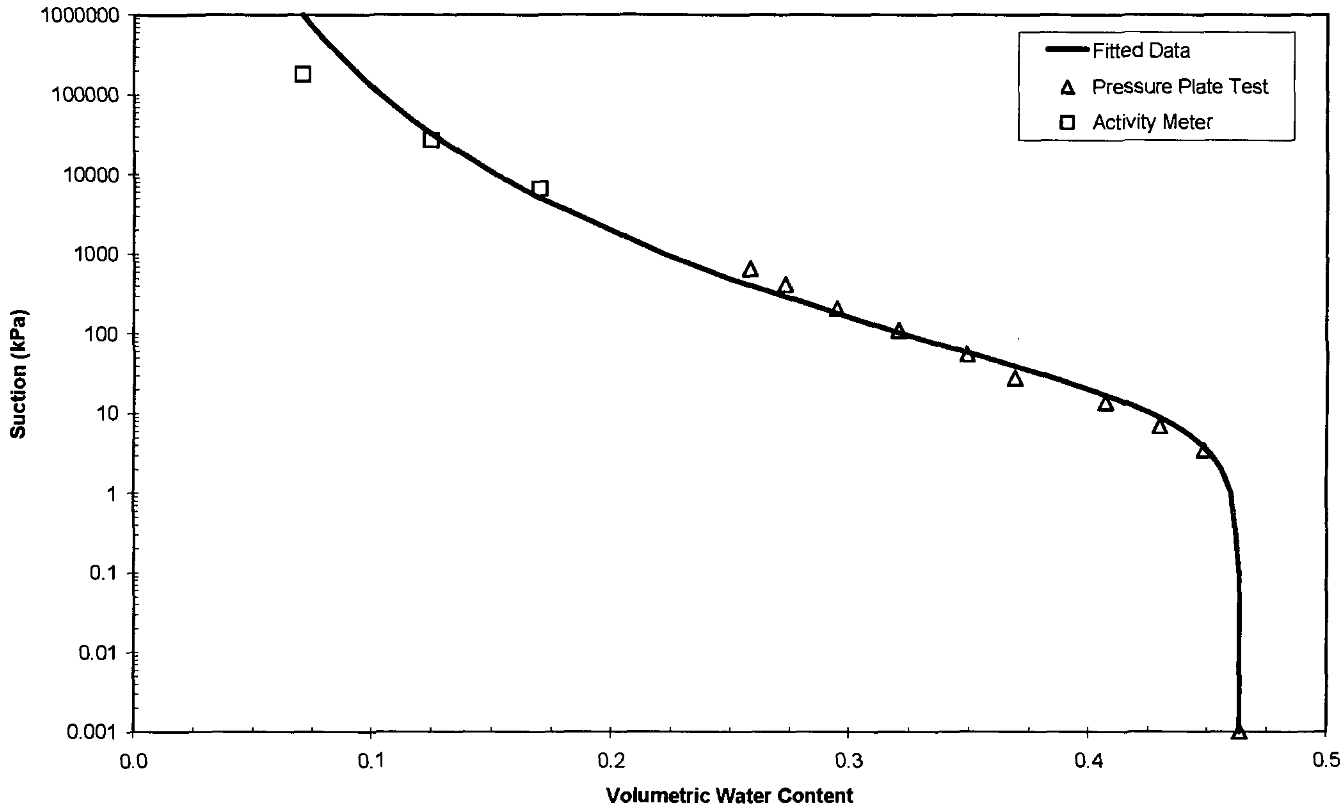
θ_r =	0.0000
θ_s =	0.4638
α =	0.0837
n =	1.1661
m =	0.1425

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4638
0.025	0.4637
0.05	0.4637
0.075	0.4636
0.1	0.4635
1	0.4602
2	0.4561
3	0.4519
4	0.4478
5	0.4438
6	0.4400
7	0.4363
8	0.4327
9	0.4293
10	0.4261
15	0.4118
20	0.4000
30	0.3817
40	0.3678
50	0.3568
60	0.3476
70	0.3399
80	0.3332
90	0.3274
100	0.3222
500	0.2490
1000	0.2221
5000	0.1701
10000	0.1516
25000	0.1302
5.00E+04	0.1161
1.00E+05	0.1034
5.00E+05	0.0792
7.50E+05	0.0740
1.00E+06	0.0706

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.464	0.4638	0.000	0.000
3.45	0.449	0.4500	-0.001	0.000
6.90	0.430	0.4366	-0.007	0.000
13.79	0.407	0.4150	-0.008	0.000
27.59	0.369	0.3856	-0.017	0.000
55.18	0.349	0.3518	-0.003	0.000
110.35	0.321	0.3173	0.003	0.000
206.91	0.295	0.2873	0.007	0.000
413.82	0.273	0.2568	0.016	0.000
655.22	0.258	0.2382	0.020	0.000
6650.00	0.170	0.1623	0.007	0.000
27000.00	0.125	0.1286	-0.004	0.000
180800.00	0.071	0.0938	-0.023	0.001

Residual = 0.000133104

Fitted and Lab Data



Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-3 (KF-3S)**		**Test Date**	
WT of Sample Ring =	70.6	g		
WT of Sample Ring + Soil =	257.79	g		
Water Content =	38.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	80.03	pcf	1.28	Mg/m^3
Water WT =	52.23	g		
Solid WT =	134.96	g		
Add Water for saturation =	3.54	g	Sr	101.64
Saturated Water Content =	41.32	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	14.3	0.000	0.001	0.413	0.530
0.5	24.1	1.862	3.449	0.399	0.512
1	27.1	2.432	6.897	0.395	0.507
2	32.6	3.477	13.794	0.387	0.497
4	49.6	6.707	27.588	0.364	0.466
8	61.8	9.025	55.176	0.346	0.444
15	75.7	11.666	103.455	0.327	0.419
30	89.4	14.269	206.910	0.308	0.394
60	98	15.903	413.820	0.295	0.379
95	114.4	19.019	655.215	0.272	0.349
125	125.1	21.052	862.125	0.257	0.330
		Activity Meter Test	3010.00	0.200	0.257
			46900.00	0.110	0.141
			307800.00	0.074	0.095

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
307.8	8.2882	14.5635	14.1315	0.074	0.095
46.9	8.2953	14.7638	14.1244	0.110	0.141
3.01	7.4872	14.4628	13.2987	0.200	0.257

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5300
α =	0.0248
n =	1.1841
m =	0.1555

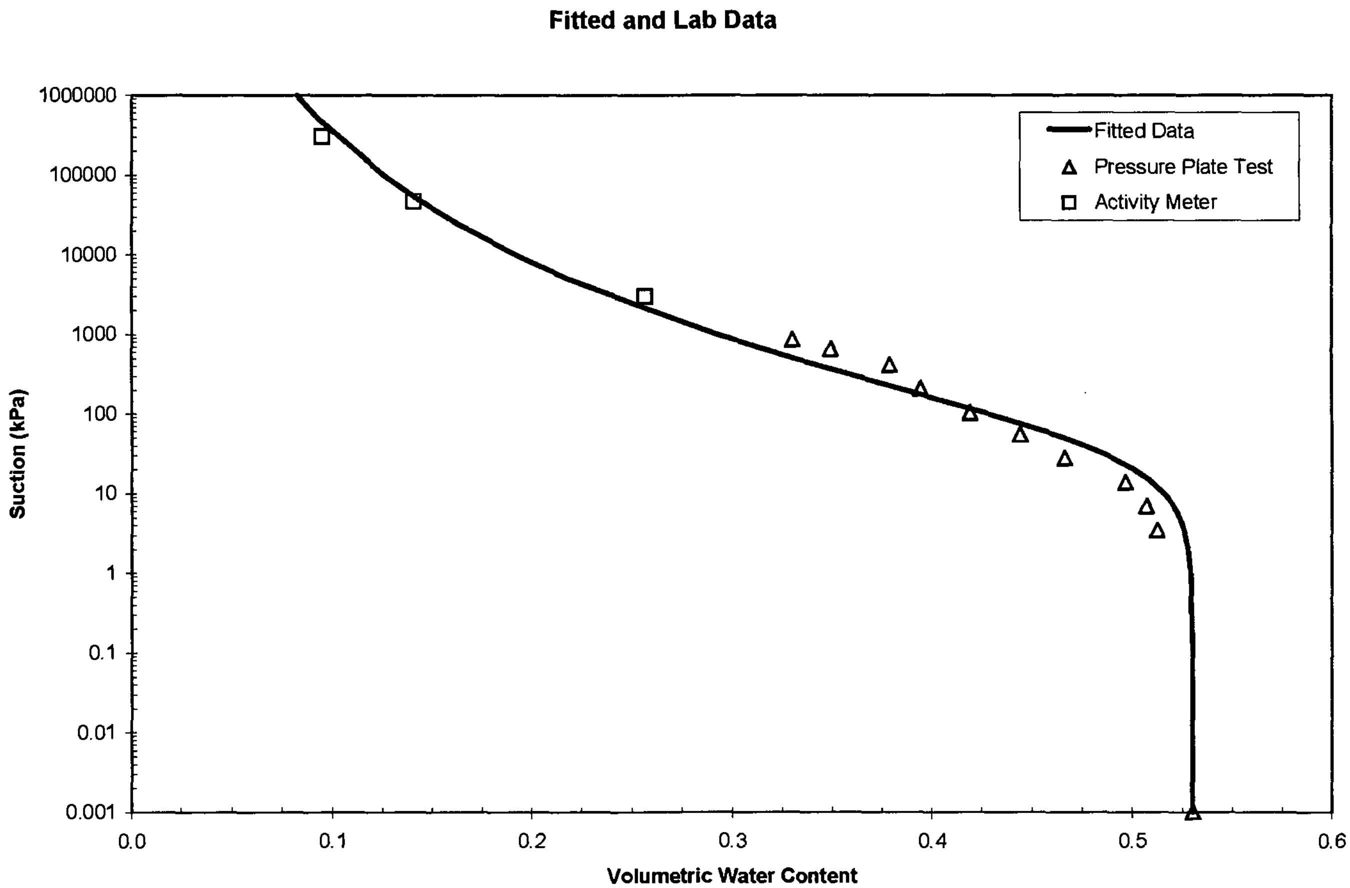
FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.530	0.5300	0.000	0.000
3.45	0.512	0.5256	-0.013	0.000
6.90	0.507	0.5205	-0.014	0.000
13.79	0.497	0.5100	-0.013	0.000
27.59	0.466	0.4908	-0.025	0.001
55.18	0.444	0.4610	-0.017	0.000
103.46	0.419	0.4263	-0.007	0.000
206.91	0.394	0.3840	0.010	0.000
413.82	0.379	0.3419	0.037	0.001
655.22	0.349	0.3154	0.034	0.001
862.13	0.330	0.3003	0.030	0.001
3010.00	0.257	0.2393	0.018	0.000
46900.00	0.141	0.1445	-0.004	0.000
307800.00	0.095	0.1022	-0.007	0.000

Residual = 0.000382068

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.5300
0.025	0.5300
0.05	0.5300
0.075	0.5299
0.1	0.5299
1	0.5290
2	0.5277
3	0.5263
4	0.5248
5	0.5233
6	0.5218
7	0.5203
8	0.5188
9	0.5172
10	0.5157
15	0.5082
20	0.5010
30	0.4878
40	0.4761
50	0.4659
60	0.4567
70	0.4486
80	0.4412
90	0.4345
100	0.4283
500	0.3308
1000	0.2924
5000	0.2180
10000	0.1920
25000	0.1622
5.00E+04	0.1428
1.00E+05	0.1257
5.00E+05	0.0934
7.50E+05	0.0867
1.00E+06	0.0822


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content

Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-4 (K#4 - S)**		**Test Date**	
WT of Sample Ring =	70.72	g		
WT of Sample Ring + Soil =	244	g		
Water Content =	32.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	77.43	pcf	1.24	Mg/m^3
Water WT =	42.70	g		
Solid WT =	130.58	g		
Add Water for saturation =	8.19	g	Sr	90.06
Saturated Water Content =	38.97	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	14.5	0.000	0.001	0.390	0.484
0.5	32.5	3.420	3.449	0.364	0.451
1	67.4	10.051	6.897	0.313	0.388
2	95	15.295	13.794	0.273	0.338
4	108	17.765	27.588	0.254	0.315
8	118	19.665	55.176	0.239	0.297
15	142	24.225	103.455	0.204	0.253
30	158	27.265	206.910	0.181	0.225
60	171.5	29.830	413.820	0.161	0.200
95	180.5	31.540	655.215	0.148	0.184
		Activity	8210.00	0.117	0.145
		Meter	10800.00	0.112	0.139
		Test	79500.00	0.083	0.102

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
79.5	8.6297	14.6584	14.1986	0.083	0.102
10.8	8.0015	14.2801	13.6494	0.112	0.139
8.21	7.4188	13.7489	13.0877	0.117	0.145

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0407
θ_s =	0.4836
α =	0.3464
n =	1.2016
m =	0.1678

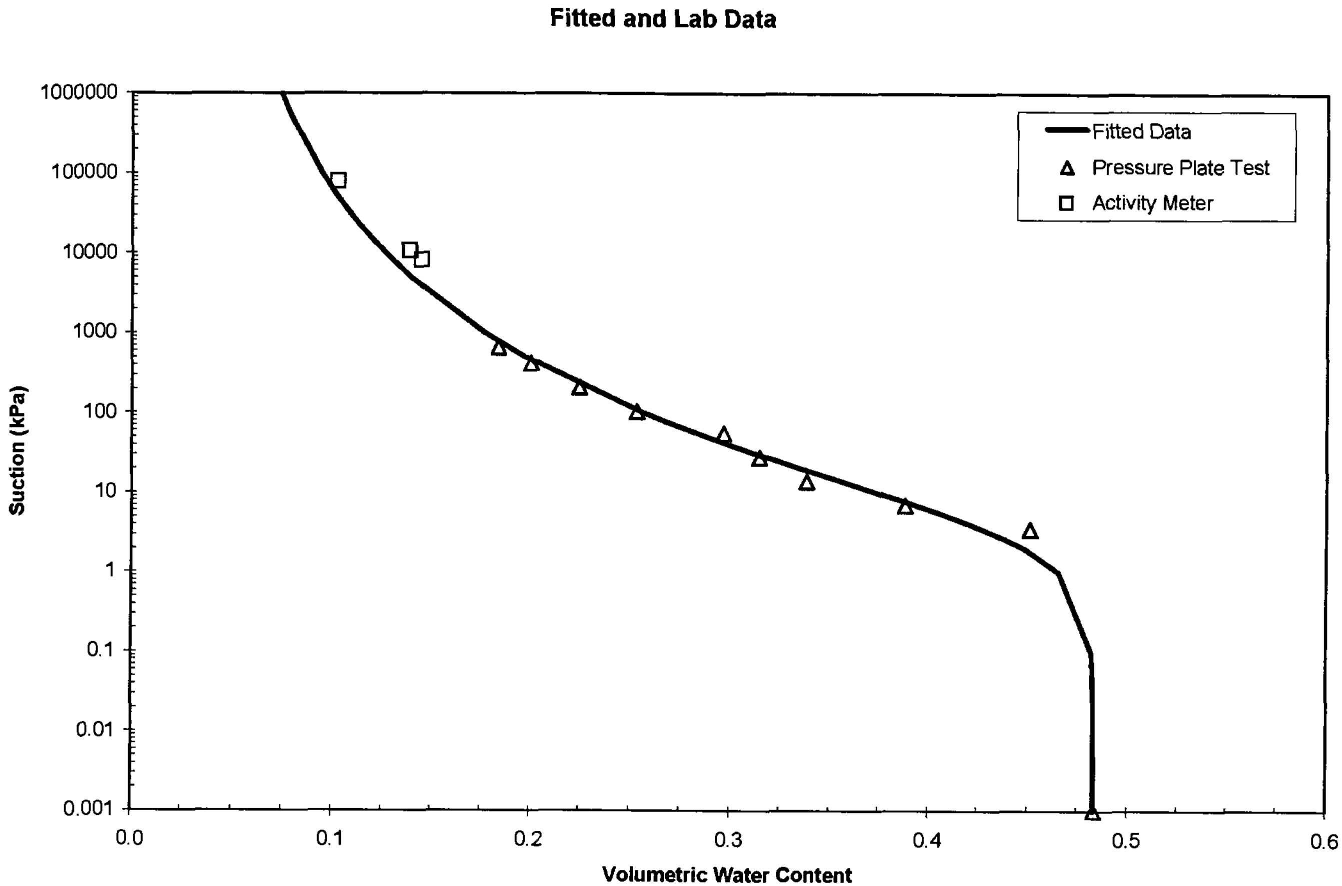
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4836
0.025	0.4834
0.05	0.4830
0.075	0.4827
0.1	0.4823
1	0.4657
2	0.4482
3	0.4334
4	0.4210
5	0.4104
6	0.4012
7	0.3932
8	0.3861
9	0.3797
10	0.3739
15	0.3516
20	0.3358
30	0.3143
40	0.2996
50	0.2886
60	0.2799
70	0.2727
80	0.2667
90	0.2615
100	0.2569
500	0.1973
1000	0.1769
5000	0.1392
10000	0.1263
25000	0.1119
5.00E+04	0.1026
1.00E+05	0.0945
5.00E+05	0.0796
7.50E+05	0.0766
1.00E+06	0.0745

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.484	0.4836	0.000	0.000
3.45	0.451	0.4276	0.023	0.001
6.90	0.388	0.3940	-0.006	0.000
13.79	0.338	0.3562	-0.018	0.000
27.59	0.315	0.3187	-0.004	0.000
55.18	0.297	0.2839	0.013	0.000
103.46	0.253	0.2555	-0.002	0.000
206.91	0.225	0.2277	-0.003	0.000
413.82	0.200	0.2034	-0.003	0.000
655.22	0.184	0.1890	-0.005	0.000
8210.00	0.145	0.1298	0.015	0.000
10800.00	0.139	0.1250	0.014	0.000
79500.00	0.102	0.0971	0.005	0.000

Residual = 0.00012128


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content

Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-5 (KF5-S - S SWCC)**		**Test Date**	2/15/2006
WT of Sample Ring =	70.18	g		
WT of Sample Ring + Soil =	264.18	g		
Water Content =	29.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	88.70	pcf	1.42	Mg/m^3
Water WT =	44.42	g		
Solid WT =	149.58	g		
Add Water for saturation =	7.74	g	Sr	105.56
Saturated Water Content =	34.87	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	10.5	0.000	0.001	0.349	0.496
0.5	18.4	1.501	3.449	0.339	0.481
1	33	4.275	6.897	0.320	0.455
2	42	5.985	13.794	0.309	0.439
4	56.5	8.740	27.588	0.290	0.413
8	67.1	10.754	55.176	0.277	0.394
16	77.5	12.730	110.352	0.264	0.375
30	86	14.345	206.910	0.253	0.359
60	99.8	16.967	413.820	0.235	0.334
95	113.3	19.532	655.215	0.218	0.310
125	125.1	21.774	862.125	0.203	0.289
195	141	24.795	1344.915	0.183	0.260
		Activity Meter Test	18600.00	0.125	0.178
			68800.00	0.085	0.121
			189000.00	0.069	0.098

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
189	7.7444	14.5943	14.1544	0.069	0.098
68.8	7.4873	14.5682	14.0131	0.085	0.121
18.6	8.6302	15.8933	15.0852	0.125	0.178

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4957
α =	0.0438
n =	1.1628
m =	0.1400

FOR GRAPHING

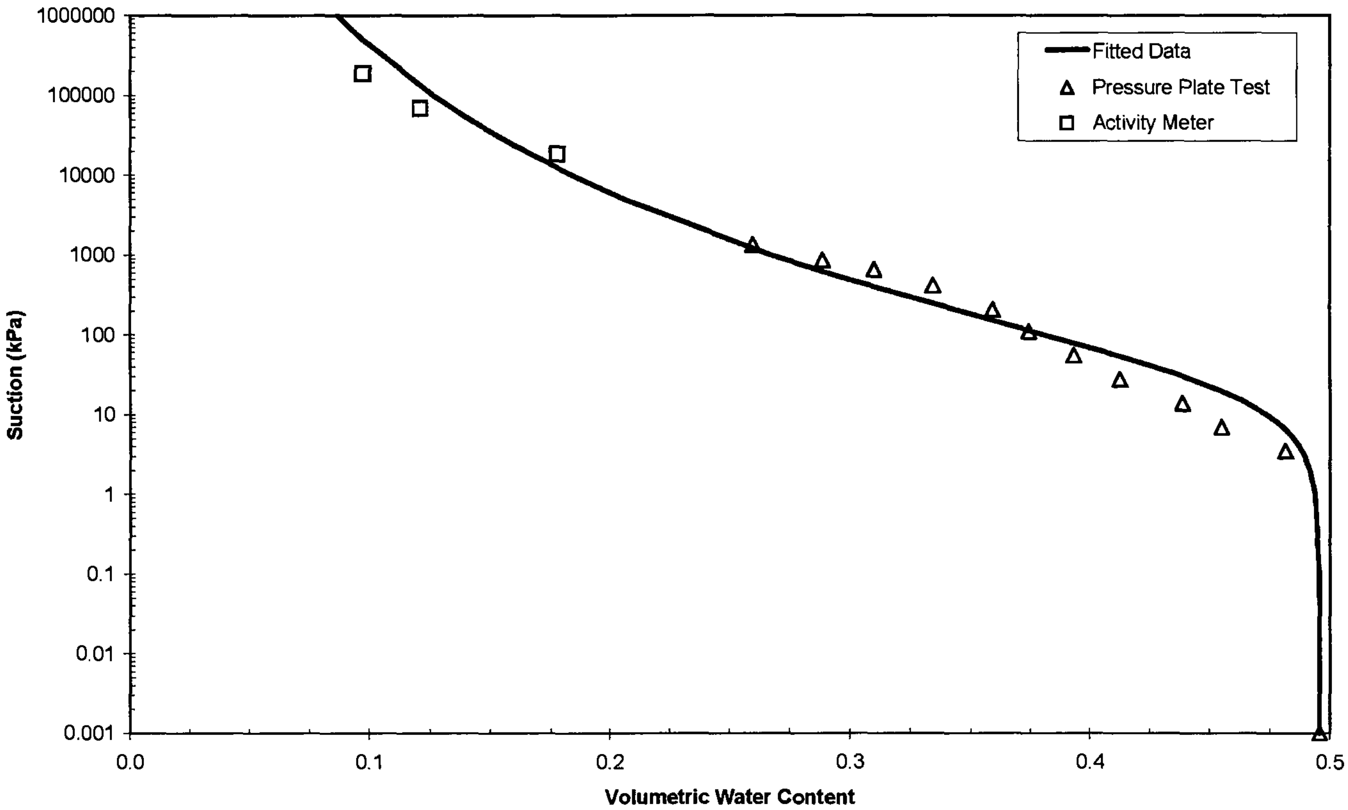
Suction (kPa)	VWC
0.001	0.4957
0.025	0.4957
0.05	0.4957
0.075	0.4956
0.1	0.4956
1	0.4939
2	0.4918
3	0.4895
4	0.4872
5	0.4849
6	0.4826
7	0.4803
8	0.4781
9	0.4759
10	0.4737
15	0.4636
20	0.4545
30	0.4392
40	0.4266
50	0.4161
60	0.4072
70	0.3993
80	0.3925
90	0.3863
100	0.3808
500	0.2987
1000	0.2674
5000	0.2061
10000	0.1841
25000	0.1586
5.00E+04	0.1417
1.00E+05	0.1265
5.00E+05	0.0974
7.50E+05	0.0912
1.00E+06	0.0870

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.496	0.4957	0.000	0.000
3.45	0.481	0.4885	-0.007	0.000
6.90	0.455	0.4805	-0.025	0.001
13.79	0.439	0.4659	-0.027	0.001
27.59	0.413	0.4426	-0.030	0.001
55.18	0.394	0.4113	-0.018	0.000
110.35	0.375	0.3756	-0.001	0.000
206.91	0.359	0.3426	0.017	0.000
413.82	0.334	0.3078	0.027	0.001
655.22	0.310	0.2862	0.024	0.001
862.13	0.289	0.2739	0.015	0.000
1344.92	0.260	0.2549	0.005	0.000
18600.00	0.178	0.1664	0.012	0.000
68800.00	0.121	0.1345	-0.014	0.000
189000.00	0.098	0.1141	-0.017	0.000

Residual = 0.000336758

Fitted and Lab Data



Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	SB-6 (K#6 - S)		Test Date	
WT of Sample Ring =	69.18	g		
WT of Sample Ring + Soil =	249.32	g		
Water Content =	37.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	77.59	pcf	1.24	Mg/m^3
Water WT =	49.29	g		
Solid WT =	130.85	g		
Add Water for saturation =	8.83	g	Sr	103.04
Saturated Water Content =	44.42	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	17	0.000	0.001	0.444	0.552
0.5	31.5	2.755	3.449	0.423	0.526
1	46.9	5.681	6.897	0.401	0.498
2	55.5	7.315	13.794	0.388	0.483
4	67.5	9.595	27.588	0.371	0.461
8	81.9	12.331	55.176	0.350	0.435
15	94.1	14.649	103.455	0.332	0.413
30	107.8	17.252	206.910	0.312	0.388
60	119	19.380	413.820	0.296	0.368
95	133.1	22.059	655.215	0.276	0.343
		Activity	1180.00	0.228	0.284
		Meter	29500.00	0.128	0.160
		Test	159700.00	0.095	0.118

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
159.7	8.2885	14.4374	13.9027	0.095	0.118
29.5	8.2962	14.6181	13.8989	0.128	0.160
1.18	7.4876	14.2941	13.0297	0.228	0.284

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5523
α =	0.0617
n =	1.1540
m =	0.1335

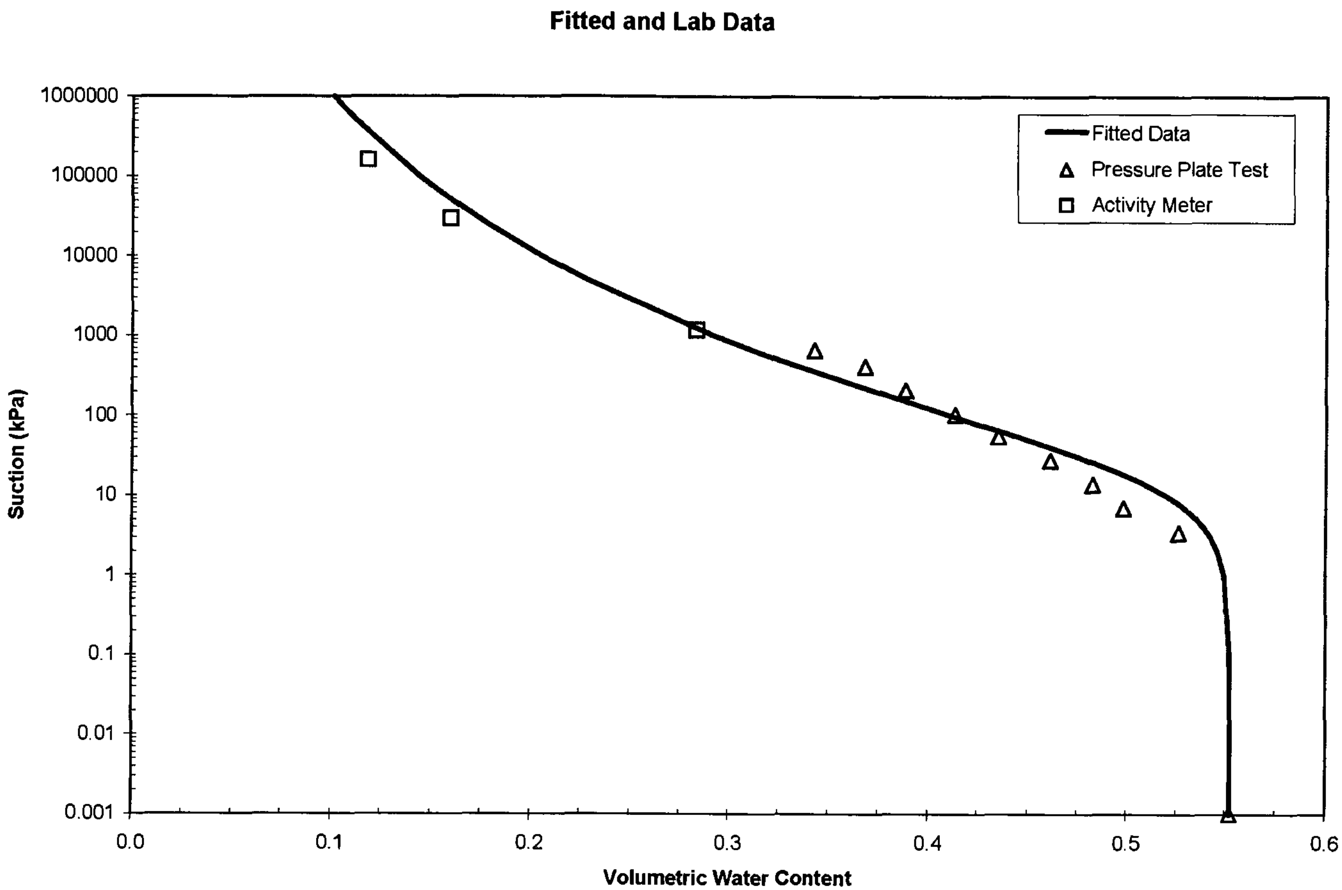
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.5523
0.025	0.5523
0.05	0.5522
0.075	0.5522
0.1	0.5521
1	0.5494
2	0.5460
3	0.5426
4	0.5391
5	0.5357
6	0.5324
7	0.5291
8	0.5259
9	0.5229
10	0.5199
15	0.5065
20	0.4949
30	0.4762
40	0.4616
50	0.4496
60	0.4396
70	0.4310
80	0.4235
90	0.4169
100	0.4109
500	0.3249
1000	0.2924
5000	0.2284
10000	0.2053
25000	0.1783
5.00E+04	0.1603
1.00E+05	0.1440
5.00E+05	0.1124
7.50E+05	0.1056
1.00E+06	0.1010

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.552	0.5523	0.000	0.000
3.45	0.526	0.5410	-0.015	0.000
6.90	0.498	0.5294	-0.031	0.001
13.79	0.483	0.5095	-0.027	0.001
27.59	0.461	0.4803	-0.019	0.000
55.18	0.435	0.4442	-0.009	0.000
103.46	0.413	0.4090	0.004	0.000
206.91	0.388	0.3705	0.018	0.000
413.82	0.368	0.3343	0.034	0.001
655.22	0.343	0.3118	0.031	0.001
1180.00	0.284	0.2851	-0.001	0.000
29500.00	0.160	0.1738	-0.014	0.000
159700.00	0.118	0.1340	-0.016	0.000

Residual = 0.000402493


Fitted and Lab Data
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1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
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0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content
Fitted Data
Pressure Plate Test
Activity Meter

Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-7 (K#7 - S)**		**Test Date**	
WT of Sample Ring =	70.66	g		
WT of Sample Ring + Soil =	250.03	g		
Water Content =	40.9	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	75.50	pcf	1.21	Mg/m^3
Water WT =	52.05	g		
Solid WT =	127.32	g		
Add Water for saturation =	4.14	g	Sr	97.35
Saturated Water Content =	44.13	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	19.2	0.000	0.001	0.441	0.534
0.5	35	3.002	3.449	0.418	0.505
1	51	6.042	6.897	0.394	0.477
2	68.4	9.348	13.794	0.368	0.445
4	87	12.882	27.588	0.340	0.412
8	103.5	16.017	55.176	0.316	0.382
15	117.3	18.639	103.455	0.295	0.357
30	131.7	21.375	206.910	0.273	0.331
60	145	23.902	413.820	0.254	0.307
95	153.4	25.498	655.215	0.241	0.292
		Activity	5120.00	0.173	0.209
		Meter	7160.00	0.161	0.195
		Test	107800.00	0.094	0.113

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
107.8	7.7173	13.6691	13.1601	0.094	0.113
7.16	8.0638	14.4217	13.5397	0.161	0.195
5.12	7.7444	14.1762	13.2271	0.173	0.209

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

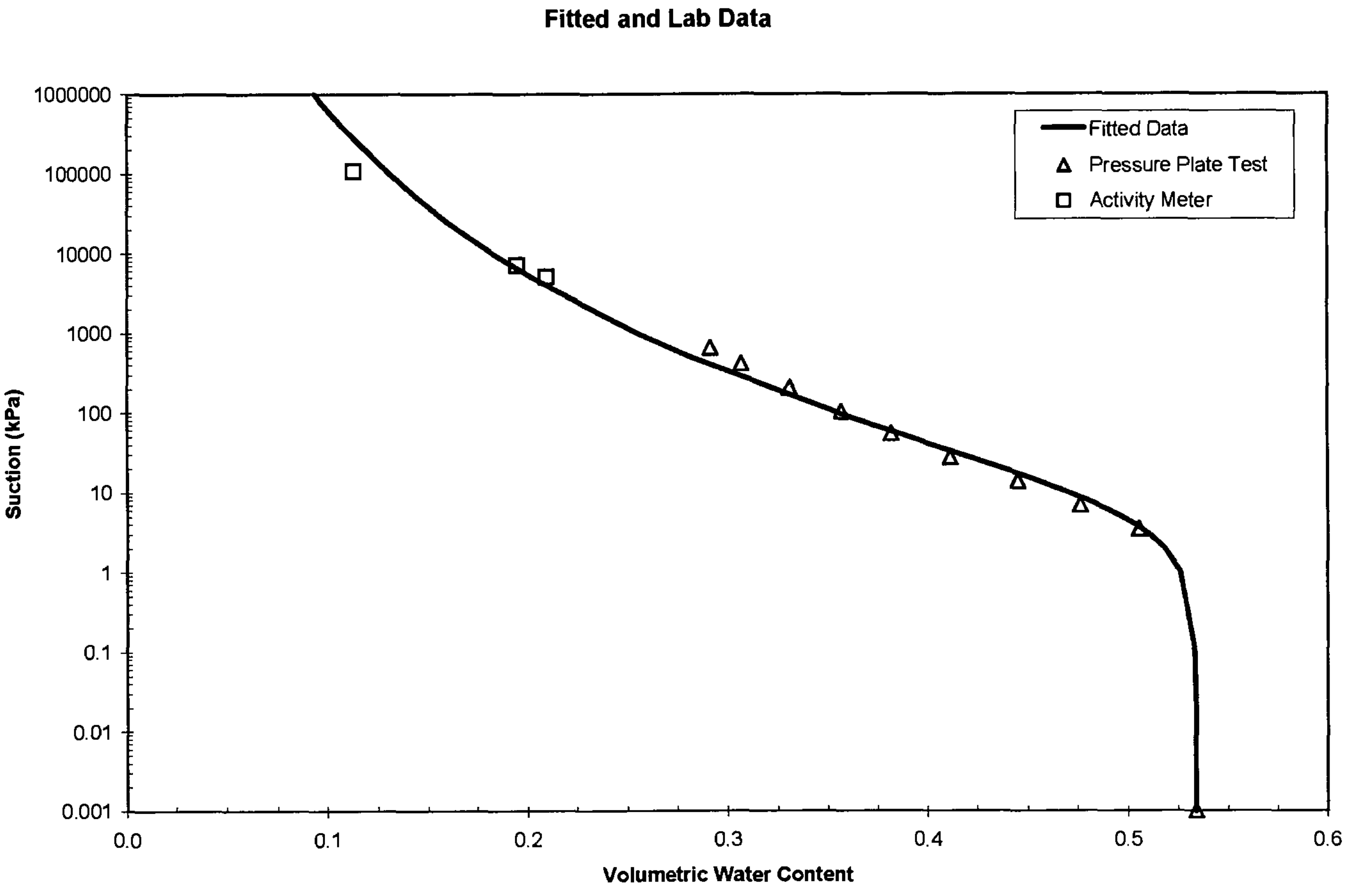
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5340
α =	0.1598
n =	1.1454
m =	0.1269

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.5340
0.025	0.5338
0.05	0.5337
0.075	0.5335
0.1	0.5334
1	0.5262
2	0.5180
3	0.5102
4	0.5031
5	0.4965
6	0.4905
7	0.4849
8	0.4797
9	0.4749
10	0.4705
15	0.4519
20	0.4377
30	0.4169
40	0.4019
50	0.3903
60	0.3809
70	0.3730
80	0.3662
90	0.3603
100	0.3550
500	0.2822
1000	0.2553
5000	0.2021
10000	0.1827
25000	0.1599
5.00E+04	0.1446
1.00E+05	0.1307
5.00E+05	0.1035
7.50E+05	0.0975
1.00E+06	0.0935

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.534	0.5340	0.000	0.000
3.45	0.505	0.5069	-0.002	0.000
6.90	0.477	0.4854	-0.009	0.000
13.79	0.445	0.4559	-0.011	0.000
27.59	0.412	0.4213	-0.010	0.000
55.18	0.382	0.3852	-0.003	0.000
103.48	0.357	0.3534	0.003	0.000
206.91	0.331	0.3204	0.010	0.000
413.82	0.307	0.2900	0.017	0.000
655.22	0.292	0.2714	0.020	0.000
5120.00	0.209	0.2014	0.008	0.000
7160.00	0.195	0.1918	0.003	0.000
107800.00	0.113	0.1293	-0.016	0.000

Residual = 0.000112057


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
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100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content

Pressure Plate Extractor Test
ASTM D 6836 - 02 (Method B)

Sample I.D.	**SB-8 (KF8 - S)**		**Test Date**	
WT of Sample Ring =	69.1	g		
WT of Sample Ring + Soil =	249.61	g		
Water Content =	34.6	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	79.55	pcf	1.27	Mg/m^3
Water WT =	46.36	g		
Solid WT =	134.15	g		
Add Water for saturation =	8.37	g	Sr	99.20
Saturated Water Content =	40.80	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	14.9	0.000	0.001	0.408	0.520
0.5	26.8	2.261	3.449	0.391	0.499
1	41.1	4.978	6.897	0.371	0.473
2	57.5	8.094	13.794	0.348	0.443
4	71.0	10.659	27.588	0.329	0.419
8	80.0	12.369	55.176	0.316	0.403
15	89.8	14.231	103.455	0.302	0.385
30	102.5	16.644	206.910	0.284	0.362
60	113.0	18.639	413.820	0.269	0.343
95	122.2	20.387	655.215	0.256	0.326
120	131.2	22.097	827.640	0.243	0.310
150	142.4	24.225	1034.550	0.227	0.290
200	154.6	26.543	1379.400	0.210	0.268
		Activity	5900.00	0.160	0.204
		Meter	25600.00	0.122	0.156
		Test	78100.00	0.099	0.126

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
78.1	7.7174	13.903	13.3477	0.099	0.126
25.6	8.0635	14.3738	13.6857	0.122	0.156
5.9	7.7441	13.1203	12.3789	0.160	0.204

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5201
α =	0.0635
n =	1.1611
m =	0.1387

FOR GRAPHING

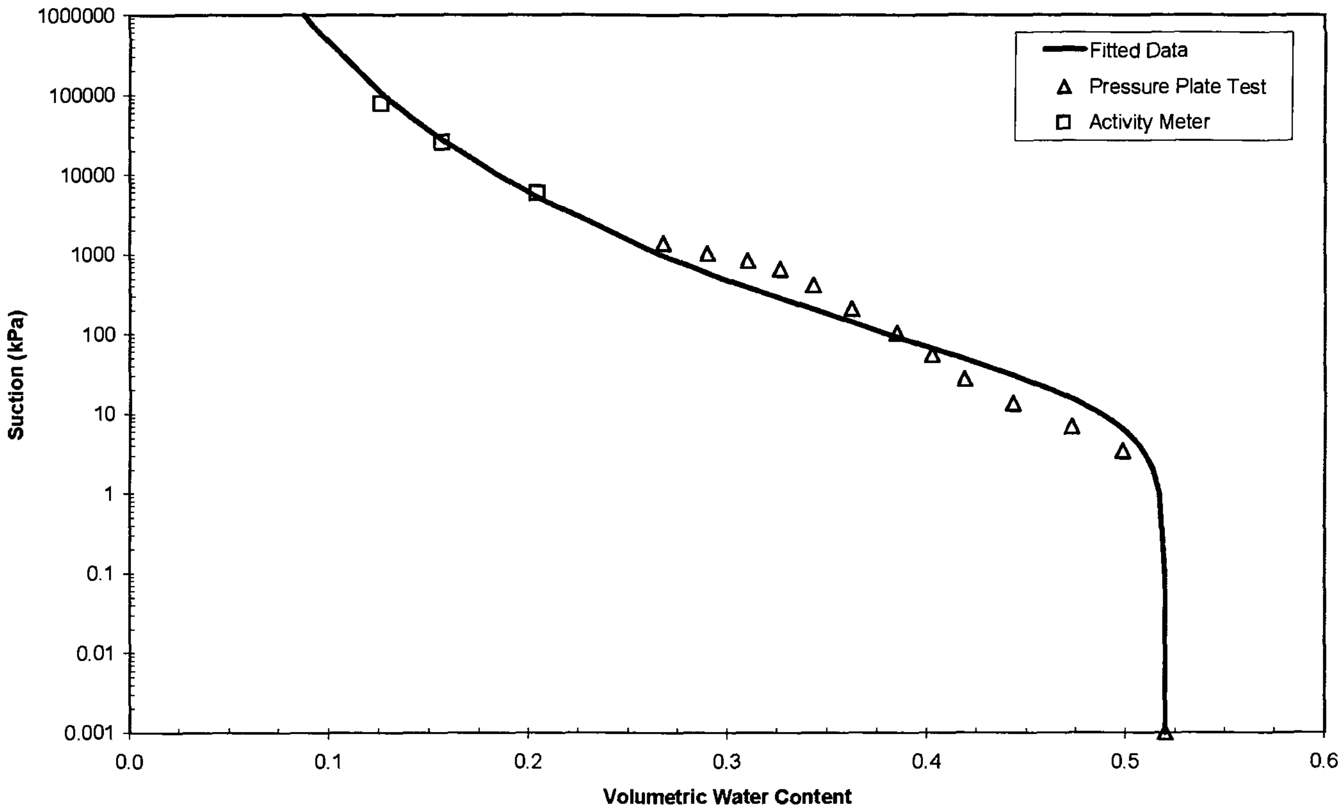
Suction (kPa)	VWC
0.001	0.5201
0.025	0.5201
0.05	0.5200
0.075	0.5200
0.1	0.5199
1	0.5172
2	0.5139
3	0.5104
4	0.5069
5	0.5035
6	0.5001
7	0.4969
8	0.4937
9	0.4907
10	0.4877
15	0.4743
20	0.4628
30	0.4443
40	0.4298
50	0.4181
60	0.4083
70	0.3999
80	0.3926
90	0.3861
100	0.3803
500	0.2973
1000	0.2662
5000	0.2056
10000	0.1839
25000	0.1587
5.00E+04	0.1419
1.00E+05	0.1269
5.00E+05	0.0980
7.50E+05	0.0918
1.00E+06	0.0876

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.520	0.5201	0.000	0.000
3.45	0.499	0.5088	-0.010	0.000
6.90	0.473	0.4972	-0.024	0.001
13.79	0.443	0.4773	-0.034	0.001
27.59	0.419	0.4483	-0.029	0.001
55.18	0.403	0.4128	-0.010	0.000
103.46	0.385	0.3784	0.006	0.000
206.91	0.362	0.3412	0.021	0.000
413.82	0.343	0.3063	0.037	0.001
655.22	0.326	0.2848	0.042	0.002
827.64	0.310	0.2744	0.036	0.001
1034.55	0.290	0.2648	0.025	0.001
1379.40	0.268	0.2529	0.015	0.000
5900.00	0.204	0.2002	0.004	0.000
25600.00	0.156	0.1581	-0.002	0.000
78100.00	0.126	0.1321	-0.006	0.000

Residual =	0.000536292

Fitted and Lab Data



Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**LB-1 (K#1-L-S)**		**Test Date**	
WT of Sample Ring =	70.7	g		
WT of Sample Ring + Soil =	297.99	g		
Water Content =	18.4	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	113.87	pcf	1.82	Mg/m^3
Water WT =	35.26	g		
Solid WT =	192.03	g		
Add Water for saturation =	1.21	g	Sr	108.61
Saturated Water Content =	18.99	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	15.5	0.000	0.001	0.190	0.347
0.5	13.2	-0.437	3.449	0.192	0.351
1	11.6	-0.741	6.897	0.194	0.354
2	10.5	-0.950	13.794	0.195	0.356
4	16.2	0.133	27.588	0.189	0.345
8	25.2	1.843	55.176	0.180	0.329
15	39.5	4.560	103.455	0.166	0.303
30	50	6.555	206.910	0.156	0.284
60	56.5	7.790	413.820	0.149	0.273
95	64.4	9.291	655.215	0.142	0.258
150	96	15.295	1034.550	0.110	0.201
200	112.1	18.354	1379.400	0.094	0.172
		Activity Meter Test	7050.00	0.072	0.131
			53800.00	0.041	0.076
			177900.00	0.031	0.056

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
177.9	7.4872	16.2436	15.9841	0.031	0.056
53.8	7.7443	16.6038	16.2517	0.041	0.076
7.05	8.0012	17.1607	16.5451	0.072	0.131

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3466
α =	0.0047
n =	1.2782
m =	0.2177

FOR GRAPHING

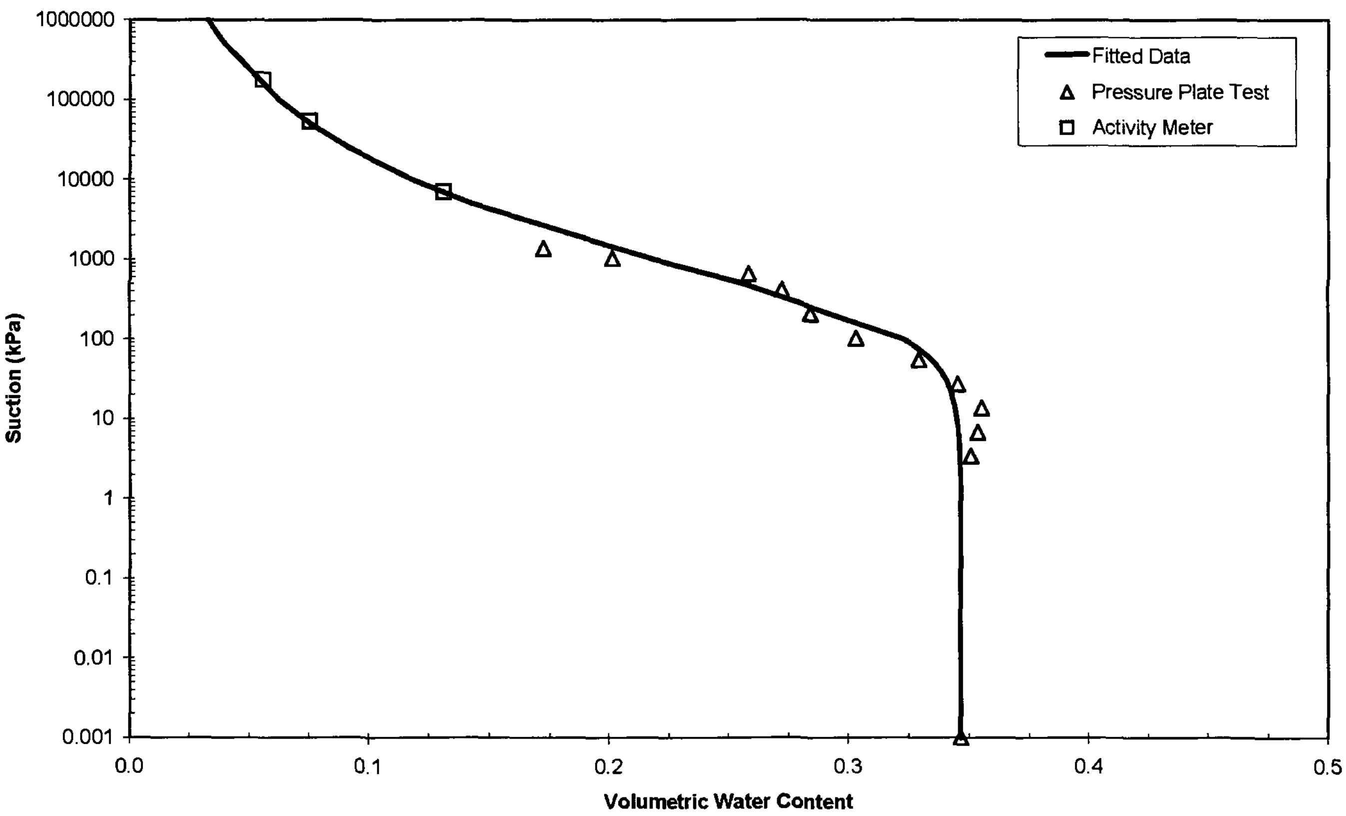
Suction (kPa)	VWC
0.001	0.3466
0.025	0.3466
0.05	0.3465
0.075	0.3465
0.1	0.3465
1	0.3465
2	0.3464
3	0.3462
4	0.3461
5	0.3459
6	0.3458
7	0.3456
8	0.3454
9	0.3452
10	0.3450
15	0.3440
20	0.3430
30	0.3406
40	0.3382
50	0.3357
60	0.3331
70	0.3305
80	0.3280
90	0.3254
100	0.3229
500	0.2563
1000	0.2188
5000	0.1432
10000	0.1184
25000	0.0918
5.00E+04	0.0757
1.00E+05	0.0625
5.00E+05	0.0399
7.50E+05	0.0357
1.00E+06	0.0329

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.347	0.3466	0.000	0.000
3.45	0.351	0.3462	0.005	0.000
6.90	0.354	0.3456	0.008	0.000
13.79	0.356	0.3443	0.011	0.000
27.59	0.345	0.3412	0.004	0.000
55.18	0.329	0.3343	-0.005	0.000
103.46	0.303	0.3220	-0.019	0.000
206.91	0.284	0.2989	-0.015	0.000
413.82	0.273	0.2663	0.006	0.000
655.22	0.258	0.2417	0.017	0.000
1034.55	0.201	0.2169	-0.016	0.000
1379.40	0.172	0.2018	-0.030	0.001
7050.00	0.131	0.1303	0.001	0.000
53800.00	0.076	0.0742	0.001	0.000
177900.00	0.056	0.0532	0.003	0.000

Residual = 0.000152112

Fitted and Lab Data



Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	LB-2 (K#2-L-S)		Test Date	
WT of Sample Ring =	70.59	g		
WT of Sample Ring + Soil =	278.16	g		
Water Content =	26.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	97.15	pcf	1.56	Mg/m^3
Water WT =	43.74	g		
Solid WT =	163.83	g		
Add Water for saturation =	4.24	g	Sr	108.80
Saturated Water Content =	29.29	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	15.7	0.000	0.001	0.293	0.456
0.5	16.8	0.209	3.449	0.292	0.454
1	23.7	1.520	6.897	0.284	0.442
2	27.8	2.299	13.794	0.279	0.434
4	36	3.857	27.588	0.269	0.419
8	43.4	5.263	55.176	0.261	0.406
15	56.6	7.771	103.455	0.245	0.382
30	71.1	10.526	206.910	0.229	0.356
60	79.5	12.122	413.820	0.219	0.341
95	93.2	14.725	655.215	0.203	0.316
125	105	16.967	862.125	0.189	0.295
150	111.1	18.126	1034.550	0.182	0.284
		Activity	12300.00	0.092	0.143
		Meter	23700.00	0.078	0.122
		Test	179700.00	0.036	0.056

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
179.7	7.717	15.2275	14.9657	0.036	0.056
23.7	7.7602	15.5457	14.9801	0.078	0.122
12.3	8.6298	16.4852	15.8258	0.092	0.143

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4560
α =	0.0085
n =	1.2532
m =	0.2020

FOR FITTING

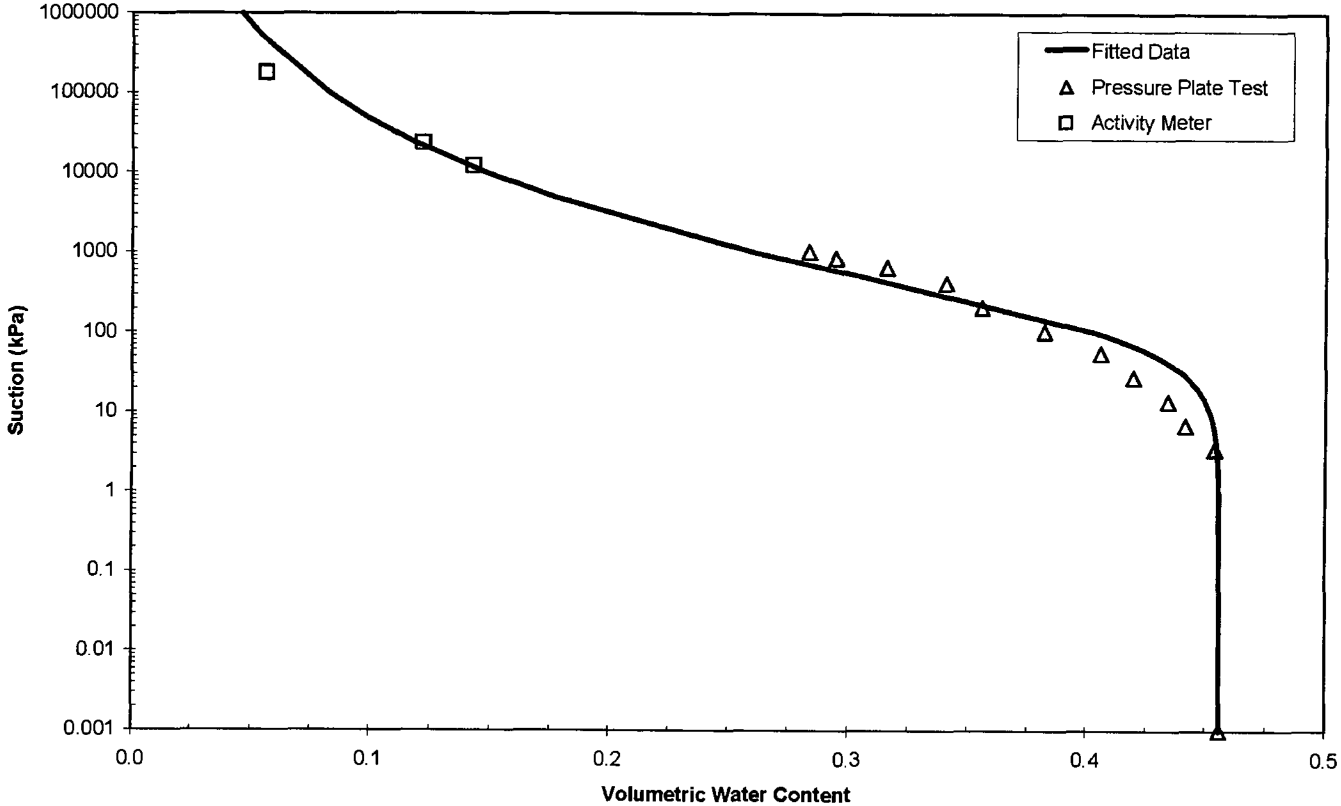
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.456	0.4560	0.000	0.000
3.45	0.454	0.4549	-0.001	0.000
6.90	0.442	0.4534	-0.012	0.000
13.79	0.434	0.4500	-0.016	0.000
27.59	0.419	0.4424	-0.023	0.001
55.18	0.406	0.4269	-0.021	0.000
103.46	0.382	0.4028	-0.021	0.000
206.91	0.356	0.3648	-0.009	0.000
413.82	0.341	0.3196	0.021	0.000
655.22	0.316	0.2890	0.027	0.001
862.13	0.295	0.2713	0.023	0.001
1034.55	0.284	0.2599	0.024	0.001
12300.00	0.143	0.1406	0.002	0.000
23700.00	0.122	0.1191	0.003	0.000
179700.00	0.056	0.0714	-0.015	0.000

Residual = 0.000293926

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4560
0.025	0.4560
0.05	0.4560
0.075	0.4560
0.1	0.4560
1	0.4557
2	0.4554
3	0.4551
4	0.4547
5	0.4542
6	0.4538
7	0.4534
8	0.4529
9	0.4524
10	0.4519
15	0.4493
20	0.4466
30	0.4410
40	0.4354
50	0.4298
60	0.4243
70	0.4191
80	0.4140
90	0.4091
100	0.4044
500	0.3069
1000	0.2620
5000	0.1764
10000	0.1481
25000	0.1175
5.00E+04	0.0986
1.00E+05	0.0828
5.00E+05	0.0551
7.50E+05	0.0497
1.00E+06	0.0462

Fitted and Lab Data



Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**LB-3 (K#3-L-S)**		**Test Date**	
WT of Sample Ring =	70.8	g		
WT of Sample Ring + Soil =	269.8	g		
Water Content =	22.7	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	96.21	pcf	1.54	Mg/m^3
Water WT =	36.76	g		
Solid WT =	162.24	g		
Add Water for saturation =	8	g	Sr	100.16
Saturated Water Content =	27.59	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	15.8	0.000	0.001	0.276	0.425
0.5	19	0.608	3.449	0.272	0.420
1	26.1	1.957	6.897	0.264	0.407
2	31.5	2.983	13.794	0.258	0.397
4	41.5	4.883	27.588	0.246	0.379
8	49.4	6.384	55.176	0.237	0.365
15	60.4	8.474	103.455	0.224	0.345
30	70.3	10.355	206.910	0.212	0.327
60	80.4	12.274	413.820	0.200	0.309
95	97	15.428	655.215	0.181	0.279
125	111.1	18.107	862.125	0.164	0.253
		Activity Meter Test	3100.00	0.108	0.166
			27000.00	0.067	0.104
			178000.00	0.036	0.055

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
178	7.715	15.2281	14.9701	0.036	0.055
27	7.7431	16.6108	16.0514	0.067	0.104
3.1	7.7178	15.8176	15.0313	0.108	0.166

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4254
α =	0.0112
n =	1.2444
m =	0.1964

FOR GRAPHING

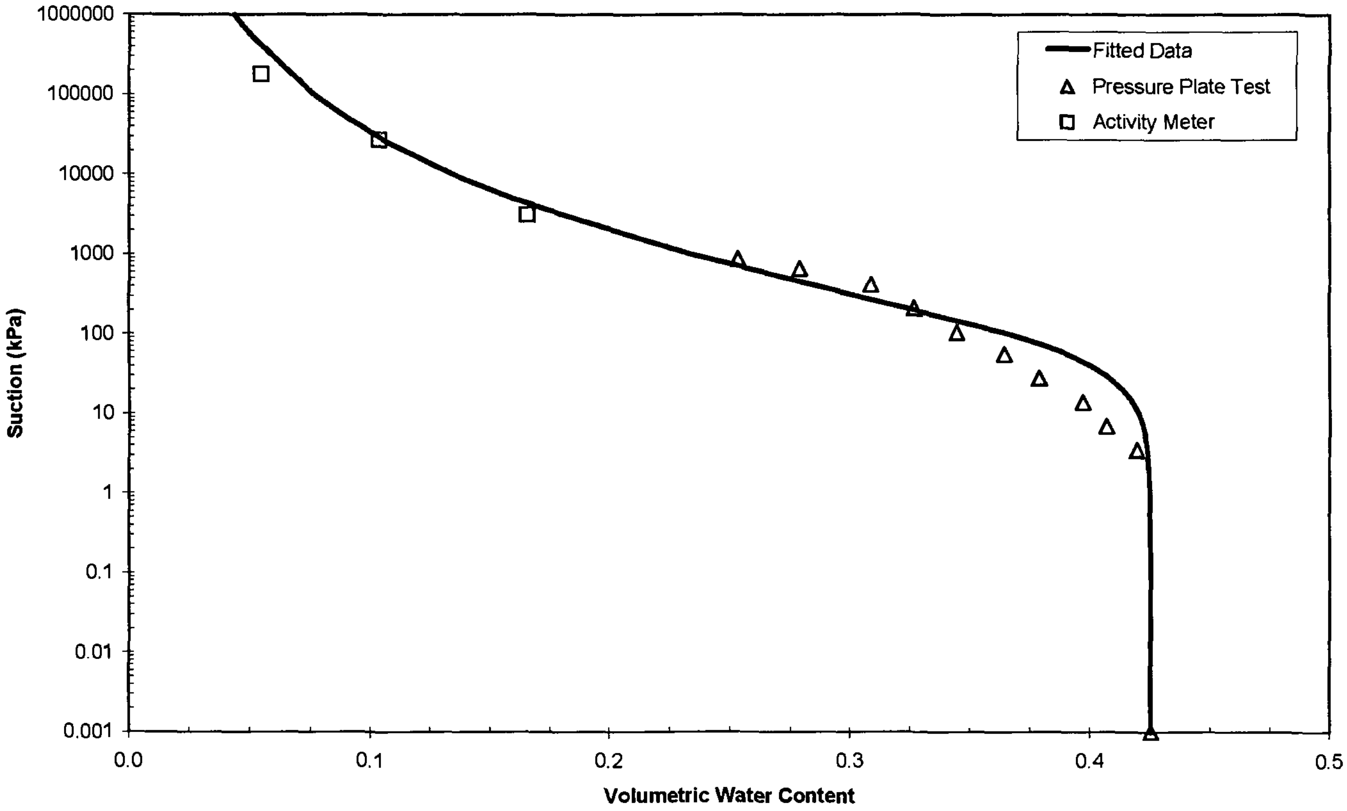
Suction (kPa)	VWC
0.001	0.4254
0.025	0.4254
0.05	0.4254
0.075	0.4254
0.1	0.4254
1	0.4251
2	0.4247
3	0.4242
4	0.4237
5	0.4231
6	0.4226
7	0.4220
8	0.4214
9	0.4208
10	0.4201
15	0.4169
20	0.4135
30	0.4068
40	0.4001
50	0.3937
60	0.3876
70	0.3818
80	0.3763
90	0.3711
100	0.3662
500	0.2734
1000	0.2337
5000	0.1590
10000	0.1343
25000	0.1074
5.00E+04	0.0907
1.00E+05	0.0765
5.00E+05	0.0516
7.50E+05	0.0468
1.00E+06	0.0436

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.425	0.4254	0.000	0.000
3.45	0.420	0.4240	-0.004	0.000
6.90	0.407	0.4220	-0.015	0.000
13.79	0.397	0.4177	-0.021	0.000
27.59	0.379	0.4084	-0.029	0.001
55.18	0.365	0.3905	-0.026	0.001
103.46	0.345	0.3645	-0.020	0.000
206.91	0.327	0.3267	0.000	0.000
413.82	0.309	0.2848	0.024	0.001
655.22	0.279	0.2575	0.021	0.000
862.13	0.253	0.2419	0.011	0.000
3100.00	0.166	0.1785	-0.013	0.000
27000.00	0.104	0.1054	-0.002	0.000
178000.00	0.055	0.0665	-0.012	0.000

Residual = 0.000289288

Fitted and Lab Data



Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	LB-5 (K#5-L-S)		Test Date	
WT of Sample Ring =	70.68	g		
WT of Sample Ring + Soil =	284.73	g		
Water Content =	28.9	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	98.47	pcf	1.58	Mg/m^3
Water WT =	47.99	g		
Solid WT =	166.06	g		
Add Water for saturation =	0	g	Sr	110.92
Saturated Water Content =	28.90	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	14.1	0.000	0.001	0.289	0.456
0.5	16.3	0.418	3.449	0.286	0.452
1	14.1	0.000	6.897	0.289	0.456
2	14.5	0.076	13.794	0.289	0.455
4	26.7	2.394	27.588	0.275	0.433
8	36.2	4.199	55.176	0.264	0.416
15	48.2	6.479	103.455	0.250	0.394
30	58.8	8.493	206.910	0.238	0.375
60	68.8	10.393	413.820	0.226	0.357
95	78.6	12.255	655.215	0.215	0.340
125	99	16.131	862.125	0.192	0.303
150	120	20.121	1034.550	0.168	0.265
200	133.5	22.686	1379.400	0.152	0.240
		Activity	4520.00	0.107	0.169
		Meter	32100.00	0.069	0.109
		Test	177000.00	0.036	0.058

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
177	7.6899	15.3048	15.0367	0.036	0.058
32.1	7.6663	15.4882	14.9847	0.069	0.109
4.52	7.7178	15.8253	15.0414	0.107	0.169

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

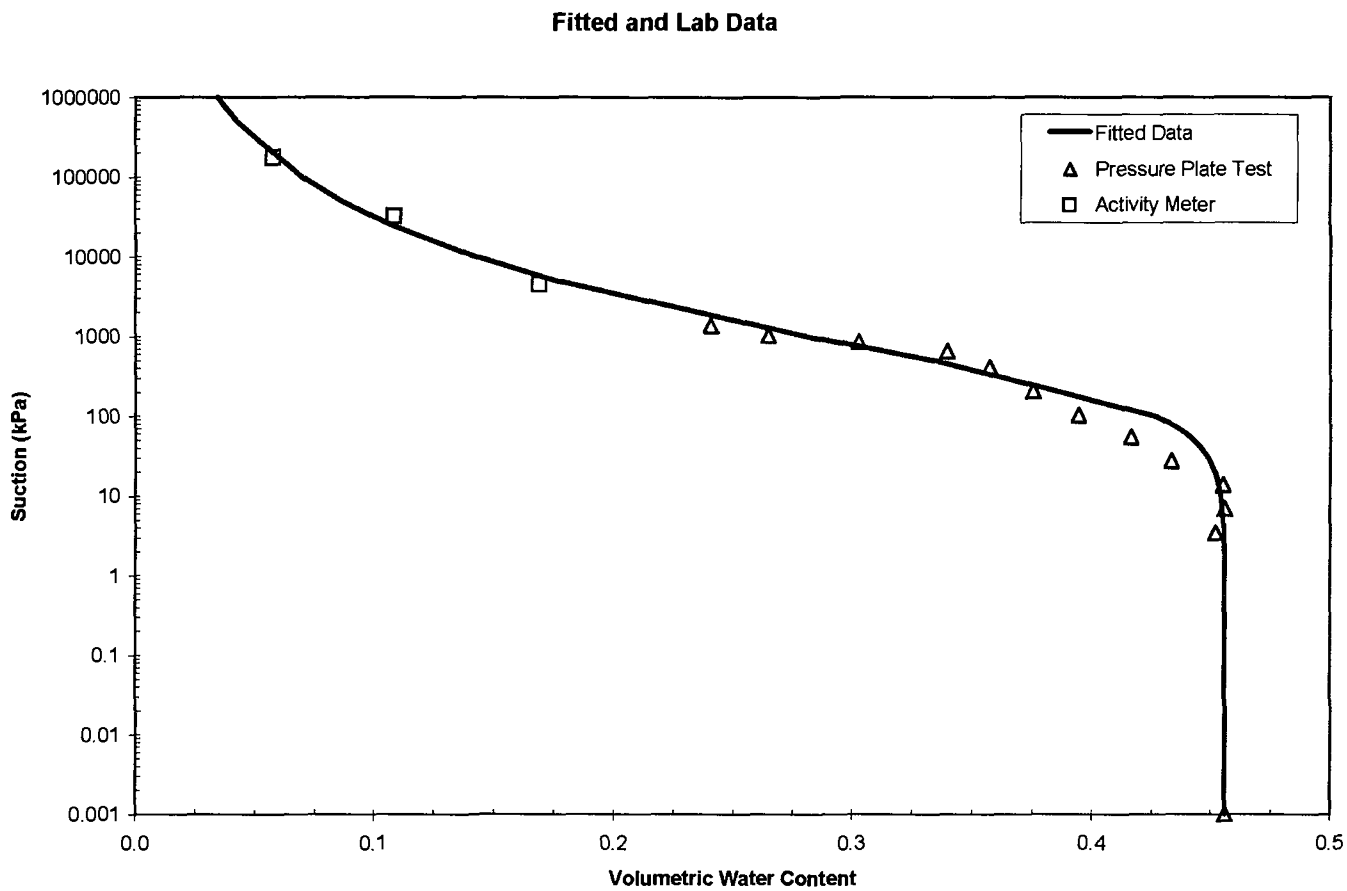
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4561
α =	0.0042
n =	1.3102
m =	0.2367

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.456	0.4561	0.000	0.000
3.45	0.452	0.4556	-0.004	0.000
6.90	0.456	0.4550	0.001	0.000
13.79	0.455	0.4535	0.002	0.000
27.59	0.433	0.4498	-0.016	0.000
55.18	0.416	0.4413	-0.025	0.001
103.46	0.394	0.4255	-0.031	0.001
206.91	0.375	0.3946	-0.019	0.000
413.82	0.357	0.3491	0.008	0.000
655.22	0.340	0.3143	0.025	0.001
862.13	0.303	0.2931	0.010	0.000
1034.55	0.265	0.2792	-0.014	0.000
1379.40	0.240	0.2578	-0.017	0.000
4520.00	0.169	0.1815	-0.013	0.000
32100.00	0.109	0.0993	0.009	0.000
177000.00	0.058	0.0585	-0.001	0.000

Residual = 0.000237723

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4561
0.025	0.4561
0.05	0.4561
0.075	0.4561
0.1	0.4561
1	0.4560
2	0.4559
3	0.4557
4	0.4555
5	0.4554
6	0.4552
7	0.4550
8	0.4548
9	0.4546
10	0.4544
15	0.4532
20	0.4519
30	0.4491
40	0.4461
50	0.4429
60	0.4397
70	0.4365
80	0.4332
90	0.4299
100	0.4266
500	0.3350
1000	0.2817
5000	0.1760
10000	0.1423
25000	0.1072
5.00E+04	0.0865
1.00E+05	0.0698
5.00E+05	0.0424
7.50E+05	0.0374
1.00E+06	0.0342


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	**LB-6 (K#6-L-S)**		**Test Date**	
WT of Sample Ring =	71.33	g		
WT of Sample Ring + Soil =	271.93	g		
Water Content =	24.6	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	95.47	pcf	1.53	Mg/m^3
Water WT =	39.60	g		
Solid WT =	161.00	g		
Add Water for saturation =	4.87	g	Sr	98.49
Saturated Water Content =	27.62	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	***(cm)***	**(cc)**	**(kPa)**		
0	17.2	0.000	0.001	0.276	0.423
0.5	22.6	1.026	3.449	0.270	0.413
1	31.4	2.698	6.897	0.259	0.397
2	34.8	3.344	13.794	0.255	0.391
4	46.1	5.491	27.588	0.242	0.370
8	54.7	7.125	55.176	0.232	0.355
15	67.5	9.557	103.455	0.217	0.332
30	82.8	12.464	206.910	0.199	0.304
60	91	14.022	413.820	0.189	0.289
95	101.4	15.998	655.215	0.177	0.271
		Activity Meter Test	7320.00	0.120	0.184
			27400.00	0.088	0.135
			179100.00	0.054	0.082

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
179.1	7.5965	15.0453	14.6664	0.054	0.082
27.4	8.0638	15.8657	15.2328	0.088	0.135
7.32	7.6393	15.6586	14.7972	0.120	0.184

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4226
α =	0.0293
n =	1.1755
m =	0.1493

FOR GRAPHING

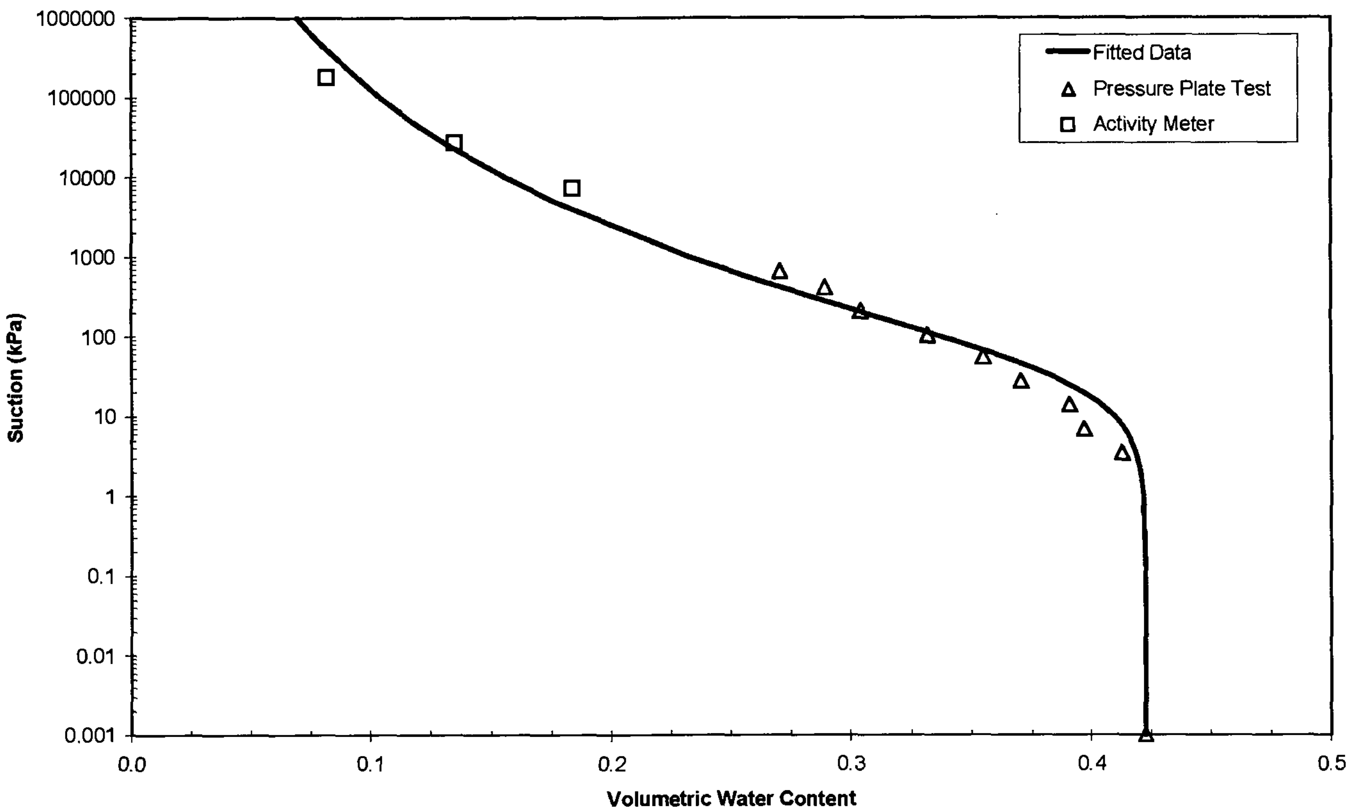
Suction (kPa)	VWC
0.001	0.4226
0.025	0.4226
0.05	0.4226
0.075	0.4226
0.1	0.4226
1	0.4217
2	0.4204
3	0.4191
4	0.4178
5	0.4164
6	0.4150
7	0.4136
8	0.4123
9	0.4109
10	0.4095
15	0.4028
20	0.3965
30	0.3853
40	0.3756
50	0.3672
60	0.3598
70	0.3533
80	0.3474
90	0.3421
100	0.3373
500	0.2623
1000	0.2330
5000	0.1761
10000	0.1560
25000	0.1328
5.00E+04	0.1176
1.00E+05	0.1041
5.00E+05	0.0785
7.50E+05	0.0731
1.00E+06	0.0695

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.423	0.4226	0.000	0.000
3.45	0.413	0.4185	-0.006	0.000
6.90	0.397	0.4138	-0.017	0.000
13.79	0.391	0.4044	-0.014	0.000
27.59	0.370	0.3879	-0.017	0.000
55.18	0.355	0.3633	-0.008	0.000
103.46	0.332	0.3357	-0.004	0.000
206.91	0.304	0.3029	0.001	0.000
413.82	0.289	0.2707	0.019	0.000
655.22	0.271	0.2505	0.020	0.000
7320.00	0.184	0.1647	0.019	0.000
27400.00	0.135	0.1307	0.004	0.000
179100.00	0.082	0.0940	-0.012	0.000

Residual = 0.000167432

Fitted and Lab Data



Large Scale Pressure Plate Extractor Test

ASTM D 6836 - 02 (Method B)

Sample I.D.	LB-8 (K#8-L-S)		Test Date	
WT of Sample Ring =	69.21	g		
WT of Sample Ring + Soil =	268.48	g		
Water Content =	37.5	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	85.94	pcf	1.38	Mg/m^3
Water WT =	54.35	g		
Solid WT =	144.92	g		
Add Water for saturation =	0	g	Sr	106.24
Saturated Water Content =	37.50	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	23.1	0.000	0.001	0.375	0.516
0.5	29.2	1.159	3.449	0.367	0.505
1	31.4	1.577	6.897	0.364	0.501
2	36	2.451	13.794	0.358	0.493
4	40.5	3.306	27.588	0.352	0.485
8	48.2	4.769	55.176	0.342	0.471
15	63.4	7.657	103.455	0.322	0.444
30	76.7	10.184	206.910	0.305	0.420
60	86	11.951	413.820	0.293	0.403
95	95.4	13.737	655.215	0.280	0.386
125	105.1	15.580	862.125	0.267	0.368
150	119.7	18.354	1034.550	0.248	0.342
200	131	20.501	1379.400	0.234	0.322
		Activity	9260.00	0.133	0.183
		Meter	41000.00	0.092	0.127
		Test	178700.00	0.048	0.067

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(Mpa)	(g)	(g)	(g)	(%)	(%)
178.7	7.6703	14.4758	14.1621	0.048	0.067
41	7.6519	14.7161	14.1191	0.092	0.127
9.26	7.7038	14.9786	14.1245	0.133	0.183

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.5165
α =	0.0056
n =	1.2678
m =	0.2112

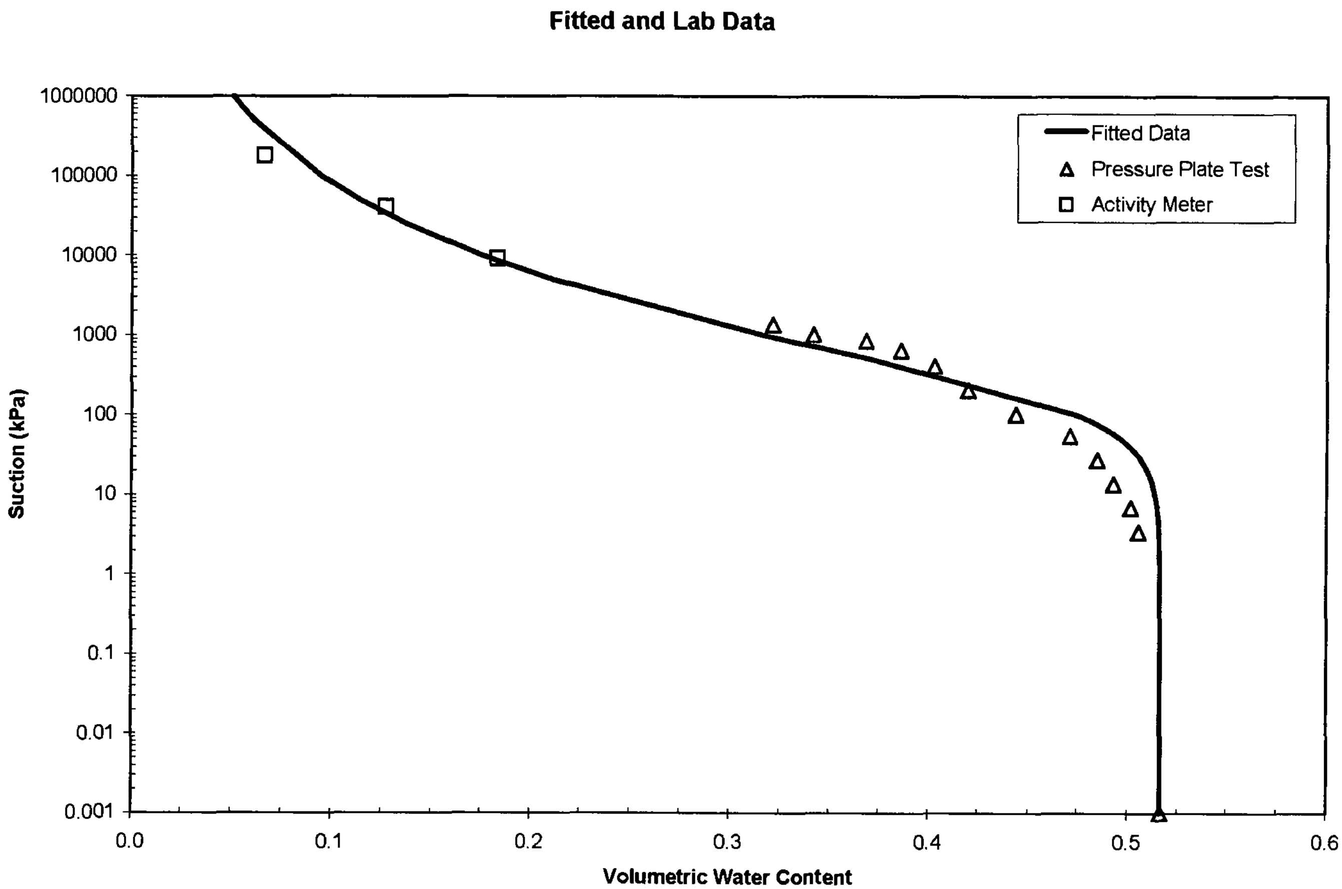
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.5165
0.025	0.5165
0.05	0.5165
0.075	0.5165
0.1	0.5164
1	0.5163
2	0.5161
3	0.5158
4	0.5156
5	0.5153
6	0.5150
7	0.5147
8	0.5144
9	0.5140
10	0.5137
15	0.5119
20	0.5099
30	0.5058
40	0.5015
50	0.4971
60	0.4927
70	0.4883
80	0.4839
90	0.4797
100	0.4755
500	0.3728
1000	0.3185
5000	0.2111
10000	0.1756
25000	0.1375
5.00E+04	0.1143
1.00E+05	0.0949
5.00E+05	0.0617
7.50E+05	0.0553
1.00E+06	0.0512

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.516	0.5165	0.000	0.000
3.45	0.505	0.5157	-0.010	0.000
6.90	0.501	0.5147	-0.013	0.000
13.79	0.493	0.5123	-0.019	0.000
27.59	0.485	0.5068	-0.022	0.000
55.18	0.471	0.4948	-0.024	0.001
103.46	0.444	0.4741	-0.030	0.001
206.91	0.420	0.4371	-0.017	0.000
413.82	0.403	0.3875	0.015	0.000
655.22	0.386	0.3515	0.034	0.001
862.13	0.368	0.3299	0.038	0.001
1034.55	0.342	0.3159	0.026	0.001
1379.40	0.322	0.2943	0.027	0.001
9260.00	0.183	0.1793	0.004	0.000
41000.00	0.127	0.1205	0.007	0.000
178700.00	0.067	0.0813	-0.015	0.000

Residual = 0.000469713



Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Water Content

Pressure Plate Extractor Test - Underwood - Thick Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm CC5 Clay Bottom		Test Date	11/4/2008
WT of Sample Ring =	0	g		
WT of Sample Ring + Soil =	1017.1	g		
Water Content =	21.42	%		
Diameter of Sample Ring, D =	5.90	in		
Height of Sample Ring, L =	1.3	in		
Volume, V =	1.98E-02	ft^3	560.0	cm^3
Dry Unit Weight =	93.38	pcf	1.50	Mg/m^3
Water WT =	179.42	g		
Solid WT =	837.68	g		
Add Water for saturation =	33.4	g	Sr	86.09
Saturated Water Content =	25.41	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.254	0.380
4.1		7.000	28.278	0.246	0.368
8.1		19.000	55.866	0.231	0.346
15.1		27.500	104.145	0.221	0.331
28.3		35.000	195.185	0.212	0.318
40		37.500	275.880	0.209	0.313
		Activity	2650.00	0.137	0.205
		Meter	8350.00	0.097	0.145
		Test	33700.00	0.058	0.087

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
2.65	18.8306	23.3799	22.8309	0.137	0.205
8.35	18.8306	23.2185	22.8309	0.097	0.145
33.7	18.8306	23.0628	22.8309	0.058	0.087
	18.8306	22.9753	22.8309	0.036	0.054

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

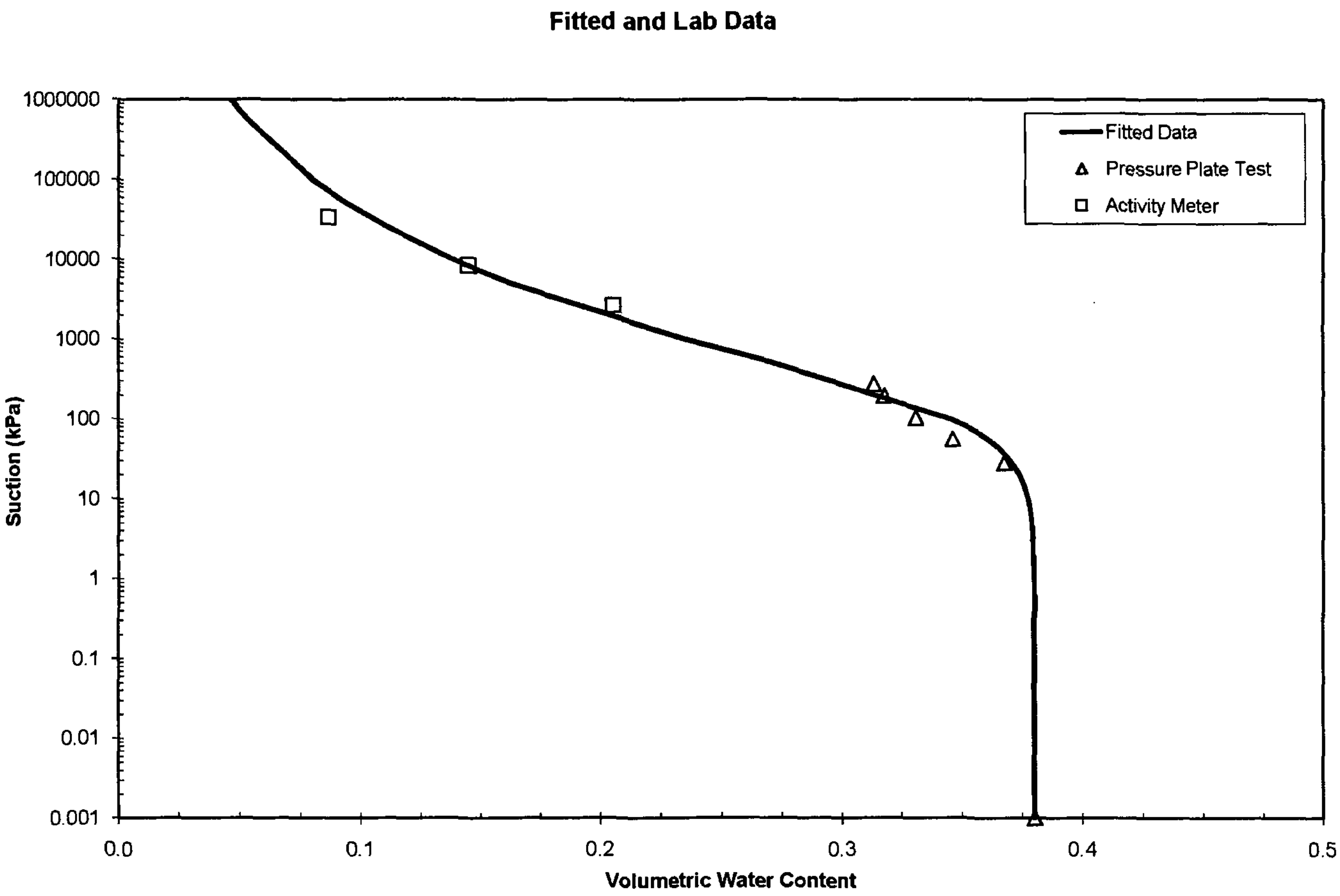
$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.3802
α =	0.0070
n =	1.2373
m =	0.1918

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.3802
0.025	0.3802
0.05	0.3802
0.075	0.3802
0.1	0.3802
1	0.3800
2	0.3798
3	0.3796
4	0.3793
5	0.3790
6	0.3787
7	0.3784
8	0.3781
9	0.3778
10	0.3775
15	0.3758
20	0.3740
30	0.3704
40	0.3666
50	0.3629
60	0.3592
70	0.3556
80	0.3521
90	0.3487
100	0.3454
500	0.2718
1000	0.2353
5000	0.1629
10000	0.1384
25000	0.1114
5.00E+04	0.0945
1.00E+05	0.0802
5.00E+05	0.0547
7.50E+05	0.0497
1.00E+06	0.0464

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.380	0.3802	0.000	0.000
28.28	0.368	0.3710	-0.003	0.000
55.87	0.346	0.3607	-0.014	0.000
104.14	0.331	0.3441	-0.013	0.000
195.19	0.318	0.3193	-0.002	0.000
275.88	0.313	0.3028	0.010	0.000
0.00	0.000	0.3802	-0.380	0.145
2650.00	0.205	0.1889	0.017	0.000
8350.00	0.145	0.1444	0.001	0.000
33700.00	0.087	0.1038	-0.017	0.000
0.00	0.000	0.3802	-0.380	0.145
0.00	0.000	0.3802	-0.380	0.145
0.00	0.000	0.3802	-0.380	0.145

Residual = 0.014560318



Fitted and Lab Data
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Suction (kPa)
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content
Fitted Data
Pressure Plate Test
Activity Meter

Pressure Plate Extractor Test - Underwood - Thick Clay Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	CC5 Clay Bottom		Test Date	8/23/2008
WT of Sample Ring =	70	g		
WT of Sample Ring + Soil =	264.6	g		
Water Content =	26.00	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	91.58	pcf	1.47	Mg/m^3
Water WT =	40.16	g		
Solid WT =	154.44	g		
Add Water for saturation =	4.4	g	Sr	93.60
Saturated Water Content =	28.85	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0	10.5	0.000	0.001	0.288	0.423
0.5	3.9	-1.254	3.449	0.297	0.435
1	4.4	-1.159	6.897	0.296	0.434
2	9.5	-0.190	13.794	0.290	0.425
4	13.4	0.551	27.588	0.285	0.418
8	18	1.425	55.176	0.279	0.410
15	23.9	2.546	103.455	0.272	0.399
30	32.2	4.123	206.910	0.262	0.384
60	37.4	5.111	413.820	0.255	0.375
		Activity Meter Test	1040.00	0.176	0.259
			2030.00	0.156	0.229
			4030.00	0.137	0.201
			7150.00	0.105	0.154
			54900.00	0.051	0.075
			74300.00	0.043	0.063
			1170.00	0.173	0.254
			1820.00	0.153	0.224
			40200.00	0.059	0.086
			62900.00	0.045	0.067

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.04	18.0172	21.755	21.1952	0.176	0.259
2.03	18.0172	21.6918	21.1952	0.156	0.229
4.03	18.0172	21.6297	21.1952	0.137	0.201
7.15	18.0172	21.5288	21.1952	0.105	0.154
54.9	18.0172	21.3566	21.1952	0.051	0.075
74.3	18.0172	21.3321	21.1952	0.043	0.063
1.17	18.5173	24.4277	23.5556	0.173	0.254
1.82	18.5173	24.3254	23.5556	0.153	0.224
40.2	18.5173	23.8509	23.5556	0.059	0.086
62.9	18.5173	23.7848	23.5556	0.045	0.067

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4271
α =	0.0030
n =	1.3422
m =	0.2550

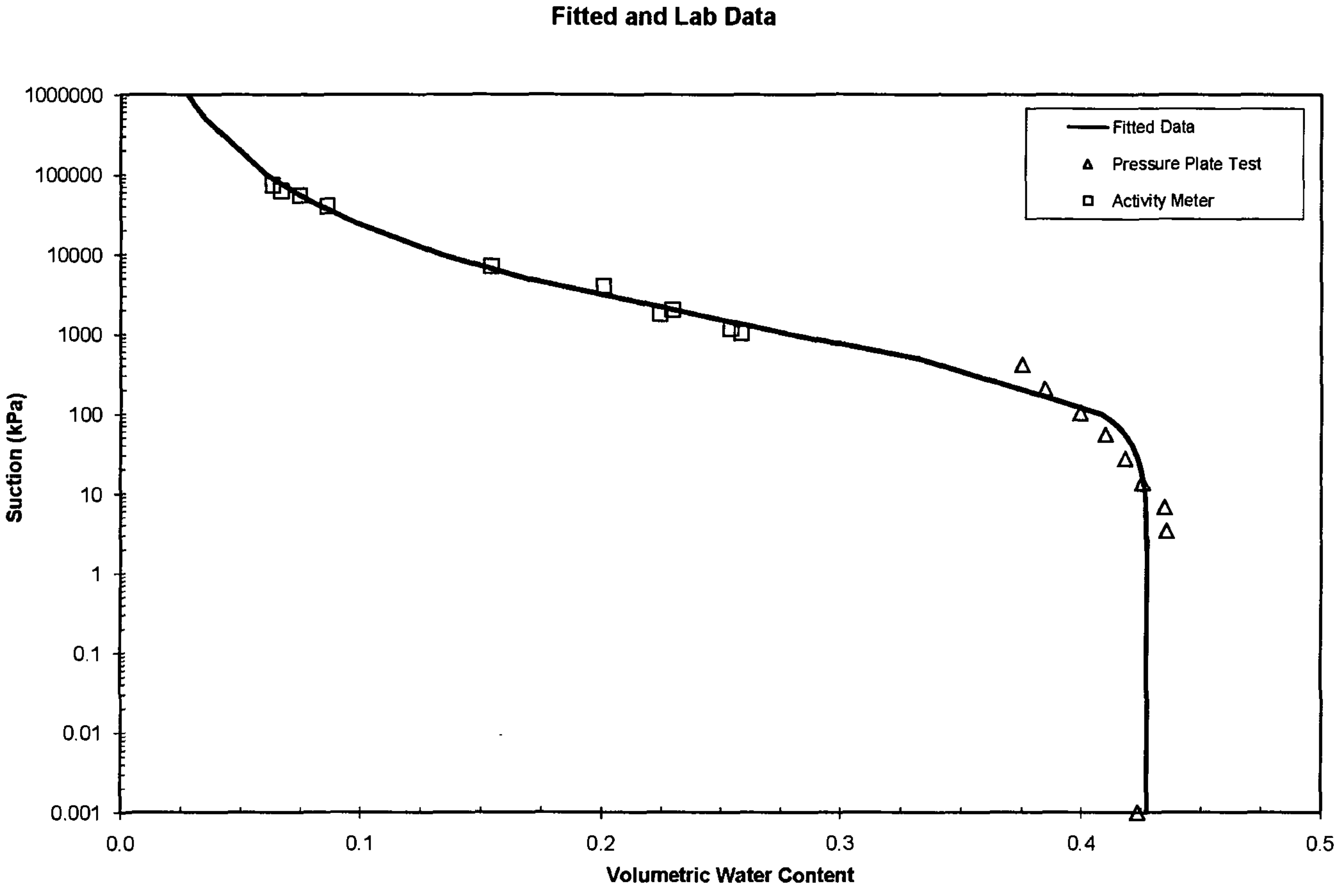
FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4271
0.025	0.4271
0.05	0.4271
0.075	0.4271
0.1	0.4271
1	0.4271
2	0.4270
3	0.4270
4	0.4269
5	0.4268
6	0.4267
7	0.4266
8	0.4264
9	0.4263
10	0.4262
15	0.4255
20	0.4247
30	0.4230
40	0.4212
50	0.4192
60	0.4171
70	0.4149
80	0.4127
90	0.4105
100	0.4082
500	0.3320
1000	0.2795
5000	0.1688
10000	0.1337
25000	0.0979
5.00E+04	0.0773
1.00E+05	0.0610
5.00E+05	0.0352
7.50E+05	0.0306
1.00E+06	0.0277

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.423	0.4271	-0.004	0.000
3.45	0.435	0.4269	0.008	0.000
6.90	0.434	0.4266	0.008	0.000
13.79	0.425	0.4257	0.000	0.000
27.59	0.418	0.4235	-0.005	0.000
55.18	0.410	0.4181	-0.008	0.000
103.46	0.399	0.4074	-0.008	0.000
206.91	0.384	0.3841	0.000	0.000
413.82	0.375	0.3451	0.030	0.001
1040.00	0.259	0.2764	-0.018	0.000
2030.00	0.229	0.2264	0.003	0.000
4030.00	0.201	0.1814	0.019	0.000
7150.00	0.154	0.1498	0.004	0.000
54900.00	0.075	0.0748	0.000	0.000
74300.00	0.063	0.0675	-0.004	0.000
1170.00	0.254	0.2674	-0.013	0.000
1820.00	0.224	0.2342	-0.010	0.000
40200.00	0.086	0.0833	0.003	0.000
62900.00	0.067	0.0714	-0.005	0.000

Residual = 0.000117941


Fitted and Lab Data
Fitted Data
Pressure Plate Test
Activity Meter
Suction (kPa)
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0
0.1
0.2
0.3
0.4
0.5
Volumetric Water Content

Pressure Plate Extractor Test - Underwood - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	254-mm ET Soil Top 2		Test Date	2/24/2009
WT of Sample Ring =	888.4	g		
WT of Sample Ring + Soil =	6056.5	g		
Water Content =	29.43	%		
Diameter of Sample Ring, D =	10.00	in		
Height of Sample Ring, L =	2.0	in		
Volume, V =	9.09E-02	ft^3	2574.1	cm^3
Dry Unit Weight =	96.84	pcf	1.55	Mg/m^3
Water WT =	1175.23	g		
Solid WT =	3992.87	g		
Add Water for saturation =	4	g	Sr	108.88
Saturated Water Content =	29.53	%		
Tube Area, A =	20.268299	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.295	0.458
0.5		97.288	3.449	0.271	0.421
1		176.334	6.897	0.251	0.390
2		279.703	13.794	0.225	0.350
3		338.481	20.691	0.211	0.327
4		385.098	27.588	0.199	0.309
8		535.083	55.176	0.161	0.250
15		555.351	103.455	0.156	0.242
		Activity	10300.00	0.090	0.140
		Meter	58100.00	0.053	0.082
		Test	72100.00	0.048	0.074

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
10.3	18.549	25.8731	25.2682	0.090	0.140
58.1	18.549	25.6228	25.2682	0.053	0.082
72.1	18.549	25.5882	25.2682	0.048	0.074

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4583
α =	0.3230
n =	1.1732
m =	0.1476

FOR FITTING

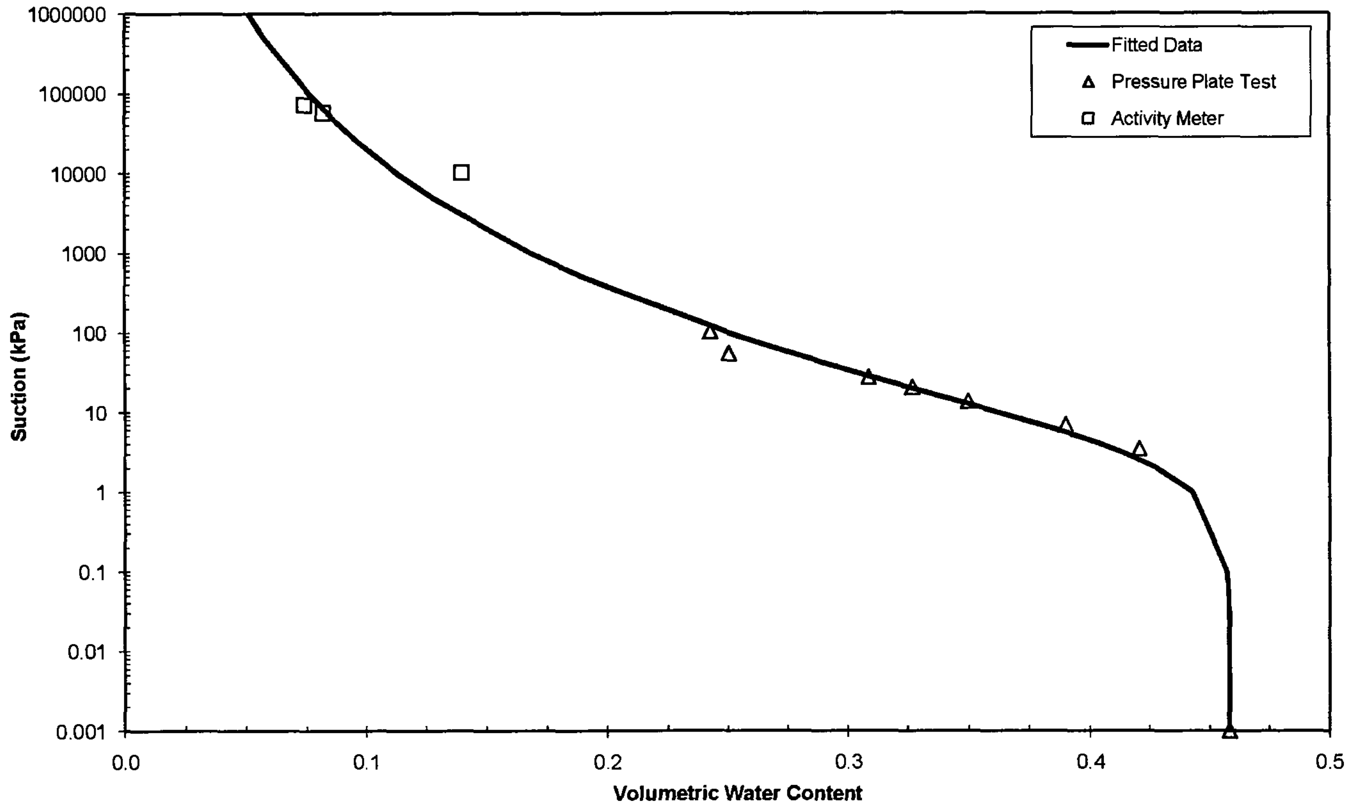
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.458	0.4583	0.000	0.000
3.45	0.421	0.4098	0.011	0.000
6.90	0.390	0.3800	0.010	0.000
13.79	0.350	0.3456	0.004	0.000
20.69	0.327	0.3249	0.002	0.000
27.59	0.309	0.3104	-0.002	0.000
55.18	0.250	0.2769	-0.027	0.001
103.46	0.242	0.2490	-0.006	0.000
10300.00	0.140	0.1125	0.027	0.001
58100.00	0.082	0.0834	-0.001	0.000
72100.00	0.074	0.0803	-0.006	0.000

Residual = 0.000160525

FOR GRAPHING

Suction (kPa)	VWC
0.001	0.4583
0.025	0.4581
0.05	0.4578
0.075	0.4575
0.1	0.4571
1	0.4427
2	0.4276
3	0.4149
4	0.4040
5	0.3946
6	0.3865
7	0.3793
8	0.3729
9	0.3671
10	0.3618
15	0.3413
20	0.3266
30	0.3062
40	0.2921
50	0.2815
60	0.2730
70	0.2660
80	0.2601
90	0.2549
100	0.2504
500	0.1899
1000	0.1684
5000	0.1275
10000	0.1131
25000	0.0965
5.00E+04	0.0855
1.00E+05	0.0759
5.00E+05	0.0574
7.50E+05	0.0535
1.00E+06	0.0509

Fitted and Lab Data



Pressure Plate Extractor Test - Underwood - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	150-mm ET Soil Top 2		Test Date	3/4/2009
WT of Sample Ring =	386.1	g		
WT of Sample Ring + Soil =	1502.6	g		
Water Content =	28.50	%		
Diameter of Sample Ring, D =	6.00	in		
Height of Sample Ring, L =	1.3	in		
Volume, V =	2.05E-02	ft^3	579.2	cm^3
Dry Unit Weight =	93.65	pcf	1.50	Mg/m^3
Water WT =	247.65	g		
Solid WT =	868.85	g		
Add Water for saturation =	17.7	g	Sr	104.17
Saturated Water Content =	30.54	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	Reading	Water out from soil sample	Suction	Water Content	Volumetric Water Content
(psi)	(cm)	(cc)	(kPa)		
0		0.000	0.001	0.305	0.458
0.5		19.000	3.449	0.284	0.426
1		24.500	6.897	0.277	0.416
2		34.000	13.794	0.266	0.400
3		42.000	20.691	0.257	0.386
4		50.000	27.588	0.248	0.372
8		70.000	55.176	0.225	0.337
15		88.000	103.455	0.204	0.306
30		112.000	206.910	0.176	0.265
		Activity Meter Test	1450.00	0.144	0.217
			3710.00	0.115	0.173
			18300.00	0.073	0.110
			35300.00	0.059	0.089
			65000.00	0.048	0.072

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	Gravimetric Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.45	18.6712	24.8746	24.0922	0.144	0.217
3.71	18.6712	24.7162	24.0922	0.115	0.173
18.3	18.6712	24.4906	24.0922	0.073	0.110
35.3	18.6712	24.4136	24.0922	0.059	0.089
65	18.6712	24.3524	24.0922	0.048	0.072

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1+(\alpha\psi)^n}\right]^m$$

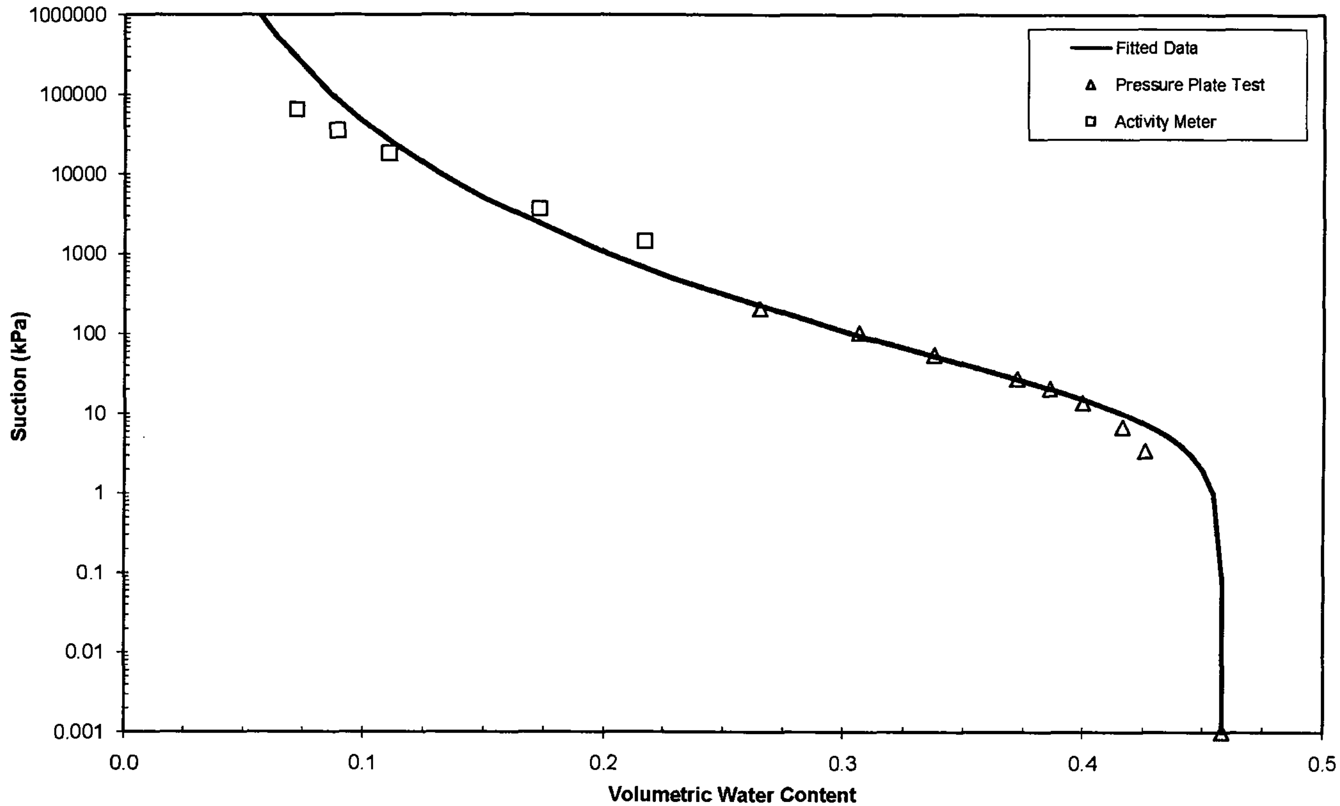
θ_r =	0.0000
θ_s =	0.4584
α =	0.0886
n =	1.1833
m =	0.1549

FOR FITTING				
Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.458	0.4584	0.000	0.000
3.45	0.426	0.4430	-0.017	0.000
6.90	0.416	0.4279	-0.012	0.000
13.79	0.400	0.4037	-0.004	0.000
20.69	0.386	0.3857	0.000	0.000
27.59	0.372	0.3715	0.000	0.000
55.18	0.337	0.3352	0.002	0.000
103.46	0.306	0.3021	0.004	0.000
206.91	0.265	0.2676	-0.003	0.000
1450.00	0.217	0.1881	0.028	0.001
3710.00	0.173	0.1584	0.014	0.000
18300.00	0.110	0.1183	-0.008	0.000
35300.00	0.089	0.1049	-0.016	0.000
65000.00	0.072	0.0938	-0.022	0.000

Residual = 0.000164107

FOR GRAPHING	
Suction (kPa)	VWC
0.001	0.4584
0.025	0.4583
0.05	0.4582
0.075	0.4582
0.1	0.4581
1	0.4544
2	0.4498
3	0.4451
4	0.4405
5	0.4360
6	0.4316
7	0.4275
8	0.4235
9	0.4197
10	0.4161
15	0.4002
20	0.3873
30	0.3673
40	0.3523
50	0.3404
60	0.3307
70	0.3225
80	0.3155
90	0.3093
100	0.3038
500	0.2284
1000	0.2013
5000	0.1500
10000	0.1321
25000	0.1117
5.00E+04	0.0984
1.00E+05	0.0866
5.00E+05	0.0645
7.50E+05	0.0599
1.00E+06	0.0568

Fitted and Lab Data



Pressure Plate Extractor Test - Underwood - Store-and-Release Cover

ASTM D 6836 - 02 (Method B)

Sample I.D.	ET-Soil Top 2		Test Date	8/23/2008
WT of Sample Ring =	70.7	g	Ring: K#6	
WT of Sample Ring + Soil =	276.03	g		
Water Content =	26.00	%		
Diameter of Sample Ring, D =	2.86	in		
Height of Sample Ring, L =	1.0	in		
Volume, V =	3.72E-03	ft^3	105.3	cm^3
Dry Unit Weight =	96.63	pcf	1.55	Mg/m^3
Water WT =	42.37	g		
Solid WT =	162.96	g		
Add Water for saturation =	1.71	g	Sr	99.23
Saturated Water Content =	27.05	%		
Tube Area, A =	0.19	cm^2		

Applied Pressure	**Reading**	**Water out from soil sample**	**Suction**	**Water Content**	**Volumetric Water Content**
(psi)	**(cm)**	**(cc)**	**(kPa)**		
0	3.2	0.000	0.001	0.270	0.419
0.6	6.6	0.646	4.138	0.267	0.413
1.2	8.3	0.969	8.276	0.265	0.410
2.1	11.2	1.520	14.484	0.261	0.404
4	16.8	2.584	27.588	0.255	0.394
8	24.3	4.009	55.176	0.246	0.381
15	36.2	6.270	103.455	0.232	0.359
30	43.9	7.733	206.910	0.223	0.345
60	53.3	9.519	413.820	0.212	0.328
		Activity Meter Test	1980.00	0.150	0.232
			3920.00	0.116	0.180
			9970.00	0.096	0.149
			25000.00	0.072	0.112
			37200.00	0.063	0.097
			48600.00	0.057	0.088
			62900.00	0.051	0.079

Activity Meter Test

Suction	Wt of Can	Wt of Can + Wet Soil	Wt of Can + Dry Soil	*Gravimetric* Water Content	Volumetric Water Content
(MPa)	(g)	(g)	(g)	(%)	(%)
1.98	18.8303	27.0099	25.9455	0.150	0.232
3.92	18.8303	26.7741	25.9455	0.116	0.180
9.97	18.8303	26.6309	25.9455	0.096	0.149
25	18.8303	26.46	25.9455	0.072	0.112
37.2	18.8303	26.3924	25.9455	0.063	0.097
48.6	18.8303	26.3495	25.9455	0.057	0.088
62.9	18.8303	26.3084	25.9455	0.051	0.079
	18.8303	26.2605	25.9455	0.044	0.069

Fit van Genuchten Eqn to SWCC Data

van Genuchten Eqn

$$\Theta = \frac{\theta - \theta_r}{\theta_s - \theta_r} = \left[\frac{1}{1 + (\alpha\psi)^n}\right]^m$$

θ_r =	0.0000
θ_s =	0.4189
α =	0.0065
n =	1.2559
m =	0.2038

FOR GRAPHING

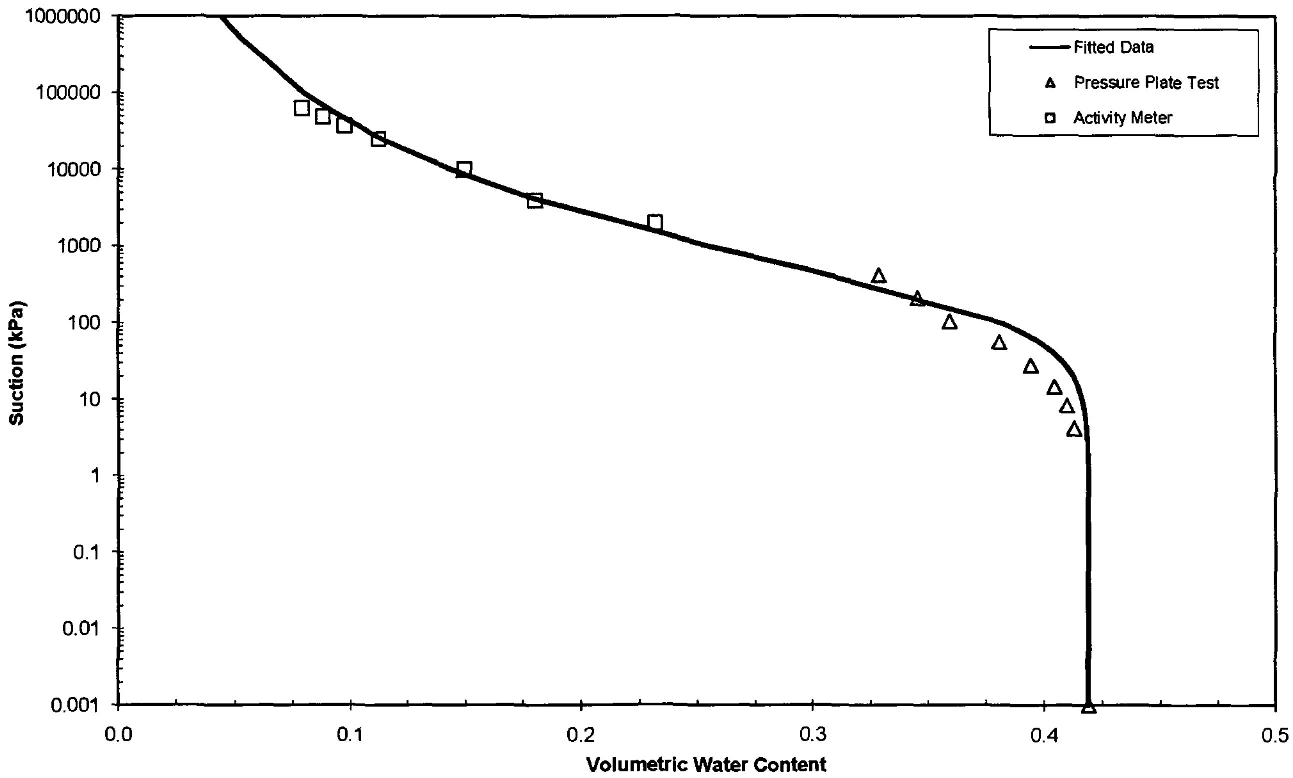
Suction (kPa)	VWC
0.001	0.4189
0.025	0.4189
0.05	0.4189
0.075	0.4189
0.1	0.4189
1	0.4187
2	0.4185
3	0.4183
4	0.4180
5	0.4177
6	0.4174
7	0.4171
8	0.4168
9	0.4165
10	0.4162
15	0.4144
20	0.4125
30	0.4086
40	0.4046
50	0.4005
60	0.3965
70	0.3926
80	0.3887
90	0.3849
100	0.3813
500	0.2967
1000	0.2543
5000	0.1711
10000	0.1435
25000	0.1136
5.00E+04	0.0952
1.00E+05	0.0797
5.00E+05	0.0528
7.50E+05	0.0476
1.00E+06	0.0442

FOR FITTING

Applied Suction (kPa)	Measured VWC	Predicted VWC	ΔWC (%)	$(\Delta WC)^2$
0.001	0.419	0.4189	0.000	0.000
4.14	0.413	0.4180	-0.005	0.000
8.28	0.410	0.4167	-0.007	0.000
14.48	0.404	0.4146	-0.010	0.000
27.59	0.394	0.4096	-0.015	0.000
55.18	0.381	0.3985	-0.018	0.000
103.46	0.359	0.3800	-0.021	0.000
206.91	0.345	0.3486	-0.003	0.000
413.82	0.328	0.3084	0.020	0.000
1980.00	0.232	0.2157	0.016	0.000
3920.00	0.180	0.1820	-0.002	0.000
9970.00	0.149	0.1437	0.006	0.000
25000.00	0.112	0.1136	-0.002	0.000
37200.00	0.097	0.1026	-0.005	0.000
48600.00	0.088	0.0959	-0.008	0.000
62900.00	0.079	0.0897	-0.011	0.000

Residual = 0.000128909

Fitted and Lab Data



APPENDIX F - STATISTICAL ANALYSES OF HYDRAULIC CONDUCTIVITY DATA

Statistical Comparison of K_{SDRI} and K_{TSB}

Store-and-Release Covers

F-Test Two-Sample for Variances

	K_{SDRI}	K_{TSB}		
Mean	-14.5509	-13.0977		
Variance	1.448922	10.18088		
Observations	6	48		
df	5	47		
F	0.142318			
P(F<=f) one-tail	0.018632		P<0.05	Equal Variance
F Critical one-tail	0.224751			

t-Test: Two-Sample Assuming Equal Variances

	K_{SDRI}	K_{TSB}		
Mean	-14.5509	-13.0977		
Variance	1.448922	10.18088		
Observations	6	48		
Pooled Variance	9.341273			
Hypothesized Mean Difference	0			
df	52			
t Stat	-1.09798			
P(T<=t) one-tail	0.138635		P>0.05	Data are similar
t Critical one-tail	1.674689			
P(T<=t) two-tail	0.27727			
t Critical two-tail	2.006647			

Statistical Comparison of K_{SDRI} and K_{TSB}

Conventional Covers with Clay Barriers

F-Test Two-Sample for Variances

	K_{SDRI}	K_{TSB}		
Mean	-15.2366	-14.0796		
Variance	6.931005	9.05163		
Observations	3	18		
df	2	17		
F	0.765719			
P(F<=f) one-tail	0.519616		P>0.05	Not Equal Variance
F Critical one-tail	0.051448			

t-Test: Two-Sample Assuming Unequal Variances

	K_{SDRI}	K_{TSB}		
Mean	-15.2366	-14.0796		
Variance	6.931005	9.05163		
Observations	3	18		
Hypothesized Mean Difference	0			
df	3			
t Stat	-0.6898			
P(T<=t) one-tail	0.269946		P>0.05	Data Are Similar
t Critical one-tail	2.353363			
P(T<=t) two-tail	0.539893			
t Critical two-tail	3.182446			

Statistical Comparison of K_{SDRI} and K_{TSB}

Conventional Covers with Composite Barriers

F-Test Two-Sample for Variances

	K_{SDRI}	K_{TSB}		
	-			
Mean	17.28961744	-15.0984		
Variance	0.112905114	1.543798		
Observations	3	17		
df	2	16		
F	0.07313465			
P(F<=f) one-tail	0.070215445		P>0.05	Not Equal Variance
F Critical one-tail	0.051458084			

t-Test: Two-Sample Assuming Unequal Variances

	K_{SDRI}	K_{TSB}		
	-			
Mean	17.28961744	-15.0984		
Variance	0.112905114	1.543798		
Observations	3	17		
Hypothesized Mean Difference	0			
df	13			
t Stat	-6.11396806			
P(T<=t) one-tail	1.84806E-05		P<0.05	Data Are Not Similar
t Critical one-tail	1.770933383			
P(T<=t) two-tail	3.69612E-05			
t Critical two-tail	2.160368652			

Table F-1. Statistical comparison of different size laboratory hydraulic conductivity test specimens using a two-sample t-Test assuming unequal variances.

Site	$K_{150\text{-mm}}$ to $K_{75\text{-mm}}$		$K_{L\text{-}LS}$ to $K_{L\text{-}SS}$	
	P(T<=t) one-tail	Statistically Similar	P(T<=t) one-tail	Statistically Similar
Store-and-Release Covers				
Altamont	-	-	0.004	No
Apple Valley	-	-	-	-
Boardman	0.111	Yes	0.001	No
Cedar Rapids			-	-
Helena	0.111	Yes	0.292	Yes
Monticello	0.059	Yes	0.203	Yes
Omaha 1	-	-	0.237	Yes
Omaha 2	0.247	Yes	0.010	Yes
Polson	-	-	0.405	Yes
Underwood	-	-	0.192	Yes
Sacramento 1	0.463	Yes	0.003	No
Sacramento 2	-	-	0.124	Yes
Conventional Covers with Clay Barriers				
Albany	-	-	-	-
Apple Valley	0.137	Yes	0.097	Yes
Cedar Rapids	-	-	0.107	Yes
Underwood 5'	-	-	0.185	Yes
Underwood 3'	-	-	-	-
Conventional Covers with Composite Barriers				
Altamont	0.225	Yes	0.056	Yes
Cedar Rapids	-	-	0.495	Yes
Omaha	-	-	-	-
Polson	-	-	0.038	No

Statistical Comparison of K_{si}/K_{sa} in Humid and Sub-Humid Climates to K_{si}/K_{sa} in Arid or Semi-Arid Climates

All Cover Types

F-Test Two-Sample for Variances

	Humid and Sub-Humid	*Arid and Semi-Arid*		
Mean	4.490021	4.531037		
Variance	2.160222	4.760167		
Observations	9	12		
df	8	11		
F	0.453812			
P(F<=f) one-tail	0.135818		P>0.05	Unequal variance
F Critical one-tail	0.301846			

t-Test: Two-Sample Assuming Unequal Variances

	Humid and Sub-Humid	*Arid and Semi-Arid*		
Mean	4.490021	4.531037		
Variance	2.160222	4.760167		
Observations	9	12		
Hypothesized Mean Difference	0			
df	19			
t Stat	-0.0514			
P(T<=t) one-tail	0.479771		P>0.05	Data are similar
t Critical one-tail	1.729133			
P(T<=t) two-tail	0.959542			
t Critical two-tail	2.093024			

Statistical Comparison of K_{si}/K_{sa} in Humid and Sub-Humid Climates to K_{si}/K_{sa} in Arid or Semi-Arid Climates

Conventional Covers Only

F-Test Two-Sample for Variances

	Humid and Sub-Humid	*Arid and Semi-Arid*		
Mean	4.574031	6.467112		
Variance	3.552464	4.28226		
Observations	5	4		
df	4	3		
F	0.829577			
P(F<=f) one-tail	0.415081		P > 0.05	Unequal variance
F Critical one-tail	0.151713			

t-Test: Two-Sample Assuming Unequal Variances

	Humid and Sub-Humid	*Arid and Semi-Arid*		
Mean	4.574031	6.467112		
Variance	3.552464	4.28226		
Observations	5	4		
Hypothesized Mean Difference	0			
df	6			
t Stat	-1.4185			
P(T<=t) one-tail	0.102917		P > 0.05	Data are similar
t Critical one-tail	1.94318			
P(T<=t) two-tail	0.205835			
t Critical two-tail	2.446912			

APPENDIX G - METHODS USED IN CHEMICAL ANALYSIS FOR GEOSYNTHETIC CLAY LINERS (GCLS)

G-1. ICP METHOD

A Varian MPX ICP-OES equipped with an axial torch was used to analyze for concentrations of principle cations (Ca, K, Mg and Na). An attached Varian SPS 3 Autosampler was used to expedite analysis. Before sample analysis, the ICP was calibrated with dilution series of certified aqueous standards from High Purity standards (Charleston, North Carolina). Calibration dilution series were prepared with nitric acid or ammonia acetate matrix depending on the matrix of samples to be tested; with a nitric acid matric used for subgrade batch elution and soluble cation samples, and an ammonia acetate matrix used for bound cation samples.

Quality control (QC) was performed following the guidelines detailed in US EPA procedure SW-846. Every 5 samples, continuing calibration verifications (CCV) and continuing calibration blanks (CCM) were analyzed. In addition, sample spikes and duplicates were analyzed every 10 samples. US EPA procedure SW-846 provides QC criteria for CCV, CCM, spiked and duplicate samples: CCVs must be within 10% of expected concentration, CCBs must be below concentration detection limits, spiked samples must have a recovery within 75-125% of the original sample and duplicate samples must demonstrate a concentration within 20% of the original sample. All US EPA Method SW-846 QC criteria were met for all calibrated wavelengths.

Calibration curve, quality control, and method detection limit (MDL) concentrations for subgrade soil batch elution and GCL bound and soluble cation tests are provided in Table G.1.

Table G. 1. Calibration curves, quality control and method detection limits for subgrade soil batch elution, soluble cation and bound cation tests.

		Cation Concentration (ppm)			
		Ca	K	Mg	Na
Method detection limit	Bound cations	2.2	0.3	0.7	3.6
	Soluble cations	0.17	0.01	0.04	0.16
	Subgrade batch	0.11	0.20	0.05	0.02
Calibration curve	Bound cations	0.5, 1, 5, 10, 50, 100, 500	0.05, 0.1, 0.5, 1, 5, 10, 50	0.05, 0.1, 0.5, 1, 5, 10, 50	1, 5, 10, 50, 100, 500, 1000
	Soluble cations Subgrade batch	1, 5, 10, 50, 100, 200	1, 5,10, 50, 100, 200	1, 5,10, 50, 100, 200	10, 50, 100, 300, 500, 1000
CCV	Bound cations	10	10	1	50
	Soluble cations Subgrade batch	50	50	50	100
Matrix spike	Bound cations	5	5	5	5
	Soluble cations Subgrade batch	50	50	50	250

G-2. SALICYLATE METHOD AND SPECTROPHOTOMETRY

The proposed standard test method for determining bentonite CEC used in this study and contained in Appendix H requires the determination of ammonium concentration in an extract solution. The Hack DR/4000 saliciylate method using high-range nitrogen NH_4^+ Test 'N Tube vials (Hach Company Method 10031) and a Spectronic 20 Genesys spectrophotometer were used to analyze the ammonium extract. The extract solution from CEC testing was diluted 1:10 for analyses. Additionally, method blanks, method spikes and CCVs were analyzed per the guidelines recommended in US EPA procedure SW-846. A calibration curve, CCV, and spike were prepared using certified air-dried ammonium sulfate $(NH_4)_2SO_4$ from Fisher Scientific (Hanover Park, Illinois) Ammonium concentrations used for the calibration curve and CCV are presented in Table G.2.

Table G.2. Calibration curve and CCV Ammonium concentrations used for CEC determination.

	Ammonium concentration (ppm)
Calibration curve	10, 20, 40, 60, 80
CCV	40

APPENDIX H - TEST METHOD FOR MEASURING SOLUBLE CATIONS, BOUND CATIONS, AND CATION EXCHANGE CAPACITY

1 SCOPE

1.1 This test method describes the procedures for measuring the soluble and bound cations as well as the cation exchange capacity (CEC) of fine-grained inorganic soils. Clay minerals in fine-grained soils carry a negative surface charge that is balanced by bound cations near the mineral surface. These bound cations can be exchanged by other cations in the pore water, which are referred to as soluble cations. The cation exchange capacity is a measure of the negative surface charge on the mineral surface. The CEC generally is satisfied by calcium (Ca), sodium (Na), magnesium (Mg), and potassium (K), although other cations may be present depending on the environment in which the soil exists. This test method was developed from concepts described previously in Lavkulich (1981) and Rhoades (1982).

1.2 In this method, the soluble salts from the mineral surface are washed off with de-ionized water and then the concentration of soluble salts within the extract is measured. The bound cations of the clay are measured by using a solution containing an index ion that forces the existing cations in the bound layer into solution. The total concentrations of bound and soluble cations in this solution are measured. The CEC is measured by displacing the index ion with another salt solution and measuring the amount of the displaced index ion.

1.3 This method requires chemical analyses on aqueous samples. USEPA methods are specified for these chemical analyses. All chemical analyses shall conform to the quality control (QC) requirements in USEPA Method SW 846, Chapter One, Quality Control Guidelines.

1.4 This standard does not purport to address the safety problems associated with its use. The user of this standard is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

1.5 All observed and calculated values shall conform to the guide for significant digits and rounding established in Practice D 6026. The procedures in Practice D 6026 that are used to specify how data are collected, recorded, and calculated are regarded as the industry standard. In addition, they are representative of the significant digits that should generally be retained. The procedures do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the objectives of the user. Increasing or reducing the significant digits of reported data to be commensurate with these considerations is common practice. Consideration of the significant digits to be used in analysis methods for engineering design is beyond the scope of this standard.

2 REFERENCED DOCUMENTS

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water

E 145 Specification for Gravity-Convection and Forced Ventilation Ovens

D 2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

2.2 *USEPA Methods:*

Method 6010B, Inductively coupled plasma spectroscopy

Method 7000A, Atomic absorption methods

Method SW 846, Chapter One, Quality Control Guidelines

3 TERMINOLOGY

3.1 *Definitions:*

3.1.1 *Acid wash* - the process of initially rinsing equipment with tap water, followed by a rinse with 10% HNO_3 solution, and then finally rinsing 3 times with DI water.

3.1.2 *Inorganic soils* – any soil with a loss of ignition (LOI) less than 1%.

3.1.3 *Fine-grained soils* – any soil with more than 50% passing the No. 200 US standard sieve.

3.1.4 *Bound cations (BC)* – cations that are adsorbed (bound) to mineral surfaces that may be exchanged.

3.1.5 *Soluble cations (SC)* – cations in the soil that are not bound to the mineral surface.

3.1.6 *Cation exchange capacity (CEC)* – the total negative charge on mineral surface to be satisfied by bound cations.

3.1.7 *Exchange Complex* – the collection of bound cations satisfying the CEC

3.2 For definitions of other terms used in this standard, see ASTM D 653.

4 SIGNIFICANCE AND USE

4.1 Fine-grained soils are used in waste containment systems as barriers to flow and contaminant transport. Liquids contained by these barriers can contain ions that may interact with the mineral surfaces in fine-grained soils.

4.2 The liquid passing through the pores of fine-grained soil can interact with the mineral surface, and affect the physical and chemical characteristics of the soil. This method can be used as part of an evaluation of these interactions.

NOTE 1 – The quality of the result produced by this standard depends on the competence of the personnel performing the test and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Practice D 3740 does not in itself ensure reliable results. Reliable results depend on many factors. Practice D 3740 provides a means of evaluating some of these factors.

5 APPARATUS

5.1 *Drying oven*, capable of maintaining a uniform temperature of 105 ± 5°C that meets the requirements of Specification E145.

5.2 *No. 10 U.S. standard sieve.*

5.3 *Desiccator,* containing silica gel.

5.4 *Laboratory balance,* 20 g capacity, ± 0.001 g accuracy and precision.

5.5 *Weighing paper,* or small weighing dish.

5.6 *End over end shaker,* capable of 30 rpm.

5.7 *Capped containers,* should tightly fit in the end over end shaker holding compartment with capacities larger than 40 mL.

5.8 *500 mL filtering flask,* connectable to low-pressure vacuum line, acid washed (Figure H.1).

5.9 *Flexible tubing,* appropriate size to connect filtering flask to the low-pressure vacuum line (Figure H.1).

5.10 *Buchner funnel,* 55 mm or 90 mm diameter, acid washed (Figure H.1).

5.11 *Wash bottle*, for dispensing solutions, new or acid washed.

5.12 *Graduated cylinder,* for measuring solution portions, acid washed.

5.13 *2.5 μm ashless filter paper* that covers the surface of Buchner funnel.

5.14 *250 mL volumetric flasks,* class A flask for precision and accuracy.

6 REAGENTS

6.1 *Reagent Water:* Use only ASTM Type I water as defined in D 1193.

6.2 *Ammonium Acetate, 1M:* dissolve 77.08 g of 99.9% pure NH_4OAc in Type II DI water (ASTM D 1193) and fill to volume in a 1000 mL volumetric flask. Adjust the pH of the solution to 7 with ammonium hydroxide or acetic acid. Approximately 1 L of NH_4OAc is needed per 6 samples.

6.3 *Isopropanol*

6.4 *Potassium Chloride, 1M:* dissolve 74.6 g of 99% pure KCl in Type II DI water and fill to volume in a 1000 mL volumetric flask. Approximately 1 L of KCl is needed per 6 samples.

6.5 *Ammonium sulfate:* dry 238 mg of ACS Certified $(NH_4)_2SO_4$ for 4 hr at 40°C. Make a 200 mg/L stock solution by dissolving the dried compound in 100 mL Type II DI water and fill to volume in a 250 mL volumetric flask. Prepare calibration standards by diluting the stock solution into concentrations of 10, 20, 40, 50, and 80 mg/L.

6.6 *Ca, Mg, K, and Na:* Use ICP-grade or AA-grade element standards in an HNO_3 matrix to prepare Ca, Mg, K, and Na calibration standards in a NH_4OAc matrix.

7 HAZARDS

7.1 This standard does not address all of the safety concerns associated with its use. The user of this standard is responsible for implementing proper safety precautions and should be aware of any possible health concerns and risks related with the materials and chemicals used while following this standard.

8 DETERMINATION OF REQUIRED AIR-DRIED MASS OF SOIL FOR ANALYSIS

8.1 Air dry 30 g of soil (12 g of solid is required for testing) according to the procedures described in ASTM D 2216.

8.2 Oven-dry 2 g of the air-dry soil to determine the water content following ASTM D 2216.

8.3 Determine total mass of air-dry soil needed to have 2 g of solid particles for determination of soluble cations.

8.4 Determine total mass of air-dry soil needed to have 10 g of solid particles for determination of bound cations.

8.5 Use the oven-dry weight (2 or 10 g) of the soil for all calculations.

Note 2 - Oven-dried soils should not be used for determining CEC, soluble cations, or bound cations because gypsum ($CaSO_4 \cdot 2H_2O$) is transformed to plaster of paris ($CaSO_4 \cdot 1/2H_2O$) at high temperatures, and plaster of paris is more soluble in water than gypsum.

9 DETERMINATION OF SOLUBLE CATIONS

9.1 Use only air-dry soil that passes the No. 10 US Standard Sieve.

9.2 Add mass of air-dry soil corresponding to 2 g of oven-dry solid particles and 100 mL of Type II DI water to a covered container that fits tightly.

9.3 Place the containers in an end-over-end shaker and shake for 1 hr at 30 rpm.

9.4 Vacuum filter the mixture in each container using 2.5 µm ashless filter paper.

9.5 Transfer the extract to a 100 mL acid washed volumetric flask preserve with 1% HNO_3 and fill to volume.

9.6 Analyze each extract for cation concentration using EPA Method 6010B (inductively coupled plasma spectrometry) or Method 7000A (atomic absorption). Ensure that these analyses meet the quality control criteria in USEPA Method SW 846 (Chapter One, Quality Control Guidelines).

10 DETERMINATION OF BOUND CATIONS

10.1 Use only air-dry soil that passes the No. 10 US Standard Sieve.

10.2 Prepare a blank sample for analysis by placing 100 mL of DI water in a covered container.

10.3 Prepare a quality control sample for analysis by creating a duplicate or a spike and place in a covered container. Add determined mass of air-dried soil corresponding to 10.0 g of solid particles and 40 mL of 1 M NH_4OAc into 100 mL covered container (use a container which tightly fits into the end over end shaker).

10.4 Shake the covered containers for 5 minutes in an end over end shaker at 30 rpm. Agitate the container to rinse the particles from the side of the container and let the mixture stand for 24 h.

10.5 After 24 hours shake the container with the mixture for 15 minutes at 30 rpm in the end over end shaker.

10.6 Rinse the 500 mL filtering flask and Buchner funnel with NH_4OAc.

10.7 Place the Buchner funnel over the 500 mL filtering flask and line the Buchner funnel with 2.5 μm ashless filter paper (Fig. H.1).

10.8 Transfer the contents of the shaken container to the Buchner funnel.

10.9 Rinse the container and cap into the Buchner funnel using a squirt bottle containing 1 M NH_4OAc.

10.10 Apply low suction to the filtering flask (< 10 kPa).

10.11 Wash the soil in the Buchner funnel with four 30 mL portions of 1 M NH_4OAc. Add each 30 mL portion slowly and allow the entire 30 mL portion to drain before adding the next 30 mL portion. Do not allow the soil to crack between additions of NH_4OAc.

10.12 Turn the suction off to the filtering flask after the last washing. Leave the NH_4OAc washed soil in the Buchner funnel; this soil is to be used for determining the cation exchange capacity (CEC).

10.13 Rinse the 250 mL volumetric flask with 1 M NH_4OAc.

10.14 Transfer the filtered aqueous solution into the 250 mL volumetric flask. Preserve the solution to pH of 2 with ICP-grade nitric acid and fill the volumetric flask to volume with NH_4OAc.

10.15 Analyze the cations in the aqueous solution using USEPA Method 6010B (inductively coupled plasma spectrometry) or USEPA Method 7000A (atomic absorption). Ensure that these analyses meet the quality control criteria in USEPA Method SW 846 (Chapter One, Quality Control Guidelines).

11 DETERMINATION OF THE CATION EXCHANGE CAPACITY

11.1 Rinse an acid washed 500 mL filtering flask with isopropanol.

11.2 Place the Buchner funnel with the 1 M NH_4OAc washed sample onto the 500 mL filtering flask (Fig. H.1).

11.3 Apply low suction (< 10 kPa) to the filtering flask. Do not allow the soil to crack when suction is applied.

11.4 Wash the soil with three 40 mL portions of isopropanol. Allow each 40 mL portion to drain before adding the next portion. Washing with isopropanol removes residual NH_4OAc.

11.5 Turn off the suction to the filtering flask when free liquid is no longer visible.

11.6 Separate the Buchner funnel from the filtering flask. Discard the isopropanol collected in the 500 mL filtering flask and rinse the flask with Type II DI water three times.

11.7 Return the Buchner funnel containing the isopropanol washed soil to the rinsed filtering flask (Fig. H.1).

11.8 Apply suction to the filtering flask and wash the soil with four 50 mL portions of 1 M KCl solution. Allow each portion of the 1 M KCl solution to drain before adding the next portion. Do not allow the soil to crack between additions of KCl solution.

11.9 Rinse a 250 mL volumetric flask with 1 M KCl.

11.10 Transfer the extract into the 250 mL volumetric flask. Rinse the filtering flask with Type II DI water and transfer the contents into the volumetric flask.

11.11 Fill the volumetric flask to volume with water.

11.12 Analyze the KCl extract for nitrogen concentration using a spectrophotometer. Ensure that these analyses meet the quality control criteria in USEPA Method SW 846 (Chapter One, Quality Control Guidelines).

12 CALCULATIONS

12.1 Calculate the concentration of soluble cations as follows:

$$S = C \times \frac{0.100L}{M_o(g)} \times 1000\frac{g}{kg}$$

where:

S = concentration of soluble cations ($cmol^+/kg$) in the soil

C = concentration of cations ($cmol^+/L$) in the DI water extract from 9.7

M_o = oven-dry mass of soil

12.2 Calculate the concentration of bound cations as follows:

$$M^+ = C \times \frac{0.25L}{M_o(g)} \times 1000\frac{g}{kg} - S$$

where:

M^+ = concentration of adsorbed cation ($cmol^+/kg$) in soil

C = concentration of cation ($cmol^+/L$) in the NH_4OAc extract from 10.15

12.3 Calculate the cation exchange capacity as follows:

$$CEC = N \times \frac{1cmol^+}{140mg} \times \frac{0.25L}{M_o(g)} \times 1000\frac{g}{kg}$$

where:

CEC = concentration of cation exchange capacity ($cmol^+$ / kg)

N = concentration of nitrogen (mg/L) from 11.12

13 REPORT

13.1 Report the following information:

13.1.1 Source and description of the soil.

13.1.2 Source and description of all chemicals used to make mixtures and solutions.

13.1.3 Dilution factor of aqueous samples prior to chemical analysis.

13.1.4 Concentration of bound cations, concentration of soluble cations, and CEC in units of $cmol^+/kg$.

13.1.5 Any modifications to this standard test method.

14 PRECISION AND BIAS

14.1 *Precision*—Test data on precision are not presented due to the nature of the soil or rock, or both materials tested by this standard. It is either not feasible or too costly at this time to have ten or more laboratories participate in a round-robin testing program. In addition, it is either not feasible or too costly to produce multiple specimens that have uniform physical properties. Any variation observed in the data is just as likely to be due to specimen variation as to operator or laboratory testing variation.

14.1.1 Subcommittee D18.04 is seeking any pertinent data from users of these test methods that might be used to make a limited statement on precision.

14.1.2 *Bias*—There is no accepted reference value for these test methods, therefore, bias cannot be determined.

15 FIGURES

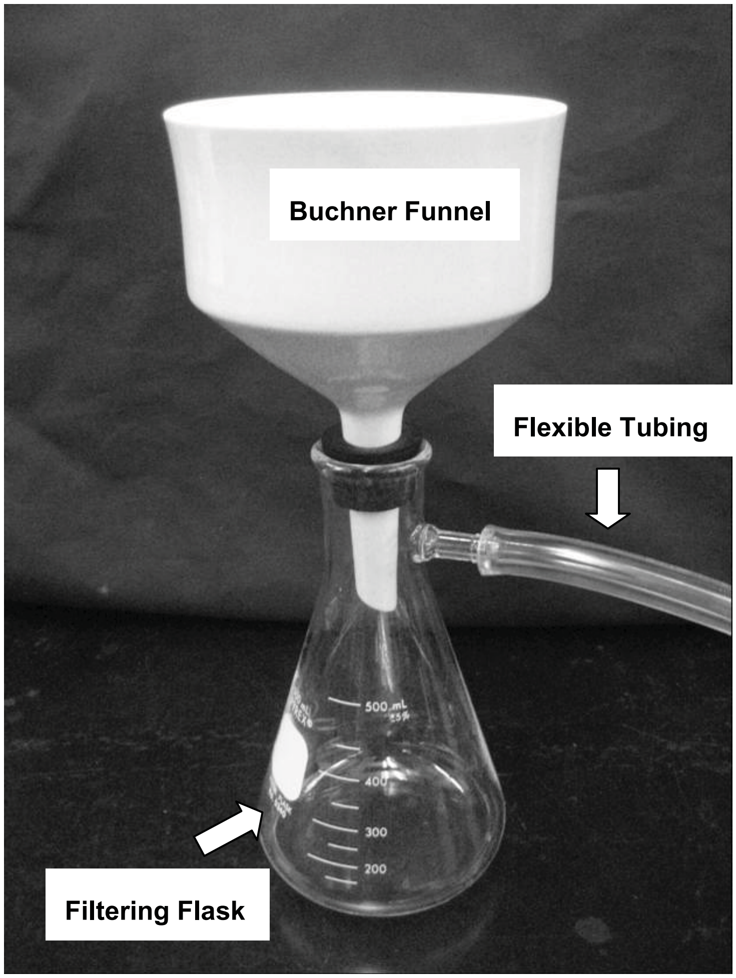


Fig. H. 1. Experimental setup for vacuum filtration.

16 REFERENCES

Lavkulich, L. (1981). Exchangeable Cations and Total Exchange Capacity by the Ammonium Acetate Method at pH 7.0. in *Soil Sampling and Methods of Analysis* (Martin R. Carter, editor). Canadian Society of Soil Science, Ottawa, Ontario, Canada, 173-175.

Rhoades, J. (1982). Soluble Salts. in *Methods of Soil Analysis*, Part 2. Chemical and Microbiological Properties, 2nd Edition (A. Page, R. Miller, D. Keeney, editors). Soil Science Society of America, Madison, Wisconsin, USA, 167-180.

APPENDIX I - SCHEMATIC AND PHOTOGRAPH OF HYDRAULIC CONDUCTIVITY TEST SETUP FOR GCLS

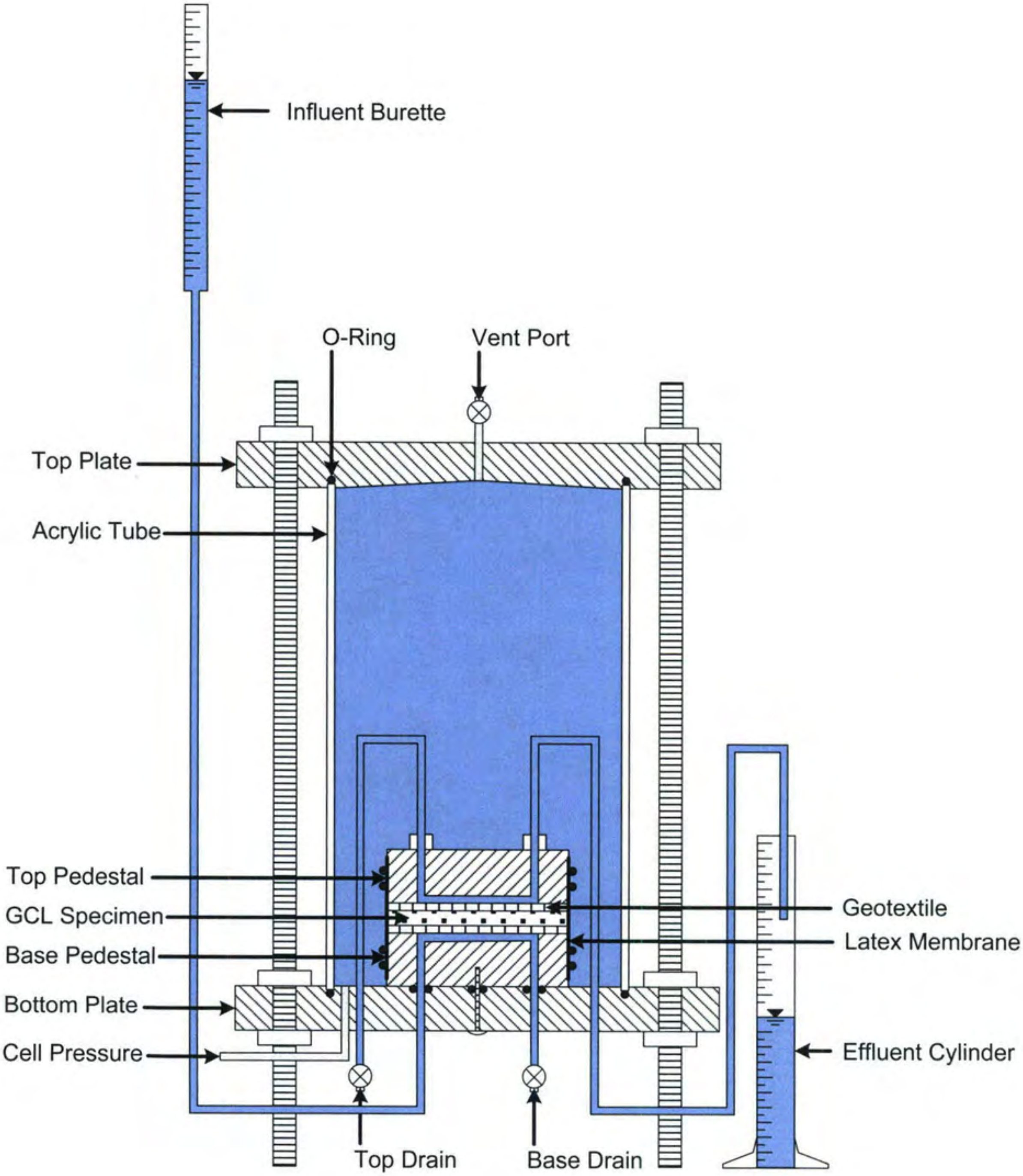


Fig. I. 1. Schematic of hydraulic conductivity test setup used in the laboratory.

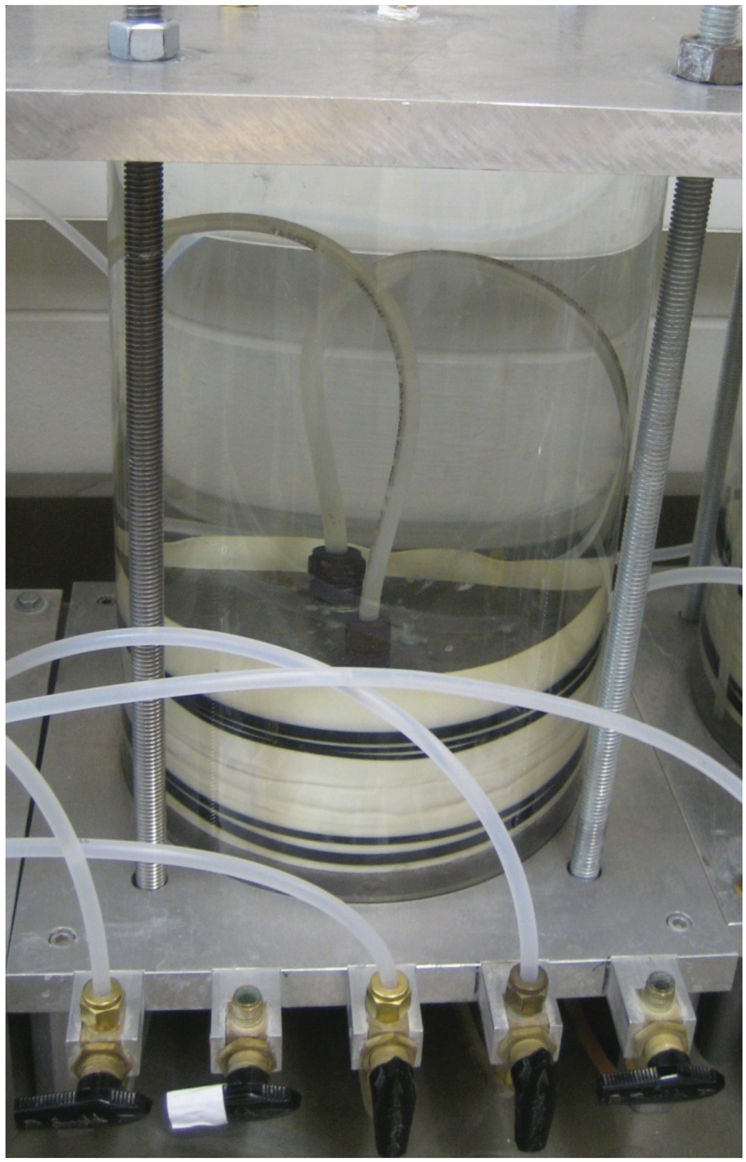


Fig. I. 2. Photograph of hydraulic conductivity test setup in the laboratory.

APPENDIX J - EXHUMED SUBGRADE POREWATER CHEMISTRIES

Table J. 1. Site A exhumed subgrade soil water contents and chemical indicator parameters.

Site ID	Subgrade w (%)	Ionic strength (M)	RMD ($M^{0.5}$)
A-1	9.8	0.035	1.16
A-2	9.8	0.037	1.67
A-3	9.8	0.035	2.59
A-4	9.8	0.047	1.38
A-5	9.8	0.024	1.53
A-6	9.8	0.028	1.06
A-7	9.8	0.034	5.08
A-8	9.8	0.026	1.21
A*	9.8	0.033	1.96

*Geometric Mean

Table J. 2. Site B exhumed subgrade soil water contents and chemical indicator parameters.

Site ID	Subgrade w (%)	Ionic strength (M)	RMD ($M^{0.5}$)
B-1	2.8	0.141	5.86
B-2	2.5	0.141	5.86
B-3	2.1	0.137	5.06
B-4	2.2	0.137	5.06
B-5	2.2	0.137	5.06
B-6	2.4	0.156	6.42
B-7	2.4	0.152	5.12
B-8	2.4	0.152	5.12
B-9	2.3	0.152	5.12
B-10	2.2	0.143	3.93
B-11	2.1	0.143	3.93
B*	2.3	0.145	5.14

*Geometric Mean

Table J. 3. Site E exhumed subgrade soil water contents and chemical indicator parameters.

Site ID	Subgrade w (%)	Ionic strength (M)	RMD ($M^{0.5}$)
E-1	15.1	0.015	0.54
E-2	15.1	0.013	0.96
E-3	15.1	0.005	0.37
E-4	14.5	0.017	0.38
E-5	11.4	0.030	0.28
E-6	14.0	0.027	0.27
E-7	14.0	0.051	0.19
E-8	14.0	0.034	0.26
E-9	14.0	0.029	0.24
E-10	16.2	0.004	0.52
E-11	16.2	0.005	0.58
E-12	16.2	0.011	0.99
E Lower k*	15.5	0.010	0.62
E Higher k*	13.5	0.034	0.25

*Geometric Mean

Table J. 4. Site F exhumed subgrade soil water contents and chemical indicator parameters.

Site ID	Subgrade w (%)	Ionic strength (M)	RMD ($M^{0.5}$)
F-1	15.9	0.018	0.58
F-2	15.9	0.014	0.33
F-3	15.9	0.017	0.21
F-4	8.5	0.063	1.81
F-5	8.5	0.058	1.62
F-6	8.5	0.056	1.52
F TP1 *	15.9	0.016	0.37
F TP2 *	8.5	0.059	1.65

*Geometric Mean

APPENDIX K - EXHUMED GCL WATER CONTENT, BOUND CATIONS, AND SOLUBLE CATIONS

Table K. 1. Site A exhumed GCL water content, swell index and soluble cations.

	Exhumed	Swell index	Soluble cations (cmol+/kg)				Soluble cations	
Site ID	w (%)	(mL/2 g)	Ca	K	Mg	Na	CMR	TCM
A-1	43.4	20.5	0.14	0.06	0.13	4.43	0.94	4.77
A-2	44.8	18.0	0.09	0.05	0.09	5.23	0.97	5.45
A-3	53.3	22.0	0.02	0.04	0.08	6.18	0.98	6.31
A-4	45.7	19.8	0.25	0.09	0.10	6.20	0.95	6.64
A-5	53.0	13.0	0.00	0.05	0.13	4.01	0.97	4.20
A-6	60.9	20.5	0.20	0.05	0.07	5.00	0.95	5.32
A-7	56.9	20.0	0.00	0.07	0.03	6.61	1.00	6.71
A-8	58.7	16.5	0.10	0.08	0.11	4.59	0.96	4.89
A*	52.1	18.8	0.10	0.06	0.09	5.28	0.96	5.54

*Arithmetic mean

Table K. 2. Site A exhumed GCL bound cations.

	Bound cations (cmol+/kg)				Bound cations		Bound cation (molar ratio)			
Site ID	Ca	K	Mg	Na	CMR	TCM	Ca	K	Mg	Na
A-1	29.5	0.71	11.3	19.7	0.33	15.3	0.48	0.01	0.18	0.32
A-2	34.9	0.81	12.0	23.5	0.34	17.8	0.49	0.01	0.17	0.33
A-3	25.9	0.83	10.1	24.0	0.41	15.2	0.43	0.01	0.17	0.39
A-4	31.8	0.60	11.1	23.7	0.36	16.8	0.47	0.01	0.16	0.35
A-5	38.9	0.68	11.7	17.3	0.26	17.1	0.57	0.01	0.17	0.25
A-6	28.7	0.65	10.6	17.3	0.31	14.3	0.50	0.01	0.19	0.30
A-7	29.0	0.68	10.7	16.5	0.30	14.2	0.51	0.01	0.19	0.29
A-8	32.8	0.60	11.0	22.5	0.35	16.7	0.49	0.01	0.16	0.34
A*	31.4	0.69	11.1	20.6	0.33	15.9	0.49	0.01	0.17	0.32

*Arithmetic mean

Table K. 3. Site B exhumed GCL water content, swell index and soluble cations.

			Soluble cations (cmol+/kg)				Soluble cations	
Site ID	Exhumed w (%)	Swell index (mL/2 g)	Ca	K	Mg	Na	CMR	TCM
B-1	21.5	12.0	0.03	0.07	0.10	10.1	0.99	10.3
B-2	21.4	14.0	0.02	0.06	0.12	9.09	0.98	9.30
B-3	21.4	19.0	0.05	0.06	0.10	9.72	0.98	9.94
B-4	21.1	20.0	0.05	0.38	0.12	10.2	0.98	10.8
B-5	20.9	16.5	0.04	0.11	0.04	8.27	0.99	8.47
B-6	17.3	16.0	0.03	0.06	0.13	8.68	0.98	8.90
B-7	19.6	14.0	0.02	0.06	0.08	9.53	0.99	9.69
B-8	18.3	17.0	0.12	0.12	0.08	8.33	0.98	8.65
B-9	18.6	13.0	0.01	0.57	0.12	8.85	0.99	9.55
B-10	19.6	15.0	0.01	0.00	0.00	8.74	1.00	8.76
B-11	21.2	18.0	0.03	0.05	0.08	8.34	0.99	8.50
B*	20.1	15.9	0.04	0.14	0.09	9.08	0.99	9.35

*Arithmetic mean

Table K. 4. Site B exhumed GCL bound cations.

	Bound cations (cmol+/kg)				Bound cations		Bound cation (molar ratio)			
Site ID	Ca	K	Mg	Na	CMR	TCM	Ca	K	Mg	Na
B-1	19.9	1.26	9.84	17.9	0.39	12.2	0.41	0.03	0.20	0.37
B-2	20.3	1.30	0.00	17.6	0.48	9.78	0.52	0.03	0.00	0.45
B-3	17.2	1.81	9.34	30.3	0.55	14.7	0.29	0.03	0.16	0.52
B-4	14.3	1.48	8.17	34.8	0.62	14.7	0.24	0.03	0.14	0.59
B-5	19.5	1.55	10.8	27.0	0.49	14.7	0.33	0.03	0.18	0.46
B-6	16.5	1.29	9.03	22.7	0.48	12.4	0.33	0.03	0.18	0.46
B-7	16.8	1.25	9.28	20.9	0.46	12.1	0.35	0.03	0.19	0.43
B-8	20.4	1.56	11.1	25.2	0.46	14.6	0.35	0.03	0.19	0.43
B-9	17.7	0.78	9.82	20.0	0.43	12.1	0.37	0.02	0.20	0.41
B-10	13.7	1.31	7.52	26.5	0.57	12.2	0.28	0.03	0.15	0.54
B-11	16.9	1.59	9.38	30.7	0.55	14.6	0.29	0.03	0.16	0.52
B*	17.5	1.38	8.58	24.9	0.50	13.1	0.33	0.03	0.16	0.47

*Arithmetic mean

Table K. 5. Site E exhumed GCL water content, swell index and soluble cations.

			Soluble cations (cmol+/kg)				Soluble cations	
	Exhumed	Swell index						
Site ID	w (%)	(mL/2 g)	Ca	K	Mg	Na	CMR	TCM
E-1	70.0	8.0	0.14	0.16	0.18	2.56	0.89	3.05
E-2	64.0	8.0	0.01	0.15	0.11	2.33	0.96	2.59
E-3	58.0	10.0	0.00	0.03	0.09	0.78	0.90	0.91
E-4	60.0	10.0	0.22	0.17	0.25	1.95	0.82	2.59
E-5	58.0	8.0	0.70	0.15	0.44	2.35	0.69	3.65
E-6	56.0	10.0	0.73	0.07	0.17	2.21	0.72	3.17
E-7	56.0	10.0	1.63	0.18	0.78	2.30	0.51	4.89
E-8	63.0	11.0	0.97	0.40	0.55	2.19	0.63	4.11
E-9	60.0	9.0	0.76	0.16	0.49	2.08	0.64	3.49
E-10	68.0	11.0	0.00	0.05	0.05	0.87	0.95	0.97
E-11	67.0	10.0	0.00	0.04	0.04	0.92	0.96	1.01
E-12	61.0	8.0	0.00	0.09	0.09	2.09	0.96	2.26
E lower k*	64.0	9.3	0.05	0.10	0.12	1.64	0.92	1.91
E higher k*	58.6	9.6	0.96	0.19	0.49	2.23	0.64	3.86

*Arithmetic mean

Table K. 6. Site E exhumed GCL bound cations.

	Bound cations (cmol+/kg)				Bound cations		Bound cation (molar ratio)			
Site ID	Ca	K	Mg	Na	CMR	TCM	Ca	K	Mg	Na
E-1	45.6	0.82	13.8	4.06	0.08	16.1	0.71	0.01	0.21	0.06
E-2	44.6	0.86	14.3	4.01	0.08	15.9	0.70	0.01	0.22	0.06
E-3	46.3	0.58	17.0	3.49	0.06	16.9	0.69	0.01	0.25	0.05
E-4	44.3	0.97	13.5	3.11	0.07	15.5	0.72	0.02	0.22	0.05
E-5	48.7	0.41	17.3	3.21	0.05	17.4	0.70	0.01	0.25	0.05
E-6	38.7	0.92	15.4	3.35	0.07	14.6	0.66	0.02	0.26	0.06
E-7	46.4	0.61	16.8	2.13	0.04	16.5	0.70	0.01	0.26	0.03
E-8	50.4	0.34	17.5	2.77	0.04	17.7	0.71	0.00	0.25	0.04
E-9	46.0	0.77	16.6	2.95	0.06	16.6	0.69	0.01	0.25	0.04
E-10	44.0	0.66	17.5	3.18	0.06	16.3	0.67	0.01	0.27	0.05
E-11	45.1	0.63	16.2	3.44	0.06	16.3	0.69	0.01	0.25	0.05
E-12	43.8	0.94	13.0	3.28	0.07	15.3	0.72	0.02	0.21	0.05
E lower k*	44.8	0.78	15.0	3.51	0.07	16.0	0.70	0.01	0.23	0.05
E higher k*	46.0	0.61	16.7	2.88	0.05	16.6	0.69	0.01	0.25	0.04

*Arithmetic mean

Table K. 7. Site F exhumed GCL water content, swell index and soluble cations.

			Soluble cations (cmol+/kg)				Soluble cations	
Site ID	Exhumed w (%)	Swell index (mL/2 g)	Ca	K	Mg	Na	CMR	TCM
F-1	60.7	8.0	0.20	0.08	0.11	2.72	0.70	3.10
F-2	60.7	10.0	0.21	0.05	0.21	1.77	0.71	2.23
F-3	64.9	10.0	0.38	0.06	0.37	1.52	0.68	2.32
F-4	42.8	13.0	0.21	0.03	0.18	8.24	0.95	8.67
F-5	46.3	12.0	0.23	0.03	0.20	8.05	0.95	8.51
F-6	45.3	13.0	0.22	0.03	0.22	7.51	0.94	7.98
F TP1 *	62.1	9.3	0.26	0.06	0.23	2.00	0.70	2.55
F TP2 *	44.8	12.7	0.22	0.03	0.20	7.93	0.95	8.39

*Arithmetic mean

Table K. 8. Site F exhumed GCL bound cations.

	Bound cations (cmol+/kg)				Bound cations		Bound cation (molar ratio)			
Site ID	Ca	K	Mg	Na	CMR	TCM	Ca	K	Mg	Na
F-1	34.6	0.91	0.00	0.99	0.05	9.13	0.95	0.03	0.00	0.03
F-2	31.8	0.84	0.00	0.40	0.04	8.26	0.96	0.03	0.00	0.01
F-3	35.0	0.81	0.00	0.44	0.03	9.07	0.97	0.02	0.00	0.01
F-4	32.2	1.30	0.00	5.49	0.17	9.74	0.83	0.03	0.00	0.14
F-5	32.0	1.36	0.00	5.35	0.17	9.69	0.83	0.04	0.00	0.14
F-6	33.7	1.24	0.00	5.00	0.16	9.98	0.84	0.03	0.00	0.13
F TP1 *	33.8	0.86	0.00	0.61	0.04	8.82	0.96	0.02	0.00	0.02
F TP2 *	32.6	1.30	0.00	5.28	0.17	9.80	0.83	0.03	0.00	0.13

*Arithmetic mean

APPENDIX L - HYDRAULIC CONDUCTIVITY RECORDS FOR EXHUMED GCLS

L-1 HYDRAULIC CONDUCTIVITY PROFILES FOR GCLS EXHUMED FROM SITE A.

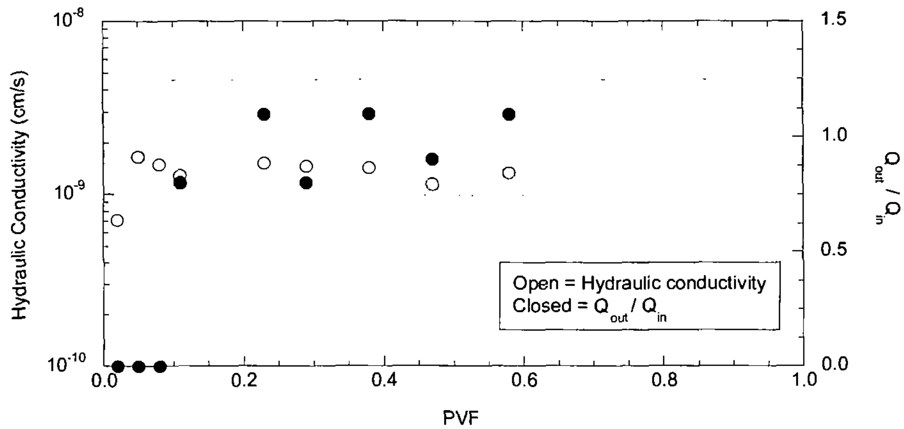


Fig. L. 1. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-1 permeated with SW.

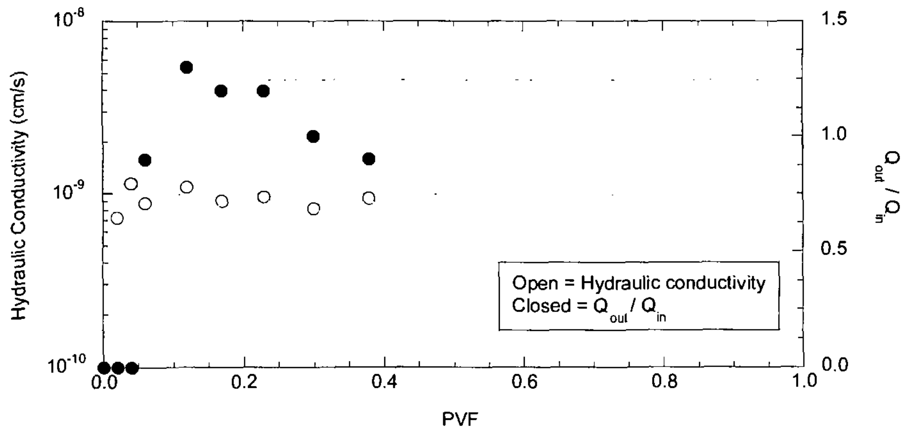


Fig. L. 2. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-2 permeated with SW.

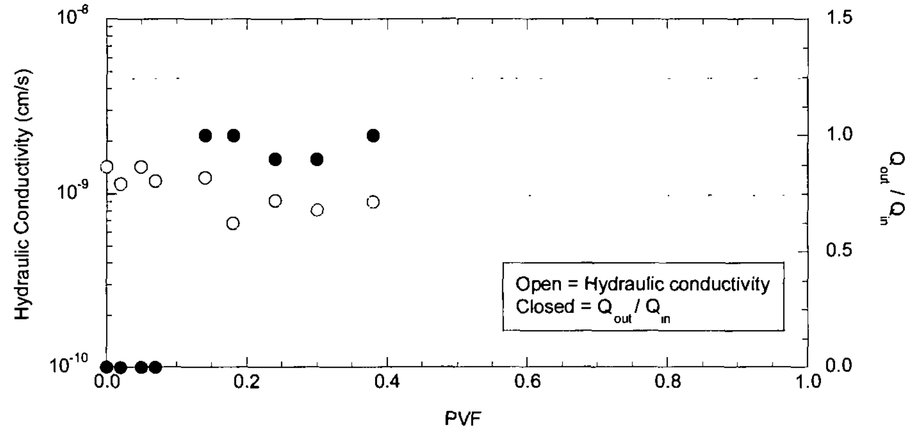


Fig. L. 3. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-3 permeated with SW.

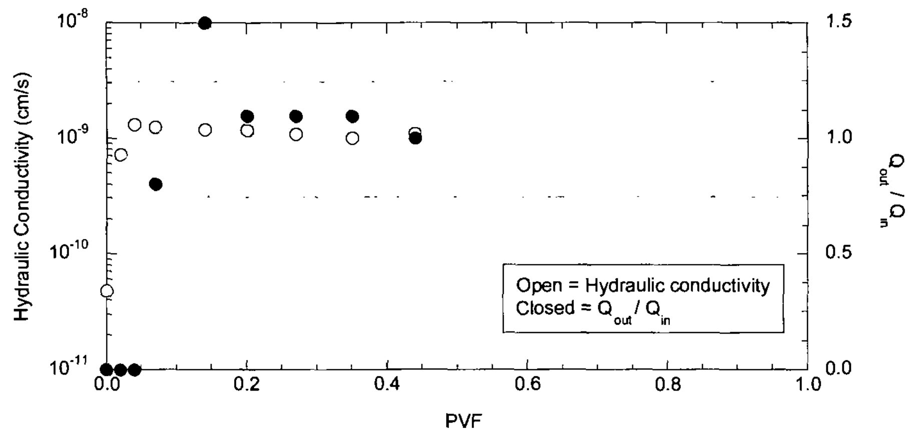


Fig. L. 4. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-4 permeated with SW.

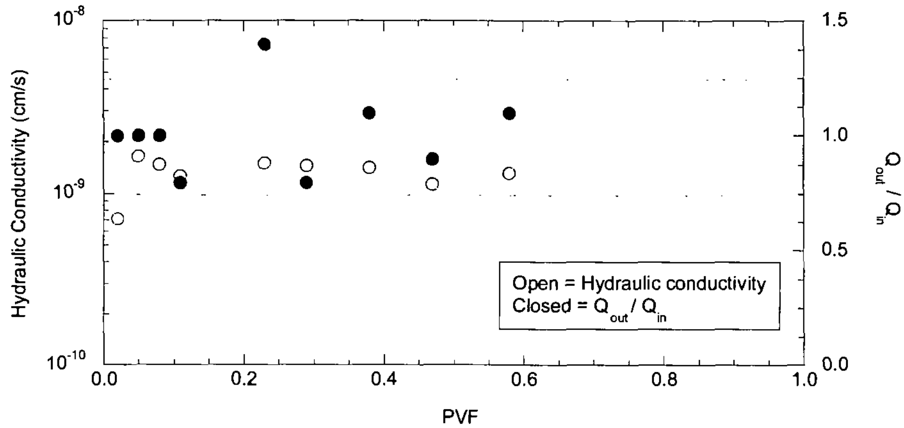


Fig. L. 5. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-5 permeated with SW.

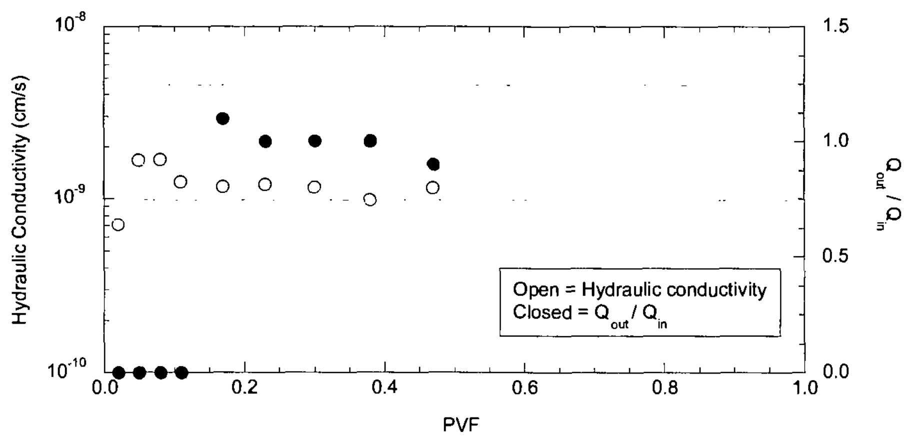


Fig. L. 6. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-6 permeated with SW.

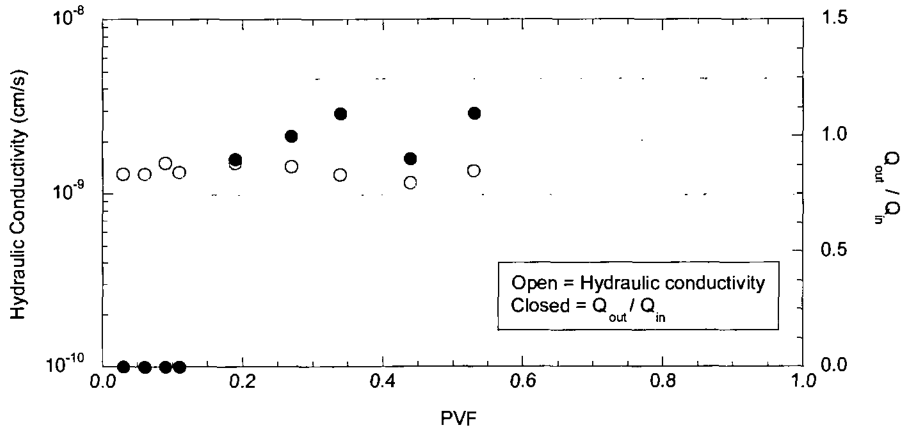


Fig. L. 7. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-7 permeated with SW.

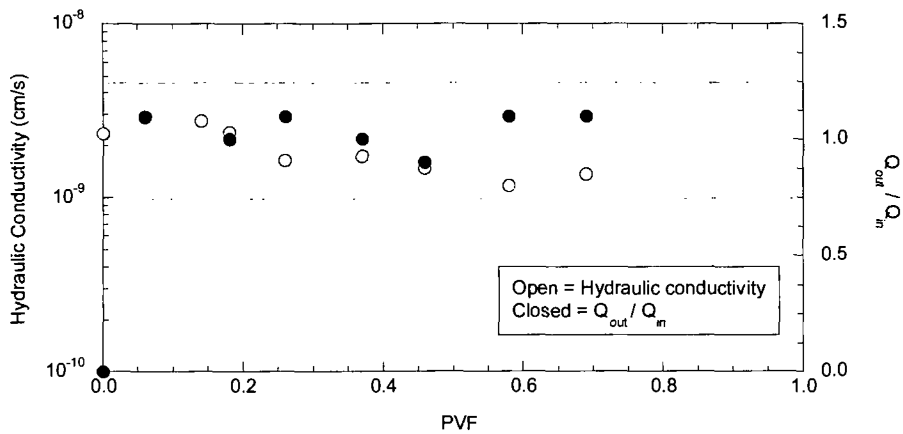


Fig. L. 8. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL A-8 permeated with SW.

L-2 HYDRAULIC CONDUCTIVITY PROFILES OF GCLS EXHUMED FROM SITE B.

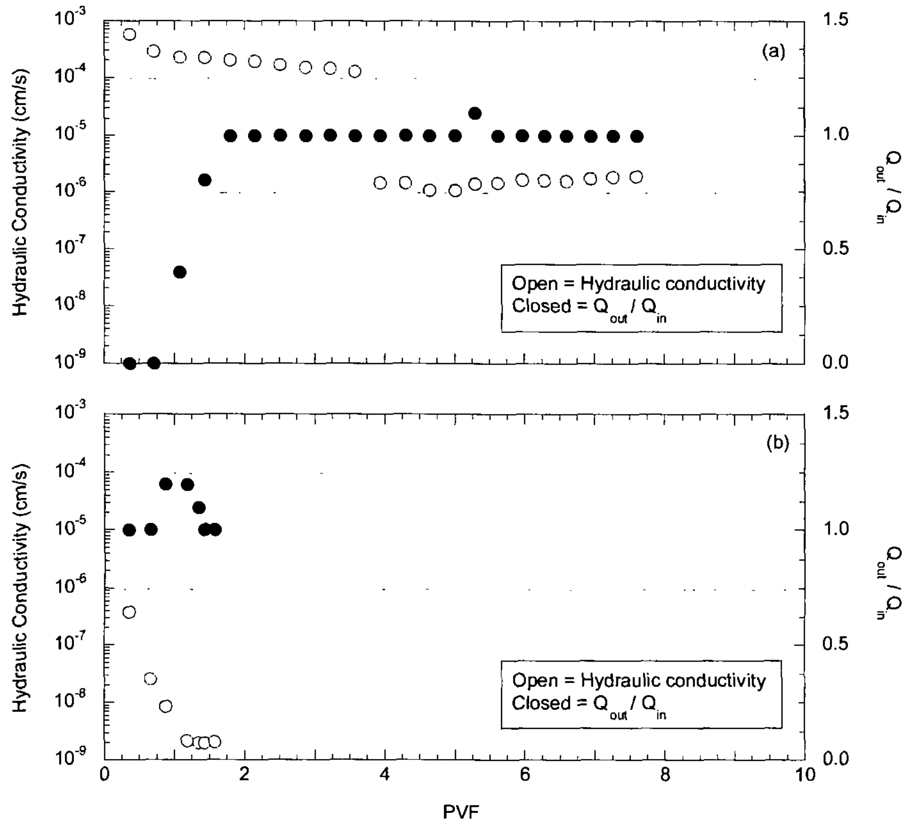


Fig. L. 9. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-1 permeated with standard water (a), and average water (b).

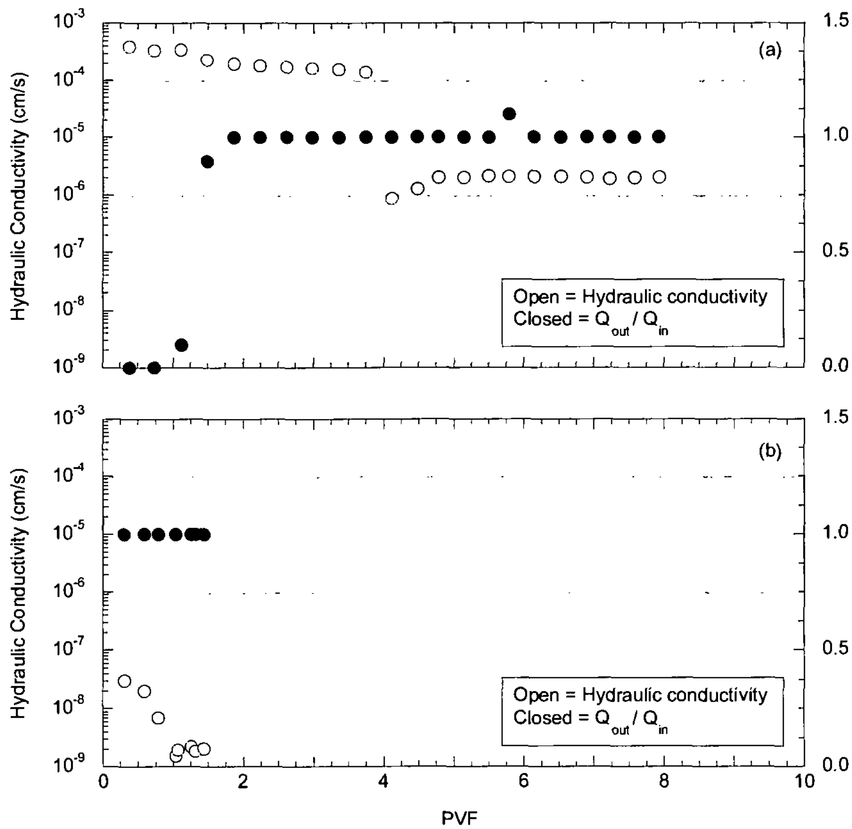


Fig. L. 10. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-2 permeated with standard water (a), and average water (b).

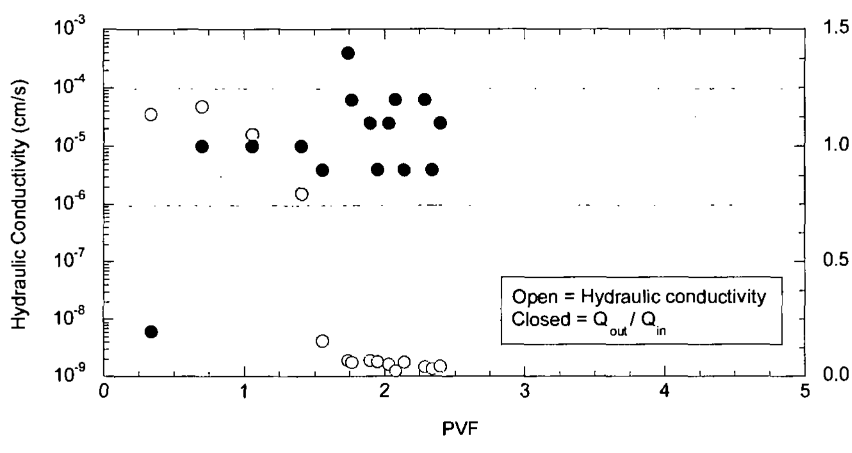


Fig. L. 11. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-3 permeated with standard water.

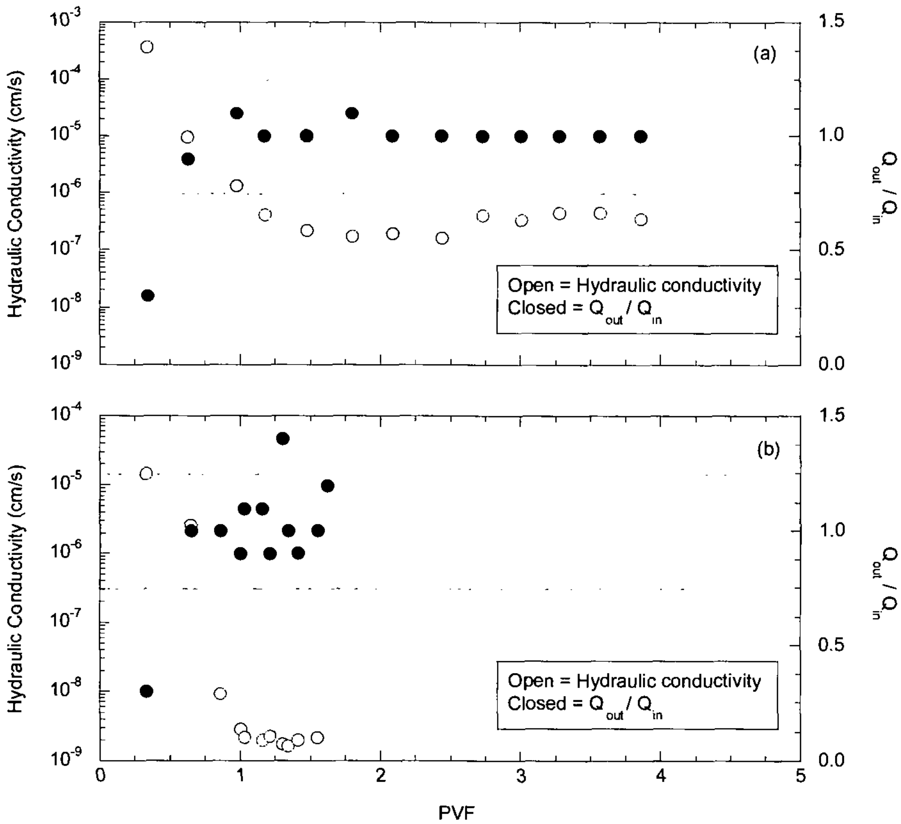


Fig. L. 12. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B4 permeated with standard water (a), and average water (b).

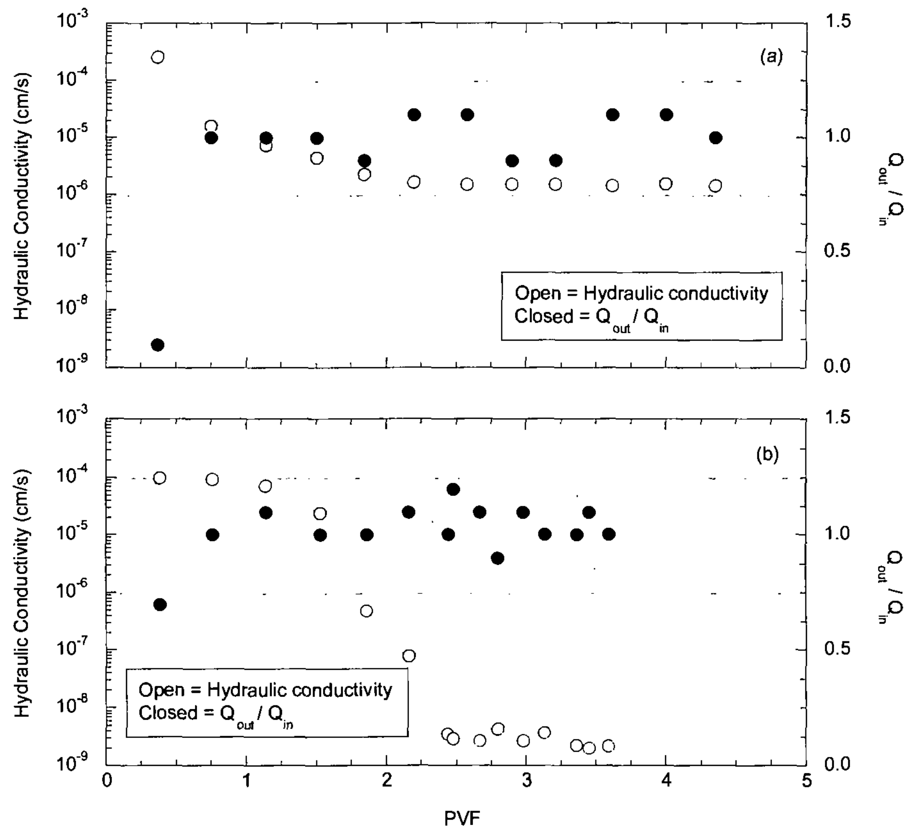


Fig. L. 13. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-5 permeated with standard water (a), and average water (b).

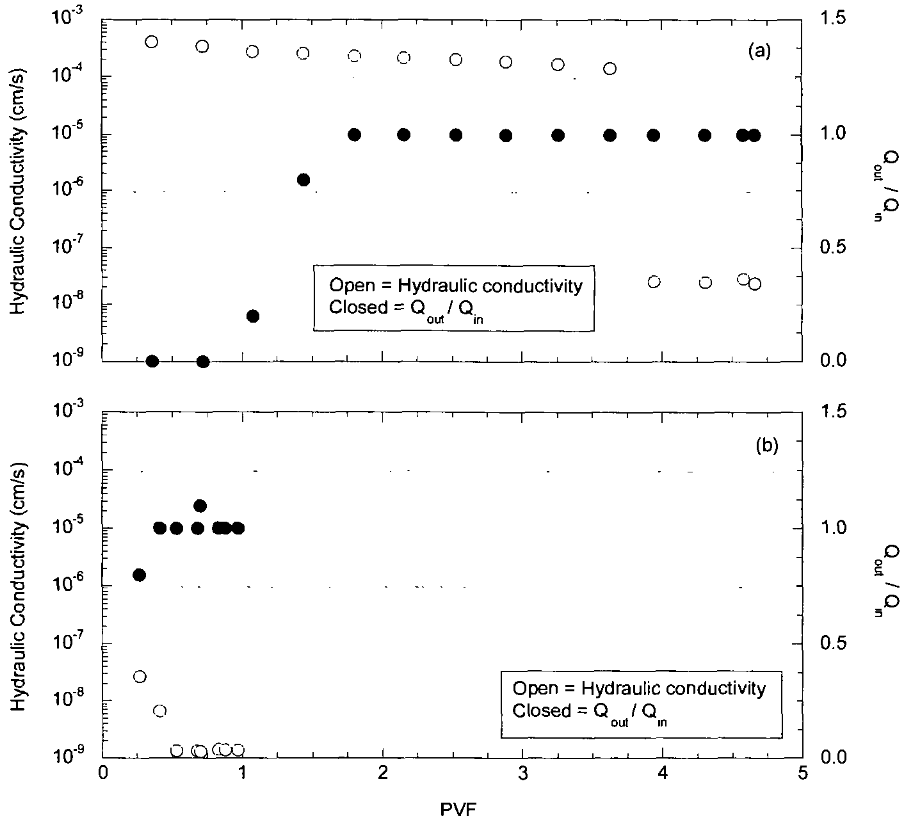


Fig. L. 14. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-6 permeated with standard water (a), and average water (b).

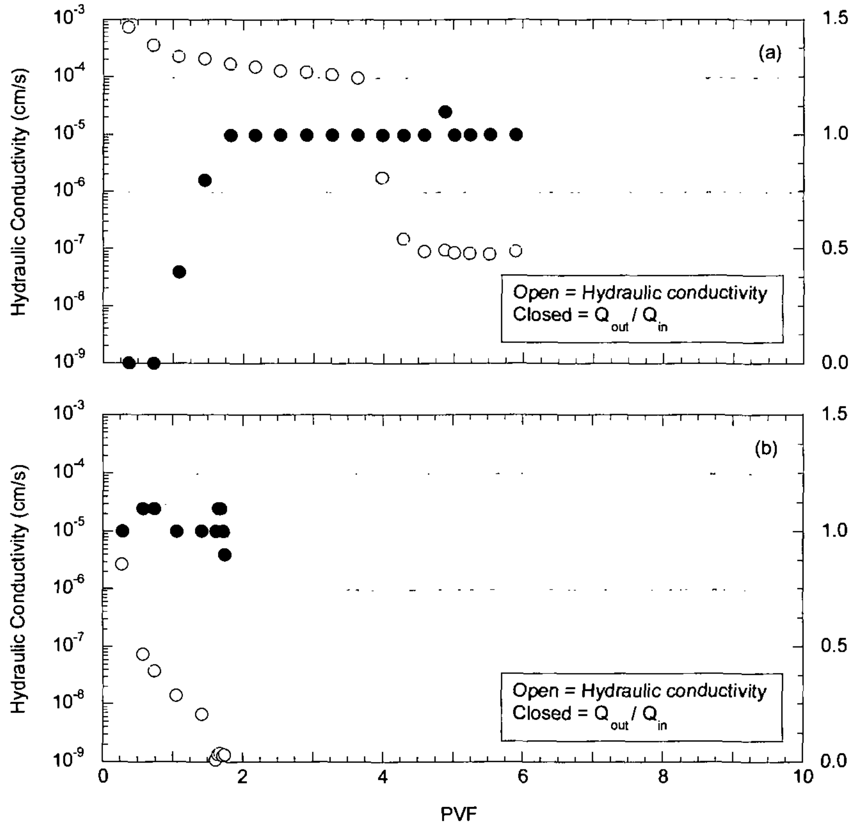


Fig. L. 15. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-7 permeated with standard water (a), and average water (b).

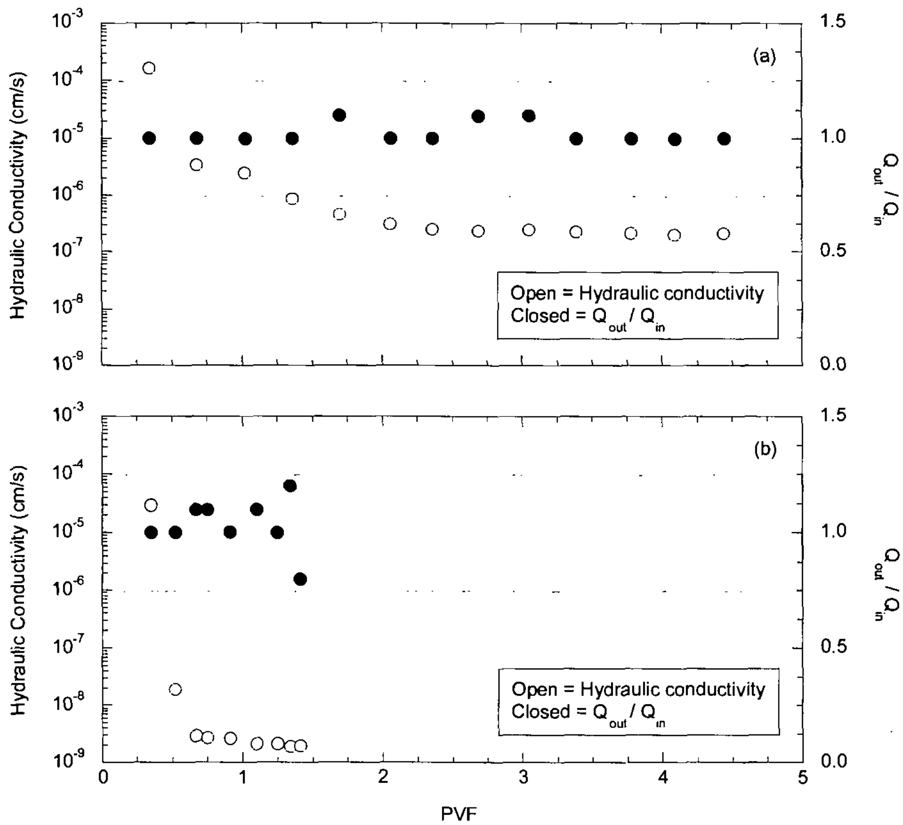


Fig. L. 16. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-8 permeated with standard water (a), and de-ionized water (b).

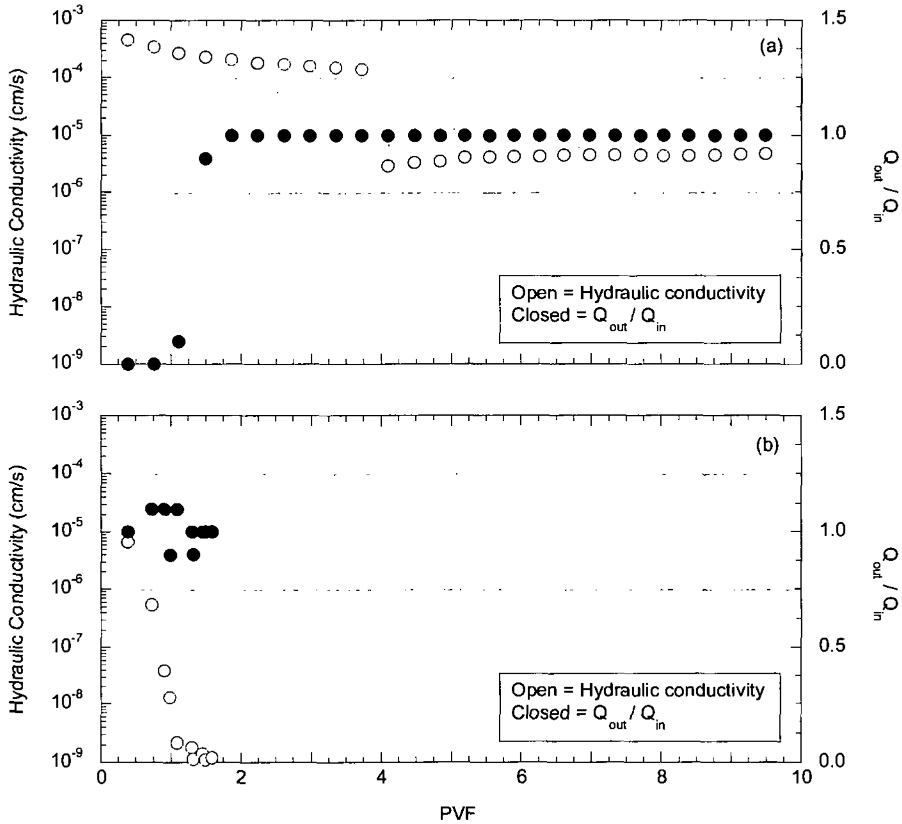


Fig. L. 17. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-9 permeated with standard water (a), and average water (b).

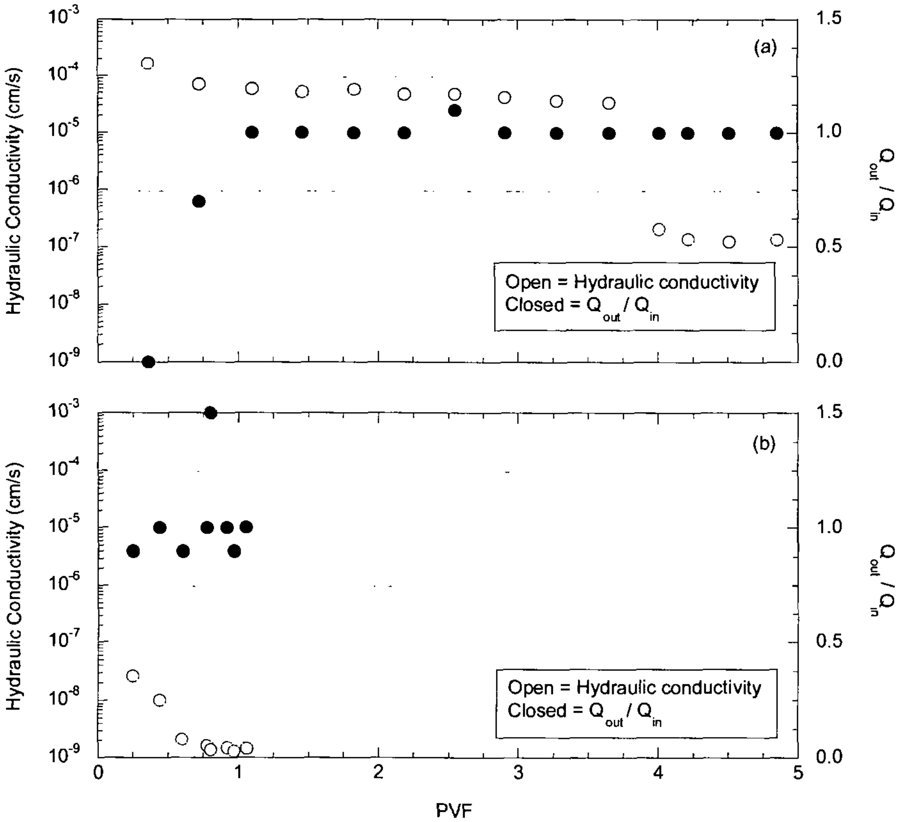


Fig. L. 18. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-10 permeated with standard water (a), and average water (b).

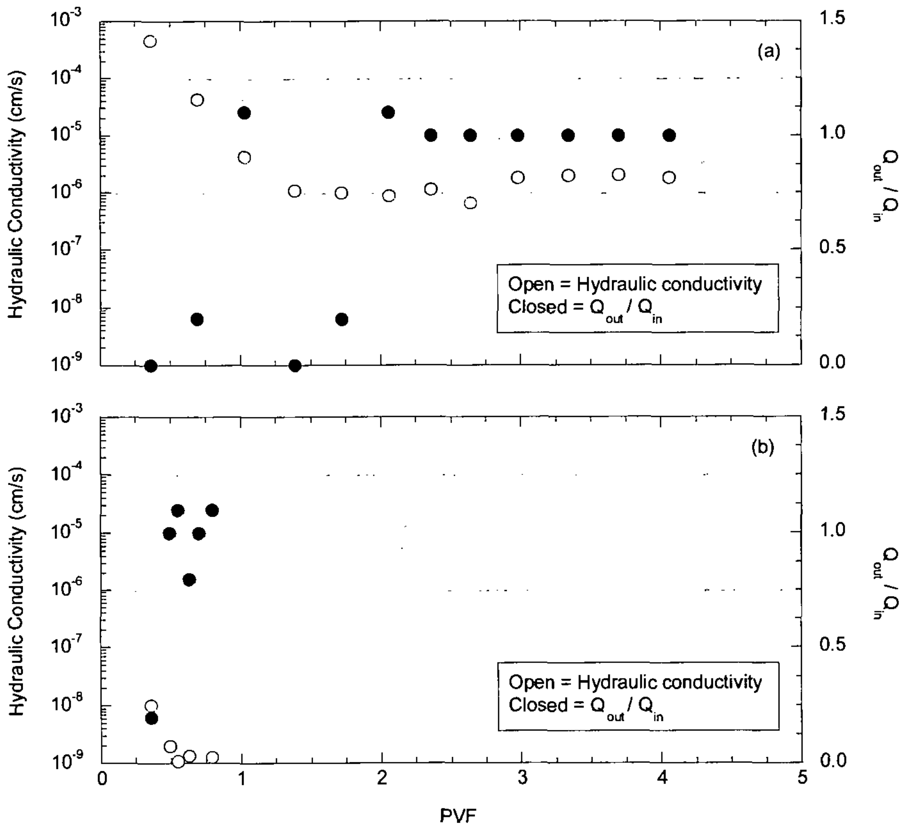


Fig. L. 19. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL B-11 permeated with standard water (a), and average water (b).

L-3 HYDRAULIC CONDUCTIVITY PROFILES OF GCLS EXHUMED FROM SITE E.

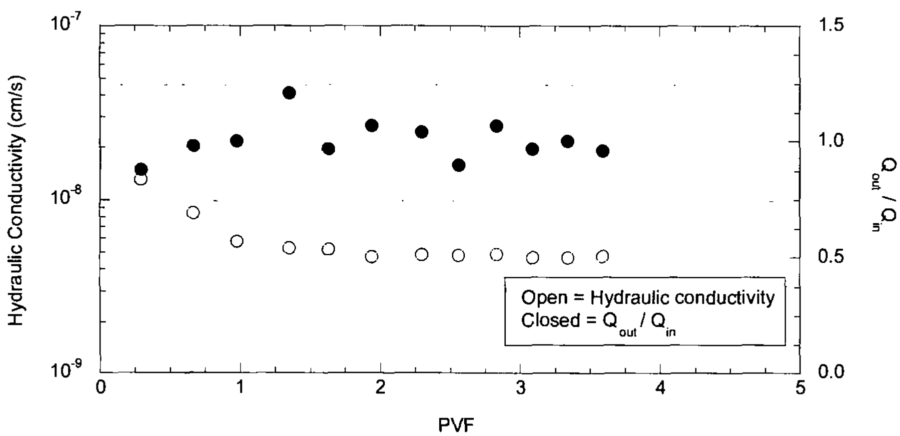


Fig. L. 20. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-1 permeated with standard water.

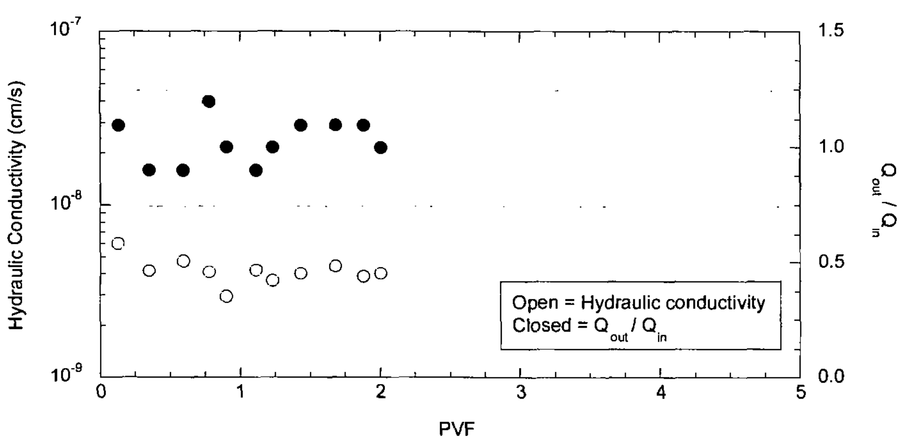


Fig. L. 21. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-2 permeated with standard water.

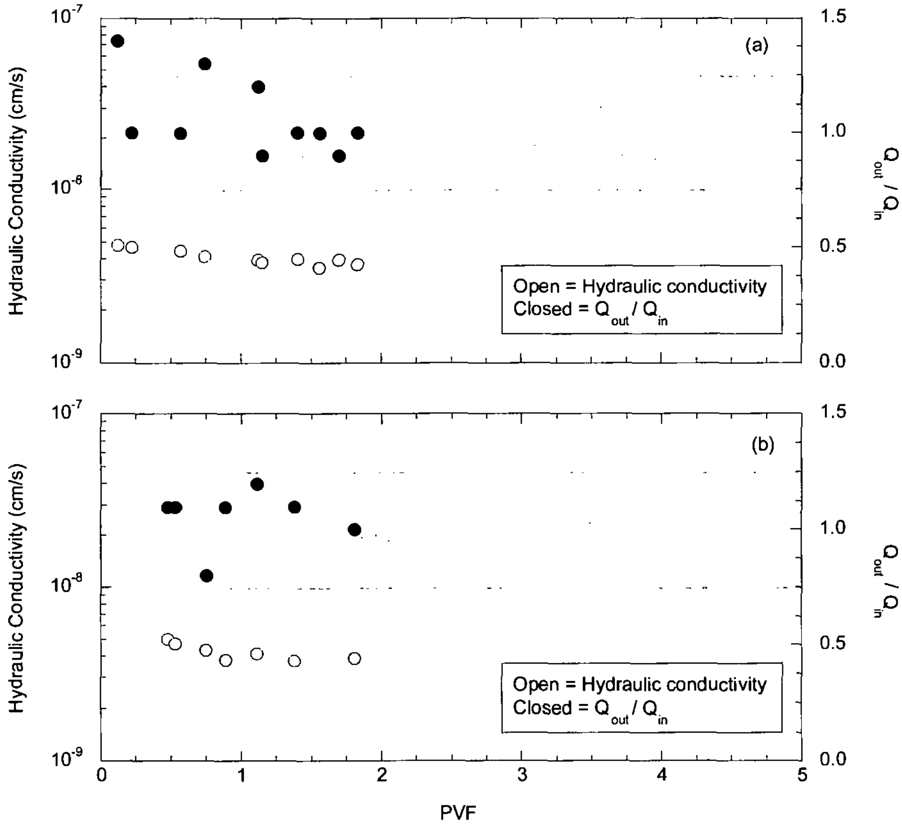


Fig. L. 22. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-3 with stress maintained (a) and no stress maintained (b) permeated with standard water.

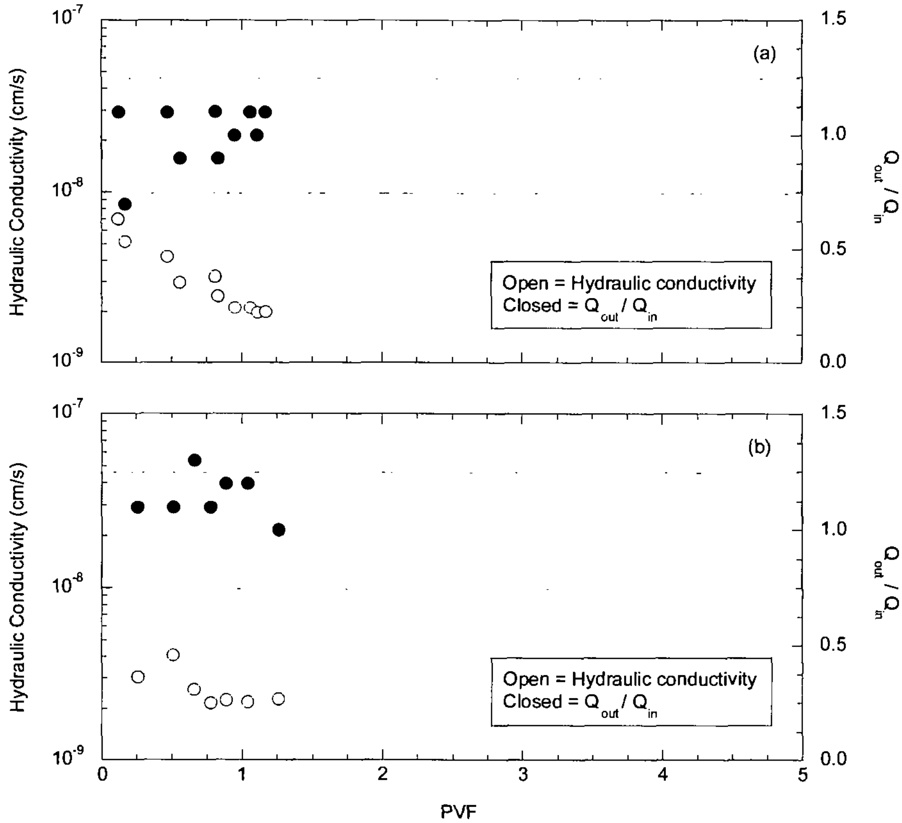


Fig. L. 23. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-4 with stress maintained (a) and no stress maintained (b) permeated with standard water.

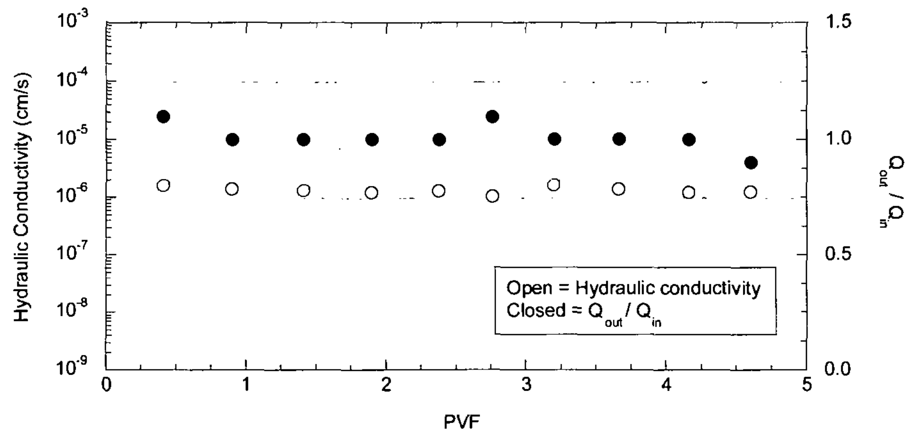


Fig. L. 24. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-5 permeated with standard water.

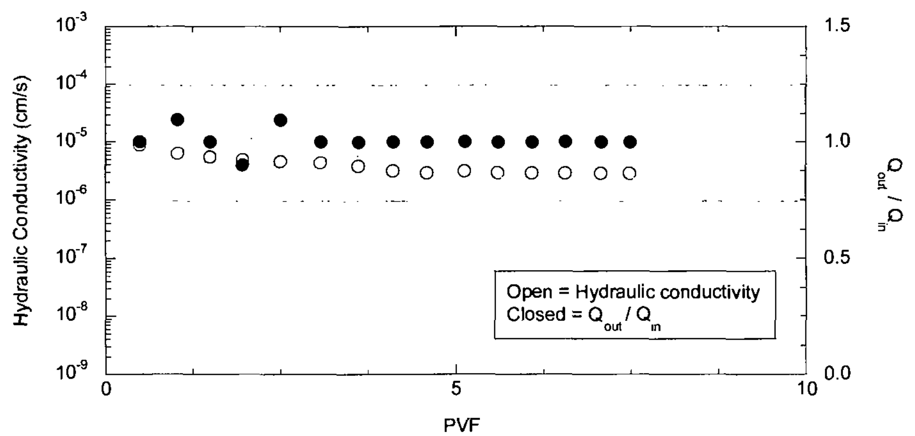


Fig. L. 25. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-6 with stress maintained (a) and no stress maintained (b) permeated with standard water.

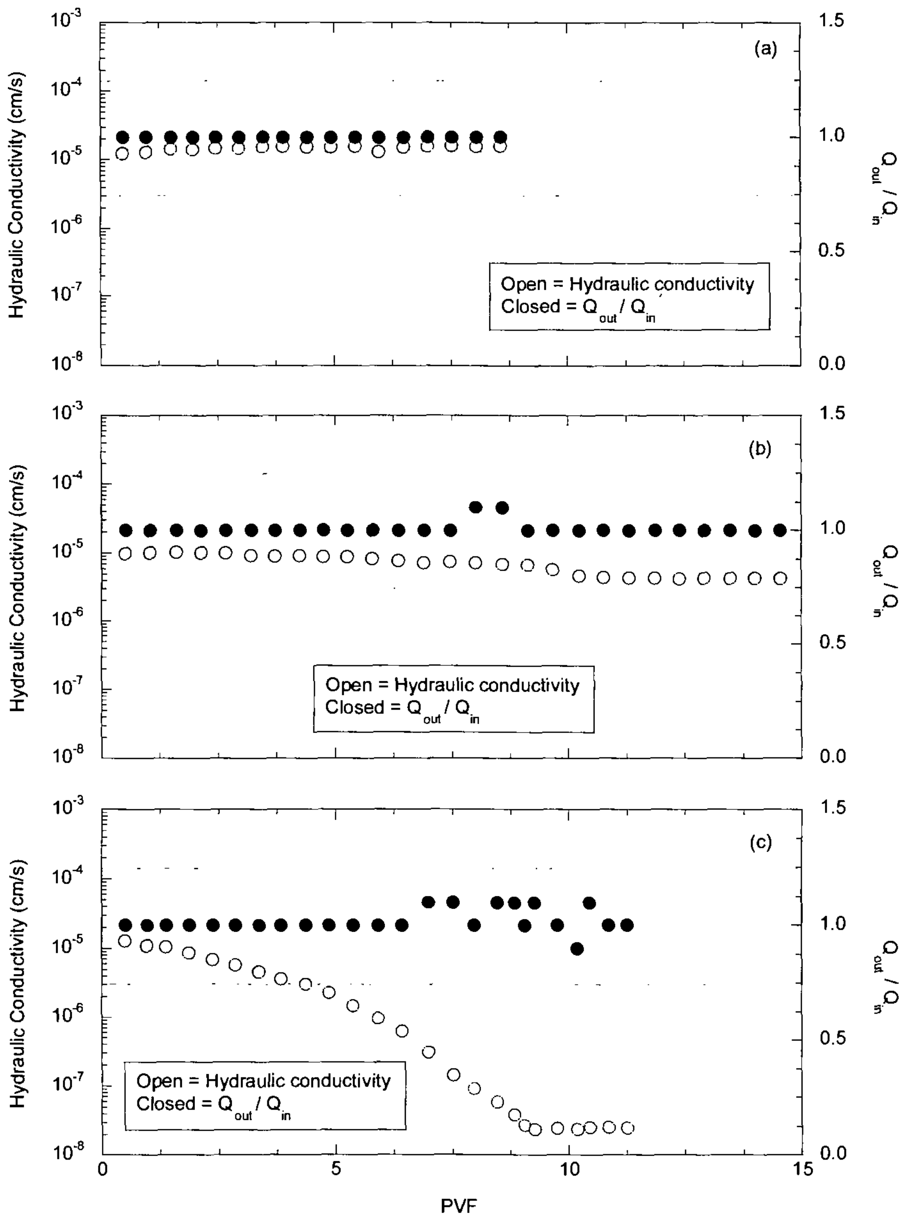


Fig. L. 26. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-7 permeated with standard water (a), average water (b), and de-ionized water (c).

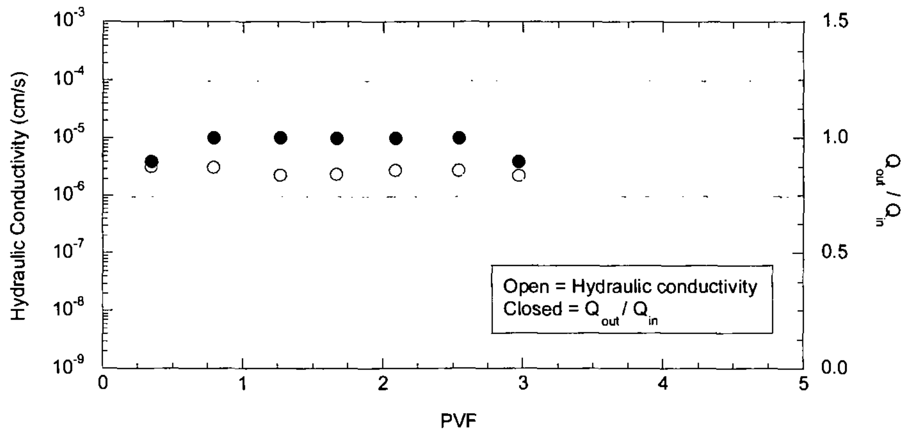


Fig. L. 27. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-8 permeated with standard water.

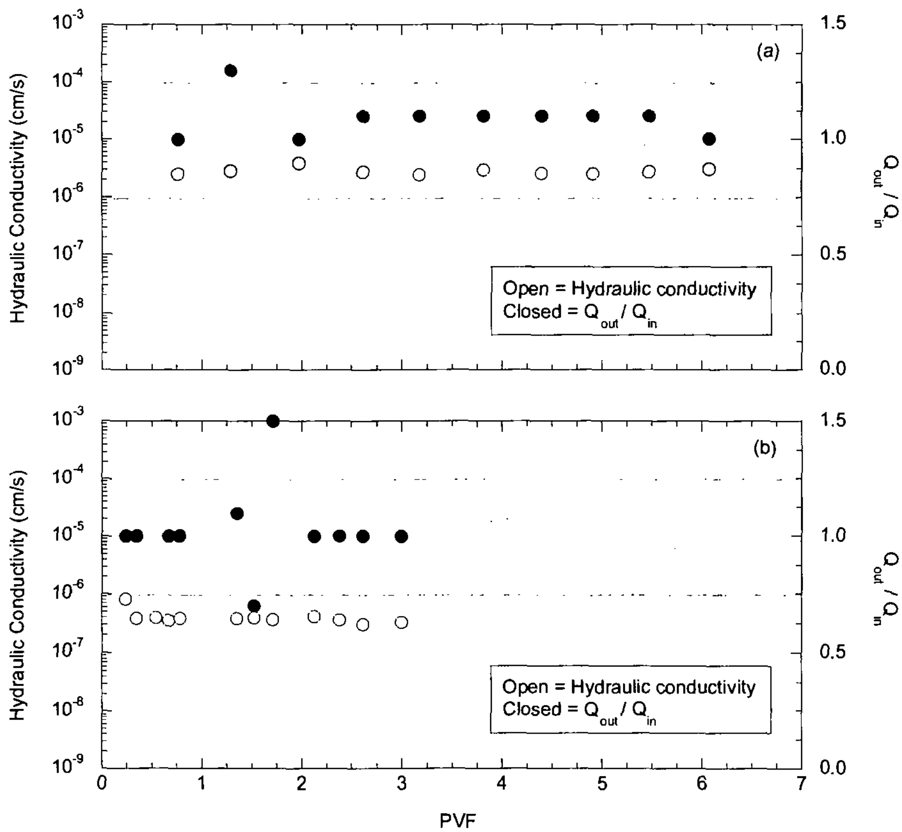


Fig. L. 28. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-9 with stress maintained (a) and no stress maintained (b) permeated with standard water.

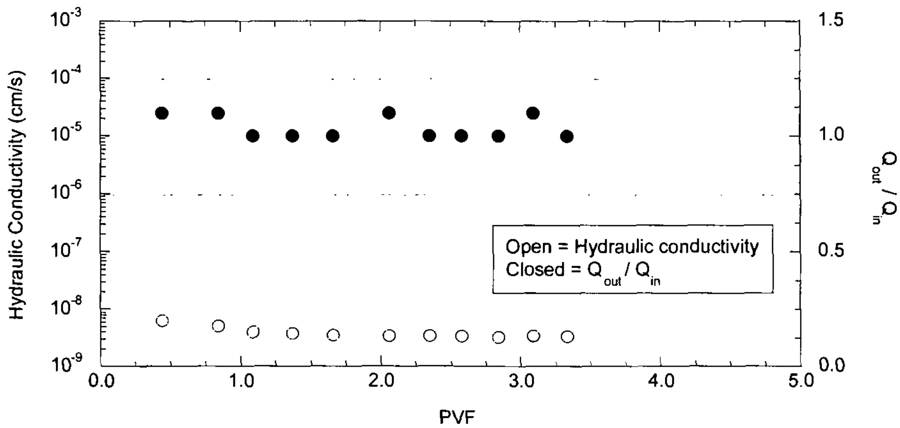


Fig. L. 29. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-10 permeated with standard water.

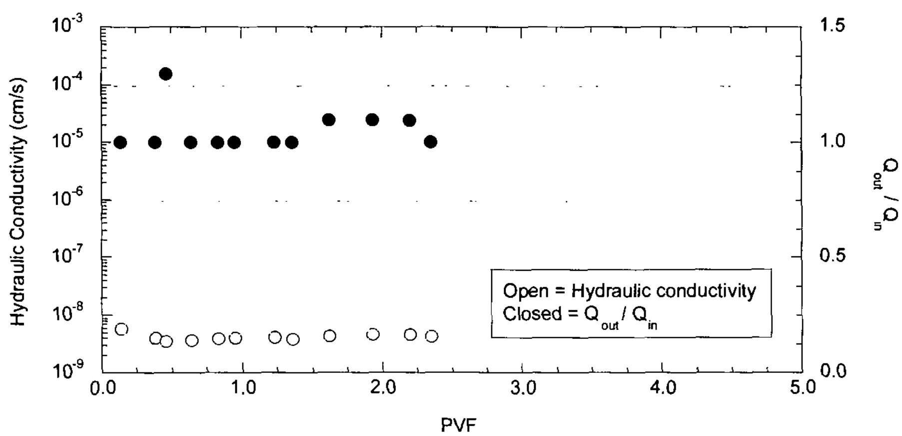


Fig. L. 30. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-11 permeated with standard water.

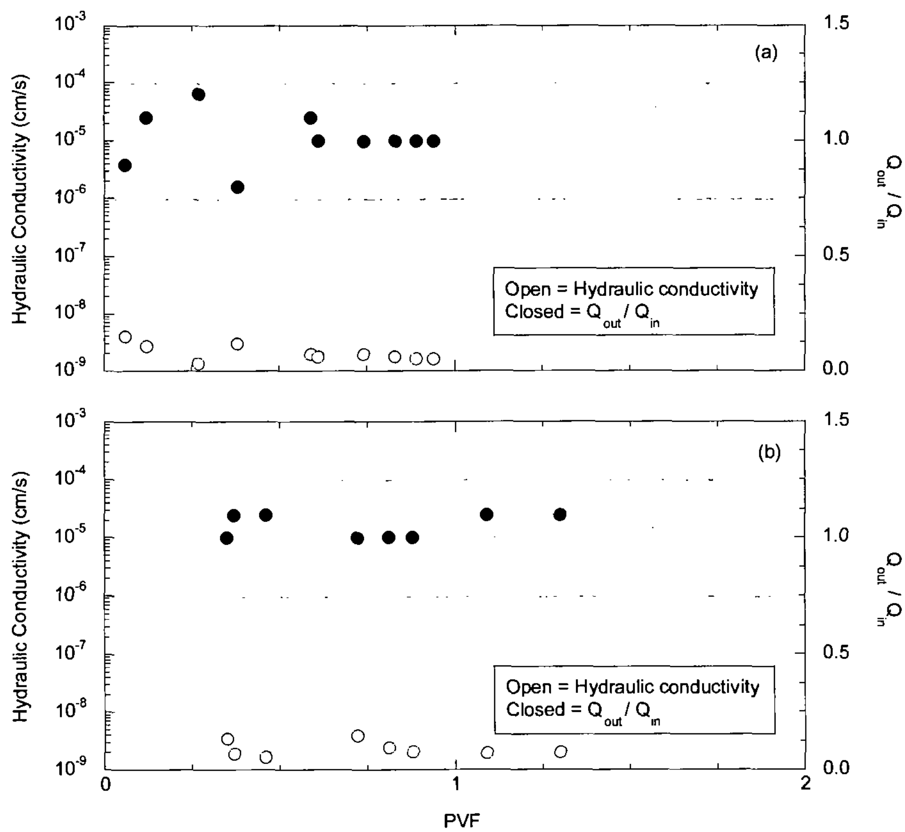


Fig. L. 31. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL E-12 with stress maintained (a) and no stress maintained (b) permeated with standard water.

L-4 HYDRAULIC CONDUCTIVITY PROFILES OF GCLS EXHUMED FROM SITE F.

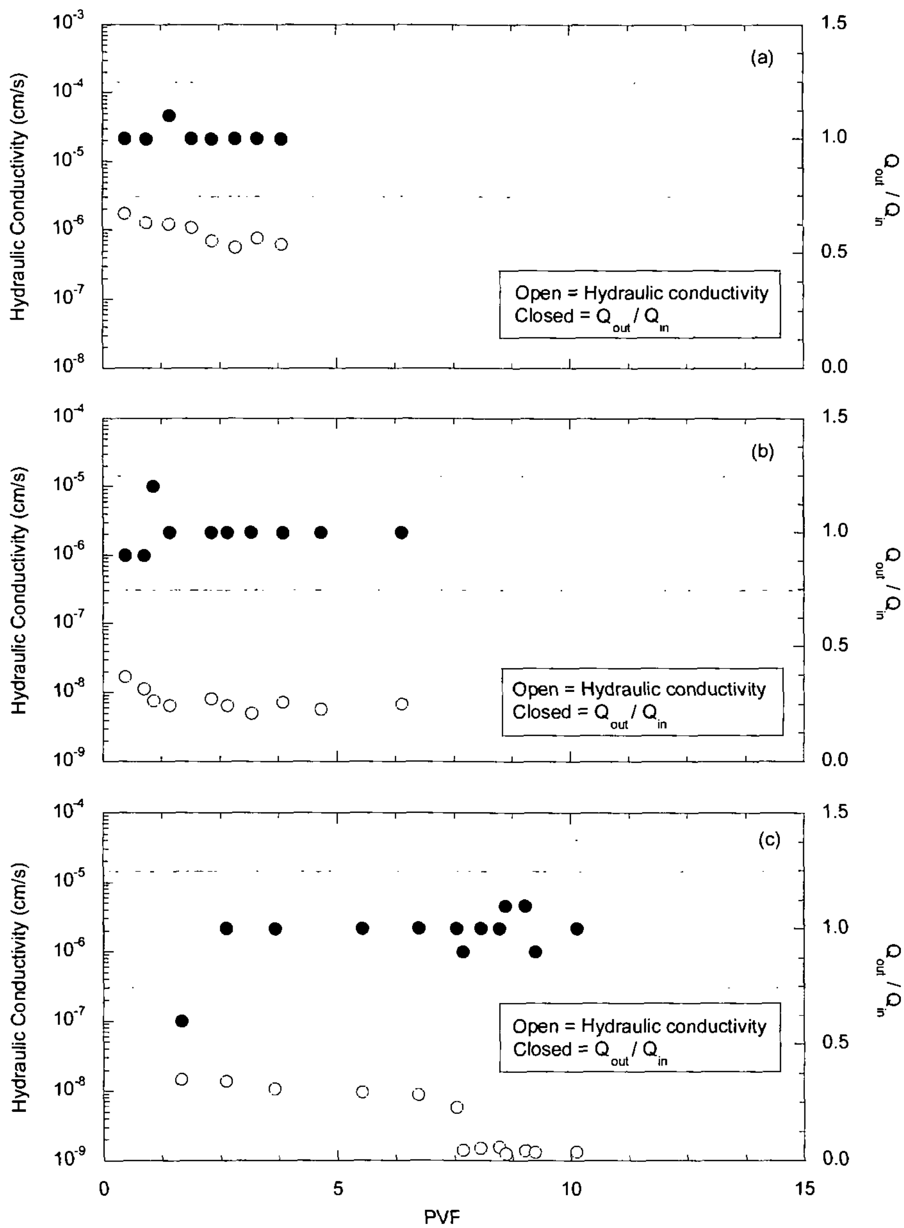


Fig. L. 32. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-1 permeated with standard water (a), average water (b), and de-ionized water (c).

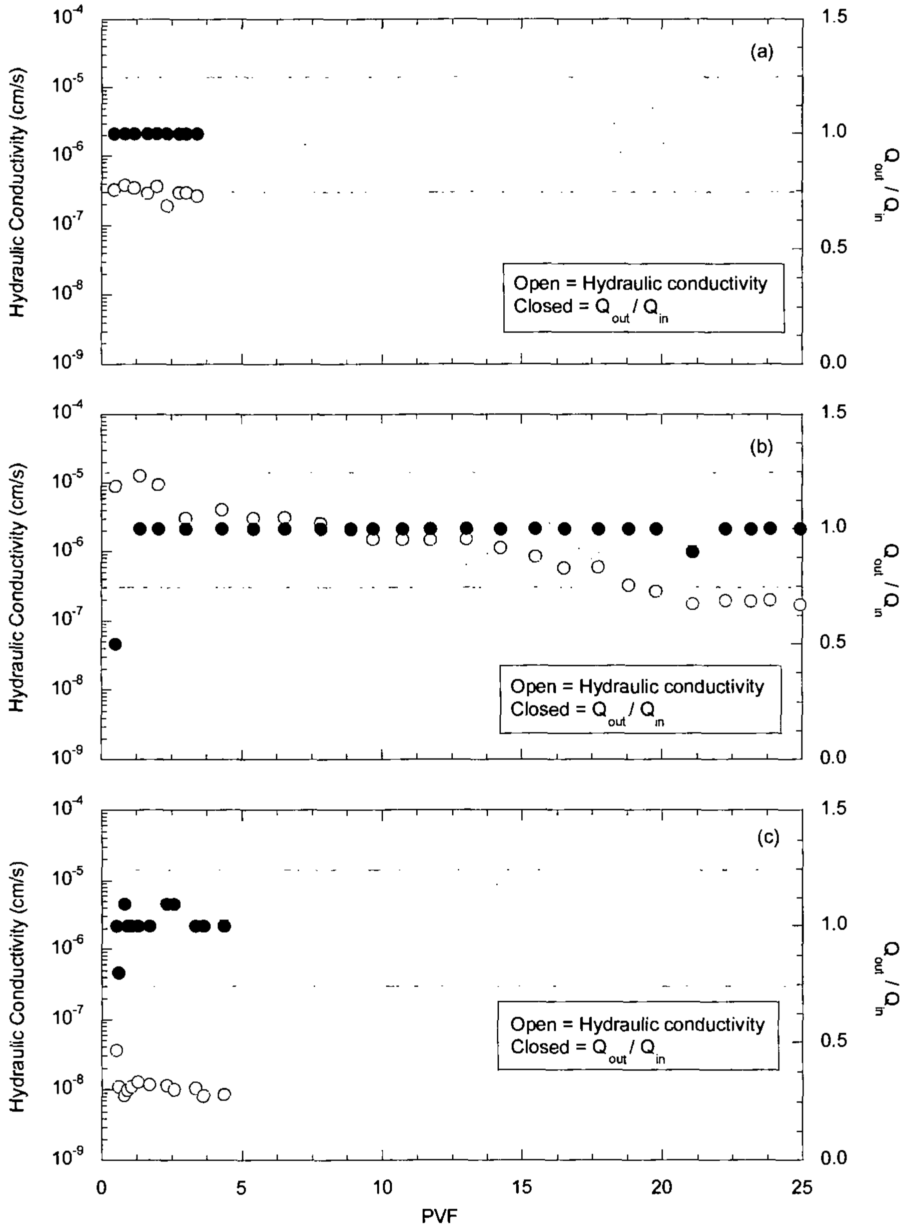


Fig. L. 33. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-2 permeated with standard water (a), average water (b), and deionized water (c).

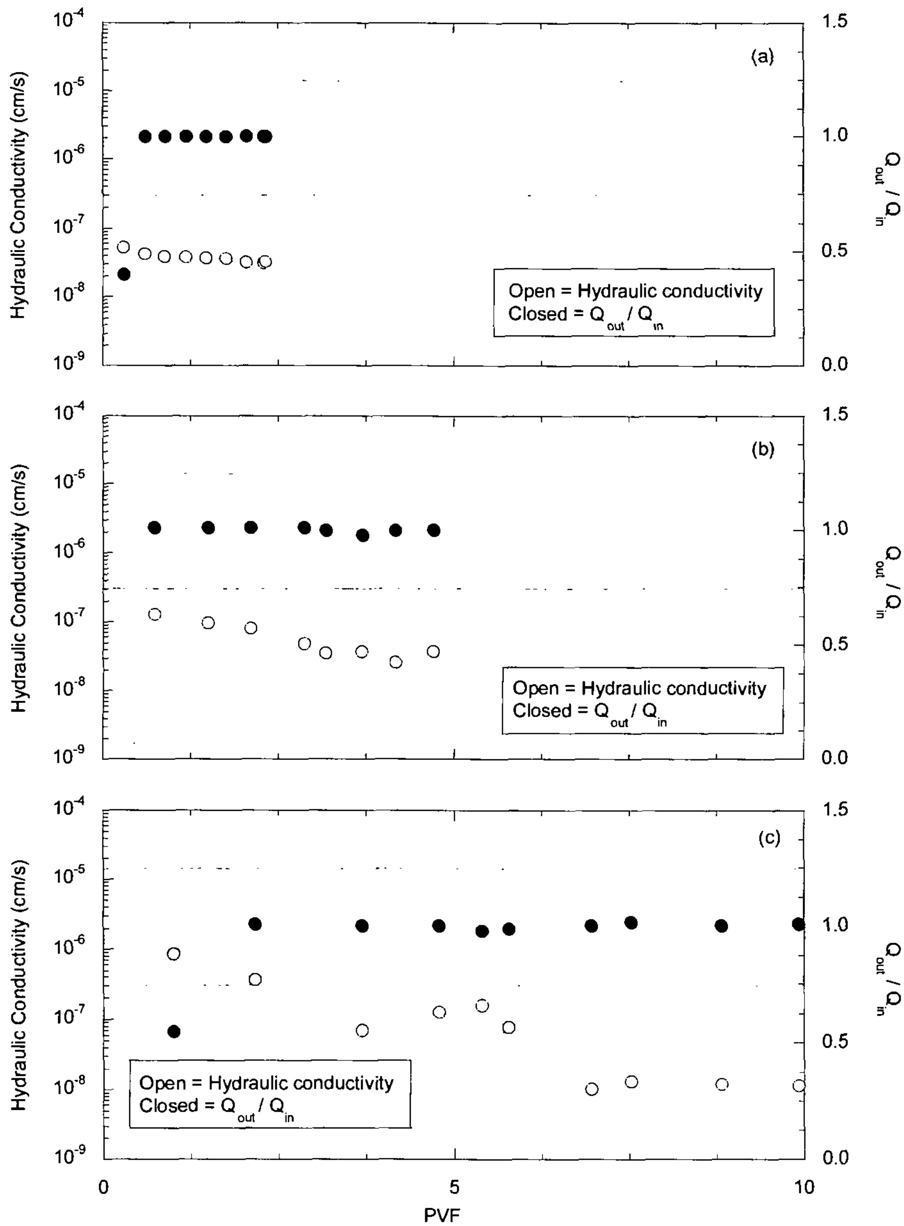


Fig. L. 34. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-3 permeated with standard water (a), average water (b), and de-ionized water (c).

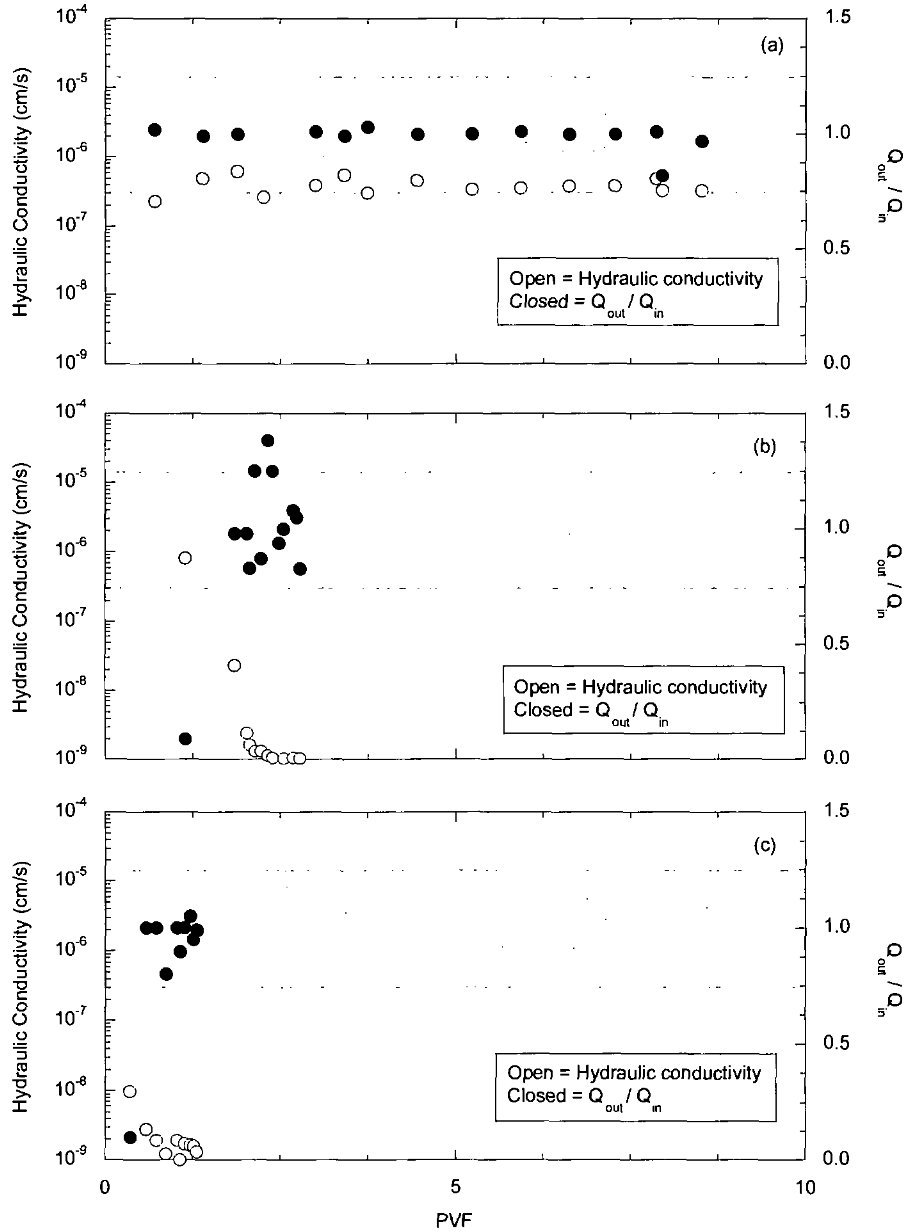


Fig. L. 35. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-4 permeated with standard water (a), average water (b), and deionized water (c).

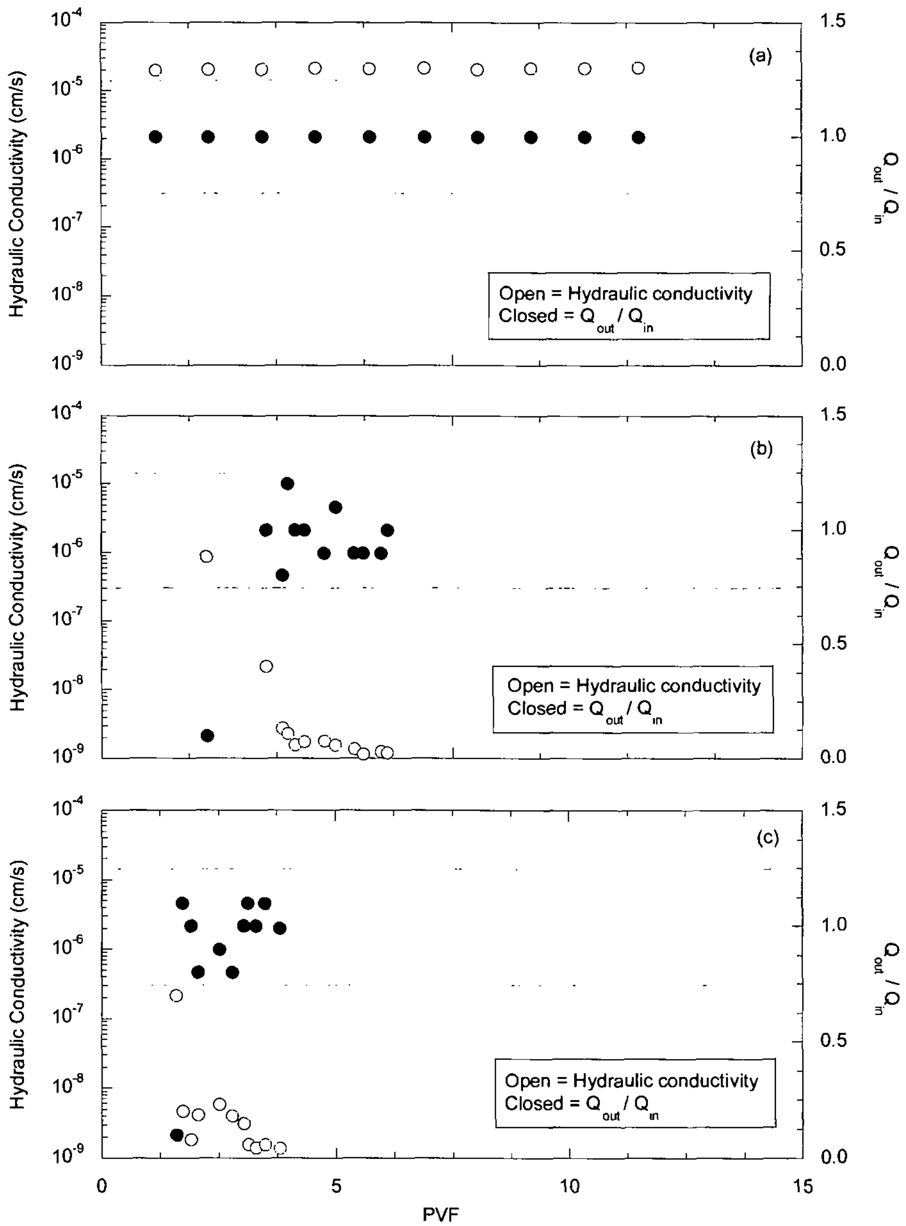


Fig. L. 36. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-5 permeated with standard water (a), average water (b), and de-ionized water (c).

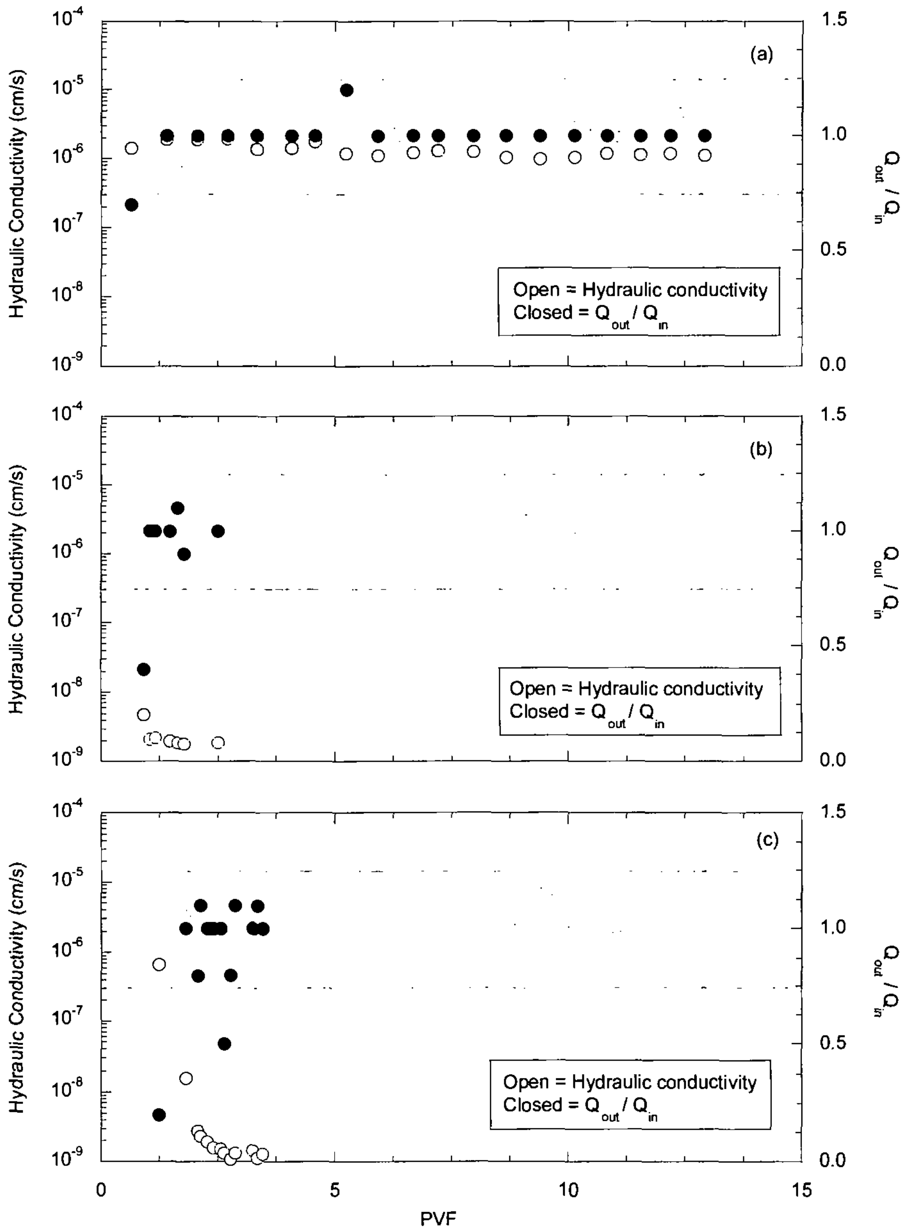


Fig. L. 37. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for GCL F-6 permeated with standard water (a), average water (b), and de-ionized water (c).

APPENDIX M - FIELD EXHUMATION PHOTOGRAPHY AND OBSERVATIONS

M-1 SITE B FIELD OBSERVATIONS

Fig. M. 1. Removing cover soils by hand at Site B.

Fig. M. 2. Rooting observed at GDL-GM interface but not at GDL overlaps.

Fig. M. 3. Minimal moisture observed at GDL-GM interface upon exposure.

Fig. M. 4. Installed whole in lysimeters GM exposed during exhumation.

Fig. M. 5. Cutting sample perimeters during GCL exhumation.

Fig. M. 6. Sliding rigid PVC plate under GCL sample during exhumation.

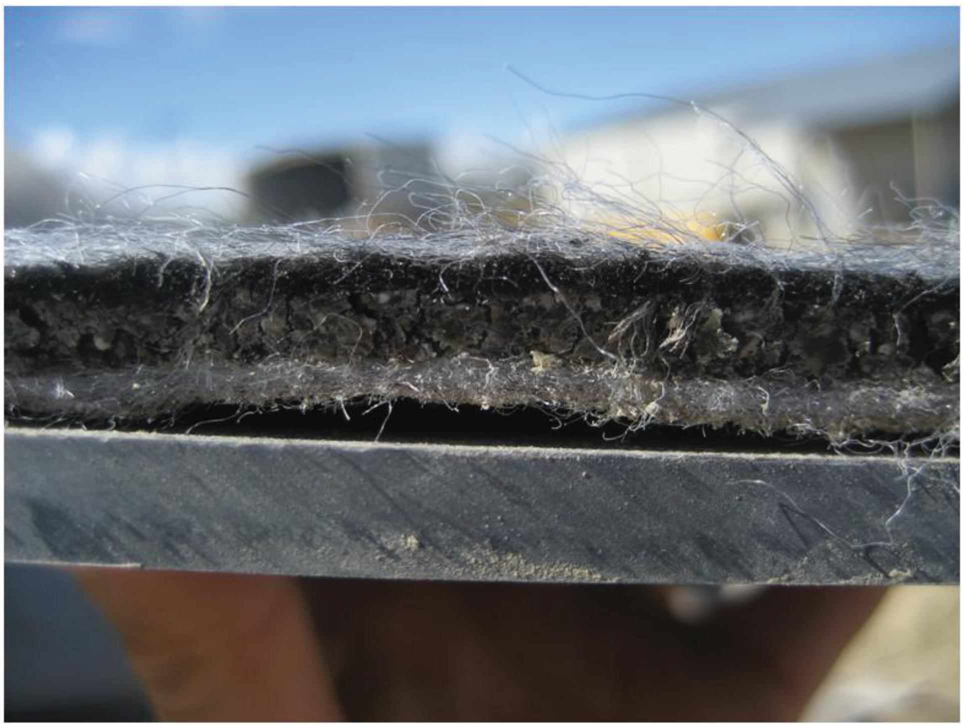


Fig. M. 7. GCL cross section on rigid PVC sampling plate immediately after exhumation.

M-2 SITE E FIELD OBSERVATIONS

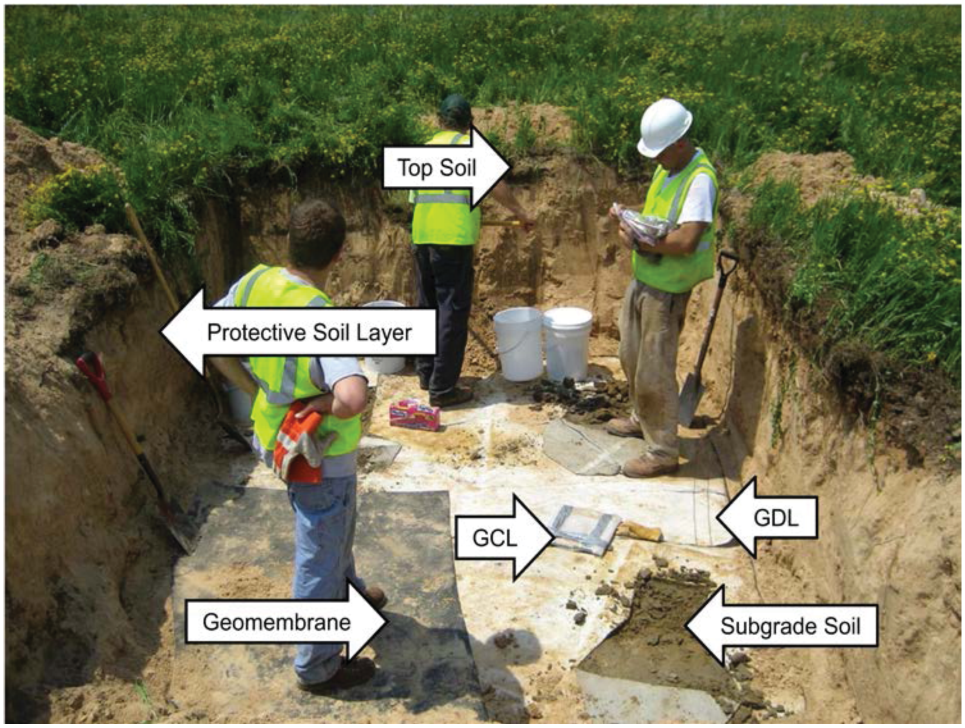


Fig. M. 8. Labeled schematic of GCL sampling test pit.

Fig. M. 9. Manual removal of soil layer overlying geocomposite barrier layer.

Fig. M. 10. Removal of GDL exposing GM.

Fig. M. 11. Moisture visible across GM immediately after GDL removal.

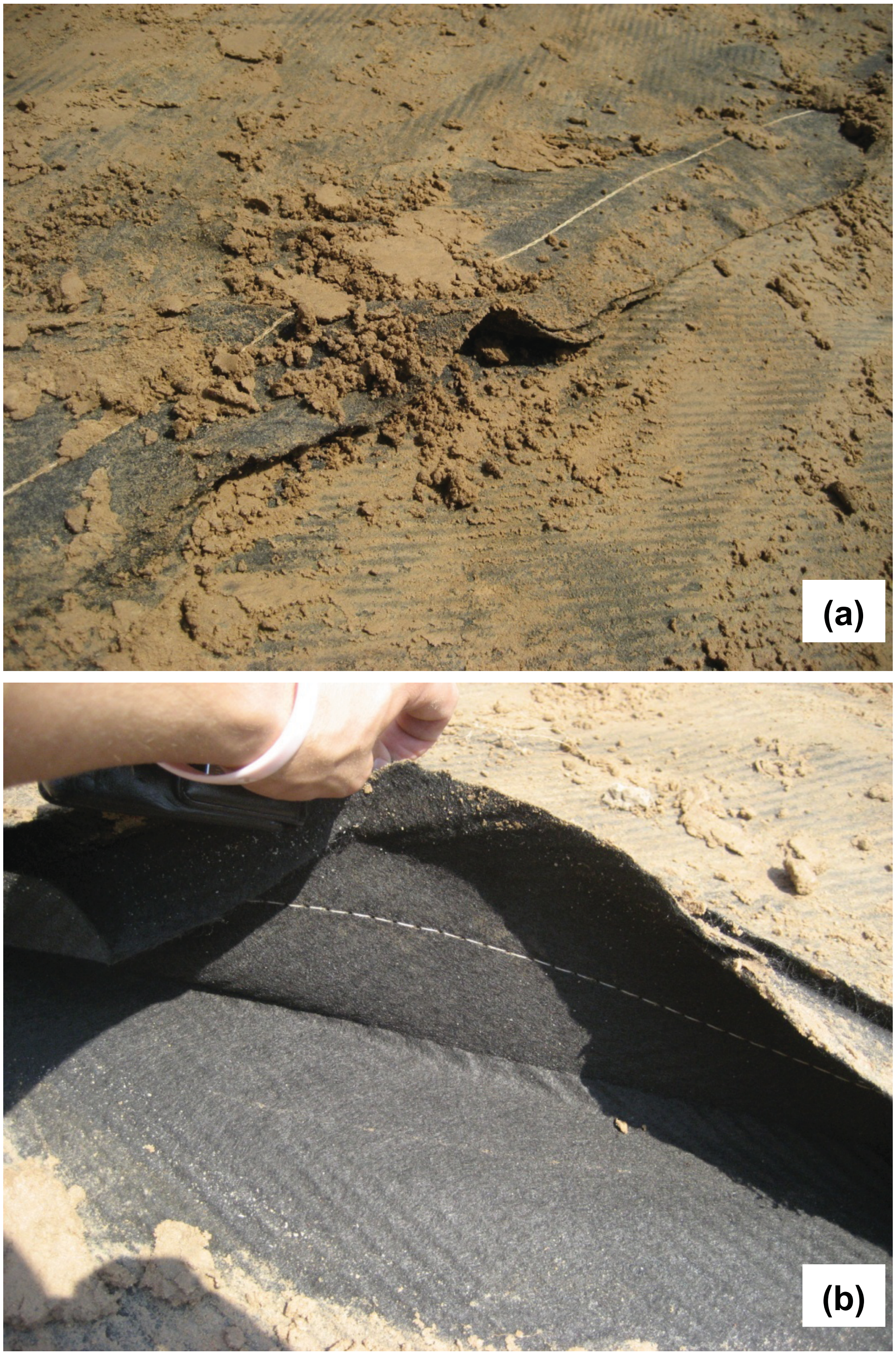


Fig. M. 12. Seam joining geotextiles in adjacent GDL panels in: (a) seam after removing cover soil (fish mouth in middle is due to disturbance during excavation) and (b) close up showing stitching of geotextiles and clean geotextiles in the overlap.

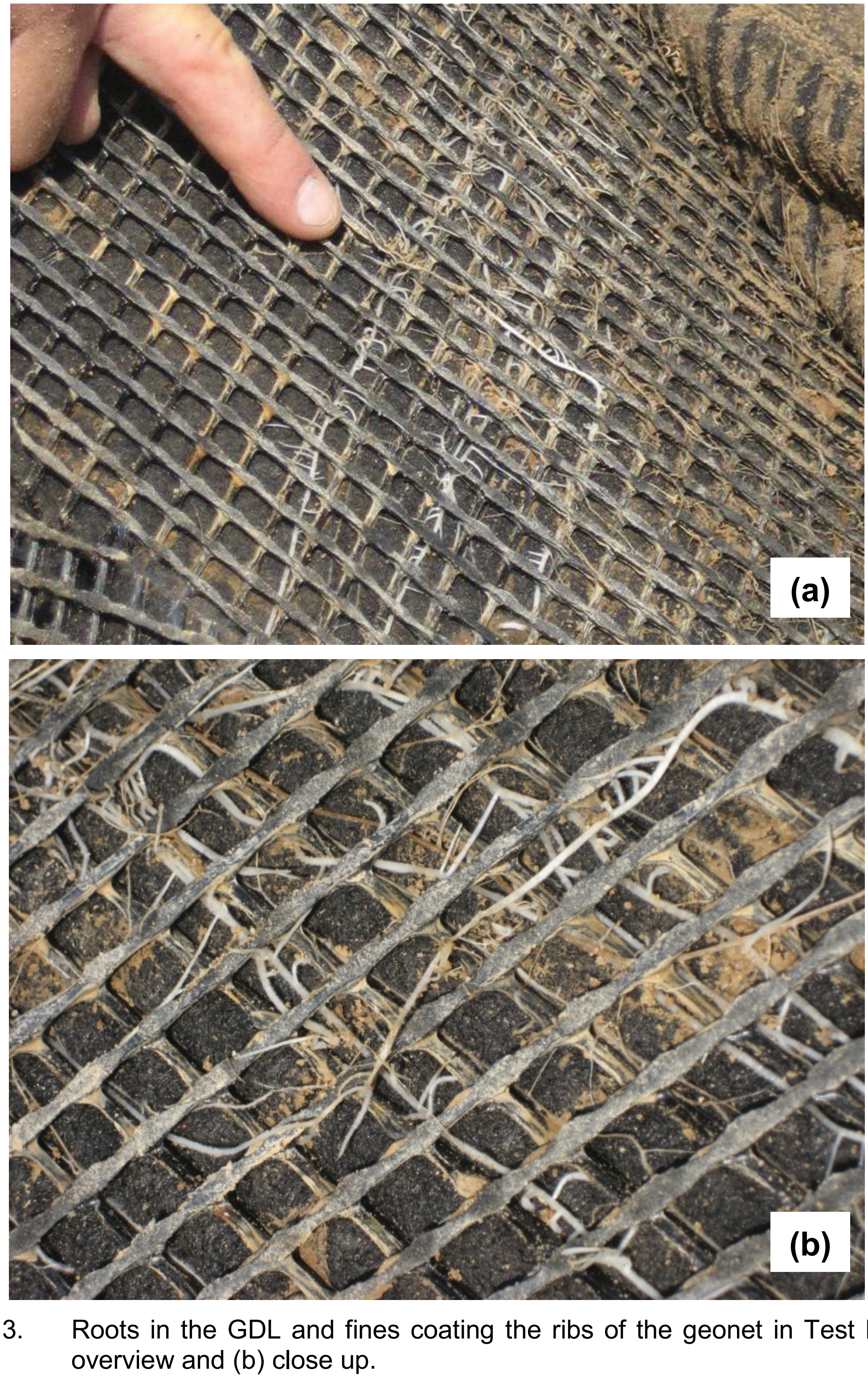


Fig. M. 13. Roots in the GDL and fines coating the ribs of the geonet in Test Pit 1: (a) overview and (b) close up.

Fig. M. 14. Examples of seams observed during exhumation: (a) dual-track wedge weld and (b) extrusion well to boot for gas well near Test Pit 4.

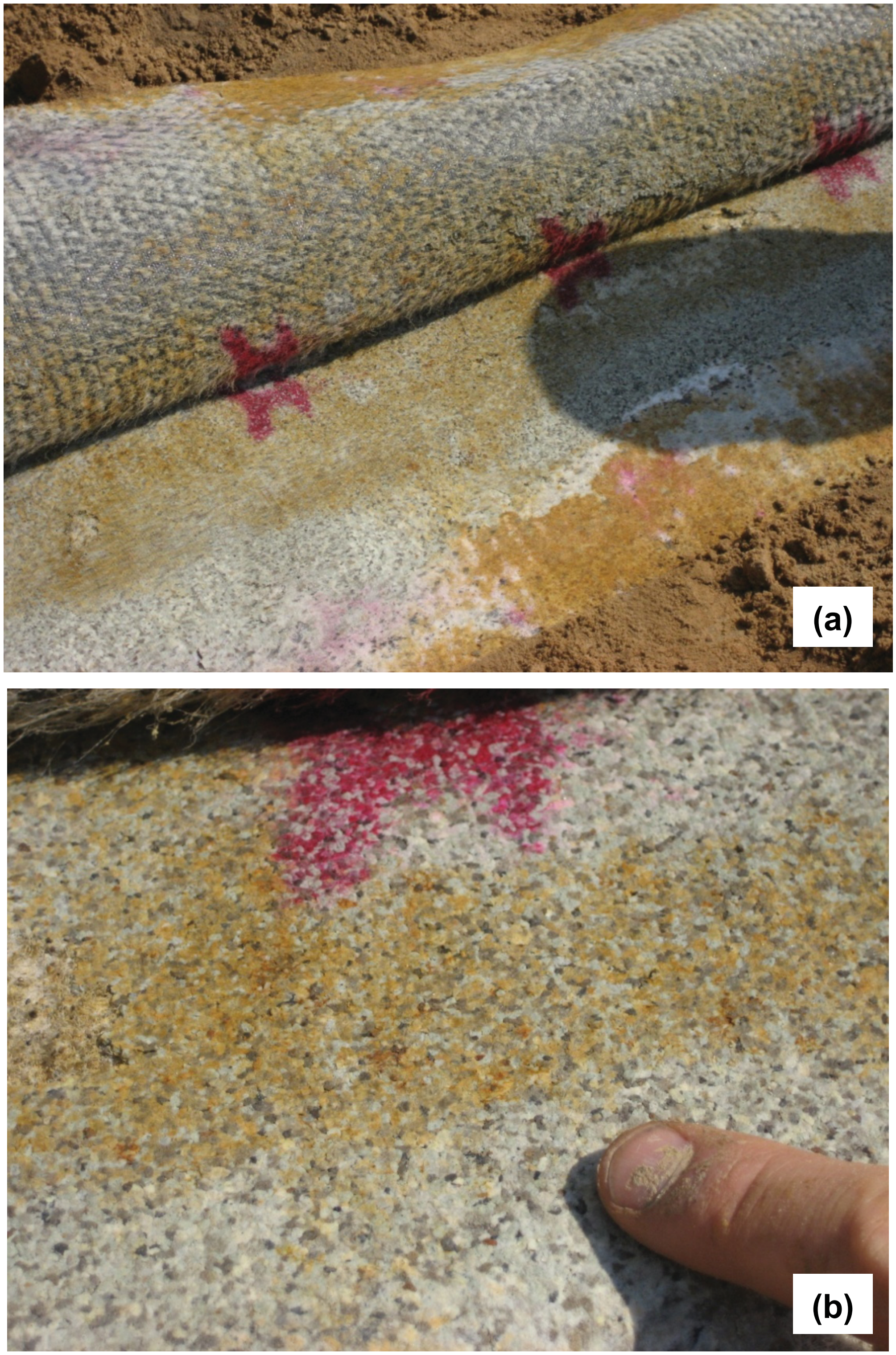


Fig. M. 15. GCL overlap: (a) match point along marks on original product and (b) close up showing hydrated bentonite granules in the overlap.

Fig. M. 16. Staining on GCL carrier nonwoven geotextiles.

Fig. M. 17. GCL sample with cut perimeter prior to sliding of sampling plate and removal.

Fig. M. 18. Black and rust colored staining underlying Site E GCL.

Fig. M. 19. Plastic bin used for GCL transport partially filled.

M-3 SITE F FIELD OBSERVATIONS

M-3.1 OBSERVATIONS DURING GCL EXHUMATION

Fig. M. 20. Test Pit 2 after removal of overlying soil layer.

Fig. M. 21. Cutting of GCL sample perimeters in Test Pit 2. Staining visible on GCL carrier geotextiles.

Fig. M. 22. Moisture seeping from GM while cutting through GM patch in Test Pit 1.

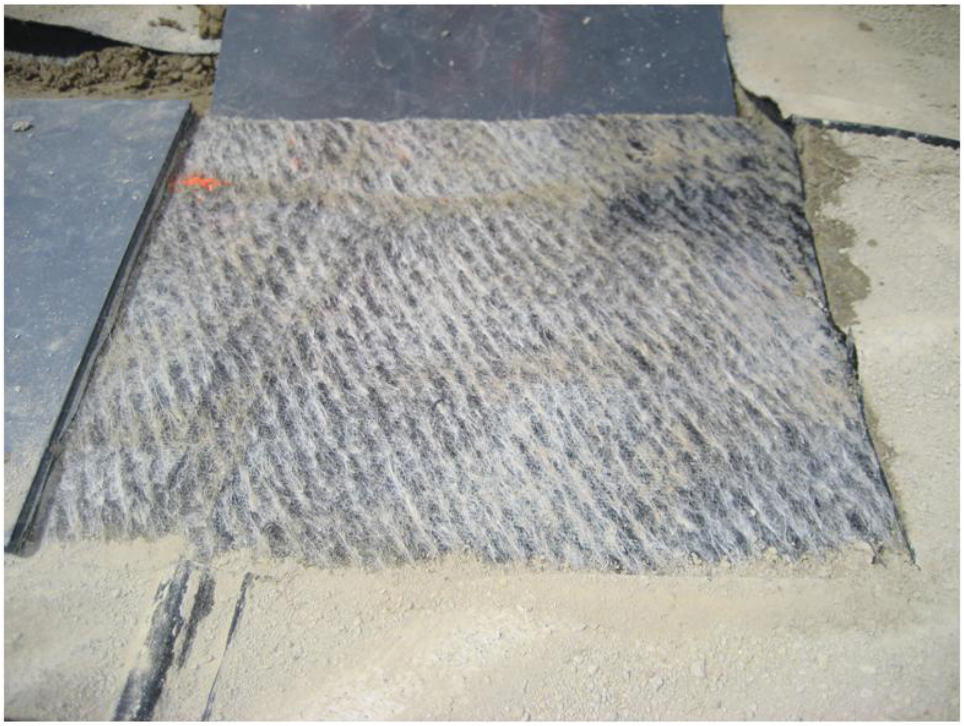


Fig. M. 23. Moisture visible on GCL after rupturing GM patch in Test Pit 1.

Fig. M. 24. Puncture visible in GCM patch weld in Test Pit 1.

Fig. M. 25. GM underlying GM patch. Hole in GM patch weld visible in upper right quadrant of the image.

M.3.2 GCL INSTALLATION OBSERVATIONS

Exhumation of GCL samples at Site F occurred coincident with installation of adjacent final cover at tie in points. The flowing photos represent observations made at Site F touring the instillation of the adjacent composite barrier layer.

Fig. M. 26. Condensation on GM overlying GCL underside from solar heating.

Fig. M. 27. GM overlying GCL before placement of overlying soil layer. Condensation for solar heating was observed underlying.

Fig. M. 28. GCL instillation team between rolls.

APPENDIX N - LABORATORY TESTING PHOTOGRAPY AND OBSERVATIONS

Fig. N. 1. Free swell testing of Site E bentonites.

Fig. N. 2. Indentations were observed in Site A GCL in plan (a) and profile (b) view.

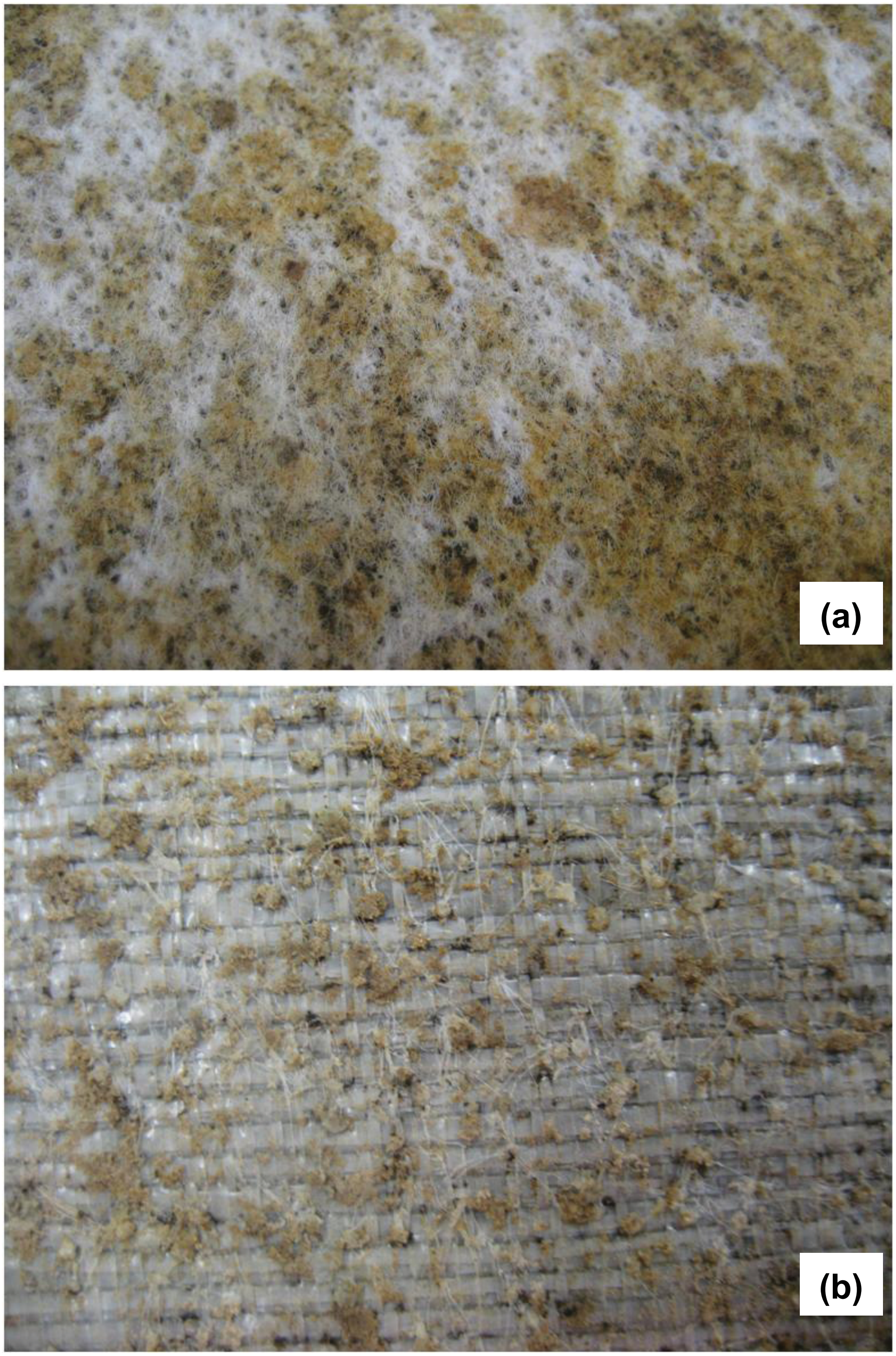


Fig. N. 3. Upper nonwoven geotextiles (a) and lower woven geotextile (b) of Site E higher hydraulic conductivity GCL prior to permeation. Dark staining visible at some needle punched fiber bundles.

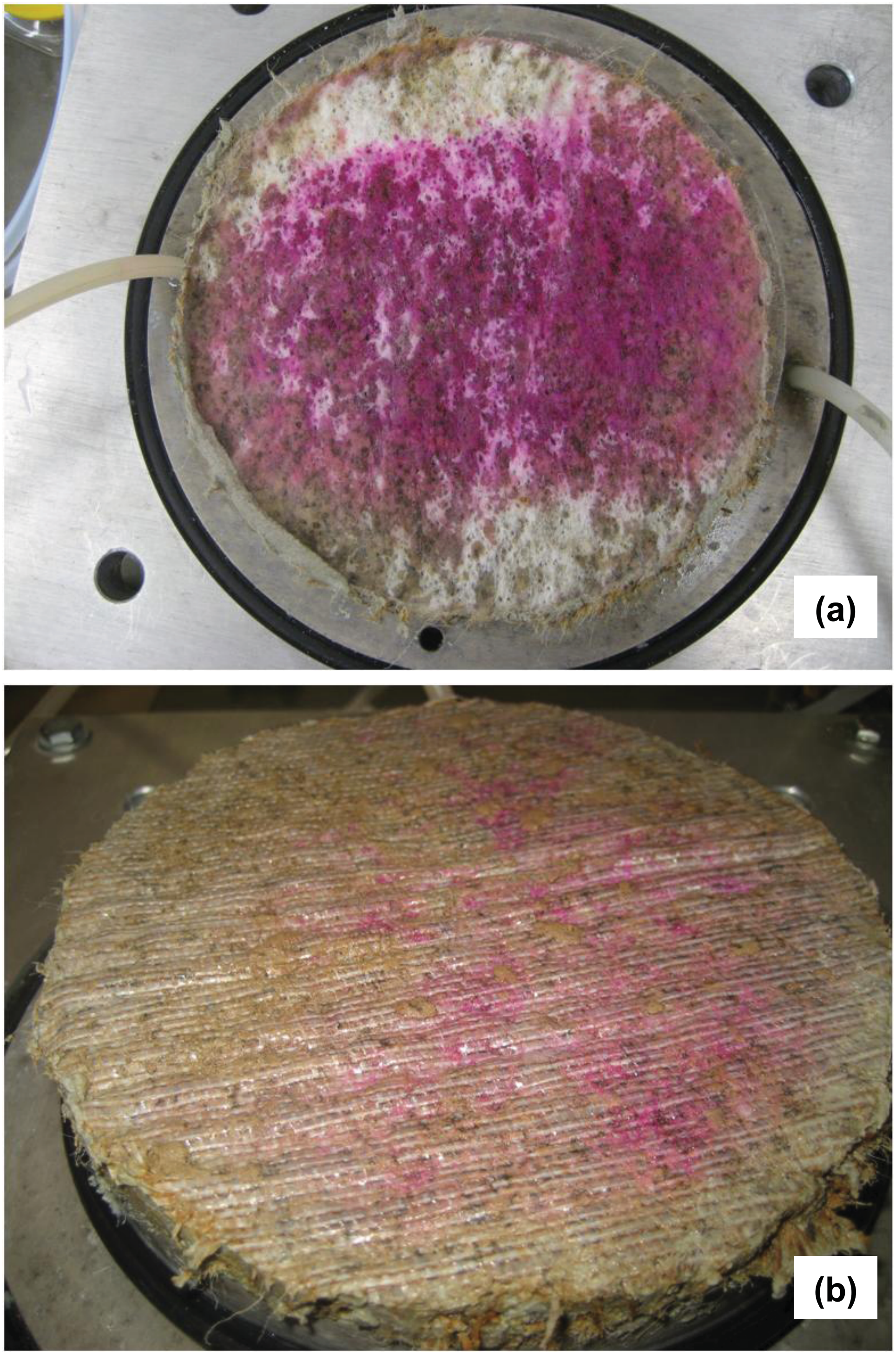


Fig. N. 4. Influent nonwoven geotextiles (a) and effluent woven geotextile (b) of Site E higher hydraulic conductivity GCL after permeation and dying.

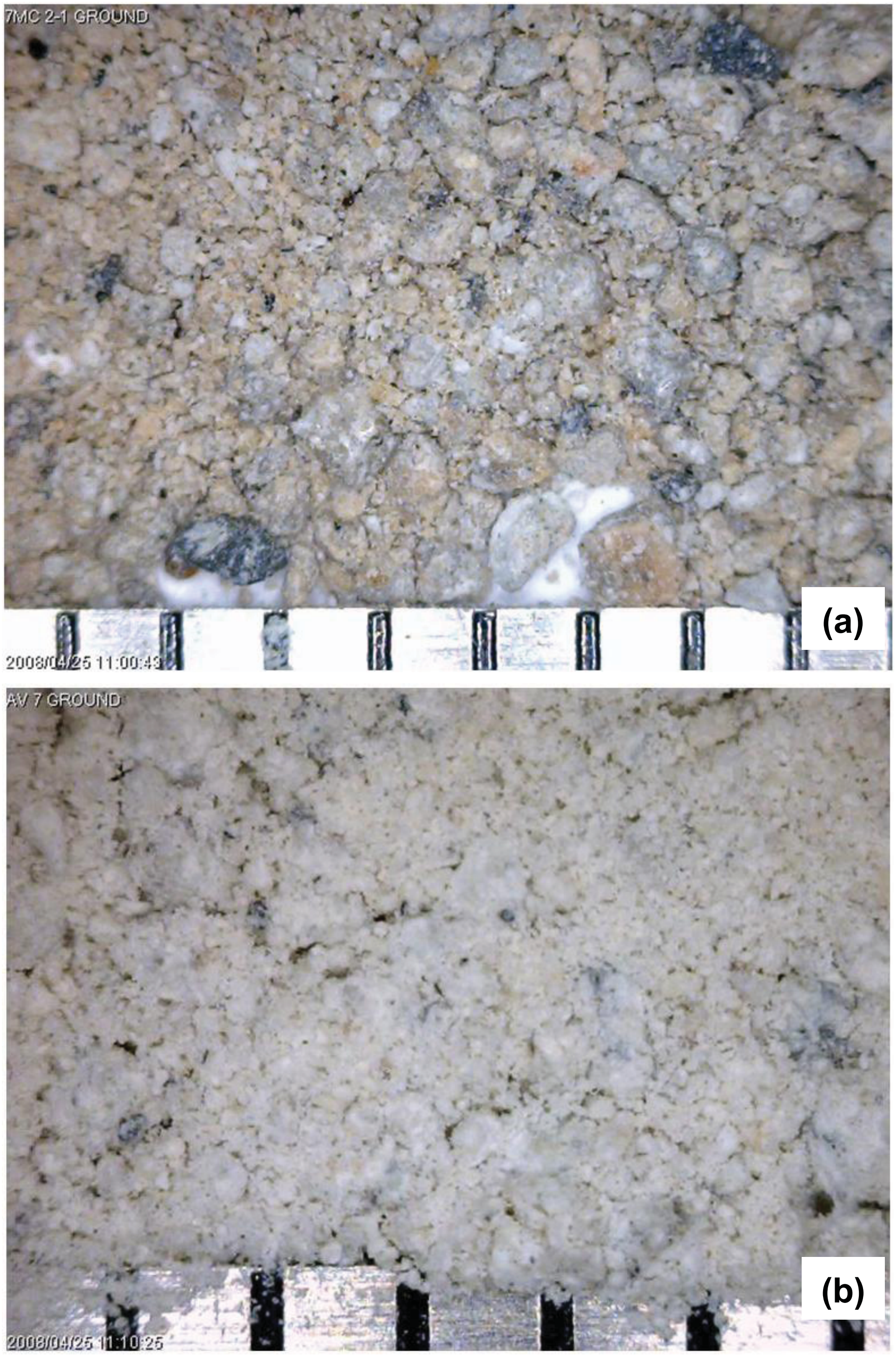


Fig. N. 5. Ground bentonite passing No. 20 sieve from Site E (a) and Site A (b).

Fig. N. 6. Bentonite from Site E TP1 during bound cation testing. Dark material is visible through the specimen.

Fig. N. 7. Additional moisture visible under folds in GM exhumed from Site F TP1.

APPENDIX O - EXPLORATION OF GCL LABORATORY TESTING METHODS

O-1 EFFECT OF INCREASED EFFECTIVE STRESS DURING PERMEABILITY TESTING

After completion of permeability testing at an effective stress representative of field conditions (18 kPa), cell pressures were increased to ascertain the possible effect of increased overlying cover material. The average hydraulic gradient was maintained at approximately 150 for the duration of testing. Hydraulic conductivity is plotted versus pore volumes of flow for duplicate Site E-6 GCL specimens in Fig. O.1. The average hydraulic conductivity is also presented in Table O.1 with corresponding hydraulic conductivity at effective stress of 18 kPa (k_{18}) over hydraulic conductivity at increased effective stress ($k_{\text{effective increased}}$).

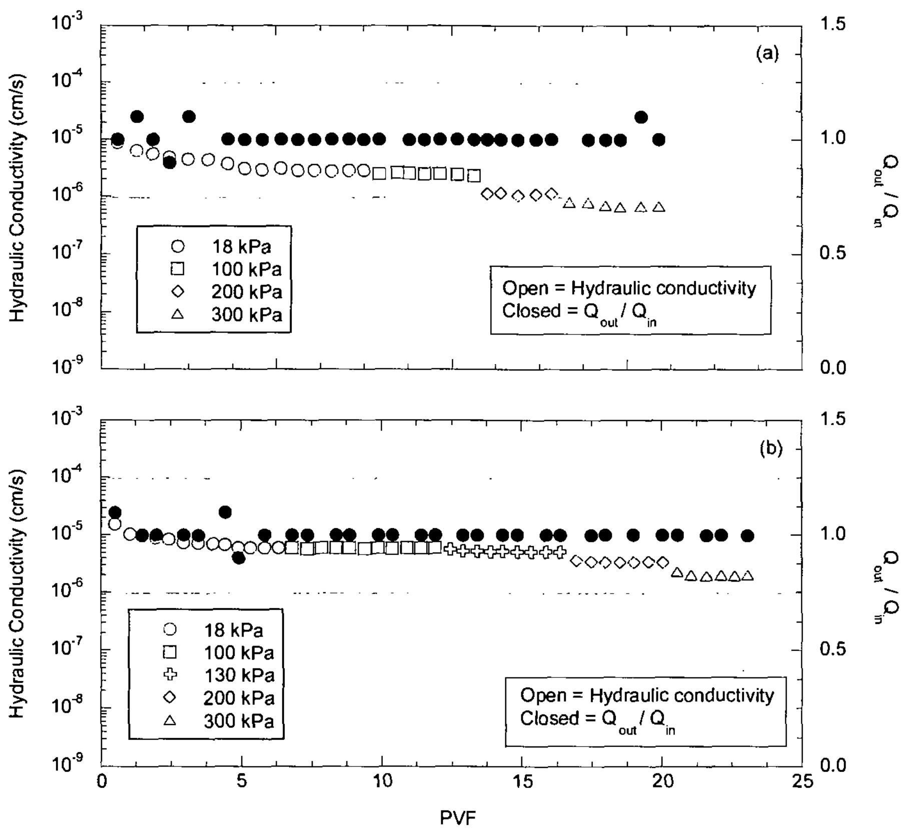


Fig. O. 1. Hydraulic conductivity and Q_{out} / Q_{in} as a function of pore volumes of flow for duplicate Site E-6 GCL permeated with standard water (Site E-6a (a), Site E-6b (b)).

Table O. 1. Final average hydraulic conductivity and $k_{18}/k_{ffective\ increased}$ at varying effective stresses for Site E-6 a & b GCLs.

	Site E-6a		Site E-6b	
Effective stress (kPa)	Final hydraulic conductivity (cm/s)	$k_{18}/k_{effective}$	Final hydraulic conductivity (cm/s)	$k_{18}/k_{effective}$
18	2.84E-06	1.0	5.99E-06	1.0
100	2.43E-06	1.2	5.88E-06	1.0
130	-	-	5.06E-06	1.2
200	1.11E-06	2.6	3.34E-06	1.8
300	6.81E-07	4.2	1.99E-06	3.0

O-2 EFFECT OF EDGE PASTE DEFECT IN PERMEABILITY TESTING

For all hydraulic conductivity tests, bentonite paste hydrated in the permeant liquid was frosted around the perimeter of the GCL specimen. The intention of this perimeter pasting is to eliminate possible flow paths the latex membrane. A hydraulic conductivity test was assembled with a generated gap in perimeter bentonite paste to asses the sensitivity of the perimeter bentonite paste assembly method. A 1 cm gap was place in the bentonite specimen pasting of Site E Test Pit 1 GCL specimen with a free swell index of 8 mL/2g (essentially calcium bentonite). A Site E GCL was chosen to provide a worst-case scenario where minimal self healing is possible. A profile of the assemble permeameter with bentonite paste gap is presented in Fig. O.2. Hydraulic conductivity profiles for a matching Site E Test Pit 1 specimen (same sample) and for the gap-pasted specimen are plotted versus PVF in Fig. O.3. The latex membrane closely formed over the bentonite paste gap after application of effective stress as shown in Fig. O.4. Both GCLs were permeated with standard water.

Fig. O. 2. GCL assembled with missing perimeter bentonite paste.

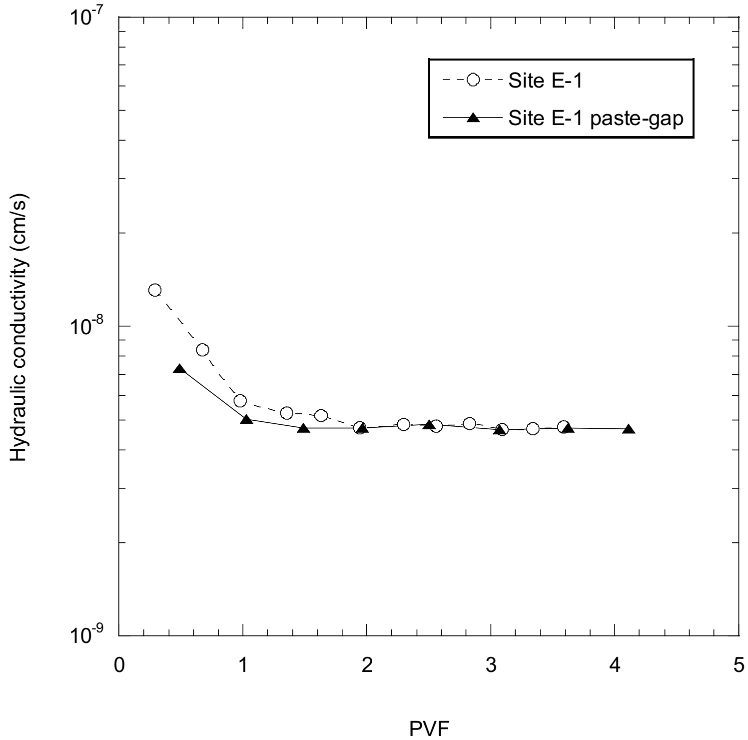


Fig. O. 3. Hydraulic conductivity versus pore volumes of flow for Site E-1 GCL and matching bentonite paste-gap specimen.

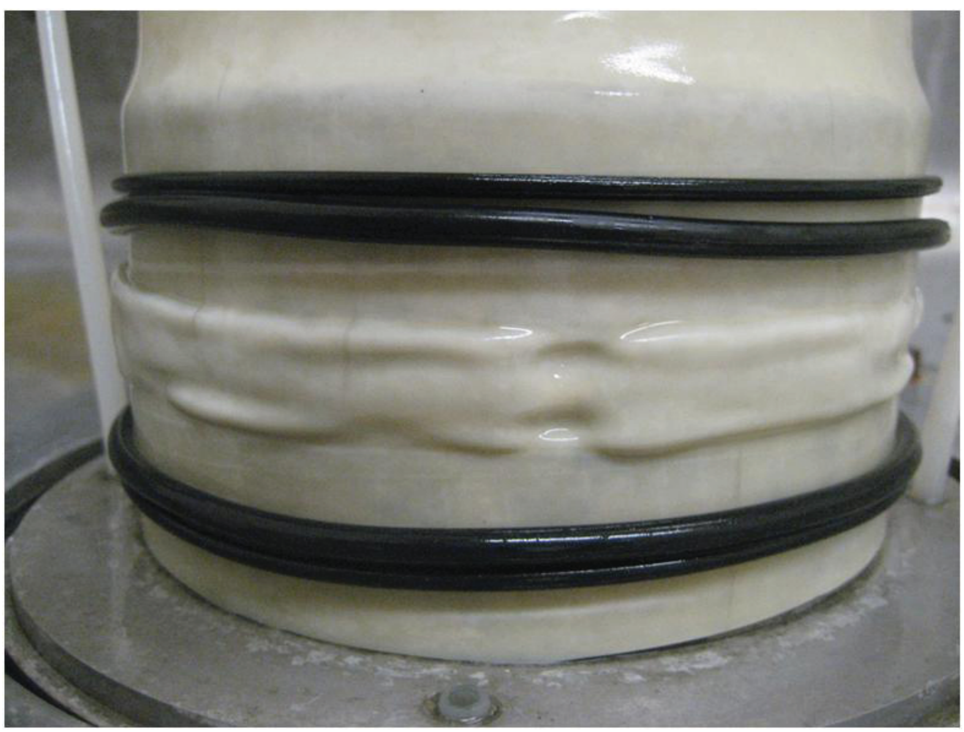


Fig. O. 4. Latex membrane over internal bentonite paste gap after application of effective stress, permeation, and disassembly.

O-3 MANUFACTURER VERSUS UNIVERSITY OF WISCONSIN EXHUMED COMPOSTIE COVER GCL HYDRAULIC CONDUCTIVITIES

Duplicate GCL specimens were exhumed from each sampling location at Site B (4 samples) and from Test Pit 1 at Site E by the University of Wisconsin and the Manufacturer. University of Wisconsin hydraulic conductivity testing was conducted as detailed in Chapters 2,3 and 4. Manufacturer hydraulic conductivity testing was performed on 10.2 cm diameter specimen with de-aired deionized water as the permeant. A maximum effective stress of 34.4 kPa was employed with an initial head of 140.6 kPa. All tests were run until the flux ratio ASTM termination criterion was met. Hydraulic conductivities from the University of Wisconsin permeating with AW or DW are plotted versus hydraulic conductivities from the manufacturer in Fig. O.5.

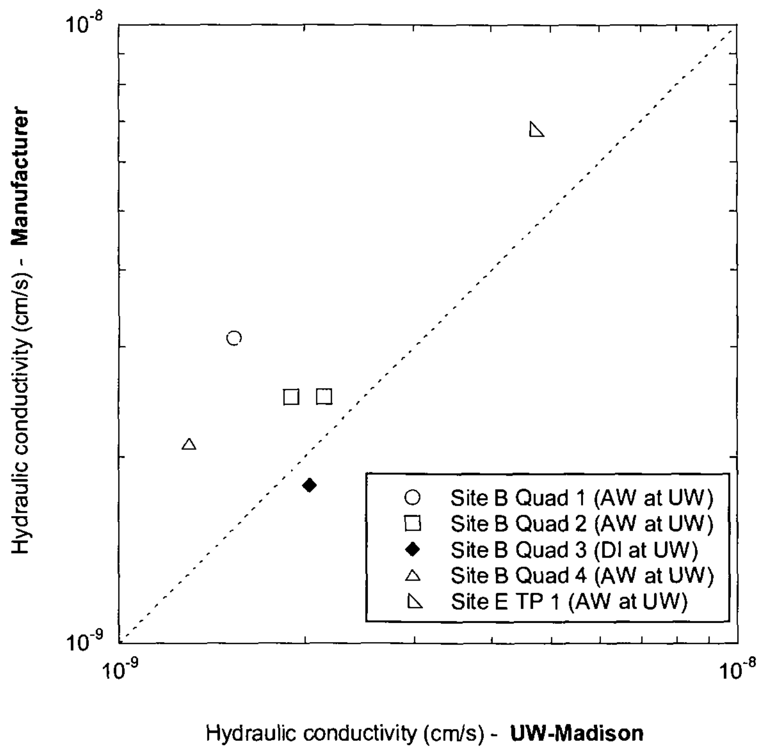


Fig. O. 5. Site B hydraulic conductivity versus testing facility for Site B GCL duplicate samples.

O-4. EFFECTS OF DESSICATION CYCLES ON EXHUMED COMPOSITE COVER GCLs.

Desiccation tests were conducted on Site A and Site E GCL specimens after permeation with SW. GCLs were removed from their permeameter, and the surrounding bentonite paste was manually removed with a small spatula. The GCL specimen was then placed between 2 geotextiles, 2 geocomposite drainage layers, and 2 rigid HDPE plates. The upper HDPE plate was then loaded vertically until a pressure (18-24 kPa) equal to the in-situ effective stress was achieved. GCLs were allowed to air dry for until their daily mass reached a steady state.

The saturated hydraulic conductivity before and after application of desiccation cycle(s) is plotted in Fig. O.6.

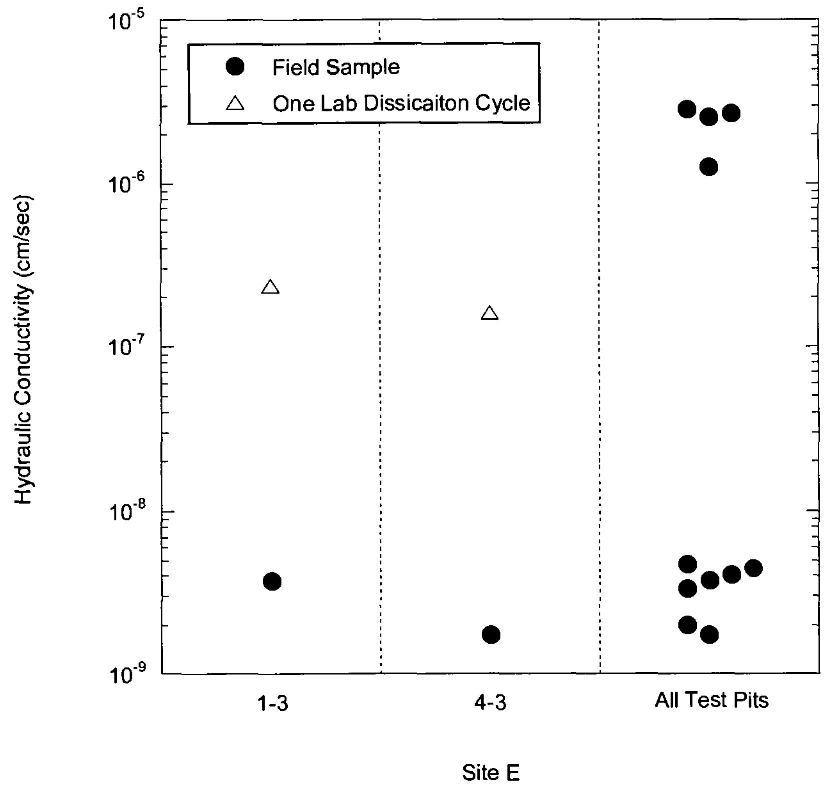


Fig. O. 6. Hydraulic conductivity after exhumation and application of desiccation cycle(s).

APPENDIX P – SUPPLEMENTAL GRAPHS AND TABLES FROM GEOSYNTHETIC MEMBRANE (GM) AND GEOSYNTHETIC DRAINAGE LAYER (GDL) TESTS

Table P1. Coefficient of variation (CoV) for each engineering property of exhumed geosynthetics.

	Altamont, CA	Apple Valley, CA	Boardman, OR	Cedar Rapids, IA	Eau Claire, WI	Helena, MT	Omaha, NE	Polson, MT	Underwood, ND
Wide Strip Yield Strength	2.3	3.8	4.1	1.8	5.1	3.0	8.7	10.2	2.6
Narrow Strip Yield Strength	7.3	10.7	9.5	12.9	15.7	2.4	17.0	6.2	9.4
Narrow Strip Break Strength	9.7	25.4	15.4	8.6	22.8	14.9	32.7	37.0	8.0
Wide Strip Yield Strain	3.0	2.6	4.0	12.6	23.2	4.4	28.8	8.3	26.1
Narrow Strip Yield Strain	10.8	8.8	16.0	9.6	34.7	9.4	22.8	16.9	7.8
Narrow Strip Break Strain	8.5	31.2	9.8	6.1	36.7	11.3	32.1	66.1	5.1
Ply Adhesion	27.3	19.8	30.2	47.0	43.0	66.4	34.9	-	58.9
Permittivity at 10 mm	15.4	10.1	30.4	35.3	43.3	57.1	47.7	-	23.3
Permittivity at 50 mm	22.1	5.8	25.7	20.7	41.2	46.1	42.4	-	35.9
Transmissivity (24 kPa)	80.0	-	55.8	23.7	64.5	4.2	23.1	-	41.9
Transmissivity (48 kPa)	66.8	-	48.5	23.9	-	3.4	27.3	-	38.8
Transmissivity (480 kPa)	82.4	-	46.8	29.2	38.6	5.3	34.3	-	41.9

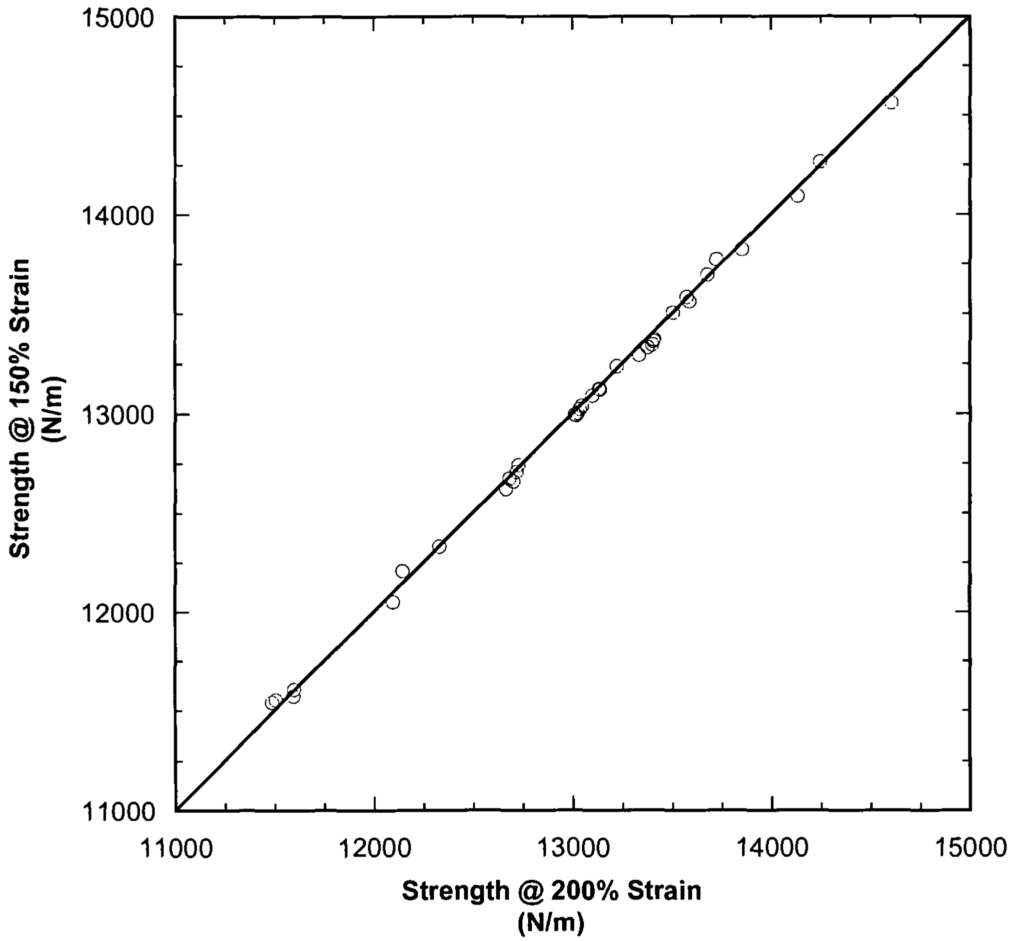


Fig. P1. Comparison of wide-width tensile strengths corresponding to 150 and 200% strain for Eau Claire samples.

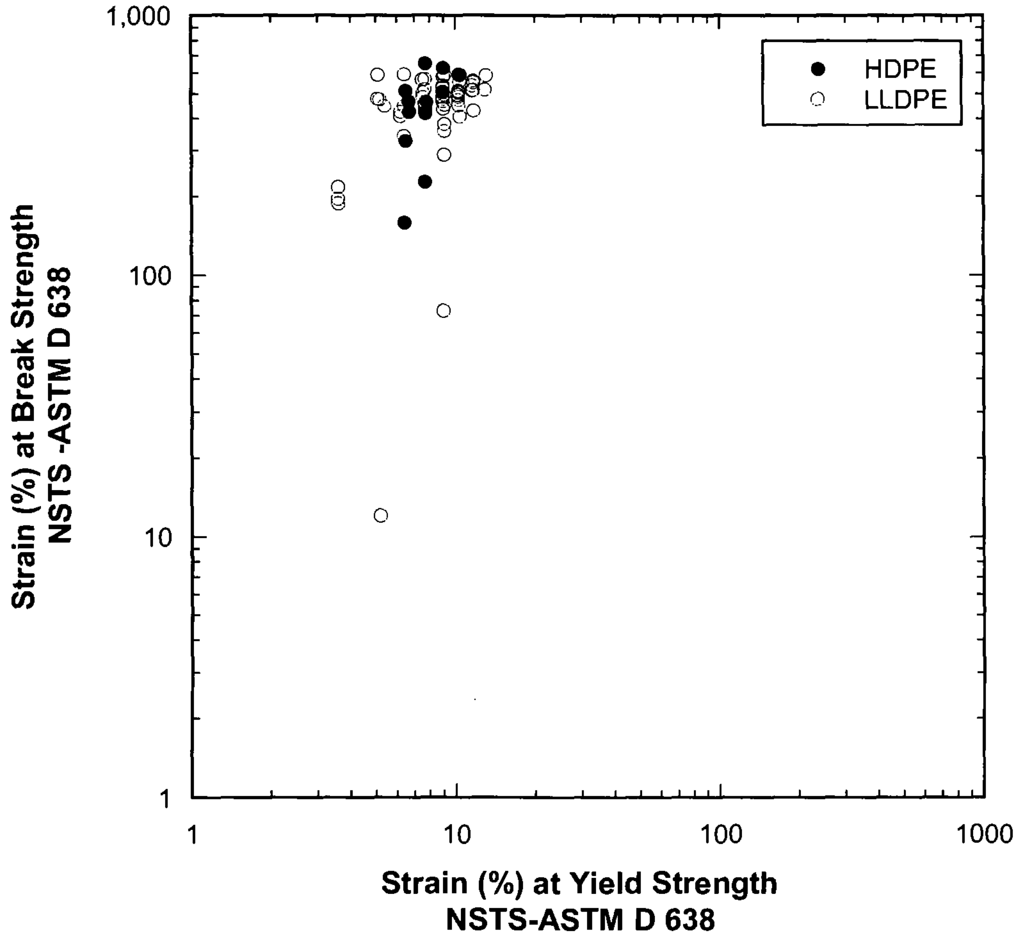


Fig. P2. Comparison between strains at narrow strip break strength and yield strength.

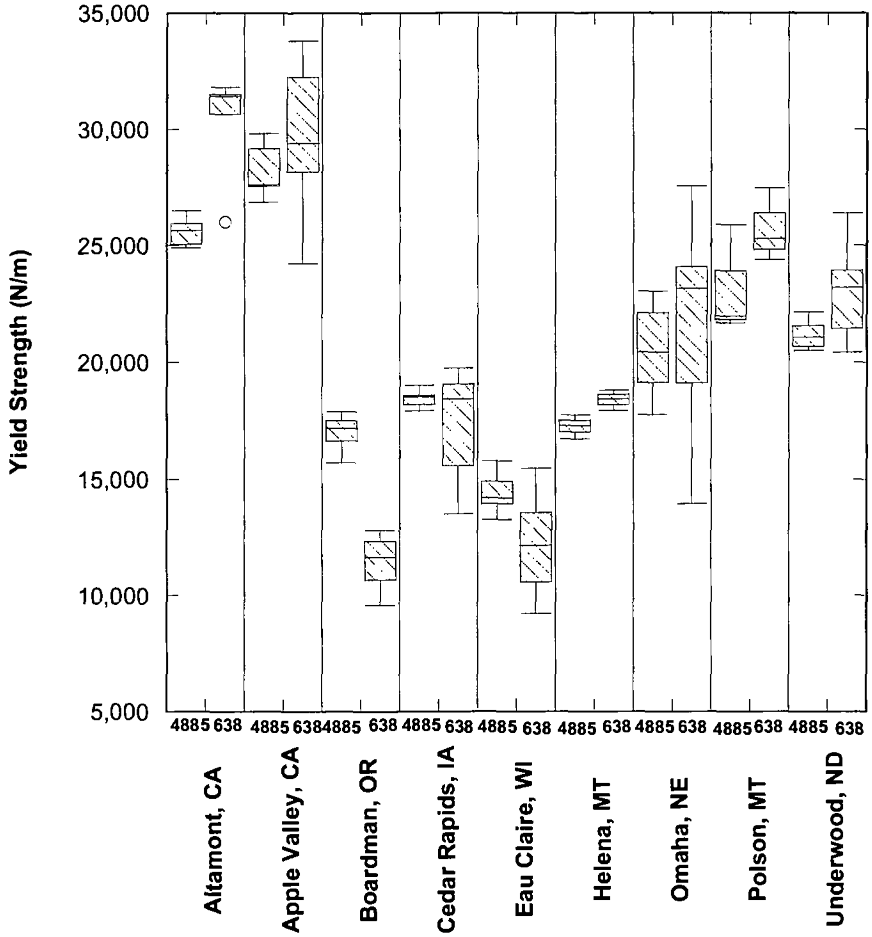


Fig. P3. Box plots comparing wide-strip and narrow-strip dumbbell tensile strengths.

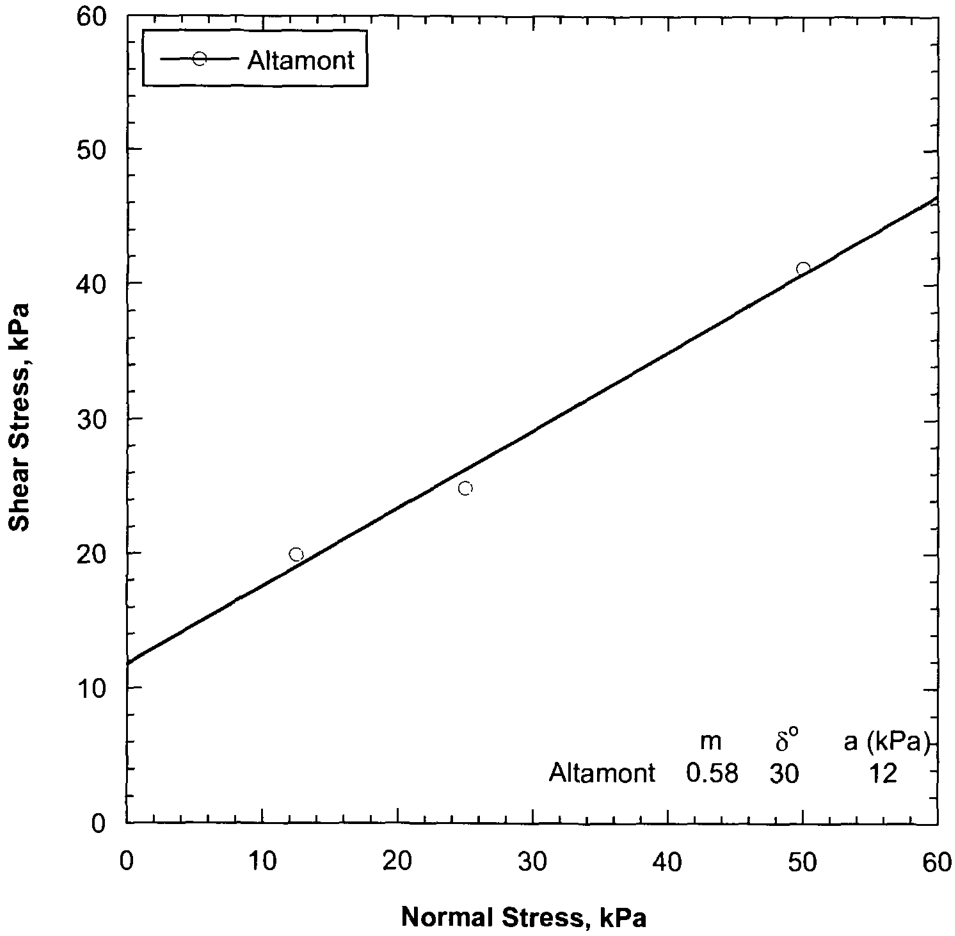


Fig. P4. Peak interface shear strength envelope for GM-GDL interface at Altamont.

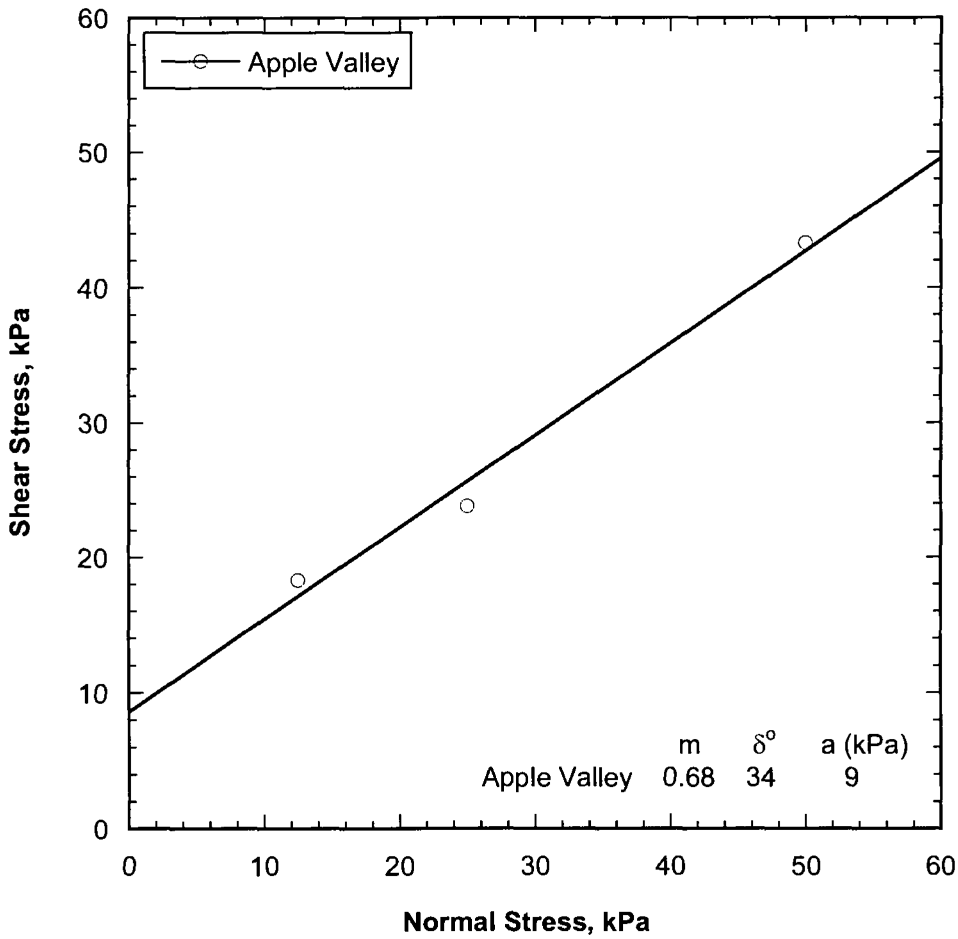


Fig. P5. Peak interface shear strength envelope for GM-GDL interface at Apple Valley.

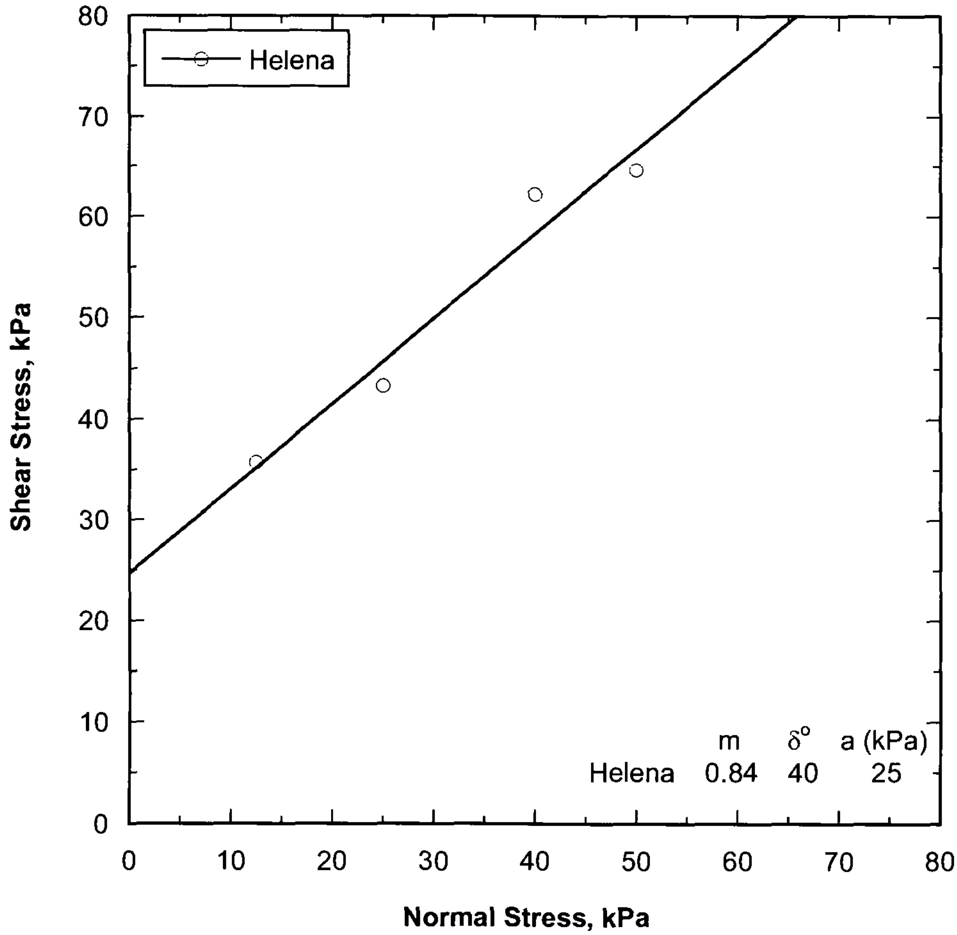


Fig. P6. Peak interface shear strength envelope for GM-GDL interface at Helena.

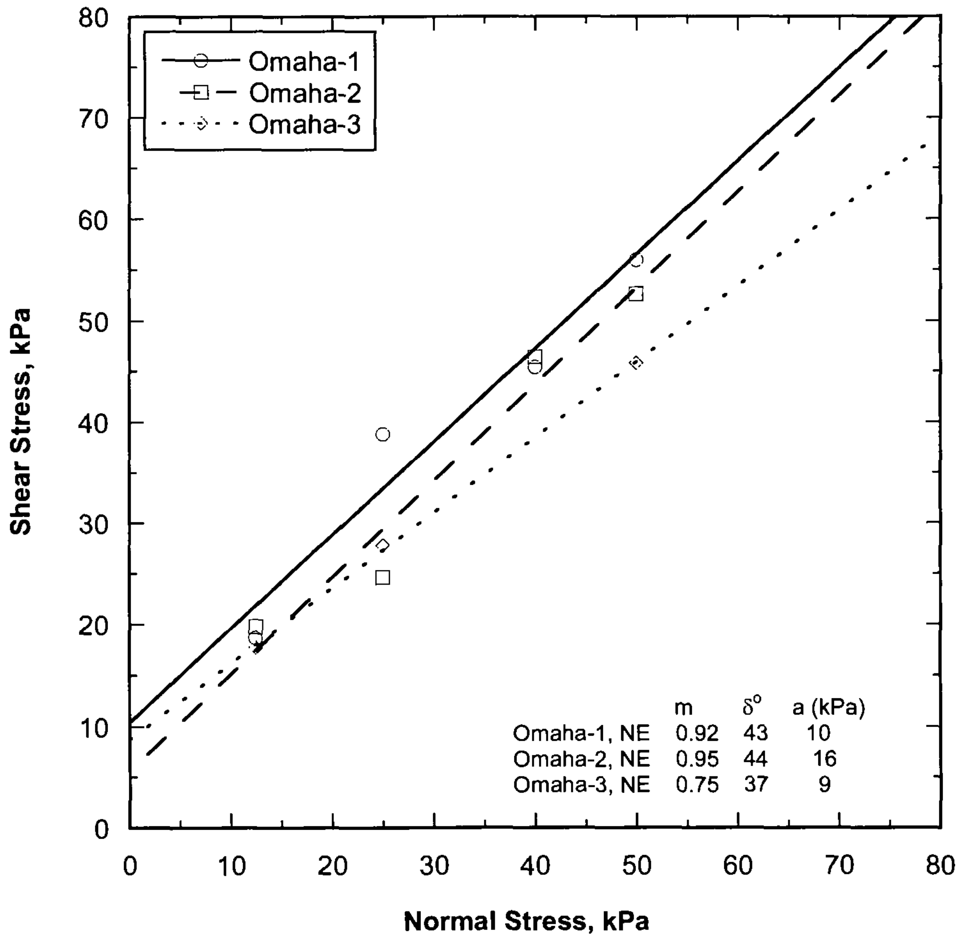


Fig. P7. Peak interface shear strength envelopes for GM-GDL interface at Omaha.

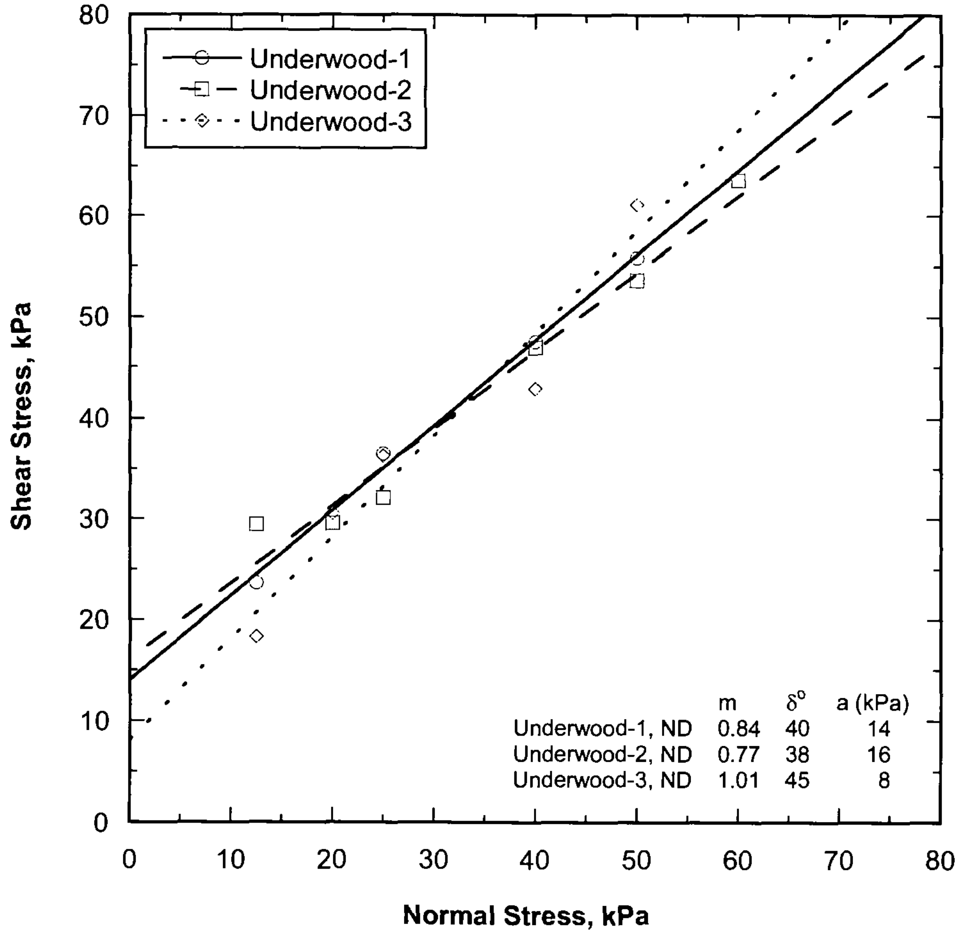


Fig. P8. Peak interface shear strength envelopes for GM-GDL interface at Underwood.

APPENDIX Q – PHOTOGRAPHS OF GM AND GDL TESTING

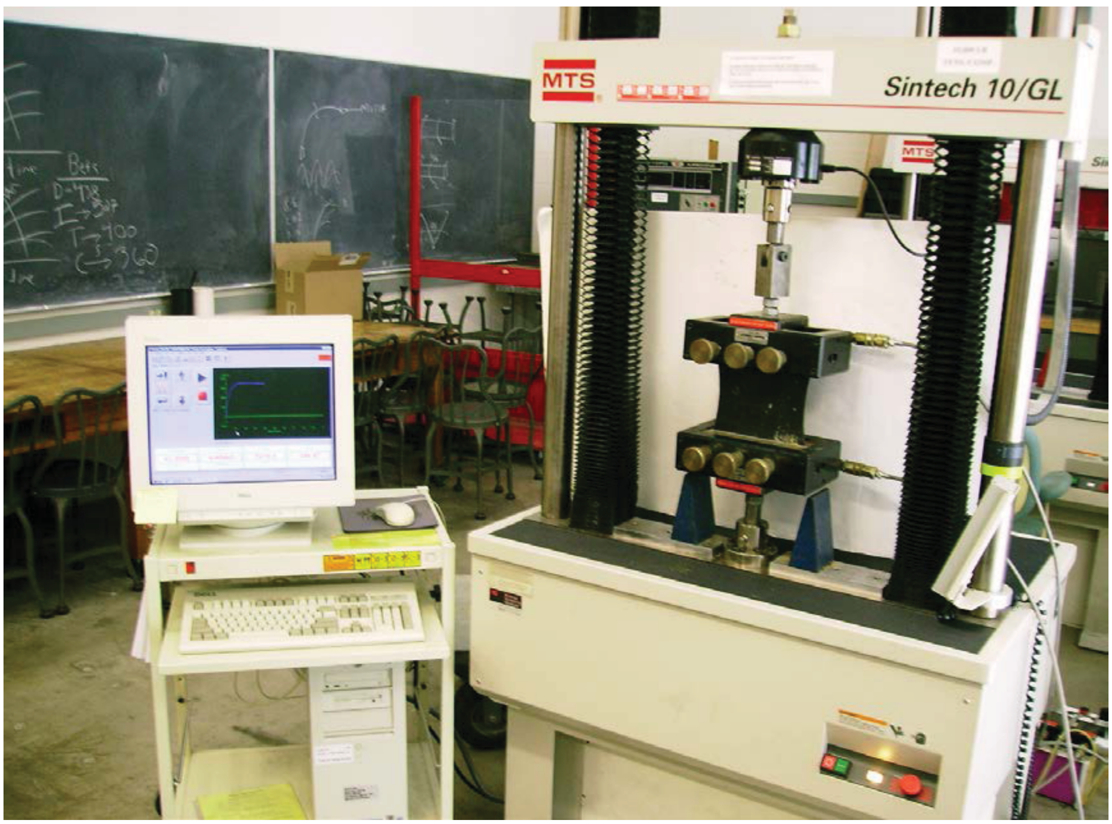


Fig. Q1. MTS Sintech 10/GL load frame equipped with Curtis Geo-Grips used for tensile testing.

Fig. Q2. Close up of a wide-strip tensile testing of GM.

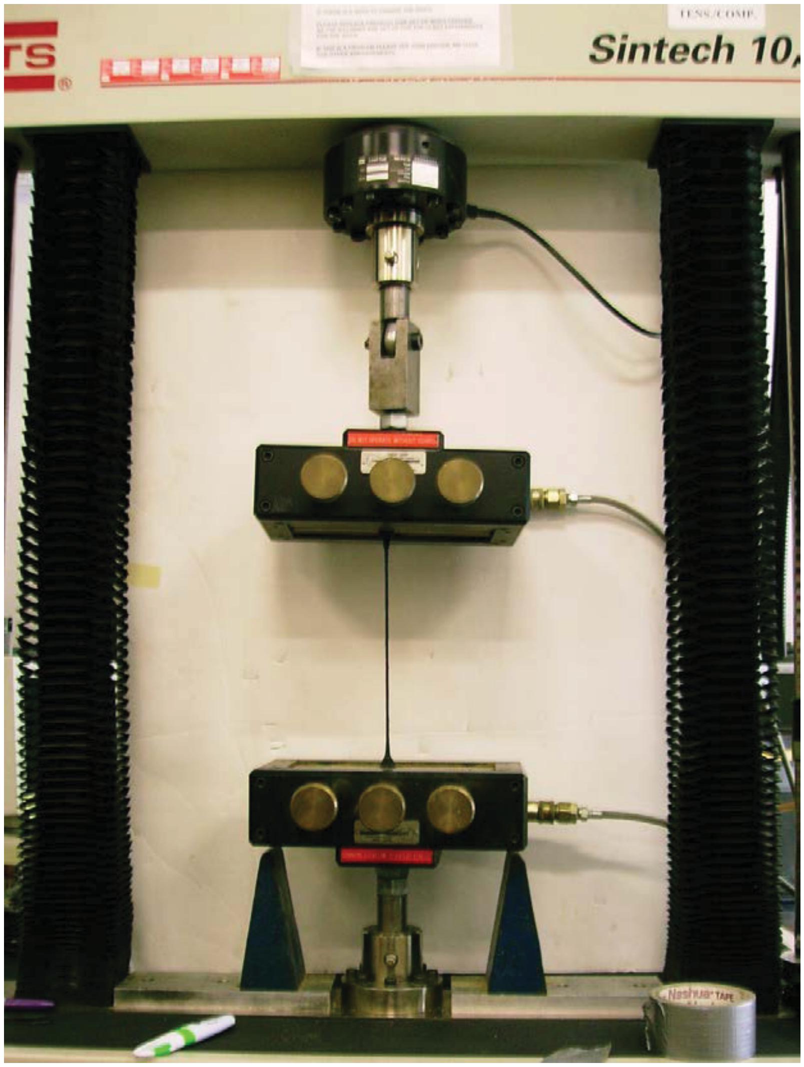


Fig. Q3. Photograph showing narrow strip specimen under tension.

Fig. Q4. Photograph of large-scale direct shear box used for interface shear tests.

Fig. Q5. Photograph of permittivity device.

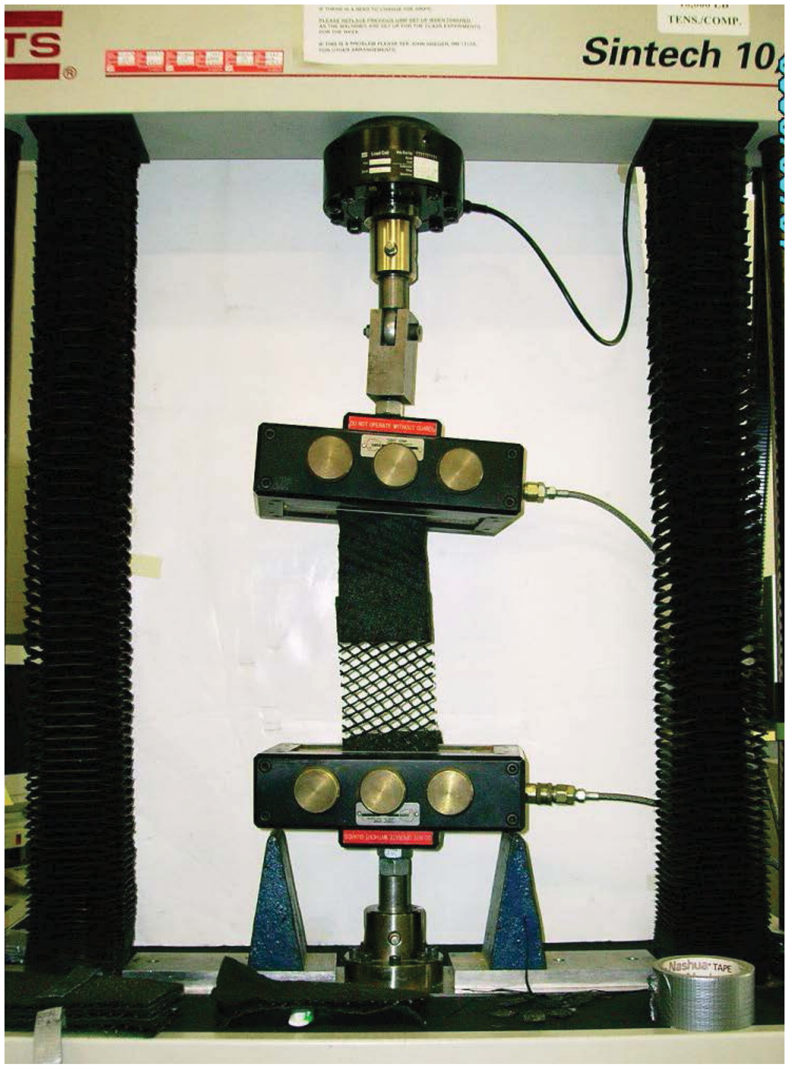


Fig. Q6. Photograph of ply adhesion test.

APPENDIX R – GM TEST DATA

Table R1. Wide-strip yield strengths (ASTM D 4885).

Identification		Wide Strip Yield Strength (N/m)					
		Specimen #					
		1	2	3	Mean	Max.	Min.
Altamont, CA	**CMP - GM2**	26491	25946	25718	**26052**	26491	25718
	CMP - GM3	25049	25577	24898	**25175**	25577	24898
Apple Valley, CA	**GM1**	29407	29833	29179	**29473**	29833	29179
	GM6	26864	27241	27618	**27241**	27618	26864
	GM8	27654	27546	28303	**27834**	28303	27546
Boardman, OR	**GM1**	17895	17872	17423	**17730**	17895	17423
	GM4	17815	17062	17512	**17463**	17815	17062
	Thin Cover	16480	15728	16625	**16278**	16625	15728
Cedar Rapids, IA	**Bottom Comp.1**	18764	18599	18424	**18596**	18764	18424
	Bottom Comp.3	19037	18583	18532	**18717**	19037	18532
	Clay Bottom 2	18203	18204	17927	**18111**	18204	17927
Eau Claire, WI	**TP1**	13046	12868	13169	**13028**	13169	12868
	TP2	14407	14600	14120	**14376**	14600	14120
	TP3	14910	14861	14471	**14747**	14910	14471
	TP4	13720	13132	12994	**13282**	13720	12994
Helena, MT	**GM-AB**	17281	16723	17747	**17250**	17747	16723
Omaha, NE	**GM-A1B**	22454	23009	22169	**22544**	23009	22169
	GM-A2B	20620	19960	20220	**20267**	20620	19960
	GM-CB	19976	22026	21728	**21243**	22026	19976
	GM-CM	18252	17758	18311	**18107**	18311	17758
Polson, MT	**GM-CM**	21647	25878	21949	**23158**	25878	21647
Underwood, ND	**GM-CC3**	21076	21112	20945	**21044**	21112	20945
	GM-CC5	20515	20675	20582	**20591**	20675	20515
	GM-ET	21758	22133	21548	**21813**	22133	21548

Table R2. Narrow-strip yield and break strengths (ASTM D 638).

Identification		Strenght (N/m)	Narrow Strip Test: Specimen # 1	2	3	Mean	Max.	Min.
Altamont, CA	CMP - GM2	@ Yield	26000	31833	31500	**29778**	31833	26000
		@ Break	44383	38133	47800	**43439**	47800	38133
	CMP - GM3	@ Yield	30650	31517	31367	**31178**	31517	30650
		@ Break	50900	46700	48750	**48783**	50900	46700
Apple Valley, CA	GM1	@ Yield	26667	30133	32250	**29683**	32250	26667
		@ Break	32266	39416	35466	**35716**	39416	32266
	GM6	@ Yield	33550	33817	28833	**32067**	33817	28833
		@ Break	39550	36900	21266	**32572**	39550	21266
	GM8	@ Yield	29400	28167	24217	**27261**	29400	24217
		@ Break	22033	30433	20316	**24261**	30433	20316
Boardman, OR	GM1	@ Yield	11183	9600	10683	**10489**	11183	9600
		@ Break	29633	24683	20700	**25005**	29633	20700
	GM4	@ Yield	10323	11783	11633	**11246**	11783	10323
		@ Break	27150	27533	25983	**26889**	27533	25983
	Thin Cover	@ Yield	12650	12333	12800	**12594**	12800	12333
		@ Break	24800	29133	35850	**29928**	35850	24800
Cedar Rapids, IA	Bottom Comp.1	@ Yield	19083	18683	19083	**18950**	19083	18683
		@ Break	40233	38216	36166	**38205**	40233	36166
	Bottom Comp.3	@ Yield	19767	18417	15567	**17917**	19767	15567
		@ Break	32250	40200	33750	**35400**	40200	32250
	Clay Bottom 2	@ Yield	15967	15050	13500	**14839**	15967	13500
		@ Break	32600	33933	34850	**33794**	34850	32600

Table R2. Narrow-strip yield and break strengths (ASTM D 638) (Continued).

Identification		Strenght (N/m)	Narrow Strip Test					
			Specimen #					
			1	2	3	Mean	Max.	Min.
Eau Claire, WI	TP1	@ Yield	12433	10550	9216	**10733**	12433	9216
		@ Break	21850	20283	20916	**21016**	21850	20283
	TP2	@ Yield	15466	13600	14750	**14605**	15466	13600
		@ Break	30366	33733	29166	**31088**	33733	29166
	TP3	@ Yield	11516	13500	13266	**12761**	13500	11516
		@ Break	30100	29450	16200	**25250**	30100	16200
	TP4	@ Yield	10283	11850	10583	**10905**	11850	10283
		@ Break	33266	34033	34866	**34055**	34866	33266
Helena, MT	GM-AB	@ Yield	17933	18417	18800	**18383**	18800	17933
		@ Break	22866	20766	27666	**23766**	27666	20766
Omaha, NE	GM-A1B	@ Yield	24433	23717	21450	**23200**	24433	21450
		@ Break	42633	43033	36250	**40639**	43033	36250
	GM-A2B	@ Yield	18650	19000	19271	**18974**	19271	18650
		@ Break	41416	46383	42683	**43494**	46383	41416
	GM-CB	@ Yield	22683	23583	23683	**23316**	23683	22683
		@ Break	44366	44133	53383	**47294**	53383	44133
	GM-CM	@ Yield	13950	16250	17300	**15833**	17300	13950
		@ Break	6983	25950	27550	**20161**	27550	6983
Polson, MT	GM-CM	@ Yield	27467	24383	25283	**25711**	27467	24383
		@ Break	14483	30133	31100	**25239**	31100	14483
Underwood, ND	GM-CC3	@ Yield	23917	21183	21417	**22172**	23917	21183
		@ Break	55033	54133	46166	**51777**	55033	46166
	GM-CC5	@ Yield	20417	21533	20833	**20928**	21533	20417
		@ Break	48050	56166	47566	**50594**	56166	47566
	GM-ET	@ Yield	26000	26383	23767	**25383**	26383	23767
		@ Break	53700	58183	53466	**55116**	58183	53466

Table R3. Wide-strip yield strains (ASTM D 638).

Identification		Wide Strip Yield Strain (%) Specimen # 1	2	3	Mean	Max.	Min.
Altamont, CA	CMP - GM2	16.7	17.3	17.4	**17.1**	17.4	16.7
	CMP - GM3	17.0	18.0	18.0	**17.7**	18.0	17.0
Apple Valley, CA	GM1	14.7	15.1	15.7	**15.2**	15.7	14.7
	GM6	15.6	15.2	15.6	**15.5**	15.6	15.2
	GM8	14.9	15.8	15.7	**15.5**	15.8	14.9
Boardman, OR	GM1	17.1	18.6	19.0	**18.2**	19.0	17.1
	GM4	19.8	18.9	18.5	**19.1**	19.8	18.5
	Thin Cover	18.3	18.7	17.9	**18.3**	18.7	17.9
Cedar Rapids, IA	Bottom Comp.1	23.1	26.3	33.5	**27.6**	33.5	23.1
	Bottom Comp.3	24.4	23.2	26.9	**24.8**	26.9	23.2
	Clay Bottom 2	26.5	27.3	30.6	**28.1**	30.6	26.5
Eau Claire, WI	TP1	23.5	30.4	34.9	**29.6**	34.9	23.5
	TP2	19.7	19.2	17.9	**18.9**	19.7	17.9
	TP3	21.0	19.8	18.5	**19.8**	21.0	18.5
	TP4	19.8	21.2	21.2	**20.7**	21.2	19.8
Helena, MT	GM-AB	18.3	16.9	18.2	**17.8**	18.3	16.9
Omaha, NE	GM-A1B	23.6	20.7	19.8	**21.4**	23.6	19.8
	GM-A2B	22.7	22.4	30.0	**25.0**	30.0	22.4
	GM-CB	20.2	21.6	20.5	**20.8**	21.6	20.2
	GM-CM	11.3	11.2	11.6	**11.4**	11.6	11.2
Polson, MT	GM-CM	18.0	16.0	15.4	**16.5**	18.0	15.4
Underwood, ND	GM-CC3	24.7	32.0	36.9	**31.2**	36.9	24.7
	GM-CC5	40.5	46.8	49.5	**45.6**	49.5	40.5
	GM-ET	23.6	28.5	41.8	**31.3**	41.8	23.6

Table R4. Narrow-strip yield and break strains (ASTM D 638).

Identification		Strain (%)	Narrow Strip Test					
			Specimen #					
			1	2	3	Mean	Max.	Min.
Altamont, CA	CMP - GM2	@ Yield	7.7	9.0	9.0	**8.6**	9.0	7.7
		@ Break	651.3	507.4	627.8	**595.5**	651.3	507.4
	CMP - GM3	@ Yield	9.0	10.4	10.3	**9.9**	10.4	9.0
		@ Break	627.7	589.8	591.1	**602.9**	627.7	589.8
Apple Valley, CA	GM1	@ Yield	6.7	6.5	6.7	**6.6**	6.7	6.5
		@ Break	468.4	511.4	424.0	**467.9**	511.4	424.0
	GM6	@ Yield	7.8	7.7	7.7	**7.7**	7.8	7.7
		@ Break	464.3	423.7	227.5	**371.8**	464.3	227.5
	GM8	@ Yield	6.4	7.7	6.5	**6.9**	7.7	6.4
		@ Break	158.2	418.5	327.0	**301.2**	418.5	158.2
Boardman, OR	GM1	@ Yield	7.6	5.4	6.2	**6.4**	7.6	5.4
		@ Break	502.1	446.2	407.8	**452.0**	502.1	407.8
	GM4	@ Yield	5.2	7.6	6.4	**6.4**	7.6	5.2
		@ Break	473.5	483.8	445.9	**467.7**	483.8	445.9
	Thin Cover	@ Yield	6.2	5.1	7.5	**6.3**	7.5	5.1
		@ Break	423.5	476.0	562.1	**487.2**	562.1	423.5
Cedar Rapids, IA	Bottom Comp.1	@ Yield	10.3	9.0	10.3	**9.9**	10.3	9.0
		@ Break	491.7	477.3	449.9	**473.0**	491.7	449.9
	Bottom Comp.3	@ Yield	10.4	10.3	7.7	**9.5**	10.4	7.7
		@ Break	406.7	493.0	455.1	**451.6**	493.0	406.7
	Clay Bottom 2	@ Yield	9.1	10.3	10.2	**9.9**	10.3	9.1
		@ Break	452.5	472.0	495.5	**473.3**	495.5	452.5

Table R4. Narrow-strip yield and break strains (ASTM D 638) (Continued).

Identification		Strain (%)	Narrow Strip Test: Specimen # 1	2	3	Mean	Max.	Min.
Eau Claire, WI	TP1	@ Yield	11.7	9.0	9.0	**9.9**	11.7	9.0
		@ Break	428.9	436.8	466.8	**444.2**	466.8	428.9
	TP2	@ Yield	3.6	3.6	3.6	**3.6**	3.6	3.6
		@ Break	194.6	216.8	187.9	**199.8**	216.8	187.9
	TP3	@ Yield	9.0	9.0	9.1	**9.0**	9.1	9.0
		@ Break	524.4	485.2	289.0	**432.9**	524.4	289.0
	TP4	@ Yield	9.0	10.4	9.1	**9.5**	10.4	9.0
		@ Break	582.0	554.5	587.2	**574.6**	587.2	554.5
Helena, MT	GM-AB	@ Yield	9.1	9.1	7.7	**8.6**	9.1	7.7
		@ Break	380.6	357.0	443.3	**393.6**	443.3	357.0
Omaha, NE	GM-A1B	@ Yield	10.3	10.3	7.7	**9.4**	10.3	7.7
		@ Break	485.2	508.7	449.8	**481.2**	508.7	449.8
	GM-A2B	@ Yield	7.7	7.7	9.0	**8.1**	9.0	7.7
		@ Break	516.6	566.3	534.8	**539.2**	566.3	516.6
	GM-CB	@ Yield	10.3	9.1	9.1	**9.5**	10.3	9.1
		@ Break	511.3	494.3	593.8	**533.1**	593.8	494.3
	GM-CM	@ Yield	5.2	5.1	6.4	**5.6**	6.4	5.1
		@ Break	12.0	588.5	591.1	**397.2**	591.1	12.0
Polson, MT	GM-CM	@ Yield	9.0	6.4	7.7	**7.7**	9.0	6.4
		@ Break	73.1	341.1	431.5	**281.9**	431.5	73.1
Underwood, ND	GM-CC3	@ Yield	10.7	11.7	10.3	**10.9**	11.7	10.3
		@ Break	550.9	550.6	500.9	**534.1**	550.9	500.9
	GM-CC5	@ Yield	13.0	13.1	11.6	**12.6**	13.1	11.6
		@ Break	517.9	584.8	512.6	**538.4**	584.8	512.6
	GM-ET	@ Yield	11.7	11.7	11.6	**11.7**	11.7	11.6
		@ Break	515.3	559.8	533.6	**536.2**	559.8	515.3

APPENDIX S – GDL TEST DATA

Table S1. Transmissivity of GDLs (ASTM D 4716).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
ALTAMONT, CA	**Alt. Bottom of Lysimeter**	1	2.1E-04	2.1E-04	7.9E-05	8.1E-05	2.1E-05	2.0E-05
			2.2E-04		8.4E-05		2.0E-05	
			2.0E-04		8.1E-05		1.9E-05	
		2	8.5E-05	8.4E-05	5.6E-05	5.5E-05	2.0E-05	2.0E-05
			8.3E-05		5.5E-05		2.0E-05	
			8.3E-05		5.3E-05		1.9E-05	
		3	8.2E-05	8.1E-05	5.2E-05	5.0E-05	1.3E-05	1.2E-05
			8.0E-05		5.0E-05		1.2E-05	
			8.0E-05		4.9E-05		1.2E-05	
	CMP-GC3	1	2.6E-04	2.6E-04	1.5E-04	1.4E-04	2.3E-05	2.2E-05
			2.6E-04		1.5E-04		2.2E-05	
			2.6E-04		1.4E-04		2.1E-05	
		2	2.9E-04	2.8E-04	1.5E-04	1.5E-04	2.3E-05	2.2E-05
			2.8E-04		1.5E-04		2.2E-05	
			2.8E-04		1.4E-04		2.2E-05	
		3	3.4E-04	3.3E-04	1.5E-04	1.5E-04	3.1E-05	3.0E-05
			3.2E-04		1.5E-04		3.0E-05	
			3.2E-04		1.5E-04		2.9E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
ALTAMONT, CA	CMP-Bottom of Lysimeter	1	2.4E-04	2.4E-04	1.7E-04	1.7E-04	9.7E-05	9.7E-05
			2.4E-04		1.7E-04		9.7E-05	
			2.4E-04		1.7E-04		9.7E-05	
		2	4.9E-05	4.8E-05	4.4E-05	4.4E-05	2.9E-05	2.8E-05
			4.8E-05		4.4E-05		2.8E-05	
			4.8E-05		4.3E-05		2.8E-05	
		3	4.2E-05	4.2E-05	3.7E-05	3.7E-05	2.1E-05	2.1E-05
			4.2E-05		3.7E-05		2.1E-05	
			4.1E-05		3.6E-05		2.1E-05	
	CMP-GC2	1	3.6E-05	3.5E-05	3.1E-05	3.1E-05	1.7E-05	1.7E-05
			3.5E-05		3.1E-05		1.7E-05	
			3.4E-05		3.1E-05		1.7E-05	
		2	3.8E-05	3.8E-05	3.5E-05	3.4E-05	2.1E-05	2.1E-05
			3.8E-05		3.4E-05		2.1E-05	
			3.7E-05		3.4E-05		2.0E-05	
		3	4.7E-05	4.6E-05	3.6E-05	3.6E-05	1.8E-05	1.7E-05
			4.6E-05		3.6E-05		1.7E-05	
			4.5E-05		3.6E-05		1.7E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
BOARDMAN, OR	LOWER GEOCOMPOSITE	1	1.7E-04	1.8E-04	1.6E-04	1.6E-04	8.0E-05	7.9E-05
			1.8E-04		1.6E-04		7.9E-05	
			1.8E-04		1.6E-04		7.7E-05	
		2	3.3E-04	3.4E-04	5.5E-05	5.5E-05	2.8E-05	2.8E-05
			3.4E-04		5.5E-05		2.8E-05	
			3.4E-04		5.5E-05		2.7E-05	
		3	7.2E-05	7.2E-05	5.8E-05	5.8E-05	2.9E-05	2.9E-05
			7.2E-05		5.8E-05		2.9E-05	
			7.1E-05		5.8E-05		2.8E-05	
	GEOCOMPOSITE 1 UPPER	1	1.9E-04	1.9E-04	1.5E-04	1.5E-04	5.6E-05	5.3E-05
			1.9E-04		1.5E-04		5.3E-05	
			1.8E-04		1.5E-04		5.2E-05	
		2	1.7E-04	1.6E-04	1.3E-04	1.3E-04	6.2E-05	6.1E-05
			1.6E-04		1.3E-04		6.1E-05	
			1.6E-04		1.2E-04		6.0E-05	
		3	1.6E-04	1.6E-04	1.2E-04	1.2E-04	5.9E-05	5.7E-05
			1.6E-04		1.2E-04		5.7E-05	
			1.5E-04		1.2E-04		5.5E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
BOARDMAN, OR	Thick Cover 3	1	6.8E-05	6.6E-05	4.7E-05	4.7E-05	2.4E-05	2.3E-05
			6.6E-05		4.6E-05		2.3E-05	
			6.5E-05		4.6E-05		2.3E-05	
		2	1.9E-04	1.9E-04	1.5E-04	1.5E-04	7.7E-05	7.5E-05
			1.9E-04		1.5E-04		7.4E-05	
			1.9E-04		1.5E-04		7.3E-05	
		3	5.5E-05	5.7E-05	4.3E-05	4.3E-05	2.3E-05	2.3E-05
			5.8E-05		4.3E-05		2.3E-05	
			5.7E-05		4.3E-05		2.3E-05	
CEDAR RAPIDS, IA	CLAY BOTTOM 1	1	3.1E-04	3.0E-04	1.8E-04	1.8E-04	8.5E-05	8.4E-05
			3.0E-04		1.8E-04		8.3E-05	
			3.0E-04		1.8E-04		8.3E-05	
		2	2.7E-04	2.8E-04	2.7E-04	2.7E-04	1.6E-04	1.6E-04
			2.8E-04		2.7E-04		1.6E-04	
			2.8E-04		2.6E-04		1.6E-04	
		3	2.8E-04	2.8E-04	2.8E-04	2.8E-04	1.8E-04	1.8E-04
			2.8E-04		2.8E-04		1.8E-04	
			2.7E-04		2.7E-04		1.7E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
CEDAR RAPIDS, IA	**BOTTOM COMPOSITE 2**	1	3.1E-04	3.1E-04	2.8E-04	2.8E-04	1.5E-04	1.5E-04
			3.1E-04		2.7E-04		1.5E-04	
			3.0E-04		2.7E-04		1.5E-04	
		2	3.2E-04	3.2E-04	3.1E-04	3.1E-04	1.8E-04	1.7E-04
			3.2E-04		3.1E-04		1.7E-04	
			3.2E-04		3.1E-04		1.7E-04	
		3	4.9E-04	4.8E-04	3.9E-04	3.9E-04	2.3E-04	2.3E-04
			4.9E-04		3.8E-04		2.3E-04	
			4.7E-04		3.9E-04		2.3E-04	
EAU CLAIRE, WI	**TP1-GC-1**	1	4.6E-04	4.4E-04	N/A		2.1E-04	2.0E-04
			4.5E-04				2.0E-04	
			4.7E-04				2.0E-04	
		2	2.5E-04				1.2E-04	
			2.4E-04				1.2E-04	
			2.4E-04				1.2E-04	
		3	6.2E-04				2.9E-04	
			6.0E-04				2.8E-04	
			5.9E-04				2.8E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	TP1-GC-2	1	5.6E-04	5.4E-04	N/A		2.2E-04	2.3E-04
			5.7E-04				2.2E-04	
			5.6E-04				2.2E-04	
		2	5.1E-04				2.5E-04	
			5.2E-04				2.5E-04	
			5.1E-04				2.4E-04	
		3	5.4E-04				2.3E-04	
			5.6E-04				2.2E-04	
			5.3E-04				2.2E-04	
	TP1-GC-3	1	2.3E-04	3.4E-04	N/A		1.1E-04	1.4E-04
			2.3E-04				1.1E-04	
			2.3E-04				1.0E-04	
		2	4.2E-04				1.6E-04	
			4.3E-04				1.6E-04	
			4.2E-04				1.6E-04	
		3	3.8E-04				1.5E-04	
			3.7E-04				1.5E-04	
			3.7E-04				1.5E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP2-GC-1**	1	3.2E-04	2.8E-04	N/A		1.1E-04	1.1E-04
			3.2E-04				1.1E-04	
			3.3E-04				1.0E-04	
		2	2.8E-04				1.2E-04	
			2.9E-04				1.1E-04	
			2.9E-04				1.1E-04	
		3	2.2E-04				1.1E-04	
			2.3E-04				1.0E-04	
			2.2E-04				1.0E-04	
	TP2-GC-2	1	1.0E-03	6.1E-04	N/A		2.6E-04	1.7E-04
			1.1E-03				2.7E-04	
			1.0E-03				2.6E-04	
		2	5.0E-04				1.3E-04	
			5.1E-04				1.3E-04	
			4.9E-04				1.2E-04	
		3	2.9E-04				1.2E-04	
			2.9E-04				1.2E-04	
			3.0E-04				1.2E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP2-GC-3**	1	3.7E-04	4.0E-04	N/A		1.5E-04	1.5E-04
			3.7E-04				1.4E-04	
			3.7E-04				1.4E-04	
		2	3.7E-04				1.2E-04	
			3.6E-04				1.2E-04	
			3.6E-04				1.2E-04	
		3	4.7E-04				1.9E-04	
			4.8E-04				1.8E-04	
			4.7E-04				1.8E-04	
	TP3-GC-1	1	2.0E-04	3.0E-04	N/A		7.5E-05	1.2E-04
			1.9E-04				7.8E-05	
			1.9E-04				7.7E-05	
		2	4.7E-04				2.0E-04	
			4.6E-04				2.0E-04	
			4.7E-04				2.0E-04	
		3	2.4E-04				7.3E-05	
			2.3E-04				7.3E-05	
			2.3E-04				7.2E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP3-GC-2**	1	1.6E-03	7.2E-04	N/A		1.6E-04	1.4E-04
			1.6E-03				1.6E-04	
			1.6E-03				1.6E-04	
		2	2.1E-04				9.9E-05	
			2.0E-04				9.8E-05	
			2.1E-04				9.8E-05	
		3	3.7E-04				1.6E-04	
			3.7E-04				1.6E-04	
			3.7E-04				1.6E-04	
	TP3-GC-3	1	3.4E-04	3.6E-04	N/A		1.5E-04	1.3E-04
			3.4E-04				1.5E-04	
			3.4E-04				1.5E-04	
		2	4.1E-04				1.2E-04	
			4.2E-04				1.2E-04	
			4.1E-04				1.2E-04	
		3	3.3E-04				1.2E-04	
			3.4E-04				1.2E-04	
			3.5E-04				1.2E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP3-GC-4**	1	5.3E-04	5.7E-04	N/A		1.7E-04	1.4E-04
			5.3E-04				1.6E-04	
			5.3E-04				1.6E-04	
		2	3.1E-04				1.3E-04	
			3.0E-04				1.3E-04	
			3.1E-04				1.2E-04	
		3	8.9E-04				1.5E-04	
			8.7E-04				1.4E-04	
			8.7E-04				1.4E-04	
	TP4-GC-1	1	4.5E-04	3.3E-04	N/A		2.0E-04	1.2E-04
			4.3E-04				2.0E-04	
			4.2E-04				1.9E-04	
		2	3.9E-04				1.6E-04	
			3.8E-04				1.5E-06	
			3.8E-04				1.5E-04	
		3	1.9E-04				6.5E-05	
			1.9E-04				6.5E-05	
			1.8E-04				6.4E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP4-GC-2**	1	1.2E-03	5.7E-04	N/A		2.2E-04	1.2E-04
			1.2E-03				2.2E-04	
			1.3E-03				2.2E-04	
		2	2.4E-04				6.2E-05	
			2.4E-04				6.2E-05	
			2.4E-04				6.1E-05	
		3	2.4E-04				7.3E-05	
			2.4E-04				7.2E-05	
			2.4E-04				7.0E-05	
	TP4-GC-3	1	4.5E-04	5.6E-04	N/A		8.9E-05	1.0E-04
			4.3E-04				8.9E-05	
			4.4E-04				8.8E-05	
		2	2.8E-04				1.4E-04	
			2.8E-04				1.4E-04	
			2.9E-04				1.4E-04	
		3	9.5E-04				7.4E-05	
			1.0E-03				7.4E-05	
			9.6E-04				7.4E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
EAU CLAIRE, WI	**TP4-GC-4**	1	2.6E-04	2.7E-04	N/A		1.1E-04	1.2E-04
			2.6E-04				1.1E-04	
			2.6E-04				1.1E-04	
		2	3.0E-04				1.4E-04	
			3.0E-04				1.4E-04	
			3.0E-04				1.4E-04	
		3	2.7E-04				1.2E-04	
			2.7E-04				1.2E-04	
			2.6E-04				1.2E-04	
HELENA, MT	**GC-AB**	1	2.3E-04	2.3E-04	2.2E-04	2.2E-04	1.3E-04	1.3E-04
			2.4E-04		2.2E-04		1.3E-04	
			2.3E-04		2.2E-04		1.3E-04	
		2	2.5E-04	2.5E-04	2.3E-04	2.3E-04	1.4E-04	1.4E-04
			2.5E-04		2.4E-04		1.4E-04	
			2.5E-04		2.3E-04		1.4E-04	
		3	2.3E-04	2.3E-04	2.2E-04	2.2E-04	1.3E-04	1.3E-04
			2.3E-04		2.2E-04		1.3E-04	
			2.3E-04		2.2E-04		1.2E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
OMAHA, NE	**GC-A1B**	1	1.7E-04	1.7E-04	1.5E-04	1.5E-04	7.0E-05	6.8E-05
			1.7E-04		1.5E-04		6.7E-05	
			1.7E-04		1.5E-04		6.6E-05	
		2	1.7E-04	1.7E-04	1.6E-04	1.5E-04	9.0E-05	8.9E-05
			1.7E-04		1.5E-04		9.0E-05	
			1.7E-04		1.5E-04		8.9E-05	
		3	1.5E-04	1.4E-04	1.3E-04	1.3E-04	8.4E-05	8.3E-05
			1.4E-04		1.3E-04		8.3E-05	
			1.4E-04		1.3E-04		8.2E-05	
	GC-A2B	1	1.8E-04	1.8E-04	1.5E-04	1.5E-04	7.7E-05	7.5E-05
			1.8E-04		1.5E-04		7.5E-05	
			1.8E-04		1.5E-04		7.3E-05	
		2	1.2E-04	1.1E-04	8.3E-05	8.2E-05	4.1E-05	4.0E-05
			1.1E-04		8.2E-05		4.0E-05	
			1.1E-04		8.1E-05		3.9E-05	
		3	1.0E-04	1.0E-04	9.1E-05	9.1E-05	4.1E-05	3.9E-05
			1.0E-04		9.1E-05		3.9E-05	
			9.9E-05		8.9E-05		3.7E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
OMAHA, NE	**GC-CB**	1	1.7E-04	1.7E-04	1.5E-04	1.5E-04	8.2E-05	8.1E-05
			1.7E-04		1.5E-04		8.1E-05	
			1.7E-04		1.5E-04		8.1E-05	
		2	1.9E-04	1.8E-04	1.7E-04	1.7E-04	9.1E-05	9.0E-05
			1.8E-04		1.7E-04		9.0E-05	
			1.8E-04		1.7E-04		8.8E-05	
		3	2.2E-04	2.2E-04	2.2E-04	2.2E-04	1.2E-04	1.2E-04
			2.3E-04		2.1E-04		1.2E-04	
			2.2E-04		2.1E-04		1.2E-04	
	GC-CM	1	1.2E-04	1.2E-04	1.0E-04	1.0E-04	5.2E-05	5.2E-05
			1.2E-04		1.0E-04		5.2E-05	
			1.2E-04		1.0E-04		5.1E-05	
		2	1.5E-04	1.5E-04	1.3E-04	1.3E-04	5.4E-05	5.2E-05
			1.5E-04		1.3E-04		5.1E-05	
			1.5E-04		1.3E-04		5.0E-05	
		3	2.0E-04	2.0E-04	1.9E-04	1.9E-04	1.1E-04	1.1E-04
			2.0E-04		1.9E-04		1.1E-04	
			2.0E-04		1.8E-04		1.0E-04	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
UNDERWOOD, ND	**GC-CC3**	1	2.4E-04	2.4E-04	2.3E-04	2.3E-04	1.0E-04	9.7E-05
			2.4E-04		2.3E-04		9.6E-05	
			2.4E-04		2.3E-04		9.2E-05	
		2	3.5E-04	3.4E-04	3.0E-04	3.0E-04	1.4E-04	1.4E-04
			3.5E-04		3.0E-04		1.3E-04	
			3.4E-04		3.0E-04		1.3E-04	
		3	4.1E-04	4.2E-04	3.6E-04	3.6E-04	1.6E-04	1.6E-04
			4.1E-04		3.5E-04		1.6E-04	
			4.3E-04		3.6E-04		1.5E-04	
	GC-CC5	1	1.3E-04	1.4E-04	1.2E-04	1.2E-04	4.7E-05	4.6E-05
			1.4E-04		1.2E-04		4.5E-05	
			1.3E-04		1.2E-04		4.4E-05	
		2	1.3E-04	1.3E-04	1.2E-04	1.2E-04	5.1E-05	4.9E-05
			1.3E-04		1.2E-04		4.8E-05	
			1.3E-04		1.2E-04		4.7E-05	
		3	1.6E-04	1.6E-04	1.4E-04	1.4E-04	6.6E-05	6.4E-05
			1.5E-04		1.4E-04		6.4E-05	
			1.6E-04		1.4E-04		6.1E-05	

Table S1. Transmissivity of GDLs (ASTM D 4716) (Continued).

			σ = 24 kPa		σ = 48 kPa		σ = 480 kPa	
Sample ID	**Sample #**	**Specimen #**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ (m^2/s)**	**Mean θ (m^2/s)**	**Transmissivity θ(m^2/s)**	**Mean θ (m^2/s)**
UNDERWOOD, ND	GC-ET	1	2.0E-04	2.0E-04	1.9E-04	1.8E-04	8.8E-05	8.5E-05
			2.0E-04		1.8E-04		8.5E-05	
			2.0E-04		1.6E-04		8.2E-05	
		2	2.0E-04	2.0E-04	2.0E-04	1.9E-04	8.8E-05	8.5E-05
			2.1E-04		1.9E-04		8.5E-05	
			2.0E-04		1.9E-04		8.3E-05	
		3	2.2E-04	2.2E-04	2.1E-04	2.1E-04	8.9E-05	8.6E-05
			2.3E-04		2.1E-04		8.6E-05	
			2.2E-04		2.1E-04		8.3E-05	

Table S2. Permittivity of GDLs (ASTM D 4491).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt-ivity ψ (s^{-1})	Mean	Std. Dev.
ALTAMONT	CMP - Bottom of Lysimeter	1	11/19/07	12.03	552.4	0.43	0.40	1.8E-02	23.81	372.7	0.74	0.72	1.3E-02
				8.73	366.9	0.40			20.92	325.1	0.73		
				9.96	418.3	0.39			21.77	334.6	0.72		
				10.68	448.1	0.39			27.36	417.3	0.72		
				8.98	370.4	0.39			22.27	333.2	0.70		
		2	05/28/08	9.77	596.1	0.57	0.57	1.3E-02	36.05	556.3	0.73	0.71	9.7E-03
				7.09	435.7	0.58			30.87	471.2	0.72		
				6.57	401.5	0.57			23.78	362.2	0.72		
				6.44	383.3	0.56			25.18	378.2	0.71		
				8.07	470.2	0.55			23.97	357.4	0.70		
		3	05/28/08	7.42	418.8	0.53	0.52	8.3E-03	23.31	326.9	0.66	0.65	7.1E-03
				6.88	380.0	0.52			22.48	310.1	0.65		
				7.43	410.2	0.52			22.30	308.4	0.65		
				8.78	479.8	0.51			21.30	291.3	0.64		
				6.77	366.1	0.51			21.84	297.9	0.64		
		4	05/28/08	9.41	515.8	0.52	0.50	1.0E-02	23.19	290.2	0.59	0.57	2.7E-02
				8.14	443.6	0.51			22.63	281.2	0.58		
				8.01	423.8	0.50			26.08	289.8	0.52		
				7.18	383.7	0.50			29.83	365.6	0.58		
				7.68	401.4	0.49			25.97	317.2	0.57		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permitt-ivity ψ (s^{-1})	Mean	Std. Dev.
ALTAMONT	CMP - GC3	1	05/28/08	7.44	415.0	0.52	0.48	2.7E-02	21.86	320.8	0.69	0.66	2.3E-02
				8.03	418.7	0.49			23.29	336.9	0.68		
				7.82	395.6	0.48			22.97	324.5	0.66		
				7.67	380.6	0.47			23.90	332.0	0.65		
				7.23	350.4	0.46			25.83	346.3	0.63		
		2	05/28/08	7.63	408.7	0.50	0.45	4.9E-02	27.91	291.2	0.49	0.48	1.3E-02
				12.70	666.4	0.49			21.33	220.3	0.49		
				14.77	681.9	0.43			23.37	237.2	0.48		
				9.17	400.7	0.41			28.36	281.8	0.47		
				7.29	305.5	0.39			27.90	272.4	0.46		
		3	05/28/08	5.58	316.2	0.53	0.50	2.5E-02	30.23	537.0	0.84	0.80	2.8E-02
				8.91	483.0	0.51			21.19	373.3	0.83		
				9.43	495.1	0.49			25.23	431.2	0.80		
				6.05	312.0	0.49			25.22	423.0	0.79		
				7.87	390.1	0.47			24.03	392.8	0.77		
		4	05/28/08	11.00	695.1	0.59	0.55	2.9E-02	30.43	470.5	0.73	0.68	4.7E-02
				9.09	549.5	0.57			24.29	373.0	0.72		
				8.87	514.9	0.55			22.14	332.8	0.71		
				8.46	482.3	0.54			24.77	335.6	0.64		
				10.60	587.1	0.52			25.69	345.1	0.63		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permit-tivity ψ (s^{-1})	Mean	Std. Dev.
ALTAMONT	Alt - Bottom of Lysimeter	1	05/28/08	9.97	442.6	0.42	0.39	1.7E-02	29.37	524.4	0.84	0.82	1.8E-02
				9.72	417.6	0.40			28.58	504.5	0.83		
				6.68	280.0	0.39			22.31	385.2	0.81		
				9.14	371.3	0.38			22.60	394.9	0.82		
				9.27	371.2	0.38			20.93	353.3	0.79		
		2	05/28/08	8.93	579.2	0.61	0.56	4.4E-02	27.62	366.1	0.62	0.60	2.5E-01
				7.19	449.3	0.59			25.64	303.0	0.56		
				6.52	396.9	0.57			25.05	257.5	0.48		
				9.52	526.1	0.52			33.01	231.4	0.33		
				8.33	450.3	0.51			18.02	388.0	1.01		
		3	05/28/08	12.07	335.5	0.26	0.20	4.3E-02	20.52	405.9	0.93	0.83	8.9E-02
				18.68	451.7	0.23			19.38	366.4	0.89		
				9.10	199.5	0.21			22.35	397.9	0.84		
				13.08	246.4	0.18			20.72	341.4	0.77		
				14.23	227.6	0.15			21.19	318.5	0.71		
		4	05/28/08	8.04	534.3	0.62	0.58	4.3E-02	21.88	365.3	0.78	0.75	2.7E-02
				7.83	504.8	0.61			21.37	350.2	0.77		
				8.51	521.7	0.58			23.67	377.2	0.75		
				8.33	485.6	0.55			30.94	478.6	0.73		
				7.81	431.6	0.52			24.00	368.2	0.72		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permit -tivity ψ (s^{-1})	Mean	Std. Dev.
APPLE VALLEY	Lysimeter Base	1	05/29/08	7.45	606.2	0.77	0.74	2.7E-02	22.89	502.5	1.03	1.03	3.2E-02
				4.92	394.2	0.75			23.61	545.6	1.09		
				6.12	484.6	0.74			14.87	324.4	1.03		
				5.55	438.6	0.74			18.34	395.7	1.01		
				10.12	747.2	0.69			15.77	337.4	1.01		
		2	05/29/08	9.84	867.2	0.83	0.76	4.4E-02	15.70	294.2	0.88	0.87	8.0E-03
				6.37	515.5	0.76			18.02	336.4	0.88		
				7.23	576.9	0.75			14.58	272.4	0.88		
				6.58	514.5	0.74			20.34	374.6	0.87		
				6.67	504.8	0.71			18.20	334.2	0.86		
		3	05/29/08	6.80	598.5	0.83	0.80	2.0E-02	26.23	628.8	1.13	1.11	1.8E-02
				10.67	922.4	0.81			15.86	380.5	1.13		
				5.98	512.8	0.81			15.14	363.2	1.13		
				6.83	575.5	0.79			17.77	416.0	1.10		
				7.36	607.3	0.78			15.89	368.4	1.09		
		4	05/29/08	7.62	743.7	0.92	0.84	5.0E-02	18.20	384.3	0.99	0.99	4.6E-03
				6.02	553.0	0.86			16.55	349.9	0.99		
				8.52	739.1	0.82			17.28	363.5	0.99		
				5.87	510.7	0.82			19.61	411.1	0.99		
				8.00	673.4	0.79			16.67	348.5	0.98		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permit-tivity ψ (s^{-1})	Mean	Std. Dev.
BOARDMAN	Geocomposite 1 Upper	1	05/29/08	6.77	494.3	0.69	0.66	1.7E-02	38.02	731.8	0.90	0.87	5.4 E-02
				8.79	626.1	0.67			29.71	573.5	0.91		
				11.37	789.4	0.65			31.67	601.5	0.89		
				7.37	510.4	0.65			32.68	615.9	0.89		
				6.33	433.5	0.64			26.20	433.8	0.78		
		2	05/29/08	6.73	555.2	0.78	0.70	5.0E-02	45.88	751.8	0.77	0.76	1.8 E-02
				7.25	551.3	0.72			28.35	464.2	0.77		
				12.15	885.7	0.69			22.85	380.1	0.78		
				8.49	593.7	0.66			24.25	388.0	0.75		
				7.03	488.1	0.65			35.23	552.0	0.74		
		3	05/29/08	8.11	599.9	0.70	0.67	2.2E-02	45.73	894.7	0.92	0.90	1.9 E-02
				8.70	636.4	0.69			24.89	480.4	0.91		
				7.39	524.1	0.67			21.37	406.4	0.89		
				7.94	555.0	0.66			20.21	380.8	0.89		
				13.07	892.1	0.64			23.05	427.0	0.87		
		4	05/29/08	9.97	744.5	0.70	0.66	3.4E-02	34.31	522.7	0.72	0.70	1.2 E-02
				6.59	475.4	0.68			31.87	479.8	0.71		
				7.62	530.4	0.65			31.67	469.7	0.70		
				7.70	520.9	0.64			26.16	386.6	0.69		
				9.15	597.8	0.61			28.94	422.1	0.69		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permit-tivity ψ (s^{-1})	Mean	Std. Dev.
BOARDMAN	Thcik Cover	1	05/29/08	10.30	456.3	0.42	0.41	5.6E-03	28.64	320.7	0.53	0.52	7.7E-03
				14.98	652.0	0.41			24.23	267.9	0.52		
				10.42	453.2	0.41			24.40	268.6	0.52		
				8.42	364.5	0.41			39.11	423.3	0.51		
				12.27	523.1	0.40			24.70	267.1	0.51		
		2	05/29/08	10.92	465.5	0.40	0.39	8.3E-03	32.53	290.9	0.42	0.42	5.2E-03
				15.89	665.8	0.39			31.83	285.3	0.42		
				13.52	561.2	0.39			38.20	337.7	0.42		
				14.30	577.2	0.38			37.48	330.1	0.41		
				8.48	346.5	0.38			27.05	235.1	0.41		
		3	05/29/08	12.98	591.6	0.43	0.42	1.1E-02	31.25	336.5	0.51	0.50	4.6E-03
				10.98	497.5	0.43			50.27	536.8	0.50		
				9.58	431.1	0.42			28.33	301.7	0.50		
				21.11	918.8	0.41			31.48	333.9	0.50		
				13.14	564.0	0.40			33.36	350.3	0.49		
		4	05/29/08	8.05	390.0	0.46	0.43	1.6E-02	24.02	236.4	0.46	0.44	2.2E-02
				18.48	862.4	0.44			33.17	289.0	0.41		
				10.36	466.2	0.42			25.27	246.5	0.46		
				8.70	394.6	0.43			29.20	271.7	0.44		
				11.95	527.6	0.42			31.55	288.7	0.43		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

				50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
CEDAR RAPIDS	Clay Bottom 1	1	05/29/08	6.14	523.9	0.80	0.77	2.9E-02	13.31	337.7	1.19	1.16	2.5E-02
				6.69	570.6	0.80			14.66	368.3	1.18		
				5.09	420.1	0.78			11.95	297.9	1.17		
				7.50	600.9	0.75			14.68	355.5	1.14		
				8.08	632.9	0.74			14.29	346.2	1.14		
		2	05/29/08	6.93	541.8	0.74	0.62	8.6E-02	39.88	505.8	0.60	0.57	2.2E-02
				9.84	714.4	0.68			70.82	868.4	0.58		
				6.71	419.7	0.59			41.33	498.9	0.57		
				8.54	504.6	0.56			70.22	820.4	0.55		
				8.66	491.5	0.53			43.69	503.7	0.54		
		3	05/29/08	6.57	716.4	1.03	1.01	1.5E-02	20.47	658.6	1.51	1.47	2.7E-02
				5.93	643.1	1.02			20.03	627.5	1.47		
				5.76	624.8	1.02			17.10	534.1	1.47		
				5.99	641.9	1.01			15.99	497.2	1.46		
				6.99	734.1	0.99			18.63	569.6	1.44		
		4	05/29/08	6.62	683.9	0.97	0.92	3.3E-02	19.57	446.1	1.07	1.06	6.3E-03
				4.87	478.9	0.92			15.51	351.8	1.07		
				7.06	691.6	0.92			16.78	378.0	1.06		
				8.87	834.7	0.88			15.23	344.5	1.06		
				6.16	590.7	0.90			16.89	379.2	1.06		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP1 GC-1	1	11/19/07	13.98	308.1	0.21	0.20	4.1E-03	78.27	416.4	0.25	0.25	3.6E-03
				14.42	311.4	0.20			64.67	345.2	0.25		
				14.20	304.5	0.20			60.33	319.5	0.25		
				14.70	309.5	0.20			58.98	307.2	0.24		
				14.23	298.3	0.20			59.52	307.3	0.24		
		2	11/19/07	13.53	507.3	0.35	0.34	1.3E-02	54.11	553.7	0.48	0.48	1.2E-02
				12.86	482.6	0.35			47.25	505.3	0.50		
				10.12	365.8	0.34			42.42	434.9	0.48		
				12.39	436.9	0.33			38.50	390.2	0.48		
				15.11	518.0	0.32			38.09	383.3	0.47		
		3	11/19/07	23.18	412.2	0.17	0.16	3.9E-03	58.02	285.4	0.23	0.22	6.2E-03
				22.46	396.3	0.17			61.98	298.4	0.23		
				16.39	280.6	0.16			61.14	289.2	0.22		
				18.42	315.9	0.16			59.39	278.3	0.22		
				17.38	291.5	0.16			56.31	257.2	0.21		
		4	11/19/07	21.20	252.1	0.11	0.11	3.4E-03	78.92	425.7	0.25	0.26	1.4E-03
				20.03	238.2	0.11			60.30	327.9	0.26		
				22.61	262.9	0.11			55.59	303.7	0.26		
				21.39	249.4	0.11			58.83	320.8	0.26		
				21.05	263.9	0.12			64.60	353.1	0.26		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP1 GC-2	1	11/19/07	14.27	315.1	0.21	0.20	4.1E-03	61.61	368.9	0.28	0.28	4.5E-03
				15.36	332.8	0.20			62.75	368.4	0.28		
				13.70	293.8	0.20			53.52	315.6	0.28		
				15.27	323.0	0.20			52.36	303.1	0.27		
				13.45	282.3	0.20			52.92	303.8	0.27		
		2	11/19/07	8.77	420.4	0.45	0.42	1.7E-02	62.77	693.9	0.52	0.51	8.3E-03
				7.89	359.5	0.43			46.62	509.7	0.51		
				10.14	456.1	0.42			35.18	379.7	0.51		
				6.73	299.0	0.42			29.86	318.5	0.50		
				6.67	286.9	0.40			25.30	269.1	0.50		
		3	11/20/07	24.08	456.2	0.18	0.17	3.7E-03	58.89	274.3	0.22	0.22	3.2E-03
				17.95	337.9	0.18			61.30	284.3	0.22		
				17.75	328.7	0.17			62.30	282.4	0.21		
				16.84	311.0	0.17			65.55	298.2	0.21		
				14.65	262.9	0.17			59.42	267.4	0.21		
		4	11/20/07	11.58	524.9	0.43	0.43	1.5E-03	55.64	661.5	0.56	0.56	3.4E-03
				9.55	432.4	0.43			41.20	490.5	0.56		
				10.33	471.8	0.43			32.36	384.7	0.56		
				9.52	433.0	0.43			31.42	368.9	0.55		
				9.37	424.9	0.43			29.17	344.0	0.55		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP1 GC-3	1	11/20/07	10.33	435.5	0.40	0.39	7.3E-03	51.37	455.1	0.42	0.42	4.2E-03
				11.48	484.7	0.40			38.52	340.2	0.42		
				7.52	310.5	0.39			34.20	302.5	0.42		
				8.17	335.5	0.39			37.08	324.4	0.41		
				7.33	295.9	0.38			32.77	294.8	0.42		
		2	11/20/07	8.95	624.7	0.66	0.64	1.6E-02	29.42	498.5	0.80	0.79	8.6E-03
				6.70	468.7	0.66			29.34	493.9	0.79		
				5.77	392.7	0.64			25.61	428.6	0.79		
				5.33	355.3	0.63			21.15	353.6	0.79		
				5.37	356.6	0.62			21.08	346.8	0.77		
		3	11/20/07	6.61	371.4	0.53	0.51	1.4E-02	26.48	368.6	0.65	0.65	5.9E-03
				5.23	290.5	0.52			26.02	362.3	0.65		
				6.70	361.5	0.51			24.05	332.2	0.65		
				7.02	372.2	0.50			21.37	293.3	0.65		
				6.92	365.3	0.50			24.48	333.7	0.64		
		4	11/20/07	7.23	394.1	0.51	0.50	7.8E-03	30.23	384.6	0.60	0.60	2.9E-03
				12.64	670.7	0.50			26.20	333.9	0.60		
				6.36	344.3	0.51			23.89	302.8	0.60		
				7.21	383.9	0.50			25.70	325.1	0.59		
				7.92	415.6	0.49			28.08	353.4	0.59		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP2 GC-1	1	11/20/07	8.12	484.2	0.56	0.54	1.7E-02	24.69	485.8	0.93	0.87	3.5E-02
				7.62	445.1	0.55			22.14	418.6	0.89		
				8.22	469.7	0.54			20.10	371.8	0.87		
				6.03	341.0	0.53			20.81	374.1	0.85		
				5.23	287.1	0.52			18.70	333.4	0.84		
		2	11/20/07	9.60	349.4	0.34	0.33	7.4E-03	48.76	493.3	0.48	0.47	7.2E-03
				7.80	272.5	0.33			38.23	384.0	0.47		
				11.07	388.3	0.33			32.97	327.9	0.47		
				8.41	292.7	0.33			65.05	632.9	0.46		
				9.60	328.9	0.32			51.42	507.1	0.46		
		3	11/20/07	9.40	458.7	0.46	0.45	7.1E-03	33.69	465.9	0.65	0.64	9.7E-03
				10.85	516.7	0.45			29.49	402.6	0.64		
				7.16	344.2	0.45			28.46	383.1	0.63		
				9.85	460.9	0.44			30.07	401.4	0.63		
				6.17	292.4	0.45			26.47	353.6	0.63		
		4	11/20/07	7.21	299.6	0.39	0.37	1.2E-02	30.03	259.4	0.41	0.39	7.7E-03
				9.01	356.8	0.37			50.77	429.4	0.40		
				8.65	346.5	0.38			39.21	328.2	0.39		
				11.81	457.5	0.36			43.95	366.4	0.39		
				8.83	337.3	0.36			39.68	325.1	0.39		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

				50 mm constant head					**10 mm constant head**				
ID		**#**	**Date**	**Time (s)**	**Volume (cm^3)**	**Permittivity ψ (s^{-1})**	**Mean**	**Std. Dev.**	**Time (s)**	**Volume (cm^3)**	**Permittivity ψ (s^{-1})**	**Mean**	**Std. Dev.**
EAU CLAIRE	**TP2 GC-2**	1	11/21/07	10.14	335.3	0.31	0.31	3.4E-03	55.58	502.7	0.43	0.41	7.9E-03
				9.32	310.9	0.31			44.13	386.6	0.41		
				8.66	286.7	0.31			44.71	387.4	0.41		
				8.11	275.3	0.32			38.61	335.5	0.41		
				11.48	381.1	0.31			36.20	312.3	0.41		
		2	11/21/07	6.08	469.1	0.73	0.70	2.5E-02	45.10	803.3	0.84	0.81	1.9E-02
				5.93	452.9	0.72			23.80	415.7	0.82		
				5.26	396.2	0.71			24.31	416.1	0.80		
				5.89	435.8	0.70			17.72	299.3	0.79		
				5.52	388.8	0.66			19.37	325.9	0.79		
		3	11/21/07	8.12	538.6	0.62	0.60	1.5E-02	44.40	728.3	0.77	0.77	4.4E-03
				7.19	470.0	0.61			27.71	452.6	0.77		
				6.34	397.5	0.59			28.88	477.7	0.78		
				6.12	386.5	0.59			22.10	365.7	0.78		
				4.75	300.9	0.60			27.18	446.1	0.77		
		4	11/21/07	7.47	474.6	0.60	0.57	2.0E-02	25.35	406.4	0.75	0.74	1.2E-02
				6.68	415.1	0.58			21.34	341.8	0.75		
				5.31	329.7	0.58			22.27	352.9	0.75		
				5.59	332.7	0.56			20.54	316.4	0.72		
				5.61	326.6	0.55			20.56	325.2	0.74		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	**Volume (cm^3)**	**Permittivity ψ (s^{-1})**	**Mean**	**Std. Dev.**	**Time (s)**	**Volume (cm^3)**	**Permittivity ψ (s^{-1})**	**Mean**	**Std. Dev.**
EAU CLAIRE	**TP2 GC-3**	1	11/21/07	9.26	340.7	0.35	0.33	1.5E-02	53.16	415.1	0.37	0.35	1.1E-02
				11.73	415.3	0.33			47.52	360.2	0.36		
				14.48	506.5	0.33			42.43	319.2	0.35		
				15.24	511.3	0.32			39.39	290.2	0.35		
				14.25	464.4	0.31			46.78	337.5	0.34		
		2	11/21/07	10.98	398.8	0.34	0.32	1.4E-02	51.87	394.5	0.36	0.35	7.7E-03
				7.98	276.6	0.33			48.37	365.2	0.36		
				8.99	306.4	0.32			47.27	350.6	0.35		
				9.61	323.0	0.32			46.06	336.4	0.34		
				10.28	330.9	0.30			39.87	287.6	0.34		
		3	11/21/07	10.39	244.0	0.22	0.21	6.6E-03	53.94	344.2	0.30	0.29	4.7E-03
				12.12	276.2	0.21			51.68	322.2	0.29		
				23.43	552.6	0.22			53.27	331.0	0.29		
				20.24	449.1	0.21			50.28	311.2	0.29		
				12.61	278.6	0.21			50.92	310.8	0.29		
		4	11/21/07	19.04	415.4	0.21	0.19	1.2E-02	61.63	297.1	0.23	0.22	5.3E-03
				15.43	319.7	0.19			63.08	298.0	0.22		
				15.47	305.6	0.19			58.12	270.3	0.22		
				15.96	305.7	0.18			63.15	289.7	0.22		
				13.67	254.7	0.18			57.23	259.7	0.21		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP3 GC-1	1	11/21/07	21.34	394.2	0.17	0.17	3.7E-03	81.66	487.6	0.28	0.27	8.1E-03
				21.98	402.2	0.17			62.57	364.4	0.27		
				16.73	303.7	0.17			52.96	302.4	0.27		
				17.73	313.8	0.17			54.82	307.5	0.26		
				17.00	298.7	0.17			51.79	287.0	0.26		
		2	11/21/07	20.20	336.9	0.16	0.15	4.7E-03	60.94	276.4	0.21	0.21	5.6E-03
				16.95	275.7	0.15			58.39	261.3	0.21		
				19.62	311.5	0.15			56.28	246.0	0.21		
				18.00	281.1	0.15			58.82	253.8	0.20		
				16.81	259.9	0.15			62.89	266.8	0.20		
		3	11/21/07	8.70	367.9	0.40	0.39	5.4E-03	49.95	536.1	0.50	0.51	6.5E-03
				7.44	310.5	0.39			40.17	441.4	0.52		
				6.76	283.6	0.39			34.98	378.2	0.51		
				7.85	325.1	0.39			30.58	326.3	0.50		
				7.50	305.8	0.38			35.74	380.5	0.50		
		4	11/21/07	10.54	440.3	0.39	0.38	1.2E-02	45.87	433.1	0.44	0.43	8.3E-03
				8.66	348.8	0.38			40.08	376.9	0.44		
				7.90	316.3	0.38			39.62	365.0	0.43		
				8.31	323.1	0.37			49.35	450.1	0.43		
				9.51	365.4	0.36			43.20	390.4	0.42		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt-ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP3 GC-2	1	11/21/07	14.19	575.9	0.38	0.38	2.7E-03	80.48	1129.8	0.66	0.63	2.1E-02
				9.92	409.6	0.39			49.97	683.2	0.64		
				9.87	405.3	0.39			39.28	525.7	0.63		
				6.42	262.7	0.38			34.87	456.3	0.62		
				8.28	336.9	0.38			30.39	393.3	0.61		
		2	11/21/07	5.87	390.9	0.63	0.60	2.0E-02	43.56	663.2	0.72	0.73	3.0E-02
				5.02	321.2	0.60			35.75	540.6	0.71		
				6.74	421.9	0.59			23.43	351.6	0.71		
				4.76	307.8	0.61			22.95	378.9	0.78		
				5.66	345.4	0.57			21.06	333.4	0.74		
		3	11/21/07	7.50	335.0	0.42	0.41	8.0E-03	38.62	514.9	0.63	0.61	1.1E-02
				8.69	384.5	0.42			26.81	355.7	0.62		
				7.93	349.7	0.41			26.00	336.3	0.61		
				6.58	288.1	0.41			27.01	349.7	0.61		
				9.68	410.8	0.40			23.96	307.1	0.60		
		4	11/21/07	6.90	450.2	0.61	0.58	2.8E-02	28.85	484.9	0.79	0.78	1.4E-02
				7.05	446.1	0.60			21.49	360.8	0.79		
				6.87	426.9	0.58			20.23	337.1	0.78		
				7.74	468.1	0.57			54.38	881.5	0.76		
				6.83	391.5	0.54			21.61	350.1	0.76		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP3 GC-3	1	11/26/07	12.67	341.3	0.25	0.24	1.2E-02	40.67	326.7	0.38	0.36	1.6E-02
				11.23	297.9	0.25			33.11	259.2	0.37		
				18.03	458.7	0.24			47.58	353.1	0.35		
				13.80	340.2	0.23			49.67	367.5	0.35		
				13.37	319.3	0.22			43.89	317.1	0.34		
		2	11/26/07	11.37	464.8	0.38	0.37	1.6E-02	45.17	424.2	0.44	0.42	1.3E-02
				10.23	410.8	0.38			39.15	361.6	0.43		
				9.23	362.7	0.37			43.95	396.1	0.42		
				8.36	316.9	0.36			40.77	361.5	0.42		
				9.87	363.3	0.35			42.61	369.9	0.41		
		3	11/26/07	7.87	570.5	0.68	0.66	2.3E-02	25.92	528.8	0.96	0.93	2.1E-02
				7.43	530.3	0.67			21.67	432.1	0.94		
				5.11	356.6	0.66			22.11	433.9	0.92		
				6.37	437.3	0.65			15.92	309.2	0.91		
				6.05	401.1	0.62			17.20	332.0	0.91		
		4	11/26/07	17.73	1114.4	0.59	0.57	2.6E-02	22.02	295.5	0.63	0.65	1.4E-02
				6.14	384.9	0.59			26.08	367.4	0.66		
				6.80	413.8	0.57			25.37	354.2	0.66		
				7.20	423.6	0.55			22.30	308.8	0.65		
				7.45	420.2	0.53			26.67	358.4	0.63		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permit -tivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP3 GC-4	1	11/26/07	10.92	486.9	0.42	0.39	1.9E-02	31.03	473.5	0.72	0.68	2.9E-02
				10.58	451.4	0.40			22.43	330.4	0.69		
				8.98	374.6	0.39			41.98	606.9	0.68		
				8.61	347.0	0.38			38.70	540.0	0.66		
				8.92	351.9	0.37			22.95	314.5	0.64		
		2	11/26/07	11.89	265.4	0.21	0.23	2.1E-02	57.08	325.5	0.27	0.25	1.9E-02
				10.92	302.5	0.26			71.02	399.9	0.26		
				11.31	300.8	0.25			60.37	305.6	0.24		
				12.34	308.1	0.23			61.61	306.9	0.23		
				14.48	336.4	0.22			96.77	468.3	0.23		
		3	11/26/07	10.36	240.8	0.22	0.23	8.0E-03	45.67	387.0	0.40	0.38	1.6E-02
				21.96	556.6	0.24			40.55	338.8	0.39		
				10.52	261.2	0.23			42.18	339.8	0.38		
				12.45	304.4	0.23			40.61	321.2	0.37		
				12.77	302.5	0.22			37.89	289.3	0.36		
		4	11/26/07	18.80	414.7	0.21	0.19	1.1E-02	35.42	447.8	0.59	0.49	5.7E-02
				15.08	319.6	0.20			19.80	193.3	0.46		
				16.86	347.7	0.19			22.70	230.4	0.48		
				15.20	300.3	0.19			32.12	323.0	0.47		
				22.78	436.6	0.18			27.30	268.7	0.46		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP4 GC-1	1	11/26/07	5.89	392.9	0.63	0.60	2.6E-02	54.14	1154.5	1.00	0.94	4.7E-02
				5.48	355.8	0.61			26.30	542.3	0.97		
				5.30	335.7	0.60			24.05	479.5	0.94		
				5.95	373.0	0.59			25.98	503.4	0.91		
				7.08	419.9	0.56			27.61	518.1	0.88		
		2	11/26/07	11.96	842.8	0.66	0.59	5.4E-02	27.83	356.0	0.60	0.57	2.2E-02
				9.08	596.4	0.62			29.42	368.1	0.59		
				9.95	616.7	0.58			26.61	324.3	0.57		
				9.11	527.3	0.54			27.12	322.3	0.56		
				7.36	415.9	0.53			28.92	335.6	0.55		
		3	11/26/07	7.70	547.7	0.67	0.63	2.8E-02	28.89	628.5	1.02	0.98	3.3E-02
				6.42	433.6	0.64			20.11	430.6	1.01		
				7.45	489.8	0.62			18.08	380.1	0.99		
				6.48	423.3	0.61			21.11	430.8	0.96		
				7.81	493.9	0.59			20.05	401.4	0.94		
		4	11/26/07	6.70	445.6	0.63	0.58	3.7E-02	20.42	299.5	0.69	0.64	2.8E-02
				6.61	431.4	0.61			27.92	386.9	0.65		
				7.03	438.6	0.59			24.05	322.2	0.63		
				6.27	376.4	0.56			23.48	313.3	0.63		
				6.37	361.0	0.53			22.52	296.9	0.62		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permit -tivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP4 GC-2	1	11/27/07	5.02	419.2	0.79	0.76	1.3E-02	28.40	711.2	1.18	1.18	7.1E-03
				5.34	430.6	0.76			15.75	397.3	1.19		
				6.33	508.6	0.76			12.58	316.2	1.18		
				8.80	703.3	0.75			12.11	308.1	1.20		
				5.84	475.3	0.77			13.05	328.0	1.18		
		2	11/27/07	11.02	494.2	0.42	0.42	2.4E-03	30.12	442.4	0.69	0.71	1.3E-02
				11.34	506.3	0.42			31.55	483.7	0.72		
				8.27	366.1	0.42			27.05	413.2	0.72		
				9.77	436.3	0.42			20.23	309.7	0.72		
				8.08	357.7	0.42			22.75	347.8	0.72		
		3	11/27/07	10.55	727.5	0.65	0.64	4.8E-03	46.39	1068.2	1.08	1.07	1.3E-02
				9.40	640.7	0.64			27.39	629.2	1.08		
				6.53	447.0	0.64			20.23	458.6	1.07		
				5.67	384.0	0.64			22.67	509.3	1.06		
				5.33	361.3	0.64			21.20	475.7	1.06		
		4	11/27/07	14.89	372.5	0.24	0.23	6.1E-03	43.77	310.0	0.33	0.27	4.6E-02
				9.58	242.1	0.24			47.15	306.5	0.31		
				11.64	288.8	0.23			46.14	243.9	0.25		
				11.61	283.6	0.23			47.17	236.3	0.24		
				15.98	377.1	0.22			50.92	248.3	0.23		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

				50 mm constant head					10 mm constant head				
Identification		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP4 GC-3	1	11/27/07	8.77	434.4	0.47	0.44	2.9E-02	33.53	693.3	0.97	0.92	3.9E-02
				8.78	425.0	0.46			14.27	288.2	0.95		
				8.33	391.8	0.44			18.42	360.0	0.92		
				7.55	338.1	0.42			19.36	368.7	0.90		
				10.61	444.6	0.39			17.89	333.4	0.88		
		2	11/27/07	7.95	558.2	0.66	0.62	3.8E-02	29.55	559.4	0.89	0.89	3.6E-03
				6.92	474.0	0.64			25.67	484.5	0.89		
				6.15	405.9	0.62			20.23	379.8	0.88		
				7.15	444.7	0.58			17.89	336.2	0.88		
				7.70	468.4	0.57			17.52	328.5	0.88		
		3	11/27/07	7.17	362.9	0.48	0.46	1.5E-02	29.67	598.5	0.95	0.89	3.9E-02
				17.36	839.2	0.45			19.23	375.3	0.92		
				10.48	515.6	0.46			22.30	421.1	0.89		
				7.14	343.3	0.45			17.77	327.2	0.87		
				8.05	371.4	0.43			18.33	332.4	0.85		
		4	11/27/07	7.08	485.2	0.64	0.60	3.6E-02	22.87	391.8	0.81	0.81	6.4E-03
				7.09	478.7	0.63			22.20	384.0	0.81		
				8.05	503.7	0.59			20.15	352.7	0.82		
				6.92	421.5	0.57			22.30	385.4	0.81		
				5.55	333.7	0.57			27.42	476.4	0.82		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
EAU CLAIRE	TP4 GC-4	1	11/27/07	8.62	401.6	0.44	0.41	1.6E-02	33.23	541.6	0.77	0.71	4.8E-02
				16.55	727.5	0.41			20.30	321.0	0.74		
				9.09	392.9	0.41			22.95	354.6	0.73		
				8.05	345.8	0.40			17.81	249.5	0.66		
				8.73	367.3	0.40			23.02	326.2	0.67		
		2	11/27/07	11.61	718.8	0.58	0.54	3.7E-02	21.20	333.9	0.74	0.71	3.9E-02
				6.98	425.4	0.57			20.93	327.5	0.74		
				7.95	456.5	0.54			24.21	369.0	0.72		
				8.92	487.9	0.51			22.73	333.2	0.69		
				9.05	477.8	0.50			20.31	279.2	0.65		
		3	11/27/07	11.34	286.9	0.24	0.22	1.3E-02	39.61	439.1	0.52	0.49	2.2E-02
				15.80	369.8	0.22			28.02	299.3	0.50		
				15.55	351.8	0.21			42.98	451.3	0.49		
				15.09	332.4	0.21			33.59	352.2	0.49		
				12.25	265.9	0.20			28.14	275.8	0.46		
		4	11/27/07	11.02	474.7	0.41	0.36	3.5E-02	38.52	436.6	0.53	0.53	1.1E-02
				9.70	397.0	0.38			29.17	333.9	0.54		
				9.46	354.2	0.35			34.39	384.4	0.53		
				8.09	289.5	0.34			29.45	326.4	0.52		
				12.36	418.9	0.32			31.39	340.2	0.51		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

				50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt-ivity ψ (s^{-1})	Mean	Std. Dev.
HELENA	GC - AB	1	09/11/08	16.68	630.2	0.36	0.34	2.7E-02	28.45	535.5	0.89	0.83	4.4E-02
				12.48	457.5	0.34			23.05	416.8	0.85		
				16.87	584.5	0.33			24.45	429.6	0.83		
				14.61	482.0	0.31			24.84	426.2	0.81		
				13.67	550.8	0.38			31.83	519.7	0.77		
		2	09/11/08	12.48	921.2	0.69	0.65	3.9E-02	26.17	644.2	1.16	1.08	5.7E-02
				8.02	573.9	0.67			14.02	333.0	1.12		
				8.20	570.2	0.65			18.71	411.6	1.03		
				10.55	698.8	0.62			17.37	391.5	1.06		
				12.56	796.6	0.60			19.45	423.2	1.02		
		3	09/11/08	15.86	462.1	0.27	0.25	1.7E-02	10.23	514.5	2.36	2.23	1.1E-01
				17.33	489.5	0.27			14.89	725.1	2.29		
				16.52	453.8	0.26			7.78	377.1	2.28		
				14.53	371.6	0.24			12.08	546.0	2.13		
				13.40	334.4	0.23			12.39	554.0	2.10		
		4	09/11/08	8.83	734.1	0.78	0.70	6.9E-02	20.45	327.9	0.75	0.72	2.8E-02
				6.42	516.2	0.76			32.70	513.4	0.74		
				7.39	542.7	0.69			41.30	635.3	0.72		
				7.40	511.4	0.65			45.55	681.4	0.70		
				13.17	868.7	0.62			28.86	419.3	0.68		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
OMAHA	GC - CB	1	07/11/08	43.05	337.8	0.07	0.07	1.1E-03	38.08	218.5	0.27	0.23	3.2E-02
				53.08	421.3	0.07			51.96	283.7	0.26		
				43.10	345.6	0.08			39.71	190.7	0.23		
				37.80	299.5	0.07			41.11	182.4	0.21		
				51.03	393.2	0.07			43.59	181.0	0.20		
		2	07/11/08	12.14	424.0	0.33	0.28	3.9E-02	20.95	406.5	0.91	0.77	1.1E-01
				12.52	407.1	0.31			35.83	645.1	0.85		
				15.23	446.9	0.28			21.25	338.7	0.75		
				17.09	450.1	0.25			27.11	407.0	0.71		
				9.80	246.1	0.24			20.95	281.3	0.63		
		3	07/11/08	22.39	771.6	0.32	0.28	3.5E-02	40.36	271.3	0.32	0.30	1.3E-02
				13.80	450.6	0.31			46.05	301.0	0.31		
				11.17	336.9	0.28			61.11	386.5	0.30		
				13.02	371.1	0.27			33.58	208.9	0.29		
				15.30	379.6	0.23			30.46	183.5	0.28		
		4	07/11/08	10.36	754.2	0.68	0.60	5.8E-02	18.45	390.5	1.00	0.96	4.2E-02
				14.08	956.9	0.64			13.48	283.8	0.99		
				9.64	608.5	0.59			15.65	325.2	0.98		
				10.36	619.4	0.56			15.92	313.4	0.93		
				8.42	485.1	0.54			12.33	236.6	0.90		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	**Volume (cm^3)**	**Permittivity ψ (s^{-1})**	**Mean**	**Std. Dev.**	**Time (s)**	**Volume (cm^3)**	**Permitt -ivity ψ (s^{-1})**	**Mean**	**Std. Dev.**
OMAHA	GC - CM	1	07/11/08	11.42	742.4	0.61	0.52	6.5E-02	25.23	322.5	0.60	0.58	1.4E-02
				10.40	604.7	0.55			23.86	297.4	0.59		
				12.05	649.3	0.51			18.65	231.0	0.58		
				9.77	491.3	0.47			20.86	252.9	0.57		
				9.83	468.0	0.45			23.28	279.6	0.56		
		2	07/11/08	15.11	769.9	0.48	0.43	3.8E-02	24.70	407.5	0.78	0.74	2.6E-02
				7.05	336.3	0.45			19.80	316.1	0.75		
				10.59	479.6	0.43			24.89	381.2	0.72		
				10.52	446.7	0.40			19.18	298.7	0.73		
				9.86	403.5	0.38			20.86	314.5	0.71		
		3	07/11/08	7.98	545.7	0.64	0.56	5.8E-02	23.86	372.4	0.73	0.71	1.9E-02
				5.61	353.5	0.59			22.89	350.2	0.72		
				9.02	533.3	0.56			28.21	421.3	0.70		
				9.80	546.8	0.52			27.67	404.7	0.69		
				9.83	517.4	0.49			22.61	351.0	0.73		
		4	07/11/08	16.31	1079.9	0.62	0.56	4.4E-02	21.46	500.7	1.10	1.03	4.0E-02
				6.17	376.5	0.57			16.02	346.2	1.02		
				8.34	484.9	0.55			14.09	310.8	1.04		
				9.67	543.8	0.53			16.55	359.0	1.02		
				10.20	551.6	0.51			15.78	332.2	0.99		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

Identification		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.
OMAHA	GC - A1B	1	07/11/08	19.11	600.0	0.30	0.24	3.8E-02	47.89	215.2	0.21	0.20	7.5E-03
				14.42	394.8	0.26			59.36	255.1	0.20		
				14.56	366.7	0.24			44.30	185.5	0.20		
				15.58	357.3	0.22			51.58	210.8	0.19		
				15.45	325.0	0.20			52.11	228.2	0.21		
		2	07/11/08	13.93	454.2	0.31	0.27	2.5E-02	32.64	323.7	0.47	0.42	3.2E-02
				12.89	391.4	0.29			25.11	233.4	0.44		
				18.64	530.4	0.27			23.11	201.6	0.41		
				11.61	314.8	0.25			26.90	227.9	0.40		
				11.87	308.2	0.24			21.15	173.3	0.39		
		3	07/11/08	11.61	677.6	0.55	0.45	6.7E-02	24.17	330.4	0.64	0.57	4.3E-02
				9.95	506.2	0.48			69.08	856.6	0.58		
				9.84	455.0	0.43			28.81	343.3	0.56		
				7.55	329.8	0.41			26.92	311.3	0.54		
				9.67	384.5	0.37			25.64	292.1	0.54		
		4	07/11/08	12.40	686.1	0.52	0.48	3.6E-02	20.42	351.3	0.81	0.73	5.5E-02
				8.33	450.1	0.51			23.28	380.2	0.77		
				11.36	585.3	0.48			22.18	342.4	0.73		
				14.21	679.2	0.45			25.37	376.4	0.70		
				9.58	444.5	0.44			25.05	358.4	0.67		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head					10 mm constant head				
				Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permit -tivity ψ (s^{-1})	Mean	Std. Dev.
OMAHA	GC - A2B	1	07/11/08	15.86	521.4	0.31	0.23	5.6E-02	23.02	204.6	0.42	0.42	1.9E-02
				10.52	292.8	0.26			25.03	219.9	0.41		
				12.77	283.9	0.21			34.05	331.9	0.46		
				12.80	259.9	0.19			20.36	177.9	0.41		
				14.48	266.9	0.17			21.36	192.4	0.42		
		2	07/11/08	11.45	441.9	0.36	0.32	2.9E-02	22.45	378.6	0.79	0.71	5.7E-02
				9.80	354.8	0.34			20.27	323.9	0.75		
				11.70	399.8	0.32			24.73	367.1	0.70		
				15.23	489.1	0.30			34.89	501.3	0.68		
				9.70	300.7	0.29			15.30	212.8	0.65		
		3	07/11/08	13.28	668.5	0.47	0.36	7.4E-02	46.67	356.2	0.36	0.31	3.2E-02
				8.73	366.8	0.40			72.48	504.7	0.33		
				9.70	360.6	0.35			159.80	1017.4	0.30		
				9.67	324.5	0.32			26.42	162.5	0.29		
				10.68	324.0	0.29			37.03	221.3	0.28		
		4	07/11/08	8.78	500.0	0.54	0.48	4.7E-02	23.36	447.6	0.90	0.81	6.3E-02
				6.65	363.2	0.51			21.17	381.3	0.85		
				8.83	440.6	0.47			21.02	362.8	0.81		
				10.86	509.2	0.44			16.64	273.8	0.77		
				9.52	430.7	0.43			19.84	312.4	0.74		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
UNDERWOOD	GC - CC3	1	08/07/08	13.65	462.9	0.32	0.25	5.5E-02	30.77	625.1	0.96	0.87	1.0E-01
				15.89	487.8	0.29			22.50	455.1	0.95		
				16.14	404.2	0.24			59.83	1154.3	0.91		
				24.52	544.1	0.21			24.14	431.1	0.84		
				18.56	370.0	0.19			25.18	382.6	0.71		
		2	08/07/08	12.43	568.0	0.43	0.37	4.7E-02	27.52	240.3	0.41	0.40	8.0E-03
				13.14	571.0	0.41			30.09	261.5	0.41		
				8.96	356.2	0.37			28.36	245.0	0.41		
				10.83	399.3	0.35			44.36	373.3	0.40		
				13.67	454.9	0.31			45.55	380.4	0.39		
		3	08/07/08	9.45	676.4	0.67	0.65	2.8E-02	44.27	987.6	1.05	0.98	5.2E-02
				9.73	698.4	0.67			22.11	473.1	1.01		
				8.92	627.2	0.66			17.14	351.3	0.96		
				8.89	606.9	0.64			19.27	388.3	0.95		
				9.83	635.4	0.61			17.12	333.6	0.92		
		4	08/07/08	32.30	516.5	0.15	0.15	2.2E-03	16.33	356.7	1.03	0.97	4.2E-02
				18.33	292.0	0.15			14.92	314.3	0.99		
				26.77	417.9	0.15			18.08	381.3	0.99		
				21.71	343.4	0.15			20.20	398.7	0.93		
				22.95	354.1	0.15			16.58	329.2	0.93		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

ID		#	Date	50 mm constant head: Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	10 mm constant head: Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
UNDERWOOD	GC - CC5	1	08/07/08	6.71	441.3	0.62	0.60	2.6E-02	29.78	760.3	1.20	1.13	4.5E-02
				7.48	491.3	0.62			16.42	400.6	1.15		
				8.80	569.9	0.61			24.58	585.9	1.12		
				6.83	432.4	0.60			12.52	293.1	1.10		
				8.70	513.2	0.55			14.48	334.0	1.08		
		2	08/07/08	6.77	485.8	0.67	0.63	4.2E-02	19.52	335.9	0.81	0.78	1.9E-02
				10.77	758.6	0.66			23.48	389.8	0.78		
				9.61	638.0	0.62			17.12	284.2	0.78		
				8.05	516.1	0.60			19.77	322.5	0.77		
				7.58	460.9	0.57			19.17	309.6	0.76		
		3	08/07/08	7.90	412.4	0.49	0.47	2.1E-02	23.67	433.2	0.86	0.83	3.2E-02
				14.68	751.2	0.48			20.52	371.1	0.85		
				11.33	564.8	0.47			16.70	297.7	0.84		
				9.64	461.6	0.45			22.86	391.0	0.80		
				9.11	426.5	0.44			19.64	327.3	0.78		
		4	08/07/08	9.23	787.8	0.80	0.70	8.6E-02	22.05	370.6	0.79	0.77	2.0E-02
				10.83	882.7	0.77			17.83	300.2	0.79		
				8.40	622.4	0.70			17.14	283.6	0.78		
				8.68	594.5	0.64			27.02	440.9	0.77		
				8.14	512.2	0.59			21.78	343.8	0.74		

Table S2. Permittivity of GDLs (ASTM D 4491) (Continued).

				50 mm constant head					10 mm constant head				
ID		#	Date	Time (s)	Volume (cm^3)	Permittivity ψ (s^{-1})	Mean	Std. Dev.	Time (s)	Volume (cm^3)	Permitt -ivity ψ (s^{-1})	Mean	Std. Dev.
UNDERWOOD	GC - ET	1	08/07/08	7.53	508.7	0.64	0.53	9.3E-02	21.08	521.4	1.16	1.13	3.4E-02
				8.67	554.0	0.60			11.89	282.2	1.12		
				10.27	593.0	0.54			15.78	366.5	1.09		
				10.45	521.6	0.47			16.67	412.3	1.16		
				9.87	428.6	0.41			17.77	415.2	1.10		
		2	08/07/08	7.73	685.8	0.83	0.77	5.6E-02	40.05	744.0	0.87	0.74	1.1E-01
				7.64	660.2	0.81			25.77	445.3	0.81		
				8.27	691.2	0.79			22.42	361.2	0.76		
				7.52	592.1	0.74			21.52	297.4	0.65		
				10.23	757.0	0.70			24.02	315.2	0.62		
		3	08/07/08	10.83	618.3	0.54	0.52	1.9E-02	23.95	594.4	1.17	1.08	5.6E-02
				10.20	580.4	0.54			16.77	392.8	1.10		
				7.30	407.8	0.53			16.83	385.1	1.08		
				9.87	530.4	0.51			14.83	327.6	1.04		
				9.58	501.8	0.49			16.67	364.1	1.03		
		4	08/07/08	14.31	1172.7	0.77	0.70	6.9E-02	30.52	545.8	0.84	1.00	1.9E-01
				5.73	465.2	0.76			68.45	1106.4	0.76		
				8.73	650.5	0.70			20.14	495.6	1.16		
				17.05	1179.0	0.65			13.11	317.8	1.14		
				7.77	505.6	0.61			11.67	274.4	1.11		

Table S3. Ply adhesion (N/m) of GDLs (ASTM D 7005).

	APPLE VALLEY				ALTAMONT	
	Composite Lys. Base		Clay-Lys. Base-1		CMP-GC3	
	A	B	A	B	A	B
1	241	276	314	388	935	844
2	383	228	312	298	1168	694
3	312	399	392	274	548	686
4	325	435	378	423	742	976
5	465	438	302	387	564	1179
	BOARDMAN					
	Composite 1 Upper		Thin Cover		Thick Cover 3	
	A	B	A	B	A	B
1	1199	1107	762	1038	870	947
2	873	796	771	795	724	833
3	563	266	769	755	719	610
4	288	451	696	838	871	779
5	219	763	757	652	576	769
	CEDAR RAPIDS					
	Clay Bottom 1		Composite Bottom		Bottom Composite 4	
	A	B	A	B	A	B
1	311	688	309	276	148	237
2	293	611	330	302	265	142
3	269	522	164	245	223	198
4	547	286	166	283	265	258
5	471	243	172	220	155	219
	EAU CLAIRE					
	TP1-GC-1		TP1-GC-2		TP1-GC-3	
	A	B	A	B	A	B
1	374	-	287	309	228	204
2	48	-	379	321	222	190
3	240	32	363	428	200	105
4	-	-	387	305	124	223
5	31	294	292	373	47	238

* All results are in N/m.
* A and B represent a randomly assigned top and bottom of the sample.

Table S3. Ply adhesion (N/m) of GDLs (ASTM D 7005) (Continued).

	EAU CLAIRE					
	TP2-GC-1		TP2-GC-2		TP2-GC-3	
	A	B	A	B	A	B
1	439	479	409	767	384	414
2	505	413	622	322	470	354
3	575	438	249	850	543	283
4	538	438	751	260	467	568
5	693	398	136	726	356	486
	EAU CLAIRE					
	TP3-GC-1		**TP3-GC-2**		**TP3-GC-3**	
	A	**B**	**A**	**B**	**A**	**B**
1	453	331	647	383	316	487
2	540	454	694	431	442	438
3	500	494	516	485	601	359
4	327	401	354	527	607	411
5	372	516	362	474	551	476
	EAU CLAIRE					
	TP3-GC-4		**TP4-GC-1**		**TP4-GC-2**	
	A	**B**	**A**	**B**	**A**	**B**
1	130	371	593	986	514	490
2	297	329	973	231	418	524
3	179	154	686	156	424	318
4	243	336	414	787	701	428
5	409	221	241	735	637	356
	EAU CLAIRE				**HELENA**	
	TP4-GC-3		**TP4-GC-4**		**GC-AB1**	
	A	**B**	**A**	**B**	**A**	**B**
1	639	640	600	484	171	703
2	638	397	685	506	109	779
3	536	848	485	464	1053	251
4	561	362	520	535	965	724
5	648	421	495	404	71	872

* All results are in N/m.
* A and B represent a randomly assigned top and bottom of the sample.

Table S3. Ply adhesion (N/m) of GDLs (ASTM D 7005) (Continued).

	OMAHA					
	GC-CB		GC-A1B		GC-A2B	
	A	B	A	B	A	B
1	297	216	337	514	312	124
2	322	226	472	308	395	254
3	193	287	398	444	260	365
4	345	217	362	562	415	266
5	336	218	504	562	359	129
	UNDERWOOD					
	GC-CC3		GC-CC5		GC-ET	
	A	B	A	B	A	B
1	666	338	356	533	1178	2065
2	101	725	270	548	1532	1234
3	533	665	858	379	1466	1595
4	792	962	909	347	1206	1252
5	658	391	647	191	1095	1609

* All results are in N/m.
* A and B represent a randomly assigned top and bottom of the sample.

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10. SUPPLEMENTARY NOTES
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11. ABSTRACT (200 words or less)

This study demonstrates that engineering properties of cover soils change while in service and that long-term engineering properties should be used as input to models employed for performance assessments. Recommendations for appropriate input are made based on the data that were collected. Increases in the saturated hydraulic conductivity, saturated volumetric water content, and the air entry suction (as characterized by van Genuchten's alpha parameter) occurred due to formation of soil structure, regardless of climate, cover design, or service life. Substantial changes in hydraulic conductivity were observed in some geosynthetic clay liners (GCLs) that did not hydrate completely and underwent cation exchange. Changes in geomembranes and geosynthetic drainage layers were modest or small, and computations based on antioxidant depletion rates suggest that the minimum service life of geomembranes is in the order of 50-125 years (the actual service life will be longer). The findings indicate that covers should be monitored to ensure that they are functioning as intended. Monitoring using pan lysimeters combined with secondary measurements collected for interpretive purposes is recommended. Future research investments should include an evaluation of remote sensing technologies for cover monitoring and analog studies to estimate properties of earthen and geosynthetic cover materials corresponding to service lives of 100s to 1000s of years.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

alternative cover assessment program (ACAP)
changes in engineering properties of soils
engineered barriers
geomembrane (GM)
geosynthetic clay liner (GCL)
geosynthetics
long-term performance assessments
pan lysimeters
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