(1) For each reading from the gage we determine matric (suction) potential at the gage bulb as $|\psi| = |\psi_{gage}| + z_{ten}$. We then restore the negative sign to ψ and add elevation to get total head, H.

$H = -|\psi| + z = -(|\psi_{gage}| + z_{ten}) + z$. Use "B" as datum: $z_B = 0$, $z_A = +40\,cm$

Flow proceeds from high to low total head. If $H_A > H_B$, flow is ~~upwards~~ downwards. If $H_B > H_A$, flow is upwards.

	Condition 1	2	3	4	5
	{All values in cm}				
$\lvert\psi_{gage}\rvert_A$	123	106	9	211	20
H_A	$-(123+20)+40 = -103$	-86	$+11$	-191	0
$\lvert\psi_{gage}\rvert_B$	22	51	65	185	6
H_B	$-(22+20)+0 = -42$	-71	-85	-205	-26
	$H_B > H_A$	$H_B > H_A$	$H_A > H_B$	$H_A > H_B$	$H_A > H_B$
	Up	Up	Down	Down	Down

% Finer

Soil	Diameter (mm) 2.00	0.074	*0.05*	0.02	0.002	%Sand	%Silt	%Clay	Texture
A1	100	97	*89*	79	16	11	73	16	Silt Loam
B1	70	15	*11.9*	8	2	58	10	2	Gravelly Loamy Sand
C1	69	40	*34.2*	27	6	35	28	6	Gravelly Loam
D1	100	92	*84.4*	75	31	16	53	31	Silty Clay Loam

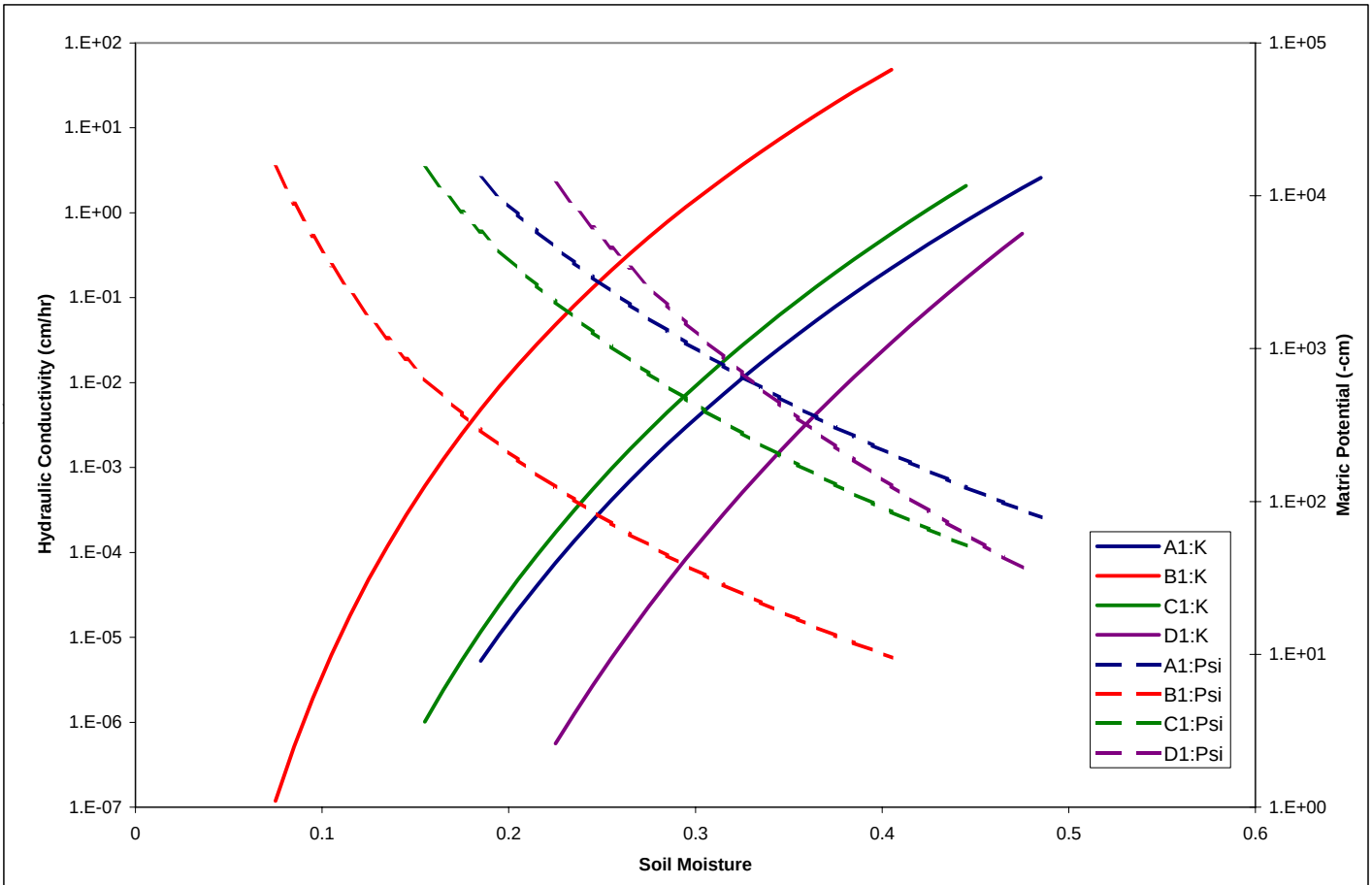
% Finer (excluding > 2 mm)

Soil	Diameter (mm) 2.00	0.074	*0.05*	0.02	0.002	%Sand	%Silt	%Clay	Texture
A1	100	97	*89*	79	16	11	73	16	Silt Loam (SIL)
B1	100	21	17	11	3	83	14	3	Loamy Sand (LS)
C1	100	58	50	39	9	50	41	9	Loam (L)
D1	100	92	*84.4*	75	31	16	53	31	Silty Clay Loam (SICL)

Table 6-1 Data

Soil	Porosity	Ksat (cm/s)	*Ksat (cm/hr)*	Psi_ae (cm)	b	Field Cap	Wilt. Pt.
A1	0.485	7.20E-04	*2.59*	-78.6	5.3	0.368	0.180
B1	0.410	1.56E-02	*56.16*	-9	4.38	0.179	0.075
C1	0.451	6.95E-04	*2.50*	-47.8	5.39	0.313	0.155
D1	0.477	1.70E-04	*0.61*	-35.6	7.75	0.357	0.219

	Soil A1		Soil B1		Soil C1		Soil D1	
θ	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*
0.075	2.45E-11	1556070	1.19E-07	15327	4.59E-11	756588	8.37E-16	60012628
0.085	1.34E-10	801555	5.16E-07	8859	2.58E-10	385364	8.48E-15	22749443
0.095	6.09E-10	444548	1.91E-06	5443	1.19E-09	211597	6.64E-14	9607480
0.105	2.38E-09	261547	6.20E-06	3511	4.74E-09	123376	4.23E-13	4423340
0.115	8.19E-09	161494	1.81E-05	2357	1.66E-08	75558	2.28E-12	2185542
0.125	2.54E-08	103808	4.82E-05	1636	5.24E-08	48205	1.06E-11	1145288
0.135	7.25E-08	69037	1.19E-04	1168	1.51E-07	31838	4.42E-11	630784
0.145	1.91E-07	47272	2.76E-04	854	4.05E-07	21660	1.66E-10	362548
0.155	4.74E-07	33197	6.04E-04	638	1.02E-06	15120	5.69E-10	216220
0.165	1.11E-06	23834	1.26E-03	485	2.40E-06	10794	1.81E-09	133189
0.175	2.47E-06	17448	2.52E-03	375	5.41E-06	7861	5.37E-09	84416
0.185	5.26E-06	12997	4.84E-03	294	1.16E-05	5826	1.50E-08	54877
0.195	1.08E-05	9833	8.99E-03	233	2.40E-05	4387	3.98E-08	36492
0.205	2.13E-05	7543	1.62E-02	187	4.78E-05	3350	1.00E-07	24767
0.215	4.06E-05	5860	2.84E-02	152	9.22E-05	2592	2.42E-07	17123
0.225	7.54E-05	4606	4.84E-02	125	1.73E-04	2029	5.62E-07	12038
0.235	1.36E-04	3658	8.07E-02	103	3.14E-04	1605	1.26E-06	8594
0.245	2.40E-04	2933	1.32E-01	86	5.58E-04	1282	2.71E-06	6222
0.255	4.14E-04	2372	2.11E-01	72	9.68E-04	1033	5.69E-06	4563
0.265	6.98E-04	1935	3.31E-01	61	1.64E-03	840	1.16E-05	3387
0.275	1.15E-03	1590	5.12E-01	52	2.74E-03	688	2.30E-05	2542
0.285	1.88E-03	1316	7.80E-01	44	4.48E-03	567	4.45E-05	1927
0.295	3.00E-03	1096	1.17E+00	38	7.21E-03	471	8.43E-05	1475
0.305	4.72E-03	918	1.73E+00	33	1.14E-02	394	1.56E-04	1139
0.315	7.32E-03	774	2.53E+00	29	1.78E-02	331	2.84E-04	887
0.325	1.12E-02	656	3.65E+00	25	2.74E-02	280	5.06E-04	696
0.335	1.69E-02	559	5.22E+00	22	4.16E-02	237	8.86E-04	551
0.345	2.52E-02	478	7.38E+00	19	6.24E-02	203	1.53E-03	438
0.355	3.72E-02	411	1.03E+01	17	9.24E-02	174	2.59E-03	351
0.365	5.43E-02	355	1.43E+01	15	1.36E-01	150	4.33E-03	283
0.375	7.84E-02	307	1.97E+01	13	1.97E-01	129	7.14E-03	230
0.385	1.12E-01	267	2.68E+01	12	2.83E-01	112	1.16E-02	187
0.395	1.59E-01	233	3.62E+01	11	4.03E-01	98	1.87E-02	154
0.405	2.23E-01	204	4.86E+01	9	5.68E-01	85	2.97E-02	127
0.415	3.11E-01	180			7.95E-01	75	4.66E-02	105
0.425	4.30E-01	158			1.10E+00	66	7.23E-02	87
0.435	5.90E-01	140			1.52E+00	58	1.11E-01	73
0.445	8.04E-01	124			2.08E+00	51	1.69E-01	61
0.455	1.09E+00	110					2.55E-01	51
0.465	1.46E+00	98					3.82E-01	43
0.475	1.95E+00	88					5.66E-01	37
0.485	2.59E+00	79						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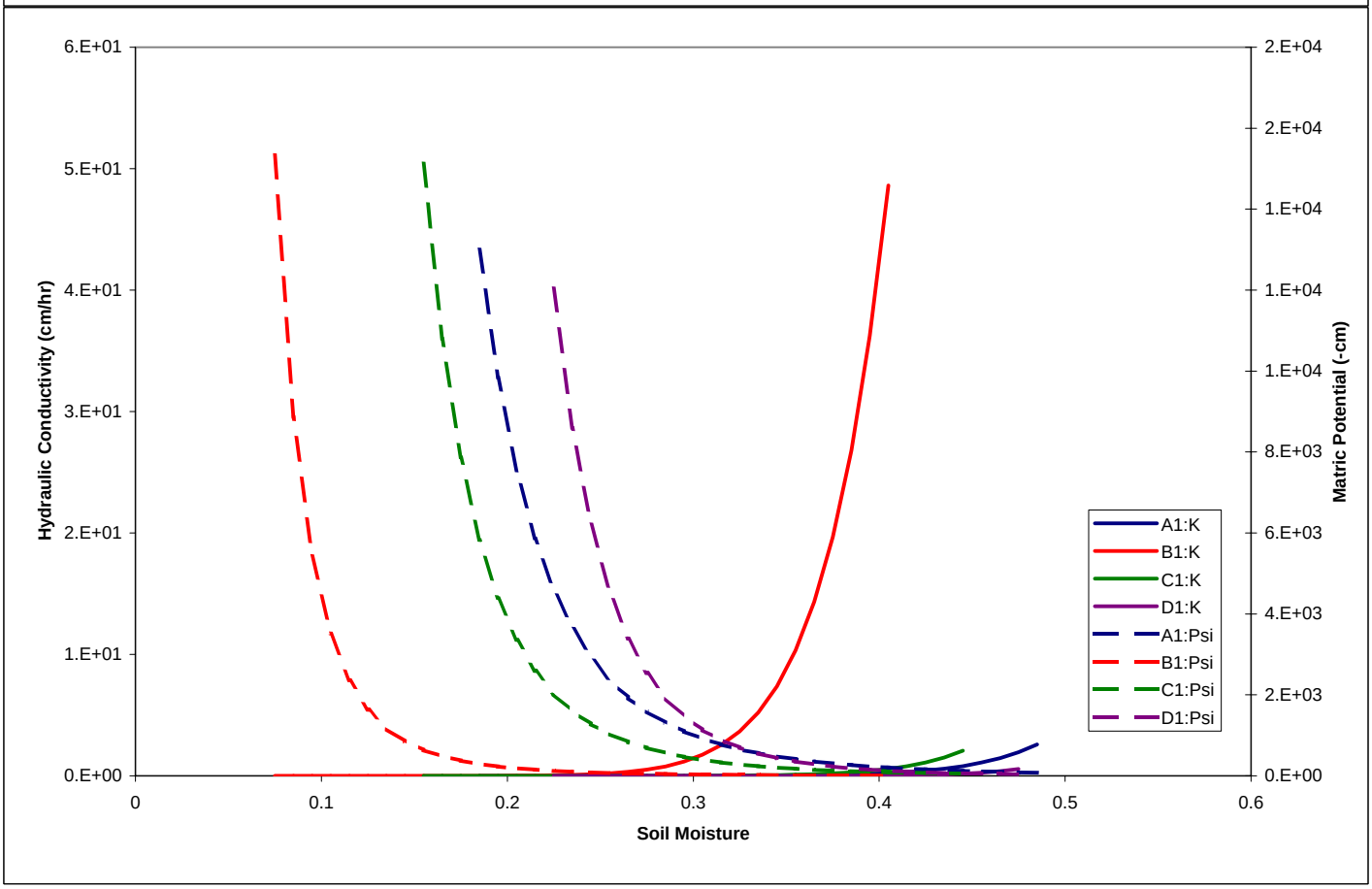
1.E-07
Hydraulic Conductivity (cm/hr)
1.E+05
1.E+04
1.E+03
1.E+02
1.E+01
1.E+00
Matric Potential (-cm)
0
0.1
0.2
0.3
0.4
0.5
0.6
Soil Moisture
A1:K
B1:K
C1:K
D1:K
A1:Psi
B1:Psi
C1:Psi
D1:Psi


6.E+01
5.E+01
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3.E+01
2.E+01
1.E+01
0.E+00
Hydraulic Conductivity (cm/hr)
2.E+04
2.E+04
1.E+04
1.E+04
1.E+04
8.E+03
6.E+03
4.E+03
2.E+03
0.E+00
Matric Potential (-cm)
0
0.1
0.2
0.3
0.4
0.5
0.6
Soil Moisture
A1:K
B1:K
C1:K
D1:K
A1:Psi
B1:Psi
C1:Psi
D1:Psi

Table 6-1 Data

Soil	Porosity	Ksat (cm/s)	*Ksat (cm/hr)*	Psi_ae (cm)	b	Field Cap	Wilt. Pt.	ResidWat
A1	0.485	7.20E-04	*2.59*	78.6	5.3	0.368	0.180	0.061
B1	0.410	1.56E-02	*56.16*	9	4.38	0.179	0.075	0.042
C1	0.451	6.95E-04	*2.50*	47.8	5.39	0.313	0.155	0.051
D1	0.477	1.70E-04	*0.61*	35.6	7.75	0.357	0.219	0.097

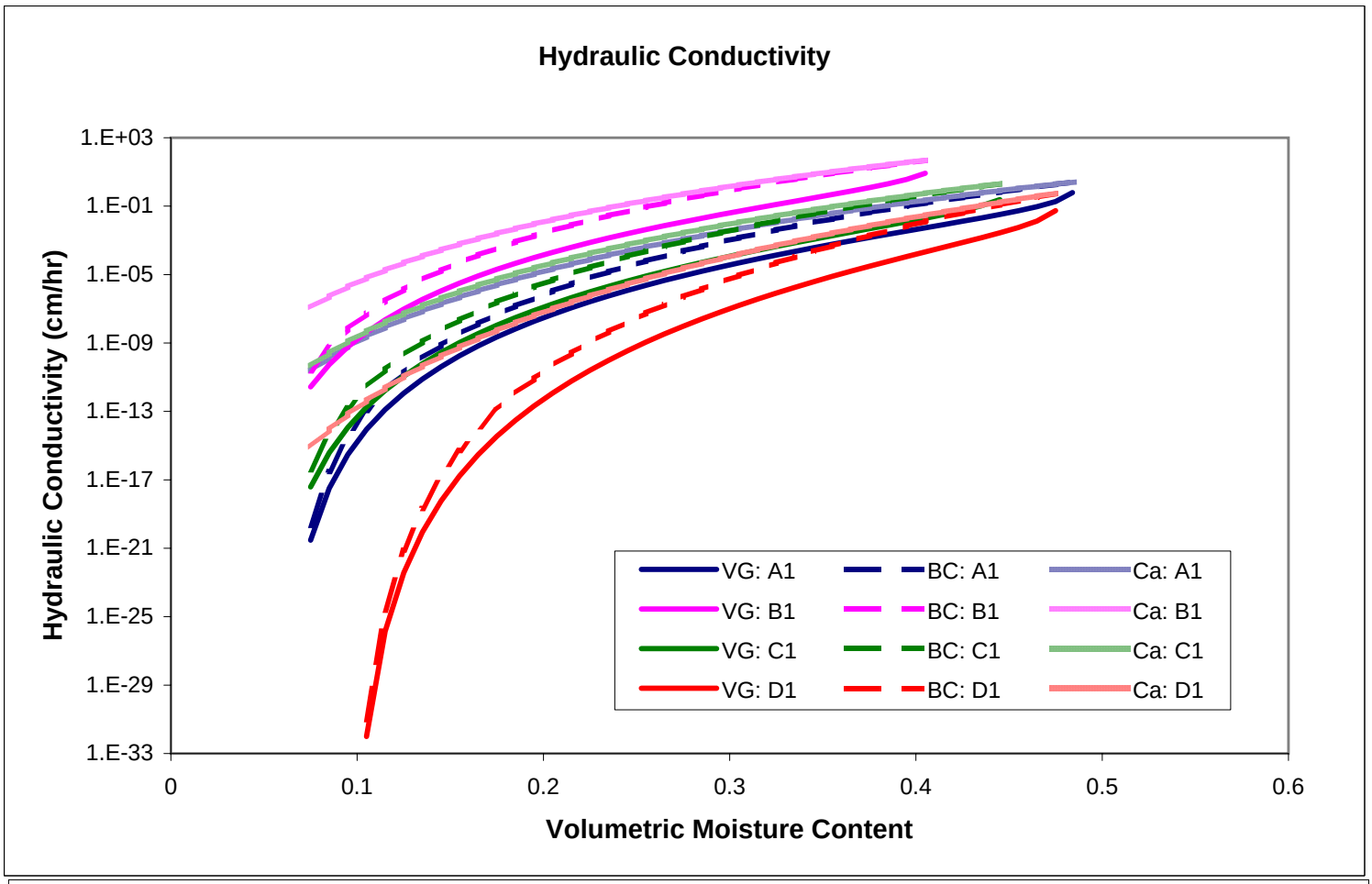
%Sand	%Silt	%Clay	Texture
11	73	16	Silt Loam (SIL)
83	14	3	Loamy Sand (LS)
50	41	9	Loam (L)
16	53	31	Silty Clay Loam (SICL)

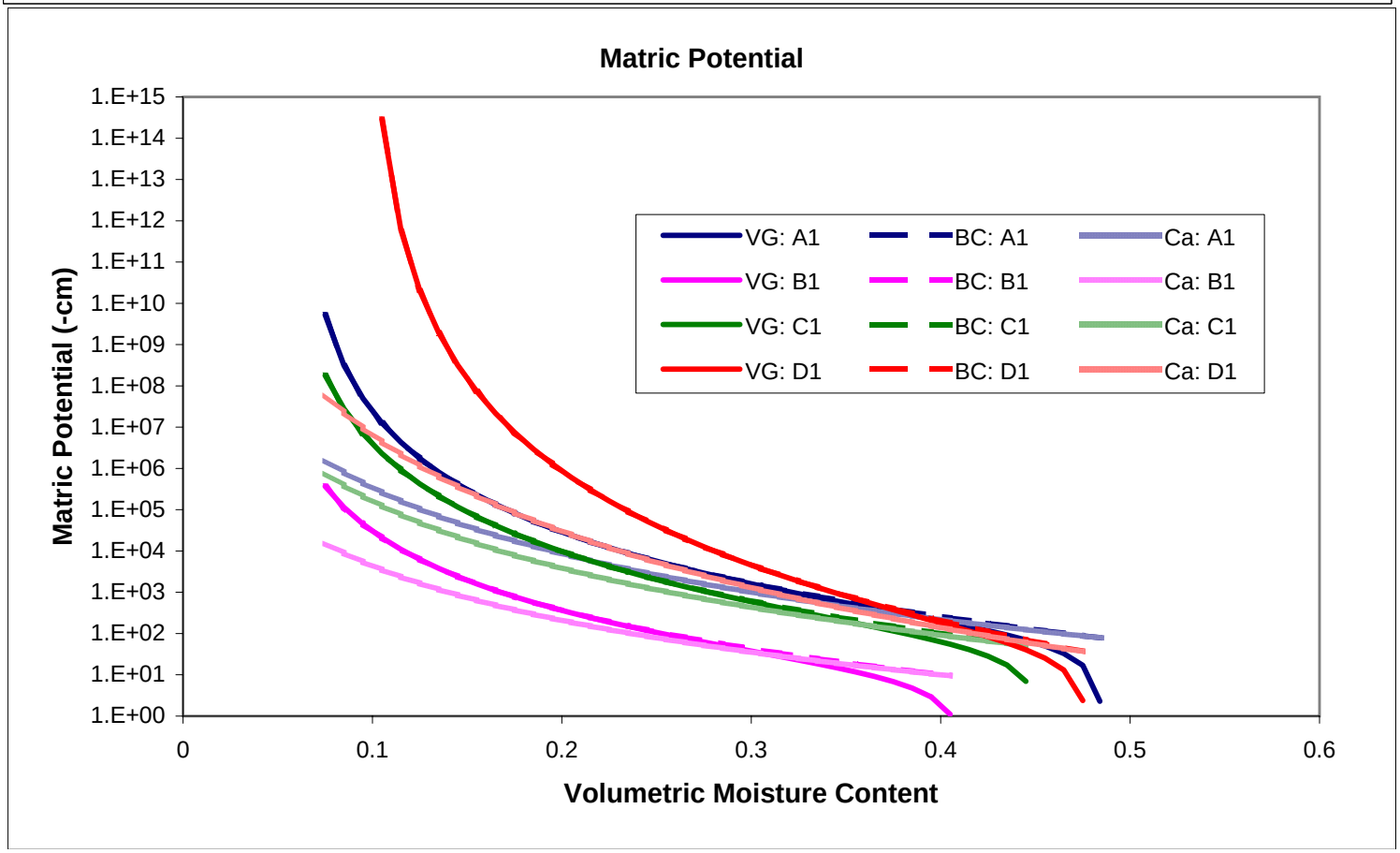
Van Genuchten

	Soil A1		Soil B1		Soil C1		Soil D1	
θ	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*
0.075	2.97E-21	5.26E+09	2.71E-12	3.68E+05	3.86E-18	1.80E+08		
0.085	3.25E-18	3.10E+08	5.53E-11	1.14E+05	3.87E-16	2.77E+07		
0.095	3.04E-16	4.94E+07	5.96E-10	4.51E+04	1.18E-14	6.93E+06		
0.105	8.79E-15	1.27E+07	4.24E-09	2.10E+04	1.77E-13	2.31E+06	9.98E-33	2.88E+14
0.115	1.27E-13	4.29E+06	2.25E-08	1.10E+04	1.68E-12	9.24E+05	1.41E-26	6.01E+11
0.125	1.17E-12	1.75E+06	9.65E-08	6.24E+03	1.15E-11	4.23E+05	3.71E-23	2.02E+10
0.135	7.82E-12	8.12E+05	3.50E-07	3.78E+03	6.20E-11	2.14E+05	8.75E-21	1.93E+09
0.145	4.10E-11	4.15E+05	1.11E-06	2.41E+03	2.76E-10	1.17E+05	5.74E-19	3.18E+08
0.155	1.79E-10	2.29E+05	3.17E-06	1.60E+03	1.05E-09	6.77E+04	1.71E-17	7.38E+07
0.165	6.70E-10	1.34E+05	8.27E-06	1.10E+03	3.56E-09	4.13E+04	2.96E-16	2.16E+07
0.175	2.23E-09	8.25E+04	2.00E-05	7.81E+02	1.09E-08	2.63E+04	3.48E-15	7.48E+06
0.185	6.69E-09	5.29E+04	4.55E-05	5.67E+02	3.04E-08	1.73E+04	3.03E-14	2.94E+06
0.195	1.85E-08	3.51E+04	9.79E-05	4.21E+02	7.91E-08	1.17E+04	2.10E-13	1.28E+06
0.205	4.74E-08	2.39E+04	2.01E-04	3.18E+02	1.93E-07	8.16E+03	1.20E-12	6.04E+05
0.215	1.14E-07	1.68E+04	3.94E-04	2.44E+02	4.45E-07	5.81E+03	5.89E-12	3.04E+05
0.225	2.60E-07	1.20E+04	7.48E-04	1.89E+02	9.78E-07	4.22E+03	2.54E-11	1.62E+05
0.235	5.65E-07	8.77E+03	1.37E-03	1.49E+02	2.06E-06	3.12E+03	9.82E-11	9.07E+04
0.245	1.18E-06	6.51E+03	2.45E-03	1.18E+02	4.16E-06	2.34E+03	3.45E-10	5.27E+04
0.255	2.35E-06	4.91E+03	4.25E-03	9.48E+01	8.14E-06	1.78E+03	1.12E-09	3.18E+04
0.265	4.56E-06	3.76E+03	7.22E-03	7.66E+01	1.54E-05	1.37E+03	3.37E-09	1.98E+04
0.275	8.55E-06	2.91E+03	1.20E-02	6.22E+01	2.84E-05	1.06E+03	9.54E-09	1.26E+04
0.285	1.56E-05	2.27E+03	1.97E-02	5.07E+01	5.11E-05	8.35E+02	2.55E-08	8.27E+03
0.295	2.78E-05	1.80E+03	3.18E-02	4.15E+01	8.98E-05	6.61E+02	6.48E-08	5.53E+03
0.305	4.83E-05	1.43E+03	5.07E-02	3.40E+01	1.55E-04	5.26E+02	1.58E-07	3.77E+03
0.315	8.24E-05	1.15E+03	7.99E-02	2.78E+01	2.62E-04	4.22E+02	3.67E-07	2.61E+03
0.325	1.38E-04	9.26E+02	1.25E-01	2.27E+01	4.36E-04	3.39E+02	8.26E-07	1.84E+03
0.335	2.27E-04	7.51E+02	1.95E-01	1.84E+01	7.17E-04	2.74E+02	1.80E-06	1.31E+03
0.345	3.68E-04	6.12E+02	3.04E-01	1.48E+01	1.17E-03	2.21E+02	3.79E-06	9.49E+02
0.355	5.90E-04	5.01E+02	4.75E-01	1.18E+01	1.88E-03	1.79E+02	7.78E-06	6.93E+02
0.365	9.34E-04	4.10E+02	7.49E-01	9.14E+00	3.00E-03	1.44E+02	1.56E-05	5.10E+02
0.375	1.46E-03	3.36E+02	1.21E+00	6.84E+00	4.78E-03	1.15E+02	3.07E-05	3.77E+02
0.385	2.28E-03	2.75E+02	2.02E+00	4.79E+00	7.61E-03	9.17E+01	5.92E-05	2.81E+02
0.395	3.53E-03	2.25E+02	3.66E+00	2.92E+00	1.22E-02	7.18E+01	1.13E-04	2.09E+02
0.405	5.45E-03	1.83E+02	8.41E+00	1.11E+00	1.97E-02	5.51E+01	2.12E-04	1.55E+02
0.415	8.41E-03	1.48E+02			3.25E-02	4.07E+01	3.98E-04	1.15E+02
0.425	1.30E-02	1.18E+02			5.58E-02	2.83E+01	7.48E-04	8.36E+01
0.435	2.04E-02	9.19E+01			1.04E-01	1.72E+01	1.42E-03	5.95E+01
0.445	3.24E-02	6.97E+01			2.41E-01	6.93E+00	2.76E-03	4.05E+01
0.455	5.32E-02	5.02E+01					5.68E-03	2.55E+01
0.465	9.26E-02	3.29E+01					1.33E-02	1.31E+01
0.475	1.85E-01	1.70E+01					5.43E-02	2.38E+00
0.484	6.16E-01	2.29E+00						

Brooks-Corey

	Soil A1		Soil B1		Soil C1		Soil D1	
θ	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*	*K(θ) (cm/hr)*	*|Ψ(θ)| (cm)*
0.075	2.15E-20	5.26E+09	2.33E-11	3.68E+05	3.87E-17	1.80E+08		
0.085	3.08E-17	3.10E+08	5.45E-10	1.14E+05	4.61E-15	2.77E+07		
0.095	3.42E-15	4.94E+07	6.53E-09	4.51E+04	1.59E-13	6.93E+06		
0.105	1.13E-13	1.27E+07	5.06E-08	2.10E+04	2.66E-12	2.31E+06	9.40E-32	2.88E+14
0.115	1.81E-12	4.29E+06	2.90E-07	1.10E+04	2.75E-11	9.24E+05	2.36E-25	6.01E+11
0.125	1.81E-11	1.75E+06	1.32E-06	6.24E+03	2.03E-10	4.23E+05	7.75E-22	2.02E+10
0.135	1.30E-10	8.12E+05	5.08E-06	3.78E+03	1.16E-09	2.14E+05	2.12E-19	1.93E+09
0.145	7.25E-10	4.15E+05	1.70E-05	2.41E+03	5.46E-09	1.17E+05	1.57E-17	3.18E+08
0.155	3.34E-09	2.29E+05	5.07E-05	1.61E+03	2.19E-08	6.77E+04	5.12E-16	7.38E+07
0.165	1.32E-08	1.34E+05	1.38E-04	1.11E+03	7.77E-08	4.13E+04	9.61E-15	2.16E+07
0.175	4.58E-08	8.25E+04	3.47E-04	7.84E+02	2.47E-07	2.63E+04	1.21E-13	7.48E+06
0.185	1.44E-07	5.29E+04	8.16E-04	5.70E+02	7.19E-07	1.73E+04	1.12E-12	2.94E+06
0.195	4.12E-07	3.51E+04	1.81E-03	4.24E+02	1.94E-06	1.17E+04	8.15E-12	1.28E+06
0.205	1.10E-06	2.40E+04	3.82E-03	3.21E+02	4.88E-06	8.18E+03	4.90E-11	6.04E+05
0.215	2.73E-06	1.68E+04	7.71E-03	2.47E+02	1.16E-05	5.83E+03	2.51E-10	3.04E+05
0.225	6.41E-06	1.20E+04	1.50E-02	1.93E+02	2.62E-05	4.24E+03	1.13E-09	1.62E+05
0.235	1.43E-05	8.80E+03	2.80E-02	1.53E+02	5.66E-05	3.14E+03	4.53E-09	9.07E+04
0.245	3.06E-05	6.54E+03	5.08E-02	1.22E+02	1.17E-04	2.36E+03	1.65E-08	5.28E+04
0.255	6.28E-05	4.94E+03	8.96E-02	9.91E+01	2.35E-04	1.80E+03	5.52E-08	3.18E+04
0.265	1.24E-04	3.79E+03	1.54E-01	8.10E+01	4.53E-04	1.39E+03	1.72E-07	1.98E+04
0.275	2.38E-04	2.94E+03	2.58E-01	6.68E+01	8.50E-04	1.09E+03	5.00E-07	1.26E+04
0.285	4.43E-04	2.31E+03	4.23E-01	5.56E+01	1.55E-03	8.59E+02	1.37E-06	8.28E+03
0.295	8.03E-04	1.83E+03	6.81E-01	4.66E+01	2.76E-03	6.86E+02	3.57E-06	5.54E+03
0.305	1.42E-03	1.47E+03	1.07E+00	3.93E+01	4.80E-03	5.52E+02	8.88E-06	3.79E+03
0.315	2.45E-03	1.19E+03	1.67E+00	3.33E+01	8.17E-03	4.48E+02	2.12E-05	2.63E+03
0.325	4.14E-03	9.67E+02	2.55E+00	2.85E+01	1.36E-02	3.67E+02	4.85E-05	1.86E+03
0.335	6.86E-03	7.94E+02	3.84E+00	2.45E+01	2.24E-02	3.03E+02	1.07E-04	1.33E+03
0.345	1.12E-02	6.57E+02	5.69E+00	2.11E+01	3.60E-02	2.51E+02	2.29E-04	9.70E+02
0.355	1.79E-02	5.47E+02	8.35E+00	1.83E+01	5.71E-02	2.10E+02	4.76E-04	7.14E+02
0.365	2.81E-02	4.58E+02	1.21E+01	1.59E+01	8.91E-02	1.76E+02	9.62E-04	5.32E+02
0.375	4.37E-02	3.86E+02	1.73E+01	1.40E+01	1.37E-01	1.49E+02	1.89E-03	4.01E+02
0.385	6.69E-02	3.27E+02	2.45E+01	1.23E+01	2.09E-01	1.26E+02	3.64E-03	3.05E+02
0.395	1.01E-01	2.78E+02	3.44E+01	1.08E+01	3.13E-01	1.08E+02	6.84E-03	2.34E+02
0.405	1.51E-01	2.38E+02	4.78E+01	9.56E+00	4.65E-01	9.23E+01	1.26E-02	1.81E+02
0.415	2.23E-01	2.04E+02			6.82E-01	7.95E+01	2.27E-02	1.41E+02
0.425	3.26E-01	1.76E+02			9.91E-01	6.87E+01	4.03E-02	1.11E+02
0.435	4.71E-01	1.53E+02			1.43E+00	5.96E+01	7.02E-02	8.82E+01
0.445	6.74E-01	1.33E+02			2.03E+00	5.19E+01	1.20E-01	7.04E+01
0.455	9.56E-01	1.16E+02					2.03E-01	5.65E+01
0.465	1.34E+00	1.02E+02					3.38E-01	4.56E+01
0.475	1.87E+00	8.92E+01					5.55E-01	3.71E+01
0.485	2.59E+00	7.86E+01						


Hydraulic Conductivity
Hydraulic Conductivity (cm/hr)
1.E+03
1.E-01
1.E-05
1.E-09
1.E-13
1.E-17
1.E-21
1.E-25
1.E-29
1.E-33
0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Moisture Content
VG: A1
BC: A1
Ca: A1
VG: B1
BC: B1
Ca: B1
VG: C1
BC: C1
Ca: C1
VG: D1
BC: D1
Ca: D1


Matric Potential
Matric Potential (-cm)
1.E+15
1.E+14
1.E+13
1.E+12
1.E+11
1.E+10
1.E+09
1.E+08
1.E+07
1.E+06
1.E+05
1.E+04
1.E+03
1.E+02
1.E+01
1.E+00
0
0.1
0.2
0.3
0.4
0.5
0.6
Volumetric Moisture Content
VG: A1
BC: A1
Ca: A1
VG: B1
BC: B1
Ca: B1
VG: C1
BC: C1
Ca: C1
VG: D1
BC: D1
Ca: D1