APPENDIX B

SUPPORTING INFORMATION FOR RUSLE

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Supporting Information for RUSLE

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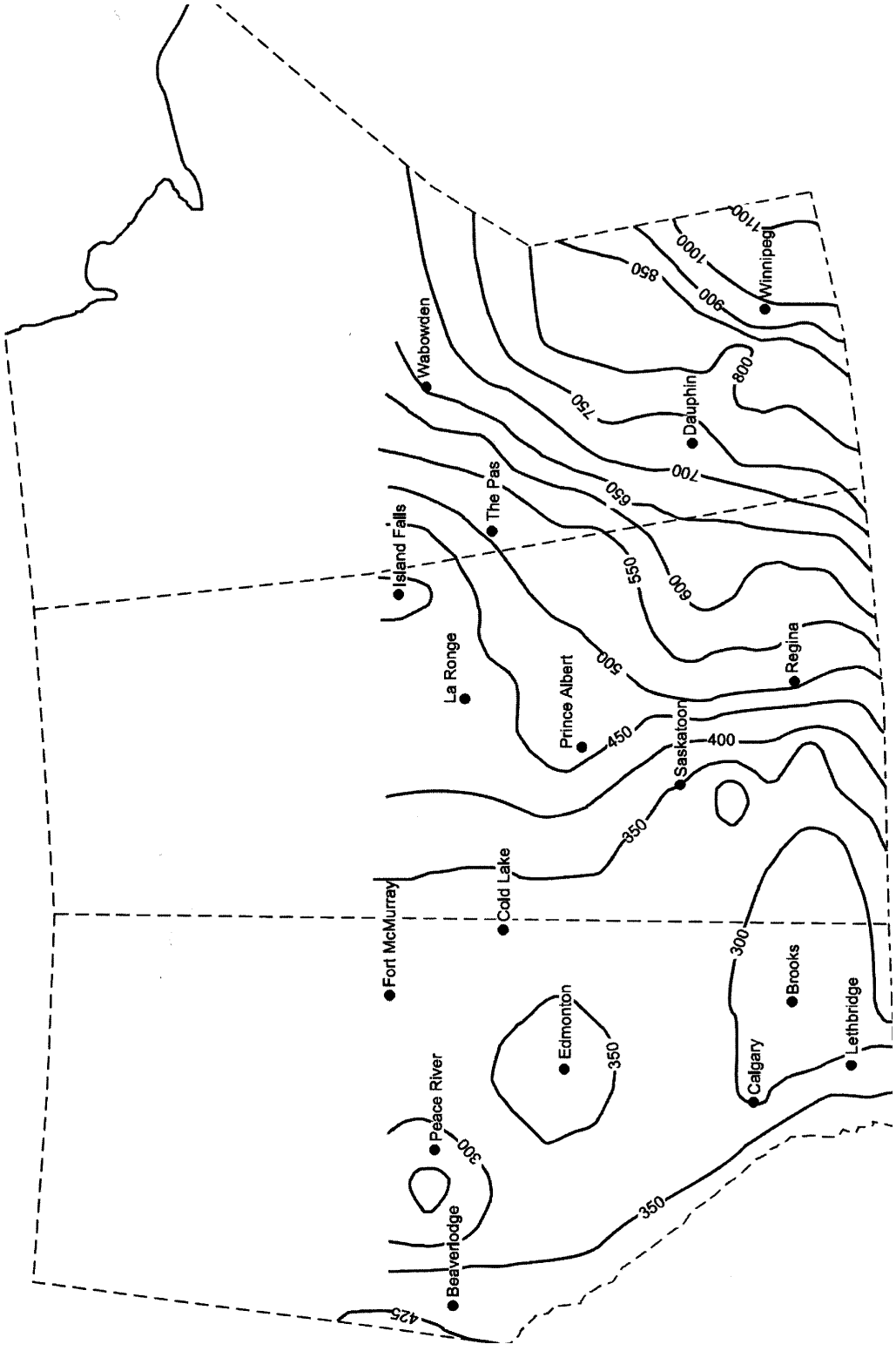

Figure B-1: Isoerodent map showing R_t values for the Prairie Region (whole year)

(Source: Wall et al, 1997)

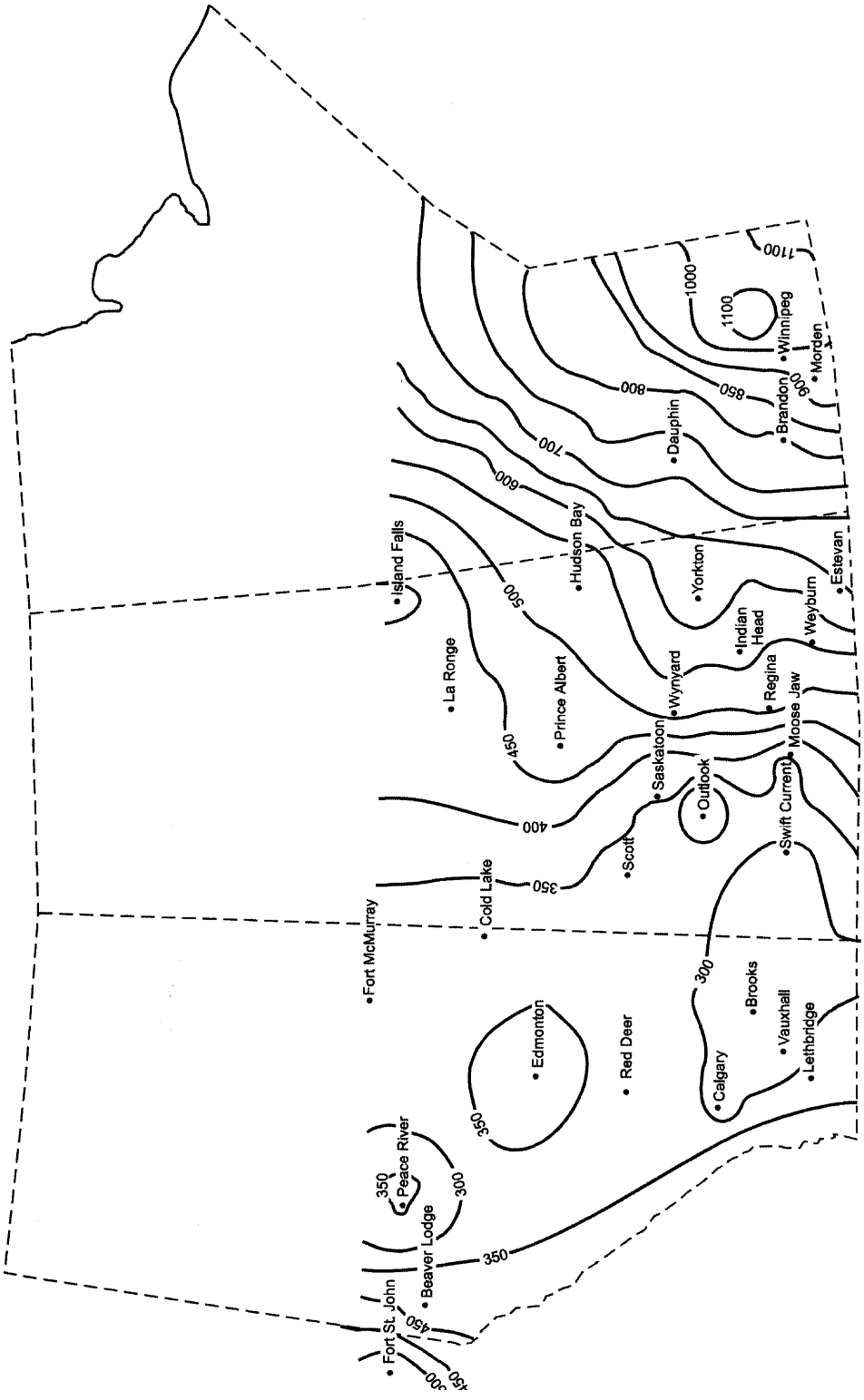

Figure B-2: Isoerodent map showing R values for the Prairie Region (spring to fall)

(Source: Wall et al, 1997)

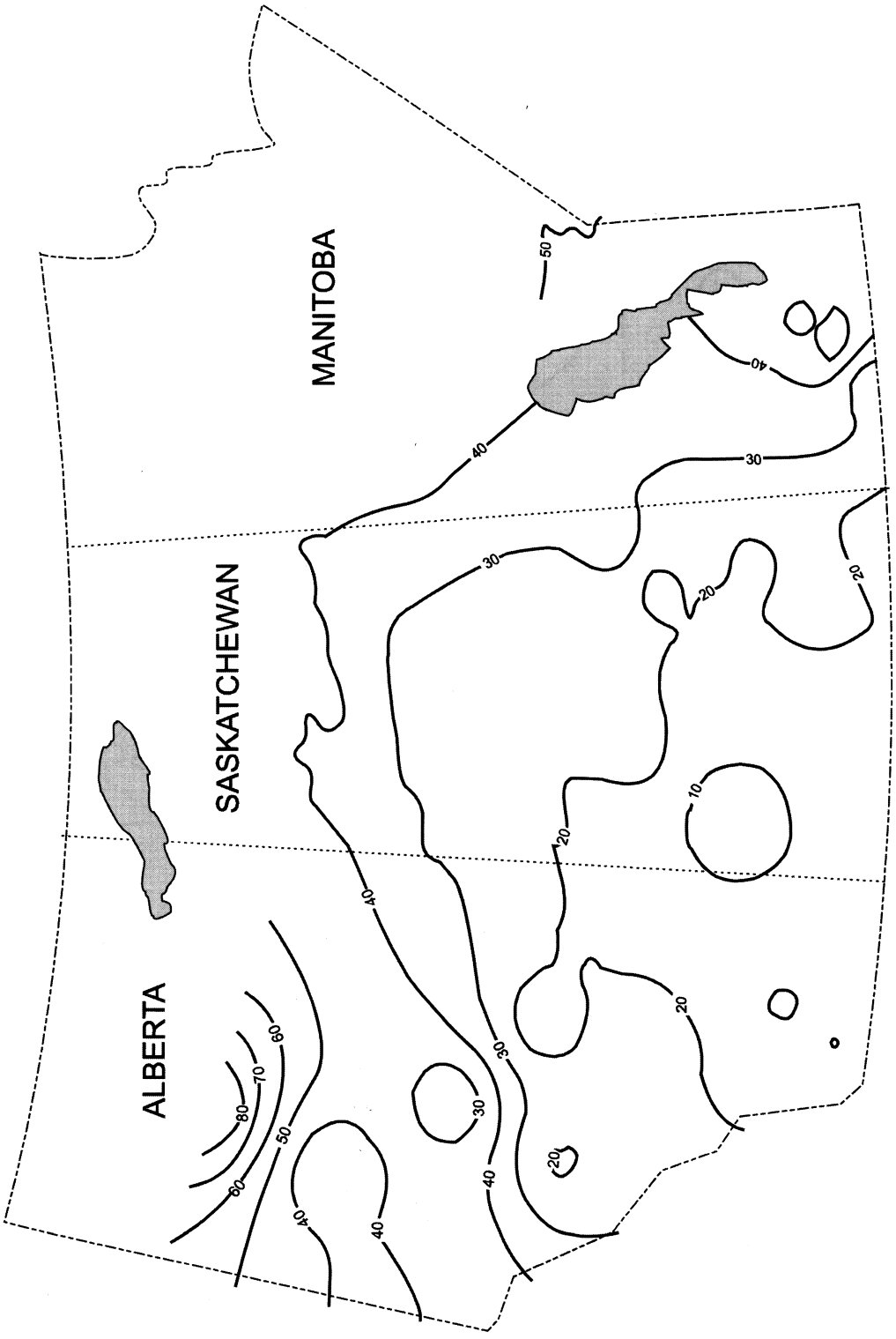

Figure B-3: Adjustment for winter conditions. R_s for the Prairie Region (winter)

(Source: Wall et al, 1997)

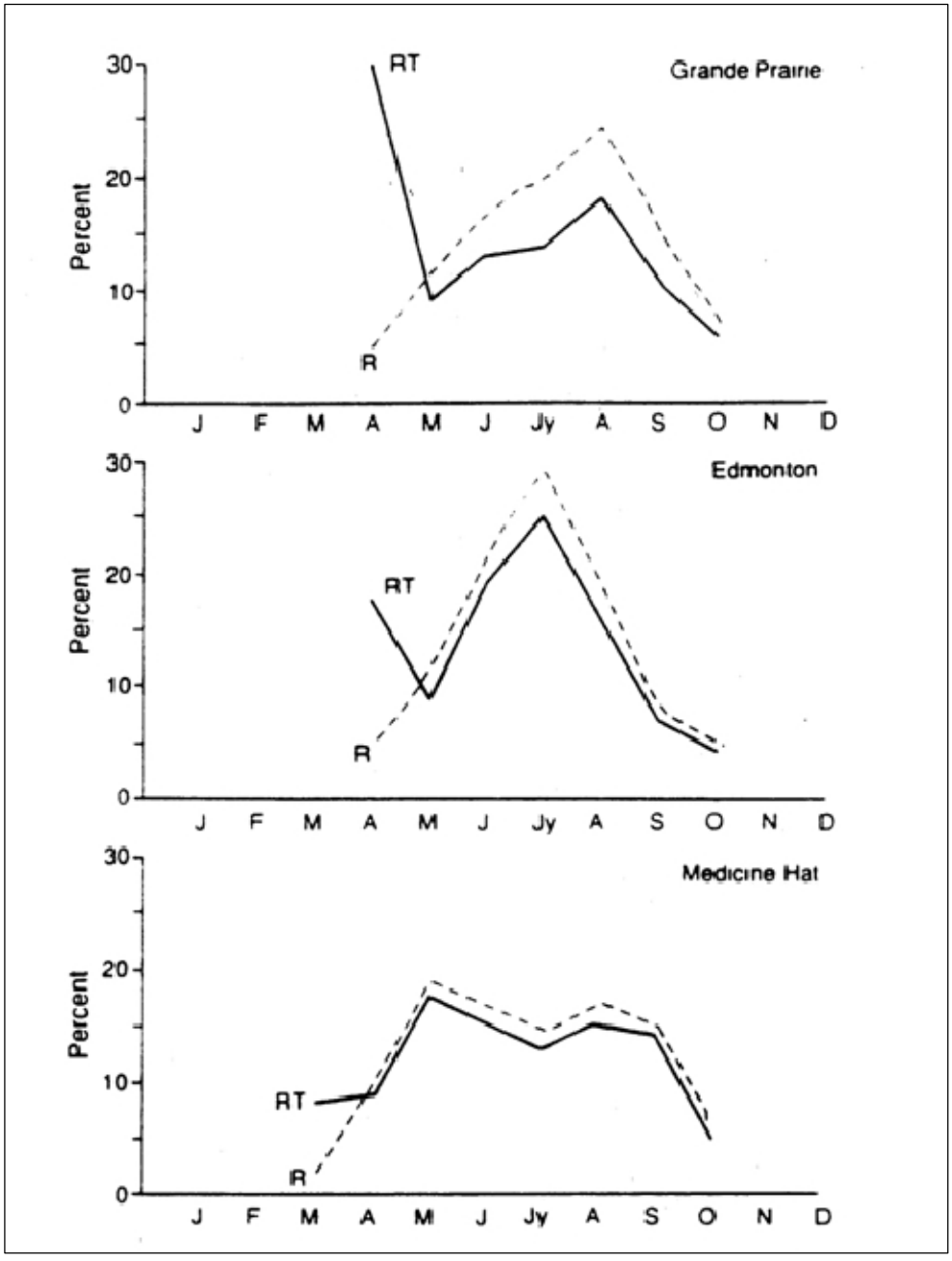

Figure B-4: Monthly Distribution Patterns of R_t for Selected Stations in Alberta

From: Water Erosion Potential of Soils in Alberta (1985). Agriculture Canada

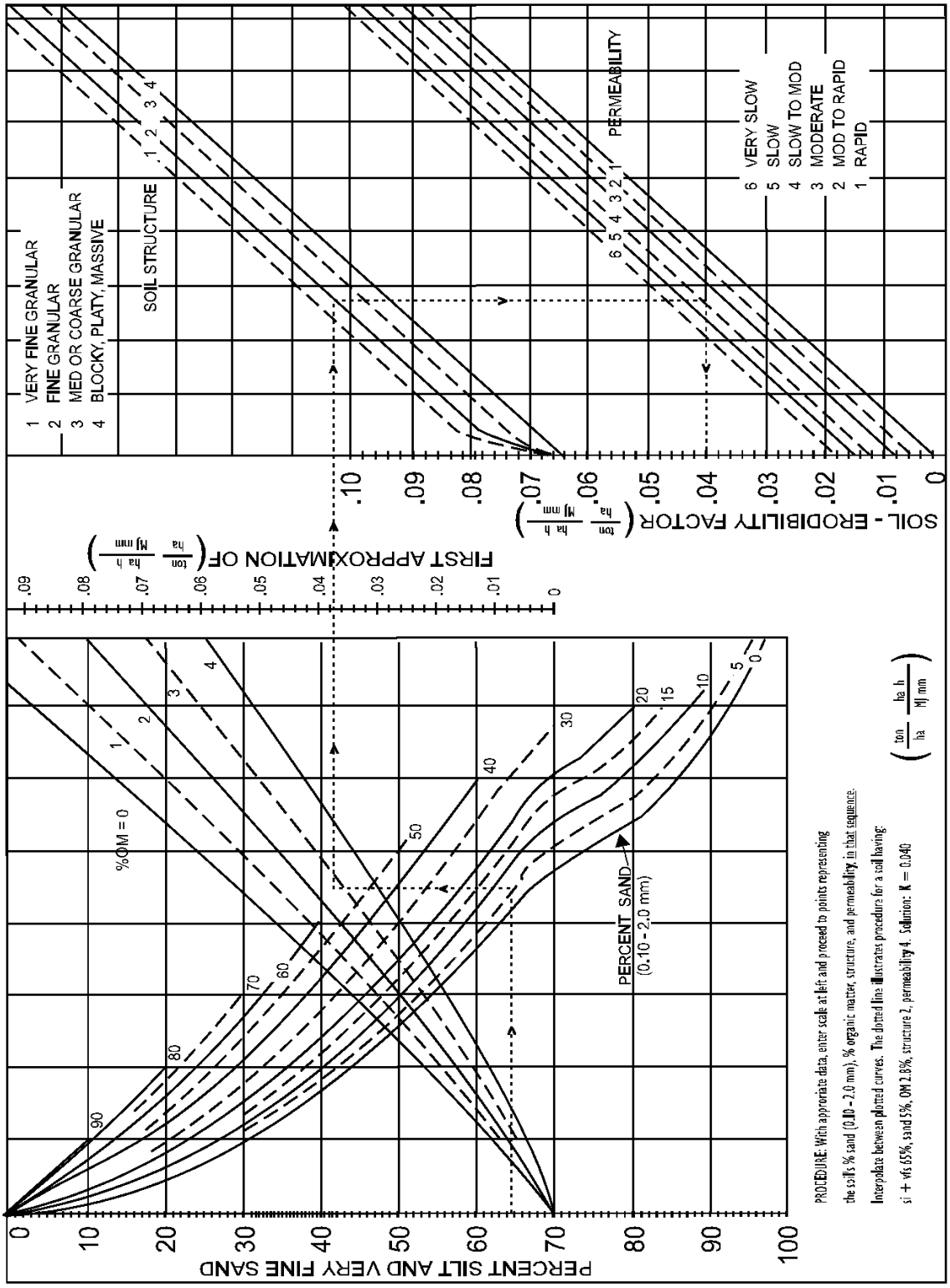

Figure B-5: The soil erodibility nomograph (Foster et al, 1981)

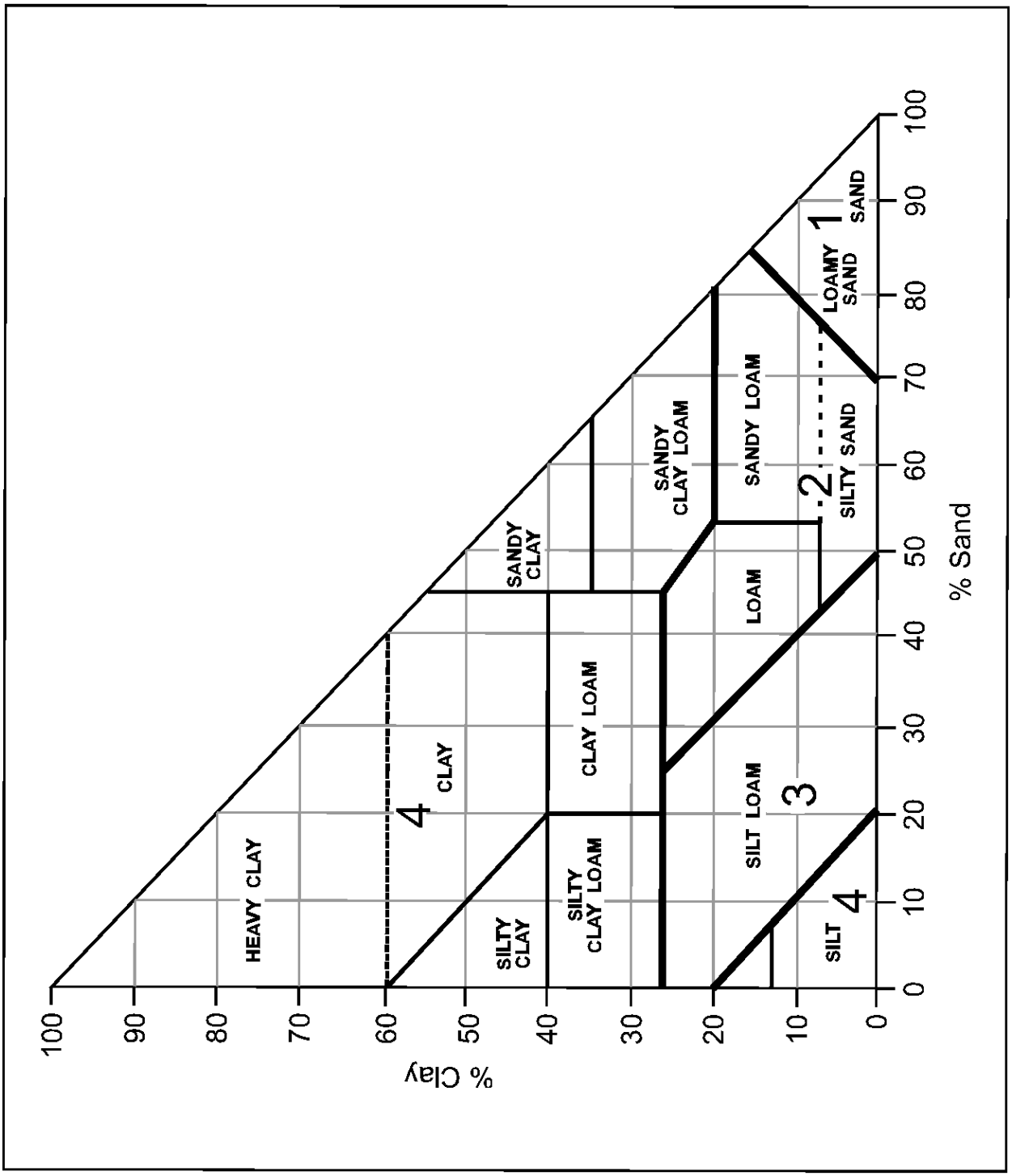

Figure B-6: Structure code based on textural classification

Source: 1) Ontario Centre for Soil Resource Evaluation, 1993
2) Wall et al, 1997

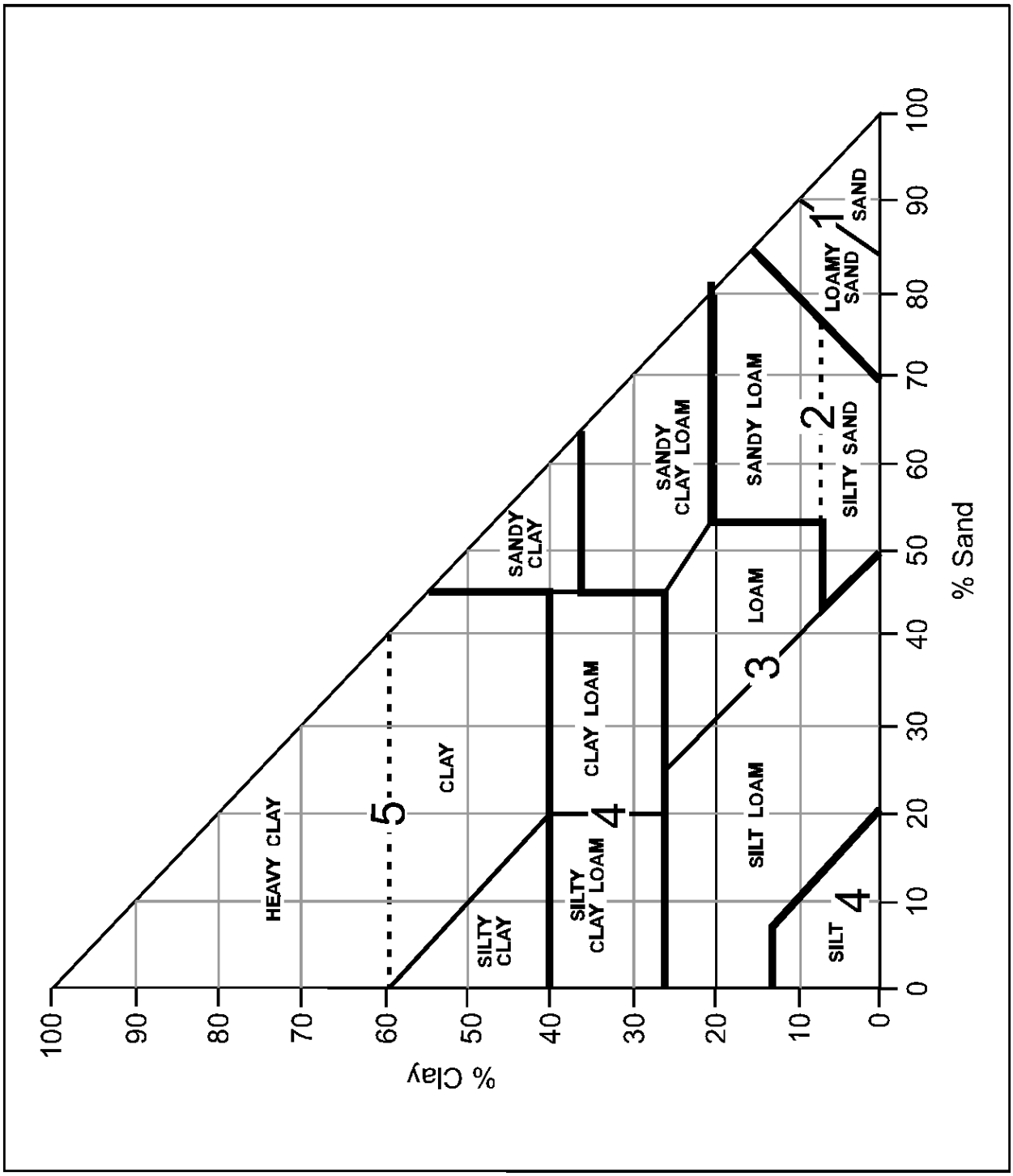

Figure B-7: Permeability code based on textural classification

(Source: Ontario Centre for
Soil Resource Evaluation, 1993)

Site	R_t	Monthly percentage of erosivity index (R)											
		J	F	M	A	M	J	J	A	S	O	N	D
Beaverlodge, B.C.	378	0	0	4	9	3	20	23	34	7	0	0	0
Lethbridge, Alta.	346	0	0	1	4	11	22	37	16	10	0	0	0
Peace River, Alta.	226	0	0	4	10	5	17	41	17	7	1	0	0
Vauxhall, Alta.	270	0	0	2	13	9	24	24	16	11	0	0	0
Broadview, Sask.	342	0	0	2	7	8	12	24	31	15	2	0	0
Estevan, Sask.	680	0	0	1	2	8	22	41	18	9	1	0	0
Outlook, Sask.	261	0	0	1	4	8	39	32	12	5	0	0	0
Saskatoon, Sask.	348	0	0	2	6	13	38	33	5	3	0	0	0
Swift Current, Sask.	268	0	0	1	3	7	43	25	16	5	0	0	0
Wynyard, Sask.	572	0	0	1	2	13	18	39	22	4	1	0	0
Yorkton, Sask.	663	0	0	1	2	7	23	26	28	10	2	0	0
Hudson Bay	510	0	0	2	5	5	22	37	18	10	1	0	0
Glenlea	1029	0	0	2	5	11	23	31	20	6	3	0	0
Gimli, Man.	848	0	0	1	4	6	25	24	27	11	3	0	0
Winnipeg, Man.	1093	0	0	1	3	12	18	21	32	12	2	0	0
White River, Ont.	1075	0	0	0	2	8	16	17	26	23	5	3	0
Windsor, Ont.	1615	2	3	5	9	6	15	20	18	9	5	4	4
London, Ont.	1330	3	3	3	9	7	14	18	15	11	7	6	4
Montreal, Que.	920	0	0	0	6	5	17	19	22	15	9	7	0
Moncton, N.B.	1225	3	4	4	4	8	10	14	15	10	12	11	5
Halifax, N.S.	1790	*	*	*	2	11	16	19	24	19	8	1	0
Kentville, N.S.	1975	4	6	7	6	3	12	12	15	10	10	7	8
Nappan, N.S.	1900	3	3	3	9	7	14	18	15	11	7	6	4
Truro, N.S.	2000	4	8	5	5	5	7	6	13	11	11	15	10
Charlottetown, P.E.I.	1520	4	4	4	9	7	13	17	14	11	7	5	5
St. John's, Nfld.	1700	4	8	5	5	5	7	6	13	11	11	17	8

* Data not available
Units for R = MJ mm ha^{-1} h^{-1}

Table B-1: Erosivity index and monthly distribution for sites in the Prairie Region and Eastern Canada

(Source RUSLEFAC)

TEXTURAL CLASS	ORGANIC MATTER CONTENT		
	< 2 %	> 2 %	AVERAGE
Clay	0.032	0.028	0.029
Clay Loam	0.044	0.037	0.040
Coarse Sandy Loam	-	0.009	0.009
Fine Sand	0.012	0.008	0.011
Fine Sandy Loam	0.029	0.022	0.024
Heavy Clay	0.025	0.020	0.022
Loam	0.045	0.038	0.040
Loamy Fine Sand	0.020	0.012	0.015
Loamy Sand	0.007	0.005	0.005
Loamy Very Fine Sand	0.058	0.033	0.051
Sand	0.001	0.003	0.001
Sandy Clay Loam	-	0.026	0.026
Sandy Loam	0.018	0.016	0.017
Silt Loam	0.054	0.049	0.050
Silty Clay	0.036	0.034	0.034
Silty Clay Loam	0.046	0.040	0.042
Very Fine Sand	0.061	0.049	0.057
Very Fine Sandy Loam	0.054	0.044	0.046

Table B-2: Soil erodibility values (K) for common surface textures

These K estimations are based on the information obtained on approximately 1600 samples collected in Southern Ontario by Ontario Institute of Pedology surveyors.

If the organic matter content of a soil is unknown, use the value in the ‘average’ column. The other two columns refer to the values which can be used if the approximately organic matter content of a particular texture is known to be either greater or less than 2 percent.

(Source: Wall et al, 1997)

Slope (%)	Slope length in meters											
	2	5	10	15	25	50	75	100	150	200	250	300
0.2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.5	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09
1	0.11	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17
2	0.18	0.20	0.22	0.23	0.25	0.28	0.29	0.30	0.32	0.33	0.35	0.35
3	0.23	0.27	0.31	0.33	0.36	0.41	0.44	0.47	0.50	0.53	0.55	0.57
4	0.27	0.33	0.39	0.42	0.47	0.55	0.60	0.64	0.70	0.74	0.78	0.81
5	0.31	0.39	0.47	0.52	0.59	0.70	0.77	0.83	0.92	0.99	1.05	1.10
6	0.35	0.45	0.54	0.61	0.70	0.84	0.94	1.02	1.14	1.24	1.32	1.39
8	0.41	0.55	0.69	0.78	0.92	1.15	1.31	1.43	1.63	1.79	1.92	2.03
10	0.48	0.66	0.84	0.96	1.15	1.47	1.69	1.87	2.15	2.38	2.57	2.74
12	0.61	0.86	1.11	1.29	1.57	2.03	2.37	2.64	3.07	3.42	3.72	3.99
14	0.70	1.01	1.33	1.56	1.91	2.52	2.96	3.31	3.89	4.36	4.77	5.12
16	0.79	1.16	1.54	1.82	2.25	3.00	3.55	4.00	4.74	5.33	5.85	6.31
20	0.96	1.44	1.96	2.34	2.94	4.00	4.79	5.44	6.51	7.39	8.16	8.85
25	1.15	1.77	2.45	2.96	3.77	5.22	6.31	7.23	8.74	10.01	11.12	12.11
30	1.33	2.08	2.92	3.56	4.57	6.42	7.84	9.03	11.01	12.68	14.15	15.47
40	1.64	2.64	3.78	4.67	6.08	8.72	10.76	12.50	15.43	17.91	20.12	22.11
50	1.91	3.13	4.55	5.66	7.45	10.83	13.47	15.73	19.57	22.85	25.77	28.43
60	2.15	3.56	5.22	6.54	8.67	12.71	15.91	18.65	23.34	27.36	30.95	34.23

Table B-3: Values for topographic factor, LS, for low ratio of rill:interill erosion, such as consolidated soil conditions with cover and rangeland (applicable to thawing soils where both inter-rill and rill erosion are significant

(Source: Wall et al, 1997)

Slope Steepness (%)	Slope Length Exponent, m		
	Rill/Interrill Ratio â		
	Low*	Moderate†	High‡
0.2	0.02	0.04	0.07
0.5	0.04	0.08	0.16
1	0.08	0.15	0.26
2	0.14	0.24	0.39
3	0.18	0.31	0.47
4	0.22	0.36	0.53
5	0.25	0.40	0.57
6	0.28	0.43	0.60
8	0.32	0.48	0.65
10	0.35	0.52	0.68
12	0.37	0.55	0.71
14	0.40	0.57	0.72
16	0.41	0.59	0.74
20	0.44	0.61	0.76
25	0.47	0.64	0.78
30	0.49	0.66	0.79
40	0.52	0.68	0.81
50	0.54	0.70	0.82
60	0.55	0.71	0.83

* conditions where rill erosion is slight with respect to interill erosion; generally C factors would be less than 0.15

† conditions where rill and interill erosion would be about equal on a 22.1 m long slope in seedbed condition on a 9% slope

‡ conditions where rill erosion is great with respect to interill erosion; generally C factors would be greater than 7.0

Table B-4: Slope length exponents (m) for a range of slopes and rill/interill erosion classes

(Source: McCool et al, 1989)

# of Segments	Sequence # of Segment (i)	Soil Loss Factor (SLF) value of m																		
		0.02	0.06	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.64	0.7	0.75	0.8	0.85	0.9
2	1	0.99	0.96	0.93	0.90	0.87	0.84	0.81	0.78	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.59	0.57	0.55	0.54
	2	1.01	1.04	1.07	1.10	1.13	1.16	1.19	1.22	1.24	1.27	1.29	1.32	1.34	1.36	1.38	1.41	1.43	1.45	1.46
3	1	0.98	0.94	0.90	0.85	0.80	0.76	0.72	0.68	0.64	0.61	0.58	0.55	0.52	0.50	0.46	0.44	0.42	0.39	0.37
	2	1.01	1.02	1.02	1.03	1.04	1.05	1.05	1.05	1.06	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.03	1.02	1.02
	3	1.02	1.05	1.08	1.12	1.16	1.19	1.23	1.26	1.30	1.33	1.37	1.40	1.43	1.46	1.49	1.52	1.55	1.58	1.61
4	1	0.97	0.92	0.87	0.81	0.76	0.71	0.66	0.62	0.57	0.54	0.50	0.47	0.44	0.41	0.38	0.35	0.33	0.31	0.29
	2	1.00	1.00	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.91	0.90	0.88	0.87	0.85	0.84	0.82	0.80	0.78
	3	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.14	1.16	1.17	1.18	1.19	1.20	1.21	1.22	1.23	1.23	1.24	1.24
	4	1.02	1.05	1.09	1.13	1.17	1.21	1.25	1.29	1.33	1.36	1.40	1.44	1.48	1.50	1.55	1.58	1.62	1.65	1.68
5	1	0.97	0.91	0.85	0.79	0.72	0.67	0.62	0.57	0.53	0.48	0.45	0.41	0.38	0.36	0.32	0.30	0.28	0.25	0.23
	2	1.00	0.99	0.97	0.96	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.77	0.76	0.73	0.71	0.69	0.66	0.64
	3	1.01	1.02	1.03	1.04	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.04	1.03	1.03	1.02
	4	1.01	1.04	1.06	1.09	1.12	1.14	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.30	1.32	1.34	1.35	1.37	1.38
	5	1.02	1.05	1.09	1.13	1.17	1.22	1.26	1.30	1.34	1.38	1.42	1.46	1.50	1.53	1.58	1.62	1.65	1.69	1.73

Table B-5: Soil loss factors (SLF) for irregular slopes

(Source: Wall et al, 1997)

Type of mulch	Mulch rate tons/acre	Land slope percent	C Factor	Length limit (feet)
None	0	all	1	-
Straw or hay, tied down by anchoring and tacking equipment	1	1.5	0.20	200
	1	6-10	0.20	100
	1.5	1.5	0.12	300
	1.5	6-10	0.12	150
	2	1.5	0.06	400
	2	6-10	0.06	200
	2	11-15	0.07	150
	2	16-20	0.11	100
	2	21-25	0.14	75
	2	26-33	0.17	50
	2	34-50	0.20	35
Crushed stone, 1/4 to 1 1/2 inch	135	<16	0.05	200
	135	16-20	0.05	150
	135	21-33	0.05	100
	135	34-50	0.05	75
	240	<21	0.02	300
	240	21-33	0.02	200
	240	34-50	0.02	150
Wood chips	7	<16	0.08	75
	7	16-20	0.08	50
	12	<16	0.05	150
	12	16-20	0.05	100
	12	21-33	0.05	75
	25	<16	0.02	200
	25	16-20	0.02	150
	25	21-33	0.02	100
	25	34-50	0.02	75

Table B-6a: C-Factors for mulch placement and respective slope length limits

(Source: Wall et al, 1997)

Treatment	C-Factor
Sod Grass	0.01
Temporary Vegetation/Cover Crop	0.45[1]
Hydraulic Mulch at 4.5 tonnes/ha	0.10[2]
Soil Sealant	0.10 – 0.60[3]
Rolled Erosion Control Products	0.10 – 0.30[3]

Notes:
[1] Assumes planting occurs within optimal climatic conditions
[2] Some limitation on use in arid and semiarid climates
[3] Value used must be substantiated by documentation.

Table B-6b: C-Factors for Other Treatments

Treatment			P- Factor
Bare Soil			
Packed and smooth			1.00
Freshly disked or rough, irregular			0.90
Sediment Containment Systems (a.k.a. Sediment Trap / Basin)			0.10-0.90[A]
Bale or Sandbag Barriers			0.90
Rock (Diameter = 25 - 50 mm) Barriers at Sump Location			0.80
Silt - Fence Barriers			0.60
Contour Furrowed Surface			
Must be maintained throughout construction activities, otherwise P-Factor =1.0, Maximum length refers to downslope length			
	Slope (%)	**Max. Length (m)**	
	1 to 2	120	0.60
	3 to 5	90	0.50
	6 to 8	60	0.50
	9 to 12	40	0.60
	13 to 16	25	0.70
	17 to 20	20	0.80
	>20	15	0.80
Terracing			
Must contain 2-year runoff volumes without overflowing, otherwise P-Factor = 1.00			
	Slope (%)		
	1 to 2		0.12
	3 to 8		0.10
	9 to 12		0.12
	13 to 16		0.14
	17 to 20		0.16
	>20		0.18
Grass Buffer Strips to Filter Sediment-laden Sheet Flows			
Strips must be at least 15 m (50 ft) wide and have a groundcover value of 65% or great, otherwise P-Factor =1.00			
	Basin Slope (%)		
	0 to 10		0.60
	11 to 24		0.80

A. Should be constructed as the first step in over lot grading.

Note: Use of P-Factor values not in this table must be supported by documentation.

Table B-7: P-Factor Values for Construction Site

(Source: Fifield 2001) (part)
(Source: Wall et al, 1997) (part)