Vermont Stream Geomorphic Assessment

Appendix N

Stratigraphic Descriptions

VT Erosion Hazard Index

Vermont Agency of Natural Resources
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Stratigraphic Descriptions and VT Erosion Hazard Index

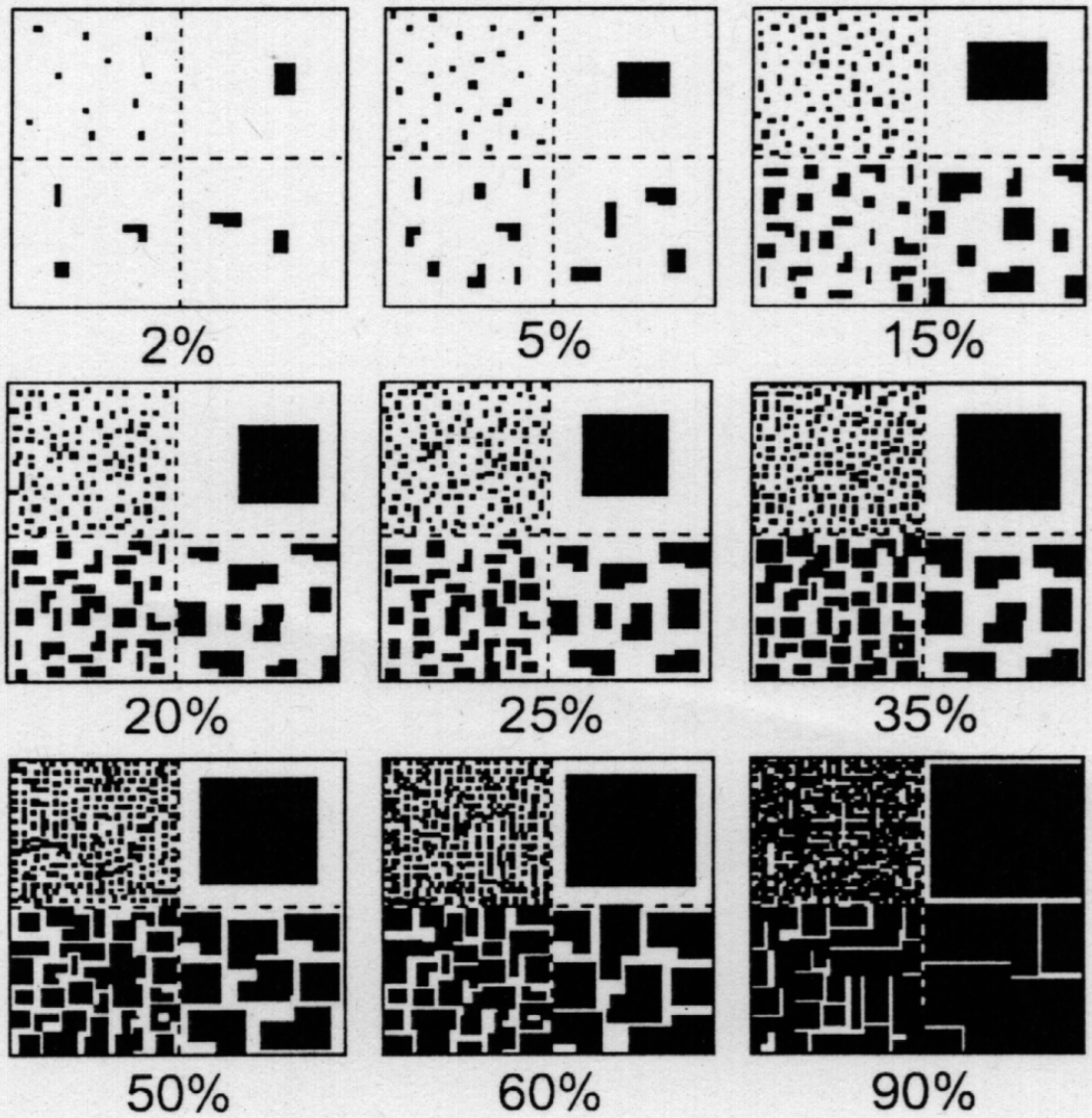
Field Identification Procedures (excluding particles larger than 3 in. and basing fractions on estimated weights)					Group Symbols #	Typical Names	Information Required for Describing Soils
Coarse-grained soils: More than half of material is *larger* than No. 200 sieve size[b] (The No. 200 sieve size is about the smallest particle visible to naked eye)	Gravels: More than half of coarse fraction is larger than No. 4 sieve size (For visual classification, the 1/4 in. size may be used as equivalent to the No. 4 sieve size)	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes		GW	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name: indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses.
			Predominantly one size or a range of sizes with some intermediate sizes missing		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see ML below)		GM	Silty gravels, poorly graded gravel-sand-silt mixtures	For undisturbed soils, add information on stratification, degree of compactness, cementation, moisture conditions, and drainage characteristics.
			Plastic fines (for identification procedures, see CL below)		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures	
	Sands: More than half of coarse fraction is smaller than No. 4 sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes		SW	Well graded sands, gravelly sands, little or no fines	Example: *Silty sand*, gravelly: about 20%, hard, angular gravel particles 1/2 in. maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)
			Predominantly one size or a range of sizes with some intermediate sizes missing		SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see ML below)		SM	Silty sands, poorly graded sand-silt mixtures	
			Plastic fines (for identification procedures, see CL below)		SC	Clayey sands, poorly graded sand-clay mixtures	
Fine-grained soils: More than half of material is *smaller* than No. 200 sieve size (The No. 200 sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than No. 40 Sieve Size						
		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			
	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses.
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
	Silts and clays liquid limit greater than 50	Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity	For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions
		Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays	Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place, loess (*ML*).
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity	
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			Pt	Peat and other highly organic soils	

From Wagner, 1957.
[a] Boundary Classifications. Soils possessing characteristics of two groups are designated by combinations of group symbols. For example: GW GC, well graded gravel-sand mixture with clay binder.
[b] All sieve sizes on this chart are U.S. standard.

Unified Soil Classification System used in Step 3.4 (Koler, 1994)

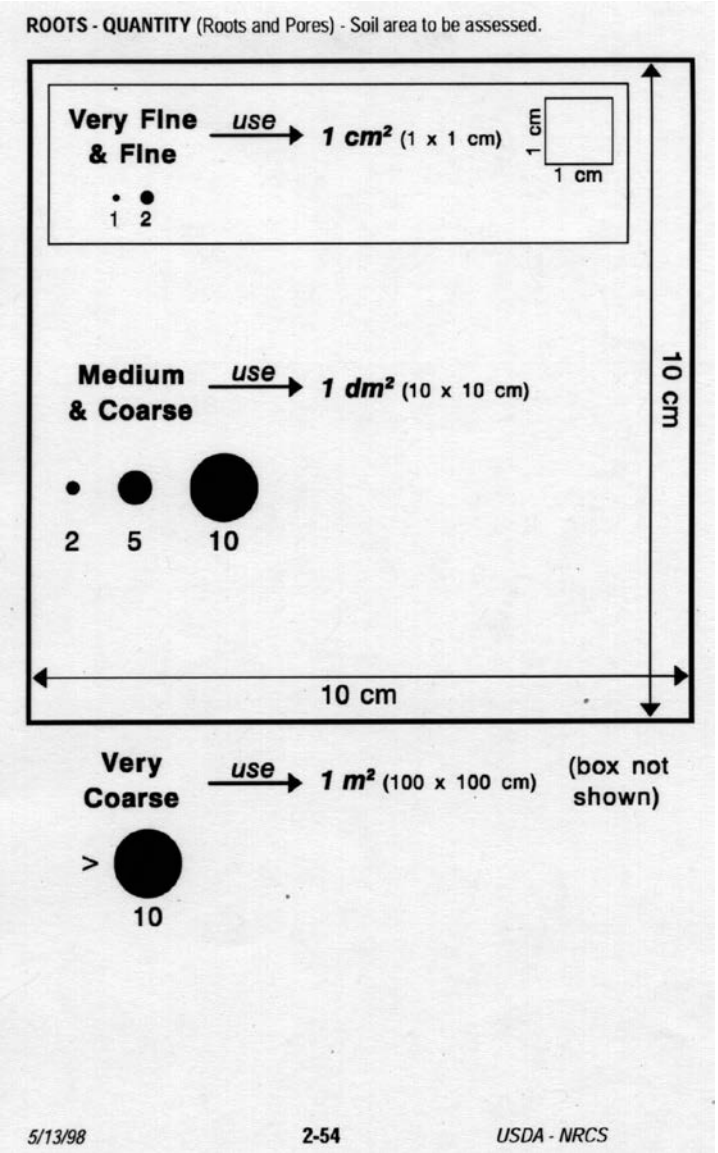
EXAMPLES OF PERCENT OF AREA COVERED

The following graphic can be used for various data elements to convey "Amount" or "Quantity". ***NOTE***: Within any given box, each quadrant contains the same total area covered, just different sized objects.



USDA - NRCS *5/13/98*

Unit Areas for Determining Root Ouantities based on Root Size



Vermont Bank Erosion Hazard Index

Use the following Table to convert the values generated on the Bank Stratigraphy Description Table (Step 3.4) of the Stream Bank Field Form into index values that are totaled to create an overall erosion hazard index for the stream bank under study.

Vermont Bank Erosion Hazard Index (BEHI)

Criteria	Very Low		Low		Moderate		High		Very High		Extreme	
	Value	Index	Value	Index	Value	Index	Value	Index	Value	Index	Value	Index
Bank Ht / Bkf Ht	1.0-1.1	1.0-1.9	1.1-1.19	2.0-3.9	1.2-1.5	4.0-5.9	1.6-2.0	6.0-7.9	2.1-2.8	8.0-9.0	>2.8	10
Root Depth / Bank Ht	1.0-0.9	1.0-1.9	0.89-0.50	2.0-3.9	0.49-0.30	4.0-5.9	0.29-1.15	6.0-7.9	0.14-0.05	8.0-9.0	<0.05	10
Weighted Root Quantity	2.40-3.0	1.0-1.9	1.65-2.39	2.0-3.9	0.90-1.64	4.0-5.9	0.45-0.89	6.0-7.9	0.15-0.44	8.0-9.0	<0.15	10
Weighted Bank Angle	0-20	1.0-1.9	21-60	2.0-3.9	61-80	4.0-5.9	81-90	6.0-7.9	91-119	8.0-9.0	>119	10
Surface Prot. (%)	80-100	1.0-1.9	55-79	2.0-3.9	30-54	4.0-5.9	15-29	6.0-7.9	10-15	8.0-9.0	<10	10
WCR or MCR	35-50	1.0-1.9	25-34	2.0-3.9	15-24	4.0-5.9	10-14	6.0-7.9	5-9	8.0-9.0	<5	10
Totals												
Erosion Hazard Index Ranges		6–11.9		12–23.9		24-35.9		36-47.9		48 –54.9		55-60

(WCR) = Weighted Consistency Rating
(MCR) = Modified Weighted Consistency Rating

	Value
Bankfull Height (Ft.)	_____
Bank Height (Ft.)	_____
Root Depth (Ft.)	_____

	Value	**Index**
Bank Height/Bankfull Height	_____	_____
Root Depth/Bank Height	_____	_____
Weighted Root Quantity	_____	_____
Weighted Bank Angle	_____	_____
Surface Protection (%)	_____	_____
Weighted Consistency Rating	_____	_____
or		
Modified Consistency Rating	_____	_____
Totals	_____	_____

Erosion Hazard:

Very Low Low Moderate

High Very High Extreme

HORIZON NOMENCLATURE

Use capital letters to identify master horizons, e.g., *A, B*. Use suffixes (lowercase letters) to denote additional horizon characteristics or features; e.g., *Ap, Btk*. [For more detailed criteria, see the "Soil Taxonomy Section", for complete definitions see Keys to Soil Taxonomy (Soil Survey Staff, 1996).] Label a horizon only after all morphology is recorded.

MASTER, TRANSITIONAL AND COMMON HORIZON COMBINATIONS [1] -

Horizon	Criteria
O	Predominantly organic matter (litter & humus)
A	Mineral, organic matter (humus) accumulation, loss of Fe, Al, clay
AB (or **AE**)	Dominantly A horizon characteristics but also contains some characteristics of the B (or E) horizon
A/B (or **A/E** or **A/C**)	Discrete, intermingled bodies of A and B (or E or C) material; majority of horizon is A material
AC	Dominantly A horizon characteristics but also contains some characteristics of C horizon
E	Mineral, loss of Si, Fe, Al, clay, or organic matter
EA (or **EB**)	Dominantly E horizon characteristics but also contains some attributes of the A (or B) horizon
E/A	Discrete, intermingled bodies of E and A horizon material; majority of horizon is E material
E and **Bt**	Thin lamellae (Bt) within a dominantly E horizon
BA (or **BE**)	Dominantly B characteristics but also contains some attributes of A (or E) horizon
B/A (or **B/E**)	Discrete, intermingled bodies of B and A (E) material; majority of horizon is B material
B	Subsurface accumulation of clay, Fe, Al, Si, humus, $CaCO_3$, $CaSO_4$; or loss of $CaCO_3$; or accumulation of sesquioxides; or subsurface soil structure
BC	Dominantly B horizon characteristics but also contains some characteristics of the C horizon
B/C	Discrete, intermingled bodies of B and C material; majority of horizon is B material
CB (or **CA**)	Dominantly C horizon characteristics but also contains some characteristics of the B (or A) horizon
C/B (or **C/A**)	Discrete, intermingled bodies of C and B (or A) material; majority of horizon is C material
C	Little or no pedogenic alteration, unconsolidated earthy material, soft bedrock
R	Hard, continuous bedrock
W	A layer of liquid water (W) or permanently frozen water (Wf) within the soil (excludes water/ice above soil) [2]

[1] Refer to the "Soil Taxonomy Section" for older horizon nomenclature.
[2] NRCS Soil Classification Staff, 1997; personal communication.

HORIZON SUFFIXES - Historically referred to as "Horizon Subscripts", and more recently as "Subordinate Distinctions" [1]. (Historical codes and conversions are shown in the "Soil Taxonomy Section".)

Horizon Suffix [2]	Criteria
a	Highly decomposed organic matter
b	Buried genetic horizon (not used with C horizons)
c	Concretions or nodules
d	Densic layer (physically root restrictive)
e	Moderately decomposed organic matter
f	Permanently frozen soil or ice (permafrost); continuous, subsurface ice; not seasonal
ff	Permanently frozen soil ("Dry" permafrost); no continuous ice; not seasonal [3]
g	Strong gley
h	Illuvial organic matter accumulation
i	Slightly decomposed organic matter
j	Jarosite accumulation [3]
jj	Evidence of cryoturbation [3]
k	Pedogenic carbonate accumulation
m	Strong cementation (pedogenic, massive)
n	Pedogenic, exchangeable sodium accumulation
o	Residual sesquioxide accumulation (pedogenic)
p	Plow layer or other artificial disturbance
q	Secondary (pedogenic) silica accumulation
r	Weathered or soft bedrock
s	Illuvial sesquioxide accumulation
ss	Slickensides
t	Illuvial accumulation of silicate clay
v	Plinthite
w	Weak color or structure within B (used only with B)
x	Fragipan characteristics
y	Pedogenic accumulation of gypsum
z	Pedogenic accumulation of salt more soluble than gypsum

[1] Keys to Soil Taxonomy, 6th Edition, 1994.
[2] Keys to Soil Taxonomy, 7th Edition, 1996.
[3] NRCS Soil Classification Staff, 1997; personal communication.

OTHER HORIZON MODIFIERS -

Numerical Prefixes (2, 3, etc.) - Used to denote lithologic discontinuities. By convention, 1 is understood but is not shown; e.g., *A, E, Bt1, 2Bt2, 2BC, 3C1, 3C2*.

Numerical Suffixes - Used to denote subdivisions within a master horizon; e.g., *A1, A2, E, Bt1, Bt2, Bt3, Bs1, Bs2*.

The Prime (') -Used to indicate the second occurrence of an identical horizon descriptor(s) in a profile or pedon; e.g., *A, E, Bt, E' Btx, C*. The prime does not indicate either buried horizons (which are denoted by a lower case "*b*"; e.g., *Btb*), or lithologic discontinuities (denoted by numerical prefixes). Double and triple primes are used to denote subsequent occurrences of horizon descriptors in a pedon; e.g., *A, E, Bt, E', Btx, E", Cd*.