

Soil Classification Data

Unified Soil Classification System

Compiled by B. W. Pipkin, University of Southern California

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES	
COARSE-GRAINED SOILS More than half of material is larger than no. 200 sieve size.	GRAVELS More than half of coarse fraction is larger than no. 4 sieve size	Clean gravels	GW Well-graded gravels, gravel-sand mixtures, little or no fines.	
		Gravels with fines	GP Poorly graded gravels, gravel-sand mixtures, little or no fines.	
		SANDS More than half of coarse fraction is smaller than no. 4 sieve size	Clean sands	GM Silty gravels, gravel-sand-silt mixtures.
			Sands with fines	GC Clayey gravels, gravel-sand-clay mixtures.
	FINE-GRAINED SOILS More than half of material is smaller than no. 200 sieve size.	SILTS AND CLAYS	Low Liquid limit.	SW Well-graded sands, gravelly sands, little or no fines.
				SP Poorly graded sands, gravelly sands, little or no fines.
				SM Silty sands, sand-silt mixtures.
			High Liquid limit.	SC Clayey sands, sand-clay mixtures.
				ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts, with slight plasticity.
				CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
Highly organic soils		SILTS AND CLAYS	High Liquid limit.	OL Organic silts and organic silty clays of low plasticity.
				MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			High Liquid limit.	CH Inorganic clays of high plasticity, fat clays.
				OH Organic clays of medium to high plasticity, organic silts.
		Pt Peat and other highly organic silts.		

NOTES:

- Boundary Classification: 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.
- All sieve sizes on this chart are U.S. Standard.
- The terms "silt" and "clay" are used respectively to distinguish materials exhibiting lower plasticity from those with higher plasticity. The minus no. 200 sieve material is silt if the liquid limit and plasticity index plot below the "A" line on the plasticity chart (next page), and is clay if the liquid limit and plasticity index plot above the "A" line on the chart.
- For a complete description of the Unified Soil Classification System, see "Technical Memorandum No. 3-357," prepared for Office, Chief of Engineers, by Waterways Equipment Station, Vicksburg, Mississippi, March 1953. (See also Data Sheet 29.1)

Checklist for Field Descriptions of Soils

Roy W. Simonson. Principal sources are U.S. Department of Agriculture Handbooks 18 and 436.

GENERAL INFORMATION AND SETTING

IDENTIFICATION: Name of soil series or broader class, as specific as feasible.

PHYSIOGRAPHY: Such as till plain, high terrace, flood plain.

UNDERLYING MATERIALS: General nature, such as calcareous clayey till or residuum from granite.

SLOPE: Approximate gradient.

PLANT COVER: Vegetation at site, such as oak-hickory forest, corn, pasture.

MOISTURE STATUS: Conditions at the time, such as wet, moist, dry.

REMARKS: Other features such as stoniness, salinity or depth to ground water; not applicable or observable everywhere.

DESCRIPTIONS OF INDIVIDUAL HORIZONS

DESIGNATION: See hypothetical soil profile, Data Sheet 36.

DEPTH: cm (or inches) from top of a horizon and from surface of organic soil.

THICKNESS: Average, such as 15 cm, plus range, such as 10-20 cm.

BOUNDARY: Lower one, as to distinctness: abrupt, clear, gradual, or diffuse; and as to topography: smooth, wavy, irregular or broken.

COLOR: Record colors of both wet and dry specimens if possible, but always for wet conditions. Use number-letter notations from Munsell Soil Color charts, e.g., 10YR 5/4. Record mottles (patches of one color in matrix of another color) as to abundance: few, common, many; as to size: fine, medium, coarse; and as to contrast: faint, distinct, prominent.

TEXTURE: Classes should show relative proportions of the separates sand, silt, and clay. See triangular graph showing textures, Data Sheet 37.2.

STRUCTURE: Describe natural units as to grade (distinctness): weak, moderate, strong; as to size: very fine, fine, medium, coarse, very coarse; and as to type: platy, prismatic, blocky, granular. Without peds, horizon can be either single-grained or massive.

CONSISTENCE: Cohesion, adhesion, and resistance of specimens to deformation and rupture. When wet: nonsticky, slightly sticky, sticky, or very sticky; also: nonplastic, slightly plastic, plastic, or very plastic. When moist: loose, very friable, friable, firm, very firm, or extremely firm. When dry: loose, soft, slightly hard, hard, very hard or extremely hard.

ROOTS: Numbers of observable roots: few, common, or many; and dimensions: fine, medium, or coarse.

PORES: Numbers of field-observable pores: few, common or many; dimensions: very fine, fine, medium, or coarse; and shapes: irregular, tubular or vesicular.

REACTION: pH as measured with field kit.

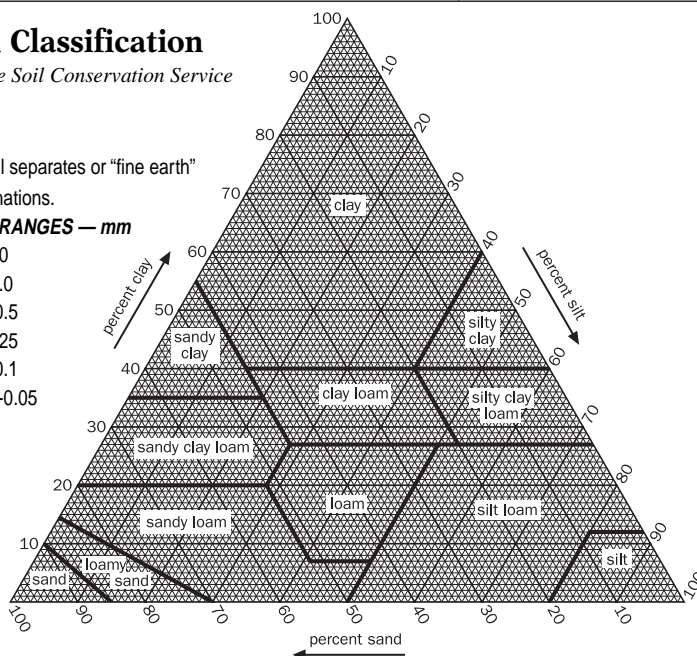
ADDITIONAL FEATURES: Other features if present, such as iron or carbonate concretions (use same abundance and dimension classes as for roots), effervescence with dilute HCl, krotovinas (filled animal burrows), cementation (weakly, strongly, indurated), and stone lines.

Guide for Textural Classification

U.S. Department of Agriculture Soil Conservation Service
May 1, 1950

Names and sizes of classes of soil separates or "fine earth" forming bases for texture determinations.

NAME	SIZE RANGES — mm
Very coarse sand	1.0-2.0
Coarse sand	0.5-1.0
Medium sand	0.25-0.5
Fine sand	0.1-0.25
Very fine sand	0.05-0.1
Silt	0.002-0.05
Clay	0.002



Particle Size Descriptions

Size Term	Particle Diameter
Sedimentary Units:	
Boulder	> 256 mm
Cobble	64 to 256 mm
Pebble	4 to 64 mm
Granule	2 to 4 mm
Very Coarse Sand	1 to 2 mm
Coarse Sand	1/2 to 1 mm
Medium Sand	1/4 to 1/2 mm
Fine Sand	1/8 to 1/4 mm
Very Fine Sand	1/16 to 1/8 mm
Silt	1/256 to 1/16 mm
Clay	< 1/256 mm
Pyroclastic Units:	
Bomb or block	> 32 mm
Lapilli	4 to 32 mm
Coarse Ash	1/4 to 4 mm
Fine Ash	< 1/4
Igneous Rocks:	
Pegmatitic	> 30 mm
Coarse Grained	5 to 30 mm
Medium Grained	1 to 5 mm
Fine Grained	< 1 mm