

UNIFIED SOIL CLASSIFICATION SYSTEM

- USCS -

Major division			Group symbol		Typical names	Classification criteria for coarse-grained soils	
coarse-grained soils (more than half of the material is larger than N. 200)	Gravels (more than half of coarse fraction is larger than N. 4 sieve size)	Clean gravels (little or no fines)	GW		Well graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{90}/D_{10} > 4$ $C_c 1 < D_{30}^2/D_{10} \times D_{40} < 3$	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (appreciable amount of fines)	GM	d/u	Silty gravels, gravel-sand-silt mixtures	Attemberg limits below A line or $L_p < 4$	Above A line with $4 < L_p < 7$ are borderline cases requiring use of dual symbols
			GC		Clayey gravels, gravel-sand-clay mixtures	Attemberg limits above A line with $L_p > 7$	
	Sands (more than half of coarse fraction is smaller than N. 4 sieve size)	Clean sands (little or no fines)	SW		Well graded sands, gravelly-sand, little or no fines	$C_u = D_{90}/D_{10} > 6$ $C_c 1 < D_{30}^2/D_{10} \times D_{40} < 3$	
			SP		Poorly graded sands, gravelly-sand, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (appreciable amount of fines)	SM	d/u	Silty sands, sand-silt mixtures	Attemberg limits below A line or $L_p < 4$	Limit plotting in atched zone with $4 < L_p < 7$ are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	Attemberg limits above A line with $L_p > 7$	
fine-grained soils (more than half of the material is smaller than N. 200)	Silt and clays (liquid limit < 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Determine percentages of sand and gravel from grain-size curve. 2. Depending on percentages of fines (fraction smaller than 200 sieve size), coase grained soils are classified as follows: Less than 5% - GW, GP, SW, SP More than 12% - GM, GC, SM, SC 5-12% - Borderline cases requiring dual symbols	
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL		Organic silts and organic silty clays of low plasticity		
	Silt and clays (liquid limit > 50)		MH		Inorganic silts, micaceus or diatomaceous fine sandy or silty soils, clastic silts		
			CH		Inorganic clays of high plasticity, fat clays		
			OH		Organic clays of medium to high plasticity, organic silts		
	Highly organic soils		Pt		Peat and other highly organic soils		