

Formula 1

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Formula 2

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Detailed Explanation

The Unified Soil Classification System (USCS), standardized in ASTM D2487 and widely adopted in North America, classifies soils for engineering purposes using two primary data sets: sieve analysis results (for grain-size distribution) and Atterberg limits (liquid limit LL, plastic limit PL, and plasticity index PI). The interactive PDF flowchart digitizes the traditional paper-based decision logic—first separating soils into coarse-grained (gravel and sand, >50% retained on No. 200 sieve) and fine-grained (silt and clay, >50% passing No. 200 sieve)—then applying increasingly specific criteria: for coarse-grained soils, it evaluates fines content (<50% vs. ≥12%) and gradation (well-graded vs. poorly graded); for fine-grained soils, it plots the LL and PI on the Casagrande plasticity chart to distinguish between clays (C) and silts (M), and further differentiate high-plasticity (CH, MH) from low-plasticity (CL, ML) behavior. Interactivity enhances usability by embedding tooltips for ASTM test methods (e.g., ASTM D422 for sieve analysis, ASTM D4318 for Atterberg limits), hyperlinked definitions of terms like 'nonplastic' or 'organic', and conditional navigation that skips irrelevant branches—reducing human error and accelerating field-to-office classification. This resource is especially valuable during rapid site investigations, peer reviews, and training, where real-time validation of classification logic supports consistent communication among geologists, engineers, and regulatory reviewers.

Key Components

#	Component
1	Decision-tree navigation interface

#	Component
2	Embedded ASTM test method references
3	Interactive plasticity chart plotter (LL–PI graph)

Applications

#	Application
1	Preliminary soil classification during Phase I/II geotechnical site investigations
2	Quality assurance of laboratory test reporting and classification consistency
3	Training tool for early-career geotechnical engineers and engineering geology students

Related Concepts

#	Concept
1	ASTM D2487
2	Casagrande Plasticity Chart
3	AASHTO Soil Classification System

Tags

geotechnical engineering, soil classification, interactive pdf

USCS Soil Classification Flowchart (Interactive PDF)