

Soil Classification

Engineering Soil Classification

แบ่งตามการใช้งานด้านวิศวกรรม มีหลายระบบ เช่น
ASTM, U.S. Bureau, Atterberg, M.I.T, Unified, AASHTO, CAA, USDA

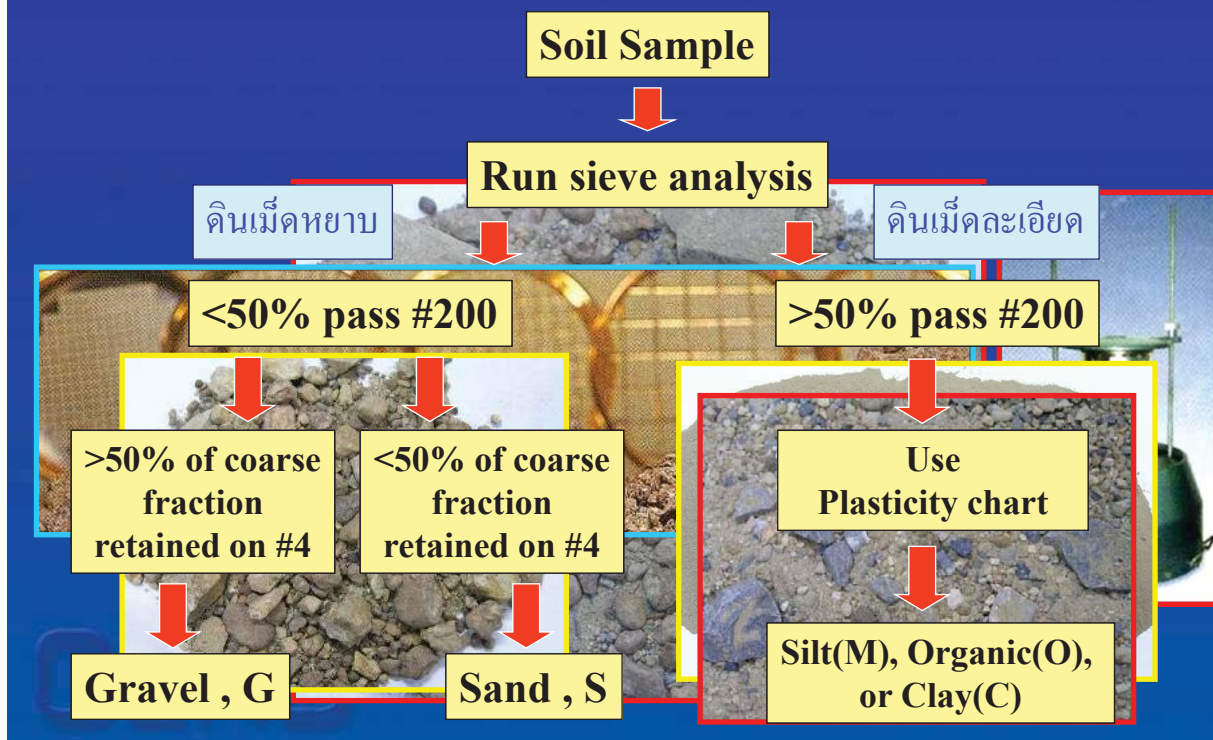
แต่ที่นิยมใช้มี 2 ระบบ คือ

1. Unified Soil Classification System (USCS)
2. American Association of State Highway and Transportation Officials (AASHTO)

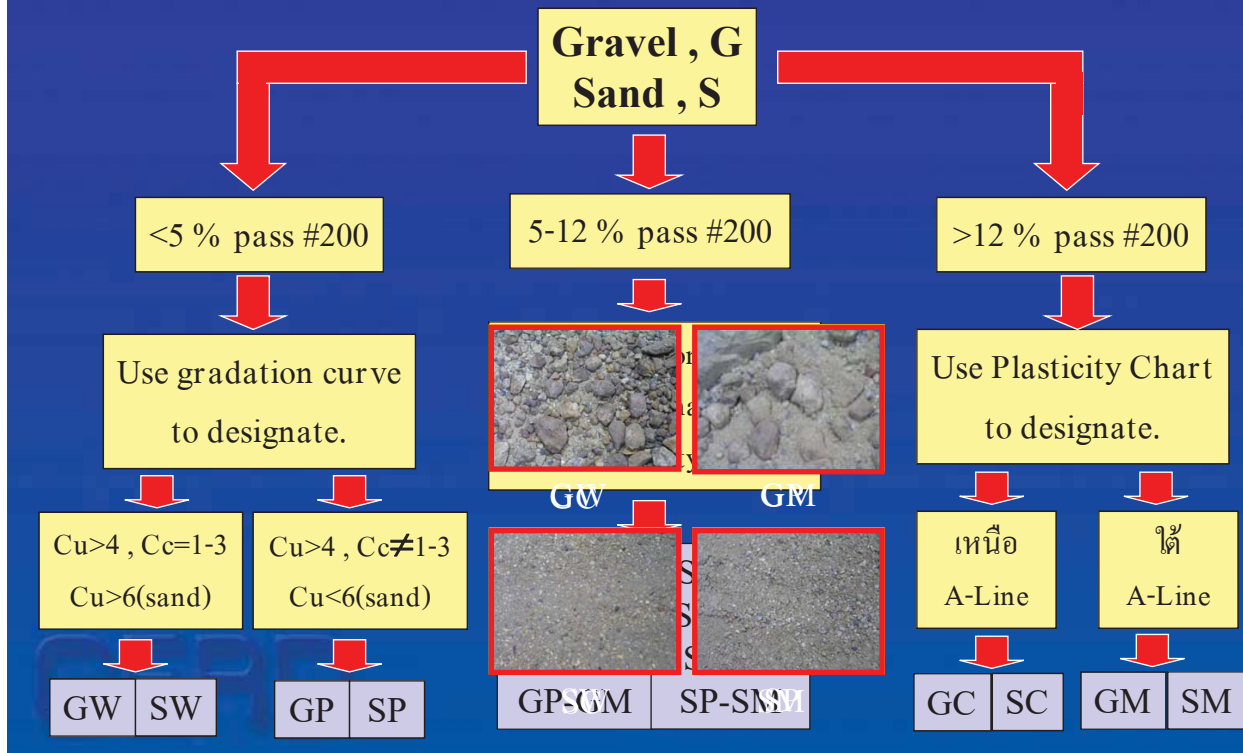
GERD

จัดทำโดย เชิดพันธุ์ อมรกุล
นิสิตวิศวกรรมปฐพี ม.เกษตรศาสตร์

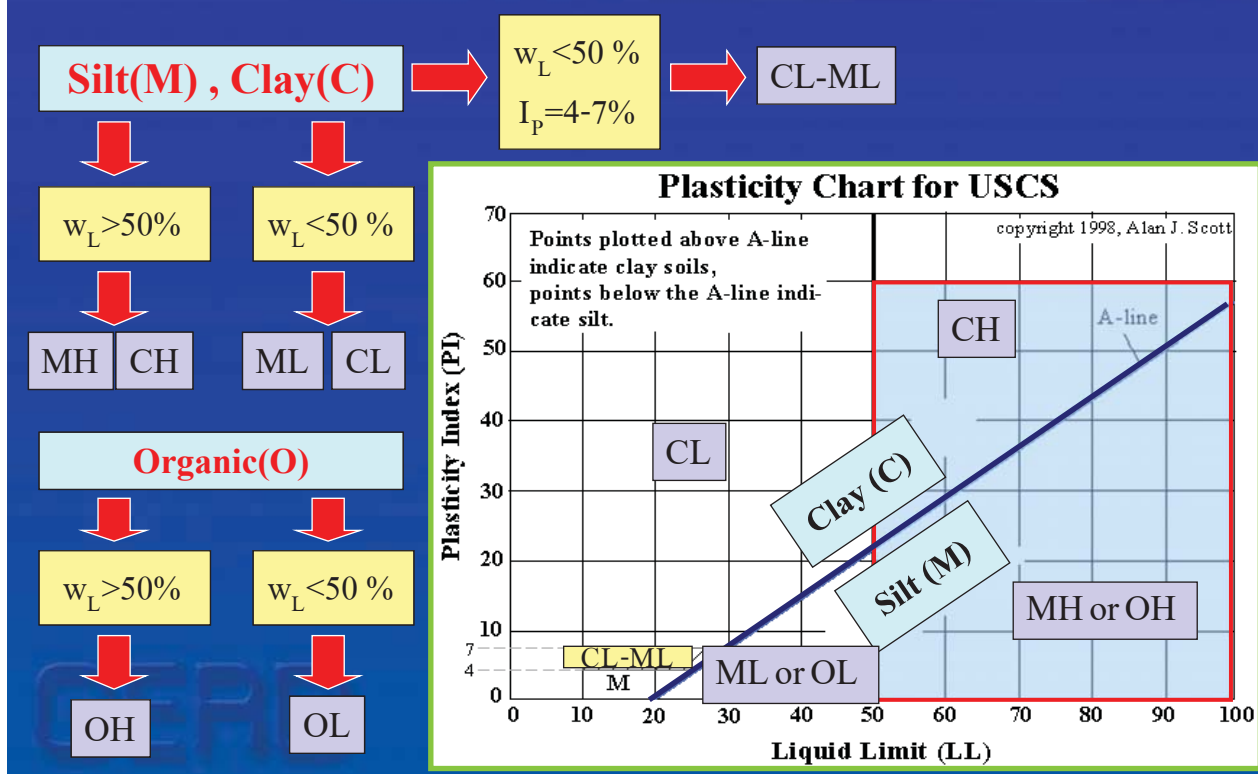
UNIFIED SOIL CLASSIFICATION SYSTEM , USCS



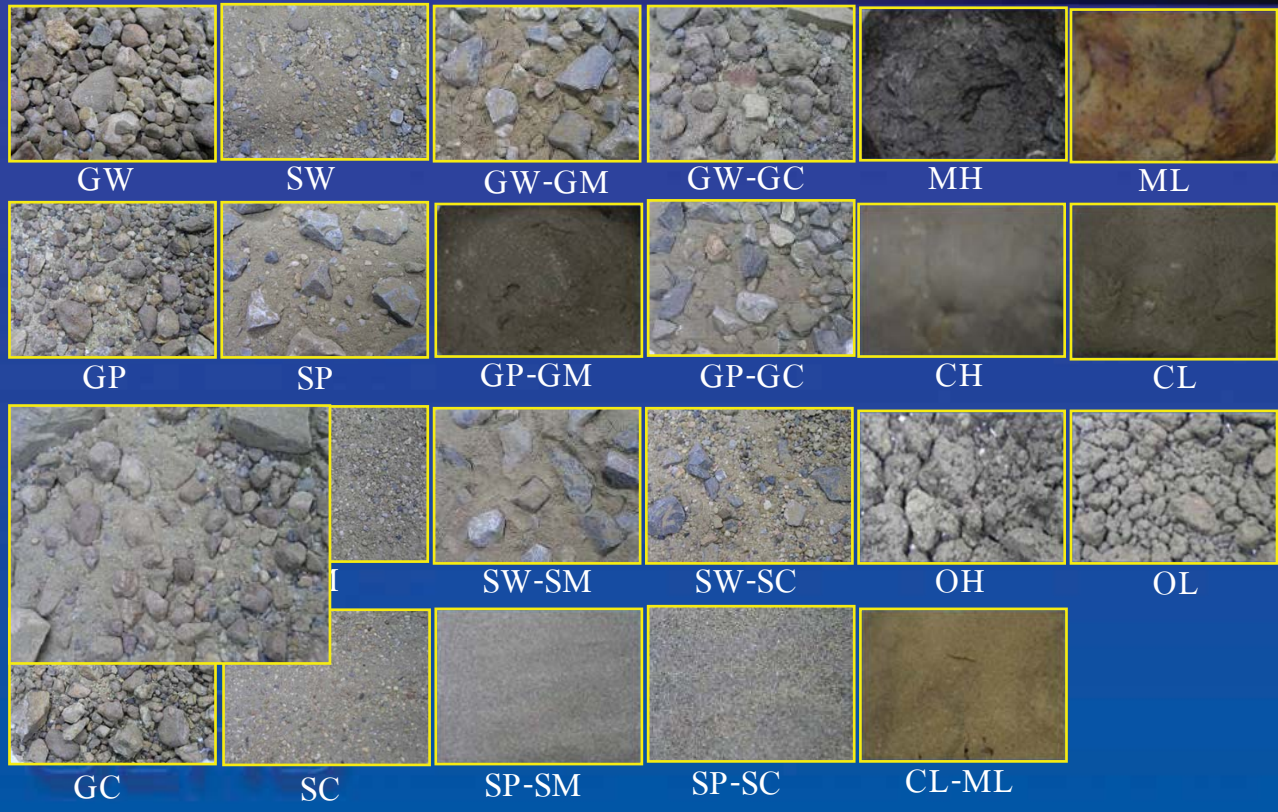
Coarse Grained Soil



Fine Grained Soil



UNIFIED SOIL CLASSIFICATION SYSTEM, USCS

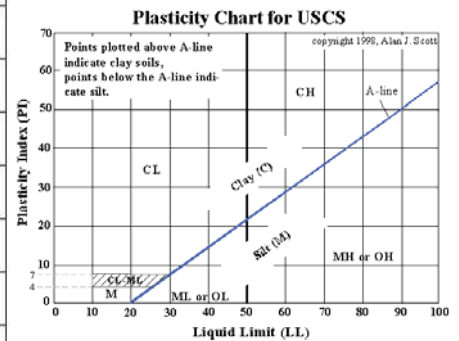
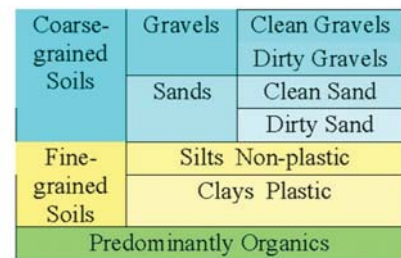


Unified Soil Classification System

Adapted from *Basic Soils Engineering*
B.K. Hough copyright 1957 The Ronald Press Company

Major Divisions	Pattern	Code	Description	
COARSE GRAINED SOILS More than half of material is larger than No. 4-sieve size.	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	
	GRAVELS WITH FINES (appreciable amount of fines)	GP	Poorly graded gravels or gravel-sand mixtures, little or no fines	
	SANDS AND SANDY SOILS More than half of material is larger than No. 200-sieve size.	CLEAN SANDS (little or no fines)	SW	Well-graded sands or gravelly sands, little or no fines
		SANDS WITH FINES (appreciable amount of fines)	SP	Poorly graded sands or gravelly sands, little or no fines
	FINE GRAINED SOILS More than half of material is smaller than No. 200-sieve size.	SILT AND SILTY SOILS	SM	Silty sands, sand-silt mixtures
		SANDS AND SANDY SILTS	SC	Clayey sands, sand-clay mixtures
SILTS AND CLAYS		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	
HIGHLY ORGANIC SOILS	Liquid limit less than 50	CL	Inorganic clays of low to medium plasticity	
		OL	Organic silts and organic silt-clays of low plasticity	
	Liquid limit greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		CH	Inorganic clays of high plasticity, fat clays	
		OH	Organic clays of medium to high plasticity, organic silts	
		PT	Peat and other highly organic soils	

Unified Soil Classification



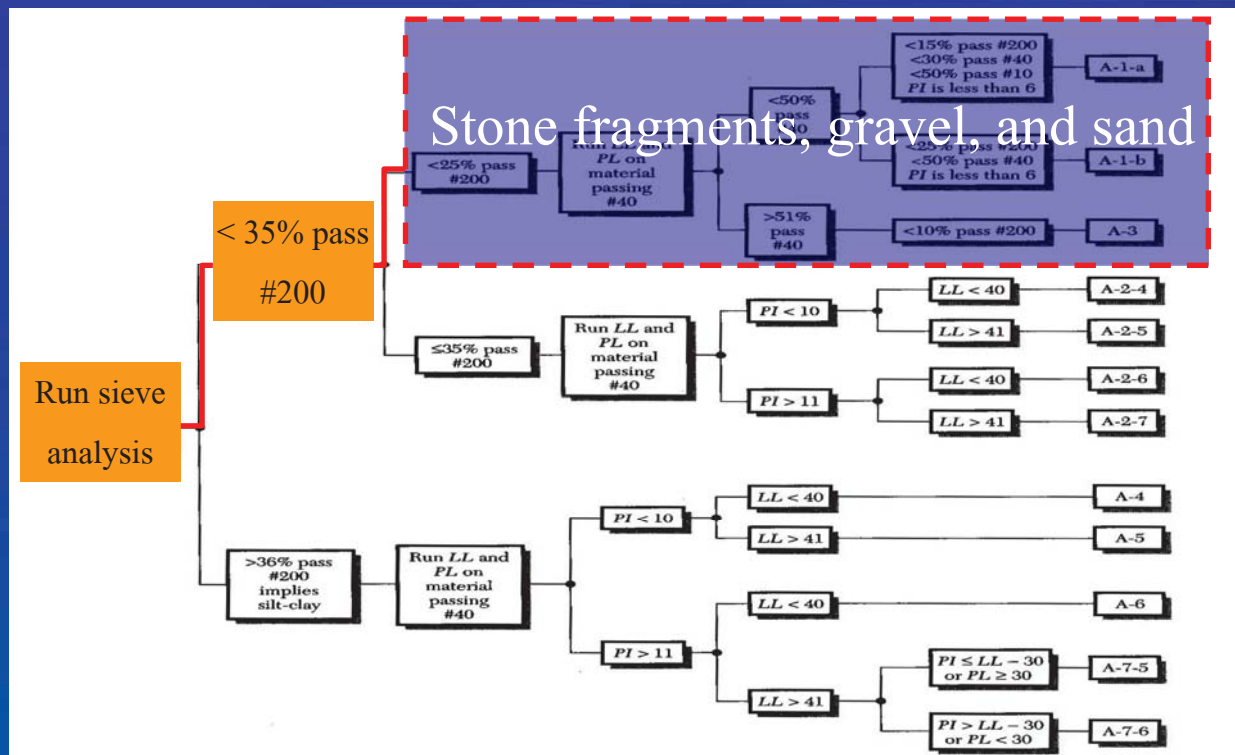
American Association of State Highway Transportation Officials System (AASHTO)

รายละเอียดการจำแนกดินระบบ AASHTO Classification

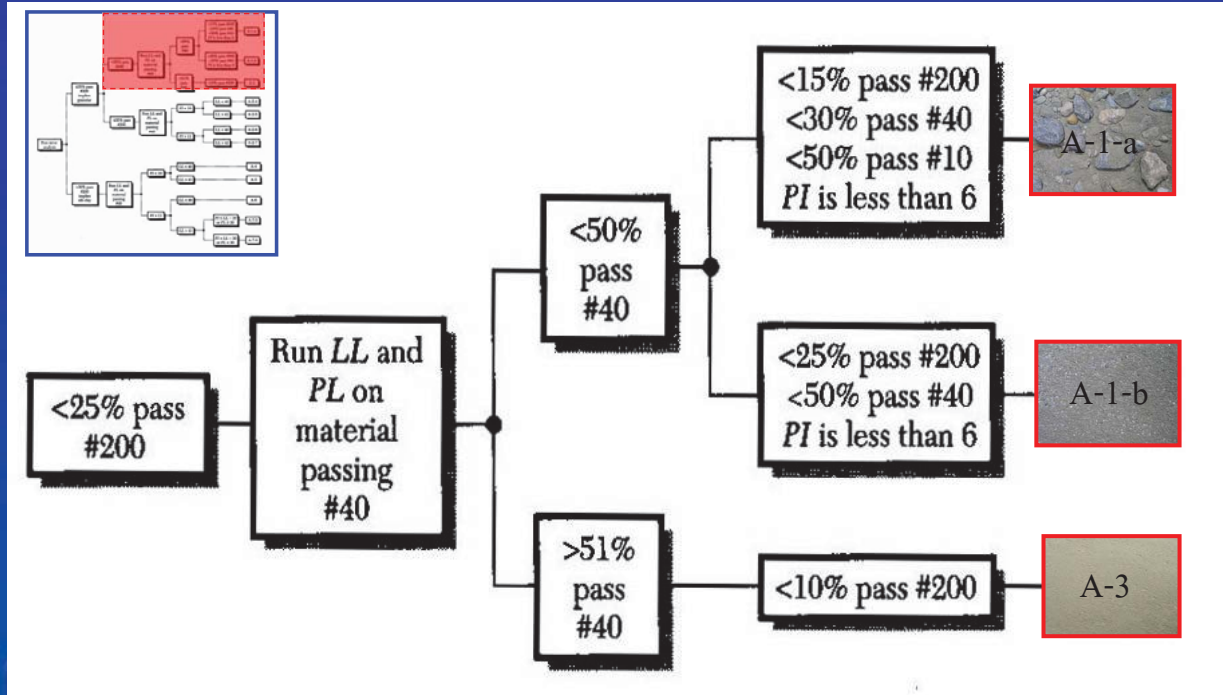
General classification	Granular Materials (35% or Less Passing No. 200)							Silt-Clay Materials (More than 35% Passing No. 200)			
	A-1		A-3	A-2				A-7			
Group classification	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5, A-7-6
Sieve analysis, percent passing:											
No. 10	50 max.	—	—	—	—	—	—	—	—	—	
No. 40	30 max.	50 max.	51 min.	—	—	—	—	—	—	—	
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	
Characteristics of fraction passing No. 40:											
Liquid limit	—	—	—	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	40 max.	
Plasticity index	6 max.	—	N.P.	10 max.	10 max.	11 min.	11 min.	10 max.	10 max.	11 min.	
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to good							Fair to poor			

*Plasticity index of A-7-5 subgroup is equal to or less than L.L. minus 30. Plasticity index of A-7-6 subgroup is greater than L.L. minus 30.

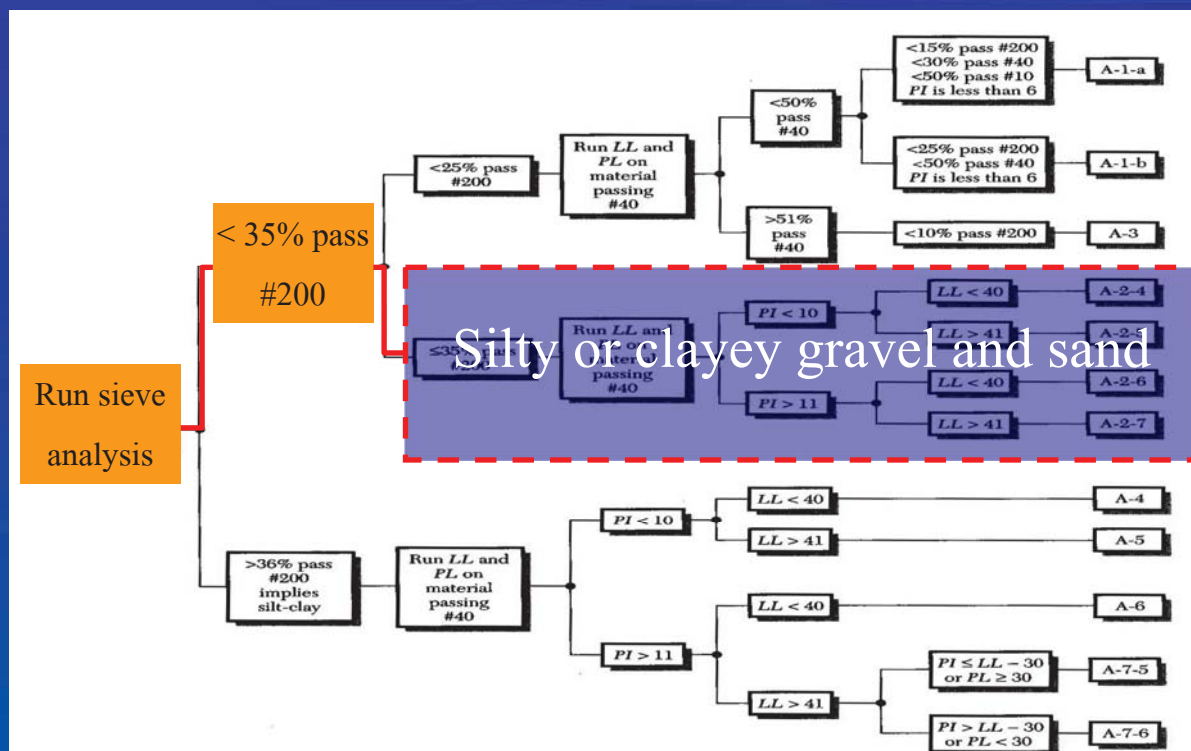
การจำแนกดินตามระบบ AASHTO



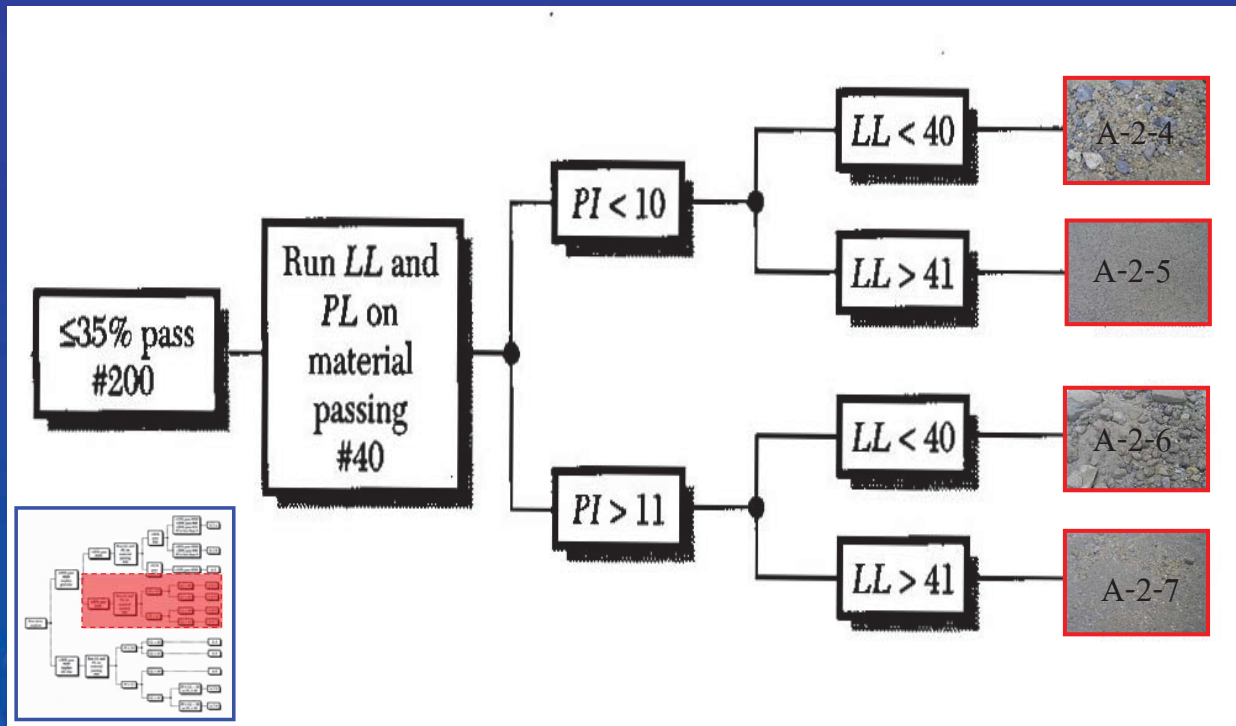
Stone fragments, gravel, and sand



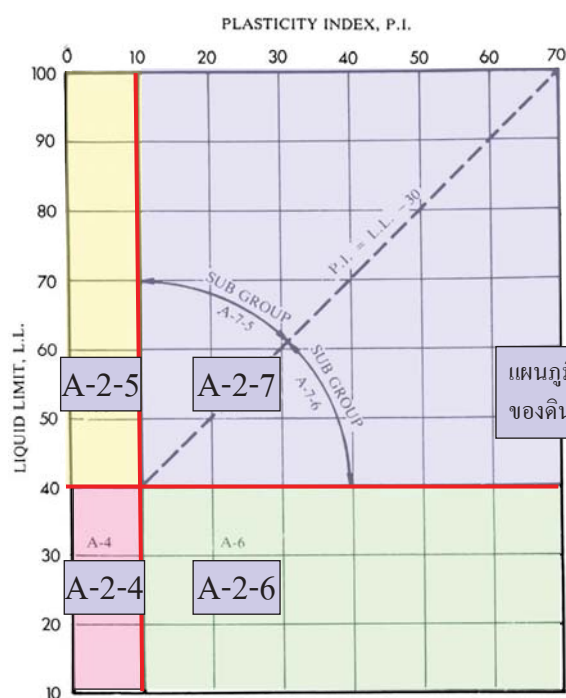
การจำแนกดินตามระบบ AASHTO



Silty or clayey gravel and sand



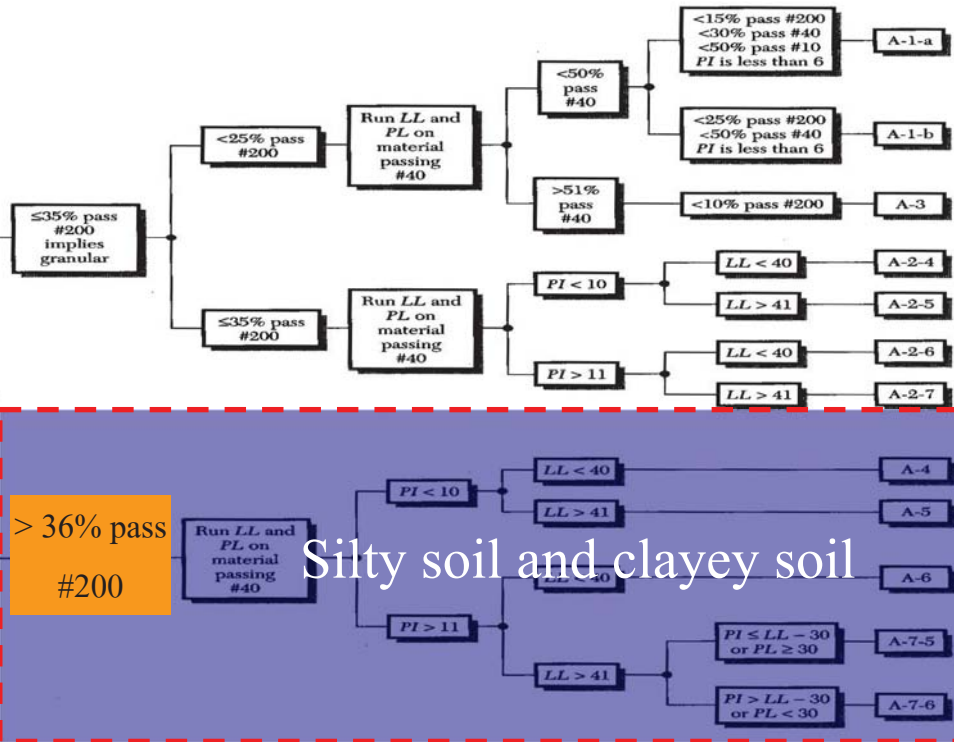
AASHTO



แผนภูมิความเหนียวสำหรับการจำแนกประเภทของดินพวกเม็ดละเอียด โดยระบบ AASHTO

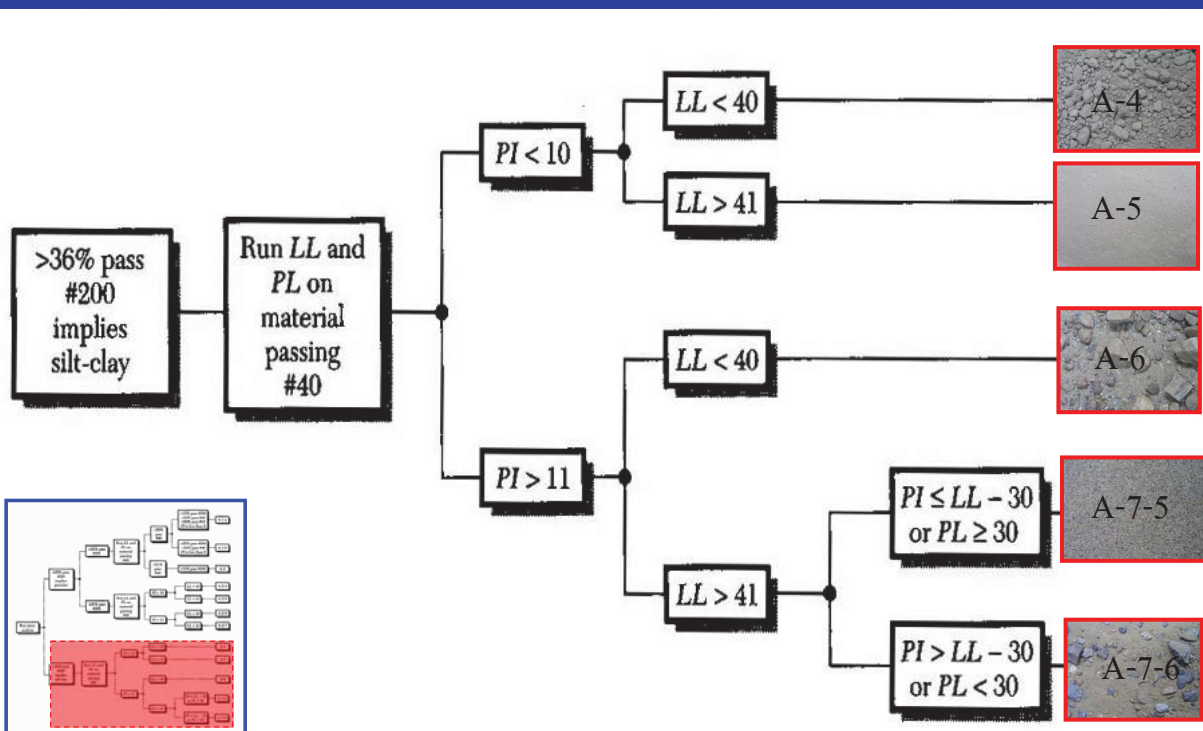
การจำแนกดินตามระบบ AASHTO

Run sieve analysis

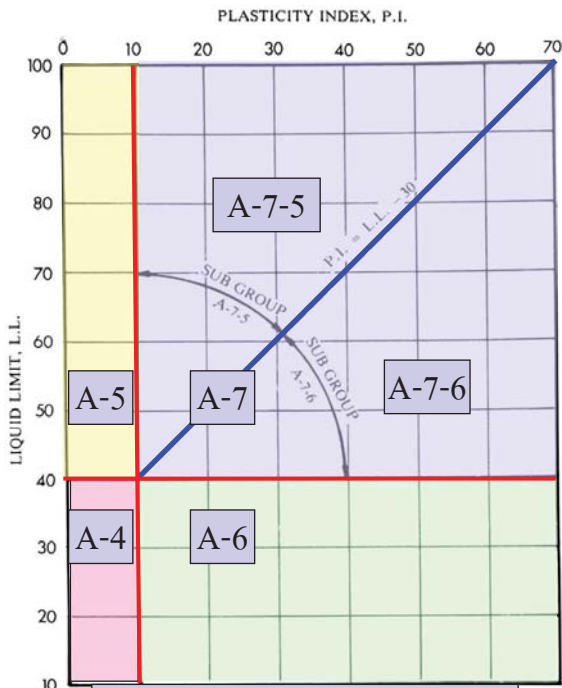


Silty soil and clayey soil

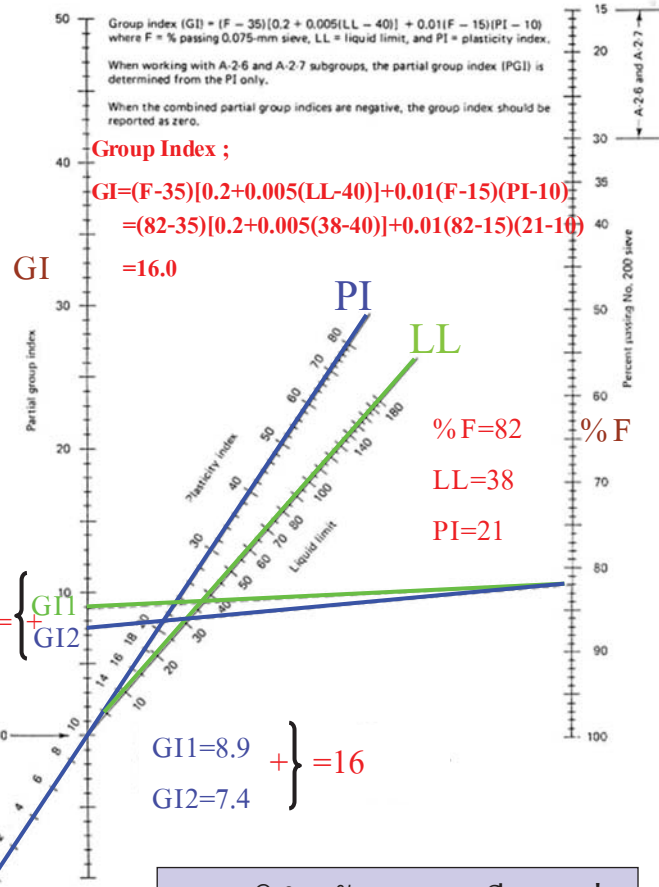
Silty soil and clayey soil



AASHTO



แผนภูมิความเหนียวสำหรับการจำแนกประเภทของดินพวกเม็ดละเอียดโดยระบบ AASHTO

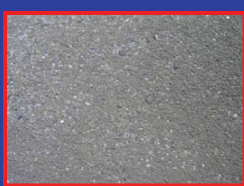


แผนภูมิสำหรับหาटरชนีของกลุ่ม

การจำแนกดินตามระบบ AASHTO



A-1-a(0)



A-1-b(0)



A-2-4(0)



A-2-5(0)



A-2-6(0)



A-2-7(3)



A-3(0)



A-4(8)



A-5(9)



A-6(10)



A-7-5(17)



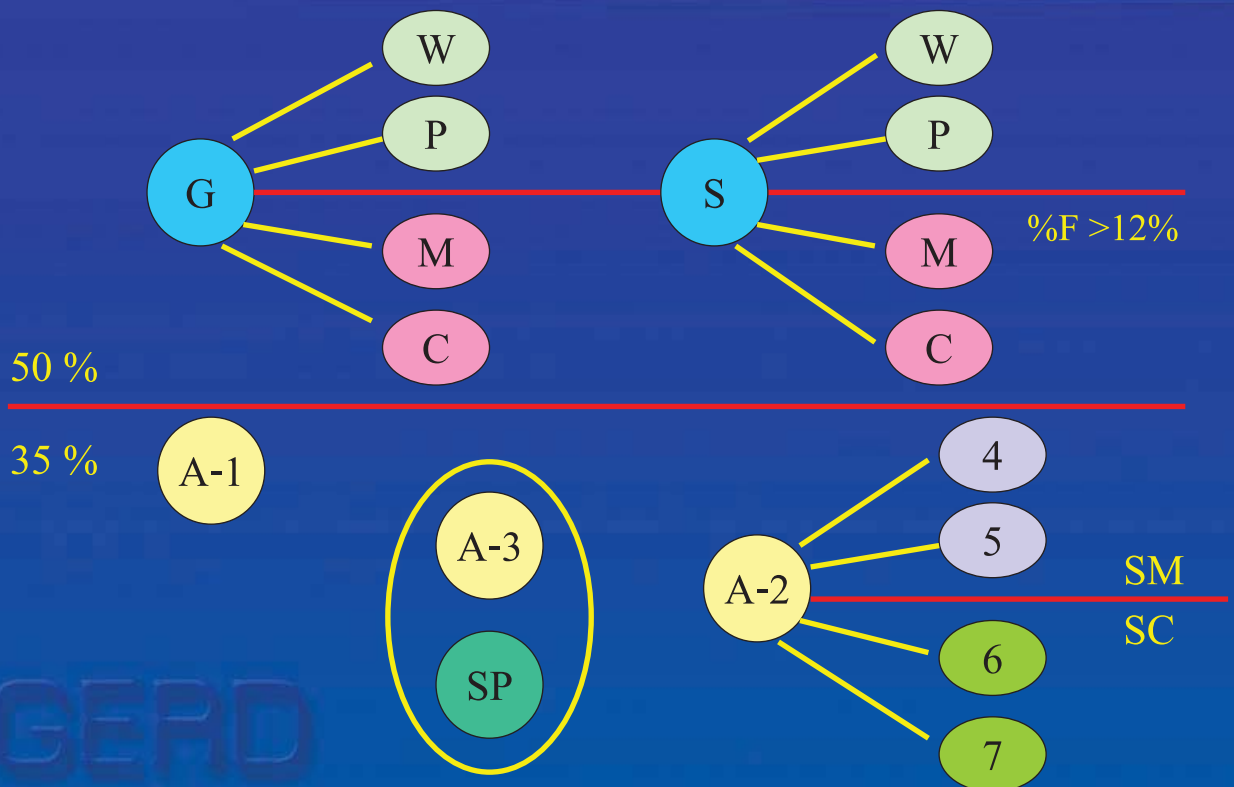
A-7-6(20)

Comparison of Soil Groups in USC and AASHTO System

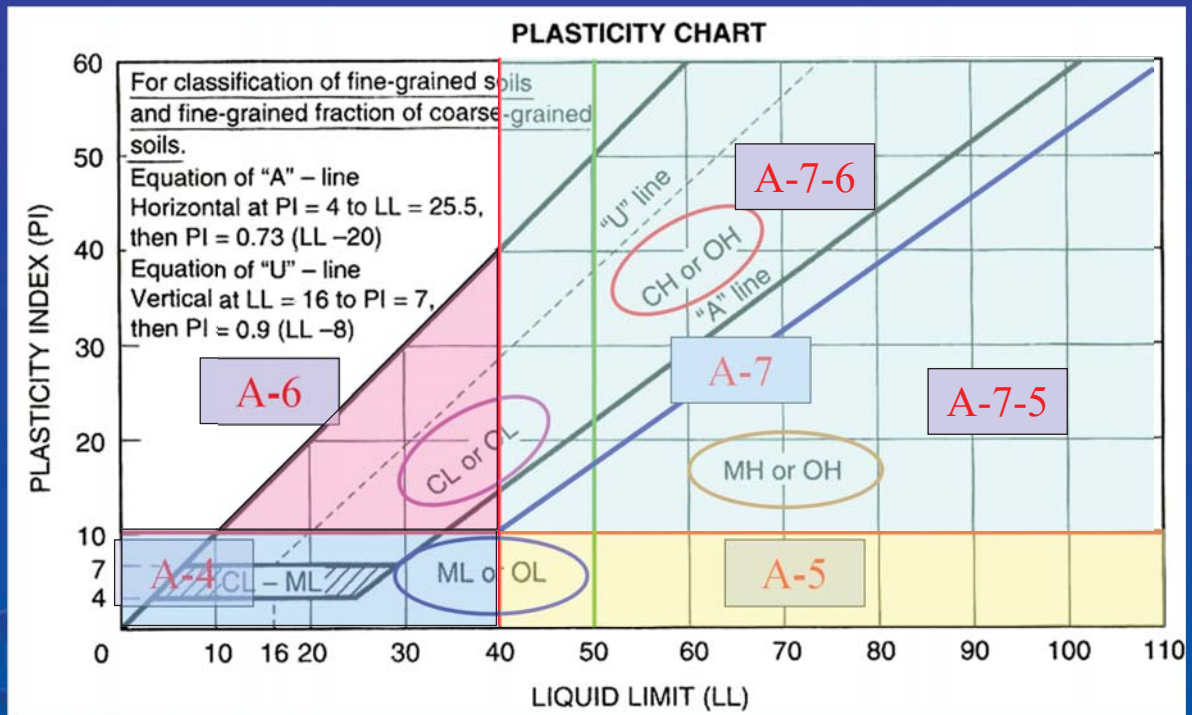
Soil Group in USC System	Comparable Soil Groups in AASHTO System		
	Most Probable	Possible	Possible but Improbable
GW	A-1-a	—	A-2-4, A-2-5 A-2-6, A-2-7
GP	A-1-a	A-1-b	A-3, A-2-4, A-2-5, A-2-6, A-2-7
GM	A-1-b, A-2-4 A-2-5, A-2-7	A-2-6	A-4, A-5, A-6, A-7-5, A-7-6, A-1-a
GC	A-2-6, A-2-7	A-2-4, A-6	A-4, A-7-6, A-7-5
SW	A-1-b	A-1-a	A-3, A-2-4, A-2-5, A-2-6, A-2-7
SP	A-3, A-1-b	A-1-a	A-2-4, A-2-5, A-2-6, A-2-7
SM	A-1-b, A-2-4, A-2-5, A-2-7	A-2-6, A-4, A-5	A-6, A-7-5, A-7-6, A-1-a
SC	A-2-6, A-2-7	A-2-4, A-6, A-4, A-7-6	A-7-5
ML	A-4, A-5	A-6, A-7-5	—
CL	A-6, A-7-6	A-4	—
OL	A-4, A-5	A-6, A-7-5, A-7-6	—
MH	A-7-5, A-5	—	A-7-6
CH	A-7-6	A-7-5	—
OH	A-7-5, A-5	—	A-7-6
PT	—	—	—

Source: Liu, 1967.

เปรียบเทียบการจำแนกชนิดของดิน
ระหว่างระบบ USC กับระบบ AASHTO



เปรียบเทียบการจำแนกชนิดของดิน ระหว่างระบบ USC กับระบบ AASHTO



Boulders

AASHTO	Gravel		Sand		Combined Silt and Clay
			Coarse	Fine	

Cobbles

USC	Gravel		Sand			Fine (Silt or Clay)
	Coarse	Fine	Co.	Medium	Fine	

Sieve Sizes								
3"	3/4"	4	10	40	60	200	270	0.005
76.2	19.1	4.76	2.00	0.42	0.25	0.074	0.050	
Particle Size ^m mm								

Comparison of soil-size limits of AASHTO (AASHO) and USC systems. (From Liu, 1967)



จบการนำเสนอ