

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, Most Gracious, Most Merciful
King Fahd University of Petroleum & Minerals
Civil Engineering Department

Dr. Talat A Bader
CE 353_092

Homework #05

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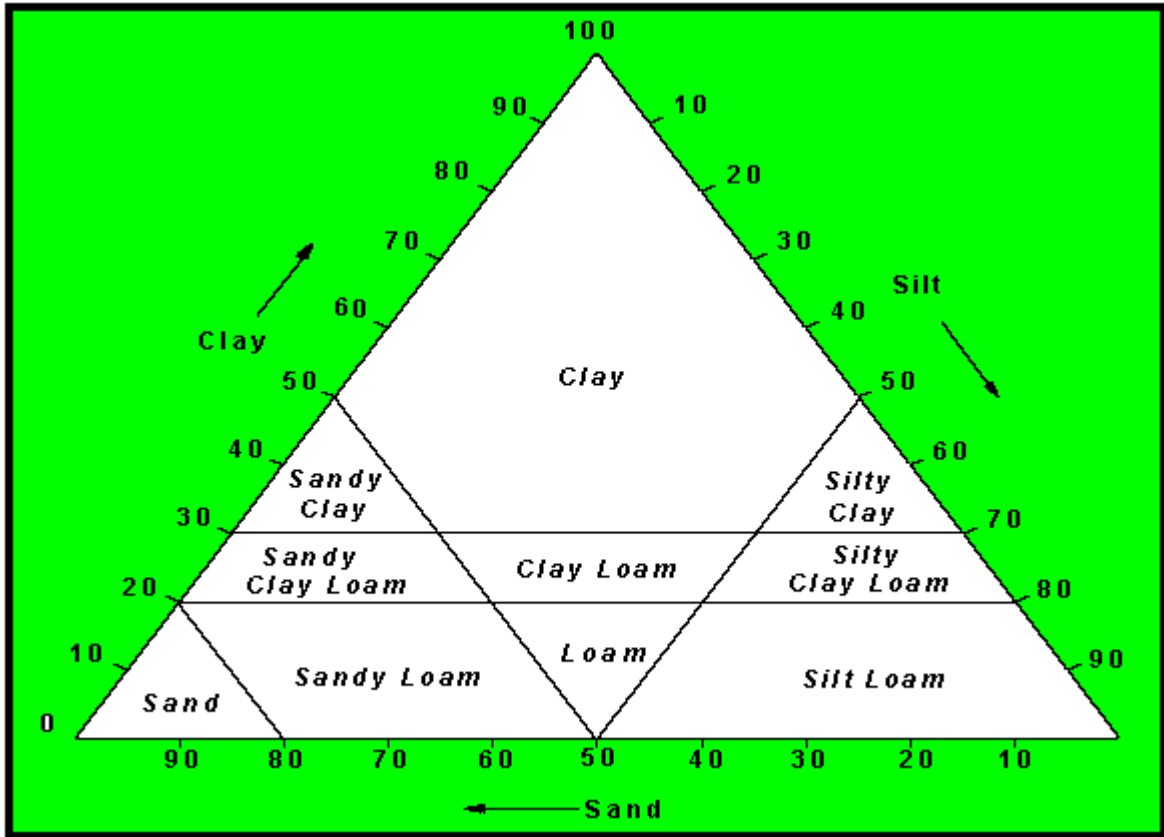
1. Solve the following Problems Page 112:

1. 3.24
2. 3.25

2. Use the same Data in Problem 3.24 and classify Soil A,D and E according to the Agricultural Classification System.

*Always Give the Professional Look of an
Engineer*

Textural Soil Classification System (USDA)



AASHTO
SOIL CLASSIFICATION

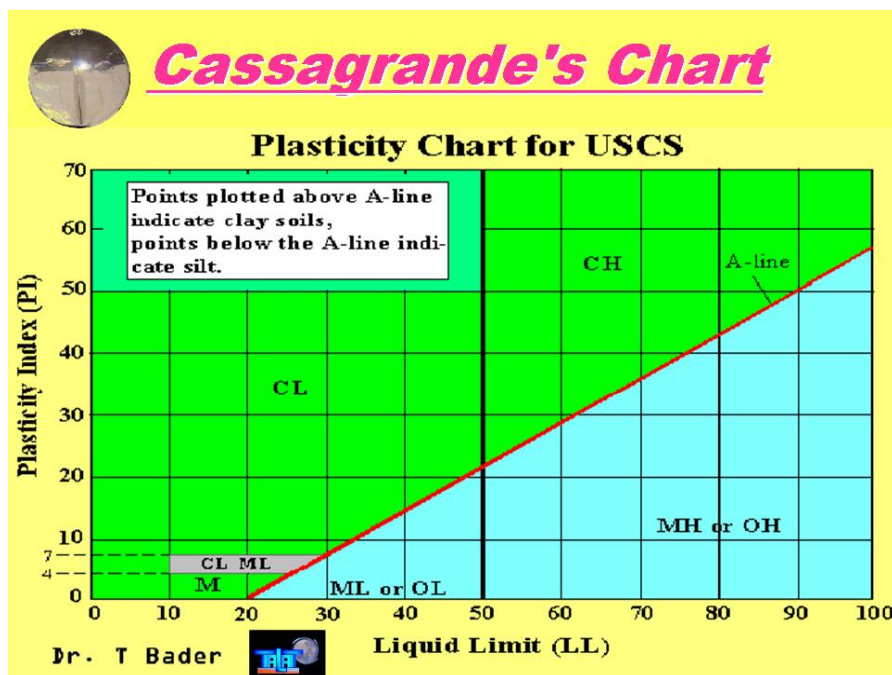
AASHTO Soil Classification System

General Classification	Granular materials (35% or less of Total Sample passing No. 200)							Silty-Clay materials (more than 35% passing No. 200)			
	A-1		A-3	A-2				A-4	A-5	A-6	A-7
Group Classification	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				
Sieve Analysis % Passing No. 10 No. 40 No.200	50 max. 30 max. 15 max.	50 max. 25 max.	51 min. 10 max	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	36 min.
Characteristic of Fraction passing No. 40											
Liquid Limit Plasticity index	-		-	40 max 10 max	41 min 10 max	40 max 11 min	41 min 11 min	40 max 10 max	41 min 10 max	40 max 11 min	41 min 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 subgrade rating	Excellent to good							Fair to poor			


Plasticity index of A-7-5 subgrade is equal to or less than LL minus 30

Plasticity index of A-7-6 subgrade is greater than LL minus 30

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Unified Classification System (UCS)

Dr. Tbader  Coarse-Grained Soils more than 50% retained on No. 200 sieve		Gravels more than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels less than 5% fines $C_U \geq 4$ and $1 \leq C_C \leq 3$ $C_U < 4$ and/or $1 < C_C < 3$	GW GP (GW-GM) GM GM-GC GC
Fine-Grained Soils 50% or more passes the No. 200 sieve		Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands less than 5% fines $C_U \geq 4$ and $1 \leq C_C \leq 3$ $C_U < 4$ and/or $1 < C_C < 3$	SW SP (SW-SM) SM SM-SC SC
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Silt and Clays liquid limit less than 50	Inorganic (examine color and odor) $PI > 7$ and plots on or above <i>A</i> line $PI < 4$ or plots below <i>A</i> line	CL ML OL
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Silt and Clays liquid limit 50 or more	Organic (examine color and odor) $\frac{(LL)_{oven\ dried}}{(LL)_{not\ dried}} < 0.75$	CH MH OH (PT - heavy odor, primarily organic)
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Sands with Fines more than 12% fines limits plot in hatched zone on plasticity chart above <i>A</i> line and hatched zone on plasticity chart	Sands with Fines more than 12% fines limits plot in hatched zone on plasticity chart below <i>A</i> line and hatched zone on plasticity chart	(GW-GM)
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Sands with Fines more than 12% fines limits plot in hatched zone on plasticity chart above <i>A</i> line and hatched zone on plasticity chart	Sands with Fines more than 12% fines limits plot in hatched zone on plasticity chart below <i>A</i> line and hatched zone on plasticity chart	(SW-SM)
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Silt and Clays liquid limit less than 50	Inorganic (examine color and odor) $PI > 7$ and plots on or above <i>A</i> line $PI < 4$ or plots below <i>A</i> line	CL ML OL
GRADATION CURVE AND ATTERBERG LIMITS ON FRACTION PASSING A No. 40 SIEVE		Silt and Clays liquid limit 50 or more	Organic (examine color and odor) $\frac{(LL)_{oven\ dried}}{(LL)_{not\ dried}} < 0.75$	CH MH OH (PT - heavy odor, primarily organic)

Group Symbol, Soil Classification