

Soil Classification

1. Scope:

This procedure is for classifying soils and aggregate.

2. Apparatus:

2.1 For sieve analysis see SD 202.

2.2 For mechanical analysis (Colloid) see SD 102.

2.3 Liquid limit and plasticity index see SD 207.

3. Procedure:

3.1 Field Classification.

A. Obtain the sieve analysis in accordance with SD 202 and the liquid limit and plasticity index in accordance with SD 207.

B. With the required data from SD 202 and SD 207, determine the classification from the chart, figure 1.

C. Enter the chart from the left and proceed to the right. The first group which the test data fits is the correct group classification.

D. A-7 group only. To determine the subgroup of A-7 soil, use the following:

(1) Subtract 30 from the liquid limit of the soil. If the P.I. is equal to or less than the L.L. minus 30, the subgroup is A-7-5.

If the P.I. is greater than the L.L. minus 30, the subgroup is A-7-6.

Examples:

L.L. = 43 P.I. = 11

L.L. $43 - 30 = 13$

The P.I. of 11 is less than 13; therefore, the subgroup is A-7-5.

L.L. = 43 P.I. = 15

L.L. $43 - 30 = 13$

The P.I. of 15 is more than 13; therefore, the subgroup is A-7-6.

E. Determination of Group Index.

- (1) The following must be known to determine the group index:
The percent passing the #200 sieve, liquid limit and plasticity index.
- (2) The group index is the sum of the values determined from figure 2. and figure 3.
- (3) Example:

Soil type A-6		
Percent passing the #200	=	65
Liquid limit	=	32
Plasticity index	=	13

- (4) Enter figure 2. with 65 percent passing the #200 and a liquid limit of 32.

Follow the line for 65 percent passing the #200 up to the line marked L.L. 40 or less. This will give you a value of 6.
- (5) Using figure 3, enter the chart on the line marked passing the #200, 55 or more.
- (6) Follow the line marked 55 to the point (By interpolation) for a P.I. of 13. This will give a value of 1.
- (7) Total the values obtained from figure 2. and figure 3.

$$6 + 1 = 7$$

The group index is 7.

3.2 Central Laboratory.

- A. The sieve analysis may be taken from SD 102 or SD 202.
- B. The procedure in the Central Laboratory is the same as shown in paragraph 3.1.
- C. The Central Laboratory will also determine the textural classification from figure 4.
- D. To use this chart, obtain the percent clay and percent silt from the colloid test, SD 102.
- E. Enter the chart with the known percent clay and percent silt, where the lines cross is the textural classification.

4. Report:

Report the gradation, liquid limit, plasticity index and soil classification on a DOT-3.

5. References:

AASHTO M145
SD 102
SD 202
SD 207
DOT-3

**CLASSIFICATION OF HIGHWAY SUBGRADE MATERIALS
(With suggested subgroups)**

General Classification	Granular Materials (35% or less passing the #200)							Silt-Clay Materials (More than 35% passing the #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	A-7-5
Sieve Analysis Percent Passing:											
#10	0-50	0-50	51-100	0-35	0-35	0-35	0-35				
#40	0-30	0-25	0-10	0-35	0-35	0-35	36-100	36-100	36-100	36-100	
#200	0-15										
Characteristics of fraction passing #40											
Liquid Limit				0-40	41+	0-40	41+	0-40	41+	0-40	41+
Plasticity Index	0-6		N.P.	0-10	0-10	11+	11+	0-10	0-10	11+	11+
Group Index	0	0	0	0	0-4	0-4	0-8	0-12	0-16	0-20	
Usual Types of Significant Constituent Materials	Stone Fragments, Gravel, & Sand		Fine Sand	Silty or Clayey Gravel & Sand			Silty Soils	Clayey Soils			
General Rating As Subgrade	Excellent to Good						Fair to Poor				

Figure 1

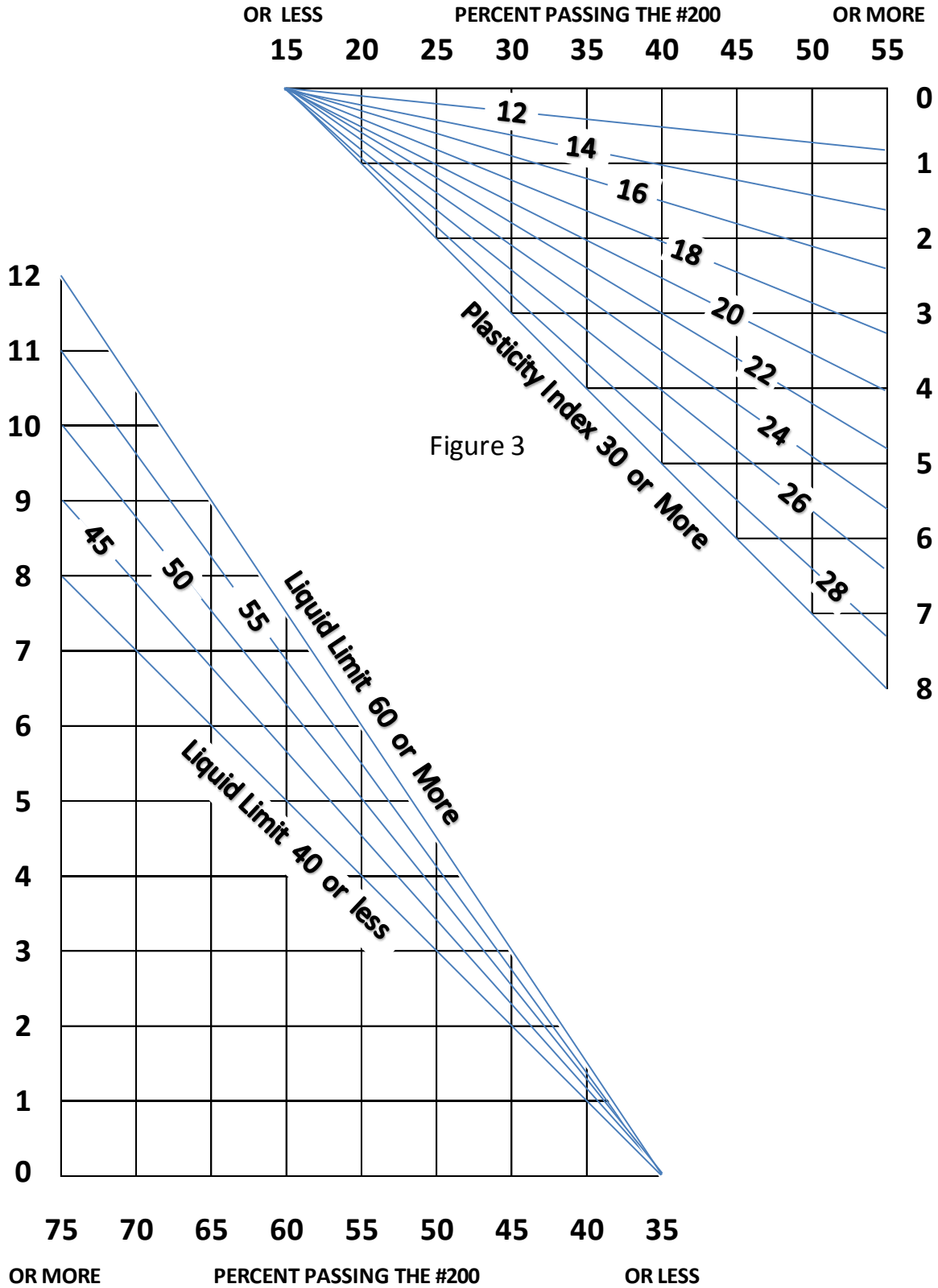


Figure 2

OR LESS PERCENT PASSING THE #200 OR MORE
15 20 25 30 35 40 45 50 55

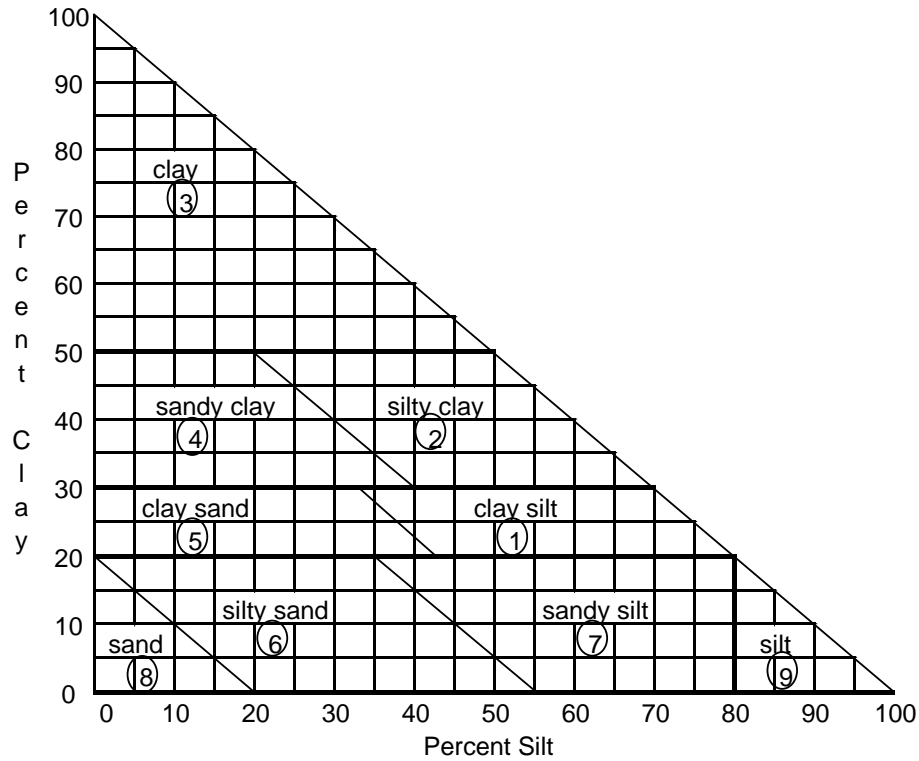
Figure 3

Plasticity Index 30 or More

Liquid Limit 60 or More

Liquid Limit 40 or less

TEXTURAL CLASSIFICATION CHART



1. 0% - 19% retained #10 sieve = Use fine classification (1) thru (9).
2. 20% - 49% retained #10 sieve. Use fine classification determined from the minus #10 sieve analysis (soil textures 1 thru 9). Add the word "Gravelly" ahead of the fine classification (i.e. Gravelly sand). Use the fine classification (1) thru (9) on the soils profile.
3. 50% - 84% Retained #10 sieve = Clayey, silty or sandy gravel. (10) Soil texture indicated on soil profile
4. 85% - 100% retained #10 sieve = Gravel (10).

SOIL LEGEND




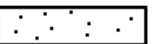
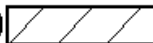
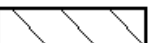
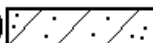
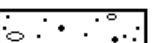
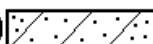
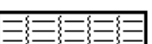
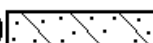
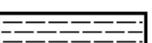
①  clay silt	⑦  sandy silt
②  silt clay	⑧  sand
③  clay	⑨  silt
④  sandy clay	⑩  gravel
⑤  clay sand	⑪  soft shale (Textural classification is clay)
⑥  silty sand	⑫  hard shale (Textural classification is clay)

Figure 4