

Question 5.2

The group index is calculated using equation 5.1:

$$GI = (F_{200} - 35)(0.2 + 0.005(LL - 40)) + 0.01(F_{200} - 15)(PI - 10)$$

I made a table of all the group indexes and classifications according to table 5.1:

Soil	Group Index	$LL - 30$	AASHTO Classification
A	16	22	A-7-5
B	5	8	A-6
C	8	11	A-7-6
D	9	2	A-6
E	2	0	A-6

The soil type for soil A is A-7-5 (16). The soil type for soil B is A-6 (8). The soil type for soil C is A-7-6 (11). The soil type for soil D is A-6 (2). The soil type for soil E is A-6 (0).

Question 5.6

Table 5.2 in the book is used for this one. The soil is coarse-grained since 11% passes the No. 200 sieve. The soil is also a sand since 9% is retained in the No. 4 sieve. The next step is to calculate C_u and C_c .

$$C_u = \frac{D_{60}}{D_{10}} = \frac{1.9 \text{ mm}}{0.1 \text{ mm}} = 19 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = \frac{(0.8 \text{ mm})^2}{1.9 \text{ mm} \times 0.1 \text{ mm}} = 3.37$$

Additionally, the A-Line is determined as follows:

$$0.73 \times (LL - 20) = 8.76$$

Since C_c is greater than 3, one of the group symbols is SP. Additionally, a plasticity index of 5 means that it plots below the A-Line, meaning that another group symbol is SM. The group symbol is SP-SM. According to figure 5.3, since the percentage of gravel (a.k.a. the percentage retained in the No. 4 sieve) is less than 15%, the group name is poorly graded sand with silt.