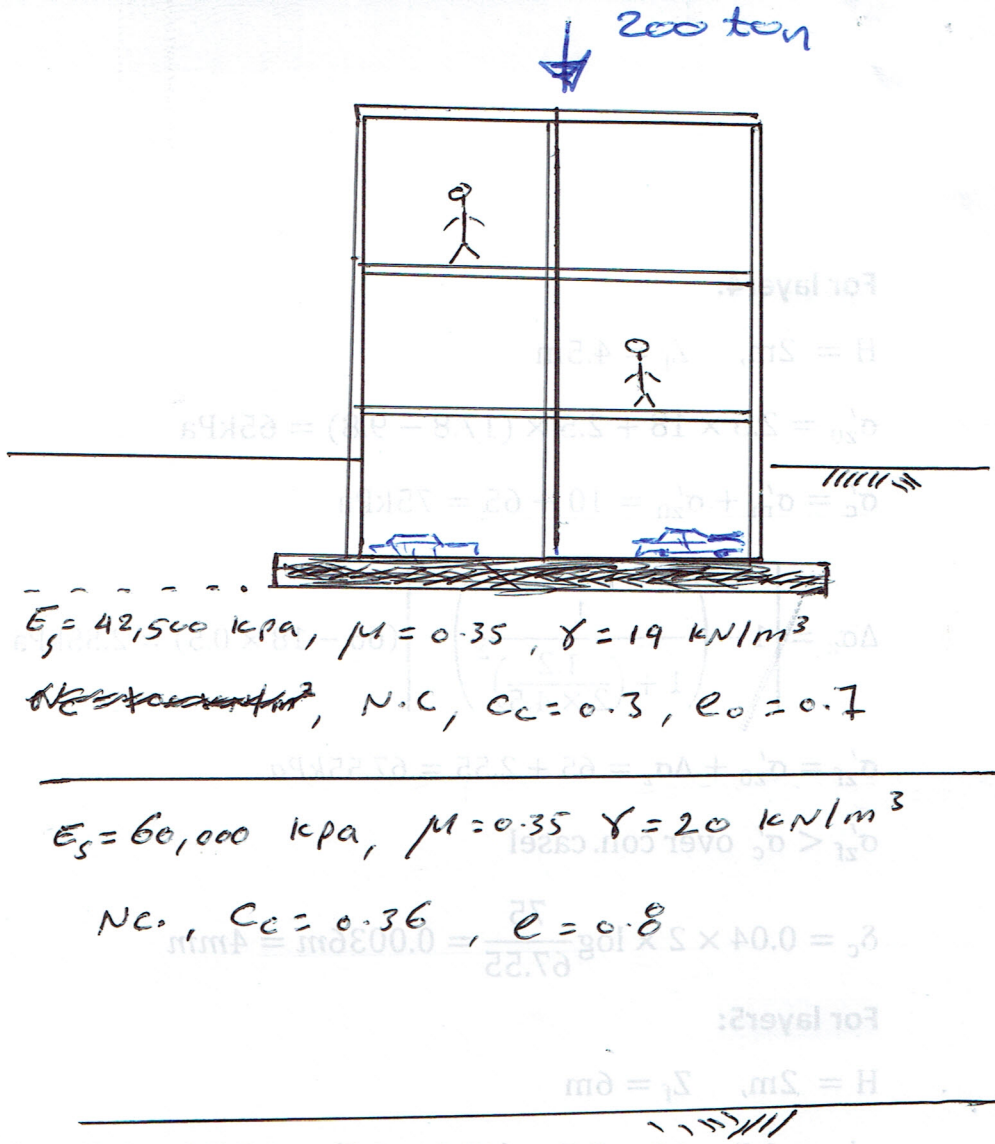

Given:

1- Total load of building = 200 ton

2- Diamension of raft foundation 30 x 40 m

3- The soil profile as shown above & assume $I_f = 0.98$

4- Find the settlement under the center of raft foundation

Solution Zero / no water table

$S = S_i + S_c$

$$S_i = q \alpha \beta' \frac{1-\mu^2}{E_s} \times I_s \times I_f$$

$$q = \frac{200{,}000}{30 \times 40} = 166.67 \text{ kN/m}^2$$

$\alpha = 4$, $\beta' = B/2 = \frac{30}{2} = 15$ m

$\mu = 0.35$

E_s @ H = min of $\begin{cases} 5B \\ \text{until Rock layer (11 m)} \end{cases}$

$$E_s = \frac{42{,}500 \times 3 + 60{,}000 \times 8}{11} = 55{,}091 \text{ kN/m}^2$$

$$n' = \frac{H}{B/2} = 0.733 \quad , \quad m' = \frac{L}{B} = \frac{40}{30} = 1.33$$

n' \ m'	1.2	1.33	1.4
0.5	0.046		0.0474
0.733	0.087	0.085	0.084
0.75	0.09		0.087

$F_1 = 0.085$

n' \ m'	1.2	1.33	1.4
0.5	0.077		0.08
0.733	0.088	0.091	0.0927
0.75	0.089		0.093

$F_2 = 0.091$

$$I_s = F_1 + \frac{1-2\mu}{1-\mu} F_2 = 0.085 + \frac{1-0.35 \times 2}{1-0.35} \times 0.091$$

$$I_s = 0.127$$

$$I_F = 0.98 \quad \text{Given}$$

$$S_i = 166.67 \times 4 \times \frac{30}{2} \times \frac{1-0.35^2}{55{,}091} \times 0.127 \times 0.98$$

$$= 0.0198 \text{ m} \approx 20 \text{ mm} < 25 \text{ mm} \quad \text{ok}$$