

一、如下圖所示之土層，計算A、B、C、D和E各點之總應力(σ)、孔隙水壓(u)和有效應力(σ')之大小？

$$\sigma_A = 0 \quad u_A = 0 \quad \bar{\sigma}_A = 0$$

$$\sigma_B = 2 \times 62.4 = 124.8$$

$$u_B = 2 \times 62.4 = 124.8$$

$$\bar{\sigma}_B = 124.8 - 124.8 = 0$$

$$\sigma_C = 2 \times 62.4 + 2 \times 115 = 354.8$$

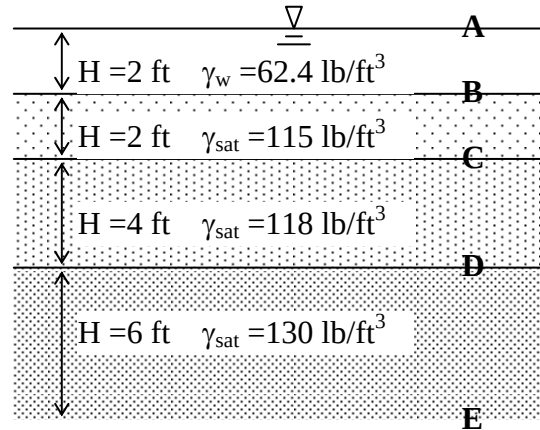
$$u_C = 4 \times 62.4 = 249.6 \quad \bar{\sigma}_C = 354.8 - 249.6 = 105.2$$

$$\sigma_D = 2 \times 62.4 + 2 \times 115 + 4 \times 118 = 826.8 \quad u_D = 8 \times 62.4 = 499.2$$

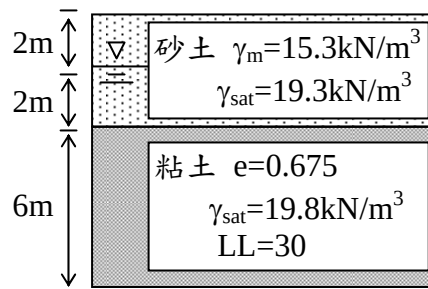
$$\bar{\sigma}_D = 826.8 - 499.2 = 327.6$$

$$\sigma_E = 2 \times 62.4 + 2 \times 115 + 4 \times 118 + 6 \times 130 = 1606.8 \quad u_E = 14 \times 62.4 = 873.6$$

$$\bar{\sigma}_E = 1606.8 - 873.6 = 733.2$$



二、如右圖所示之土壤剖面，已知粘土之預壓密壓力為 160 kN/m^2 ，且其再壓縮指數 $C_r = 0.1 C_c$ ，若地表有一外加載重 $q = 120 \text{ kN/m}^2$ ，則此粘土層將產生多少主要壓密沉陷量？。



粘土層中點之初始垂直覆土有效應力：

$$\bar{\sigma}_0 = 2 \times 15.3 + 2 \times 19.3 + 3 \times 19.8 - 5 \times 9.81 = 79.55 < \bar{\sigma}_i = 160$$

$$\bar{\sigma}_f = 79.55 + 120 = 199.55 > \bar{\sigma}_i = 160$$

$$C_c = 0.009 \times (LL - 10) = 0.009 \times (30 - 10) = 0.18$$

$$C_r = 0.1 \times C_c = 0.1 \times 0.18 = 0.018$$

$$\begin{aligned} S_c &= \frac{C_r}{1 + e_0} \cdot L \cdot \log \frac{\bar{\sigma}_i}{\bar{\sigma}_0} + \frac{C_c}{1 + e_0} \cdot L \cdot \log \frac{\bar{\sigma}_f}{\bar{\sigma}_i} \\ &= \frac{0.018}{1 + 0.675} \times 6 \times \log \frac{160}{79.55} + \frac{0.18}{1 + 0.675} \times 6 \times \log \frac{199.55}{160} \\ &= 0.0814 \text{ m} \\ &= 8.14 \text{ cm} \end{aligned}$$