Consolidation Settlement Calculation

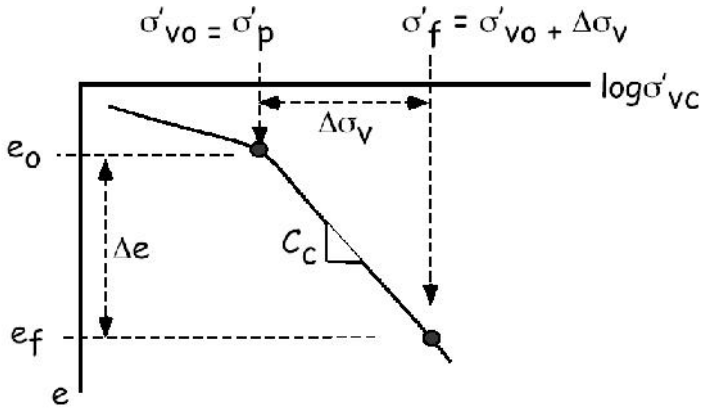
Change in volume (ΔV) = $V_0 - V_1$ = $H\,A - (H - S_c)\,A$ = $S_c\,A$

$$\Delta e = \frac{\Delta V_v}{V_s}$$

$$V_s = \frac{V_0}{1+e_0} = \frac{A.H}{1+e_0}$$

$\Delta V_v = S_c \,.\, A$ ⇒ $\Delta e \,.\, V_s$ ⇒ $\Delta e.\frac{AH}{1+e_0}$ ⇒ $S_c = \frac{\Delta e}{1+e_0} H$

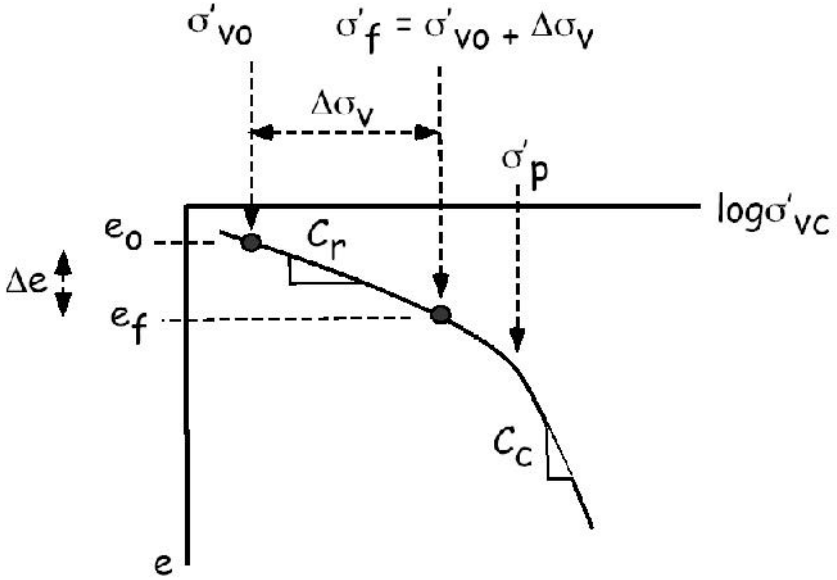
Normally Consolidated Clays



$$S_c = \frac{H_0}{1+e_0} C_c \log\left[\frac{\sigma'_{vo} + \Delta\sigma_v}{\sigma'_{vo}}\right]$$

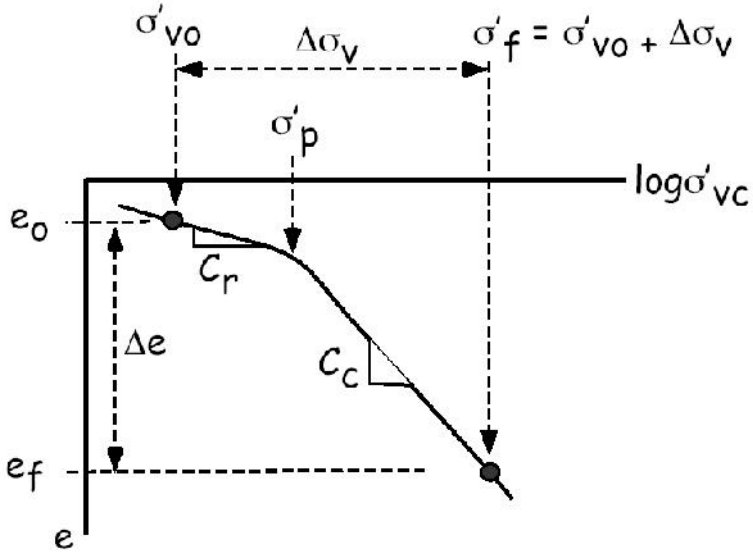
Over Consolidated Clays

$\sigma'_f < \sigma'_p$



$$S_c = \frac{H_0}{1+e_0} C_r \log\left[\frac{\sigma'_{vo} + \Delta\sigma_v}{\sigma'_{vo}}\right]$$

$\sigma'_f > \sigma'_p$



$$S_c = \frac{H_0}{1+e_0}\left[C_r \log\left[\frac{\sigma'_p}{\sigma'_{vo}}\right] + C_c \log\left[\frac{\sigma'_{vo} + \Delta\sigma_v}{\sigma'_p}\right]\right]$$