

OEDOMETRIC SETTLEMENT OF SINGLE FOOTINGS



TASHFEEN

ENGINEERING SOLUTIONS

Required parameters for settlement calculation

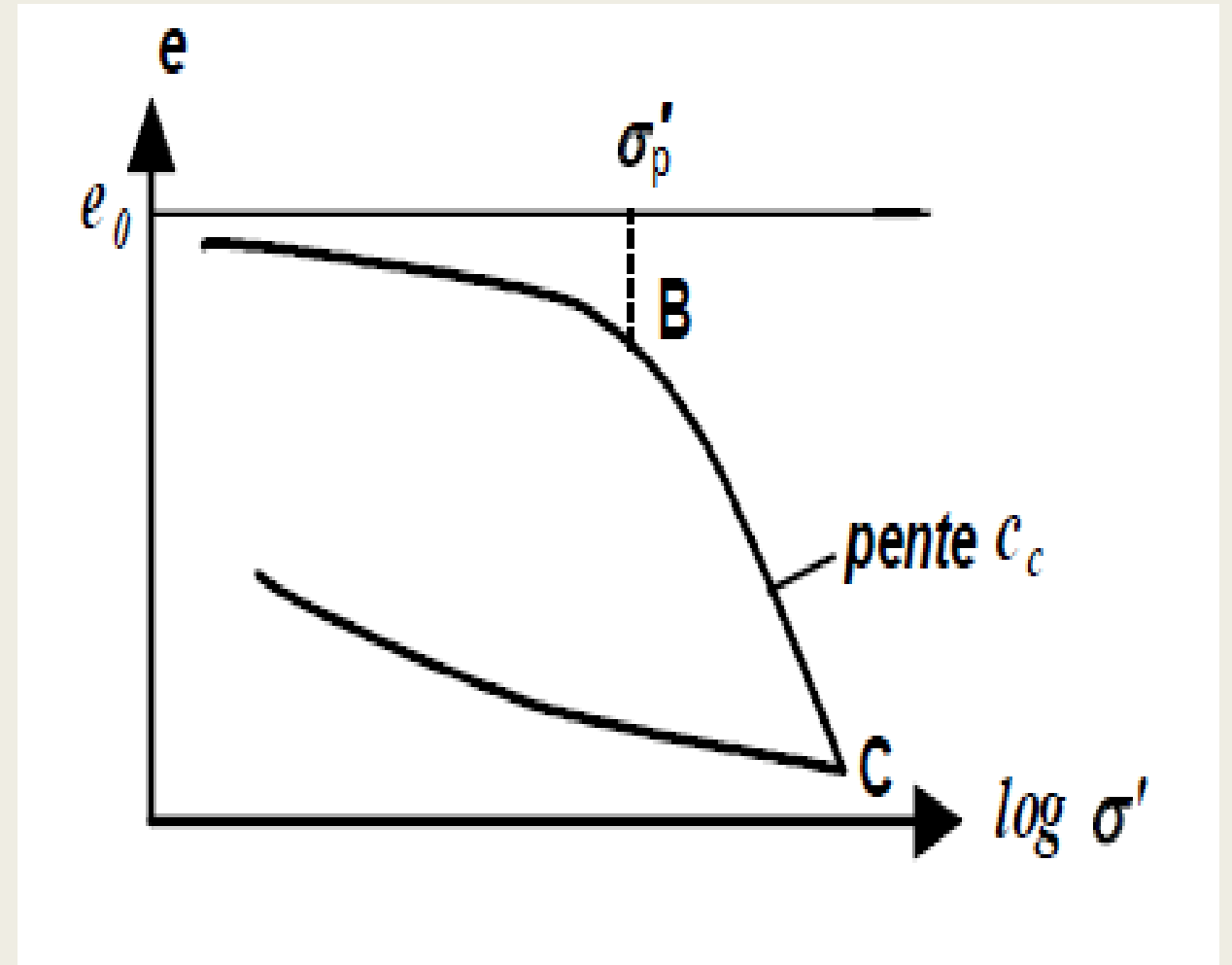
C_s : Swelling Index

C_c : Compression Index

e_0 : Initial Void Index

σ'_{v0} : Initial Effective Stress

σ'_P : Pre-Consolidation Stress



- **Normally Consolidated Soil** : $\sigma'_{v0} = \sigma'_p$

$$S_{oed} = \frac{C_c}{1+e_0} H \log \left(\frac{\Delta\sigma + \sigma'_{v0}}{\sigma'_{v0}} \right)$$

- **Over-Consolidated Soil** : $\sigma'_{v0} < \sigma'_p$

Si $\Delta\sigma + \sigma'_{v0} > \sigma'_p$ then :

$$S_{oed} = \frac{C_s}{1+e_0} H \log \left(\frac{\sigma'_p}{\sigma'_{v0}} \right) + \frac{C_c}{1+e_0} H \log \left(\frac{\Delta\sigma + \sigma'_{v0}}{\sigma'_{v0}} \right)$$

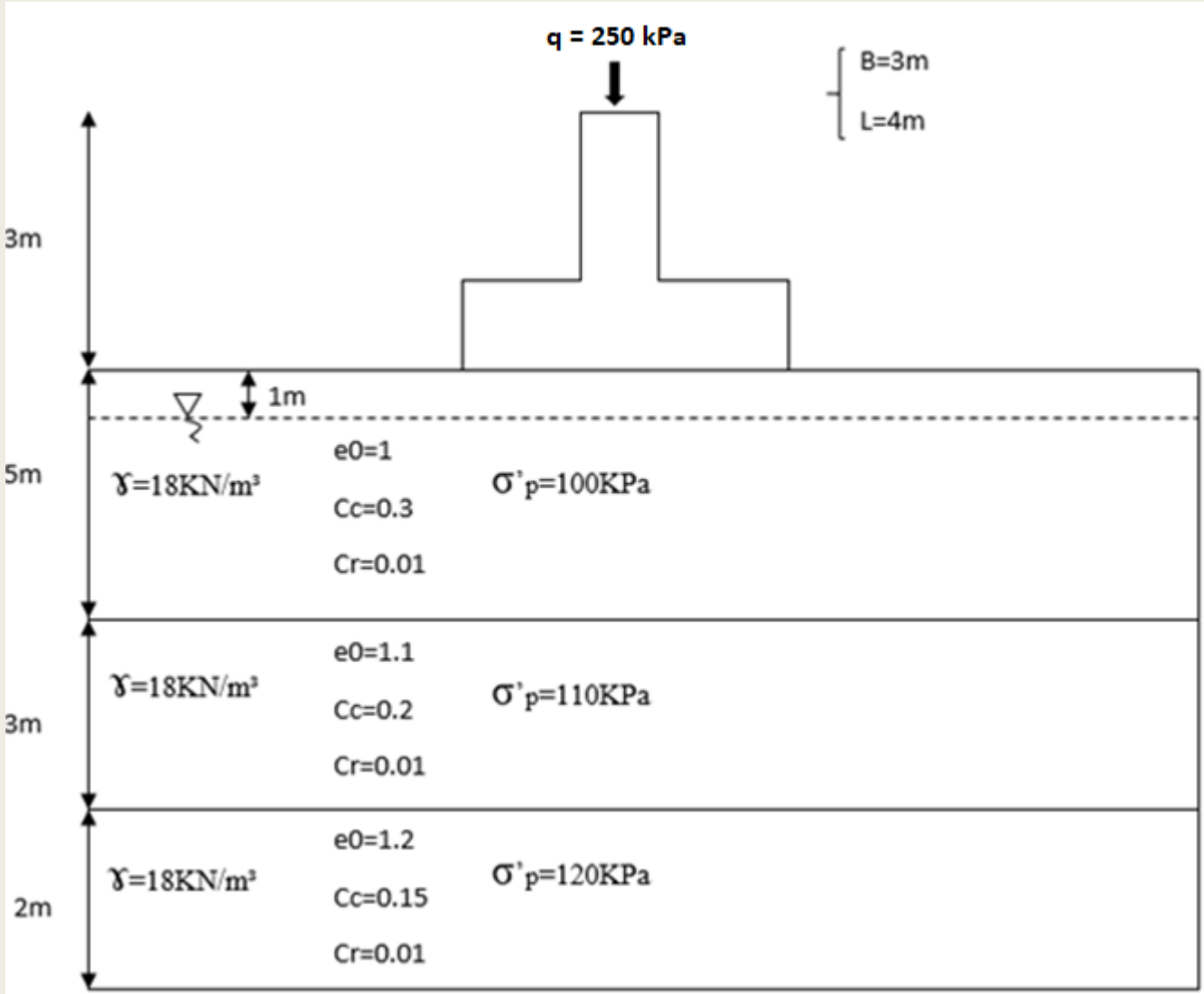
Si $\Delta\sigma + \sigma'_{v0} < \sigma'_p$ then :

$$S_{oed} = \frac{C_s}{1+e_0} H \log \left(\frac{\Delta\sigma + \sigma'_{v0}}{\sigma'_{v0}} \right)$$

- **Under-consolidated Soil** : $\sigma'_{v0} > \sigma'_p$

$$S_{oed} = \frac{C_c}{1+e_0} H \log \left(\frac{\Delta\sigma + \sigma'_{v0}}{\sigma'_{v0}} \right)$$

Example :



Oedometric settlement :

$$\text{Net stress} = 250 - 18 \times 3 = 196 \text{ kPa}$$

Layer	H (m)	$\Delta\sigma$ (KPa)	σ'_{v0} (KPa)	σ'_p (KPa)	Settlement (m)
Clay	5	105,48	84	100	0,209
Clay	3	25	116	110	0,024
Clay	2	14,112	136	120	0.0082

$$S_{\text{oed}} = 24 \text{ cm}$$



TASHFEEN

ENGINEERING SOLUTIONS

www.geotashfeen.tech