Soil

By Rajat Singh

Day -03

By- Rajat Sir

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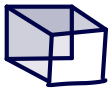
Unit weight and it's Measurement



$1\ m^3$

$\rho = \left(\frac{m}{Vol^m}\right)$

$\gamma = \frac{Weight}{Vol^m}$

$\gamma = \rho g$

(x) KN/m^3

kg/m^3

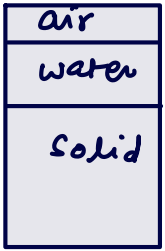
g/cm^3

Unit weight and it's Measurement

Bulk Unit weight

$$\gamma_t = \left[\frac{\text{Total weight}}{\text{Total volm}}\right]$$

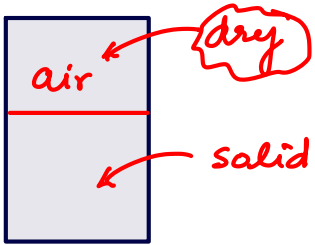
$$\gamma_t = \frac{W_s + W_w}{V_v + V_s}$$



Unit weight and it's Measurement

Dry Unit weight

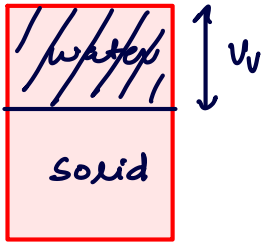
$$\gamma_{dry} = \left[\frac{W_s}{V_v + V_s}\right] *$$



Unit weight and it's Measurement

Saturated unit weight

$$\gamma_{sat.} = \frac{[\omega_w + \omega_s]}{V_v + V_s}$$

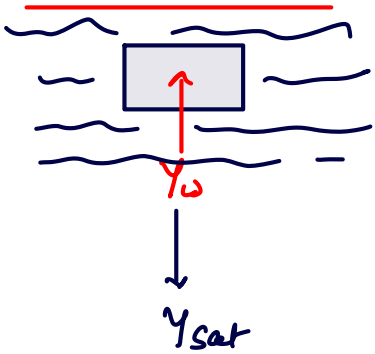


Unit weight and it's Measurement

γ_w

Submerged unit weight

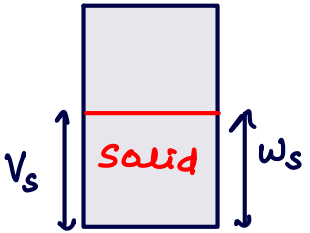
$$\gamma_{sub} = \gamma_{sat} - \gamma_w$$



Unit weight and it's Measurement

Unit weight of soil solid

$$\gamma_s = \frac{w_s}{V_s}$$



Imp

$$\gamma_s > \gamma_{sat} > \gamma_{bulk} > \gamma_{dry} > \gamma_{sub}$$

Specific Gravity

Std. fluid → water

True specific Gravity or **Absolute specific Gravity**

$$G_s = \left[\frac{\text{weight of soil solid of given volm}}{\text{weight of std. fluid of same volm.}} \right]$$

$$G_s = \frac{\omega_s}{\omega_\omega} \times \frac{V}{V} = \frac{\gamma_s}{\gamma_\omega}$$

Specific Gravity

Apparent specific Gravity Or Mass specific Gravity or Bulk Sp. Gr.

$$G_m = \frac{\text{weight of soil of given volm}}{\text{weight of Std. fluid of same volm.}}$$

$$G_m = \frac{\gamma_{bulk}}{\gamma_w}$$

Imp. Relation →

$$Se = wQ$$

$$V_w = \frac{w_w}{\gamma_w}$$

$$V_s = \frac{w_s}{\gamma_s}$$

$$e = \frac{V_v}{V_s} \times \frac{V_w}{V_w}$$

$$= \frac{1}{\left(\frac{V_w}{V_v}\right)} \times \frac{V_w}{V_s}$$

$$= \frac{1}{S} \times \frac{w_w/\gamma_w}{w_s/\gamma_s}$$

$$e = \frac{1}{S} \times w \times Q_s$$

$$Se = wQ_s$$

$$\gamma_m = \frac{\gamma_s}{1+e} \quad (*)$$

$$\eta = \frac{e}{1+e}$$

$$\gamma_m = \gamma_s(1-\eta) \quad (*)$$

$$1-\eta = 1-\frac{e}{1+e}$$

$$(1-\eta) = \frac{1+e-e}{1+e} = \frac{1}{1+e}$$

$$\frac{1}{1+e} = (1-\eta)$$