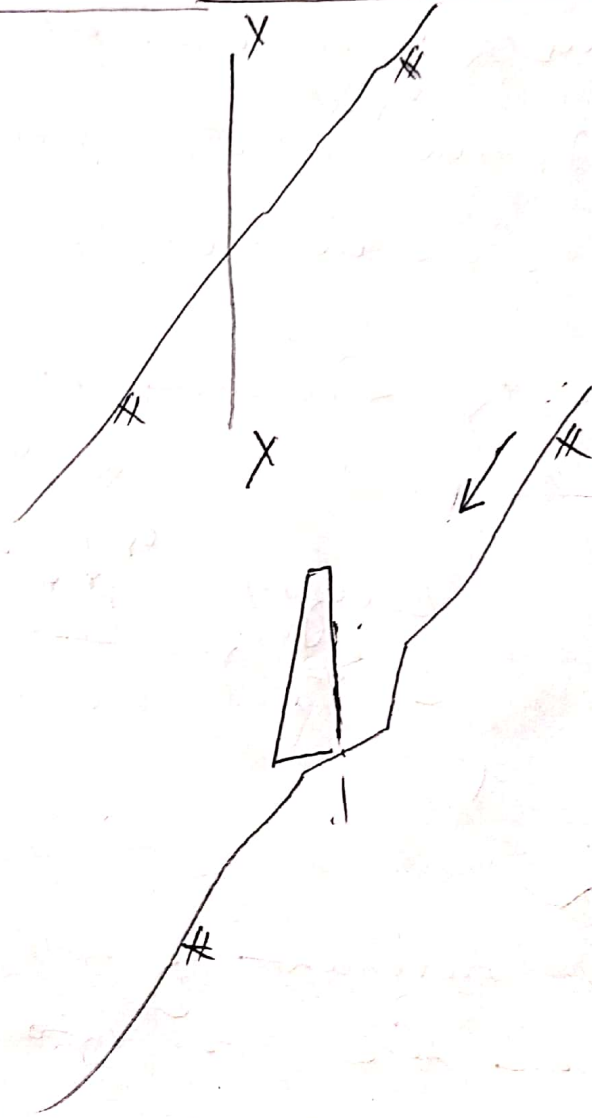


Subject: Soil and Rock Mechanics

Topic: Earth Pressure theory

Instructor: Prof. RASHID MUSTAFA

Lecture : 01



⇒ Various factors that affect the Lateral Earth Pressure or Lateral Earth Pressure is the function of

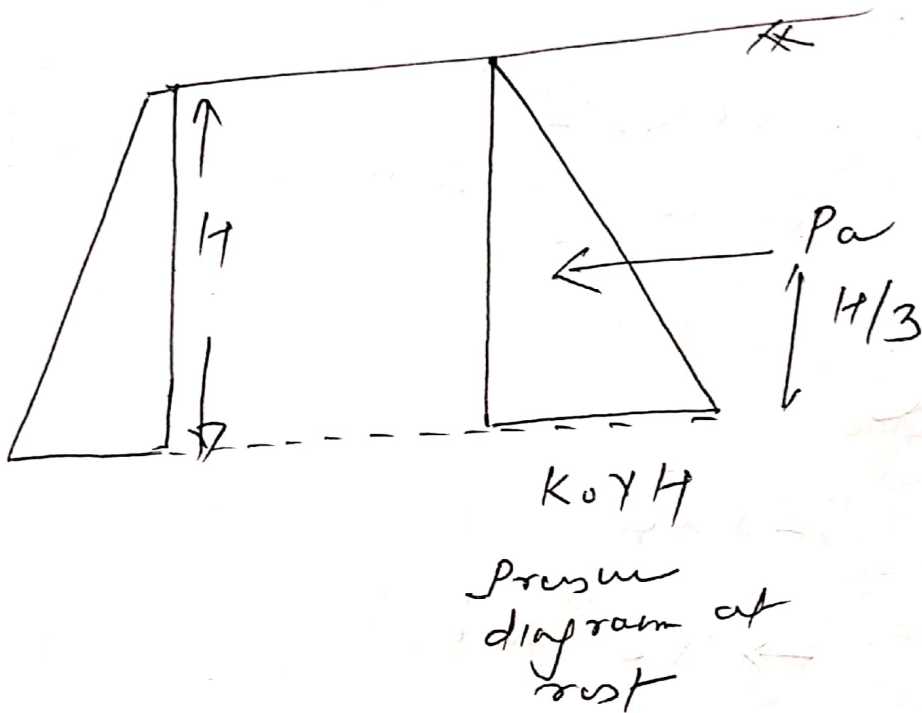
- ① Cohesion (c) of the Backfill
- ② Angle of internal friction of the soil
- ③ Unit weight of the soil (γ)

At depth z , $\sigma_v = \gamma \cdot z$. (3)

$$\sigma_h' = \sigma_h = k \cdot \sigma_v$$

$$\sigma_h = p_o = k_o \cdot \sigma_v = k_o \cdot \gamma z \quad \text{--- (1)}$$

Where $k_o \rightarrow$ Earth Pressure at-rest coefficient
 $\gamma \rightarrow$ Unit wt of soil



~~k_o~~

Total thrust at-rest condition $(P_o) = \frac{1}{2} \times k_o \gamma H \times H$
 $= \frac{1}{2} k_o \gamma H^2$

Nature of Total Lateral thrust at-rest condition is parabolic

In 1944 Jacky has given the expression of k_0 for Normally Consolidated Soil (4)

$$\text{Over Consolidation Ratio (OCR)} = \frac{\text{Past overburden}}{\text{Present overburden}}$$

If the value of $\text{OCR} = 1$ then such type of soil is called Normally Consolidated

If the value of $\text{OCR} > 1$ then such type of soil is called overconsolidated soil

Acc to Jacky (1944)
For NC soil

$$k_0 = 1 - \sin \phi$$

↳ NC soil

For Overconsolidated soil

$$(k_0)_{oc} = (k_0)_{nc} \times \sqrt{\text{OCR}}$$

Note: If the value of Poisson's ratio of soil is given then Earth Pressure at rest (k_0) can be computed as

$$k_0 = \frac{\nu}{1 - \nu}$$