LECTURE 26

Preconsolidation Pressure

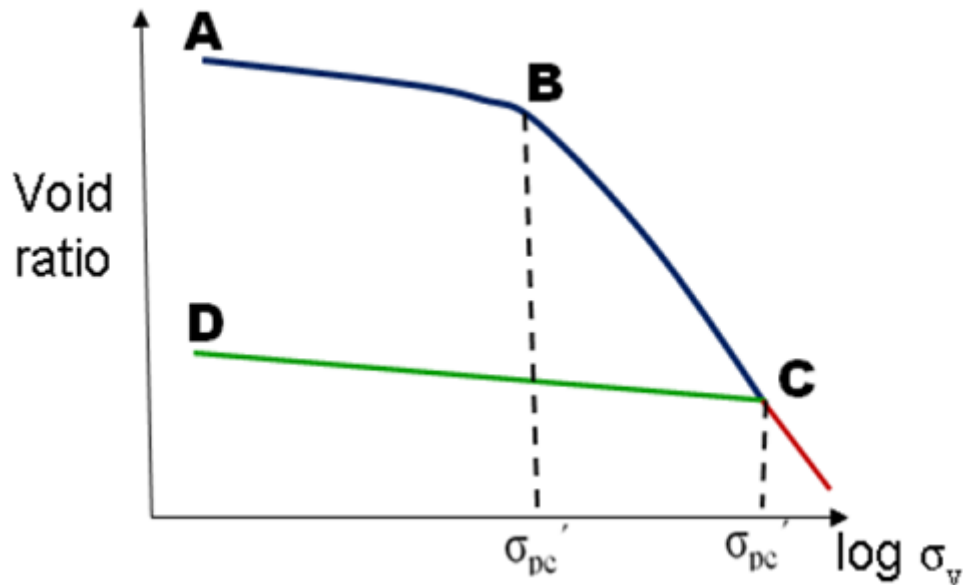It is the maximum effective stress experienced by a soil in its stress history (past existence)

Figure: Void ratio versus effective stress (log scale)

For the soil loaded along the recompression curve AB the effective stress close to point B will be the preconsolidation pressure.

If the soil is compressed along BC and unloaded along CD and then reloaded along DC the effective stress close to point C will be the new preconsolidation pressure.
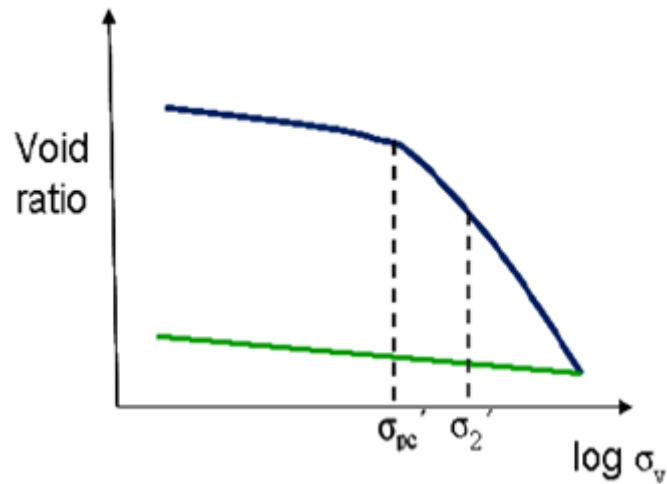
Effect of Stress History

Based on the stress history (preconsolidation pressure) soils are classified as

1. Normally Consolidated Soils

2. Over Consolidated Soils

3. Under Consolidated Soils

Normally Consolidated Soils

It is a soil deposit that has never subjected to a vertical effective stress greater than the present vertical stress.

Void ratio versus effective stress (log scale)

Under Consolidated Soils

A soil deposit that has not consolidated under the present overburden pressure (effective stress) is called Under Consolidated Soil. These soils are susceptible to larger deformation and cause distress in buildings built on these deposits.

Over Consolidated Soils

It is a soil deposit that has been subjected to vertical effective stress greater than the present vertical effective stress.
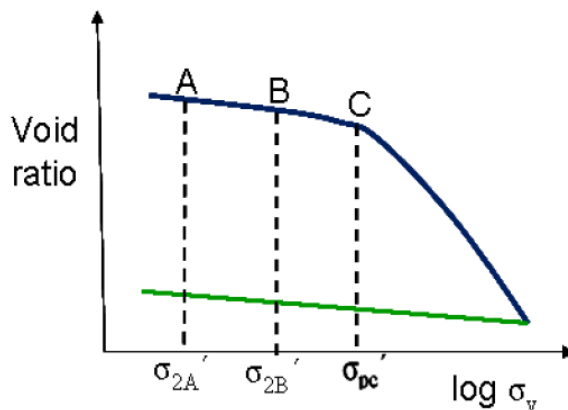
Void ratio versus effective stress (log scale)

The stress state σ_{2A}' and σ_{2B}' represent over consolidated soil (well with in preconsolidation pressure) Over consolidated soil deposits are less compressible and therefore structures built on these soils undergo less settlement.

Over Consolidation Ratio (OCR)

It is the defined as the ratio of preconsoliadtion pressure to the present vertical effective stress

$$OCR = \frac{\sigma_{pc}{}'}{\sigma_z{}'}$$

This is indicative of the position of soil away from the normal consolidated line

OCR =1 Normally consolidated Soils

Note: -- Soils having higher OCR are less compressible

-- They show elastic behavior to certain extent