

GEOTECHNICAL ENGG.-I (VI Sem)

Unit-2

(Part-2 Soil Suction; Factors affecting soil suction)

Soil Suction:

The tensile stress caused in water is called the capillary tension for the capillary potential. The capillary tension or capillary action potential is the pressure deficiency, pressure reduction or negative pressure in the pore water (or the pressure below atmospheric) by which water is retained in a soil mass. It decreases linearly from a maximum value of $h_c \gamma_w$ at the level of meniscus to zero value at the free water surface. The pressure deficiency in the head water held water is also termed as *Soil suction* or *Suction pressure*.

Factor affecting Soil suction:

Following are the some factors affecting soil suction:

1. Particle size of the soil-

Smaller the size of the particles, smaller will be the pore size with small radii of radius menisci, resulting in greater capillary rise and hence greater suction.

2. Water content-

Smaller the water content content, greater will be the soil suction. Soil suction will attain its maximum value when the soil is dry.

3. Plasticity index of soil-

For a given water content, soil suction will be greater in a soil which has greater plasticity index than in the one which has lower plasticity index.

4. Soil structure-

The size of interstices in a soil depends upon the structure of the soil. Change in the structure of a soil result in the change in the size of the interstices and hence change in the soil suction.

5. History of drying and wetting-

For the same soil, suction is greater during drying cycle than during wetting cycle.

6. Temperature-

Rise in the temperature results in decrease of surface tension (T_s) and decrease in soil suction. Similarly, fall in the temperature results in increase of soil suction.

7. Denseness of soil-

Increase in denseness of soil results in decrease in the size of the pores of the soil and hence increase in soil suction. At low density, the soil will be relative loose, with large size pores, resulting in decrease in soil suction.

8. Angle of contact-

The mineralogical composition of soul governs the angle of contact between the soil particles and water. Soil suction decreases with increase in the angle of contact (α). The capillary height and hence the soil suction is maximum when $\alpha=0$.

9. Dissolved salts-

Impurities, such as dissolved salts etc. increase the surface tension (h_c), resulting in increase in soil suction.

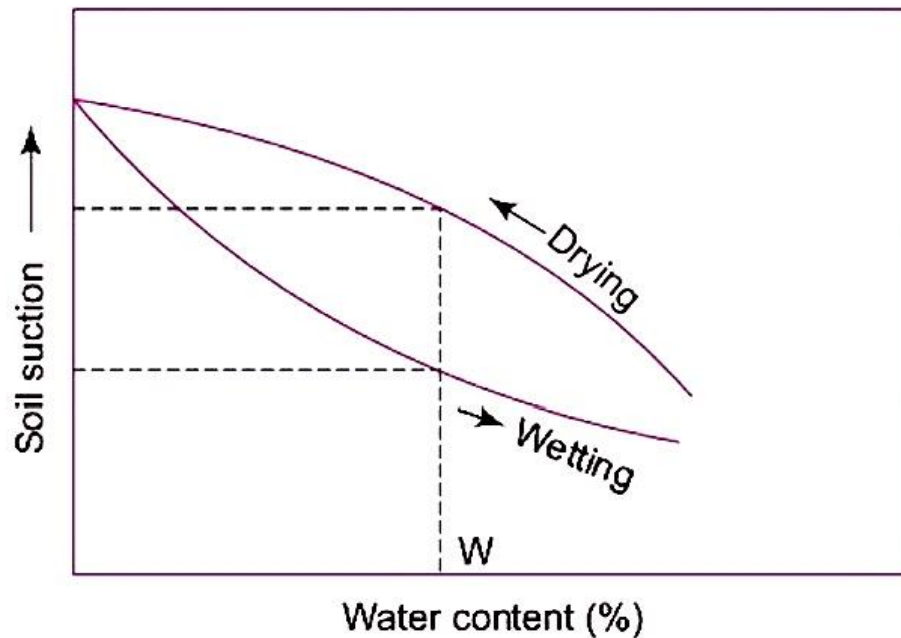


Fig. 1 Variation of soil suction during drying and wetting cycles

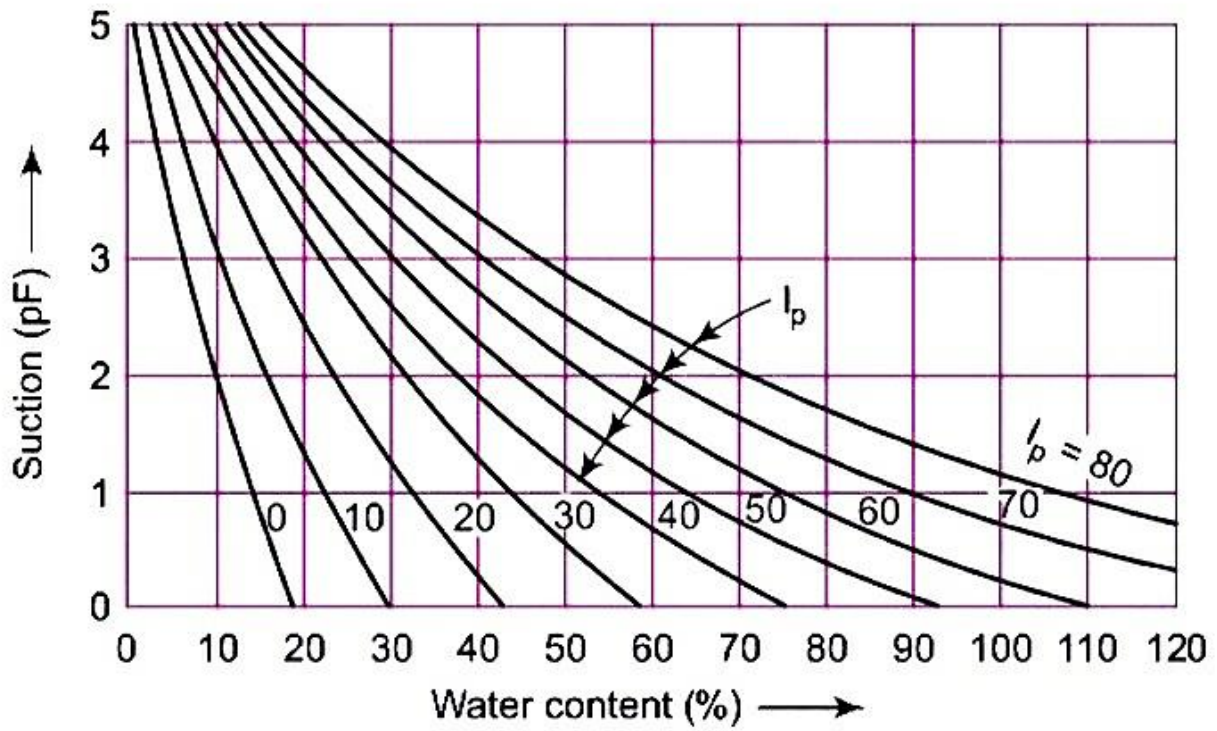


Fig 2. Relation between soil suction and water content at various I_p