

Infiltration

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▣ The process of entering rain water in to soil strata of earth is called **INFILTRATION**.

▣ The infiltrated water first meets the soil moisture deficiency if any & excess water moves vertically downwards to reach the groundwater table. This vertical movement is called **PERCOLATION**.

INFILTRATION CAPACITY

- ▣ The **infiltration capacity** of soil is defined as the maximum rate at which it is capable of absorbing water and is denoted by **f**.
- ▣ If $i \geq f$ then $f_a = f$ (depend upon soil capacity)
- ▣ If $i < f$ then $f_a = i$ (depend upon rainfall intensity)
- ▣ where f_a = actual infiltration capacity
 i = rate of rainfall
 f = infiltration capacity

▣ For

Dry Soil – (infiltration rate) **f** is **more**

Moist Soil – (infiltration rate) **f** is **less**

▣ **Maximum rate** of water absorption
by soil – **Infiltration Capacity**

▣ **Maximum capacity** of water absorption
by soil – **Field Capacity**

INFILTRATION RATE

- ▣ The rate at which soil is able to absorb rainfall or irrigation .
- ▣ It is measured in (**mm/hr**) or (**inches/hr**)
- ▣ **Infiltrometer** is used for measurement of infiltration.
- ▣ If (**$i > f$**) runoff occurs.
- ▣ Infiltration rate is connected to **hydraulic conductivity**.

▣ Hydraulic conductivity is ability of a fluid to flow through a porous medium.

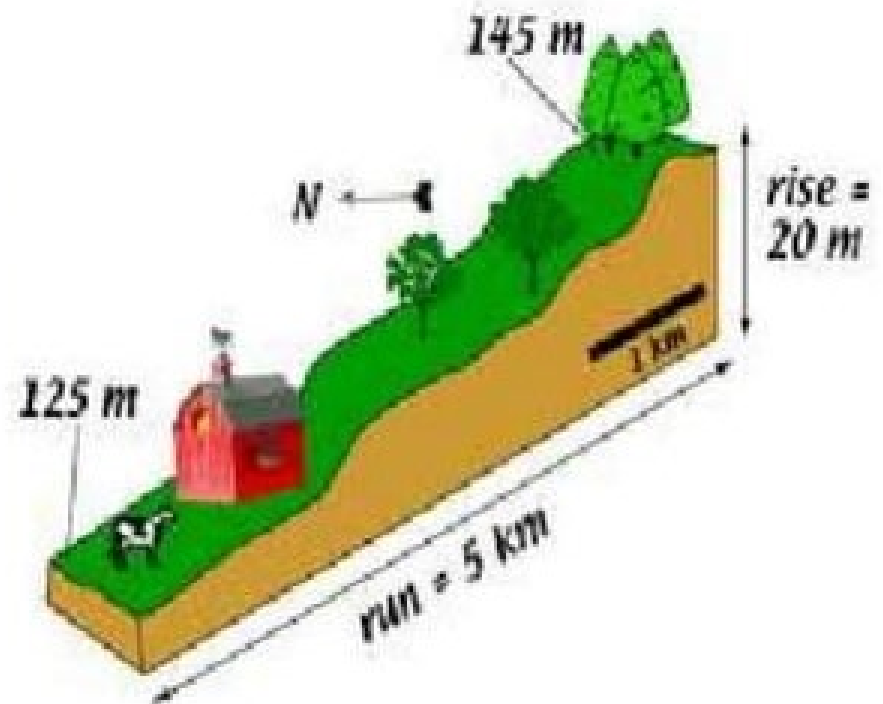
It is determined by the size and shape of the pore spaces in the medium & viscosity of fluid.

OR

It is expressed as the volume of fluid that will move in unit time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

FACTOR AFFECTING INFILTRATION CAPACITY

- ▣ **SLOPE OF THE LAND:-** The steeper the slope (gradient), the less the infiltration or seepage.



□ **DEGREE OF SATURATION:-**

The more saturated the loose Earth materials are, the less the infiltration.



- **POROSITY:-** Porosity is the percentage of open space (pores and cracks) in a earth surface.
- The greater the porosity, the greater the amount of infiltration.

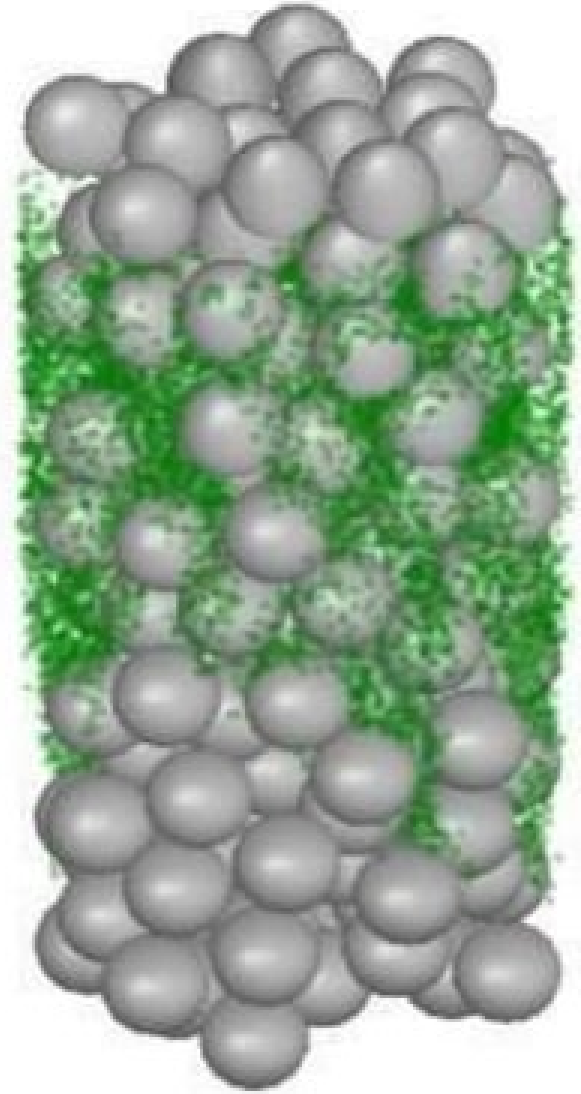
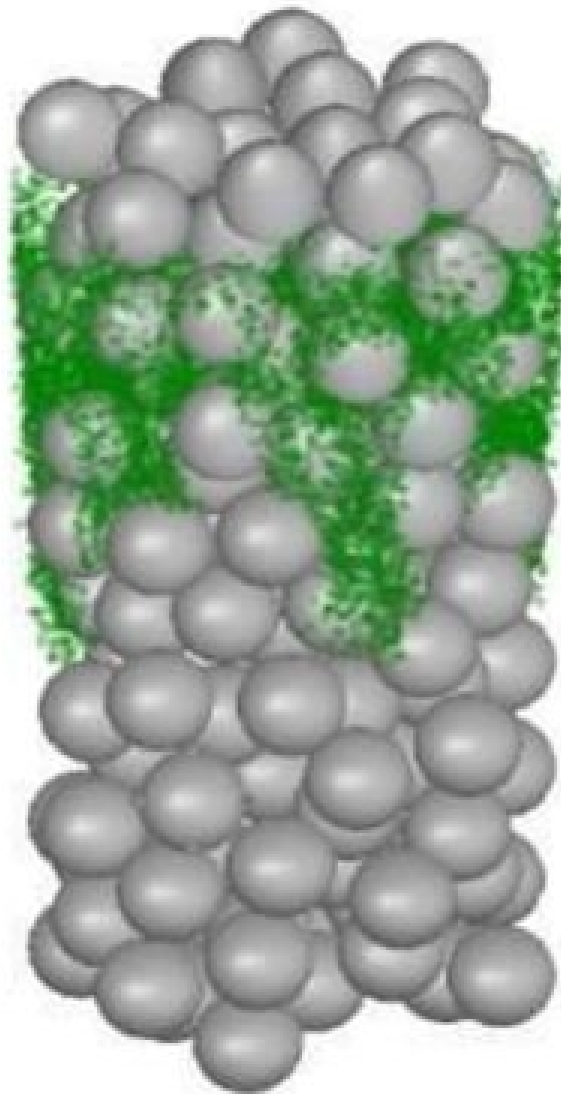
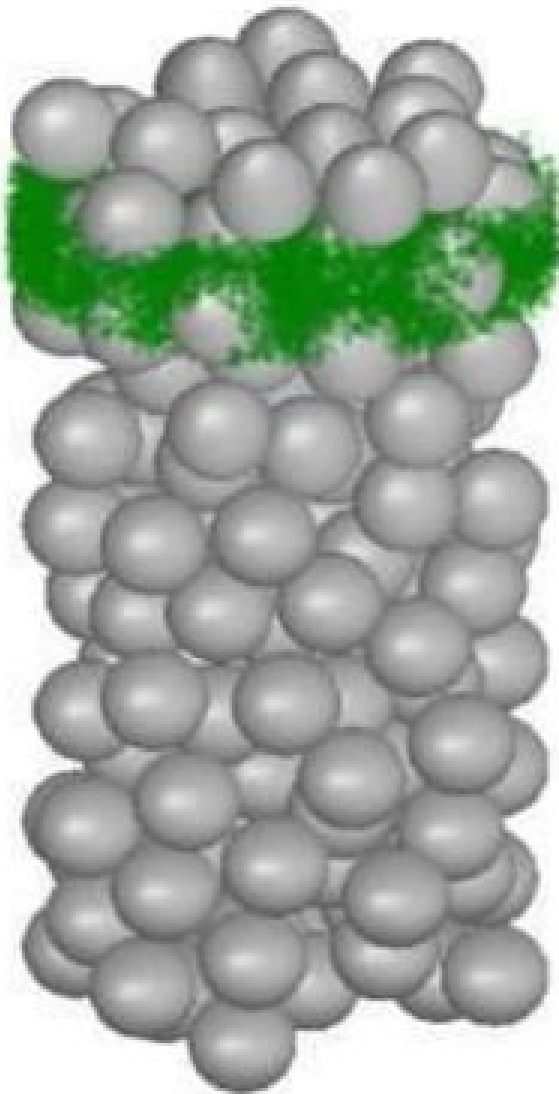
SPONGE



CLAY BRICK



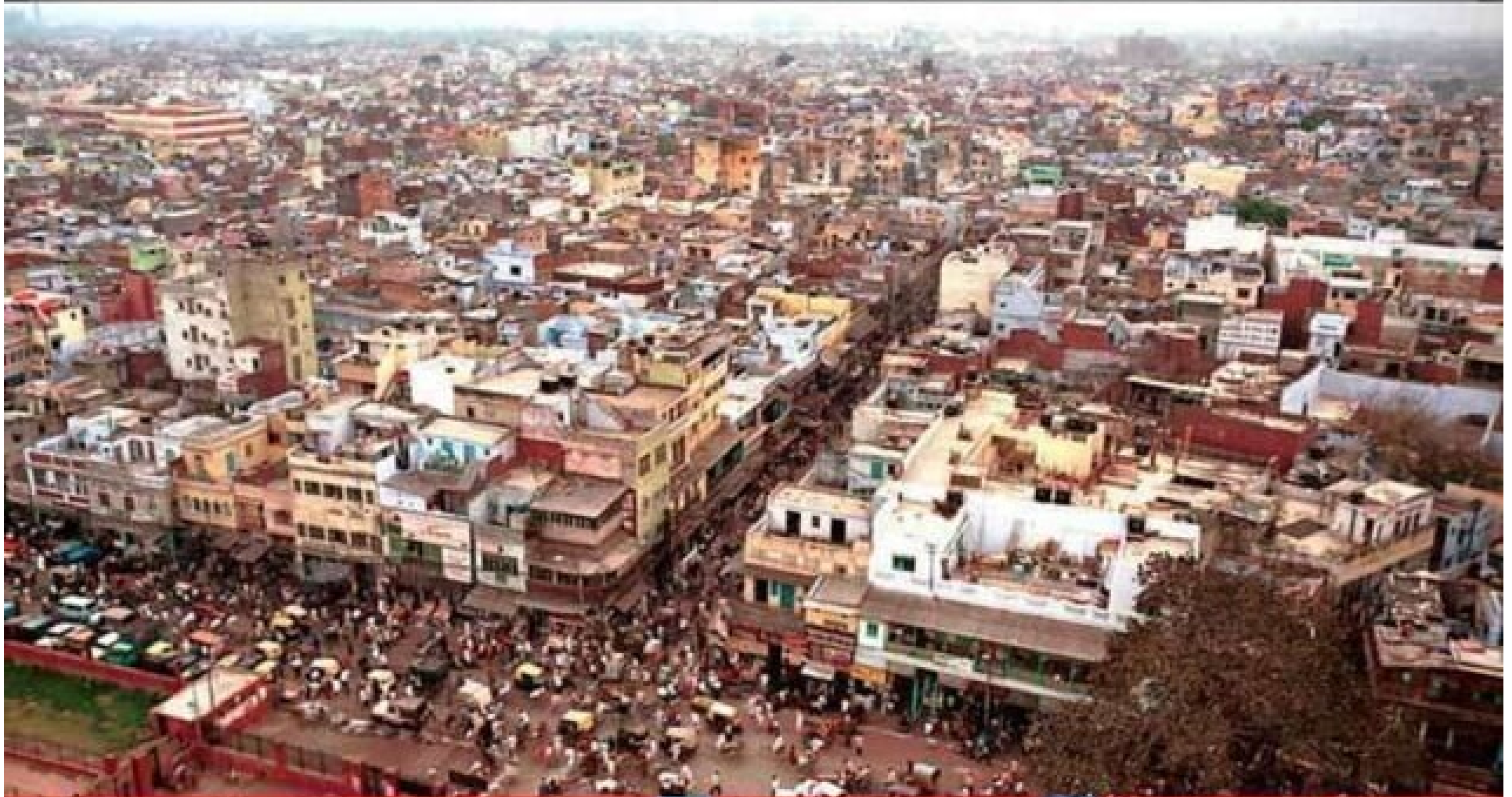
PACKING OF SOIL GRAINS



- ▣ **COMPACTION:-** The clay surfaced soils are compacted even by the impact of rain drops which reduce infiltration. This effect is negligible in sandy soils



- **Land Use:-** Roads, parking lots, and buildings create surfaces that are not longer permeable. Thus infiltration is less.



▣ SURFACE COVER CONDITION:-

Vegetation:- Grasses, trees and other plant types capture falling precipitation on leaves and branches, keeping that water from being absorbed into the Earth & take more time to reach in to the ground.



MORE the **vegetation**
Slower the **Infiltration**.

▣ **TEMPERATURE** – At high temperature viscosity decreases and infiltration increases

▣ Summer – Infiltration  increases

▣ Winter – Infiltration  decreases



▣ OTHER FACTORS –

- a) **Entrapped air in pores**- Entrapped air can greatly affect the hydraulic conductivity at or near saturation
- b) **Quality of water**-Turbidity by colloidal water
- c) **Freezing**- Freezing in winter may lock pores.
- d) **Annual & seasonal changes** –According to change in land use pattern. Except for Massive deforestation & agriculture.

Thanks