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Transport and deposit of soil

Transported soil is weathered soil deposits that are transported from one place to another by natural agents like water, wind, and glaciers. They have a terms Water **transported soil**s, Wind transported soils, Gravity deposited soils, Glacier deposited soils.

Ways of Transported soil

- Water Transported soils
- Wind transported soils
- Gravity deposited soils
- Glacier Deposited Soils
- Soils transported by the combined action

Water transported soil

Flowing water is one of the most important agents of transportation of soils. If the velocity of flow is large, then it carries a large quantity of soil either by suspension or by rolling along the bed.

The size of the soil particle carrier depends on the velocity of flow. If the velocity of flow. If the velocity of flow is high, then it can particles of large sizes, such as boulders and gravels. With a decrease in velocity, the coarse particles get the deposit.

The finer particles carry further downstream and are deposited when the velocity reduces.

All types of soils carried and deposited by river water are known as alluvial deposits. Deposits made in lakes are called lacustrine deposit.

Wind transported soils

Some soil particles are transported by wind. In this phenomenon, we get wind transport soils, the particle size of the soil depends upon the velocity of the wind. Soils deposited by the wind called aeolian deposits.

When wind speed is very fast then he takes a lot of soils one place to another place. If wind speed is slow then he takes some soil then all depend on the speed of winds.

Gravity deposited soils

Under the action of gravity, soils can transport through short distances. Soil masses and rock fragments collected at the foot of the cliffs or steep slopes had fallen from a higher elevation under the action of the gravitational force. Colluvial soils have been deposited by the gravity.

Glacier Depsited soils

The glacier is large masses of ice form by the compaction of snow. As the glaciers grow and move, they carry with them soils varying in size fine-grained to huge boulders. Soils get to mix with the ice and transport far away from their original position. Drift is a general term uses for the deposits to make by glaciers directly or indirectly.

Soils Transported by combined Action

Sometimes, two or more gents of transportation act together and transport the soil. For example, a soil particle may fall under gravity and may carry by the wind to a far off place.

Soil composition

Soil is one of the most important elements of an ecosystem, and it contains both biotic and abiotic factors. The composition of abiotic factors is particularly important as it can impact the biotic factors, such as what kinds of plants can grow in an ecosystem.

Soil Layers

Soil is composed of both biotic—living and once-living things, like plants and insects—and abiotic materials—nonliving factors, like minerals, water, and air.

Soil contains air, water, and minerals as well as plant and animal matter, both living and dead. These soil components fall into two categories. In the first category are biotic factors—all the

living and once-living things in soil, such as plants and insects. The second category consists of abiotic factors, which include all nonliving things—for example, minerals, water, and air. The most common minerals found in soil that support plant growth are phosphorus, and potassium and also, nitrogen gas. Other, less common minerals include calcium, magnesium, and sulfur. The biotic and abiotic factors in the soil are what make up the soil's composition.

Soil scientists conduct various tests on soils to learn about their composition. Soil testing can identify the amounts of biotic and abiotic factors in the soil. The results of these tests can also reveal if the soil has too much of a specific mineral or if it needs more nutrients to support plants. Scientists also measure other factors, such as the amount of water in the soil and how it varies over time—for instance, is the soil unusually wet or dry? The tests can also identify contaminants and heavy metal in the soil and determine the soil's nitrogen content and pH level (acidity or alkalinity). All of these measurements can be used to determine the soil's health.

Basic definitions:

Various definitions of terms used in Geotechnical Soil Engineering are presented.

Volumetric Relationships of Soil

1. Void Ratio

Void ratio is the volume of voids to the volume of solids. It is denoted by **'e'.**

$$e=Vv/Vs$$

It is expressed as a decimal.

2. Porosity

It is defined as the ratio of volume of voids to the total volume. It is denoted by **'n'.**

$$n=Vv/V$$

It is generally expressed as a percentage

$1/n=V/Vv= (Vv+vs)/Vv$

$$1/n= 1+ (1/e) = (1+e)/e$$

$$n=e/(1+e) \rightarrow \textbf{(a)}$$

$$1/e=(1/n)-1=(1-n)/n$$

$$e=n/(1-n) \rightarrow \textbf{(b)}$$

n equations (a) and (b), the porosity should be expressed as a ratio and not percentage.

3. Degree of saturation

The degree of saturation is the ratio of the volume of water to the volume of voids. It is denoted by 'S'.

$$\mathbf{S=Vw/Vv}$$

The degree of saturation generally expressed as a percentage. It is equal to zero when the soil is absolutely dry and 100% when the soil is fully saturated.

4. Percentage air voids

It is the ratio of volume of air to the total volume.

$$\mathbf{n_a= Va/V}$$

It is also expressed as a percentage.

5. Air content

Air content is defined as the ratio of the volume of air to the volume of voids

$$\mathbf{a_c= Va/Vv}$$

Also,

$$\mathbf{n_a=n\ a_c}$$

6. Water content

The water content (w) is defined as the ratio of the mass of water to the mass of solids

$$w = Mw/Ms$$

It is also known as the moisture content (m). It is expressed as a percentage but used as a decimal in computation.

Volume Mass Relationship of Soils

7. Bulk Mass Density of Soil

The bulk mass density (?) is defined as the total mass (M) per unit volume (V)

$$? = M/V$$

8. Dry Mass Density

The dry mass density ($?_d$) is defined as the mass of solids per unit total volume

$$?_d = Ms/V$$

9. Saturated Mass Density

The saturated mass density ($?_{sat}$) is the bulk density of the soil when it is fully saturated

$$?_{sat} = Msat/V$$

10. Submerged Mass Density

When the soil exists below water, it is in a submerged condition. The submerged mass density (?') of the soil is defined as the submerged mass per unit total volume.

$$?' = Msub/V$$

11. Mass Density of Solids

The mass density of solids ($?_s$) is equal to the ratio of the mass of solids to the volume of solids

$?_s$=Ms/Vs

Volume-Weight Relationships of Soils

1. BULK UNIT WEIGHT (?)= W/V
2. DRY UNIT WEIGHT ($?_{d)}$ = Ws/V
3. SATURATED UNIT WEIGHT ($?_{sat}$) = Wsat/V
4. SUBMERGED UNIT WEIGHT ($?_{sub}$ or ?') = Wsub/V
5. UNIT WEIGHT OF SOIL SOLIDS ($?_s$) = Ws/Vs

12. Specific Gravity of Solids

The specific gravity of soil particles (G) is defined as the ratio of the mass of a given volume of solids to the mass of an equal volume of water at 4° C.

$$\mathbf{G = ?_s/?_w}$$

The mass density of water $?_{w\ at}$ 4°C is 1gm/ml, 1000 kg/m^3 or 1 Mg/m^3

<u>Reference:</u>

https://www.civilknowledges.com/transported-soil/

https://www.ctahr.hawaii.edu/mauisoil/a_comp.aspx

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