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ENGINEERS ACADEMY

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Volume - 4

Soil Foundation Engineering

SIERRA INNOVATIONS

BASIC TYPES OF SOIL

THEORY

1.1 SOIL TYPES AND FORMATIONS

- There are two main groups of soils according to their origin (i) soils formed by physical weathering e.g., Gravel and Sand (ii) Soils formed by chemical weathering e.g., silts and clays.
- If the products of rock weathering are still located at the place of origin, they are called Residual soils.
- Any soil that has been transported from its place of origin by wind, water, ice or any other agency and has been re-deposited is called Transported soil.
- **Alluvial Soils :** deposited from suspension in Running Water.
- **Lacustrine Soils :** deposited from suspension in still, fresh water of lakes.
- **Marine Soils :** deposited from suspension in sea water.
- **Aeolian Soils :** Transported by wind.
- **Glacial Soils :** Transported by Ice.

1.2 SOME SPECIAL/TYPICAL SOILS

- **Loess :** A loose deposit of windblown silt that has been weakly cemented with calcium carbonate and montmorillonite.
- **Bentonite :** A chemically weathered volcanic ash.
- **Peat:** A highly organic soil; fibrous and highly compressible.
- **Muck :** A mixture of fine particles, inorganic soil and black, decomposed organic mater.

  Note : Peat and Muck are also called cumulose soils.
- **Colluvial Soil :** the accumulation of rock debris or **Talus** at the base of a steep cliff or a rock escarpment due to action of gravity.
- **Marl :** A very fine grained calcium carbonated soil of marine origin.

1.3 Some Common Soils and Engineering Problems Encountered with them

- **Marine Deposits :** Marine clays are very soft and may contain organic matter.
- These Possess low shear strength and high compressibility hence, pose problems as foundation material.
- **Laterites And Lateritic Soils :** Formed by decomposition of rock. removal of the bases and silica and formation of oxides of iron and aluminium at the top of the soil profile.
- These are two types – Primary and Secondary. Primary laterite is found at high altitude near hills.
- Secondary laterites are found at coastal belts.
- Generally laterites pose no difficulties as foundation material and retain their slopes well.
- **Black Cotton Soils :** These soils have been formed from basalt or trap and contain clay mineral montmorillonite, which is responsible for the excessive swelling and shrinkage characteristics of the soil.
- Under reamed piles should be used in foundations in these soils.
- **Desert Soils :** These are wind blown deposits of sand.
- Dune sand is non plastic uniformly graded fine sand.
- Problems associated with these soils are of soil stabilization for roads and runways for reducing settlement under static and dynamic loads and reducing its perviousness to make it suitable for storage and transport of water.

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