CORE CUTTER METHOD
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THEORY:

Core cutter test is used to determine the in-situ density of soil. The in-situ density is defined as the density of soil measured at its actual depth on the field. The in-situ moisture content of soil varies with time, resulting in variable in-situ bulk density. To avoid variation with time, the in-situ density should be reported in terms of the dry density with moisture content.

NEED & SCOPE:

In-situ density of the soil is needed for the determination of following:

- Bearing capacity of soils
- Stability analysis of slopes and earth retaining structures
- Determination of pressures on underlying strata for the calculation of settlement and the design of underground structures

Where soil compaction is required (projects like embankment and earth dam construction), core cutter test can be used as a quality control test to evaluate the degree of compaction.

LIMITATIONS

This method can not be used for gravelly soil, in which the sharp edges of the core-cutter would deteriorate on ramming. Moreover, it can not be used for purely cohesionless soil, where the soil is not able to stick to the inner surface of core cutter. In such cases, core cutter can not retain the soil, hence sand replacement method shall be used.

APPARATUS REQUIRED:

1. Core Cutter
2. Dolly
3. Vernier Callipers
4. Rammer
5. Straight edge
6. Balance of 20 kg capacity
7. Small containers
8. Balance with a sensitivity of 0.01 gm
9. Oven controlled at 105˚ C

PROCEDURE:

Determination of In-situ Bulk density

1. Take the empty weight of core cutter and measure the internal diameter and height of the core cutter using a vernier callipers.
2. Level the soil surface, where we need to find the in-situ density and place the core cutter vertically on the surface, with a dolly over it.
3. Using the rammer, give blows to the core cutter assembly to drive it inside the ground. Stop ramming when the dolly is just around the surface.
4. Dig out the cutter containing the soil out of the ground and trim off any solid extruding from its ends, so that the cutter contains a volume of soil equal to its internal volume determined from dimensions of core cutter.
5. Determine the weight of the collected soil inside the core cutter and find the in-situ bulk density of soil sample.
6. Take out the soil from the core cutter and take three soil samples for moisture content determination.

Determination of Moisture Content

1. Take the weight of empty containers used for moisture content determination.
2. Place the wet soil sample in the container and take the weight of the container filled with wet soil.
3. Place the containers with wet soil in an oven set at 105˚ C temperature for at least 24 hours for drying.
4. Take out the containers from oven after 24 hours and weigh the container filled with dry soil.
5. Take average of the moisture content of three samples and report the average moisture content of soil sample.

OBSERVATIONS & RECORDINGS:

Dimensions of Core Cutter

Internal diameter of core cutter = cm

Height of core cutter = cm

Volume of core cutter = cm^3

Bulk density:

Wt. of Core-Cutter (W_1)	=	gm.
Wt. of Core-Cutter + Wet Soil (W_2)	=	gm.
Wt. of Wet Soil ($W_s = W_2 - W_1$)	=	gm.
Volume of Core-cutter V_c	=	cm^3
Bulk Density of Soil ($\gamma_t = W_s/V_c$)	=	g/cm^3

Moisture Content:

CONTAINER No.			
Wt. of container, W_c (gm)			
Wt. of container + Wet soil, W_w (gm)			
Wt. of container + Dry Soil , W_d (gm)			
Wt. of water, W_w-W_d (gm)			
Wt. of dry soil, W_d-W_c (gm)			
Moisture Content, w % = (W_w-W_d / W_d-W_c) * 100			
Average Moisture Content, w%			

Dry Density:

Dry Density of Soil,