SMG-06: STANDARD PROCTOR TEST

Reference Standard: BS 1377:1975, Test 14; ASTM D 698; AASHTO T 99

INTRODUCTION

Compaction is the process of densification of soil by reducing air voids. The degree of compaction of a given soil is measured in terms of its dry density. When soil is compacted usually by mechanical means, the solid particles are packed more closely together, thus increasing the soil density while air is being removed. The dry density is maximum at the optimum water content, W_{opt}. A curve is drawn between the water content and the dry density to obtain the maximum dry density and the optimum water content (refer Figure 1)

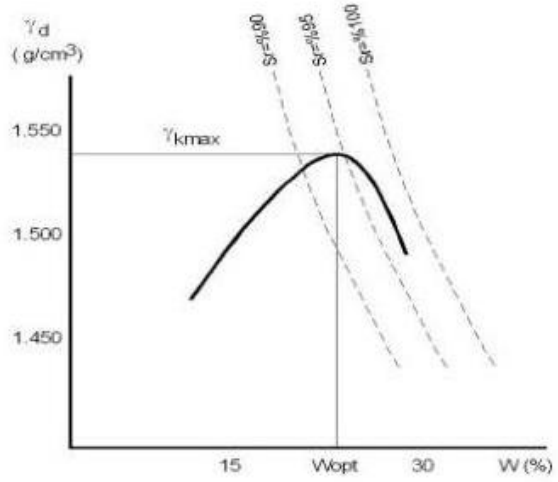

Figure 1: Dry density-moisture content relationship for soil

The size of the individual soil particles does not change, neither is water removed. If the percentage of air voids is zero, that is, the soil is totally saturated. Increasing the water content for a saturated soil results in a reduction in dry unit weight. The relation between the moisture content and dry unit weight for saturated soil is known as the zero air voids line.

OBJECTIVE

To determine the maximum dry density and the optimum moisture content of a given soil.

APPARATUS

List out equipment and apparatus use in the experiment complete with figures.

PROCEDURES

1) Prepare about 3 to 4 kg of oven-dry soil.
2) Pulverize soil and use only the ones passing 4.75mm.
3) Conduct test for the first point at water content of about 5% (by weight). Mix soil thoroughly.
4) Weight the compaction mold including the base plate (i.e., without the collar) and record in data sheet.
5) Check the volume of mold (volume of standard mold is 1000 cm^3).
6) Fix the mold with the collar to the base plate.
7) Apply a quantity of moist soil in the mold such that when compacted it occupies a little over one third of the height of the mold. Apply 25 free fall blows from 300 mm above the soil by using the rammer. Distribute the blows uniformly over a surface.
8) Repeat the procedure above for the following two layers and make sure there is excess soil on top of the mold.
9) Detach collar and base plate.
10) Strike out soil at the top of mold by using the straightedge.
11) Weight the mold with base plate and soil, and record its mass on data sheet.
12) Extrude soil from mold using the extruder.
13) Take soil samples and determine water content (2 moisture content determination for each compaction points).
14) Conduct at least 4 compaction points, i.e., sat at moisture content of about 5%, 10%, 20% and 30% (by weight of dry soil) or until the weight is decrease.

DATASHEET

Mould Details:

Height: _____ cm , Diameter: _____ cm , Volume: _____ cm^3

WATER CONTENT									
Mass of Mould + Base *(m_1)*	g								
Mass of Mould + Base + Compacted Specimen *(m_2)*	g								
Mass of Compacted Specimen *($m_2 - m_1$)*	g								
Bulk Density, $\rho = (m_2 - m_1)/V$	g/cm^3								
CONTAINER NO.									
Container Weight	g								
Wet Soil + Container	g								
Wet Soil, W_w	g								
Dry Soil + Container	g								
Dry Soil, W_d	g								
Moisture Loss, W_w - W_d	g								
Moisture Content	%								
Average Moisture Content	%								
Dry Density, $\rho_d = \rho/(1+w)$	g/cm^3								
Dry Unit Weight, γ_d	kN/m^3								