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Standard Proctor Compaction Test

Introduction

Standard Proctor Tests are used to determine the relationship between moisture/water content of soils and their density. Specifically, this test is performed to determine the optimum moisture content a soil must have to achieve a maximum dry density when compacted.

The greater the dry density of a soil the more stable it will be on slopes or as a base for construction. In short, increasing the density of a soil increases its overall strength.

Purpose

The purpose of this lab is to explore the relationship between a soil's moisture content and dry density to ascertain its maximum dry density and optimum moisture content.

Apparatus

You will need the following equipment to complete this test:

- Balance – sensitive to 0.1g
- No. 4 sieve
- Mixing tools
- Rigid straight edge
- Proctor mould
- Rammer
- Metal tray
- Hammer

Procedure

1. Break up ~3 kg of a given soil sample taking care not to crush individual particles.
2. The sample should be broken so as to pass through the No.4 sieve (4.75mm).
3. Add and thoroughly mix in 5% of water by mass of your sample.
4. Add and mix in water for each trial at 2% increments.
5. Place sample in the Proctor Mould in 3 equal layers compacting each layer with 25 blows from the rammer.

6. After the sample has been compacted, remove the collar and trim the compacted soil to be even with the top of the mould.
7. Obtain appropriate masses.
8. Obtain a representative sample from the middle of the compacted specimen, weigh and place in the oven to dry for 24 hours.
9. Weigh the dry samples and obtain their moisture contents.

Exercises

By filling in the lab sheet provided perform the following:

1. **Plot a graph of Dry Density (kg/m^3) versus moisture content (%)**
2. **Determine maximum dry density of the soil.**
3. **Determine optimum moisture content to achieve maximum dry density.**
4. **Discuss your results.**

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LAB SHEET

Name_____ Maximum Dry Density _____

Date_____ Optimum Moisture Content_____

DENSITY	Trial No.	1	2	3	4	5
	Mass of mould + soil (g)					
	Mass of mould (g)					
	Mass of soil (g)					
	Density (kg/m^3)					
	Dry density (kg/m^3)					
MOISTURE CONTENT	Container Number					
	Mass of sample + container (g)					
	Mass of dry sample + container (g)					
	Mass of water (g)					
	Mass of container (g)					
	Mass of dry soil (g)					
	Moisture content (%)					

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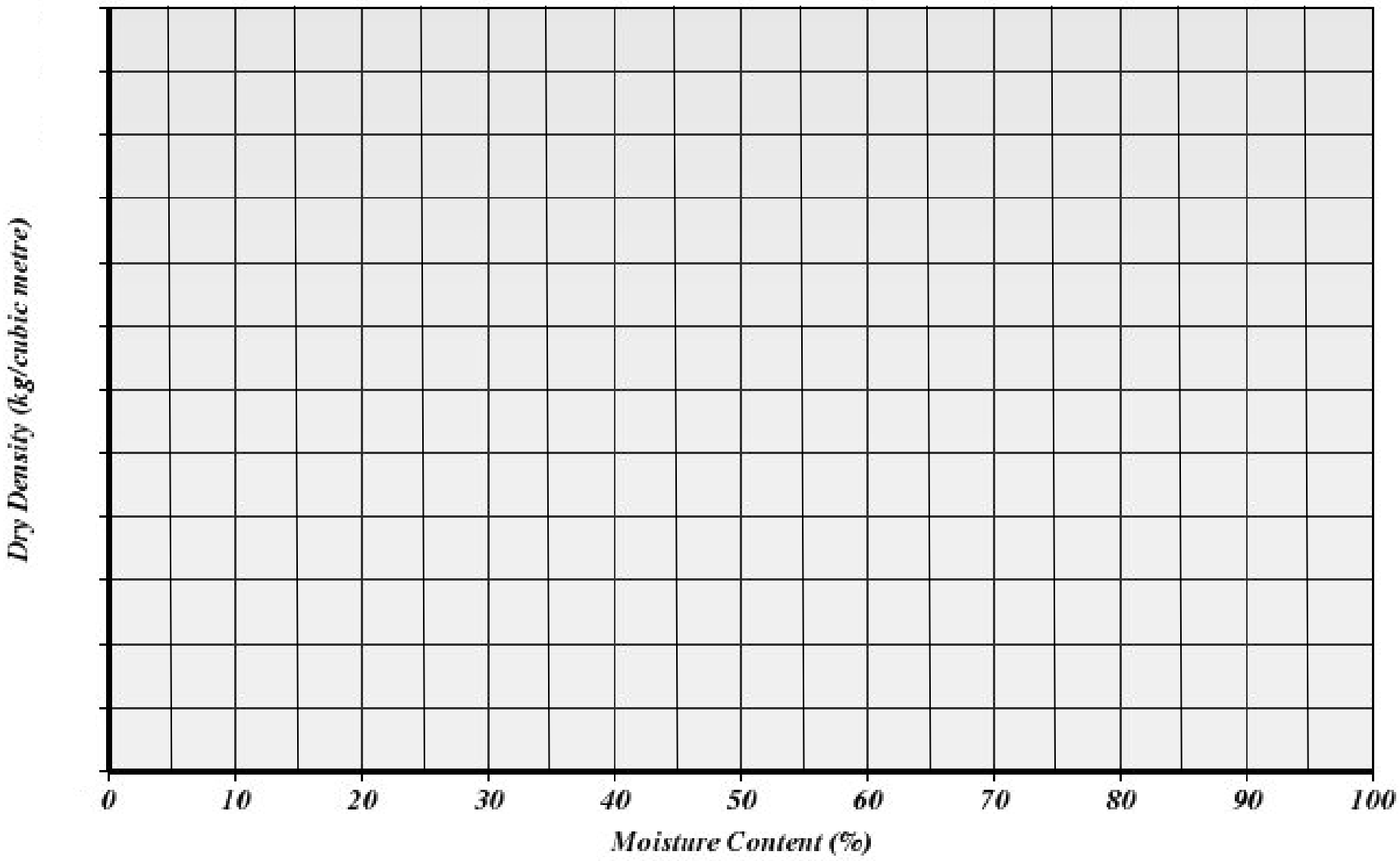
Dry Density (kg/cubic metre)
0
10
20
30
40
50
60
70
80
90
100
Moisture Content (%)