U.S. Army Corps of Engineers (USACE)
UNIT WEIGHTS, VOID RATIO, POROSITY, AND DEGREE OF SATURATION
For us of this, see EM 1110-2-1906; the proponent agency is CECW-EC.

Purpose: To calculate Unit Weights, Void Ratio, Porosity, and Degree of Saturation using the Volumetric Method

Project

Boring Number		Date	

Water Content

Sample or Specimen No.							
Tare No.							
Weight in Grams — Tare Plus Wet Soil							
Tare Plus Dry Soil							
Water	W_W						
Tare							
Dry Soil	W_S						
Water Content	W	%	%	%	%	%	%

Weigh-Volume Relations

Sample or Specimen No.							
Cylinder No.							
Centimeters — Height of Cylinder	H						
Inside Diameter of Cylinder	D						
Weight in Grams — Soil and Container							
Container							
Wet Soil	W						
Dry Soil	W_s						
Specific Gravity of Soil	G_S						
Volume in CC — Wet Soil (*volume of cylinder*)	V						
Dry Soil = W_S/G_S	V_S						
LB per Cu Ft — Wet Unit Wt = (W/V) 62.4	γ_m						
Dry Unit Wt = (W/V) 62.4	γ_d						
Void Ratio = $(V-V_S)/V_S$	e						
Porosity, % = $[(V-V_S)/V_S]$ x 100	n						
Degree of Saturation, % $[V_W/(V-V_S)]$ x 100	S	%	%	%	%	%	%

Volume of a cylinder, $V = \pi*r2*H$

Volume of water, $V_W = W_W$/specific gravity of water[*] _____ [*]Specific gravity of water in metric system = 1 (*approx.*)

Remarks:

Technician:	Computed By:	Checked By: