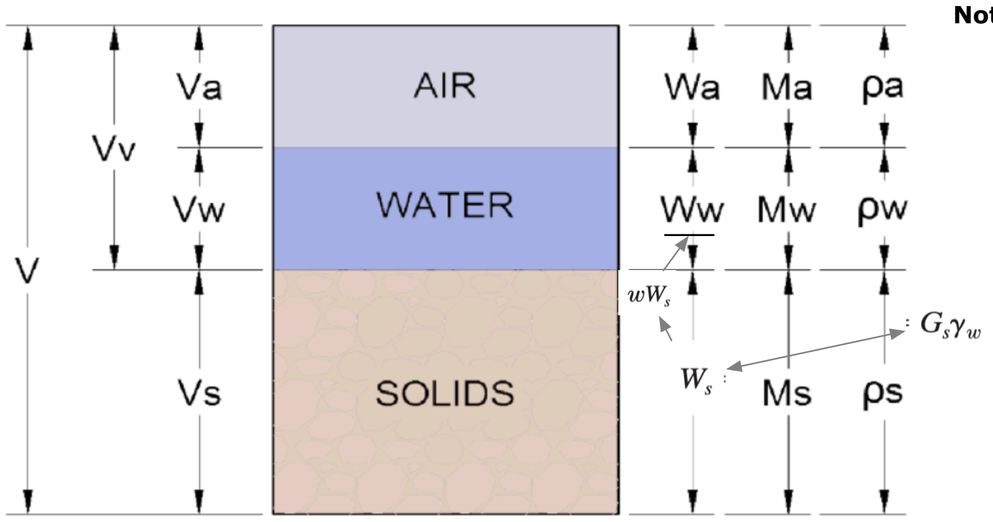
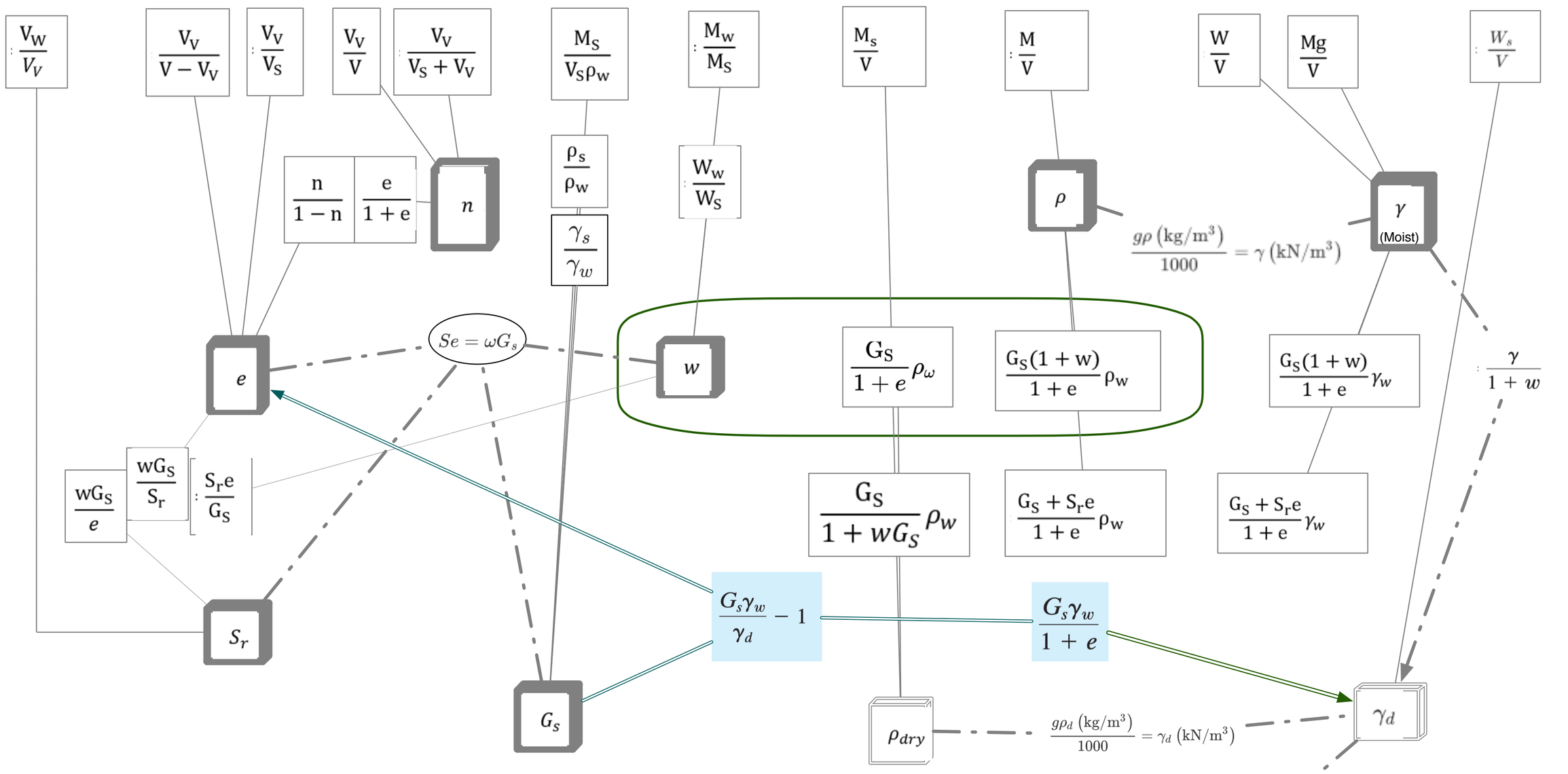


Notation

A = Air Content, percentage (%)
e = void ratio (ratio of volume of voids to the volume of solids), no units
G_s = specific gravity (the ratio of the density of the soil to the density of water), no units
I_D = density index (relative density), percentage (%)
n = porosity (ratio of the volume of voids to the total volume), percentage (%)
S_r = degree of saturation, percentage (%)
w = water content, percentage (%)
ρ = bulk density (the ratio of the total mass to the total volume), ib/ft^3 or kg/m^3
ρ_{sat} = saturated bulk density (the ratio of the total saturated mass to the total volume), ib/ft^3 or kg/m^3
ρ_{dry} = dry bulk density (the ratio of the total dry mass to the total volume), ib/ft^3 or kg/m^3
ρ' = effective density (bulk density - density of water), ib/ft^3 or kg/m^3
γ = unit weight(ratio of the total weight (force) to the total volume), ksi or KPa
γ' = buoyant unit weight or effective unit weight(unit weight - unit weight of water), ksi or KPa

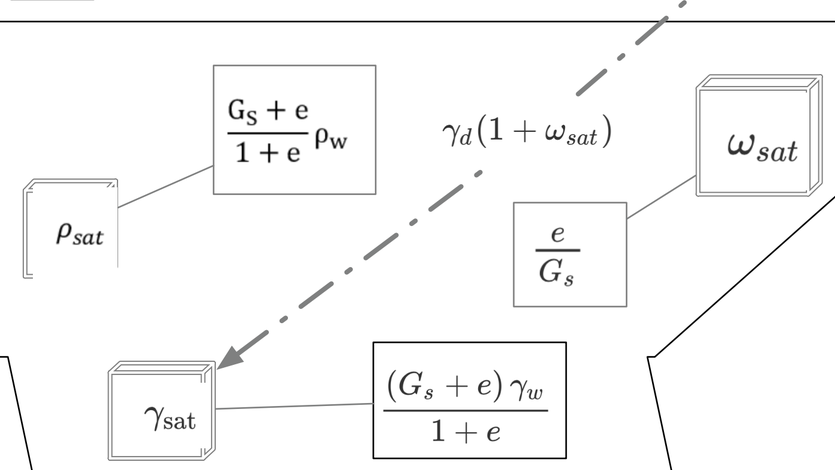
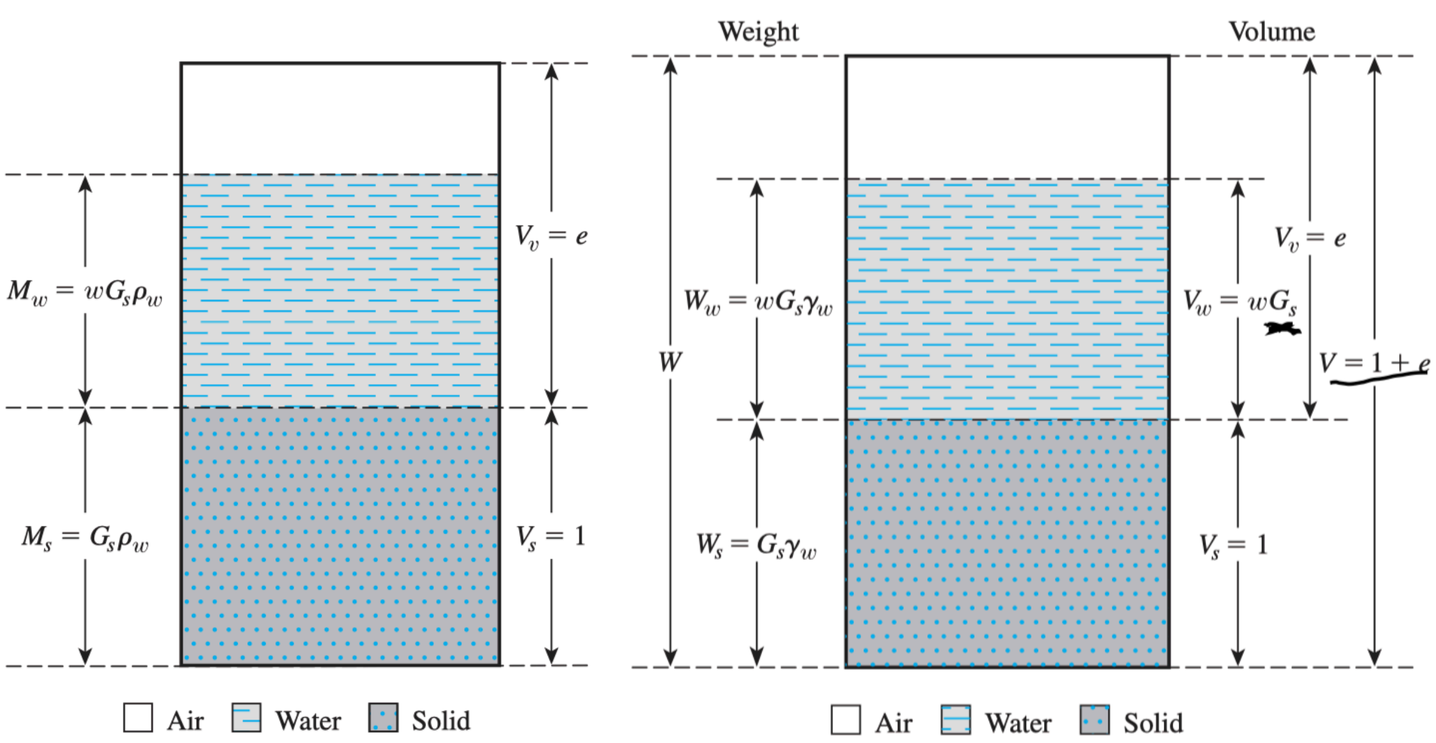


$$D_r = \frac{e_{\max} - e}{e_{\max} - e_{\min}}$$

$$D_r = \frac{(1-n_{\min})(n_{\max}-n)}{(n_{\max}-n_{\min})(1-n)}$$

If S = 1, the soil sample is saturated

$\gamma_w = 9.81\ KN/m^3$

$\gamma_w = 62.4\ lb/ft^3$

ρ_w = density of water = 1000 kg/m^3.