CIVE 353 Equation Sheet

$$S_r = \frac{V_\omega}{V_V} \quad \gamma' = \gamma_{sat} - \gamma_\omega \quad \omega = \frac{w_\omega}{w_S} \quad S_r e = G_S \omega \quad A = \frac{e - \omega G_S}{1+e} \quad \rho_d = \frac{\rho}{1+\omega} \quad \gamma = \frac{G_S(1+\omega)}{1+e}\gamma_\omega \quad R(\%) = \frac{\gamma_{d(field)}}{\gamma_{d(\max-lab)}}100$$

$$LI = \frac{\omega - PL}{LL - PL} \quad C_c = \frac{(D_{30})^2}{(D_{10})(D_{60})} \quad C_U = \frac{D_{60}}{D_{10}} \quad A = \frac{PI}{(percent\ clay\ size\ fraction\ by\ weight)} \quad q = -K\iota A \quad K = \frac{\gamma_w}{\eta}\overline{K}$$

$$K = 2.303\frac{aL}{At}\log_{10}\frac{h_1}{h_2} \quad K = \frac{QL}{AHt} \quad h_T = h_P + h_Z + h_v \quad \Delta h = \frac{h}{N_d} \quad v_S = \frac{v}{n} \quad v = Ki \quad q = Kh\frac{N_f}{N_d} \quad q = N_f \Delta q \quad F = \frac{\iota_c}{\iota_m} \quad \iota_{cr} = \frac{\gamma'}{\gamma_\omega} \quad \sigma_V' = \gamma' L \pm \gamma_\omega h$$

$$S_c = m_V H \Delta\sigma' \quad m_V = \frac{a_V}{1+e_o} \quad OCR = \frac{\sigma'_c}{\sigma'_0} \quad Cc = 0.009(LL-10) \quad S_c = \frac{C_r}{1+e_o}H\log\left(\frac{\sigma_c'}{\sigma_o'}\right) + \frac{C_C}{1+e_0}H\log\left(\frac{\Delta\sigma' + \sigma_0'}{\sigma_c'}\right)$$

$$S_c = \frac{C_c}{1+e_o}H\log\left(\frac{\sigma_2'}{\sigma_1'}\right) \quad \sigma = \sigma' + \mu \quad K = \frac{\sigma'_h}{\sigma'_v} \quad K_0 = 1 - \sin\phi' \quad \Delta\sigma_Z = \frac{3P}{2\pi}\frac{z^3}{(r^2+z^2)^{5/2}} \quad \Delta\sigma_Z = qI$$

$$C_V = \frac{K}{m_V\gamma_\omega} = \frac{K}{\gamma_w\left(\frac{a_v}{1+e_0}\right)} \quad U_z = \frac{u_o - u_z}{u_o} = 1 - \frac{u_e}{u_o} \quad U = \frac{S_p}{S'_p} \quad T_V = \frac{c_v t}{H^2_{dr}}$$

$$T_V = \frac{\pi}{4}\left[\frac{U\%}{100}\right]^2 \text{ for U = 0 to 60\%}$$

$$T_V = 1.781 - 0.933\log(100 - U\%) \text{ for U > 60 \%}$$

$$\tau' = c' + \sigma_N' \tan\phi' \quad \mathrm{T} = \mu\,\mathrm{N} \quad \frac{P}{A} = \sigma_1 - \sigma_3 \quad \mathrm{FS} = \frac{\tau_{\max}}{\tau_m} \quad B = \frac{\Delta\mu}{\Delta\sigma_3} \quad A = \frac{\Delta\mu}{\Delta\sigma_1} \quad \Delta\mu = B[\Delta\sigma_3 + A(\Delta\sigma_1 - \Delta\sigma_3)]$$

$$t = \frac{\sigma_1 - \sigma_3}{2} \quad s = \frac{\sigma'_1 + \sigma'_3}{2} \quad \sin\phi' = \tan\alpha \quad a = c'\cos\phi'$$