

**NorthWoods Software****Shear Friction Design**

Project Name:

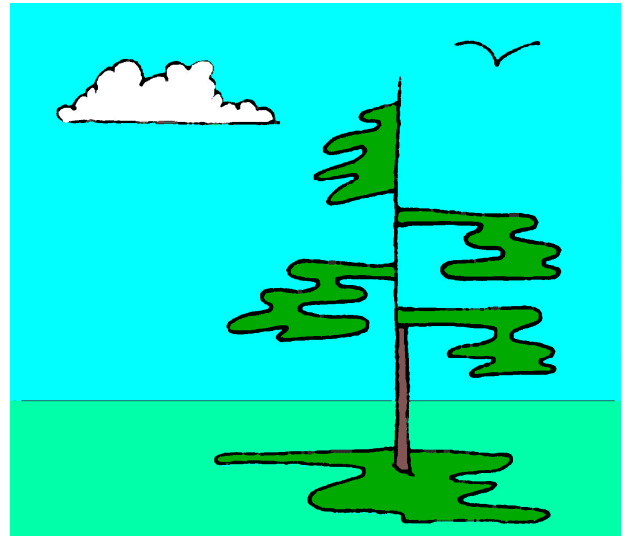
Project Number:

Project Description:

Project Designer: Dik

Last Revised: 18-02-28

Reference: CSA Standard A23.3-14

**Concrete Properties**

$$\Phi_c := 0.65$$

Material Factor for Concrete

8.4.2

$$f'_c := 25 \text{ MPa}$$

28 day concrete compressive strength

$$\gamma_c := 2500 \frac{\text{kg}}{\text{m}^3}$$

Concrete Density Factor

$$\lambda := 1.00$$

 $\lambda = 1.00$  Regular Weight Concrete $\lambda = 0.85$  Semi-Low Density Concrete $\lambda = 0.75$  Low Density Concrete**Concrete Modulus of Elasticity**

$$\text{if } \left( \gamma_c < 1500 \frac{\text{kg}}{\text{m}^3} \right) \vee \left( \gamma_c > 2500 \frac{\text{kg}}{\text{m}^3} \right) \quad = 26517.594 \text{ MPa} \quad \text{Equation 8.1}$$

$$E_c := 0.0$$

else

$$E_c := \left( \frac{3300 \cdot \sqrt{f'_c}}{\text{MPa}^{.5}} + 6900 \right) \cdot \left( \frac{\gamma_c}{2300} \right)^{1.5} \cdot \frac{\text{m}^{\frac{9}{2}}}{\text{kg}^{\frac{3}{2}}} \text{ MPa}$$

$$E_c := \frac{4500 \cdot \sqrt{f'_c}}{\text{MPa}^{.5}} \text{ MPa} = 22500 \text{ MPa} \quad \text{Alternative Modulus of Elasticity} \quad \text{Equation 8.2}$$

**Concrete Modulus of Rupture**

$$f_r := 0.6 \cdot \lambda \cdot \frac{\sqrt{f'_c}}{\text{MPa}^{.5}} \text{ MPa} = 3 \text{ MPa} \quad \text{Equation 8.3}$$