

Pool Grade beams under CMU Wall & Granite

$$\rho_c = \text{Concrete } 150 \#/\text{ft}^3 \quad e = 0.0136$$

$$f'_c = 3,000 \text{ psi}$$

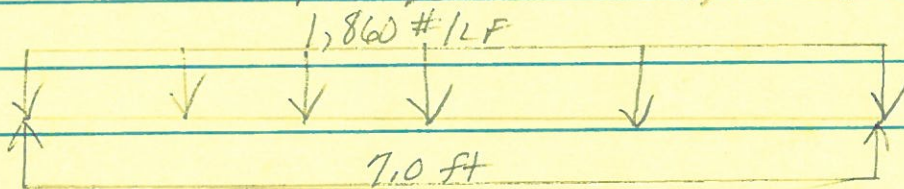
$$f_y = 60,000 \text{ psi}$$

Estimate Weight/Linear Foot

$$\text{beam cross section} = 12.4 \text{ ft}^2 \quad \text{Beam dim} = 18W \times 20d$$

$$12.4 \text{ ft}^2 \times 150 \#/\text{ft}^3 = 1,860 \#/\text{LF} \quad d = 17$$

Maximum Span between Piling = 7.0'



$$W_D = 1.2D = 1.2(1,860 \#/\text{LF}) = 2232 \#/\text{LF}$$

$$M_u = \frac{W_u L^2}{8} = \frac{(2232)(7)^2}{8} = 13,671 \text{ ft}\cdot\#$$

$$164,052 \text{ in}\cdot\#$$

$$A_{s \text{ req}} = \frac{M_u}{\phi f_y d} = \frac{164,052}{(\phi 0.9)(0.19)(60,000)17} = 0.198 \text{ in}^2$$

$$A_{s \text{ min}} = \frac{3\sqrt{f'_c}}{f_y} b w d = \frac{3\sqrt{3000}}{60,000} \times 16 \times 20 = 0.876 \text{ in}^2$$

$$3 \text{ ea } \#5 \text{ on bottom} = 0.93 \text{ in}^2 \quad \& \text{ 2 ea } \#5 \text{ top} = 0.62 \text{ in}^2$$

$$\text{Check } e = A_s/bd = 1.55/(18 \times 20) = 0.004 > e_{\text{min}} 0.003$$

$$< e_{\text{max}} 0.014 \text{ OK}$$