$$\sigma_c = \frac{Mh}{I} = \frac{24(10^3)(146.41)(10^{-3})}{914.3(10^{-6})}$$

$$= \underline{3.84 \text{ Mpa (comp.)}}$$

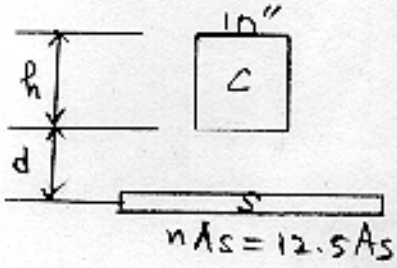
$$\sigma_s = n\frac{Mc}{I} = \frac{13.333(24)(10^3)(24-6)(10^{-3})}{914.3(10^{-6})}$$

$$= \underline{85.3 \text{ Mpa (Tension)}}$$

4-169 Supplemental problem (2)

$$n = \frac{E_s}{E_c} = \frac{30000}{2400} = 12.5$$

$$M_{max} = \frac{wL^2}{8} = \frac{1200(20^2)}{8} = 60{,}000 \text{ ft-lb}$$



$$\sigma_c = \frac{Mh}{I} = 800 = \frac{60.000(12)h}{I}$$

$$I = 900h \quad \cdots (1)$$

$$\sigma_s = \frac{nMd}{I} = 16000 = \frac{12.5(60000)(12)d}{I}$$

$$I = 562.5d \quad \cdots (2)$$

By (1) & (2)

$$900h = 562.5d$$

$$h = 0.625d$$

$$10(h)\left(\frac{h}{2}\right) = 12.5 A_s d$$

$$A_s = \frac{5}{12.5}\frac{h^2}{d} = \frac{5}{12.5}(0.625)^2 d$$

$$= \frac{1.9531}{12.5} d$$

$$I = \frac{1}{3}(10)h^3 + 12.5 A_s d^2$$

$$= \frac{10}{3}(0.625d)^3 + 1.953(d^3)$$

$$2.761 d^3 = 562.5d$$

$$d = 14.258 \text{ (in)}$$

a) $A_s = \frac{1.9531}{12.5} d = \underline{2.23 \text{ in}^2}$

b) Depth $= h + d = (0.625+1)d$

$$= \underline{23.2 \text{ in}}$$