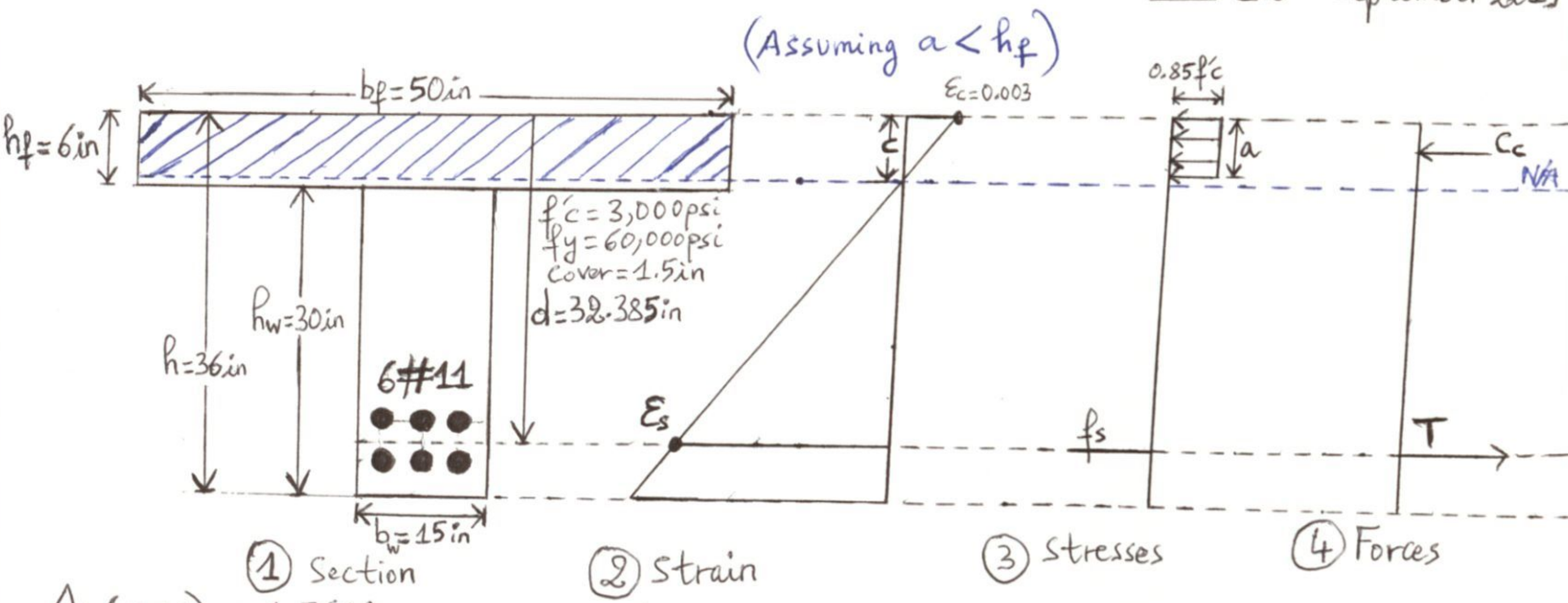




DTY Tutoring, inc.
 Email: dtytutoring@gmail.com
 Website: www.dtytutoring.com

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$$A_b(\#11) = 1.56 \text{ in}^2$$

$$A_s = 6A_b = 6(1.56 \text{ in}^2) = 9.36 \text{ in}^2$$

$$T = A_s f_y = (9.36 \text{ in}^2) \left(60 \frac{\text{kips}}{\text{in}^2} \right) = 561.6 \text{ kips}$$

$$C_c = 0.85 f'_c a b_f = 0.85 f'_c A_c$$

From ④ $\sum F_x = 0 \Rightarrow T = C_c \Rightarrow 561.6 \text{ kips} = 0.85 f'_c A_c \Rightarrow A_c = \frac{561.6 \text{ kips}}{0.85 \left(3 \frac{\text{kips}}{\text{in}^2} \right)} = 220.2352941 \text{ in}^2$

$$A_{\text{Flange}} = (b_f)(h_f) = (50 \text{ in})(6 \text{ in}) = 300 \text{ in}^2$$

$A_c < A_{\text{Flange}} \Rightarrow$ Therefore assumption $a < h_f$ is correct.

$$A_c = ab \Rightarrow a = \frac{A_c}{b_f} = \frac{220.2 \text{ in}^2}{50 \text{ in}} = 4.404 \text{ in} < h_f \checkmark$$

$$a = \beta_1 c \Rightarrow c = \frac{a}{\beta_1} = \frac{4.404 \text{ in}}{0.85} = 5.181176471 \text{ in}$$

Check strain $\Rightarrow \epsilon = \frac{0.003(d-c)}{c} = \frac{0.003(32.385 - 5.18)}{5.18} = 0.01574974457$

$\epsilon_y = 0.002 \rightarrow \text{OK}$
 $\epsilon_s(\text{steel}) \text{ has yielded.}$

From ④ $\sum M_c = 0$

$$M_N = T \left(d - \frac{a}{2} \right) = 561.6 \text{ kips} \left(32.385 \text{ in} - \frac{4.404 \text{ in}}{2} \right) = 16,950.7728 \text{ kips-in}$$

$$= 16,950.7728 \text{ kips-in} \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) = 1,412.5644 \text{ kips-ft}$$

$\phi M_N = (0.90)(1,412.5644 \text{ kips-ft}) = 1,271.30796 \text{ kips-ft}$