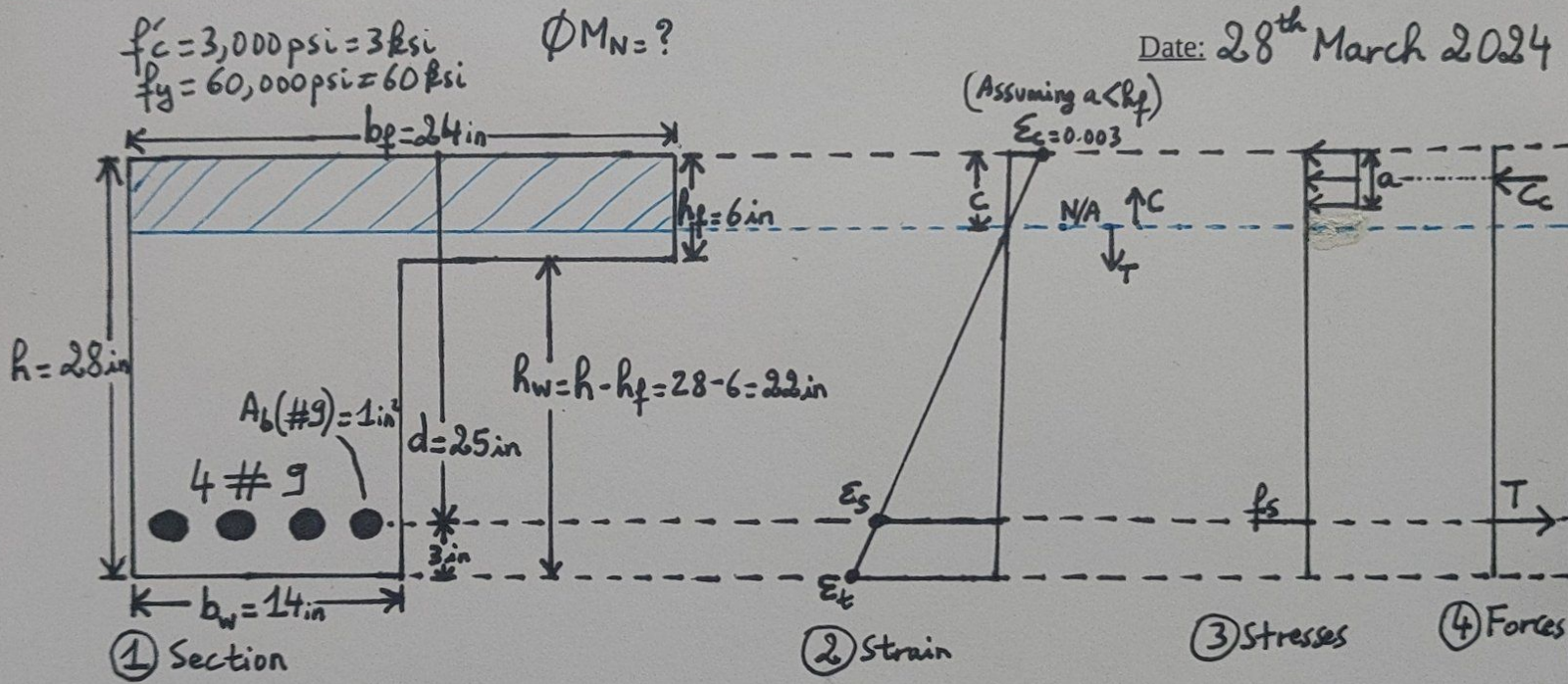


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$A_s = 4A_b = 4(1 \text{ in}^2) = 4 \text{ in}^2$   
 $T = A_s f_y = (4 \text{ in}^2)(60 \frac{\text{kips}}{\text{in}^2}) = 240 \text{ kips}$  ;  $C_c = 0.85 f'_c a b_f = 0.85 f'_c A_c$   
 From ④  $\Rightarrow \sum F_x = 0 \Rightarrow T = C_c \Rightarrow 240 \text{ kips} = 0.85 f'_c A_c \Rightarrow A_c = \frac{240 \text{ kips}}{0.85 (3 \frac{\text{kips}}{\text{in}^2})} = 94.11764706 \text{ in}^2$   
 $A_{\text{Flange}} = (b_f)(h_f) = (24 \text{ in})(6 \text{ in}) = 144 \text{ in}^2$  ;  $A_c < A_{\text{Flange}} \Rightarrow$  Therefore assumption  $a < h_f$  is correct.  
 $A_c = (a)(b) \Rightarrow a = \frac{A_c}{b_f} = \frac{94.11764706 \text{ in}^2}{24 \text{ in}} = 3.921568628 \text{ in} < h_f \checkmark$   
 $a = \beta_1 c \Rightarrow c = \frac{a}{\beta_1} = \frac{3.921568628 \text{ in}}{0.85} = 4.61361015 \text{ in}$

Check strain  $\Rightarrow \epsilon = \frac{0.003(d-c)}{c} = \frac{0.003(25 - 4.61361015)}{4.61361015} = 0.01325625 > \epsilon_y = 0.002$

From ④  $\Rightarrow +\sum M_{C_c} = 0$   
 $M_N = T(d - \frac{a}{2}) = 240 \text{ kips} (25 \text{ in} - \frac{3.92 \text{ in}}{2}) = 5,529.411765 \text{ kips-in} (\frac{1 \text{ ft}}{12 \text{ in}}) = 460.7843138 \text{ kips-ft}$   
 $\phi M_N = (0.90)(460.7843138 \text{ kips-ft}) = 414.7058824 \text{ kips-ft}$

OK  $\epsilon_s$  (steel) has yielded  $> 0.005$   
 $\phi = 0.90$

$\phi M_N = 414.7 \approx 415 \text{ kips-ft}$