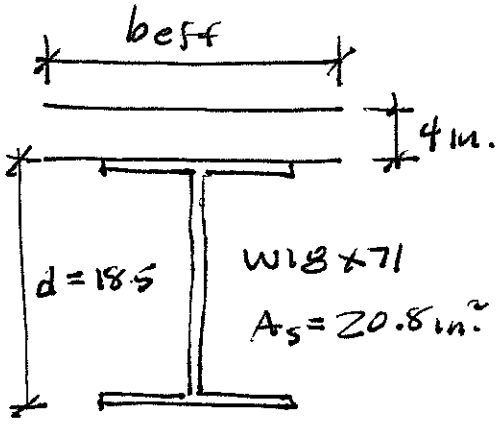
4.



$b_{eff} = \frac{18}{4} = 4.5\,ft$ * $= 54\,in.$

or $= 5\,ft$

DETERMINE LOCATION OF PNA

$C_c = 0.85(4)(54)(4) = 734\,k$ *

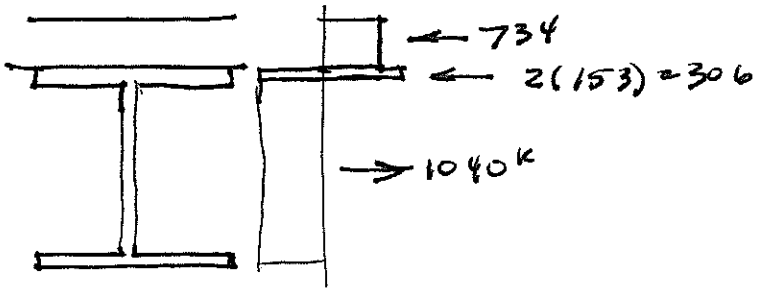
$C_s = A_s f_y = 20.8(50) = 1040\,k$

SINCE $C_c < C_s$ PNA IS IN STEEL

$$A_{s\text{-comp}} = \frac{1040 - 734}{2(50)} = 3.06\,in.^2$$

$b_f = 7.64$ $t_f = 0.810$

assume PNA in flange $\quad x = \frac{3.06}{7.64} = 0.400 < t_f = 0.810$



$$M_n = 1040\left(\frac{18.5}{2}\right) + 734\left(\frac{4}{2}\right) - 306\left(\frac{0.400}{2}\right) = 11{,}000\ in\text{-}k$$

$$= 917\,ft\text{-}kips$$

a) $\phi M_n = 0.9(917) = \underline{825}\ ft\text{-}k$

b) $\frac{M_n}{\Omega} = \frac{917}{1.67} = \underline{549}\ ft\text{-}k$