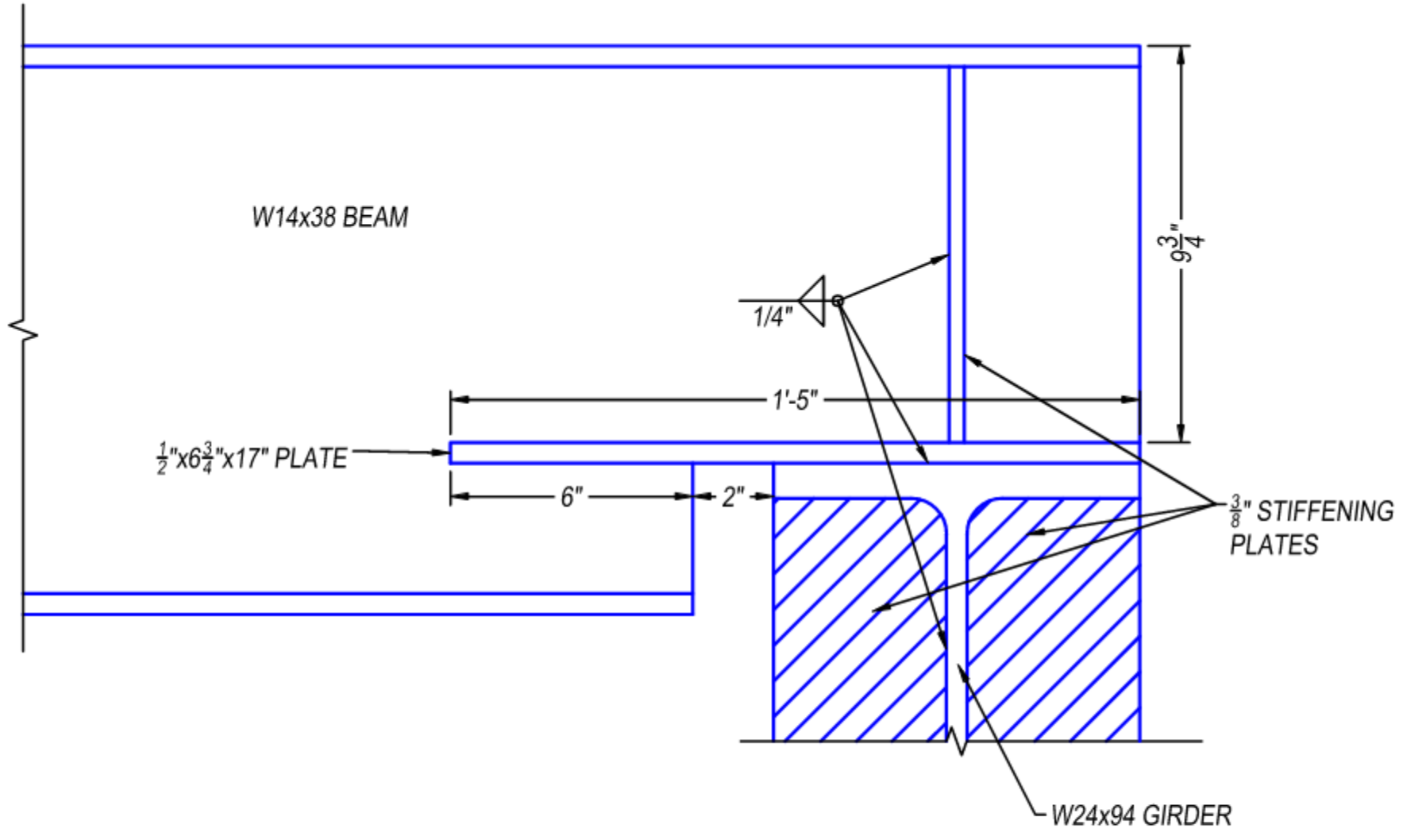


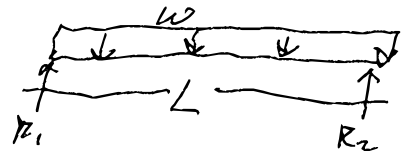
S7
2

DETAIL - W24x94 GIRDER & W14x38 BEAM CONNECTION

SCALE 2" = 1'

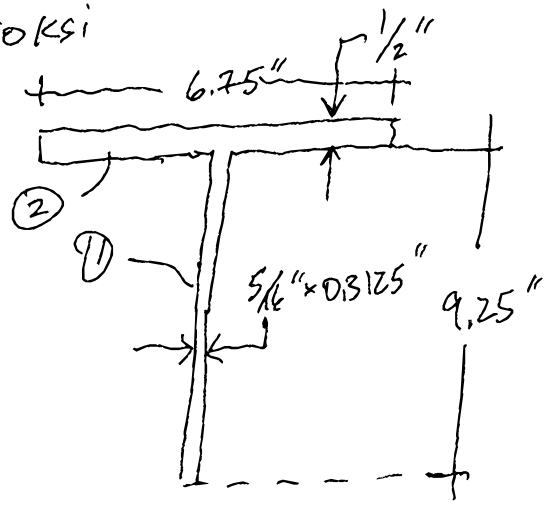
AISC 13th J4.2

$R_n = 0.6 F_y A_g$



$F_y = 50$ ksi

$A_g =$



$L_r = 187 \text{ psf} \times 6.5 = 1216$ plf

$D = 20 \text{ psf} \times 6.5 = 130$ plf

38 plf mech

$W = 1.2(168) + 1.6(1216) =$

$W = 202 + 1946 = 2148$ plf

$R_1 = \frac{WL}{2} = \frac{2148 \frac{lbs}{ft}(17')}{2}$

$R_1 = 18.3$ kips

$A_1 = 9.25''(0.3125'') = 2.890625$

$A_2 = 6.75(0.5) = 3.375$

$A_g = A_1 + A_2 = 3.375 + 2.891 = 6.1266 \text{ in}^2$

$C_v = 1$

$\frac{h}{t_w} = \frac{9.25}{0.3125} = 29.6$

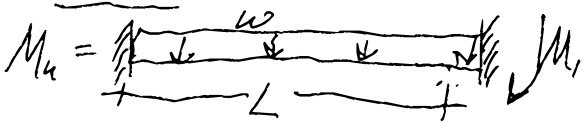
$R_n = 0.6\left(50 \frac{K}{in^2}\right)\left(3.375 \text{ in}^2\right) =$ kips

$\phi_{LRFD} = 1$ $\quad \boxed{\phi R_{ny} = 101.25 \text{ kips}}$ (controls)

$\phi R_{nu} = 0.75\left(\frac{65 \text{ ksi}}{50 \text{ ksi}}\right)\phi R_{ny}$

$\boxed{\phi R_{nu} = 183 \text{ kips}}$

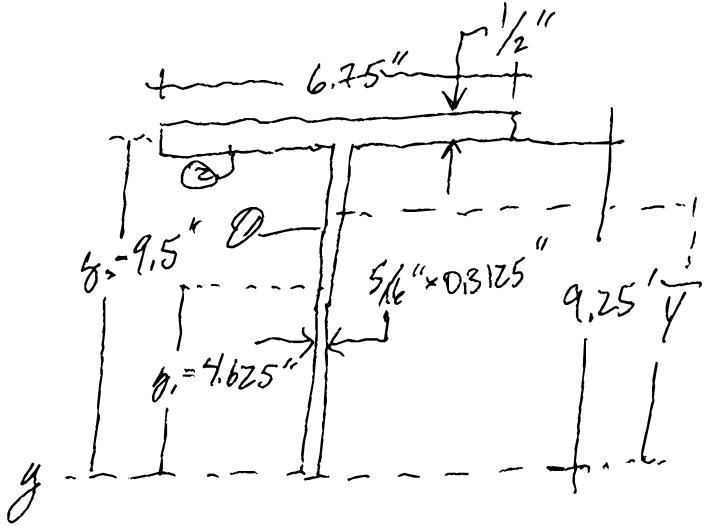
Moment



$$M_u = \frac{WL^2}{12} = \frac{2148\ \frac{lb}{ft}\ (17ft)^2}{12} = 3043$$

$$M_u = 3.1\ ft\text{-}kip$$

Centroid



	A in^2	$\bar{y}$ in	$\bar{y}A$ in^3
1)	2.89	4.625	13.37
2)	3.375	9.5	32.1

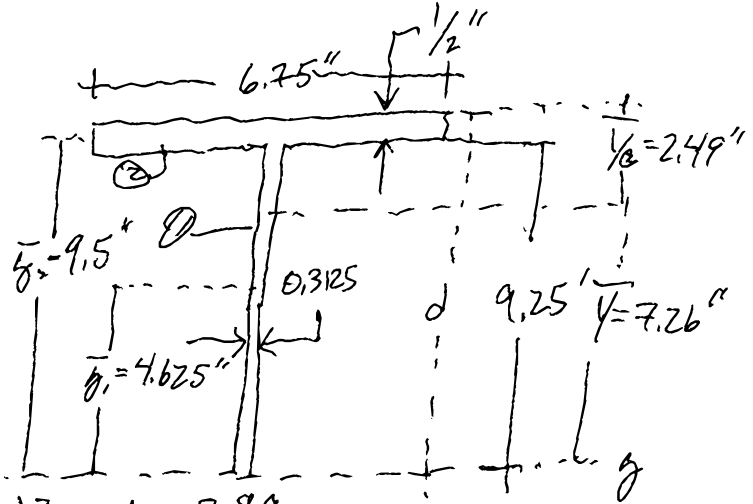
$\Sigma A = 6.266\ in^2$ $\quad$ $\Sigma \bar{y}A = 45.47$

$$\bar{y}\Sigma A = \Sigma \bar{y}A \Rightarrow \bar{y} = \frac{\Sigma \bar{y}A}{\Sigma A}$$

$$\bar{y} = \frac{45.47}{6.266} = 7.26\ in$$

Centroidal Moment of Inertia (I_x)

$I_x = \sum(\bar{I} + Ad^2)$ $\quad \bar{I} = \frac{1}{12}bh^3$



$\sum_1 = \frac{1}{12}(0.3125in)(9.25in)^3 + (2.89in^2)(7.26 - 4.625)^2$

79.645 $\quad$ 6.94

$\sum_1 = 20.61 + 20.1$

$\sum_1 = \boxed{40.71\ in^4}$

$\sum_2 = \frac{1}{12}(6.75in)(0.5in)^3 + (3.375)(9.5 - 7.26)^2$

0.125 $\quad$ 5.1

$\sum_2 = 0.07 + 17.21 = \boxed{17.28\ in^4}$

$A_1 = 2.89$

$A_2 = 3.375$

$d = 9.75"$

$Z_x = 14.2\ in^3$

foundation calc

$I_x = 40.71 + 17.28 = \boxed{58\ in^4}$

$S_x = I_x / \bar{y}_2 = 58in^4 / 7.26" = 8\ in^3$

$M_y = F_y S_x = 50(8in^3) = 400$ kip-in

$M_n = M_p = F_y Z_x \leq 1.6 M_y$

$50ksi(14.2in^3) \leq 1.6(400\ kip\text{-}in)$

$710\ k\text{-}in \leq 640\ k\text{-}in$

$M_p = 640\ k\text{-}in\left(\frac{ft}{12in}\right) = \boxed{53.3\ k\text{-}ft}$

FLB (Does not Apply)

slenderness

$$\lambda = \frac{b_f}{2t_f} = \frac{6.75}{2(0.5)} = 6.75$$

$$\lambda_{pf} = 0.38\sqrt{\frac{E}{F_y}} = 9.15$$

$\lambda_{rf} = 24.1$ $\lambda < \lambda_{pf}$ = Compact flange

$$M_n = M_p = 53.3 \text{ k-ft}$$

$\phi_{bending} = 0.9$

$$\phi M_n = (0.9)53.3 \text{ k-ft} = 47 \text{ k-ft}$$

$M_u = 3.1$ k-ft < 47 k-ft

Design is Okay ✓