Solution Hwk # 6, Prob # 1, text # 4.5-5

Loads : $DL := 380$ Kips $LL := 1140$ Kips $P_u := 1.2 \cdot DL + 1.6 \cdot LL$ $P_u = 2.28 \times 10^3$ Kips

Structural System for finding K (recommended values)

Major Axis: $K_x := 1.0$ Minor Axis: $K_y := 1.0$

$L_x := 35$ ft $L_y := 15$ ft

$K_y \cdot L_y = 15$ Refer to table 4-2 W 12 x 230 $P_d := 2320$ Kips

or W 14 x 211 $P_d := 2280$ Kips

Checking for section W 14 x 211

$A_g := 62$ in^2 $d := 15.7$ in $t_w := 0.980$ in $b_f := 15.8$ in $t_f := 1.56$ in

$E := 29000$ Ksi $F_y := 50$ Ksi $h := 10$ in $r_x := 6.55$ in $r_y := 4.07$ in

Slenderness Limits:

$\frac{K_y \cdot L_y}{r_y} = 3.686$ & $\frac{K_x \cdot L_x}{r_x} = 5.344$

We find that the major axis has greater slenderness ratio, therefore, finding equivalent slenderness ratio as

$KL_{eq} := \frac{K_x \cdot L_x}{\left(\frac{r_x}{r_y}\right)}$ $KL_{eq} = 21.748$ t gives $\phi P_n := 1940$ Kip $<$ P_u

Assume another section, say **<u>W 14 x 257</u>**

$A_g := 756\, in^2$ $d := 16.4$ in $t_w := 1.18$ in $b_f := 16$ in $t_f := 1.89$ in

$E := 29000$ Ksi $F_y := 50$ Ksi $h := 10$ in $r_x := 6.71$ in $r_y := 4.13$ in

$L_y = 15$ ft $L_x = 35$ ft

Slenderness Limits:

$\frac{K_y \cdot L_y}{r_y} = 3.632$ & $\frac{K_x \cdot L_x}{r_x} = 5.216$

We find that the major axis has greater slenderness ratio, therefore, finding equivalent slenderness ratio as

$KL_{eq} := \dfrac{K_x \cdot L_x}{\left(\dfrac{r_x}{r_y}\right)}$ $\quad$ $KL_{eq} = 21.542 \ \ t$ gives $\quad$ $\phi P_n := 2380 \ \ Kip \quad > \quad P_u$

(OK)

Check for Local buckling

$\dfrac{b_f}{2 \cdot t_f} = 4.233 \quad < \quad \lambda_r := 0.56 \cdot \sqrt{\dfrac{E}{F_y}} \quad \lambda_r = 13.487$ $\quad$ From Table B 5.1

$\dfrac{h}{t_w} = 8.475 \quad < \quad \lambda_r := 1.49 \cdot \sqrt{\dfrac{E}{F_y}} \quad \lambda_r = 35.884$ $\quad$ From Table B 5.1

We can see that the section is NON-COMPACT and also safe from the applied load view point.

Solution Hwk # 6, Prob # 2, text # 4.5-8

Beam Sections W 18 x 35

$A_g := 10.3\ in^2$ $d := 17.7\ in$ $t_w := 0.3\ in$ $b_f := 6.0\ in$ $t_f := 0.425\ in$

$E := 29000\ Ksi$ $F_y := 50\ Ksi$ $h := 15.5\ in$ $r_x := 7.04\ in$ $r_y := 1.22\ in$

$I_{xb} := 510\ in^4$ $I_y := 15.3\ in^4$ $L_b := 20\ ft$

Columns Sections W 10 x 54

$A_{gc} := 15.8\ in^2$ $d := 10.1\ in$ $t_w := 0.37\ in$ $b_f := 10\ in$ $t_f := 0.615\ in$

$E := 29000\ Ksi$ $F_y := 50\ Ksi$ $h := 7.5\ in$ $r_{xc} := 4.37\ n$ $r_y := 2.56\ in$

$I_{xc} := 303.0\ n^4$ $I_y := 103.0\ in^4$ $L_c := 12\ ft$

Calculation of Effective length factor Kx for column AB

$G_A := 10$

$$G_B := \frac{2\left(\frac{I_{xc}}{L_c}\right)}{2\cdot\left(\frac{I_{xb}}{L_b}\right)} \qquad G_B = 0.99$$

gives us $K_x := 1.95$

Calculation of Effective length factor Kx for column BC

$$G_A := \frac{2\left(\frac{I_{xc}}{L_c}\right)}{2\cdot\left(\frac{I_{xb}}{L_b}\right)} \qquad G_A = 0.99$$

gives us $K_x := 1.3$

$$G_B := \frac{2\left(\frac{I_{xc}}{L_c}\right)}{2\cdot\left(\frac{I_{xb}}{L_b}\right)} \qquad G_B = 0.99$$

Column AB $\qquad K_x := 1.95$

$$\lambda_c := \frac{K_x \cdot L_c \cdot 12}{r_{xc} \cdot \pi} \cdot \sqrt{\frac{F_y}{E}} \qquad \lambda_c = 0.849 \qquad < 1.5 \qquad F_{cr} := 0.658^{\lambda_c^{\,2}} \cdot F_y \qquad F_{cr} = 36.971$$

$$\phi P_n := 0.85 \cdot F_{cr} \cdot A_{gc} \qquad \phi P_n = 496.519$$

Now, $\quad \dfrac{\phi P_n}{A_{gc}} = 31.425 \quad$ & $\quad F_y = 50$ Ksi $\quad$ gives $\quad \tau := 0.627$

(Table 4 - 1)

Column BC $\qquad K_x := 1.3$

$$\lambda_c := \frac{K_x \cdot L_c \cdot 12}{r_{xc} \cdot \pi} \cdot \sqrt{\frac{F_y}{E}} \qquad \lambda_c = 0.566 \qquad < 1.5 \qquad F_{cr} := 0.658^{\lambda_c^{\,2}} \cdot F_y \qquad F_{cr} = 43.722$$

$$\phi P_n := 0.85 \cdot F_{cr} \cdot A_{gc} \qquad \phi P_n = 587.185$$

Now, $\quad \dfrac{\phi P_n}{A_{gc}} = 37.164 \quad$ & $\quad F_y = 50$ Ksi $\quad$ gives $\quad \tau := 0.329$

Solution Hwk # 6, Prob # 3, text # 4.5-10

Beam Sections W 18 x 50

$A_g := 14.7\ in^2$ $d := 18$ in $t_w := 0.355$ in $b_f := 7.5$ in $t_f := 0.972$ in

$E := 29000$ Ksi $F_y := 50$ Ksi $h := 15.5$ in $r_x := 7.38$ in $r_y := 1.65$ in

$I_{xb} := 800\ in^4$ $I_y := 40.1\ in^4$ $L_{bl} := 18$ ft $L_{br} := 20$ ft

Columns Sections W 12 x 72

$A_{gc} := 21.1\ in^2$ $d := 12.3$ in $t_w := 0.43$ in $b_f := 12$ in $t_f := 0.670$ in

$E := 29000$ Ksi $F_y := 50$ Ksi $h := 9.125$ n $r_{xc} := 5.31$ n $r_{yc} := 3.04$ in

$I_{xc} := 597\ in^4$ $I_y := 195\ in^4$ $L_c := 15$ ft $P_u := 300$ Kips $K_y := 1.0$

Calculation of Effective length factor Kx for column AB

$G_B := 10$

$$G_A := \frac{\left(\frac{I_{xc}}{L_c}\right)}{\left(\frac{I_{xb}}{L_{bl}}\right) + \left(\frac{I_{xb}}{L_{br}}\right)} \qquad G_A = 0.471$$

gives us $K_x := 1.8$

Calculation using Kx - inelastic using reduction factor method

$\frac{P_u}{A_{gc}} = 14.218$ $F_y := 50$ $\tau := 1.0$ Therefore, $K_x = 1.8$

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xc}}{r_{yc}}\right)} \qquad KL_{eq} = 15.458$$

$$\lambda_c := \frac{K_x \cdot L_c \cdot 12}{r_{xc} \cdot \pi} \cdot \sqrt{\frac{F_y}{E}} \qquad \lambda_c = 0.806 \quad < 1.5 \qquad F_{cr} := 0.658^{\lambda_c^{\,2}} \cdot F_y \qquad F_{cr} = 38.084 \text{ Ksi}$$

$\phi P_n := 0.85 \cdot F_{cr} \cdot A_{gc}$ $\phi P_n = 683.042$ Kips $>$ $P_u = 300$ Kips

This value is also checked using Table 4-2, for $KL_{eq} = 15.458$ gives $\phi P_n := 694.0$ Kips

General Information: HWK # 6 Prob # 4 text 4-5-11

$F_y := 50$ Ksi $\quad K_y := 1.0 \quad L_c := 13$ ft $\quad L_b := 30$ ft $\quad E := 29000$ Ksi

Column AB : $P_u := 750$ Kips

Beam Sections W 18 x 46 (beam BM)

$A_g := 13.5\ in^2 \quad d := 18.1\ in \quad t_w := 0.36\ in \quad b_f := 6.06\ in \quad t_f := 0.605\ in$

$I_{xb} := 712\ in^4 \quad I_y := 22.5\ in^4 \quad h := 15.5\ in \quad r_{xb} := 7.25\ in \quad r_{yb} := 1.29\ in$

Columns Sections W 12 x 96 (cols. AB & BC)

$A_{gc} := 28.2\ in^2 \quad d := 12.7\ in \quad t_w := 0.55\ in \quad b_f := 12.2\ in \quad t_f := 0.9\ in$

$I_{xc} := 833\ in^4 \quad I_y := 270\ in^4 \quad h := 9.125\ n \quad r_{xc} := 5.44\ in \quad r_{yc} := 3.09\ in$

Calculation of Effective length factor Kx for column AB (W 12 x 96)

$G_A := 1$

Table 4-1

Now, $\dfrac{P_u}{A_{gc}} = 26.596$ Ksi & $F_y = 50$ Ksi => $\tau := 0.819$

$$G_B := \tau \frac{2\left(\frac{I_{xc}}{L_c}\right)}{\left(\frac{I_{xb}}{L_b}\right)} \qquad G_B = 4.422 \qquad K_x := 1.62$$

Therefore, $K_x \cdot L_c = 21.06$ ft > $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xc}}{r_{yc}}\right)} \qquad KL_{eq} = 11.962 \text{ ft}$$

From Table 4 - 2 for W 12 x 96 $\quad \phi P_n := 1020$ Kip > $P_u = 750$ Kip

check for local buckling:

$$\frac{b_f}{2 \cdot t_f} = 6.778 \quad < \quad \lambda_r := 0.56 \cdot \sqrt{\frac{E}{F_y}} \qquad \lambda_r = 13.487$$ From Table B 5.1

$$\frac{h}{t_w} = 16.591 \quad < \quad \lambda_r := 1.49 \cdot \sqrt{\frac{E}{F_y}} \qquad \lambda_r = 35.884$$ From Table B 5.1

We can see that the section is <u>NON-COMPACT and SAFE</u> from the applied load view point.

Column MN : $P_u := 1000$ Kips

Beam Sections W 18 x 46 (left and right)

$A_g := 13.5\ in^2$ $d := 18.1\ in$ $t_w := 0.36\ in$ $b_f := 6.06\ in$ $t_f := 0.605\ in$

$I_{xb} := 712\ in^4$ $I_y := 22.5\ in^4$ $h := 15.5\ in$ $r_{xb} := 7.25\ in$ $r_{yb} := 1.29\ in$

Columns Sections W 12 x 96 (upper and lower)

$A_{gc} := 28.2\ in^2$ $d := 12.7\ in$ $t_w := 0.55\ in$ $b_f := 12.2\ in$ $t_f := 0.9\ in$

$I_{xc} := 833\ in^4$ $I_y := 270\ in^4$ $h := 9.125\ n$ $r_{xc} := 5.44\ in$ $r_{yc} := 3.09\ in$

Calculation of Effective length factor Kx for **column MN (W 12 x 96)**

$G_N := 10$

Now, $\frac{P_u}{A_{gc}} = 35.461$ Ksi & $F_y = 50$ Ksi => $\tau := 0.436$
(Table 4-1)

$$G_M := \tau \frac{2\left(\frac{I_{xc}}{L_c}\right)}{2\left(\frac{I_{xb}}{L_b}\right)} \qquad G_M = 1.177 \qquad K_x := 1.93$$

(Chart)

Therefore, $K_x \cdot L_c = 25.09$ ft > $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xc}}{r_{yc}}\right)} \qquad KL_{eq} = 14.251 \text{ ft}$$

From **Table 4 - 2 for W 12 x 96** $\phi P_n := 966$ Kip < $P_u = 1 \times 10^3$ ip

check for local buckling:

$$\frac{b_f}{2 \cdot t_f} = 6.778 \quad < \quad \lambda_r := 0.56 \cdot \sqrt{\frac{E}{F_y}} \quad \lambda_r = 13.487$$ From Table B 5.1

$$\frac{h}{t_w} = 16.591 \quad < \quad \lambda_r := 1.49 \cdot \sqrt{\frac{E}{F_y}} \quad \lambda_r = 35.884$$ From Table B 5.1

We can see that the section is NON-COMPACT but Not Good from the applied load view point.

Column BC : $P_u := 600$ Kips

Beam Sections W 18 x 46 (right)

$A_g := 13.5\ in^2$ $d := 18.1\ in$ $t_w := 0.36\ in$ $b_f := 6.06\ in$ $t_f := 0.605\ in$

$I_{xb} := 712\ in^4$ $I_y := 22.5\ in^4$ $h := 15.5\ in$ $r_{xb} := 7.25\ in$ $r_{yb} := 1.29\ in$

Columns Sections W 12 x 96 (lower)

$A_{gcl} := 28.2\ in^2$ $d := 12.7\ in$ $t_{wl} := 0.55\ in$ $b_{fl} := 12.2\ in$ $t_{fl} := 0.9\ in$

$I_{xcl} := 833\ in^4$ $I_{yl} := 270\ in^4$ $h_l := 9.125\ in$ $r_{xcl} := 5.44\ in$ $r_{ycl} := 3.09\ in$

Columns Sections W 12 x 79 (upper)

$A_{gcu} := 23.2\ in^2$ $d := 12.4\ in$ $t_{wu} := 0.47\ in$ $b_{fu} := 12.1\ in$ $t_{fu} := 0.735\ in$

$I_{xcu} := 662\ in^4$ $I_{yu} := 216\ in^4$ $h_u := 9.125\ in$ $r_{xcu} := 5.34\ in$ $r_{ycu} := 3.05\ in$

Calculation of Effective length factor Kx for **column BC (W 12 x 96 - lower properties similar)**

Now, $\frac{P_u}{A_{gcl}} = 21.277$ Ksi & $F_y = 50$ Ksi => $\tau := 0.949$ **(Table 4-1)**

$$G_B := \tau \frac{\left(\frac{I_{xcl}}{L_c}\right)\cdot 2}{\left(\frac{I_{xb}}{L_b}\right)} \qquad G_B = 5.124 \qquad G_C := \tau \frac{\left(\frac{I_{xcl}}{L_c}\right) + \left(\frac{I_{xcu}}{L_c}\right)}{\left(\frac{I_{xb}}{L_b}\right)} \qquad G_C = 4.598$$

$K_x := 2.12$ **(Chart)**

Therefore, $K_x \cdot L_c = 27.56$ ft > $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xcl}}{r_{ycl}}\right)} \qquad KL_{eq} = 15.654 \text{ ft}$$

From Table 4 - 2 for W 12 x 96 $\phi P_n := 935$ Kip > $P_u = 600$ Kip

check for local buckling:

$$\frac{b_{fl}}{2 \cdot t_{fl}} = 6.778 \quad < \quad \lambda_r := 0.56 \cdot \sqrt{\frac{E}{F_y}} \quad \lambda_r = 13.487 \quad \text{From Table B 5.1}$$

$$\frac{h_l}{t_{wl}} = 16.591 \quad < \quad \lambda_r := 1.49 \cdot \sqrt{\frac{E}{F_y}} \quad \lambda_r = 35.884 \quad \text{From Table B 5.1}$$

We can see that the section is <u>NON-COMPACT and SAFE</u> from the applied load view point.

Column LM : $P_u := 1200$ Kips

Beam Sections W 18 x 46 (left and right)

$A_g := 13.5\ in^2$ $d := 18.1\ in$ $t_w := 0.36\ in$ $b_f := 6.06\ in$ $t_f := 0.605\ in$

$I_{xb} := 712\ in^4$ $I_y := 22.5\ in^4$ $h := 15.5\ in$ $r_{xb} := 7.25\ in$ $r_{yb} := 1.29\ in$

Columns Sections W 12 x 96 (lower and col. LM)

$A_{gcl} := 28.2\ in^2$ $d := 12.7\ in$ $t_{wl} := 0.55\ in$ $b_{fl} := 12.2\ in$ $t_{fl} := 0.9\ in$

$I_{xcl} := 833\ in^4$ $I_{yl} := 270\ in^4$ $h_l := 9.125\ in$ $r_{xcl} := 5.44\ in$ $r_{ycl} := 3.09\ in$

Columns Sections W 12 x 79 (upper)

$A_{gcu} := 23.2\ i^2$ $d := 12.4\ in$ $t_{wu} := 0.47\ in$ $b_{fu} := 12.1\ in$ $t_{fu} := 0.735\ in$

$I_{xcu} := 662\ in^4$ $I_{yu} := 216\ in^4$ $h_u := 9.125$ $r_{xcu} := 5.34\ in$ $r_{ycu} := 3.05\ in$

Calculation of Effective length factor Kx for **column LM (W 12 x 96 - lower properties similar)**

Now, $\frac{P_u}{A_{gcl}} = 42.553$ Ksi & $F_y = 50$ Ksi => $\tau := 0.0319$
(Table 4-1)

$$G_L := \frac{\left(\frac{I_{xcl}}{L_c}\right) + \left(\frac{I_{xcu}}{L_c}\right)}{2\left(\frac{I_{xb}}{L_b}\right)} \qquad G_L = 2.423 \qquad G_M := \frac{2\left(\frac{I_{xcl}}{L_c}\right)}{2\left(\frac{I_{xb}}{L_b}\right)} \qquad G_M = 2.7$$

$K_x := 1.7$ **(Chart)**

Therefore, $K_x \cdot L_c = 22.1$ ft > $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xcl}}{r_{ycl}}\right)} \qquad KL_{eq} = 12.553\ \text{ft} \quad < \quad K_y \cdot L_c = 13\ \text{ft}$$

From Table 4 - 2 for W 12 x 96 $\phi P_n := 995$ Kip < $P_u = 1.2 \times 10^3$ Kip

We can see that the section is NOT GOOD from the applied load view point.

Column FG : $P_u := 240$ Kips

Joint F

Beam Sections W 18 x 40

$A_g := 11.8\ in^2$ $d := 17.9\ in$ $t_w := 0.315\ in$ $b_f := 6.02\ in$ $t_f := 0.525\ in$

$I_{xb} := 612\ in^4$ $I_y := 19.1\ in^4$ $h := 15.5\ in$ $r_{xb} := 7.21\ in$ $r_{yb} := 1.27\ in$

Columns Sections W 10 x 49

$A_{gcl} := 14.4\ in^2$ $d := 9.98\ in$ $t_{wl} := 0.34\ in$ $b_{fl} := 10\ in$ $t_{fl} := 0.560\ in$

$I_{xcl} := 272\ in^4$ $I_{yl} := 93.4\ in^4$ $h_l := 7.5\ in$ $r_{xcl} := 4.35\ in$ $r_{ycl} := 2.54\ in$

$$G_F := \frac{2\left(\frac{I_{xcl}}{L_c}\right)}{\left(\frac{I_{xb}}{L_b}\right)} \qquad G_F = 2.051$$

Joint G

Beam Sections W 16 x 26

$A_g := 7.68\ in^2$ $d := 15.7\ in$ $t_w := 0.25\ in$ $b_f := 5.5\ in$ $t_f := 0.345\ in$

$I_{xb} := 301\ in^4$ $I_y := 9.59\ in^4$ $h := 13.625\ in$ $r_{xb} := 6.26\ in$ $r_{yb} := 1.12\ in$

Columns Sections W 10 x 49

$A_{gcl} := 14.4\ in^2$ $d := 9.98\ in$ $t_{wl} := 0.34\ in$ $b_{fl} := 10\ in$ $t_{fl} := 0.560\ in$

$I_{xcl} := 272\ in^4$ $I_{yl} := 93.4\ in^4$ $h_l := 7.5\ in$ $r_{xcl} := 4.35\ in$ $r_{ycl} := 2.54\ in$

$$G_G := \frac{\left(\frac{I_{xcl}}{L_c}\right)}{\left(\frac{I_{xb}}{L_b}\right)} \qquad G_G = 2.085$$

$K_x := 1.58$ **(Chart)**

Calculation of Effective length factor Kx for **column FG (W 10x49)**

Therefore, $K_x \cdot L_c = 20.54$ ft $>$ $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xcl}}{r_{ycl}}\right)} \qquad KL_{eq} = 11.993 \quad ft \qquad < \qquad K_y \cdot L_c = 13 \quad ft$$

From Table 4 - 2 for W 10x49 $\quad \phi P_n := 464 \quad Kip \qquad > \qquad P_u = 240 \quad Kip$

We can see that the section is GOOD from the applied load view point.

Column HI : $\quad P_u := 480 \quad Kips$

Joint I

Beam Sections W 18 x 40

$A_g := 11.8 \ in^2 \qquad d := 17.9 \ in \qquad t_w := 0.315 \ in \qquad b_f := 6.02 \ in \qquad t_f := 0.525 \ in$

$I_{xb} := 612 \ in^4 \qquad I_y := 19.1 \ in^4 \qquad h := 15.5 \ in \qquad r_{xb} := 7.21 \ in \qquad r_{yb} := 1.27 \ in$

Columns Sections W 10 x 49

$A_{gcl} := 14.4 \ in^2 \qquad d := 9.98 \ in \qquad t_{wl} := 0.34 \ in \qquad b_{fl} := 10 \ in \qquad t_{fl} := 0.560 \ in$

$I_{xcl} := 272 \ in^4 \qquad I_{yl} := 93.4 \ in^4 \qquad h_l := 7.5 \ in \qquad r_{xcl} := 4.35 \ in \qquad r_{ycl} := 2.54 \ in$

$$G_I := \frac{2\left(\frac{I_{xcl}}{L_c}\right)}{2\left(\frac{I_{xb}}{L_b}\right)} \qquad G_I = 1.026$$

Joint H

Beam Sections W 16 x 26

$A_g := 7.68 \ in^2 \qquad d := 15.7 \ in \qquad t_w := 0.25 \ in \qquad b_f := 5.5 \ in \qquad t_f := 0.345 \ in$

$I_{xb} := 301 \ in^4 \qquad I_y := 9.59 \ in^4 \qquad h := 13.625 \ in \qquad r_{xb} := 6.26 \ in \qquad r_{yb} := 1.12 \ in$

Columns Sections W 10 x 49

$A_{gcl} := 14.4 \ in^2 \qquad d := 9.98 \ in \qquad t_{wl} := 0.34 \ in \qquad b_{fl} := 10 \ in \qquad t_{fl} := 0.560 \ in$

$I_{xcl} := 272 \ in^4 \qquad I_{yl} := 93.4 \ in^4 \qquad h_l := 7.5 \ in \qquad r_{xcl} := 4.35 \ in \qquad r_{ycl} := 2.54 \ in$

$$G_H := \frac{\left(\frac{I_{xcl}}{L_c}\right)}{2\left(\frac{I_{xb}}{L_b}\right)} \qquad G_H = 1.043$$

$K_x := 1.32$ **(Chart)**

Calculation of Effective length factor Kx for **column FG (W 10x49)**

Therefore, $K_x \cdot L_c = 17.16$ ft $>$ $K_y \cdot L_c = 13$ ft

$$KL_{eq} := \frac{K_x \cdot L_c}{\left(\frac{r_{xcl}}{r_{ycl}}\right)} \qquad KL_{eq} = 10.02 \text{ ft} \quad < \quad K_y \cdot L_c = 13 \text{ ft}$$

From Table 4 - 2 for W 10x49 $\phi P_n := 464$ Kip $<$ $P_u = 480$ Kip

We can see that the section is <u>NOT GOOD</u> from the applied load view point.