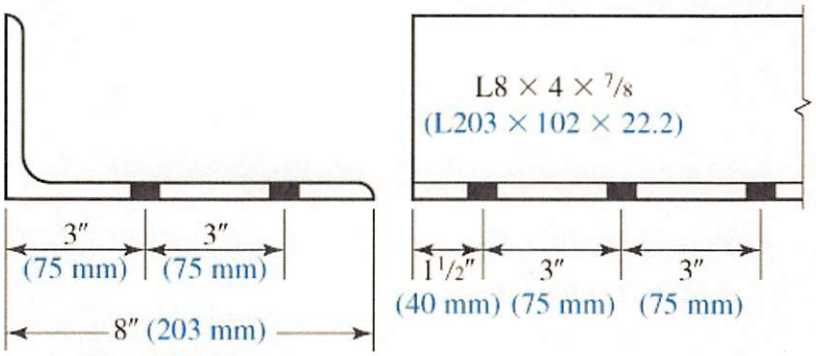
3.3-10 Figure 3.3-10 shows an L8 × 4 × 7/8, (L203 × 102 × 22.2) ASTM A572 Grade 50 (F_y = 50 ksi (345 MPa); F_u = 65 ksi (450 MPa)) , with two lines of (3)3/4-in.-diameter (M20) bolts in standard holes. The member carries a dead load of 290 kips(1,290 kN) and a live load of 25 kips(111 kN) in tension. The owner is requesting that the maximum slenderness ratio must be 300 .



3/4" dia. (M20) bolts in Standard holes

$d_{Hole} = 3/4'' + 1/8'' = 7/8''$

$D = 290^k \quad L = 25^k$

$\frac{L}{r} = 300^*$

FROM TABLE 1-7 (1-44) $A_g = 9.79 in^2$ $\bar{x} = 0.997 in.$

$r_{min} = r_z = 0.846 in$

$A_n = A_g - 2 Holes(7/8'')(7/8'') = 8.2588 IN^2$

CASE 2

$U = \left(1 - \frac{\bar{x}}{\ell}\right) = \left(1 - \frac{0.997 in}{6 in}\right) = 0.8338$

LRFD YIELDING $0.9 F_y A_g = 0.9(50ksi)(9.79 in^2) = \underline{440.6^k}$

RUPTURE $0.75 F_u A_e = 0.75(65ksi)(8.2588 in^2)(0.8338)$

$= \underline{335.7^{k*}}$

ASD: YIELDING $0.6 F_y A_g = 0.6(50ksi)(9.79 IN^2) = \underline{293.7^k}$

RUPTURE $0.5 F_u U A_n = 0.5(65ksi)(0.8338)(8.2588 in^2)$

$= \underline{223.8^k}$

3.3-10

e) IF THE SHORT LEG IS ATTACHED TOO?

$\square = 1.0$

f) IS SECTION OK FOR LOADING?

#1 $P = 1.4D = 1.4(290^k) = 406^k$ *

LRFD: LC #2 $P = 1.2D + 1.6L = 1.2(290^k) + 1.6(25^k) = 388^k$

$406^k > 335.7^k$ N.G.

ASD: LC #2 $L + D = 290^k + 25^k = 315^k$

$315^k > 223.8^k$ N.G.

g) $r_{min} = r_z = 0.846in$

$\frac{L}{r} = 300$ $L = r\,300 = 300(0.846in)$

$= 253.8in.$

$= 21.15ft$