FIGURE 3.10

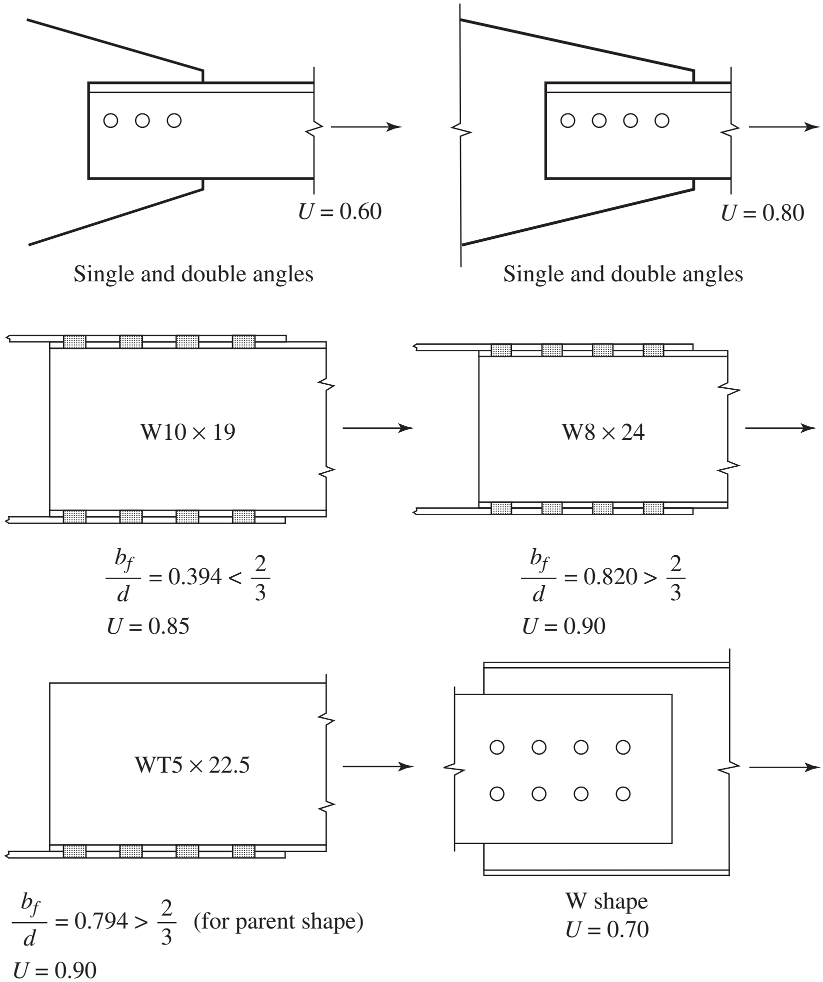


FIGURE 3.11

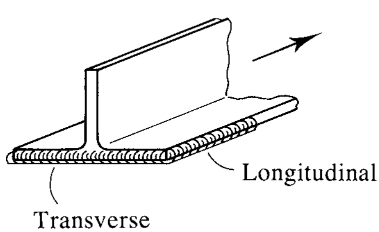
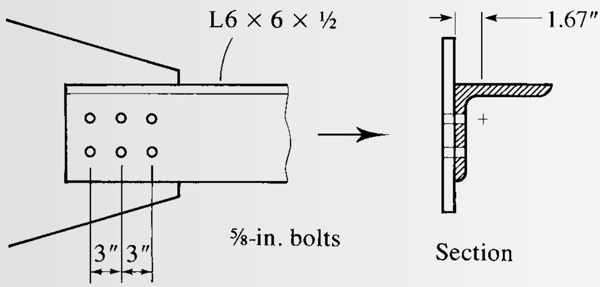


FIGURE 3.12



The length of the connection is

$$\ell = 3 + 3 = 6 \text{ in.}$$

$$\therefore U = 1 - \left(\frac{\bar{x}}{\ell}\right) = 1 - \left(\frac{1.67}{6}\right) = 0.7217$$

$$A_e = A_n U = 5.02(0.7217) = 3.623 \text{ in.}^2$$

The alternative value of U could also be used. Because this angle has three bolts in the direction of the load, the reduction factor U can be taken as 0.60, and

$$A_e = A_n U = 5.02(0.60) = 3.012 \text{ in.}^2$$

Either U value is acceptable, and the Specification permits the larger one to be used. However, the value obtained from Equation 3.1 is more accurate. The alternative values of U can be useful during preliminary design, when actual section properties and connection details are not known.

EXAMPLE 3.5

If the tension member of Example 3.4 is welded as shown in Figure 3.13, determine the effective area.

SOLUTION As in Example 3.4, only part of the cross section is connected and a reduced effective area must be used.

$$U = 1 - \left(\frac{\bar{x}}{\ell}\right) = 1 - \left(\frac{1.67}{5.5}\right) = 0.6964$$

ANSWER $A_e = A_g U = 5.77(0.6964) = 4.02 \text{ in.}^2$