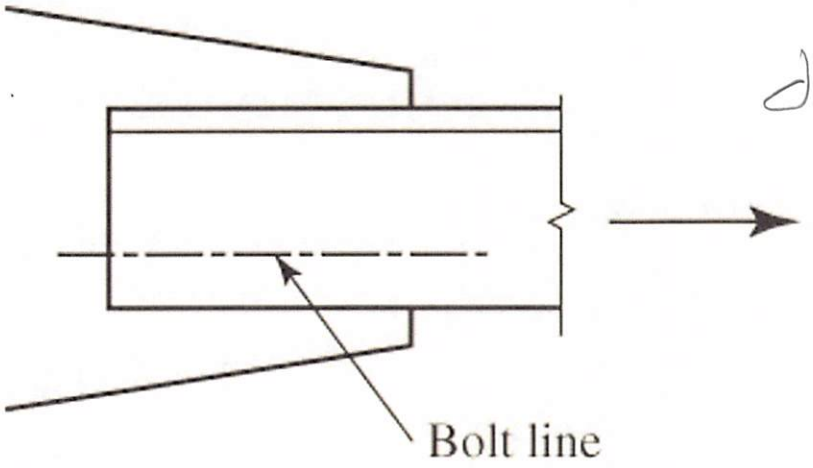
3.6-1 Select a single-angle tension member of A572 Grade 50 ($F_y = 50$ ksi (345 MPa); $F_u = 65$ ksi (450 MPa)) steel to resist a dead load of 35 kips (156 kN) and a live load of 105 kips (467 kN). The length of the member is 18 feet (5,500 mm), and it will be connected with a single line of 1-inch-diameter (M24) bolts, as shown in Figure P3.6-1. There will be four or more bolts in this line.

CASE 8 $U = 0.80$ *

$d_{Hole} = 1\text{in} + 3/16'' = 1\,3/16\text{ in}$



a) LRFD LOAD COMBINATION 2 $1.2D + 1.6L$

$$P_U = 1.2(35k) + 1.6(105k) = 210^k$$

$$\text{REQUIRED } A_g \Rightarrow \frac{P_U}{0.9F_y} = \frac{210^k}{0.9(50ksi)} = 4.6667\,in^2$$

$$A_e = \frac{P_U}{0.75F_U} = \frac{210k}{0.75(65ksi)} = 4.3077\,in^2$$

$$r_{min} = \frac{L}{300} = \frac{18ft(12in/ft)}{300} = 0.72\,in$$

* TRY L6×4×1/2 $A_g = 4.75\,in^2$ $r_{min} = 0.864in$

$A_g > \text{REQUIRED } A_g$ $r_{min} > \text{RE. } r_{min}$

3.6-1

$$A_n = A_g - A_{HOLES} = 4.75 in^2 - 1(1/2 in)(1\ 3/16 in)$$
$$= 4.1563 in^2$$

$$A_e = UA_n = 0.8(4.1563 in^2) = 3.325 in^2$$

$A_e <$ REQUIRED A_e N.G.

TRY L8 x 6 x 7/16 $A_g = 5.99 IN^2$ $r_{min} = 1.31$ in

$$A_n = A_g - A_{HOLES} = 5.99 IN^2 - 1(7/16")(1\ 3/16 in) = 5.6703 in$$

$$A_e = UA_n = 0.8(5.6703 in) = 4.5362 in^2$$

$A_g >$ REQ. A_g ✓ $r_{min} >$ REQ. r_{min} ✓

$A_e >$ REQ. A_e ✓

L8 x 6 x 7/16 O.K.