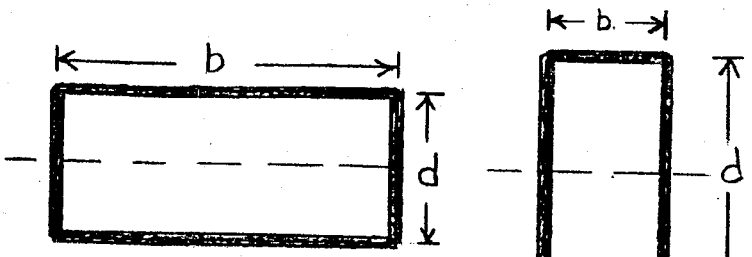
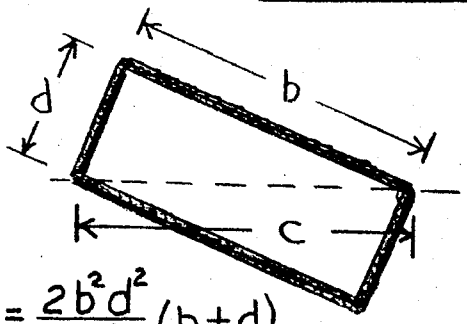
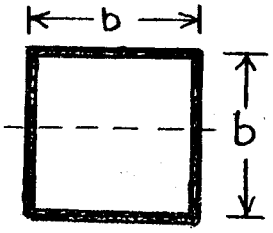


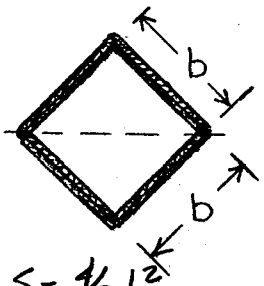
$$I_w = \frac{d^2}{6}(3b+d) \qquad S_w = d/3\,(3b+d)$$

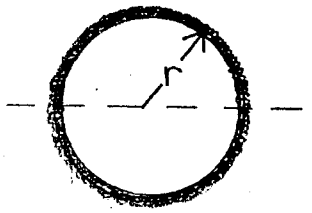


$$I_w = \frac{2b^2d^2}{3c^2}(b+d)$$

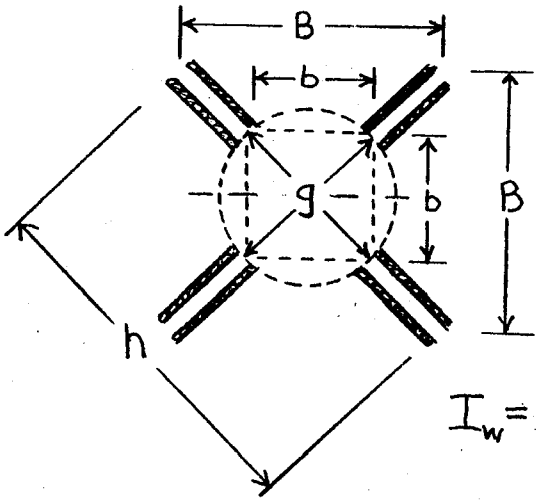


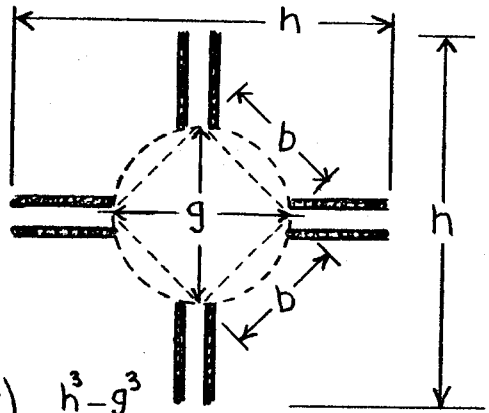
$$I_w = \frac{2}{3}b^3 \qquad S = 1/3\,b^2$$



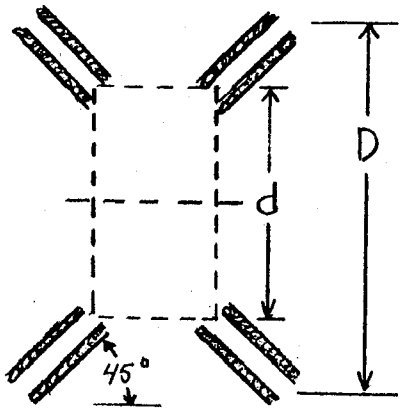


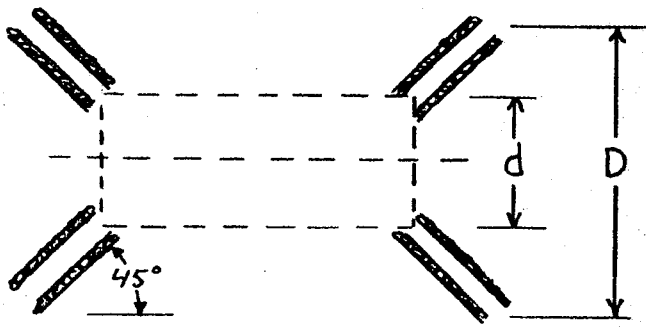
$$I_w = \pi r^3 \qquad S = \pi r^2$$





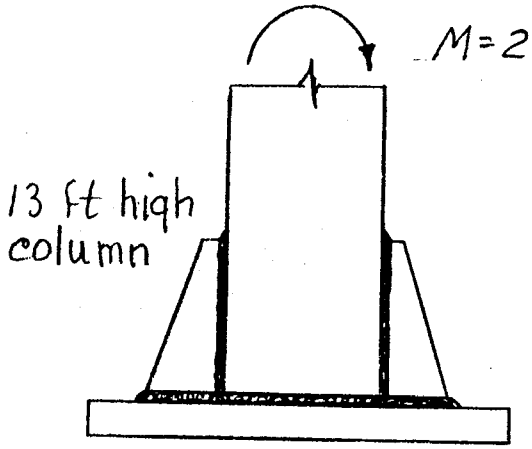
$$I_w = \frac{\sqrt{2}}{3}(B^3 - b^3) = \frac{h^3 - g^3}{6}$$

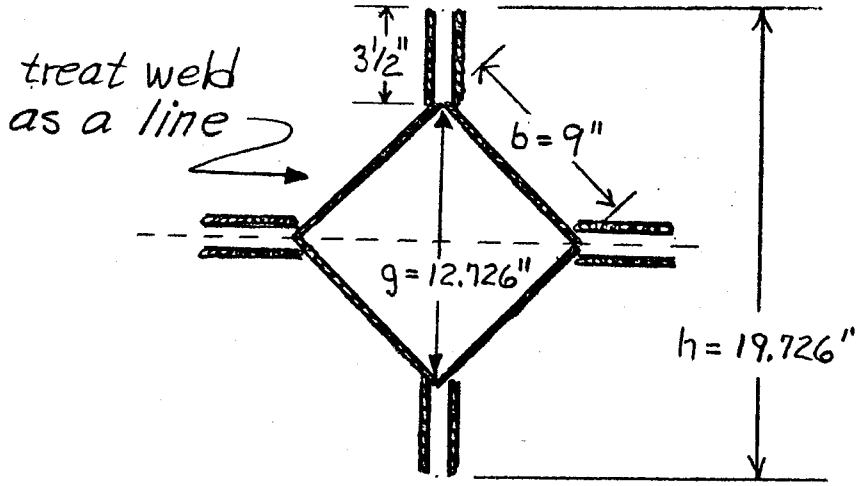




$$I_w = \frac{\sqrt{2}}{3}(D^3 - d^3)$$

Determine size of weld at base of column





Moment of Inertia of welded connection (I_w)

bracket $I_w = \frac{h^3 - g^3}{6} = \frac{19.726^2 - 12.726^2}{6} = 935.7\ in^3$

sq. tube $I_w = 2/3\ b^3 = 2/3\ (9)^3 = 486.0$

Total = $1421.7\ in^3$

$$S_w = \frac{I_w}{h/2} = \frac{1421.7}{9.86} = 144.2\ in^2$$

unit bending force on weld

$$f_b = \frac{M}{S_w} = \frac{24{,}300.\ ft\ lb \times 12}{144.2} = 2020\ lb/linear\ inch$$

leg size of fillet weld $w = \frac{2020}{11{,}200} = .181$ or 3/16" ◺