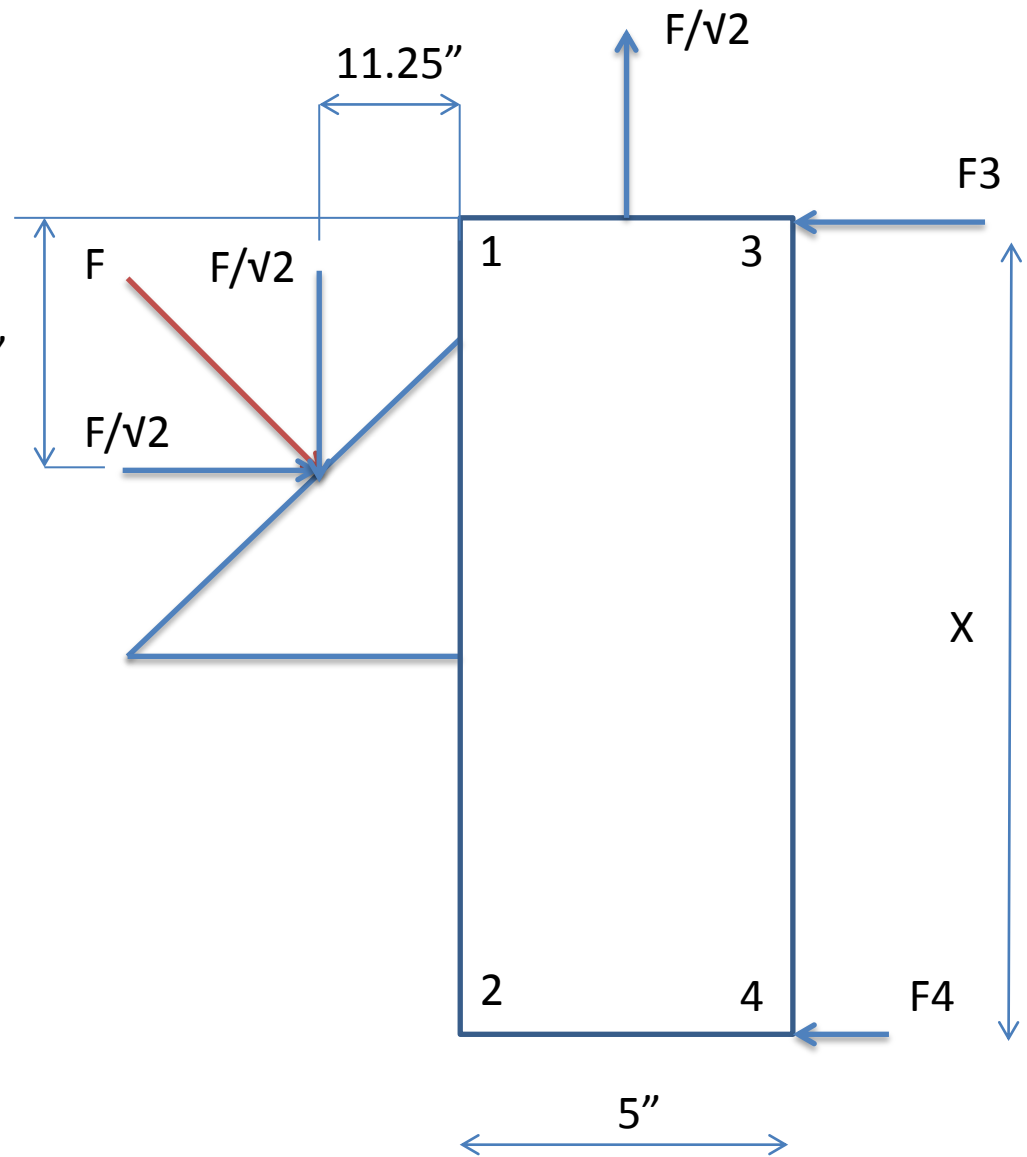
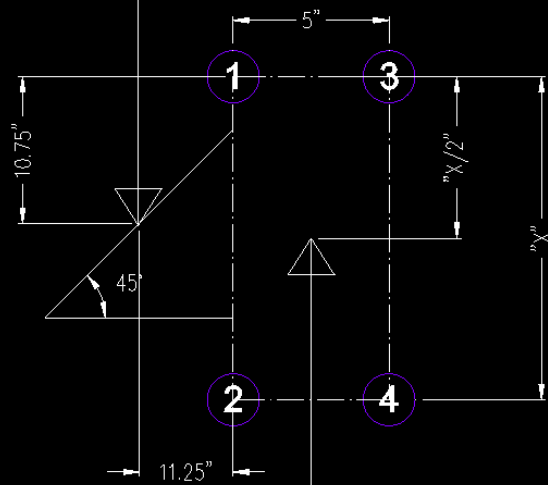


10.75"



FORCE OF COMMODITY



FORCE OF TRAVELING SHEAR

Based on the commodity force  $F$  acting perpendicular on the plow (red force  $F$ ) this force can be replaced by its horizontal and vertical components both great  $F/\sqrt{2}$  because the plow angle is  $45^\circ$ .

$\sum F_{\text{vertical}} = 0$

Obviously the plow pull force is equal to the vertical component of  $F$ , so the pull force is  $F/\sqrt{2}$

There no other vertical forces provided we consider rolling forces to be very low (close to 0) in relation to the pull force.

$\sum M_{\text{around 1}} = 0$  (clockwise is positive)

$$-F/\sqrt{2} \times 11.25'' - F/\sqrt{2} \times 10.75'' - F/\sqrt{2} \times 2.5'' + F_4 \times X = 0$$

$$-F/\sqrt{2} \times (11.25'' + 10.75'' + 2.5'') = -F_4 \times X$$

$$-F/\sqrt{2} \times (24.5'') = -F_4 \times X$$

$$F_4 = F/\sqrt{2} \times (24.5''/X)$$

$\sum F_{\text{horizontal}} = 0$  (to the right is positive)

$$F/\sqrt{2} - F_4 - F_3 = 0$$

$$F_3 = F/\sqrt{2} - F/\sqrt{2} \times (24.5''/X) = F/\sqrt{2} \times (1 - 24.5''/X)$$

From above we can see that if  $X = 24.5''$ ,  $F_3$  will be 0 and  $F_4$  will be  $F/\sqrt{2}$