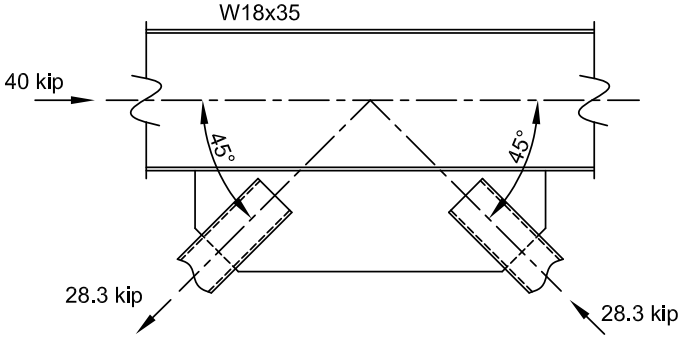
steel quiz

This month's Steel Quiz takes a look at quality control, quality assurance and AISC 360 Chapter N.

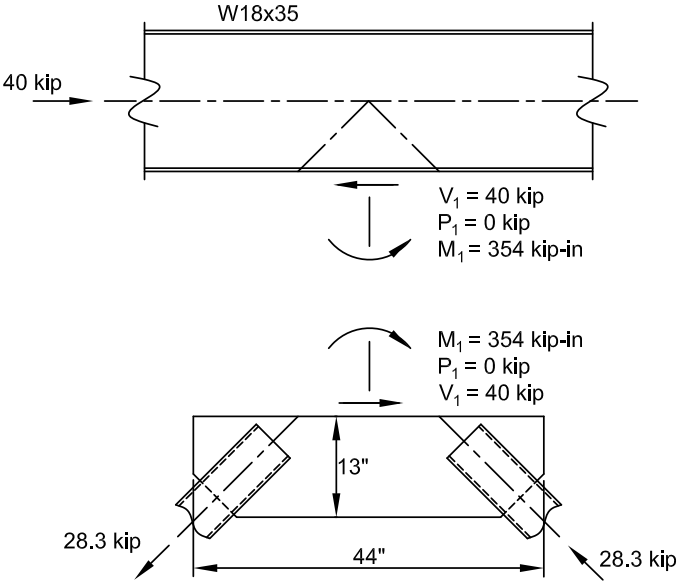
Complete the free body diagrams provided below using the given brace configuration, applied forces and the assumed internal force distribution. Solve for each unknown force and properly indicate the direction of each force.

Hint: Forces can be equal to 0.

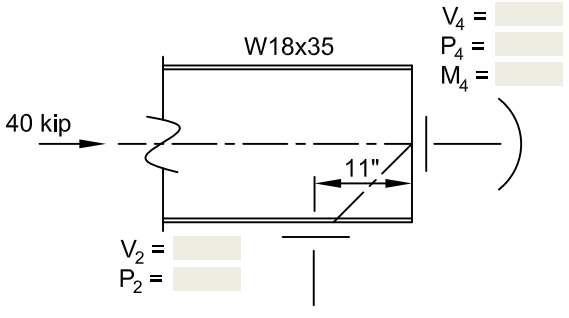
Configuration

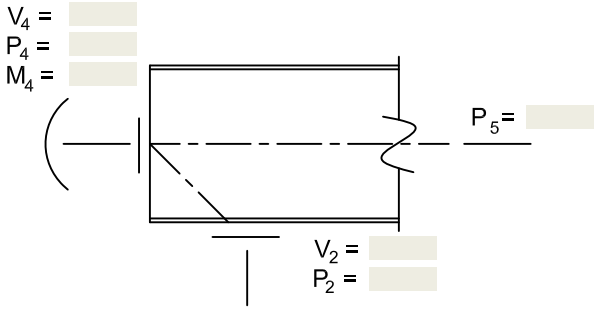


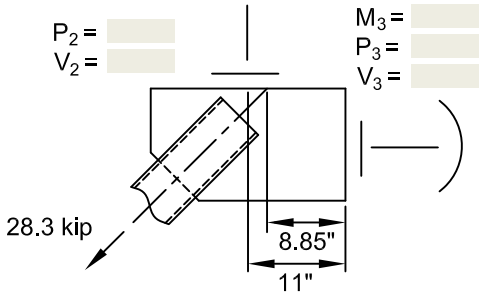
Assumed Force Distribution

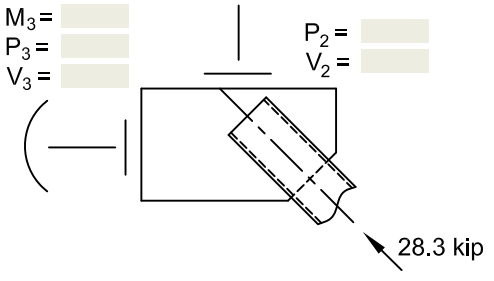


Free Body Diagrams









TURN PAGE FOR ANSWERS

Solution

$V_2 = V_1 / 2$		$V_2 = 20$ kip
$\Sigma F_x = 0 = 40$ kip $- V_2 - P_4$		$P_4 = 20$ kip
Resolve M_1 into force couple P_2	$P_2 = M_1 / 22''$	$P_2 = 16.1$ kip
$\Sigma F_y = 0 = V_4 - P_2$		$V_4 = 16.1$ kip
$\Sigma M_B = 0 = P_2 \times 11'' - V_2 \times 8.85'' - M_4$		$M_4 = 0$ kip-in
$\Sigma F_x = 0 = P_4 - V_2 - P_5$		$P_5 = 0$ kip
$\Sigma F_y = 0 = P_2 + V_3 - 28.3$ kip $\times \sin 45°$		$V_3 = 3.9$ kip
$\Sigma F_x = 0 = 28.3 \times \cos 45° - V_2 - P_3$		$P_3 = 0$ kip
$\Sigma M_c = 0 = P_2 \times (11'' - 8.85'') - V_3 \times 8.85'' - M_3$		$M_3 = 0$ kip

Note that other assumed distributions of the forces are possible vs. what was given as long as statics is satisfied and the forces are consistent with the intended performance of the connection and the assumptions used in the structural analysis.

Free Body Diagrams