

**NorthWoods Software****Program Name: Cross\_Bracing****Project Name: -****Project Number: -****Project Description: -****Project Designer: Dik****Last Revised (yy-mm-dd): 18-05-27****Reference: N/A**

Created using SMath Studio, a MathCAD workalike from <https://en.smath.info/view/SMathStudio>  
 User responsible to verify data using an alternative method

**Menu:**

..... Enter Data Space ..... Important Output ..... Logical Constructs Blue Text:Units

**Defined Units:**

$K := \text{kip}$  kilopounds force

**Material Properties**

$f_y := 33 \text{ ksi}$

$E_s := 29000 \text{ ksi}$

**Enter Data:****Enter Data:**

$L := 24 \text{ ft}$

Length of Frame

$h := 18 \text{ ft}$

Height of Frame

$\cosine := \frac{h}{L}$

Angle from Horizontal

$d := \sqrt{L^2 + h^2}$

Length of Diagonal

$d = 30.00 \text{ ft}$

$w_d := 6 \text{ in}$

Width of Bracing

$t_d := .048 \text{ in}$

Thickness of Bracing

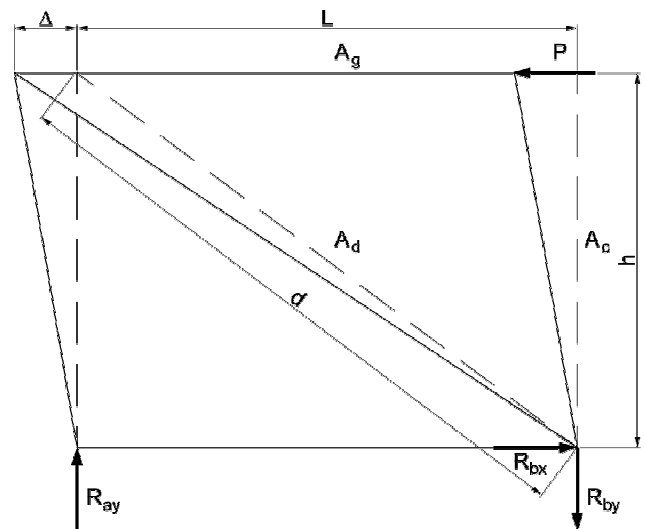
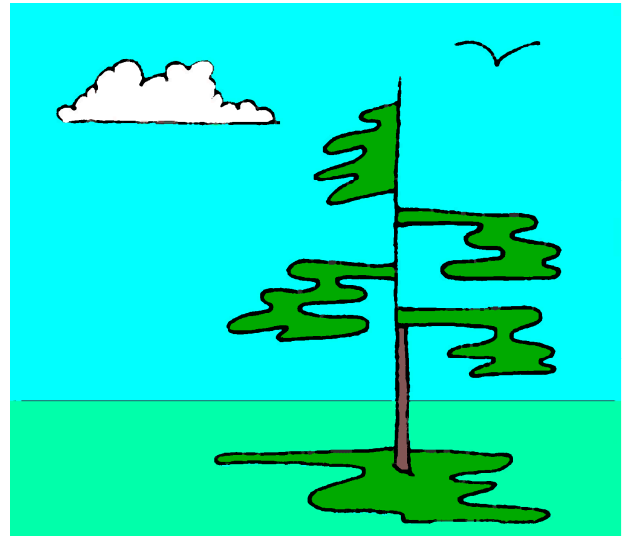
$N_d := 2$

Number of Braces

$A_d := w_d \cdot t_d \cdot N_d$

Area of Bracing

$A_d = 0.58 \text{ in}^2$



$$A_c := 9 \text{ in}^2$$

$$A_g := 9 \text{ in}^2$$

$$P := 20 \text{ K}$$

$$\Delta_d := \frac{P}{E_s} \cdot \left( \frac{d^3}{L^2 \cdot A_d} \right)$$

$$\Delta_d = 0.67 \text{ in}$$

$$\Delta_g := \frac{P}{E_s} \cdot \left( \frac{L}{A_g} \right)$$

$$\Delta_g = 0.02 \text{ in}$$

$$\Delta_c := \frac{P}{E_s} \cdot \left( \frac{d^2}{h \cdot A_c} \right)$$

$$\Delta_c = 0.05 \text{ in}$$

$$\Delta_{total} := \Delta_d + \Delta_c + \Delta_g$$

$$\Delta_{total} = 0.74 \text{ in}$$

$$\Delta_{dik} := \frac{P \cdot L}{A_d \cdot E_s \cdot (\cosine^2)}$$

$$\Delta_{dik} = 0.61 \text{ in}$$