

$$E = 29,000 \text{ ksi} \\ = 200 \text{ GPa}$$

HSS 6" x 3" x 1/8
Area = 2 in²

$$Length = 3000 \text{ mm} = 118.112''$$

$$F = K d$$

$$F = 3 \text{ kN/m} = \frac{0.2248}{3.28} \times 3 = 0.205365 \text{ kip/ft}$$

$$K = \frac{EA}{L} \begin{bmatrix} C^2 & C s \\ C s & S^2 \\ -C^2 & -C s \\ -C s & -S^2 \end{bmatrix} \begin{matrix} C = \cos \theta \\ S = \sin \theta \\ \therefore \theta = 90^\circ \end{matrix}$$

Element 1

$$K_1 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Element 2

$$K_2 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$K_3 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

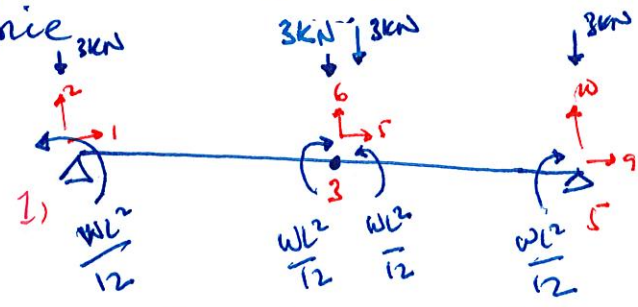
$$K_4 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$K_5 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$K_6 = \frac{29 \times 10^6 (2)}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Global stiffness (K₁₁) = 10 x 10 matrix

$$K = \frac{29 \times 10^6}{118.112''} \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{Bmatrix} d_1 \\ d_2 \\ \vdots \\ d_{10} \end{Bmatrix} = \begin{Bmatrix} f_1 \\ f_2 \\ \vdots \\ f_{10} \end{Bmatrix}$$



Equivalent End Forces