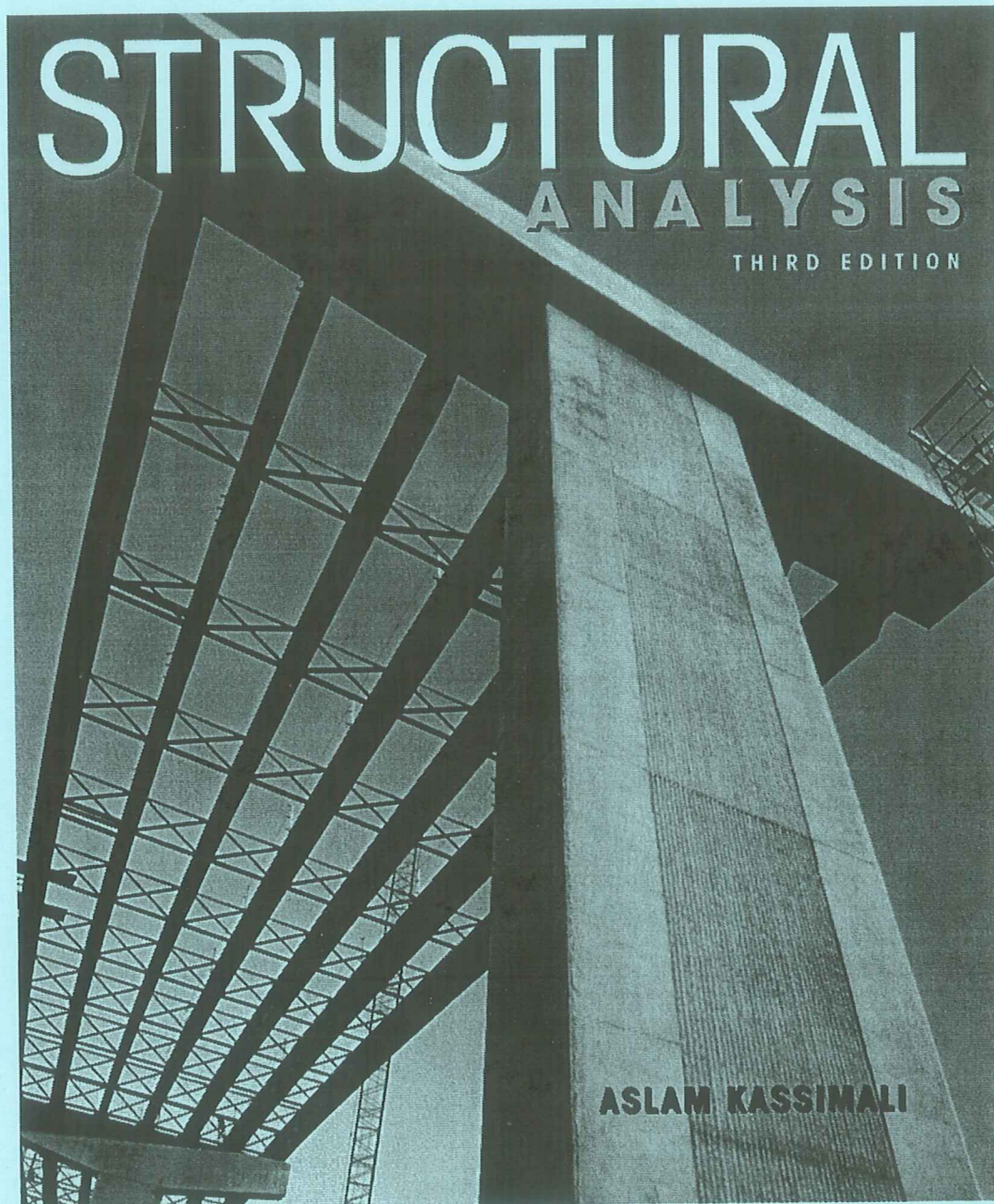


INSTRUCTOR'S SOLUTIONS MANUAL

to accompany



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THOMSON
— ★ —
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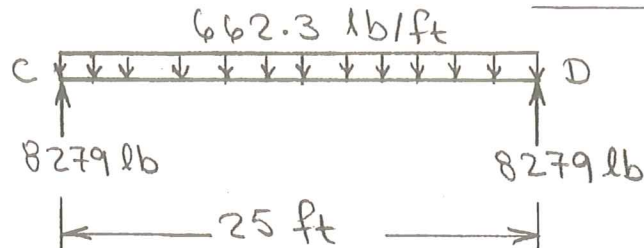
Chapter Two

Loads on Structures

CHAPTER 2

2.1 Beam CD

$$\begin{aligned}\text{Uniformly distributed load} &= 150(12)\left(\frac{4}{12}\right) + 490\left(\frac{18.3}{144}\right) \\ &= \underline{662.3 \text{ lb/ft}}\end{aligned}$$



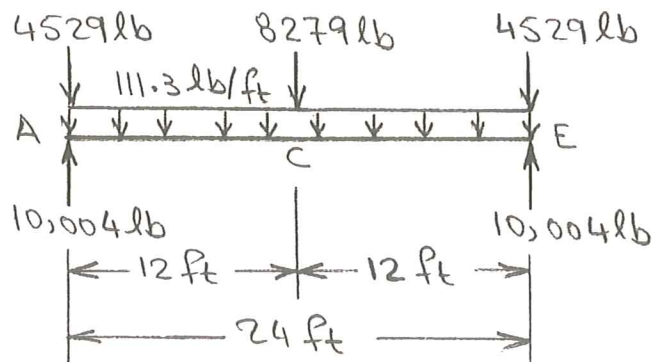
Girder AE

$$\text{Uniformly distributed load} = 490\left(\frac{32.7}{144}\right) = \underline{111.3 \text{ lb/ft}}$$

$$\text{Concentrated load at C} = \underline{8279 \text{ lb}}$$

Concentrated loads at A and E

$$= \left[150(6)\left(\frac{4}{12}\right) + 490\left(\frac{18.3}{144}\right)\right]\left(\frac{25}{2}\right) = \underline{4529 \text{ lb}}$$



2.4

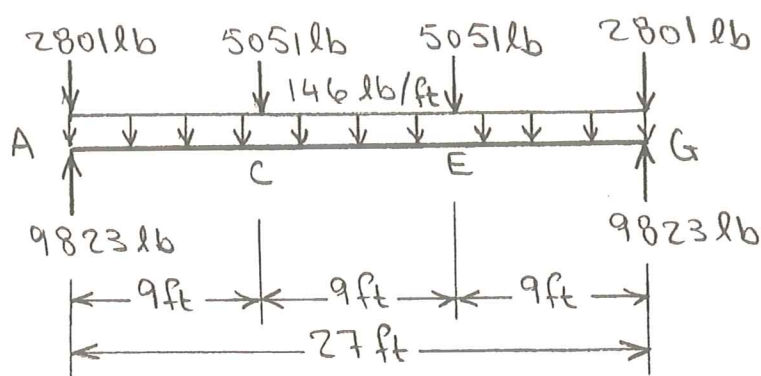
Uniformly distributed load = $490 \left(\frac{42.9}{144} \right) = \underline{146 \text{ lb/ft}}$

Concentrated loads at A and G

$$= \left[150(4.5) \left(\frac{4}{12} \right) + 490 \left(\frac{16.2}{144} \right) \right] \left(\frac{20}{2} \right) = \underline{2801 \text{ lb}}$$

Concentrated loads at C and E

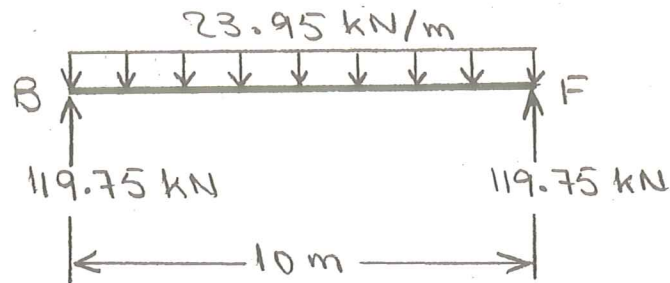
$$= \left[150(9) \left(\frac{4}{12} \right) + 490 \left(\frac{16.2}{144} \right) \right] \left(\frac{20}{2} \right) = \underline{5051 \text{ lb}}$$



2.6 Live load = $4.79 \text{ kPa} = 4.79 \text{ kN/m}^2$

Beam BF

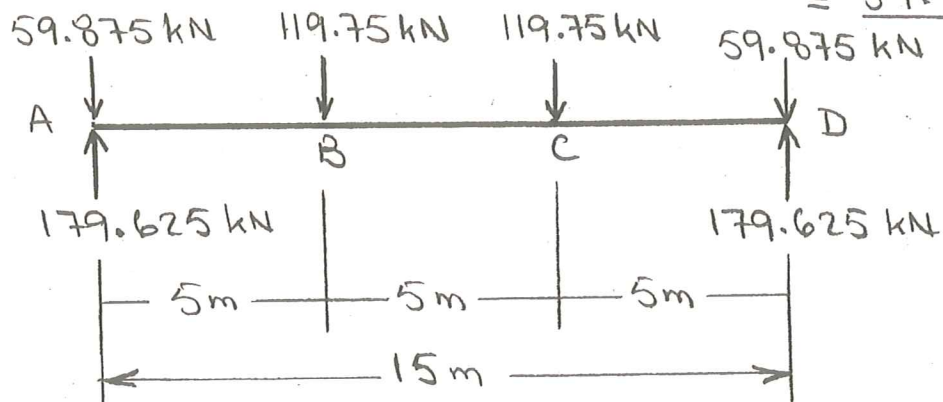
Uniformly distributed load = $4.79(5) = \underline{23.95 \text{ kN/m}}$



Girder AD

Concentrated loads at B and C = $\underline{119.75 \text{ kN}}$

Concentrated loads at A and D = $\left[4.79(2.5)\right] \frac{10}{2}$
 $= \underline{59.875 \text{ kN}}$



2.8 $V = 85 \text{ mph}$, $h = 40 + (15/2) = 47.5 \text{ ft}$,
 $I = 1.0$, $z_g = 1200 \text{ ft}$, $\alpha = 7.0$, $K_{zt} = 1$
 and $K_d = 1$
 $K_h = 2.01 \left(\frac{47.5}{1200} \right)^{2/7} = 0.8$
 $q_h = 0.00256 (0.8)(1)(1)(85)^2 (1) = 14.8 \text{ psf}$
 $C_x = 0.85$

For $\theta = 45^\circ$ and $h/L = 47.5/30 = 1.58$:

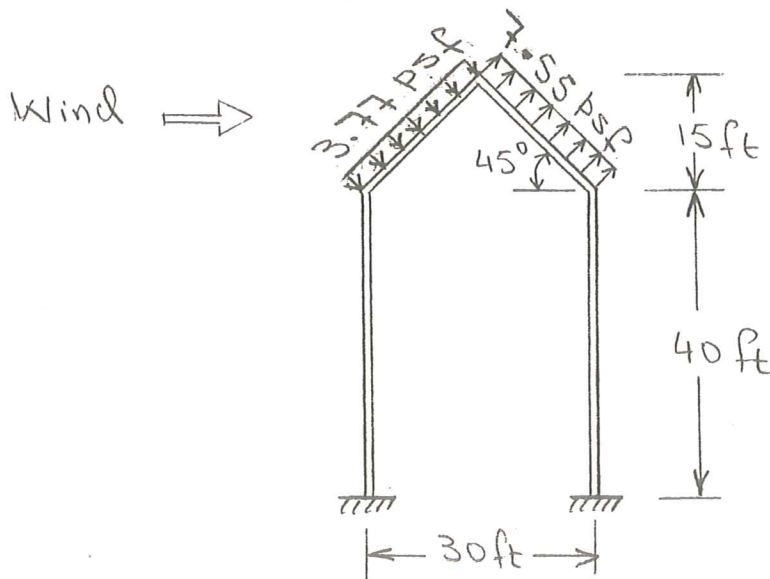
$C_p = 0.3$ for windward side

$C_p = -0.6$ for leeward side

Thus, the wind pressures are:

$p_h = 14.8 (0.85)(0.3) = \underline{3.77 \text{ psf}}$ for windward side

$p_h = 14.8 (0.85)(-0.6) = \underline{-7.55 \text{ psf}}$ for leeward side



2.10

$$V = 90 \text{ mph}, \quad h = 30 + \frac{11}{2} = 35.5 \text{ ft}$$

$$I = 1.15, \quad z_g = 900 \text{ ft}, \quad \alpha = 9.5, \quad k_{zt} = 1$$

$$\text{and } k_d = 1$$

$$K_h = 2.01 \left(\frac{35.5}{900} \right)^{2/9.5} = 1.02$$

$$q_h = 0.00256 (1.02)(1)(1)(90)^2 (1.15) = 24.32 \text{ psf}$$

$$G = 0.85$$

$$\text{Roof slope: } \theta = \tan^{-1}(11/20) = 28.8^\circ$$

$$\frac{h}{L} = \frac{35.5}{40} = 0.89$$

$$C_p = -0.3 \text{ and } 0.2 \text{ for windward side}$$

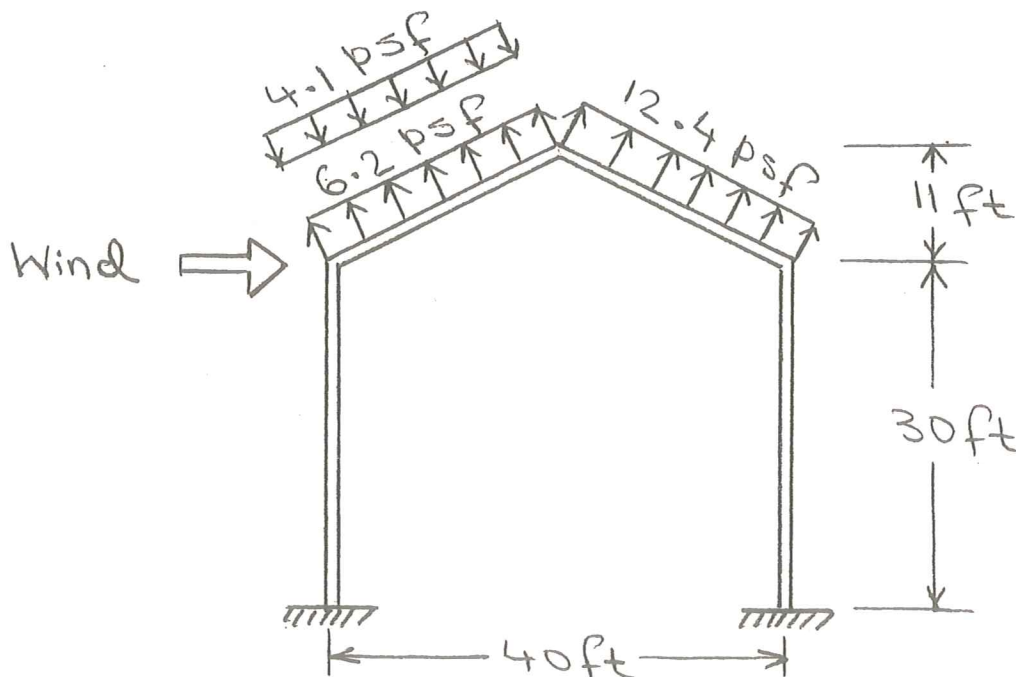
$$C_p = -0.6 \text{ for leeward side}$$

Thus, the wind pressures are:

$$p_h = 24.32 (0.85) (-0.3) = \underline{-6.2 \text{ psf}} \quad \left. \begin{array}{l} \text{for} \\ \text{windward} \\ \text{side} \end{array} \right\}$$

$$p_h = 24.32 (0.85) (0.2) = \underline{4.1 \text{ psf}}$$

$$p_h = 24.32 (0.85) (-0.6) = \underline{-12.4 \text{ psf}} \quad \left. \begin{array}{l} \text{for leeward} \\ \text{side} \end{array} \right\}$$



2.12 $p_g = 20 \text{ psf}$, $C_e = 1$, $C_t = 1$, $I = 1.2$

$$p_f = 0.7 C_e C_t I p_g = 0.7 (1)(1)(1.2)(20) = 16.8 \text{ psf}$$

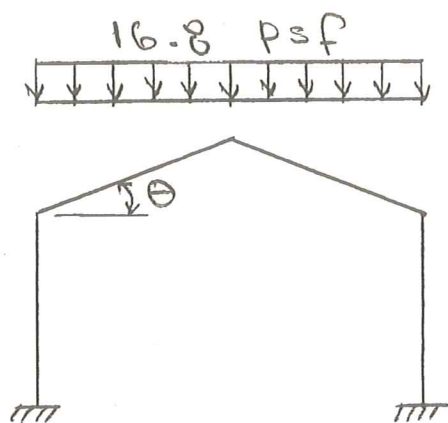
$$\theta = \tan^{-1}(11/20) = 28.8^\circ, \quad \frac{70}{W} + 0.5 = \frac{70}{20} + 0.5 = 4^\circ$$

Therefore, the minimum values of p_f need not be considered.

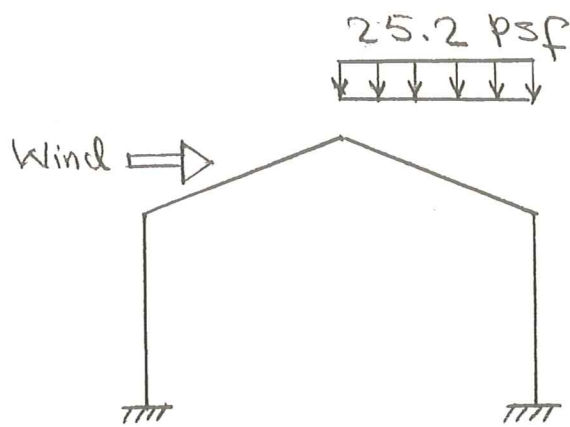
$$C_s = 1$$

$$\text{Balanced load} = p_s = C_s p_f = 1(16.8) = \underline{16.8 \text{ psf}}$$

$$\begin{aligned} \text{Unbalanced load} &= 1.5 p_s / C_e = 1.5(16.8) / 1 \\ &= \underline{25.2 \text{ psf}} \end{aligned}$$



Balanced
Snow Load



Unbalanced
Snow Load