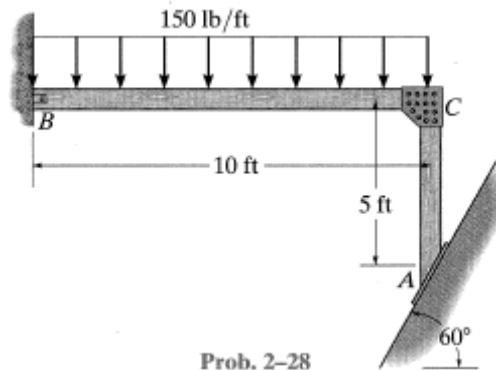


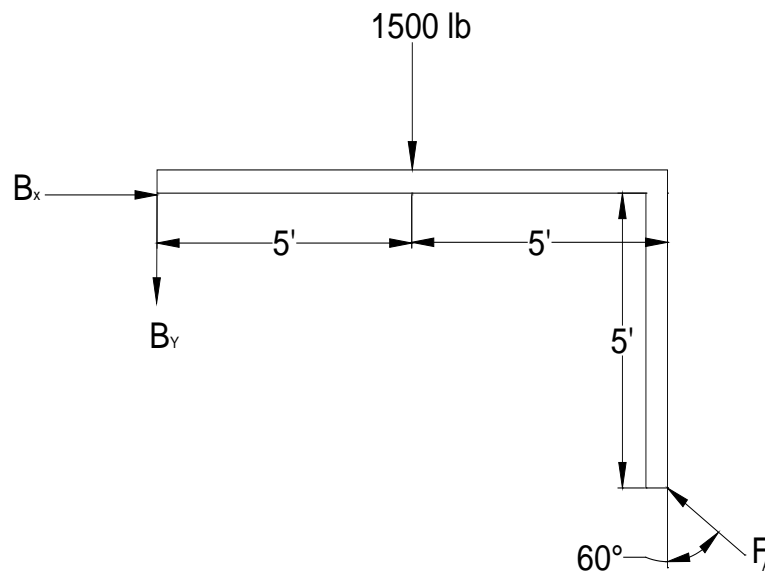
**CE 371- Structural Analysis I**  
**Homework #2: Solutions**

**5. 2-28**

Determine the reactions at the smooth support A and pin support B. the connection at C is fixed.



**Sol:**



$$\curvearrowright +\Sigma M_B = 0: \quad -1500(5) + F_A (\cos 60^\circ) (10) - F_A (\sin 60^\circ) (5) = 0$$

$$F_A = 11,196.15 \text{ lb} = \mathbf{11.2 \text{ k}} \quad \text{Ans} \quad (4 \text{ Points})$$

$$\rightarrow +\Sigma F_X = 0; \quad B_X - 11,196.15(\sin 60^\circ) = 0$$

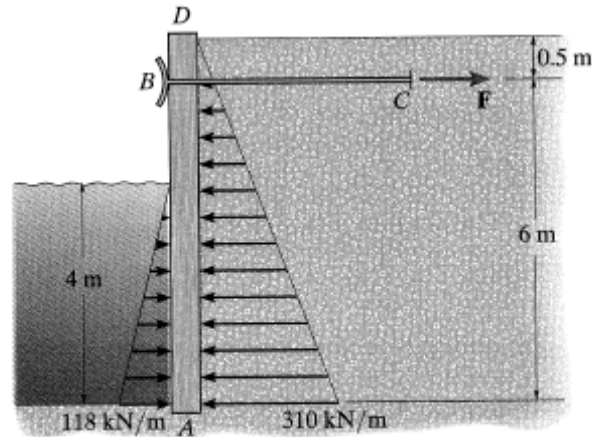
$$B_X = \mathbf{9.70 \text{ k}} \quad \text{Ans} \quad (3 \text{ Points})$$

$$\uparrow +\Sigma F_Y = 0; \quad -B_Y - 1500 + 11,196.15 (\cos 60^\circ) = 0$$

$$B_Y = \mathbf{4.10 \text{ k}} \quad \text{Ans} \quad (3 \text{ Points})$$

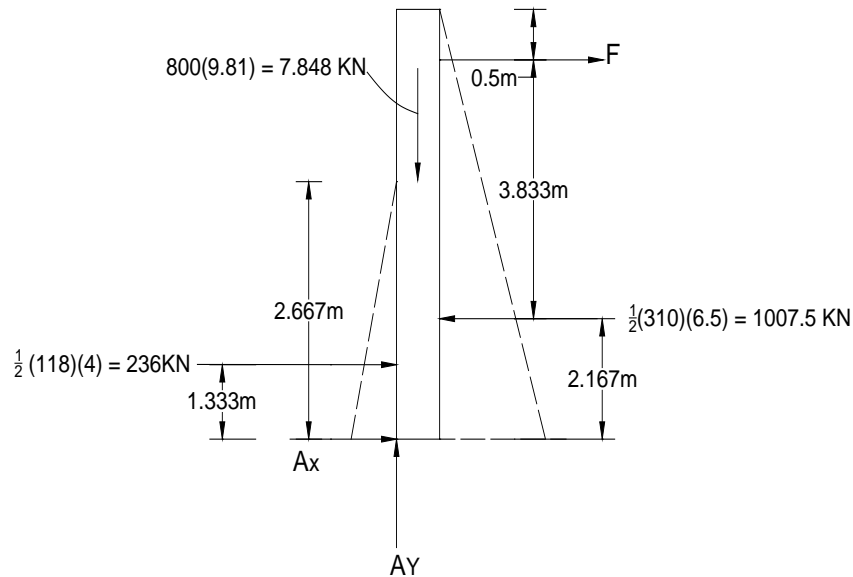
**6. 2- 29**

The bulkhead  $AD$  is subjected to both water and soil- backfill pressures. Assuming  $AD$  is “pinned” to the ground at  $A$ , determine the horizontal and vertical reactions there and also the required tension in the ground anchor  $BC$  necessary for equilibrium. The bulkhead has a mass of 800 kg.



**Prob. 2-29**

**Sol:**



$$\curvearrowright + \Sigma M_A = 0; \quad 1007.5(2.167) - 236(1.333) - F(6) = 0$$

$$F = 311.375 \text{ kN} = \mathbf{311 \text{ kN}}$$

**Ans (4 Points)**

$$\rightarrow + \Sigma F_X = 0; \quad A_X + 311.375 + 236 - 1007.5 = 0$$

$$A_X = \mathbf{460 \text{ kN}}$$

**Ans (3 Points)**

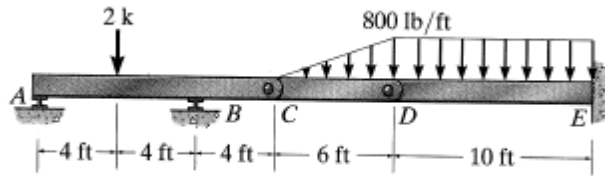
$$\uparrow + \Sigma F_Y = 0; \quad A_Y - 7.848 = 0$$

$$A_Y = \mathbf{7.85 \text{ kN}}$$

**Ans (3 Points)**

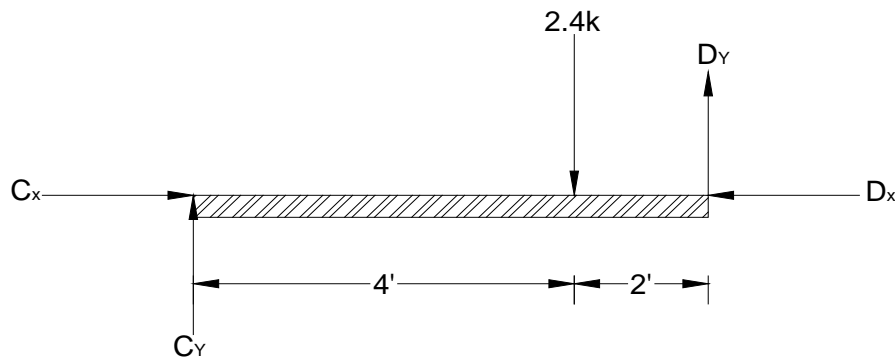
7. 2-34

Determine the reactions at A, B, and E. Assume A and B are roller supported.



Prob. 2-34

Sol:



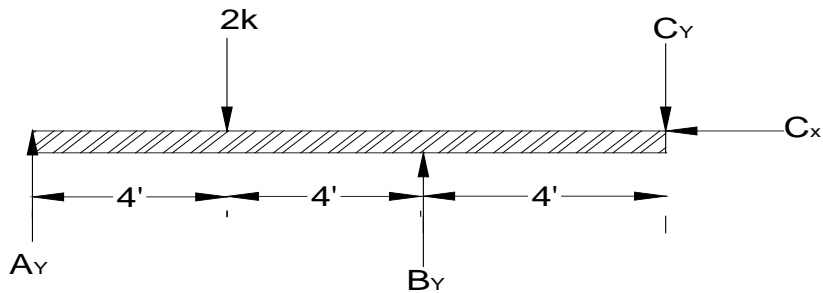
Member CD:

$$\curvearrowright +\Sigma M_C = 0: \quad 2400(4) - D_Y(6) = 0$$

$$D_Y = 1600 \text{ lb}$$

$$\uparrow +\Sigma F_Y = 0; \quad C_Y - 2400 + 1600 = 0$$

$$C_Y = 800 \text{ lb}$$



Member ABC:

$$\curvearrowleft +\Sigma M_B = 0: \quad -A_Y(8) + 2000(4) - 800(4) = 0$$

$$A_Y = 600 \text{ lb}$$

Ans

(2 Points)

$$\uparrow + \Sigma F_Y = 0; \quad B_Y + 600 - 2000 - 800 = 0$$

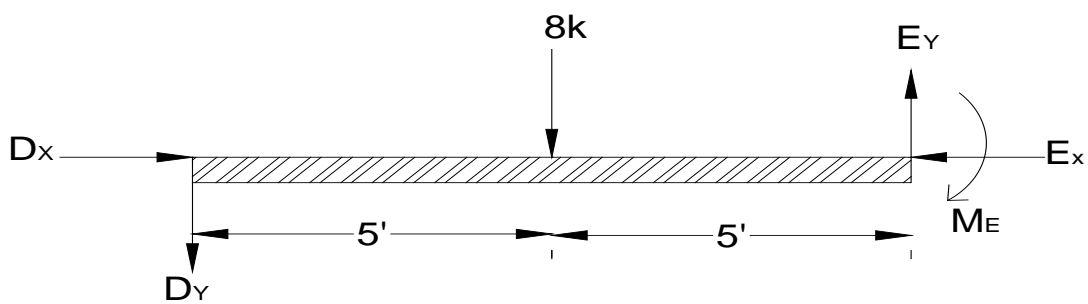
$$B_Y = 2200 \text{ lb} \quad \text{Ans} \quad (2 \text{ Points})$$

$$\rightarrow + \Sigma F_X = 0; \quad C_X = 0$$

**Member CD:**

$$\rightarrow + \Sigma F_X = 0; \quad D_X = 0$$

**Member DE:**



$$\rightarrow + \Sigma F_X = 0; \quad E_X = 0 \quad \text{Ans} \quad (1 \text{ Point})$$

$$\uparrow + \Sigma F_Y = 0; \quad E_Y - 8000 - 1600 = 0$$

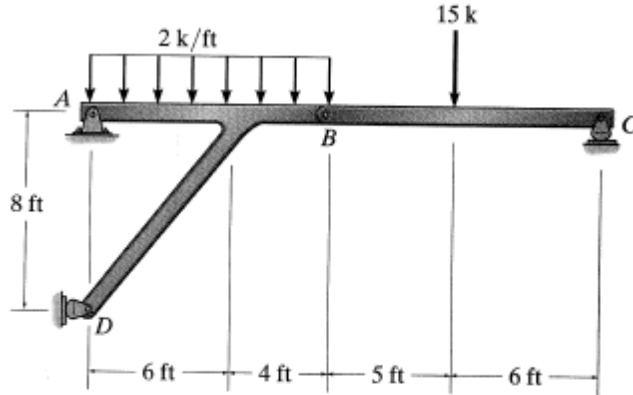
$$E_Y = 9600 \text{ lb} \quad \text{Ans} \quad (2 \text{ Points})$$

$$\curvearrowright + \Sigma M_E = 0; \quad -M_E + 8000(5) + 1600(10) = 0$$

$$M_E = 56000 \text{ lb.ft} \quad \text{Ans} \quad (3 \text{ Points})$$

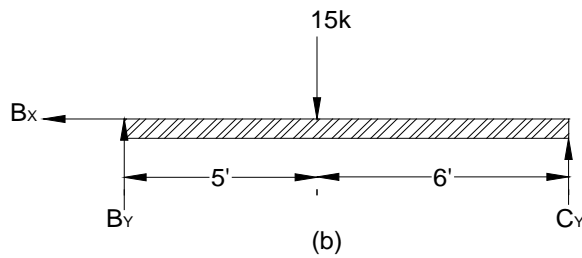
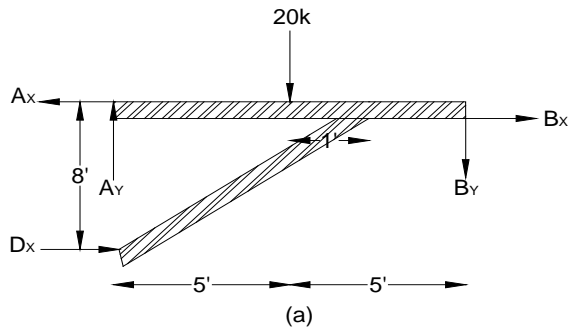
**8. 2 -38**

Determine the reactions at the supports A, C, and D, B is pinned.



Prob. 2-38

**Sol:**



**From FBD (b):**

$$\curvearrowright +\Sigma M_B = 0; \quad C_Y (11) - 15(5) = 0$$

$$C_Y = 6.82 \text{ k}$$

**Ans (2 Points)**

$$\uparrow +\Sigma F_Y = 0; \quad B_Y + 6.818 - 15 = 0$$

$$B_Y = 8.812 \text{ k}$$

**(1 Point)**

$$\xrightarrow{+ \Sigma F_X = 0;} \quad B_X = 0 \quad (1 \text{ Point})$$

**From FBD (a)**

$$\curvearrowleft + \Sigma M_A = 0; \quad D_X (8) - 8.182(10) - 20(5) = 0$$
$$\mathbf{D_X = 22.7 \text{ k}} \quad \text{Ans} \quad (2 \text{ Points})$$

$$\uparrow + \Sigma F_Y = 0; \quad A_Y - 20 - 8.182 = 0$$
$$\mathbf{A_Y = 28.2 \text{ k}} \quad \text{Ans} \quad (2 \text{ Points})$$

$$\xleftarrow{+ \Sigma F_X = 0;} \quad A_X - 22.73 = 0$$
$$\mathbf{A_X = 22.73 = 22.7 \text{ k}} \quad \text{Ans} \quad (2 \text{ Points})$$