2.119

2.119 A tank wall has the shape shown in Fig. P2.119 Determine the horizontal and vertical components of the force of the water on a 4-ft length of the curved section AB.

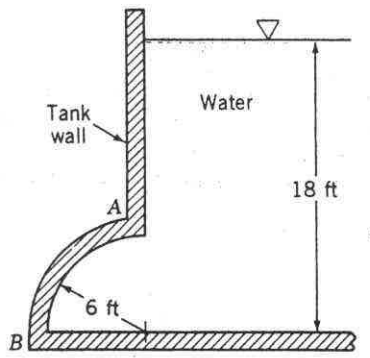


FIGURE P2.119

$$F_1 = \gamma h_{c_1} A_1$$

$$= \left(62.4 \frac{lb}{ft^3}\right)(15\,ft)(6\,ft \times 4\,ft)$$

$$= 22{,}500\ lb$$

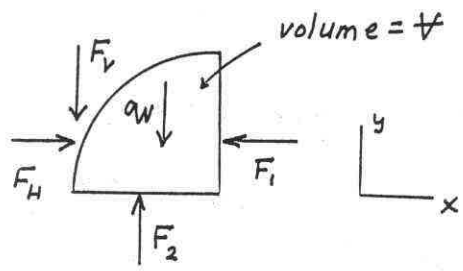
$$F_2 = \gamma h_{c_2} A_2$$

$$= \left(62.4 \frac{lb}{ft^3}\right)(18\,ft)(6\,ft \times 4\,ft)$$

$$= 27{,}000\ lb$$

$$W = \gamma \forall = \left(62.4 \frac{lb}{ft^3}\right)\left(\frac{1}{4}\right)(\pi)(6\,ft)^2(4\,ft)$$

$$= 7060\ lb$$



For equilibrium,

$$\Sigma F_x = 0$$

so that

$$F_H = F_1 = \underline{22{,}500\ lb \leftarrow \text{on tank}}$$

and

$$F_V = F_2 - W = 27{,}000\ lb - 7060\ lb = \underline{19{,}900\ lb \uparrow \text{on tank}}$$