



**ROXANA GERALDINE HERNÁNDEZ GÁLVEZ**

**ARQ. PEDRO ALBERTO GARCIA LOPEZ**

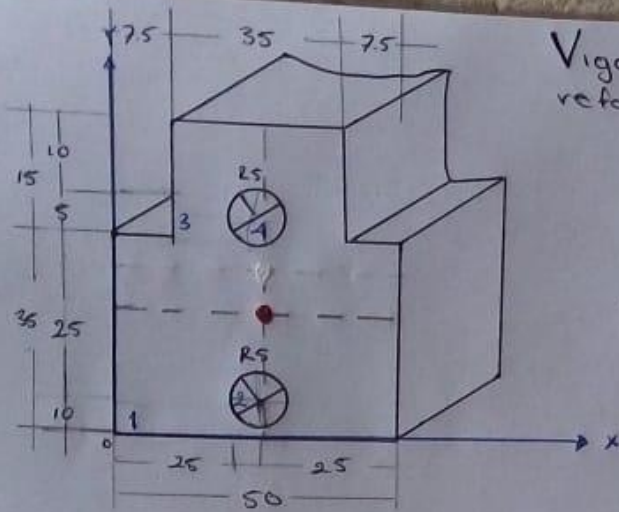
**ESTATICA PARA LA ARQUITECTURA**

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**3ER. CUATRIMESTRE**

**LAR- LICENCIATURA EN ARQUITECTURA "A"**

**COMITÁN DE DOMÍNGUEZ CHIAPAS A 17 JUNIO 2021.**



Viga refabricada con concreto reforzado

$$X = \frac{\sum X \cdot A}{\sum A} \rightarrow CEX = \frac{A_1 \cdot X_1 + A_2 \cdot X_2 + \dots}{A_1 + A_2 + A_3 + \dots}$$

$$Y = \frac{\sum Y \cdot A}{\sum A} \rightarrow CEY = \frac{A_1 \cdot Y_1 + A_2 \cdot Y_2 + \dots}{A_1 + A_2 + A_3 + \dots}$$

$$\textcircled{1} \quad A_1 = b \cdot h = 50 \text{ cm} (30 \text{ cm}) = 1500 \text{ cm}^2$$

$$\bar{X}_1 = b/2 = 50 \text{ cm} / 2 = 25 \text{ cm}$$

$$\bar{Y}_1 = h/2 = 30/2 = 15 \text{ cm}$$

$$\textcircled{2} \quad A_2 = \pi \cdot R^2 = 3.1416 (5)^2 = 78.54 \text{ cm}^2$$

$$\bar{X}_2 = R = 5 \text{ cm} + 20 \text{ cm} = 25 \text{ cm}$$

$$\bar{Y}_2 = R = 5 \text{ cm} + 5 \text{ cm} = 10 \text{ cm}$$

$$\textcircled{3} \quad A_3 = b \cdot h = 35 \text{ cm} (5 \text{ cm}) = 175 \text{ cm}^2$$

$$\bar{X}_3 = b/2 = 35 \text{ cm} / 2 = 17.5 + 7.5 \text{ cm} = 25 \text{ cm}$$

$$\bar{Y}_3 = h/2 = 5 \text{ cm} / 2 = 2.5 \text{ cm} + 30 = 32.5 \text{ cm}$$

$$\textcircled{4} \quad A_4 = \pi \cdot R^2 = 3.1416 (5)^2 = 78.54 \text{ cm}^2$$

$$\bar{X}_4 = R = 5 \text{ cm} + 20 \text{ cm} = 25 \text{ cm}$$

$$\bar{Y}_4 = R = 5 \text{ cm} + 30 = 35 \text{ cm}$$

$$Afc = 1750 \text{ cm}^2 - 78.54 \text{ cm}^2 + 525 \text{ cm}^2 - 78.54 \text{ cm}^2$$

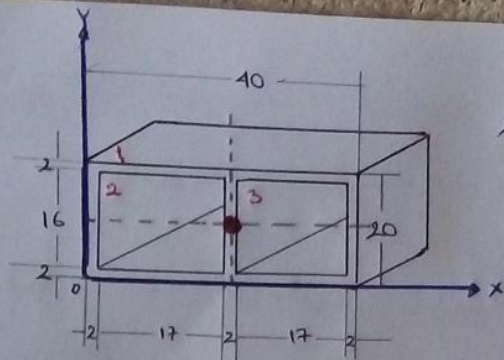
$$\underline{\underline{2117.92}} = 2118 \text{ cm}^2$$

$$C_{gx} = \frac{1750(25) - 78.54(25) + 525(25) - 78.54(25)}{1750 - 78.54 + 525 - 78.54}$$

$$= \frac{52,948 \text{ cm}^3}{2117.92 \text{ cm}^2} = \underline{\underline{25 \text{ cm}}}$$

$$C_{gy} = \frac{1750(17.5) - 78.54(10) + 525(42.5) - 78.54(10)}{1750 - 78.54 + 525 - 78.54}$$

$$= \frac{49010.5 \text{ cm}^3}{2117.92 \text{ cm}^2} = \underline{\underline{23.14 \text{ cm}}}$$



Block hueco

$$X = \frac{\sum x A}{\sum A} \rightarrow CEX = \frac{A_1 \cdot X_1 + A_2 \cdot X_2 + A_3 \cdot X_3 \dots}{A_1 + A_2 + A_3 + \dots}$$

$$Y = \frac{\sum y A}{\sum A} \rightarrow CEY = \frac{A_1 \cdot Y_1 + A_2 \cdot Y_2 + A_3 \cdot Y_3 \dots}{A_1 + A_2 + A_3 + \dots}$$

$$\textcircled{1} A_1 = b \cdot h = 40 \text{ cm} (20 \text{ cm}) = 800 \text{ cm}^2$$

$$\bar{X}_1 = b/2 = 40 \text{ cm}/2 = 20 \text{ cm}$$

$$\bar{Y}_1 = h/2 = 20 \text{ cm}/2 = 10 \text{ cm}$$

$$\textcircled{2} A_2 = b \cdot h = 17 \text{ cm} (16 \text{ cm}) = 272 \text{ cm}^2$$

$$\bar{X}_2 = b/2 = 17 \text{ cm}/2 = 8.5 \text{ cm} + 2 \text{ cm} = 10.5 \text{ cm}$$

$$Y_2 = h/2 = 16 \text{ cm}/2 = 8 \text{ cm} + 2 \text{ cm} = 10 \text{ cm}$$

$$\textcircled{3} A_3 = b \cdot h = 17 \text{ cm} (16 \text{ cm}) = 272 \text{ cm}^2$$

$$\bar{X}_3 = b/2 = 17 \text{ cm}/2 = 8.5 \text{ cm} + 21 \text{ cm} = 29.5 \text{ cm}$$

$$Y_3 = h/2 = 16 \text{ cm}/2 = 8 \text{ cm} + 2 = 10 \text{ cm}$$



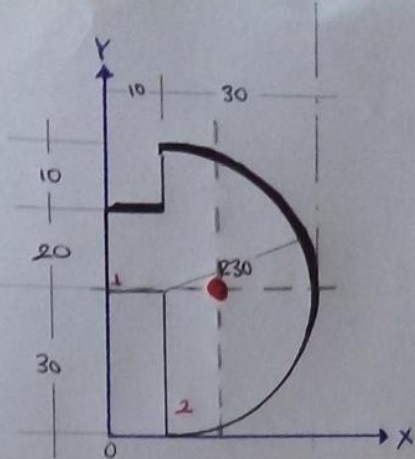
$$A_{fc} = 800 \text{ cm}^2 - 272 \text{ cm}^2 - 272 \text{ cm}^2 =$$
$$= 800 \text{ cm}^2 - 544 \text{ cm}^2 = \underline{256 \text{ cm}^2}$$

$$C_{gx} = \frac{800 \text{ cm}^2 (20 \text{ cm}) - 272 \text{ cm}^2 (10.5 \text{ cm}) - 272 \text{ cm}^2 (29.5 \text{ cm})}{800 \text{ cm}^2 - 272 \text{ cm}^2 - 272 \text{ cm}^2}$$

$$= \frac{5120 \text{ cm}^3}{256 \text{ cm}^2} = \underline{20 \text{ cm}}$$

$$C_{gy} = \frac{800 \text{ cm}^2 (10 \text{ cm}) - 272 \text{ cm}^2 (10 \text{ cm}) - 272 \text{ cm}^2 (10 \text{ cm})}{800 \text{ cm}^2 - 272 \text{ cm}^2 - 272 \text{ cm}^2}$$

$$= \frac{2560 \text{ cm}^3}{256 \text{ cm}^2} = \underline{10 \text{ cm}}$$



Placa PL-1

$$X = \frac{\sum xA}{\sum A} \rightarrow CE_X = \frac{A_1 \cdot X_1 + A_2 \cdot X_2 + A_3 \cdot X_3 + \dots}{A_1 + A_2 + A_3 + \dots}$$

$$Y = \frac{\sum yA}{\sum A} \rightarrow CE_Y = \frac{A_1 \cdot Y_1 + A_2 \cdot Y_2 + A_3 \cdot Y_3 + \dots}{A_1 + A_2 + A_3 + \dots}$$

$$\textcircled{1} A_1 = b \cdot h = 10 \text{ cm} (20 \text{ cm}) = 200 \text{ cm}^2$$

$$\bar{X}_1 = b/2 = 10 \text{ cm}/2 = 5 \text{ cm}$$

$$\bar{Y}_1 = h/2 = 20 \text{ cm}/2 = 10 \text{ cm} + 30 \text{ cm} = 40 \text{ cm}$$

$$\textcircled{2} A_2 = \frac{\pi \cdot R^2}{2} = \frac{3.1416 (30)^2}{2} = 1413.72 \text{ cm}^2$$

$$\bar{X}_2 = \frac{4R}{3\pi} = \frac{120}{9.4248} = 12.73 \text{ cm} + 10 = 22.73 \text{ cm}$$

$$\bar{Y}_2 = R = 30 \text{ cm}$$

$$A_{fc} = 200 \text{ cm}^2 + 1413.72 \text{ cm}^2 = \underline{1613.72 \text{ cm}^2}$$

$$C_{gx} = \frac{200 \text{ cm}^2 (5 \text{ cm}) + 1413.72 \text{ cm}^2 (22.73 \text{ cm})}{200 \text{ cm}^2 + 1413.72 \text{ cm}^2}$$

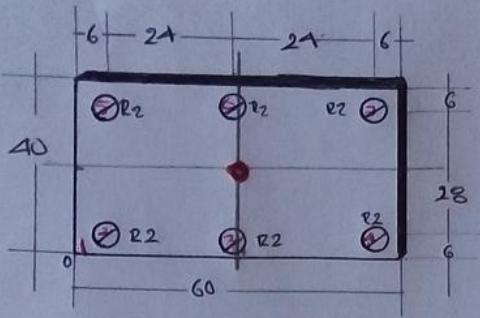
$$= \frac{33133.8556 \text{ cm}^3}{1613.72 \text{ cm}^2} = \underline{20.53 \text{ cm}}$$

$$C_{gy} = \frac{200 \text{ cm}^2 (40 \text{ cm}) + 1413.72 \text{ cm}^2 (30 \text{ cm})}{200 \text{ cm}^2 + 1413.72 \text{ cm}^2}$$

$$= \frac{50411.6 \text{ cm}^3}{1613.72 \text{ cm}^2} = \underline{31.23 \text{ cm}}$$



## Placa PL-2



$$X = \frac{\sum xA}{\sum A} \rightarrow CEX = \frac{A_1 \cdot x_1 + A_2 \cdot x_2 + \dots}{A_1 + A_2 + \dots}$$

$$Y = \frac{\sum yA}{\sum A} \rightarrow CEY = \frac{A_1 \cdot y_1 + A_2 \cdot y_2 + \dots}{A_1 + A_2 + \dots}$$

$$\textcircled{1} A_1 = b \cdot h = 60 \text{ cm} (40 \text{ cm}) = 2400 \text{ cm}^2$$

$$\bar{X}_1 = b/2 = 60 \text{ cm}/2 = 30 \text{ cm}$$

$$\bar{Y}_1 = h/2 = 40 \text{ cm}/2 = 20 \text{ cm}$$

$$\textcircled{2} A_2 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_2 = R = 2 \text{ cm} + 4 \text{ cm} = 6 \text{ cm}$$

$$\bar{Y}_2 = R = 2 \text{ cm} + 4 \text{ cm} = 6 \text{ cm}$$

$$\textcircled{3} A_3 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_3 = R = 2 \text{ cm} + 28 \text{ cm} = 30 \text{ cm}$$

$$\bar{Y}_3 = R = 2 \text{ cm} + 4 \text{ cm} = 6 \text{ cm}$$

$$\textcircled{4} A_4 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_4 = R = 2 \text{ cm} + 52 \text{ cm} = 54 \text{ cm}$$

$$\bar{Y}_4 = R = 2 \text{ cm} + 4 \text{ cm} = 6 \text{ cm}$$

$$\textcircled{5} A_5 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_5 = R = 2 \text{ cm} + 4 \text{ cm} = 6 \text{ cm}$$

$$\bar{Y}_5 = R = 2 \text{ cm} + 32 \text{ cm} = 34 \text{ cm}$$

$$\textcircled{6} A_6 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_6 = R = 2 \text{ cm} + 28 \text{ cm} = 30 \text{ cm}$$

$$\bar{Y}_6 = R = 2 \text{ cm} + 32 \text{ cm} = 34 \text{ cm}$$

$$\textcircled{7} A_7 = \pi \cdot R^2 = 3.1416 (2)^2 = 12.5664 \text{ cm}^2$$

$$\bar{X}_7 = R = 2 \text{ cm} + 52 \text{ cm} = 54 \text{ cm}$$

$$\bar{Y}_7 = R = 2 \text{ cm} + 32 \text{ cm} = 34 \text{ cm}$$



$$\begin{aligned}
 Afc &= 2400 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 \\
 &= \underline{2324 \cdot 6016 \text{ m}^2}
 \end{aligned}$$

$$\begin{aligned}
 C_{gx} &= 2400(30) - 12 \cdot 5664(6) - 12 \cdot 5664(30) - 12 \cdot 5664(54) - 12 \cdot 5664(6) - \\
 &\quad 12 \cdot 5664(30) - 12 \cdot 5664(54) \\
 &= 2400 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 \\
 &= \frac{69738.048 \text{ cm}^3}{2324 \cdot 6016 \text{ m}^2} = \underline{30 \text{ cm}}
 \end{aligned}$$

$$\begin{aligned}
 C_{gy} &= 2400(20) - 12 \cdot 5664(6) - 12 \cdot 5664(6) - 12 \cdot 5664(6) - \\
 &\quad 12 \cdot 5664(34) - 12 \cdot 5664(34) - 12 \cdot 5664(34) \\
 &= 2400 - 12 \cdot 5664 - 12 \cdot 5664 - 17 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 - 12 \cdot 5664 \\
 &= \frac{46492.032 \text{ cm}^3}{2324 \cdot 6016 \text{ cm}^2} = \underline{20 \text{ cm}}
 \end{aligned}$$