

UDS

Licenciatura en Arquitectura

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Materia:

Análisis de Estructuras

Nombre del profesor:

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Cuatrimestre:

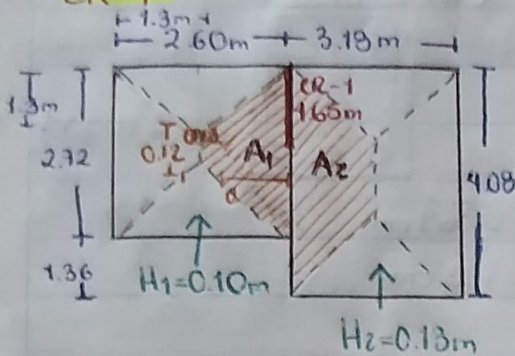
Quinto

Nombre de la actividad:

Unidad II: Cálculos de armados (Cerramientos)

Fecha: 11 de febrero de 2024

CR-1



① Altura - Peralte

$$H_1 = \frac{P}{170} + R \rightarrow \frac{2.60m + 2.72m + 2.60m + 2.72m}{170} + 0.04$$

$$H_1 = 0.1025 \rightarrow \boxed{0.10m}$$

$$H_2 = \frac{P}{170} + R \rightarrow \frac{3.18m + 4.08m + 3.18m + 4.08m}{170} + 0.04$$

$$H_2 = 0.1254 \rightarrow \boxed{0.13m}$$

② Azolca

$$\text{Losa 1 (0.10m)} = 610 \text{ kg/m}^2$$

$$\text{Losa 2 (0.13m)} = 682 \text{ kg/m}^2$$

③ Áreas

$$A_1 = \frac{b \cdot h}{2} \rightarrow \frac{(2.72m + 0.12m) \cdot 1.36m}{2} = 1.85 \text{ m}^2$$

$$A_2 = \frac{b \cdot h}{2} \rightarrow \frac{(4.08m + 0.9m) \cdot 1.59m}{2} = 3.96 \text{ m}^2$$

④ Peso de Área (P. Losa x Área Trib.)

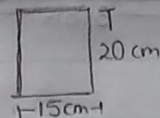
$$P_1 = 1.85 \text{ m}^2 (610 \text{ kg/m}^2) = \frac{1,128.5}{2.72m} = 414.88 \text{ kg/m}$$

$$P_2 = 3.96 \text{ m}^2 (682 \text{ kg/m}^2) = \frac{2,700.72}{4.08m} = 661.94 \text{ kg/m}$$

⑤ Carga w

$$P.P. = h = \frac{l}{12} \rightarrow \frac{1.65m}{12} = 0.1375 = 0.15 \text{ cm}$$

$$b = 0.5(h) \rightarrow 0.5(0.15) = 0.075 = 0.10$$

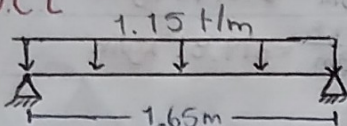


$$P.P. = h(b) P_{\text{con}} \rightarrow (0.20 \text{ cm} \times 0.15 \text{ m} \times 2.4 \text{ t/m}) = 0.072 \text{ t/m}$$

$$P_1 + P_2 = 414.88 \text{ kg/m} + 661.94 \text{ kg/m} = 1076.82 \text{ kg/m}$$

$$0.072 \text{ t/m} + 1.076 \text{ t/m} = \boxed{1.148 \text{ t/m}}$$

⑥ D.C.L



⑦ Momento (Mto)

$$\frac{w(L^2)}{8} \rightarrow \frac{1.15 \text{ t/m} (1.65m)^2}{8} = \boxed{0.391 \text{ t.m}}$$

⑧ Momento Último (MU)

$$M_{to} (1.3 \times 10^5) = 0.391 \text{ t.m} (1.3 \times 10^5) = \boxed{50,830 \text{ k/cm}}$$

← Datos →

$$H = 20 \text{ cm}$$

$$b = 15 \text{ cm}$$

$$L = 165 \text{ m}$$

$$d = 16 \text{ cm}$$

$$F_c = 200 \text{ k/cm}^2$$

$$F_y = 4,200 \text{ k/cm}^2$$

$$F''_c = 136 \text{ k/cm}^2$$

$$F_R = 0.90$$

⑨ q

$$q = \sqrt{\frac{MU}{F_R \cdot b \cdot d^2 \cdot F_c} \cdot 2 + 1} \rightarrow \sqrt{\frac{50,830 \text{ k/cm} \cdot 2 + 1}{0.9 \cdot 15 \cdot 16^2 \cdot 136}} = \boxed{0.8852}$$

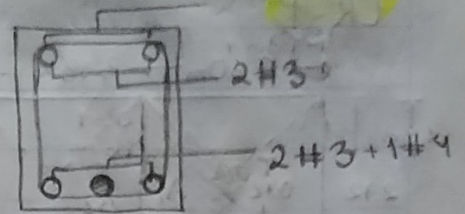
⑩ P

$$P = \frac{(-q + 1) F''_c}{F_y} \rightarrow \frac{(-0.8852 + 1) 136 \text{ k/cm}^2}{4,200 \text{ k/cm}^2} = \boxed{0.00371}$$

⑪ A_s

$$A_s = \rho(b)d \rightarrow 0.00371(15\text{ cm})(16\text{ cm}) = \boxed{0.8904\text{ cm}^2}$$

$$L I = 2\#3 = 1.42\text{ cm}^2 + 1\#4 = 2.69\text{ cm}^2$$

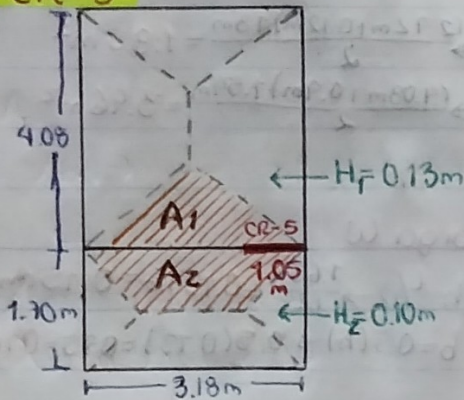


- ⑫ $N^3 = 0.71\text{ cm}^2$
 $N^4 = 1.27\text{ cm}^2$
 $N^5 = 1.98\text{ cm}^2$
 $N^6 = 2.86\text{ cm}^2$

$$A_{s\text{min}} = \rho_{\text{min}}(b)d = (0.00235)(15)(16) = 0.564\text{ cm}^2$$

$$A_{s\text{max}} = \rho_{\text{max}}(b)d = (0.01143)(15)(16) = 2.743\text{ cm}^2$$

CR-5



① Altura - Paralte

$$H_1 = \frac{P}{170} + R \rightarrow \frac{4.08\text{ m} + 3.18\text{ m} + 4.08\text{ m} + 3.18\text{ m}}{170} + 0.04 = 0.125 = \boxed{0.13\text{ m}}$$

$$H_2 = \frac{P}{170} + R \rightarrow \frac{3.18\text{ m} + 1.70\text{ m} + 3.18\text{ m} + 1.70\text{ m}}{170} + 0.04 = 0.097 = \boxed{0.10\text{ m}}$$

② Azotea

$$\text{Losa 1 (0.13m)} = 682\text{ kg/m}^2$$

$$\text{Losa 2 (0.10m)} = 610\text{ kg/m}^2$$

③ Áreas

$$A_1 = \frac{B \cdot h}{2} \rightarrow \frac{3.18\text{ m} \times 1.59\text{ m}}{2} = 2.52\text{ m}^2$$

$$A_2 = \frac{B+b}{2} \cdot h \rightarrow \frac{(3.18\text{ m} + 1.48\text{ m}) \cdot 0.85}{2} = 1.98\text{ m}^2$$

④ Peso de Área (P. Losa x Área Trib.)

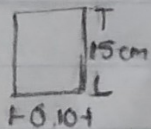
$$P_1 = 2.52\text{ m}^2 (682\text{ kg/m}^2) = \frac{1718.64}{3.18\text{ m}} = 540.45\text{ kg/m}$$

$$P_2 = 1.98\text{ m}^2 (610\text{ kg/m}^2) = \frac{1207.8}{3.18\text{ m}} = 379.81\text{ kg/m}$$

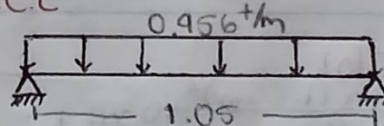
⑤ Carga w

$$P.P. h = \frac{1}{2} \rightarrow \frac{1.05\text{ m}}{2} = 0.08 = 0.10\text{ m} = 0.15$$

$$b = 0.5(h) \rightarrow 0.5(0.10\text{ m}) = 0.05\text{ m} = 0.10\text{ m}$$



⑥ D.C.L



⑦ Momento (M_{to})

$$\frac{w \cdot L^2}{8} \rightarrow \frac{0.96\text{ t/m} (1.05\text{ m})^2}{8} = \boxed{0.132\text{ t}\cdot\text{m}}$$

$$P.P. h(b) \rho_{soo} \rightarrow (0.15\text{ m} \times 0.10\text{ m}) 2.4\text{ t/m} = 0.036\text{ t/m}$$

$$P_1 + P_2 = 540.45 + 379.81 = 920.26\text{ kg/m}$$

$$0.036\text{ t/m} + 0.920\text{ t/m} = \boxed{0.956\text{ t/m}}$$

⑧ Momento Último (M_U)

$$M_{to} (1.3 \times 10^5) = 0.132\text{ t}\cdot\text{m} (1.3 \times 10^5) = 17160\text{ k/cm}$$

← Datos →

H = 15 cm
 b = 10 cm
 L = 105 cm
 d = 11 cm
 $F_R = 280 \text{ kg/cm}^2$
 $F_Y = 4,200 \text{ kg/cm}^2$
 $F_C = 136 \text{ kg/cm}^2$
 $F_R = 0.90$

⑨ ρ

$$\rho = \sqrt{\frac{\mu U}{F_R \cdot b \cdot d^2 \cdot F_C \cdot 2 + 1}} \rightarrow \sqrt{\frac{17160 \text{ kg/cm}^2}{0.90 \times 10 \text{ cm} \times 11^2 \text{ cm} \times 136 \cdot 2 + 1}} = 0.8765$$

⑩ P

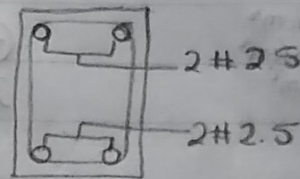
$$P = \frac{(-\rho + 1) F_C}{F_Y} \rightarrow \frac{(-0.8765 + 1) 136 \text{ kg/cm}^2}{4200 \text{ kg/cm}^2} = 0.00399$$

N° 2 → 0.31 cm²
 N° 2.5 → 0.49 cm²

⑪ A_s

$$A_s = P(b)d \rightarrow 0.00399 (10 \text{ cm}) 11 \text{ cm} = 0.4389 \text{ cm}^2$$

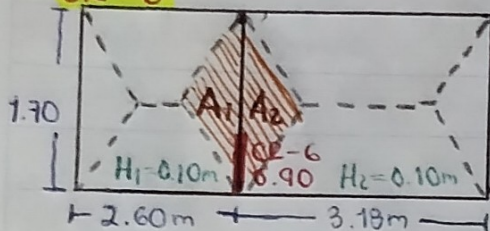
$$L I = 2 \# 2.5 = 0.98 \text{ cm}^2$$



⑫ $A_{s \min} = P_{\min}(b)d \rightarrow (0.00235) 10 \text{ cm} \times 11 \text{ cm} = 0.2585 \text{ cm}^2$

$$A_{s \max} = P_{\max}(b)d \rightarrow (0.01143) 10 \text{ cm} \times 11 \text{ cm} = 1.2573 \text{ cm}^2$$

CR-6



① Altura - Peralte

$$H_1 = \frac{P}{170} + R \rightarrow \frac{2.60 \text{ m} + 1.70 \text{ m} + 2.60 \text{ m} + 1.70 \text{ m}}{170} + 0.04 = 0.09 = 0.10 \text{ m}$$

$$H_2 = \frac{P}{170} + R \rightarrow \frac{3.18 \text{ m} + 1.70 \text{ m} + 3.18 \text{ m} + 1.70 \text{ m}}{170} + 0.04 = 0.097 = 0.10 \text{ m}$$

② Azotea

$$\text{Cosa } 142 (10 \text{ cm}) = 610 \text{ kg/m}^2$$

③ Áreas

$$A_1 = \frac{b \times h}{2} \rightarrow \frac{1.70 \text{ m} \times 1.80 \text{ m}}{2} = 1.105 \text{ m}^2$$

$$A_2 = \frac{b \times h}{2} \rightarrow \frac{1.70 \text{ m} \times 1.59 \text{ m}}{2} = 1.351 \text{ m}^2$$

④ Peso de Área (P. Cosa x Área Trib.)

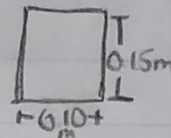
$$P_1 = 1.105 \text{ m}^2 (610 \text{ kg/m}^2) = \frac{674.05}{1.70 \text{ m}} = 396.5 \text{ kg/m}$$

$$P_2 = 1.351 \text{ m}^2 (610 \text{ kg/m}^2) = \frac{824.11}{1.70 \text{ m}} = 484.77 \text{ kg/m}$$

⑤ Carga W

$$P.P. h = l/12 \rightarrow \frac{0.90 \text{ m}}{12} = 0.075 = 0.10 = 0.15 \text{ m}$$

$$b = 0.5(h) \rightarrow 0.5(0.10 \text{ m}) = 0.05 = 0.10 \text{ m}$$

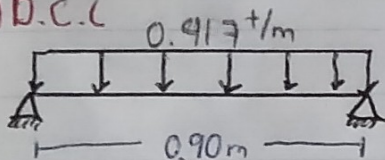


$$P.P. h(b) P_{\text{Cosa}} \rightarrow 0.15 (0.10) 2.44 \text{ kg/m} = 0.036 \text{ kg/m}$$

$$P_1 + P_2 = 396.5 \text{ kg/m} + 484.77 \text{ kg/m} = 881.27 \text{ kg/m}$$

$$0.036 \text{ kg/m} + 0.881 \text{ kg/m} = 0.917 \text{ kg/m}$$

⑥ D.C.L



⑦ Momento (M_{to})

$$\frac{wL^2}{8} \rightarrow \frac{0.92 \text{ t/m} (0.90)^2}{8} = 0.0931 \text{ t}\cdot\text{m}$$

⑧ Momento Último (M_U)

$$M_{to} (13 \times 10^5) = 0.0931 \text{ t}\cdot\text{m} (13 \times 10^5) = 12,103 \text{ k/cm}$$

← Datos →

H = 15 cm
b = 10 cm
L = 90 cm
d = 11 cm
F_c = 200 kg/cm²
F_y = 4200 kg/cm²
F_c' = 136 kg/cm²
F_R = 0.90

⑨ q

$$q = \sqrt{-\frac{M_U}{F_R \cdot b \cdot d \cdot F_c} \cdot 2 + 1} \rightarrow \sqrt{-\frac{12,103 \text{ k/cm}}{0.9 \times 10 \times 11^2 \times 136} \cdot 2 + 1} = 0.9146$$

⑩ P

$$P = \frac{(-q + 1) F_c}{F_y} \rightarrow \frac{(-0.9146 + 1) 136 \text{ kg/cm}^2}{4,200 \text{ kg/cm}^2} = 0.00276$$

⑪ A_s

$$A_s = P \cdot b \cdot d \rightarrow 0.00276 (10 \text{ cm}) (11 \text{ cm}) = 0.3036 \text{ cm}^2$$

$$L I = 2 \# 2.5 = 0.98 \text{ cm}^2$$



2#2.5
2#2.5

⑫ A_{smin} = P_{min}(b)d → 0.00235 (10 cm) 11 cm = 0.2585 cm²

A_{smax} = P_{max}(b)d → 0.01143 (10 cm) 11 cm = 1.2573 cm²

