UDS

Mi Universidad

Ejercicios

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Métodos Energéticos

Segundo Parcial

Análisis de Estructuras

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Arquitectura

Quinto Cuatrimestre

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$$\text{①} \quad H1 = \frac{P}{170} + R \rightarrow$$

$$\frac{2.77m + 2.40m + 2.77m + 2.40m + 0.04}{170} = \underline{0.10m}$$

$$\text{②} \quad H2 + \frac{P}{170} + R \rightarrow$$

$$\frac{4.00m + 2.40m + 4.00m + 2.40m + 0.04}{170} = 0.115m = \underline{0.12m}$$

③ AZOTEA

LOSA 1 (0.10m) = 6.10 kg/cm²

LOSA 2 (0.12m) = 6.58 kg/cm²

④ AREA

$$A1 = \frac{b \times h}{2} \rightarrow \frac{(2.77m \times 1.2m)}{2} = 1.662 \, cm^2$$

$$A2 = \frac{b \times h}{2} \rightarrow \frac{(4.00m \times 1.2m)}{2} = 2.40 \, m^2$$

⑤ PESO DE AREA (P. LOSA × AREA TRIB) / ZONA DE APOYO

P1 = 1.662 cm² (6.10 kg/cm²) = 10.1382 h/m² / 2.40 = 4.22 kg/m

P2 = 2.40 m² (6.58 kg/cm²) = 15.792 h/m² / 2.40 = 6.58 kg/m

⑥ CARGA W

P1 + P2 + PESO PROPIO DE LA TRABE

$$P.P = h = \frac{1}{12} \rightarrow 2.57m / 12 = 0.214 = \underline{0.25m}$$

$$b = 0.5(h) \rightarrow 0.5(0.25) = 0.12 = \underline{0.15m}$$

P.P = h(b) PESO = 0.25m × 0.15m (2.40 t/m) = 0.09 t/m

$$P1 + P2 = 4.22 \, kg/m + 6.58 \, kg/m = \frac{10.80 \, h/m}{1000} = 0.01080 \, t \cdot m$$

0.09 t/m + 0.01080 t/m = 0.1008 t/m

PESO = 2.4 t/m

0.25   0.15

DATOS:

H ~ 25 cm

b = 15 cm

L = 2.57

d = 21 cm

F'C = 200 kg/cm²

FY = 4200 kg/cm²

F'C = 136 h/cm

FR = 0.90

⑦   W = 2.00 t/m

△   △

2.57

⑧ MOMENTO (MTO)

$$\frac{w(L)}{8} = \frac{2.00 \, t/m \, (2.57)}{8} = \underline{0.64 \, t \cdot m}$$

⑨ MOMENTO ULTIMO (MU)

MU = MTO (1.3 × 10⁵) = 0.64 t·m (130000)

MU = 8,3200 h/cm

(10) $q = \sqrt{- \dfrac{MU}{FR \cdot b \cdot d^2 \cdot F'C}} \cdot 2 + 1$

$q = \sqrt{- \dfrac{83200\,h/cm}{0.90 \cdot 15cm \cdot (21cm)^2 \cdot 136\,h/cm}} \cdot 2 + 1 = \underline{0.89133}$

(11) $p = \dfrac{(-q+1) \cdot F'C}{FY} = \dfrac{(-0.89133) \cdot 136\,hg/cm^2}{4200} = \underline{0.002886\ cm^2}$

(12) A)

$As = \dfrac{P(b)d}{} \rightarrow 0.002886\ (15)(21) = \underline{0.187677\ cm^2} = \underline{2\ cm^2}$

N.3 = 0.71 cm²

N.4 = 1.27 cm²

N.5 = 1.98 cm²

N.6 = 2.85 cm²

$L.I = 2\#3 = 1.42$

2#4 + 1#3

25

2#3

15
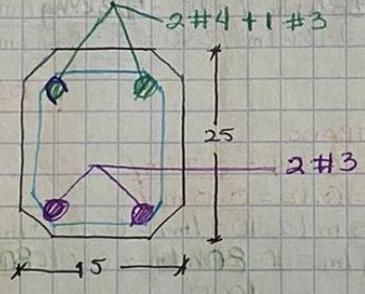
As min = P min (b)(d) =
(0.00235)(15)(21) = 0.74025

As max = P max (b)(d) =
(0.01143)(15)(21) = 3.60045

800L = 2#4 + 1 #3

.25

2#3

① $H_1 = \dfrac{P}{170} + R \rightarrow$
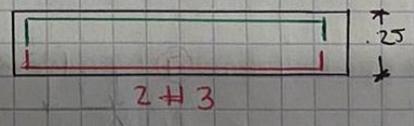
$\dfrac{2.90m + 1.60m + 2.90m + 1.60m + 0.04}{170} = 0.053 = 0.10m$ /

② $H_2 = \dfrac{P}{170} + R \rightarrow$
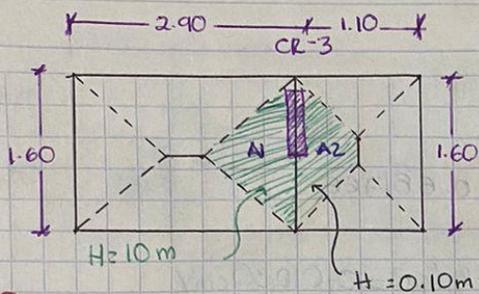
$\dfrac{1.10m + 1.60m + 1.10m + 1.60m + 0.04}{170} = 0.032 = 0.10m$ /

2.90 —— CR-3 —— 1.10
1.60 — 1.60
H = 10 m
H = 0.10m

③ AZOTEA

LOSA 1 (0.10m) = 6.10 kg/cm²
LOSA 2 (0.10m) = 610 ng/cm²

④ AREA

• $A_1 = \dfrac{b \times h}{2} \rightarrow \dfrac{(2.90m \times 0.8m)}{2} = 1.16$ ng/m² /

• $A_2 = \dfrac{B + b + h}{2} \rightarrow \dfrac{1.10m + 0.5m}{2}(0.55) = 0.6875$ m²

⑤ PESO DE AREA (P. LOSA X AREA TRIB) ZONA DE APOYO

$P_1 = 1.16$ kg/m² (6.10 kg/cm²) = 7.076 /1.60 = 4.4225 ng/m /
$P_2 = 0.6875$ ng/m² (6.10 ng/cm²) = 4.1937 /1.60 = 2.6210 ng/m /

⑥ CARGA W

$P_1 + P_2 +$ PESO PROPIO DE LA TRABE
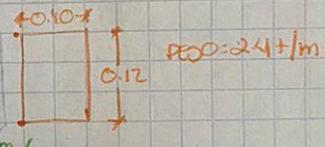
P.P = $h = 4/12 \rightarrow 1.29m /12 = 0.107 = 0.12$ m /
$b = 0.5 (h) \rightarrow 0.5 (0.12m) = 0.06m = 0.10m$ /

P.p = h(b) PESO = 0.12 X 0.10 (240 t/m) = 0.0288 t/m /

$P_1 + P_2 = 4.4225$ ng/m + 2.6210 ng/m = $\dfrac{7.0435}{1000} = 0.0070435$ t/m /

0.0288 t/m + 0.0070435 t/m = 0.03584 t/m /

PESO = 24 t/m
0.10
0.12

DATOS

H = 0.12
b = 0.10
l = 1.29
d = 8
FIC = 200 kg/cm²
FY = 4,200 kg/cm²
FIC = 136 n/cm²
FR = 0.90

⑦

1.00 t/m
A ———— A
1.29
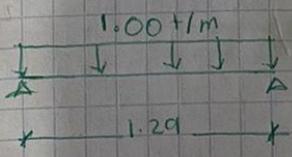
⑧ MOMENTO (MTO)

$\dfrac{W(L)}{8} = \dfrac{1.00 t/m (1.29)}{8} = 0.16125$

⑨ MOMENTO ULTIMO (MU)

MU = MTO (1.3×10^{3}) = 0.16125 (130.000)

MU = 20,962 J

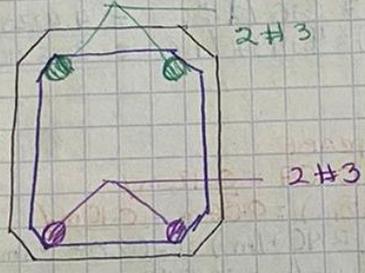(10) $q = \sqrt{-\dfrac{M_u}{F_R \cdot b \cdot d^2 \cdot F'c}} \cdot 2 + 1$

$q = \sqrt{-\dfrac{20962.5}{0.90 \cdot 10(8)^2 \cdot 136 \, k/cm^2}} \cdot 2 + 1 = 0.681766$

(11) $p = \dfrac{(-q+1) \cdot F'c}{FY} = \dfrac{(-0.6817+1) \cdot 136 \, kg/cm^2}{4200} = 0.01030 \, cm^2/$

(12) AS

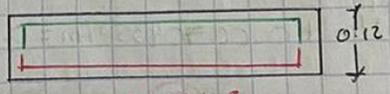AS $= p(b) d \longrightarrow 0.01030(10)(8) = 0.8124 = 1 \, cm^2$

N.3 $= 0.71 \, cm^2$
N.4 $= 1.27 \, cm^2$
N.5 $= 1.98 \, cm^2$
N.6 $= 2.85 \, cm^2$

L.I $= 2 \, \#3 = 1.42$

2 #3

2 #3

L $= 2 \#3$

AS MIN $= p$ min $(b)(d) =$
$(0.00235)(10)(8) = 0.188$

AS max $= p$ max $(b)(d)$
$(0.01143)(10)(8) = 0.9144$

L $= 2 \#3$

0.12

$$① H = \frac{P}{170} + R \rightarrow$$

$$\frac{1.10m + 1.80m + 1.10m + 1.80m + 0.04}{170} = 0.034 = \underline{0.10m}$$

Dimensions shown: 1.10, 4.00, 0.30, 1.80, 2.10, A1, A2, CR=5

$$② H_2 = \frac{P}{170} + R \rightarrow$$

$$\frac{4.00m + 2.10m + 4.00m + 2.10m + 0.04}{170} = 0.072 = \underline{0.10m}$$
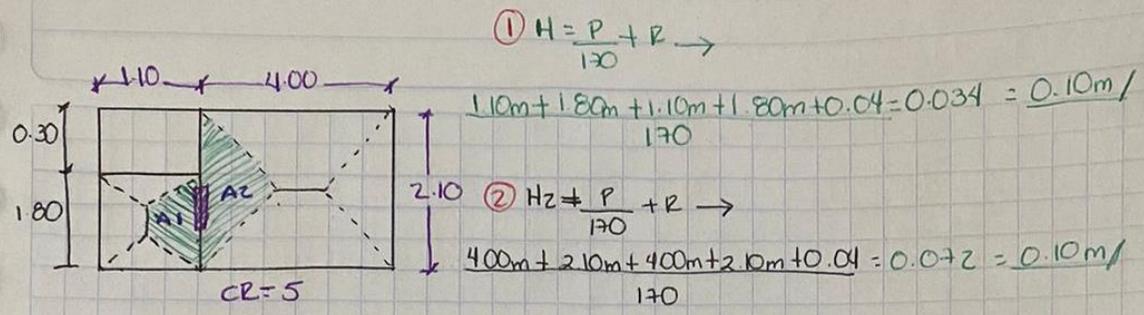
③ AZOTEA

LOSA 1 (0.10m) = 6.10 kg/cm²
LOSA 2 (0.10m) = 6.10 kg/cm²

④ AREA

• $A_1 = \frac{B \times b \times h}{2} \rightarrow \frac{1.10 + 0.7(0.55)}{2} = 0.7425 \, m^2$

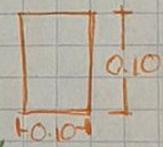• $A_2 = \frac{B \times h}{2} \rightarrow \frac{4.00 \times 1.05}{2} = 2.1 \, m^2$

⑤ PESO DE AREA (P. LOSA × AREA TRIB) / ZONA DE APOYO

$P_1 = 0.7425 \, m^2 (6.10 \, kg/cm^2) = 452.925 / 1.80 = 2.51 \, kg/m$

$P_2 = 2.1 \, m^2 (6.10 \, kg/cm^2) = 12.81 / 2.10 = 6.1 \, kg/m$

⑥ CARGA W

$P_1 + P_2 + $ PESO PROPIO DE LA TRABE

0.10, 0.10
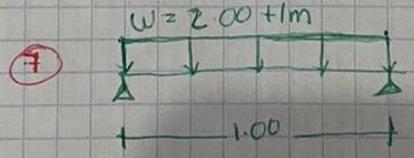
$P.P = h = \frac{1}{12} \rightarrow 1.00m / 12 = 0.083 = 0.10m$

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

$P.P = h(b) \, peso = 0.10m \times 0.10m (2.40 \, t/m) = 0.024 \, t/m$

$P_1 + P_2 = 2.51 \, kg/m + 6.1 \, kg/m = \frac{8.61 \, t/m}{1000} = 0.00861 \, t \cdot m$

$0.024 \, t/m + 0.00861 \, t \cdot m = 0.03261 \, t/m$

DATOS:

H = 10 cm
b = 10 cm
l = 1.00
d = 6
FIC = 200 kg/cm²
FY = 4,200 kg/cm²
FIC = 136 n/cm²
FR = 0.90

⑦

W = 2.00 t/m

1.00

⑧ MOMENTO (MTO)

$$\frac{W(L)}{8} = \frac{2.00 \, t/m (1.00)}{8} = 0.25 \, t \cdot m$$

⑨ MOMENTO ULTIMO (MU)

$MU = MTO (1.3^{\times 10^5}) = 0.25 m \cdot t \cdot m (130,000)$

$MU = 32,500 \, t/cm$

⑩ $q \sqrt{- \dfrac{MU}{FR \cdot b \cdot d^2 \cdot f'c}} \cdot 2 + 1$

$q \sqrt{- \dfrac{32500}{0.90 \cdot 10 \, (6)^2 \cdot 136 \, k/cm^2}} \cdot 2 + 1 =$