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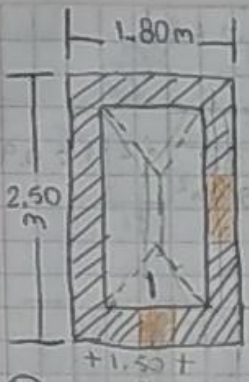
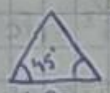
ANALISIS DE ESTRUCTURAS

CUATRIMESTRE: 5°

LICENCIATURA EN ARQUITECTURA

METODOS ENERGETICOS





① 1 Losa → perimetro = / 170

1.80 + 1.80 + 2.50 + 2.50 = 8.60

$\frac{8.60\,m}{170} + 0.04 = 0.090\,m = 10$

② $\frac{10}{cm}$ = 610 Kg/m²

③ $+0.15\,m = 1.65\,m$

Area 1 = $\frac{B \times h}{2}$ → $\frac{1.80\,m\,(0.90\,m)}{2} = 0.81\,m^2$

④ Peso de area = Area (P.Losa)

$0.81\,m^2\,(610\,kg/m^2) = 494.10\,kg/m^2$

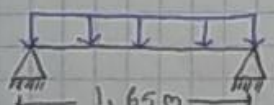
$\frac{494.10\,kg/m^2}{1.80\,m} = \frac{274.5\,kg/m}{1000}$ → 0.275 t/m

⑤ P.t + P.P.

$\frac{1.50\,m}{12} = 0.125\,m \approx 0.20$

$0.20 \times 0.15 \times 2.4 = 0.072\,t/m + 0.275\,t/m = 0.347\,t/m$

⑥ w = 0.347 t/m



⑦ momento = $\frac{w(L)^2}{8}$ → $\frac{0.347\,t/m\,(1.65\,m)^2}{8} = 0.1180\,t.m$

⑧ Momento ultimo = M+0 $(1.3^{\times 10^5})$

0.1180 t.m (130,000) = 15,340 kg·cm

DATOS:
$b = 15\,Cm$
$h = 20\,Cm$
$d = H - r = 16\,Cm$
$F'c = 200\ Kg/Cm^2$
$Fy = 4{,}200\ Kg/Cm^2$
$F''c = 136\ kg/Cm^2$
$FR = 0.90$
$\rho min = 0.00235$
$\rho max = 0.01143$

(9) $$\sqrt{\frac{MD}{FR \cdot b \cdot d^2 \cdot F''c} \cdot 2 + 1} - \sqrt{\frac{15{,}340\ kg \cdot Cm}{0.90 \cdot 15\ cm \cdot 16^2\ cm \cdot 136\ kg/cm^2} \cdot 2 + 1} = 0.9668$$

(10) $$\rho = \frac{(-9 + 1) \cdot F''c}{Fy}$$

$$\rho = \frac{(-0.9668 + 1) = 136\ kg/cm^2}{4{,}200\ kg/cm^2} = 0.001075$$

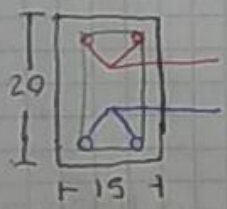
$= \rho min = 0.00235$

(11) $As \rightarrow \rho (b) d$

$0.00235\ (15\ cm)\ 16\ cm = 0.564\ cm^2$

(12) $As\,min = \rho min\ b \cdot d = 0.564\ cm^2$

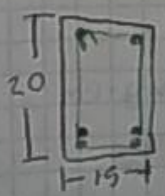
$As\,max = \rho max\ b \cdot d = 2.7432\ cm^2$



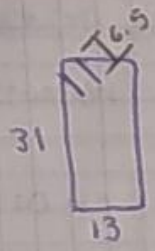
$\#3 = 0.71\,cm^2$
$2\,\#3 = 1.42\,cm^2$

$ARMEX = 0.50\,cm^2$

$0.50\,cm^2 + 0.71\,cm^2 = 1.21\,cm^2$
$+ 0.71\,cm^2$
$1.92\,cm^2$



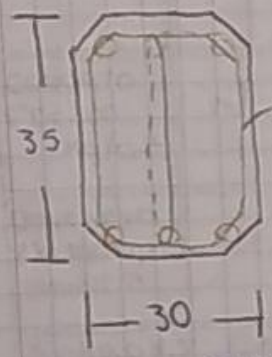
ARMEX
15 x 20 - 4
+ 2 # 3



L = 31 + 31 + 13 + 13 + 6.5 + 6.5

L = 101 M

$$Pzas = 30/0.20 + 1 = \frac{16 \text{ piezas}}{\times 2 \text{ piezas}} = 32 \text{ PZAS}$$



ESTRIBO N.2
Ø 20
CABLES

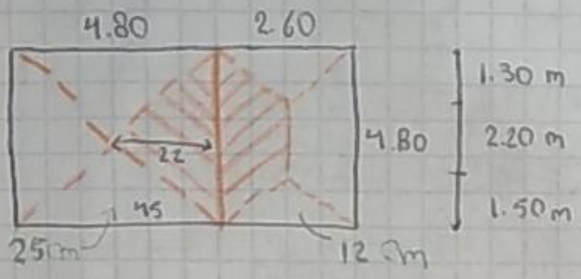
Total = 1.01m × 32 PZAS = 32.32 m

+ 3% desperdicio

L = 30 m 33.28m(0.25 K/m) = 33.28 m

= 8.32 kg = 9kg

26 / 2 = 13



① $H_1 = \frac{P}{170} + A \rightarrow \frac{4.80m + 4.80m + 4.80m + 4.80m}{170} + 0.04m = 0.152m = 0.25m$ (0.142)

$H_2 = \frac{P}{170} + A \rightarrow \frac{2.60m + 4.80m + 2.60m + 4.80m}{170} + 0.04m = 0.127m = 0.12m$ (0.117)

AZOTEA

② Losa 1 = 665 Kg/m²

Losa 2 = 658 Kg/cm²

③ AREA

$A_1 = \frac{b \times h}{2} \rightarrow \frac{4.80m \times 2.40m}{2} = 5.76\ m^2$

$A_2 = \frac{B + b \cdot h}{2} \quad \frac{4.8m + 2.20m(1.30m)}{2} = 3.83\ m^2$

④ Peso de área (P. Losa X Area Tributaria) / Losa del apoyo

$P_1 = 5.76\ m^2\ (663\ kg/m^2) = 3,830.40\ K/m^2 / 4.80m = 798\ Kg/m$

$P_2 = 3.83\ m^2\ (658\ kg/m^2) = 2,520.14\ K/m^2 / 4.80m = 525.02\ kg/m$

⑤ CARGA W

$P_1 + P_2$ + Peso propio de Trabe

$P.P. = h = \frac{L}{12} \rightarrow \frac{4.80}{12} = 0.40m$

$b = 0.5(h) \rightarrow 0.50\ (0.40) = 0.20\ m$

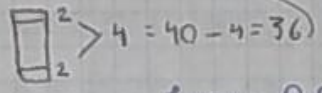
Peso = 2.4 T/m

h (b) Peso = 0.40 m × 0.20 m (2.40 t/m) = 0.192 t/m

$P_1 + P_2 = \frac{1,323.02 \text{ K/m}}{1000} \rightarrow 1.323 \text{ t/m}$ mas $= 1.515$ t/m

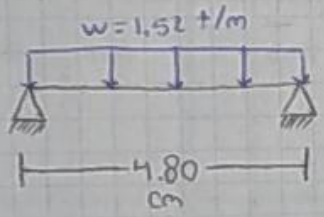
DATOS

H = 40 cm
b = 20 cm
L = 480 cm
d = 36 cm
F'c = 200 K/cm²
Fy = 4,200 K/cm²
F*c = 136 K/cm²
FR = 0.90



ρ max = 0.01143
ρ min = 0.00235
ρ = 0.006440

⑥



⑦ Momento

$\frac{w(L)^2}{8} \rightarrow \frac{1.52 \text{ t/m} (4.80 \text{ m})^2}{8} = 4.37 \text{ t.m}$

⑧ Momento ultimo (Mu)

Mu = Mto. (1.3×10^5) = kg/cm

Mu = 4.37 t.m (130,000) = 568,100 K/cm

⑨ $q = \sqrt{-\frac{Mu}{FR \cdot b \cdot d^2 \cdot F''c} \cdot 2 + 1}$

$q = \sqrt{-\frac{568,100 \text{ K/cm}}{0.90 \cdot 20 \text{ cm} \cdot 36^2 \text{ cm} \cdot 136 \text{ K/cm}^2} \cdot 2 + 1} = 0.8011$

⑩ $\rho = \frac{(-q+1) \cdot F''c}{Fy} \rightarrow \frac{(-0.8011+1) \cdot 136 \text{ K/cm}^2}{4,200 \text{ K/cm}^2} = 0.006440$

(11) $As = \rho(b)d$

$0.0064(30)(32) = 6.144\ cm^2$

(12) No4 = $1.27\ cm^2$
No5 = $1.98\ cm^2$
No6 = $2.85\ cm^2$

$2\#5+1\#4 = 5.23\ cm^2$

$2\#4 = 2.54\ cm^2$

(13)

$As\ min = f_{min}(b)d = 1.61\ cm^2$

$As\ max = 7\rho_{max}(b)d = 8.22\ cm^2$