



**Mi Universidad**

**ANALISIS DE  
ESTRUCTURAS**

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*Nombre de la Materia: Análisis de Estructuras*

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*Nombre de la Licenciatura: Arquitectura*

*Cuatrimestre: 5to*



Entrepiso 10 cm Habitacional

Acabado de piso =	70 Kg/m <sup>2</sup>
Entoriado	30 Kg/m <sup>2</sup>
Losa 10cm	240 Kg/m <sup>2</sup>
Aplanado	30 Kg/m <sup>2</sup>
Reglamento	40 Kg/m <sup>2</sup>
<hr/>	
cv casa	410 Kg/m <sup>2</sup>
habi	190 Kg/m <sup>2</sup>
<hr/>	
	600 Kg/m <sup>2</sup>

C<sub>vm</sub> = 190 Kg/m<sup>2</sup>  
 C<sub>va</sub> = 100 Kg/m<sup>2</sup>  


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 290 Kg/m<sup>2</sup>

Entrepiso 12 cm Habitacional

70 Kg/m <sup>2</sup>	
288 Kg/m <sup>2</sup>	
30 Kg/m <sup>2</sup>	
30 Kg/m <sup>2</sup>	
40 Kg/m <sup>2</sup>	
<hr/>	
458 Kg/m <sup>2</sup>	
cv habi	190 Kg/m <sup>2</sup>
<hr/>	
648 Kg/m <sup>2</sup>	

C<sub>vm</sub> = 190 Kg/m<sup>2</sup>  
 C<sub>va</sub> = 100 Kg/m<sup>2</sup>  


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 290 Kg/m<sup>2</sup>

Azotea 10 cm Habitacional

Acabado piso =	70 Kg/m <sup>2</sup>
entoriado =	30 Kg/m <sup>2</sup>
Relevo =	100 Kg/m <sup>2</sup>
Losa 10cm =	240 Kg/m <sup>2</sup>
Aplanado =	30 Kg/m <sup>2</sup>
Reglamento =	40 Kg/m <sup>2</sup>
<hr/>	
	510 Kg/m <sup>2</sup>
cv azotea	100 Kg/m <sup>2</sup>
<hr/>	
Total	610 Kg/m <sup>2</sup>

C<sub>vm</sub> = 100 Kg/cm<sup>2</sup>  
 C<sub>va</sub> = 70 Kg/cm<sup>2</sup>  


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 170 Kg/cm<sup>2</sup>

Azotea 12 cm Habitacional

70 Kg/cm <sup>2</sup>	
30 Kg/cm <sup>2</sup>	
100 Kg/cm <sup>2</sup>	
288 Kg/cm <sup>2</sup>	
30 Kg/cm <sup>2</sup>	
40 Kg/cm <sup>2</sup>	
<hr/>	
558 Kg/cm <sup>2</sup>	
cv azotea	100 Kg/cm <sup>2</sup>
<hr/>	
Total	658 Kg/cm <sup>2</sup>

C<sub>vm</sub> = 100 Kg/cm<sup>2</sup>  
 C<sub>va</sub> = 70 Kg/cm<sup>2</sup>  


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 170 Kg/cm<sup>2</sup>



Entrepiso 10cm Auda

Acabado de piso	70 kg/cm <sup>2</sup>
Entortado	30 kg/cm <sup>2</sup>
Loza 10cm	240 kg/cm <sup>2</sup>
Aplanado	30 kg/cm <sup>2</sup>
Reglamento	40 kg/cm <sup>2</sup>

$$410 \text{ kg/cm}^2$$

$$\text{Cvm } 250 \text{ kg/cm}^2$$


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$$\text{Total } 660 \text{ kg/cm}^2$$

$$\text{Cvm} = 250 \text{ kg/cm}^2$$

$$\text{Cva} = 180 \text{ kg/cm}^2$$


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$$430 \text{ kg/cm}^2$$

Entrepiso 12 cm Auda

Acabado de piso	70 kg/cm <sup>2</sup>
Entortado	30 kg/cm <sup>2</sup>
Loza 10cm	288 kg/cm <sup>2</sup>
Aplanado	30 kg/cm <sup>2</sup>
Reglamento	40 kg/cm <sup>2</sup>

$$458 \text{ kg/cm}^2$$

$$\text{Cvm } 250 \text{ kg/cm}^2$$


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$$\text{Total } 708 \text{ kg/cm}^2$$

$$\text{Cvm} = 250 \text{ kg/cm}^2$$

$$\text{Cva} = 180 \text{ kg/cm}^2$$


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$$430 \text{ kg/cm}^2$$

Azotea 10cm Auda

Pavimento	70 kg/cm <sup>2</sup>
Entortado	30 kg/cm <sup>2</sup>
Loza de 10cm	240 kg/cm <sup>2</sup>
Aplanado	30 kg/cm <sup>2</sup>
Reglamento	40 kg/cm <sup>2</sup>

$$100 \text{ kg/cm}^2$$

$$510 \text{ kg/cm}^2$$

$$\text{Cva } 100 \text{ kg/cm}^2$$


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$$\text{Total} = 610 \text{ kg/cm}^2$$

$$\text{Cvm} = 100 \text{ kg/cm}^2$$

$$\text{Cva} = 70 \text{ kg/cm}^2$$


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$$170 \text{ kg/cm}^2$$

Azotea 12cm Auda

Pavimento	70 kg/cm <sup>2</sup>
Entortado	30 kg/cm <sup>2</sup>
Loza 10cm	288 kg/cm <sup>2</sup>
Aplanado	30 kg/cm <sup>2</sup>
Reglamento	40 kg/cm <sup>2</sup>

$$100 \text{ kg/cm}^2$$

$$558 \text{ kg/cm}^2$$

$$\text{Cvm } 100 \text{ kg/cm}^2$$


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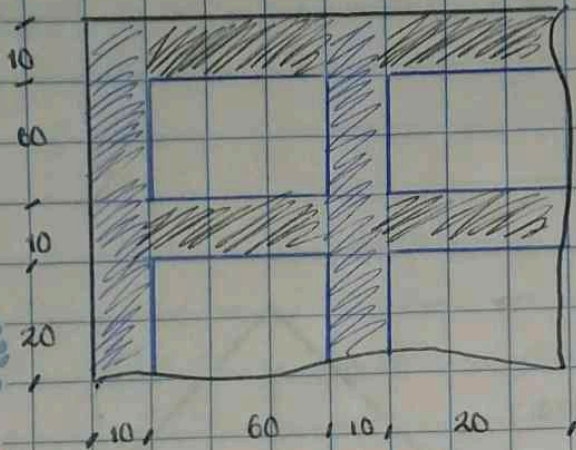

$$658 \text{ kg/cm}^2$$

$$\text{Cvm} = 100 \text{ kg/cm}^2$$

$$\text{Cva} = 70 \text{ kg/cm}^2$$


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$$170 \text{ kg/cm}^2$$



PESO DE CASETON 15 kg/m<sup>3</sup>

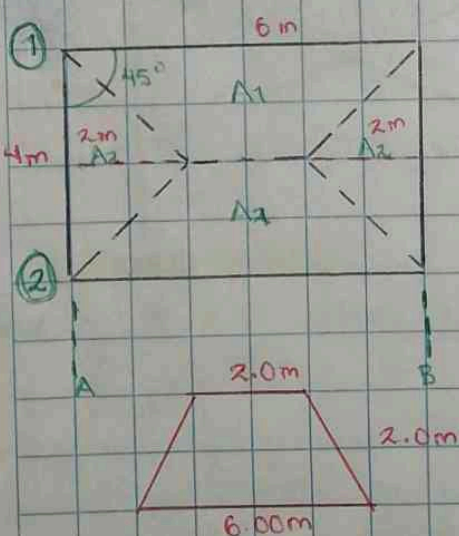
$$(0.10 \text{ m} \times 0.20 \text{ m} \times 1.0 \text{ m}) \times (2 \text{ Pzas}) = 0.04 \text{ m}^3 \times 2400 \text{ kg/m}^3 = 96 \text{ kg/m}^2$$

$$(0.10 \text{ m} \times 0.20 \text{ m} \times 0.80 \text{ m}) \times (2 \text{ Pzas}) = 0.032 \text{ m}^3 \times 2400 \text{ kg/m}^3 = 76.8 \text{ kg/m}^2$$

$$(10 \text{ m} \times 1 \text{ m} \times 0.05 \text{ m}) = 0.05 \text{ m}^3 \times 2400 \text{ kg/m}^3 = 120 \text{ kg/m}^2$$

$$(10.80 \text{ m} \times 0.80 \text{ m} \times 0.20 \text{ m}) \times (2.5 \text{ Pzas}) = 0.18 \text{ m}^3 (15 \text{ kg/m}^3) = 2.70 \text{ kg/m}^2$$

$$\text{Total} = 96 \text{ kg/m}^2 + 76.8 \text{ kg/m}^2 + 120 \text{ kg/m}^2 + 2.70 \text{ kg/m}^2 = 295.5 \text{ kg/m}^2$$



Área trapezoidal (geométrica)

Peso = Área tubo x (Peso losa)

W = Peso

Longitud del apoyo

Peralte de Losa

$$\frac{\text{Perimetro}}{170} + R = \frac{20 \text{ m}}{170} + 0.04 \text{ m} = 0.15 \text{ m}$$

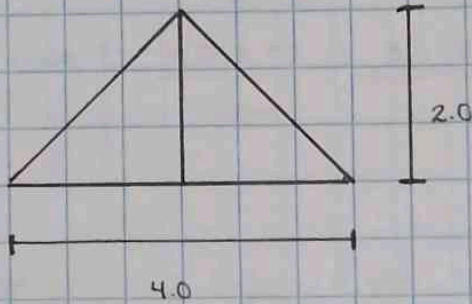
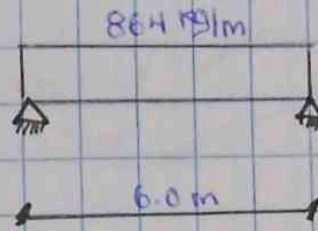
$$\text{Peso} = 8 \text{ m}^2 (6448 \text{ kg/m}^2) = 5184 \text{ kg}$$

$$\frac{B+b \times h}{2} = \frac{(6.00 \text{ m} + 2.00 \text{ m}) \times 2.00 \text{ m}}{2} = 8 \text{ m}^2$$

Losa 12cm Chapeado  
CH



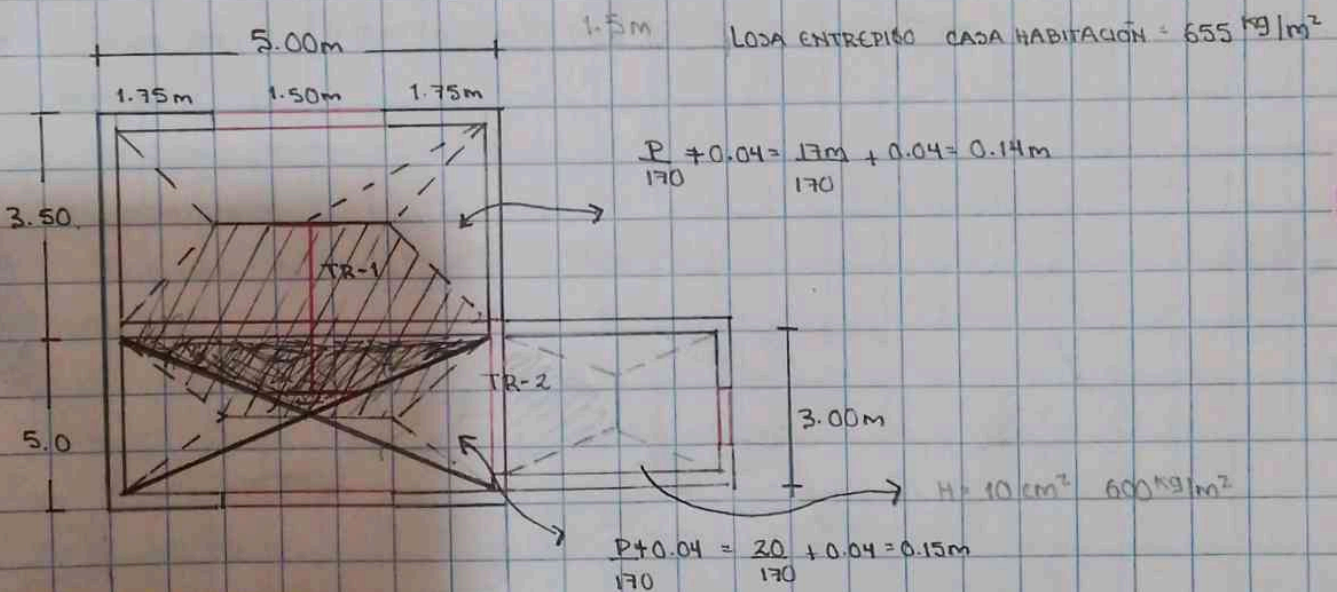
$$W = \frac{5,184 \text{ kg/m}^2}{6 \text{ m}} = 864 \text{ kg/m}$$



$$\frac{B \times h}{2} = \frac{4 \times 2}{2} = 4 \text{ m}^2$$

$$\text{Peso} = 4 \text{ m}^2 (648 \text{ kg/m}^2) = 2592 \text{ kg/m}^2$$

$$W = \frac{2592 \text{ kg/m}^2}{4} = 648 \text{ kg/m}^2$$



**TRABE TR-1**

ÁREA 1- =  $\frac{B+b \times h}{2} \rightarrow \underline{\underline{5.687 \text{ m}^2}}$

ÁREA 2- =  $\frac{B \times h}{2} \rightarrow \underline{\underline{6.25 \text{ m}^2}}$

**PESO = AREA X PESO DE LOZA**

$$\text{Área 1} = 5.687 \text{ m}^2 (655 \text{ kg/m}^2) = \underline{\underline{3.724.985 \text{ K/m}^2}}$$

$$\text{Área 2} = 6.25 \text{ m}^2 (655 \text{ kg/m}^2) = \underline{\underline{4.103.75 \text{ K/m}^2}}$$

**CARGA (W)**

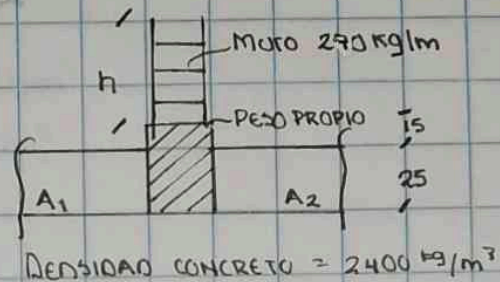
$$\text{ÁREA 1} = \frac{3.724.985 \text{ K/m}^2}{5.0 \text{ m}} = \underline{\underline{744.995 \text{ K/m}}}$$

$$\text{ÁREA 2} = \frac{4.103.75}{5.0 \text{ m}} = \underline{\underline{818.75 \text{ K/m}}}$$

$$h_{\text{trabe}} = \frac{L}{12} \rightarrow \frac{5.0 \text{ m}}{12} = 0.41 \text{ m}$$

0.40 min

$$b = (0.5)h = 0.20 \text{ m} = 0.15 \text{ m}$$



**PESO PROPIO**

$$h = 2.0 \text{ m} \times 270 \text{ kg/m}$$

$$\text{Trabe TR-1} \rightarrow [0.15 \text{ m} (0.40 \text{ m}) \times 1 \text{ m}] \times 2400 \text{ kg/m}^3 = 144 \text{ kg/m}$$

**PESO MURO**

$$h = 2.0 \text{ m} \times 270 \text{ kg/m} = 570 \text{ K/m}$$

**PESO CERRAMIENTO**

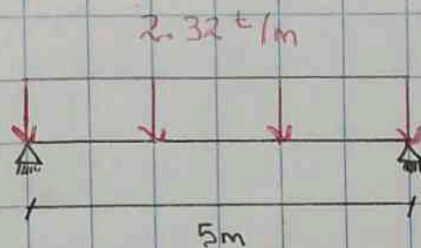
$$(0.15 \times 0.20 \times 1 \text{ m}) \times 2400 \text{ kg/m}^3 = 72 \text{ kg/m}$$

**CARGA (W)**

$$\text{Área 1} = 744.995 \text{ K/m}^2$$

$$\text{Área 2} = 818.75 \text{ K/m}^2$$

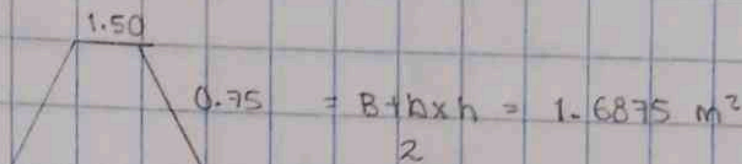
$$W = 2,319.745 \text{ kg/m}$$



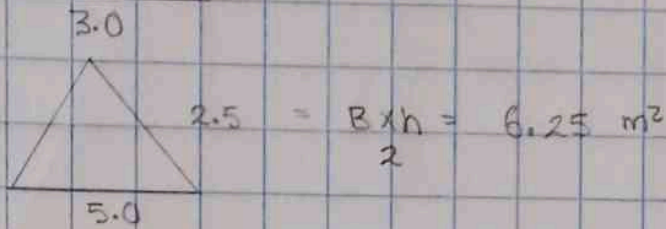


## TRABE TR-2

Área 1 =



Área 2 =



$$P \pm 0.04 = 0.09$$

170



Losas 10cm Entrepiso C.1

$600 \text{ kg/m}^2$

### PESO = AREA X PESO LOZA

$$\bar{\text{Área}} = (1.687 \text{ m}^2) (600 \text{ kg/m}^2) = 1,012.2 \text{ K/m}^2$$

$$\bar{\text{Área}} 2 = (6.25 \text{ m}^2) (600 \text{ kg/m}^2) = 3,750 \text{ K/m}^2$$

### CARGA (w)

$$\bar{\text{Área}} 1 = \frac{1012.2 \text{ K/m}^2}{3 \text{ m}} = 337.4 \text{ K/m}^2$$

$$\bar{\text{Área}} 2 = \frac{3750 \text{ K/m}^2}{5} = 750 \text{ K/m}^2$$

$$h \text{ trabe } \frac{L}{12} \rightarrow \frac{3.00 \text{ m}}{12} = 0.25$$

$$b = (0.5) h \times 0.25 \text{ m} = 0.15$$

### PESO PROPIO

$$\text{Trabe TR-1} \rightarrow [0.15 \text{ m} (0.25) \times 1 \text{ m}] \times 2400 \text{ kg/m}^3 = 90 \text{ kg/m} -$$

### PESO MURO

$$h = 0.90 \text{ m} \times 270 \text{ kg/m} = 243 -$$

### PESO CERRAMIENTO

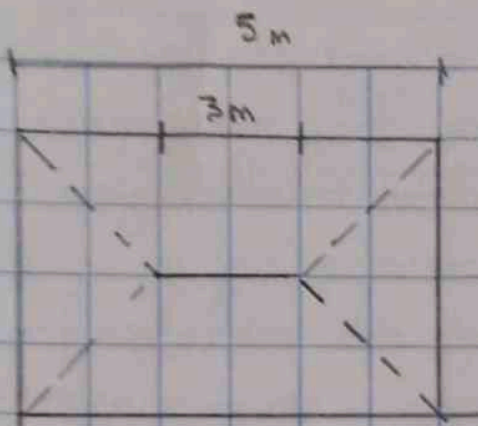
$$(0.15 \times 0.20 \times 1 \text{ m}) 2400 \text{ kg/m}^3 = 72 \text{ kg/m} -$$

### CARGA (w)

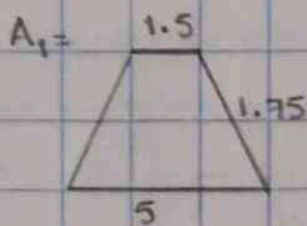
$$\bar{\text{Área}} 1 = 337.4 \text{ kg/m}^2 -$$

$$\bar{\text{Área}} 2 = 750 \text{ kg/m}^2 -$$

$$w = 1492.4$$



$$\frac{P}{170} + 0.04 = 0.09 \text{ m}$$



$$\frac{B \cdot b \cdot h}{2} = 5.687 \text{ m}^2$$

**Peso = Area x peso loco**

$$A_1 = 5.687 \times 655 \text{ kg/m}^2 = 3724.985 \text{ kg/m}^2$$

**CARGA (W)**

$$3724.985 \text{ kg/m}^2 \div 5 = 744.997 \text{ kg/m}^2$$

$$h_{trabe} = \frac{l}{12} = \frac{3.5}{12} = .29 \text{ cm} = 30$$

$$b = 0.5 \times 30 = 0.15 \text{ cm}$$

**Peso PROPIO**

$$[0.15 (0.30) \times 1 \text{ m}] \times 2400 \text{ kg/m}^2 = 108 \text{ Kg}$$

**PRETIL**

$$2 \times 270 = 540 \text{ kg/m}^2$$

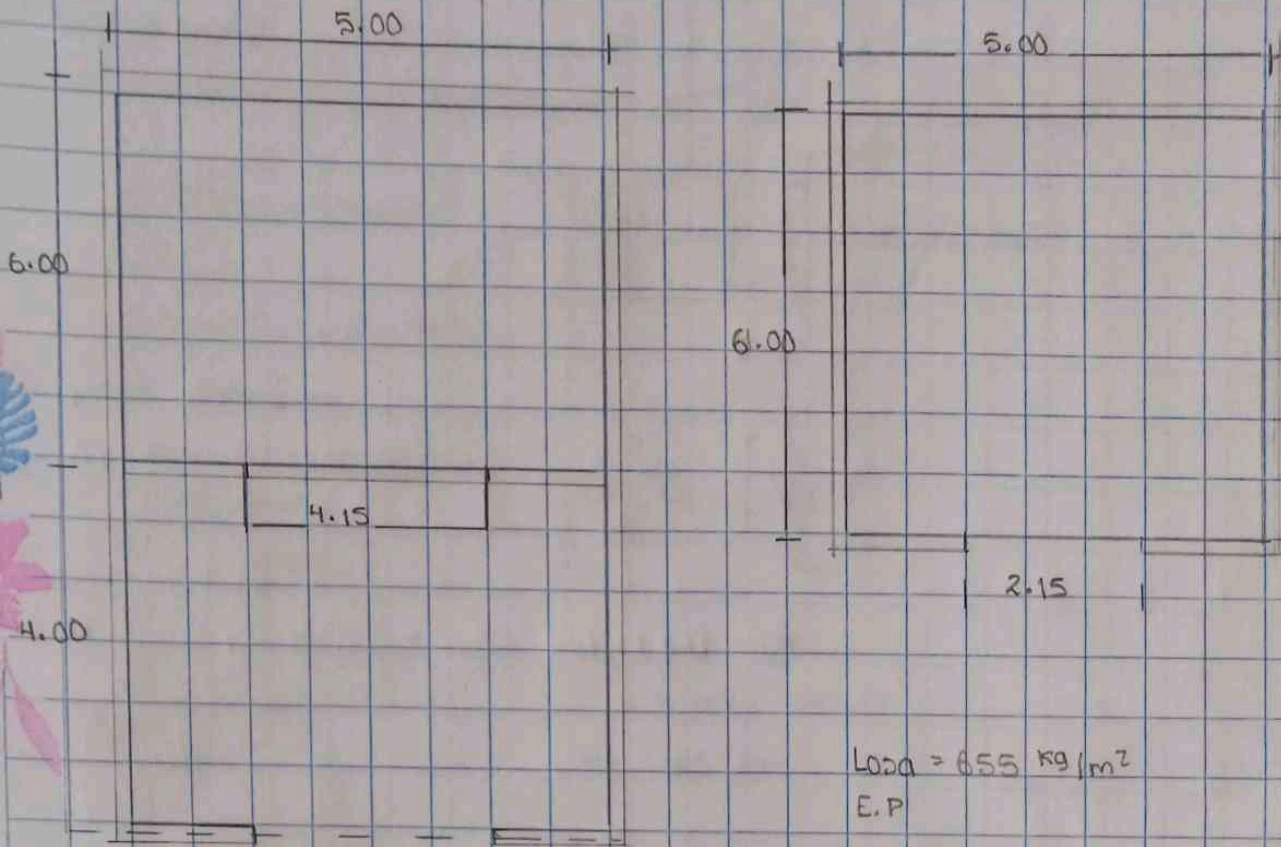
**CADENA**

$$(0.15 \times 0.20 \times 1) \times 2400 \text{ kg/m}^2 = 72 \text{ kg/m}$$

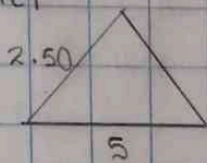
**CARGA W**

$$W = 1464.997 \text{ kg/m}^2$$



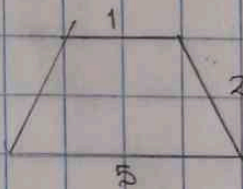


1- Área



$$A = \frac{b \times h}{2} = \frac{5 \times 2.5}{2} = 6.25 \text{ m}^2$$

Area 2



$$A = \frac{B+b}{2} \times h = \frac{5+1}{2} \times 2 = 6 \text{ m}^2$$

2- Peso = Área x Carga

$$A_1 = 6.25 \text{ m}^2 (655 \text{ kg/m}^2) = 4093.75 \text{ kg/m}^2$$

$$A_2 = 6.0 \text{ m}^2 (655 \text{ kg/m}^2) = 3930 \text{ kg/m}^2$$

3- CARGA (W) (Peso / Distancia)

$$A_1 = 4093.75 \text{ kg/m}^2 \div 5 \text{ m} = 818.75 \text{ kg/m}$$

$$A_2 = 3930 \text{ kg/m}^2 \div 5 \text{ m} = 786.0 \text{ kg/m}$$

h trabe ( $\frac{L}{12}$ )

$$\frac{4.15}{12} = 0.30$$

B = 0.5(h)

$$0.5(0.30) = 0.15 \text{ m}$$

4- PESO PROPIO

$$[0.15(0.30)1m] \times 2400 \text{ kg/m}^3 = 108 \text{ kg/m}$$

$$W_1 = 1,712.75 \text{ kg/m}^2$$

5- PESO MURO

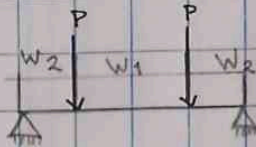
$$3m(270 \text{ kg/m}) = 810 \text{ kg/m}$$

6- PESO CERRAMIENTO

$$0.15 \times 0.25 \times 2400 = 90 \text{ kg/m}$$

→ Pretel 0.20 m

0.25



$$W_1 = 1,712.75 \text{ kg/m}^2$$

$$W_2 = 3,498 \text{ kg/m}^2$$

$$P = 1048.393$$

AZOTECA

$$665 \text{ kg/m}^2$$

$$h = 25$$

7- LOSA DE AZOTECA

$$\text{Área } 3 = 6.25 \text{ m}^2$$

$$6.25 \text{ m}^2 (665 \text{ kg/m}^2) = 4156.25$$

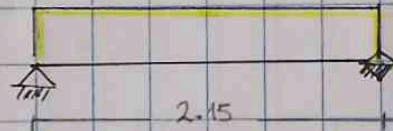
8- Carga W

$$4156.25 \text{ kg} \div 5m = 831.25 \text{ kg/m}$$

9- PESO PRETEL

$$0.20m(270 \text{ kg/m}) = 54 \text{ kg/m}$$

Carga Puntual

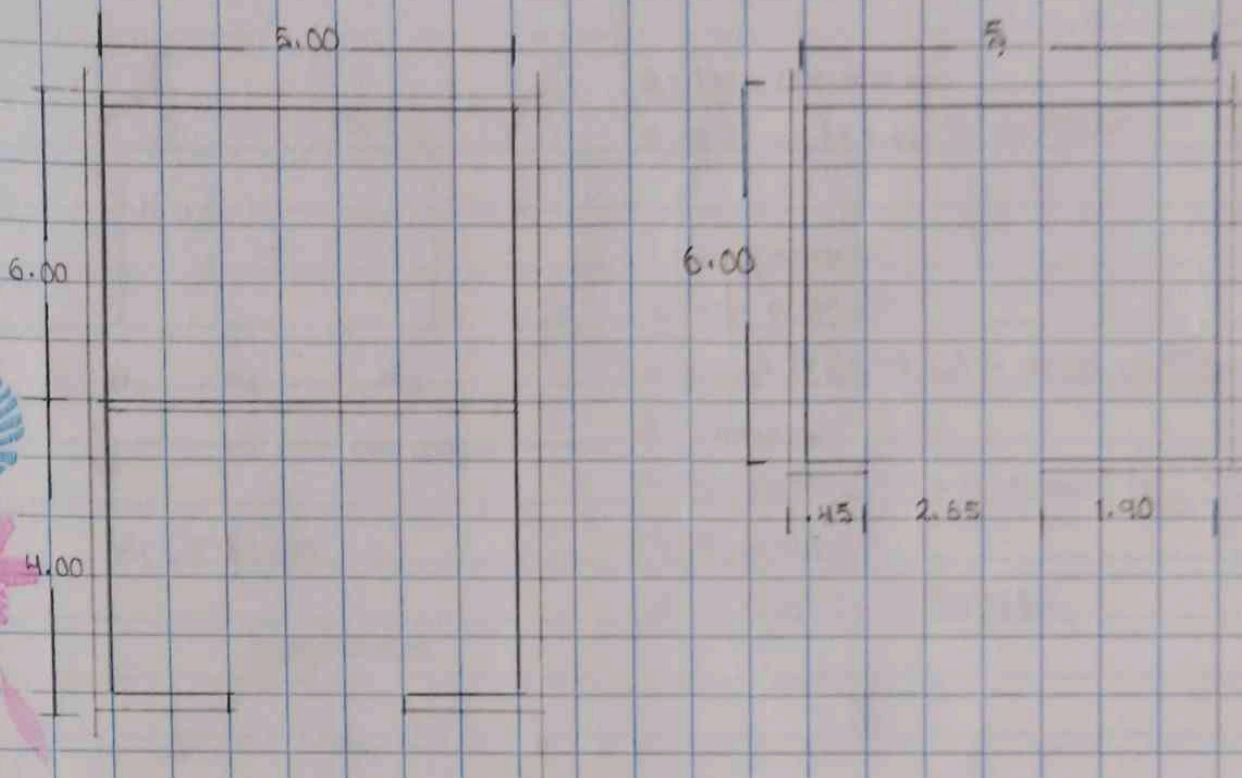


$$W = 90 \text{ kg/m} + 831.25 \text{ kg/m} + 54 \text{ kg/m}$$

$$W = \frac{975.25 \text{ kg/m} (2.15)}{2} = 1048.393$$

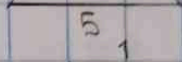
$$\text{Reacción } A = RB = \frac{W(L)}{2}$$



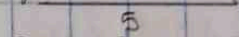


1- AREA

①  $A = \frac{b \times h}{2} = \frac{5 \times 2.5}{2} = 6.25 \text{ m}^2$



②  $A = \frac{B + b \times h}{2} = \frac{5 + 5 \times 2.5}{2} = 6 \text{ m}^2$



2- PESO = AREA x P. LOSA

$A_1 = 6.25 \text{ m}^2 (655 \text{ kg/m}^2) = 4093.75 \text{ kg/m}^2$

$A_2 = 6.00 \text{ m}^2 (655 \text{ kg/m}^2) = 3930 \text{ kg/m}^2$

3- CARGA (W)

$A_1 = 4093.75 \text{ kg/m}^2 \div 5 \text{ m} = 818.75 \text{ kg/m}^2$

$A_2 = 3930 \text{ kg/m}^2 \div 5 \text{ m} = 786 \text{ kg/m}^2$

$n \text{ take } (\frac{L}{12})$

$\frac{5 \text{ m}}{12} = 0.40$

$B = 0.5(n)$

$0.5(0.40) = 0.2 \text{ m}$

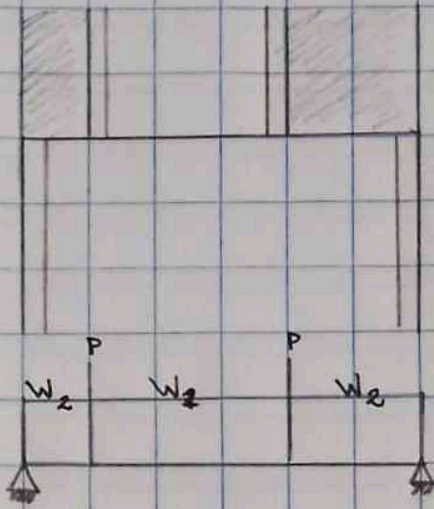
4- PESO PROPIO

$[0.20(0.40)1] \times 2400 \text{ kg/m}^3 = 192 \text{ kg/m}$

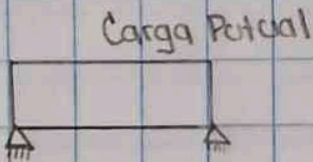
$W_1 = 1786.75$

5- PESO MURO

$3 \text{ m} (270 \text{ kg/m}) = 810 \text{ kg/m}^2$



$$W_1 = 1786.75$$



$$W = 90 \text{ kg/m} + 831.25 \text{ kg/m} + 54 \text{ kg/m}$$

$$W = \frac{975.25 \text{ kg/m} (2.65)}{2} = 1292.206$$

$$W_1 = 1786.75 \text{ kg/m}^2$$

$$W_2 = 3572 \text{ kg/m}^2$$

$$P = 1292.206$$

6- PESO CERRAMIENTO

$$[0.15 (0.25) \times 2400] = 90 \text{ kg/m}^2$$

7- LOJA AZOTEA

$$\text{Área 3} = 6.25 \text{ m}^2$$

$$6.25 \text{ m}^2 (665 \text{ kg/m}^2) = 4156.25 \text{ kg/m}$$

8- CARGA W

$$4156.25 \text{ kg/m} \div 5 = 831.25 \text{ kg/m}$$

9- PESO PRETIL

$$0.20 (270 \text{ kg/m}) = 54 \text{ kg/m}$$