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Licenciatura: Arquitectura

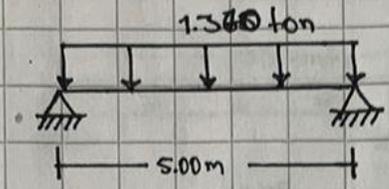
Cuatrimestre: 5

Materia: Análisis de Estructuras

Profesor: García López Pedro Alberto

Actividad: Métodos Energéticos

Fecha: 11/02/2024



①  $MTO = 1.56(5.00)^2 / 8 = 4.875 \text{ t.m}$

P.P.  $5.00 / 12 = 0.41 \rightarrow 0.40$      $0.40 / 2 = 0.20$

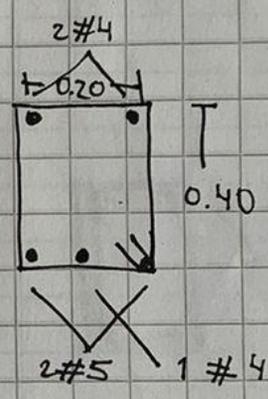
P.P.  $= 0.40 \times 0.20 \times 2.40 = 0.192 + 1.37 = 1.56 \text{ ton}$

②  $MU = 4.875 \text{ t.m} \times 1.3 \times 10^5$

$MU = 633.750$

③  $q = \sqrt{\frac{-633,750}{0.9 \times 20 \times 36^2 + 136}} \cdot 2 + 1$

$q = 0.774$



④  $f = \frac{(-0.774 + 1) \cdot 136}{4200} = 0.00731$

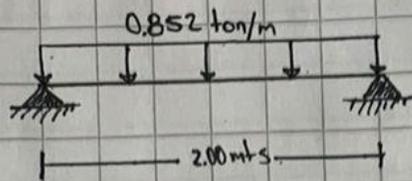
⑤  $AS = 0.00731 (0.20)(0.36)$   
 $= 5.26 \text{ cm}^2$

$\frac{2 \#5}{1 \#4}$   
 $5.23 \text{ cm}^2$

$2 \#4 = 2.54$

⑥  $AS_{min} = 0.002357 (0.20)(0.36) = 1.69 \text{ cm}^2$

$AS_{max} = 0.01143 (0.20)(0.36) = 8.22 \text{ cm}^2$



$$\textcircled{1} \text{ MTO} = 0.92 (2.00)^2 / 2 = 0.46$$

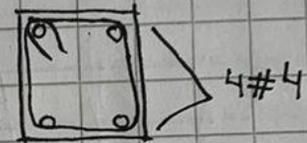
$$\text{P.P.} = 2.00 / 12 = 0.16 \rightarrow 0.20 \quad 0.15$$

$$\text{P.P.} = 0.20 \times 0.15 \times 2.40 = 0.072 + 0.852 = 0.92$$

$$\textcircled{2} \text{ MV} = 0.46 \times (1.3 \times 10^5) = 59800$$

$$\textcircled{3} \text{ } q = \sqrt{\frac{59800}{0.9 \cdot 15 \cdot 16 \cdot 136} \cdot 2 + 1}$$

$$q = 0.863$$



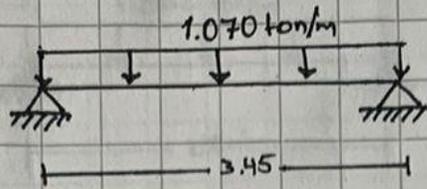
$$\textcircled{4} \text{ } f = \frac{(-0.863 + 1) \cdot 136}{4200} = 0.004436$$

$$\textcircled{5} \text{ } A_s = 0.004436 (0.15) (0.16) = 1.064 \text{ cm}^2$$

$$2 \#4 = 2.54 \text{ cm}^2$$

$$\textcircled{6} \text{ } A_s \text{ min} = 0.002357 (0.15) (0.16) = 0.565 \text{ cm}^2$$

$$A_s \text{ max} = 0.01143 (0.15) (0.16) = 2.74 \text{ cm}^2$$



$$\textcircled{1} \text{ MTO} = 1.17(3.45)^2 / 8 = 1.740 \text{ ton.m}$$

$$\text{P.P.} = 3.45 / 12 = 0.28 \rightarrow 0.30 \quad 0.30 / 2 = 0.15$$

$$\text{P.P.} = 0.30 \times 0.15 \times 2.40 = 0.108 + 1.070 = 1.17 \text{ ton}$$

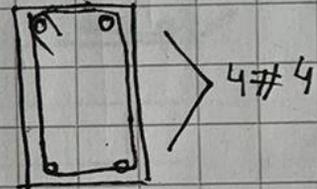
$$\textcircled{2} \text{ MU} = 1.740 \times (1.3 \times 10^5) = 226 \ 200$$

$$\textcircled{3} \text{ } \rho = \sqrt{\frac{226 \ 200}{0.9 \times 15 \times 26^2 \times 136} \cdot 2 + 1}$$

$$\rho = 0.797$$

$$\textcircled{4} \text{ } \rho = \frac{(-0.797 + 1) \cdot 136}{4200}$$

$$\rho = 0.00657$$



$$\textcircled{5} \text{ } A_s = 0.00657(0.15)(0.26) \quad 2\#4 = 2.54 \text{ cm}^2$$

$$= 2.56 \text{ cm}^2$$

$$\textcircled{6} \text{ } A_{s \text{ min}} = 0.002357(0.15)(0.26) = 0.91 \text{ cm}^2$$

$$A_{s \text{ max}} = 0.01143(0.15)(0.26) = 4.45 \text{ cm}^2$$

