

DATOS

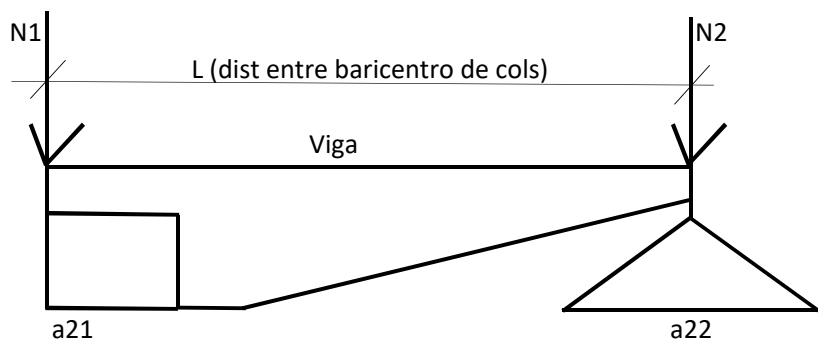
N1. servicio 150.0 t

N2. servicio 200.0 t

L 6.00 m

sigma.adm: 3.0 kg/cm²30.0 t/m²

NF: -2.50 m

h30 300 kg/cm²acero 4200 kg/cm²42000 t/m²E acero 2E+06 kg/cm²2E+07 t/m²

	L	D
N1	37.5 t	112.5 t
N2	50.0 t	150.0 t

0. COLUMNAS

TRONCO

c1= 0.75 m

c2= 0.30 m

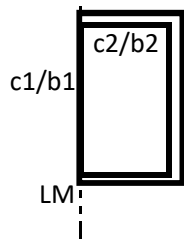
area col1 2250 cm²

rec

0.05

b1= 0.80 m

b2= 0.33 m



1. ESTIMACION DEL AREA DE LA BASE y CALCULO a2

R1.aprox= 1.3*N1.serv

R1.aprox= 195.0 t

Area.aprox= R1 aprox/σ.adm

Area.aprox= 6.50 m²

considero

a1/a2 ≤ 2

----->

a1= 2*a2

Area.base= a1*a2

Area.base= 2*a2*a2

Area.base= 2*a2²

de

Area.base= R1.aprox/σ.adm

2*a2²= R1.aprox/σ.adm

despejo a2

a2= RAIZ(R1.aprox/2*σ.adm)

a2= 1.80 m

a2= 1.80 m

ADOPTO

2. REACCION REAL DEL SUELO y CALCULO de a1

$$R1.real = 1.1 * N1.serv * L / (L - a2/2)$$

$$R1.real = 194.1 \text{ t}$$

$$a1 = R1 / (a2 * \sigma.adm)$$

$$a1 = 3.59 \text{ m}$$

$$a1 = 3.60 \text{ m} \quad \text{ADOPTO}$$

verifico relacion de lados

$$a1/a2 = 2 \quad \text{OK}$$

recalculo Area Base con R.real

$$Area.nec = R1.real / \sigma.adm$$

$$Area.nec = 6.47 \text{ m}^2$$

$$Area.adop = a1 * a2$$

$$Area.adop = 6.48 \text{ m}^2 > Area.nec \quad \text{verifica}$$

3. ESTABILIDAD / VERIFICACION AL LEVANTAMIENTO

$$R_0 = R1.real / 1.1$$

$$R_0 = 176.5 \text{ t}$$

$$R2 = R_0 - N1.serv \quad (\text{sumatoria de fuerzas verticales})$$

$$R2 = 26.5 \text{ t}$$

verifico estabilidad al levantamiento en N2:

$$\text{levantam: } v * R2 \leq N2.perm$$

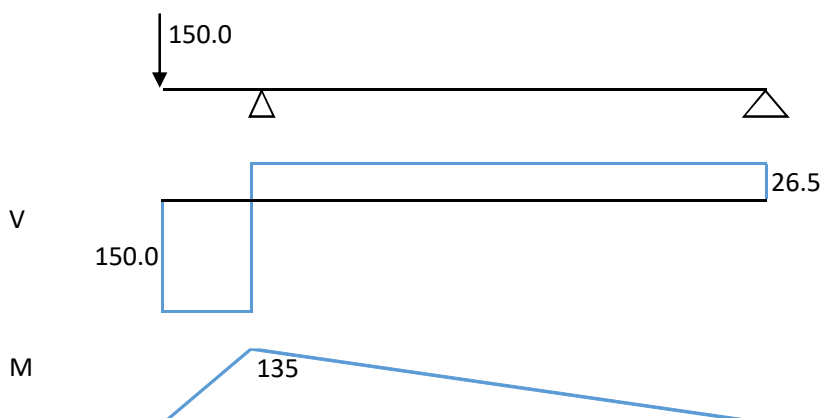
$$v = 1.5$$

$$v * R2 \quad N2.perm$$

$$39.7 < 150.0 \text{ t}$$

VERIFICA

4. DIAGRAMA DE CARGAS, CORTE, MOMENTOS (simplificado)



5. CALCULO DE ZAPATA / GEOMETRIA

$$\begin{aligned}bv &= c1 + 0.1(\text{ m}) \\bv &= 0.85 \text{ m} \quad (\text{minimo}) \\bv &= 0.85 \text{ m} \quad \text{ADOPTO}\end{aligned}$$

$$\begin{aligned}\text{Dbase} &= (a1 - bv)/3 \\ \text{Dbase} &= 0.92 \text{ m} \\ \text{Dbase} &= 0.95 \text{ m} \quad \text{ADOPTO}\end{aligned}$$

$$\text{recubrim} \geq 5 \text{ cm}$$

$$\begin{aligned}h &= D\text{-rec} \\ h &= 0.90 \text{ m}\end{aligned}$$

$$\begin{aligned}z &= 0.2 \cdot D \text{ (min 25cm)} \\ z &= 0.19 \text{ m} \\ z.\text{adop} &= 0.25 \text{ m} \quad \text{ADOPTO}\end{aligned}$$

5.1. FACTORIZACION

$$\begin{aligned}U1 &= 1.4D \\ U2 &= 1.6L\end{aligned}$$

$$\begin{aligned}N1.U1 &= 157.5 \text{ t} \\ N1.U2 &= 195.0 \text{ t}\end{aligned}$$

5.2. SOLICITACIONES ULTIMAS

$$\begin{aligned}RU &= N1U \cdot L / (L - a2/2) \\ RU &= 229.4 \text{ t}\end{aligned}$$

$$\begin{aligned}\sigma U &= RU / (a1 \cdot a2) \\ \sigma U &= 35.4 \text{ t/m}^2\end{aligned}$$

5.3. MOMENTO y ARMADURA EN LA BASE

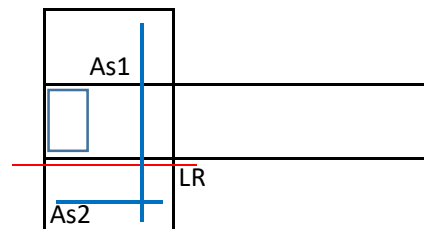
$$\begin{aligned}M.LR &= (a_1 - bv)^2 \cdot \frac{\sigma_t \cdot a_2}{8} \\ M.LR &= 60.2 \text{ tm}\end{aligned}$$

$$\phi = 0.9$$

$$\begin{aligned}As1 &= 1.2 \cdot M.LR / (0.8 \cdot h \cdot \phi \cdot Fy) \\ As1 &= 26.6 \text{ cm}^2 \\ As1/m &= As1/a2 \\ As1/m &= 14.8 \text{ cm}^2/m\end{aligned}$$

se adopta As1

$$\begin{aligned}\phi b &= 16 \text{ mm} \\ \text{cant} &= 14 \\ \text{sep} &= 13 \text{ cm}\end{aligned}$$



$As2 = 0.2 \cdot As1$
 $As2 = 5.3 \text{ cm}^2$
 $As2/m = As2/a1$
 $As2/m = 1.5 \text{ cm}^2/m$
 se adopta $As2$ $\phi b = 10 \text{ mm}$
 cant 7
 sep 58 cm
 adopto minima $\phi 10c/20$

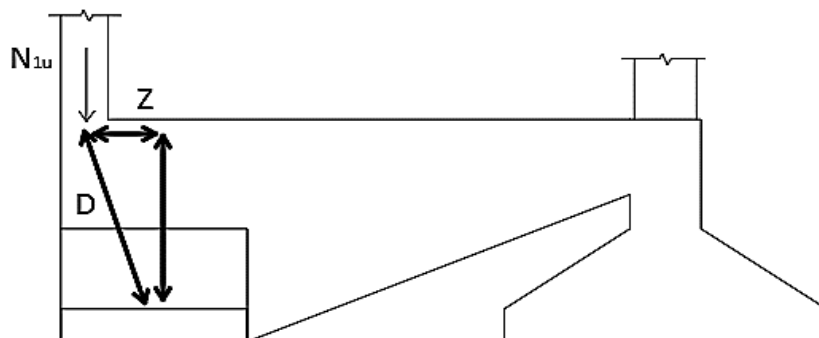
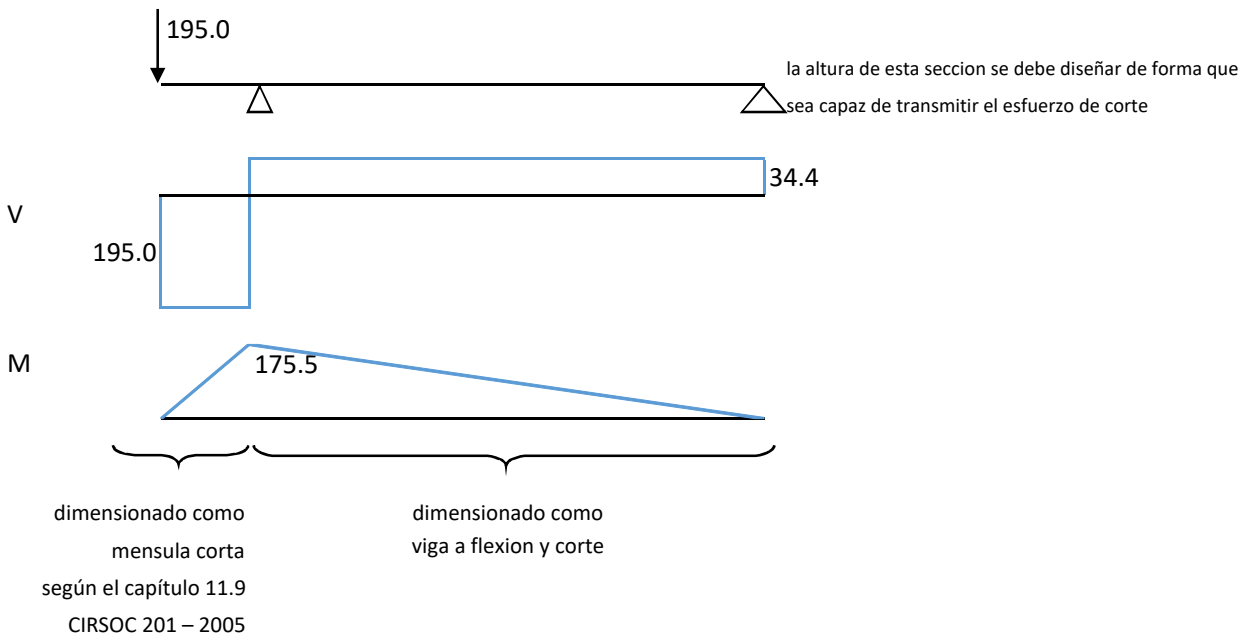
6. SECCION DE LA VIGA

$Dv.min = Dbase + bv/2$ (orden de magnitud de predimensionado)
 $Dv.min = 1.38 \text{ m}$
 $Dv = 1.50 \text{ m}$ **ADOPTO** (se debe cumplir condicion de mensula corta: $Long MC < Dv$)
 $3 \leq Dv/bv \leq 5$ (recomendación general, no se adapta a todos los casos
 1.76 ya que bv depende mucho del ancho de la col)

7. DIMENSIONAMIENTO DE ARMADURAS DE VIGA (MENSULA CORTA, FLEXION Y CORTE)

7.1 DIAGRAMAS DE CARACTERISTICAS MAYORADOS (simplificado)

Con estos valores dimensionar las armaduras según HORMIGON 1



8. ESQUEMA ARMADO (esquemático, no representas las cantidades adoptadas)

