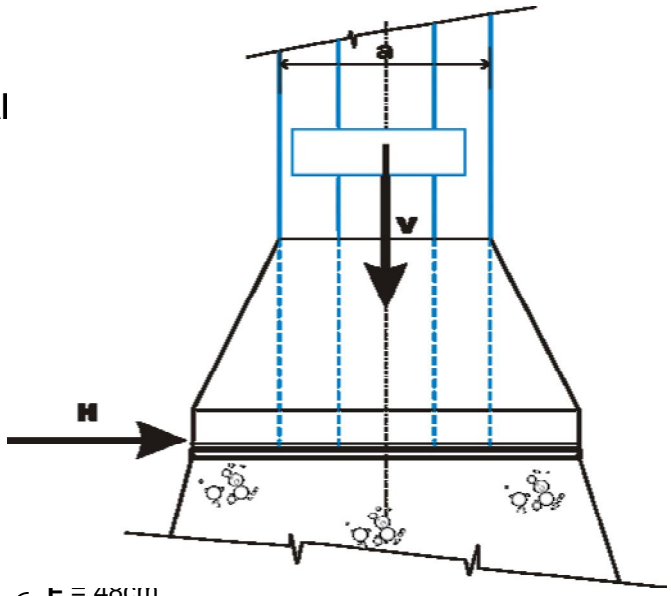
CATEDRA: **CONSTRUCCIONES METALICAS**

GUÍA DE TRABAJOS PRACTICO
BASE CON COLUMNA EMPOTRAI



DATOS:

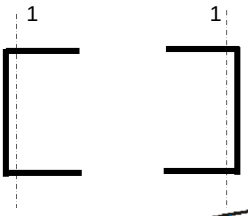
V = 5,90 t
H = 2,30 t
M = 2000 kgm
e = 33,9 cm
$\sigma_{H°}$ =40 kg/cm^2
σ_t = 1 kg/cm^2
$\gamma_{H°}$ = 2,40 t/m^3
γ_{tr} = 1,60 t/m^3

(AC 3.3.2.4.3.)

Sección de columna = 2 PNU 160
a = 24 cm

r = 48cm
I_x = 1850 cm^4
W_x = 232 cm^3
i_x =6,21 cm
i_1 = 1,89 cm
e_y = 1,84 cm

I_y = 5130 cm^4
W_y = 428 cm^3
i_y = 10,3 cm



* $\sigma = \frac{\mathbf{V}}{\mathbf{a}1 * \mathbf{b}1} \leq$ (

** $\sigma = \frac{\mathbf{V}}{\mathbf{a}1 * \mathbf{b}1} + \frac{\mathbf{M}}{(\mathbf{a}1 * \mathbf{b}1^2)}$

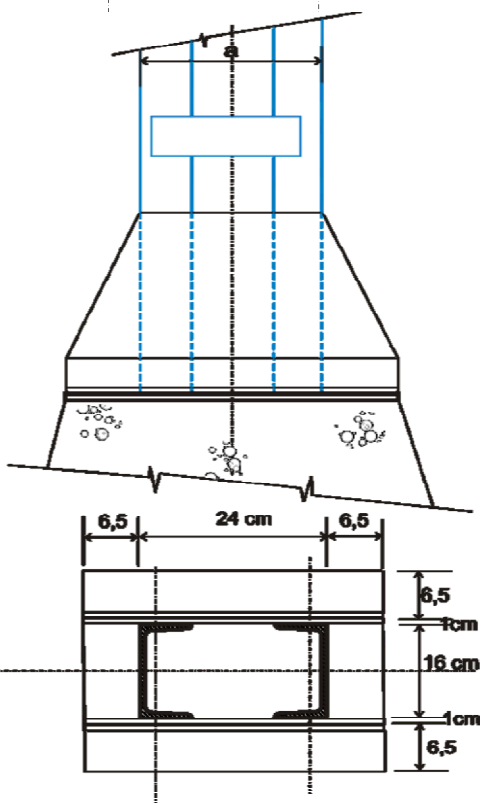
adopto $\mathbf{a_1}$ = a + 2 PNL

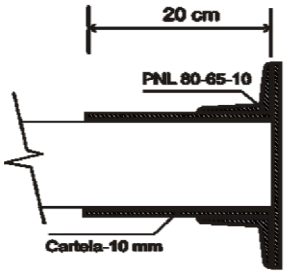
* $\mathbf{b_1} = \frac{5900kg}{30kg/cm^2 * 3}$

adopto $\mathbf{b_1}$ = 16 cm (PN

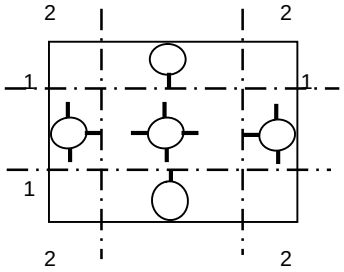
** $\sigma_{trab} = \frac{5900}{31 * 37} + \frac{2}{31}$

q_{tr} = **33,42 kg/cm^2**





CALCULO DE PLACA INFERIOR Ó DE ASIENTO



Determinación de momentos considerando placas (losas)

s/eje 1-1

$M_1 = \frac{q * l_1^2}{2} =$ 706 kgcm/cm

s/eje 2-2

$M_2 =$ 706 kgcm/cm

Losa central

M3 ap y = -595 kgcm/cm

M3 tr y = 602 kgcm/cm

Dimensionado

Acero F24
Clase II
Destino C
Cargas P S
γ = 1,45

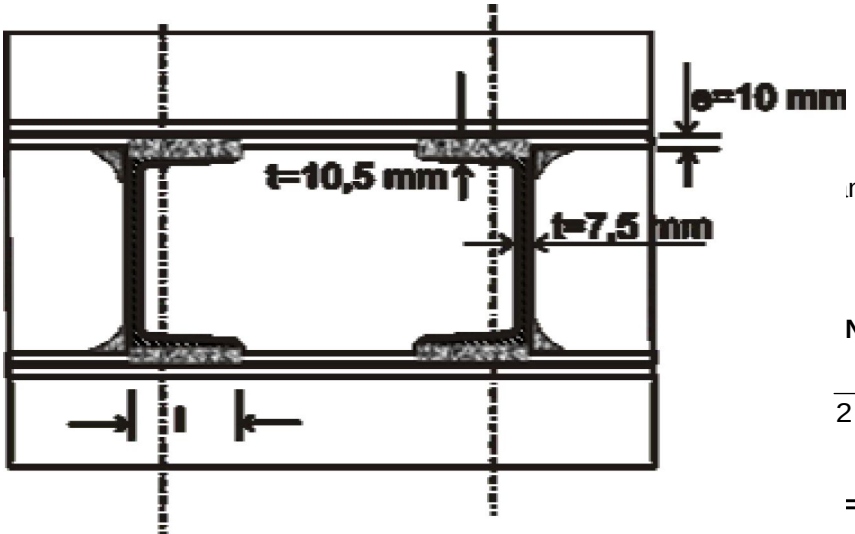
σ_{adm} = 1.665 kg/cm^2

de $\sigma = \frac{M}{W} = \frac{M_1}{1cm * e^2 / 6} \leq \sigma_{adm}$ $\Rightarrow$ $t_{nec} = \sqrt{\frac{706\ .kgcm\ * 6}{1665\ kg / cm^2\ * 1cm}}$

t_{nec} = 1,59 cm

Adopto **t = 19,0 mm** (3/4")

CALCULO DE UNIONES SOLDADAS



ancho soldadura: > 0,3 mm ; < 0,7 t_{min} = 0,7 mm

N VERTICAL CARTELA-PERFIL U

$\frac{V}{2 * n = 2} + \frac{M}{a * n = 2} = 5.641 kg$

$= \frac{F}{a_s * l} \leq \tau_{adm}$ = 1245 kg/cm^2

$\Rightarrow$ l_{nec} : $< \frac{F}{0.3\ * 1245} = 15\ .cm$; $> \frac{F}{0.7 * 1245} = 6.47 cm$

$l_{sold} = l_{nec} + 2a = 15,6$ cm

$l_{sold} = l_{nec} + 2a = 7,87$ cm

l_{sold} : > 15 a_{min} = 4,5 cm ; < 60 a = 42 cm

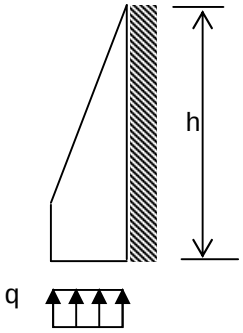
adopto l_{sold} **= 8 cm**

UNION HORIZONTAL CARTELA-PERFIL U

a_s = 0,7 cm

$$l = \frac{H}{4 * a_s * \tau_{adm}} = 1{,}54.cm$$ **adopto** **l_{sold} = 6 cm**

VERIFICACION DE LA CARTELA



q = q_{tr} * 31cm/2 = 518 kg/cm

se considera como una ménsula corta:

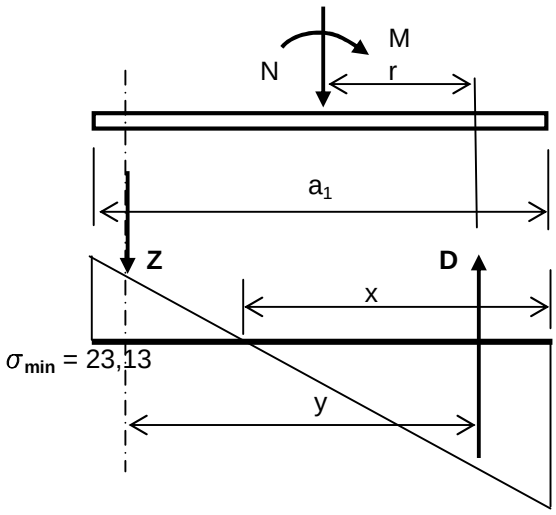
$$\mathbf{M} = \frac{q * l^2}{2} = \frac{518 * 6.5^2 cm^2}{2} = 10.943.kgcm$$

se adopta **t** = 10mm

$$\frac{M}{W} = \frac{10943.kgcm}{\frac{t * h^2}{6}} \leq \sigma_{adm} \Rightarrow$$ h_{nec}= 6,28 cm

se adopta h = 20 cm (constructivo)

CALCULO DE PERNOS DE ANCLAJE



σ_{min} = 23,13

σ_{max} = -33,39

$$\frac{x}{a_1} = \frac{\sigma_{max}}{|\sigma_{max}| + |\sigma_{min}|}$$

$$\sigma_{max;min} = \frac{N}{A}(1 \pm \frac{6 * e}{a_1}) = \begin{cases} \sigma_{min} = & 23{,}13 \\ \sigma_{max} = & -33{,}39 \end{cases}$$

e = 33,9 cm

x = 21,85 cm

y = 2/3 a1 = **24,67 cm**

Se debe considerar la situación más desfavorable, que es el caso hipotético de que N = 0 y sólo esté actuando el M

Z = M/y = 200000 kgcm/24,67 cm = 8.107 kg

Si está actuando N = 5.900 kg r = a/2 - x/3 = 11,22 cm

$$\sum_D M = 0 \Rightarrow \mathbf{Z} = \frac{M - N * r}{y} = \frac{200.000 - 5.900 * 11.22}{24.67} =$$ **5.424 kg**

$$\mathbf{A_{nec}} = \frac{Z}{n^o * \sigma_{adm}} = \frac{8.107.kg}{3 * 1.665 kg/cm^2} = 1.63.cm^2$$ **Φ_{nec} = 1,43 cm/,87 = 1,63 cm**

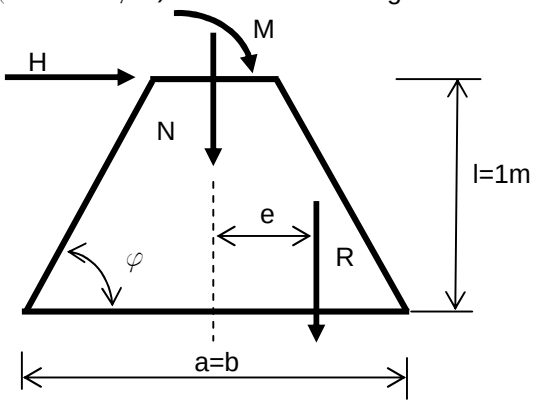
adopto **Φ_{perno} = 1,6 cm** (5/8") verifica también para la situación de N=5.900 kg

$$\mathbf{l_{anclaje}} = \frac{Z}{n^o * \pi * \phi * \tau_{adm}} = \frac{8.107.kg}{3 * 3{,}14 * 1{,}6 * 6.kg/cm^2} =$$ **90 cm** > 10Φ = 16 cm

$n^{o} * \pi * \phi * \tau_{adm}$ $3 * 3{,}14 * 1{,}6 * 6.kg/cm^{2}$

CALCULO DE LA BASE DE HORMIGÓN

R = N + B + T = 5900 kg + (vol T * γ_t) + (vol hº * γhº) = 13.100 kg



γ_t = 1.600 kg/m³

Vol_t = 2,4 m³ estimado

$\gamma_{hº}$ = 2.400 kg/m³

$Vol_{hº}$ = 1,4 m³ estimado

es conveniente que las tensiones sobre el terreno sean positivas inferiores a la admisible.

$$e = \frac{H * d + M}{R} = \frac{(2.300 * 1m) + 2.000 kgm}{13.100.kg} = 0{,}33 \text{ m} \Rightarrow \textbf{a = b = 2m}$$

$$\sigma_{1\text{-}2} = \frac{R}{a * b}\left(1 \pm \frac{6*e}{a}\right) = \begin{cases} \sigma_1 = 0{,}65 \text{ kg/cm}^2 \\ \sigma_2 = 0{,}003 \text{ kg/cm}^2 \end{cases}$$

se deben verificar las siguientes condiciones constructivas:

1)el ángulo de talud debe ser > 50º por ser hormigón simple $\Phi = \text{arctg}100 / \frac{(200 - 37)}{2} =$

Φ = 50,8º (BC)

2) la altura de la base debe ser mayor a ala longitud de anclaje del perno l > 90 cm (se adopta **l = 100 cm**)